WEST VIRGINIA
SECRETARY OF STATE

JOE MANCHIN III

ADMINISTRATIVE LAW DIVISION

Form #2

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OFFICE WEST VIRGINIA SECRETARY OF STATE

NOTICE OF A COMMENT PERIOD ON A PROPOSED RULE

AGENCY: West Virginia Board of Education TITLE NUMBER: 126

RULE TYPE: Legislative; CITE AUTHORITY: W. Va. Constitution, Article XII, §2, W.Va. Code §18-2-5

AMENDMENT TO AN EXISTING RULE: YES X NO ____

IF YES, SERIES NUMBER OF RULE BEING AMENDED: 44

TITLE OF RULE BEING AMENDED: Content Standards ~~Instructional Goals~~ and Objectives for West Virginia Schools (2520)

IF NO, SERIES NUMBER OF NEW RULE BEING PROPOSED: ____

TITLE OF RULE BEING PROPOSED: ____

IN LIEU OF A PUBLIC HEARING, A COMMENT PERIOD HAS BEEN ESTABLISHED DURING WHICH ANY INTERESTED PERSON MAY SEND COMMENTS CONCERNING THESE PROPOSED RULES. THIS COMMENT PERIOD WILL END ON November 23, 2001 AT 4:45 p.m. ONLY WRITTEN COMMENTS WILL BE ACCEPTED AND ARE TO BE MAILED TO THE FOLLOWING ADDRESS:

Ms. Deborah Brown, Executive Director
Office of Instructional Services
West Virginia Department of Education
1900 Kanawha Boulevard East, Bldg. 6, Room 330
Charleston, West Virginia 25305-0330

THE ISSUES TO BE HEARD WILL BE LIMITED TO THIS PROPOSED RULE.

William J. Luff, Jr.
Associate State Superintendent of Schools

SCANNED

ATTACH A **BRIEF** SUMMARY OF YOUR PROPOSAL

EXECUTIVE SUMMARY

POLICY 2520
CONTENT STANDARDS AND OBJECTIVES FOR WEST VIRGINIA SCHOOLS

Background:
Policy 2520 defines the content standards (or instructional goals) and objectives for the programs of study required by Policy 2510 and establishes a standardized format for such. The original effective date of the policy was July 1997. From April through August 2001, committees of educators from across the state gathered to work on curriculum refinement in the content areas of mathematics, reading and English language arts, science and social studies. The committees incorporated content based on the most current research, national standards and best teaching practices in the field. In addition, comments received from teachers throughout West Virginia during focus group sessions conducted during Summer 2001 were considered and included when possible. Primary Issues that have been addressed in the current revision work are building a rigorous and challenging curriculum, ensuring a curriculum that is accessible to every student, and designing a format that can easily be used and understood.

Purpose:
The purpose of this Board item is to seek the approval of the West Virginia Board of Education to place Policy 2520 revisions on public comment until November 23, 2001.

Major Changes:
The most noticeable change is in terminology, in the use of the term "content standards," instead of "instructional goals." Because "content standards" is a phrase that is understood nationally and because the way in which the content standards are being used to organize all aspects of the curriculum, it is recommended that the term content standards be used as the curriculum is revised in any content area.

Each content area begins with a set of content standards. Grade-level objectives are then organized under the standards, so that the focus stays on helping students achieve the comprehensive goals, not just mastering the incremental steps. The objectives (those incremental steps) are still there – refinement committees have worked very hard to consolidate, delete, sequence, and clarify as needed to produce a picture of the curriculum that is clear in its intent and manageable in it implementation.

A second change is the addition of performance descriptors. Performance descriptors answer the question "How well does the student perform on the content standards at any given grade level?" Although performance descriptors are not part of Policy 2520, they are included in this document so that comments can be gathered and Board approval obtained, in accordance with federal Title I requirements.

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OFFICE WEST VIRGINIA SECRETARY OF STATE

TITLE 126
LEGISLATIVE RULE
BOARD OF EDUCATION

SERIES 44

CONTENT STANDARDS ~~INSTRUCTIONAL GOALS~~ AND OBJECTIVES FOR WEST VIRGINIA SCHOOLS (2520)

§126.44.1 General.

1.1. Scope. – West Virginia Board of Education Policy 2510 provides a definition of a delivery system for, and an assessment and accountability system for, a thorough and efficient education for West Virginia public school students. Policy 2520 defines the content standards (or instructional goals) and objectives for the programs of study required by Policy 2510.

1.2 Authority. – W. Va. Constitution, Article XII, §2, and W. Va. Code §18-2-5.

1.3 Filing Date. -- ~~December 18, 2000~~

1.4 Effective Date -- ~~January 18, 2001~~

1.5 Repeal of former rule – This legislative rule amends WV 126CSR44 (Policy 2520).

§126-44-2. Purpose.

2.1 This policy defines the content standards (or instructional goals) and objectives for the programs of study required by Policy 2510 in English language arts, mathematics, science, social studies, health, dance, music, theatre, visual art, geography, foreign languages, drive education, physical education, and the Robert C. Beach Vocational Agriculture Credit.

§126-44-3. Incorporation by Reference.

3.1 A copy of 126CSR44 Content Standards ~~Instructional Goals~~ and Objectives for West Virginia Schools (Policy 2520) is attached. Copies may be obtained in he Office of the Secretary of State in the West Virginia Department of Education, Office of Instructional Services.

§126.44.4. Summary of the Content Standards (or Instructional Goals) and Objectives

4.1. The West Virginia Board of Education has the responsibility for establishing high quality standards pertaining to all educational standards pertaining to all education programs (W.Va. Code §18-9A-22). The content standards ~~instructional goals~~ and objectives provide a focus for teachers to teach and students to learn those skills and competencies essential for future success in the workplace and further education. The document includes: content standards ~~instructional goals~~ for English language arts, mathematics, social studies, science, health, dance, music, theatre, visual art, geography, foreign languages, driver education, physical education, and the Robert C. Beach Vocational Agriculture Credit. Also included are program charts for K-2, 3-4, 5-8, and 9-12; instructional practices for K-1; a document guide; instructional objectives that reflect a rigorous and challenging curriculum, the objectives assessed on the state standardized test, process/workplace objectives and computer/technology objectives for each grade level in each program of study. Process/workplace skills are noted for grades 7-12 with the ◊ symbol.

Policy 2520: *Content Standards and Objectives for West Virginia Schools*

Draft Copy
For Comment Only
August 2001

David Stewart
State Superintendent of Schools

Foreword

The West Virginia Board of Education and the West Virginia Department of Education are pleased to present a draft of the revised *Content Standards and Objectives for West Virginia Schools* in the content areas of mathematics, reading and English language arts, science and social studies.

Committees of educators from across the state gathered to work on the curriculum refinement in these four content areas. The committees incorporated content based on the most current research, national standards and best teaching practices in the field. In addition, comments received from teachers throughout West Virginia in focus group sessions conducted during Summer 2001 were considered and included when possible. Primary issues that have been addressed in the current revision work are building a rigorous and challenging curriculum, ensuring a curriculum that is accessible to every student, and designing a format that can easily be used and understood.

The most noticeable change in terminology is the use of the term content standards, instead of instructional goals. Because "content standards" is a phrase that is understood nationally and because the way in which the content standards are being used to organize all aspects of the curriculum, it is recommended that the term content standards be used as the curriculum is revised in any content area.

Each content area begins with a set of content standards. Instructional objectives are then organized under the standards, so that the focus stays on helping students achieve the comprehensive goals, not just mastering the incremental steps. The instructional objectives (those incremental steps) are still there—refinement committees have worked very hard to consolidate, delete, sequence, and clarify as needed to produce a picture of the curriculum that is clear in its intent and manageable in its implementation.

A second change is the addition of performance descriptors. Performance descriptors answer the question "How well does the student perform on the content standards at any given grade level?" Although performance descriptors are not part of Policy 2520, they are provided in this document in order to gather your comments on the content of the descriptors. (See "Explanation of Terms" section for further discussion of this topic.)

After having submitted this revision of Policy 2520 to the West Virginia Board of Education in October 2001, written comments will be received. In December 2001, a finalized version of the content standards and objectives in mathematics, reading and English language arts, science and social studies that incorporate all changes warranted by the comments will be presented to the State Board to be adopted.

David Stewart
State Superintendent of Schools

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Explanation of Terms

Content Standards (or Instructional Goals) are broad descriptions of what students should know and be able to do in a content area. Content standards describe what students' knowledge and skills should be at the end of a K-12 sequence of study.

Instructional Objectives are incremental steps toward accomplishment of content standards. Instructional objectives are listed by grade level and are organized around the content standards. Objectives build across grade levels as students advance in their knowledge and skills.

Numbering of Objectives

Explanation: The first number is the grade level.
The second number is the goal addressed.
The third number is the objective number.

Illustration: If an objective number in Reading and English Language Arts is 6.2.3, it means that the objective is a sixth grade objective, that it addresses Goal #2 in Reading and English Language Arts, and that it is the third objective listed under that goal.

Performance Descriptors describe in narrative format at what levels students may achieve the content standards. Four performance levels have been proposed for West Virginia: distinguished, mastery, partial mastery and novice. A general description of each of these categories is listed below:

- **Distinguished**: Superior performance that goes beyond grade level expectations.
- **Mastery:** Solid academic performance at the grade level. Students demonstrate competency in challenging subject matter, can apply knowledge and skills to real-world situations, and can use analytical skills appropriate to the subject matter.
- **Partial Mastery:** Incomplete mastery of prerequisite knowledge and skills that are necessary for success at each grade level.
- **Novice:** Substantial gaps in prerequisite knowledge and skills that are necessary for success at each grade level.

Performance Descriptors serve two functions. Instructionally, they give teachers more information about the level of knowledge and skills they are building in their students. Performance levels and descriptors are also used to categorize and explain student performance on statewide assessment instruments.

MATHEMATICS

Mathematics standards have been written in response to the need to better prepare students for college, other post-secondary education, and gainful employment. The five mathematics standards, Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability, are aligned directly with the National Council of Teachers of Mathematics document, *Principles and Standards for School Mathematics* released in 2000. The curriculum is designed to be ambitious and rigorous at all grade levels. This rigor is required to achieve a society that has the capability to think and reason mathematically.

The standards describe what each student of mathematics should be able to accomplish in K-12. The objectives spiral upward through the grade levels, eliminating repetition of content and increasing in rigor throughout the student's academic career. It is important that all students value mathematics, become confident in their ability to do mathematics, become mathematical problem solvers, communicate mathematically, make connections to other content areas and to the real world application of mathematics, and learn to reason mathematically.

West Virginia's vision for education includes the integration of technology throughout the curriculum so that all West Virginia students have the opportunity to develop technology skills that support learning. Successful learning environments provide opportunities for students to use technology interwoven with relevant curricular content. West Virginia teachers are responsible for integrating technology appropriately in the students' learning environment.

The content and character of school mathematics provide a vision to guide educators as they strive for continual improvement of mathematics education. The following six principles for school mathematics are the major influences on the improvement of classrooms, schools, and educational systems.

1. **Equity:** High expectations and strong support for all students.
2. **Curriculum:** Coherent, focused on important mathematics, and well articulated across the grades.
3. **Teaching:** Understanding what students know and need to learn and then challenging and supporting them to learn it well.
4. **Learning:** Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.
5. **Assessment:** Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.
6. **Technology:** Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.

Mathematics Content Standards K-12

Standard 1: Number and Operations
Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Standard 2: Algebra
Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Standard 3: Measurement
Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Standard 4: Geometry
Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Standard 5: Data Analysis and Probability
Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Kindergarten Mathematics Content Standards and Objectives

Kindergarten objectives emphasize the use of manipulatives, concrete materials, and appropriate technology so that students explore and develop ideas that are fundamental to the study of mathematics: number, counting, ordering, comparing, classifying, patterning, shape, size, position, numeration, measuring, and problem solving. The emphasis is on experience and growth in mathematics. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

K.1.1	count forward and backward to 20 with and without objects.
K.1.2	read, write, order, and compare numbers to 20.
K.1.3	model odd and even numbers to 20.
K.1.4	count and group concrete items by ones and tens.
K.1.5	identify place value of each digit utilizing standard and expanded form through 20.
K.1.6	identify ordinal positions 1^{st} – 10^{th} and directionality.
K.1.7	estimate the number of objects in a group of 20 or less and count to determine reasonableness.
K.1.8	identify and name halves and whole using concrete items.
K.1.9	model addition and subtraction of whole numbers using 10 or less items and write the corresponding number sentence.
K.1.10	understand meanings of operations and the relationship between addition and subtraction (e.g., identity element of addition, commutative property).
K.1.11	solve grade level appropriate problems using a variety of strategies.

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives

Students will:

K.2.1	sort and classify objects by one attribute.
K.2.2	identify, describe, and extend a repeating pattern found in common objects, sound, and movement.
K.2.3	model and identify patterns of counting by 5's and 10's.
K.2.4	solve grade level appropriate problems involving analysis of change.

Standard 3: Measurement

Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives

Students will:

K.3.1	estimate the size of an object and compare and order objects with respect to a given attribute.
K.3.2	use standard and nonstandard units of measure to find the length of an object.
K.3.3	compare two objects in nonstandard units of measure, according to one or more of the following attributes: length, height, weight.
K.3.4	name the days of the week and the seasons of the year.
K.3.5	read time to the nearest hour using analog and digital clocks.
K.3.6	identify the name and value of penny, nickel, and dime.
K.3.7	determine the value of a collection of pennies with a total value less than twenty cents.

Standard 4: Geometry

Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives

Students will:

K.4.1	use physical materials to construct, identify, and classify basic geometric plane shapes: circle, square, rectangle, triangle.
K.4.2	identify basic geometric shapes in the environment.
K.4.3	describe spatial relationships: inside/outside, top/bottom, before/after.
K.4.4	identify the separate parts used to make a whole object.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data; develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives

Students will:

K.5.1	collect, sort and organize data as a group project.
K.5.2	construct graphs using objects and pictures.
K.5.3	analyze data represented on a graph using grade level appropriate questions.

First Grade Mathematics Content Standards and Objectives

The first grade objectives continue the emphasis on the use of manipulatives, concrete material, and appropriate technologies to give students the foundation needed to explore new mathematical concepts. Development of mathematical language allows students to explain such concepts as: addition and subtraction of whole numbers; knowing the value of coins; knowing addition and subtraction facts; identifying two and three dimensional figures; and gathering, organizing, and explaining data. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

1.1.1	count forward and backward to 100 with and without objects.
1.1.2	read, write, order, and compare numbers to 100.
1.1.3	model and identify odd and even numbers to 100 with and without objects.
1.1.4	count and group concrete items by ones, tens, and hundreds.
1.1.5	identify place value of each digit utilizing standard and expanded form through 100.
1.16	identify and read ordinal numbers 1^{st} - 20^{th} .
1.1.7	estimate the number of objects in a group of 100 or less and count to determine reasonableness of estimate.
1.1.8	identify and name halves, thirds, and fourths as part of a whole and as part of a group using models.
1.1.9	model addition and subtraction of whole numbers using 18 or less items and write the corresponding number sentence.
1.1.10	understand meanings of operations and the relationship between addition and subtraction (e.g., identity element of addition, commutative property, fact families, inverse operations)
1.1.11	memorize basic addition facts with sums to 10 and corresponding subtraction facts.
1.1.12	model 2-digit addition and subtraction without regrouping to solve the algorithm.
1.1.13	add three numbers with a sum of 18 or less.
1.1.14	solve grade level appropriate picture and story problems using multiple strategies.

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives
Students will:
1.2.1 sort and classify objects by more than one attribute.
1.2.2 analyze and create a repeating pattern using common objects and numbers.
1.2.3 use input/output model with grade appropriate functions.
1.2.4 identify and write number patterns by 2's, 5's, and 10's.
1.2.5 identify and represent number patterns using words, AB form, and T-charts.
1.2.6 use models to demonstrate that the quantities on each side of a number sentence are equivalent.
1.2.7 solve grade level appropriate problems involving analysis of change.

Standard 3: Measurement
Students will:
- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives
Students will:
1.3.1 estimate, measure, compare and order using customary, metric, and nonstandard units to determine length to nearest whole unit.
1.3.2 understand appropriate grade level conversions within a system of measurement.
1.3.3 compare two objects or events according to one or more of the following attributes: length, height, weight, time, temperature and volume.
1.3.4 name the months of the year and find a date on a monthly calendar.
1.3.5 explain time concept in context of personal experience.
1.3.6 read time to the half hour using an analog and digital clock.
1.3.7 calculate elapsed time to the hour.
1.3.8 identify the name and value of quarter and dollar.
1.3.9 count and trade a collection of pennies, nickels, and dimes with a total value of 100 cents or less.
1.3.10 role-play making change up to a dime.
1.3.11 select the appropriate tools of measurement to determine length, weight, volume and temperature.

Standard 4: Geometry
Students will:
- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives

1.4.1 draw and describe triangles, squares, circles, and rectangles according to number of sides and vertices.
1.4.2 use physical materials to construct, identify, and classify three-dimensional figures: cube, cone, sphere, rectangular solid, pyramid, and cylinder.
1.4.3 identify three-dimensional shapes in the environment.
1.4.4 identify and construct open and closed figures.
1.4.5 identify, determine, and draw a line of symmetry.
1.4.6 identify and draw plane shapes that are congruent.
1.4.7 describe spatial relationships: over/under, left/right.
1.4.8 find and name locations with simple relationships on a coordinate system.
1.4.9 describe the shape created by combining two or more two-dimensional shapes.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data; develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives

Students will:

1.5.1 identify and investigate various forms of data collection.
1.5.2 read and interpret a pictograph with each picture representing a single unit.
1.5.3 conduct simple experiments and use the data to predict which of the events is more likely or less likely to occur if the experiment is repeated.
1.5.4 discuss events related to students' experiences as likely or unlikely.
1.5.5 tally by one's, organize the data in a chart/table, and construct a bar graph; read and interpret tally charts and tables.
1.5.6 analyze data represented on a graph using grade level appropriate questions.

Second Grade Mathematics Content Standards and Objectives

The second grade objectives help a student to become a more independent problem solver through concrete and technology related experiences which explore new problem solving strategies, everyday use of mathematical language, and reasonableness and interrelationships of mathematics. Additional concepts include: place value through thousands, basic multiplication and related division facts, estimation, introduction of properties of mathematics, and measurement which includes spatial perception. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

2.1.1 read, write, order, and compare numbers to 1000.
2.1.2 identify any number as odd or even.
2.1.3 count and group concrete items by 1's, 10's, 100's, and 1000's.
2.1.4 identify place value of each digit utilizing standard and expanded form through 1000.
2.1.5 identify and read any ordinal number.
2.1.6 round to nearer 10 and 100 to better understand place value.
2.1.7 identify and name fractions as part of a whole and as part of a group using models.
2.1.8 understand meaning of operations and the relationship between addition and subtraction (e.g., identity element of addition, associative property, commutative property, inverse operations, fact families).
2.1.9 memorize basic addition facts with sums to 18 and corresponding subtraction facts.
2.1.10 model 2- and 3-digit addition and subtraction without and with regrouping to solve the algorithm.
2.1.11 use rounding to determine the reasonableness of a sum or a difference.
2.1.12 solve grade level appropriate story problems that require one or two-step solutions using multiple strategies.
2.1.13 model basic multiplication facts and corresponding division facts.

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives

Students will:

2.2.1 analyze, describe, extend and create a growing pattern.
2.2.2 use input/output model with grade appropriate functions.
2.2.3 model and identify patterns of counting by 3's and 4's.
2.2.4 given the rule, complete the pattern.
2.2.5 use models to demonstrate equivalency of two numerical expressions written as a number sentence.
2.2.6 solve grade level appropriate problems involving analysis of change.

Standard 3: Measurement

Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives

Students will:

2.3.1 use a ruler to draw and compare lengths given lengths in centimeters and inches.
2.3.2 estimate and determine the perimeter of a polygon.
2.3.3 estimate and count the number of square units needed to cover a given area.
2.3.4 understand appropriate grade level conversions within a system of measurement.
2.3.5 estimate and determine weight/mass of familiar objects in pounds and kilograms.
2.3.6 order events in relation to time.
2.3.7 given a calendar, determine past and future dates of the week and identify specific dates.
2.3.8 read time to the nearest quarter hour using an analog and digital clock.
2.3.9 calculate elapsed time to the half hour.
2.3.10 read and write amounts of money to a dollar.
2.3.11 role-play making change to a dollar.
2.3.12 read Celsius and Fahrenheit thermometers.

Standard 4: Geometry

Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives

Students will:

2.4.1 identify and describe a cube, rectangular solid, cylinder, cone, and pyramid according to the number of faces and edges.
2.4.2 compare and contrast plane and solid geometric shapes.
2.4.3 given a design with a line of symmetry, construct the mirror image.
2.4.4 model line segments and angles.
2.4.5 identify the congruent shape that has been rotated and/or reflected.
2.4.6 plot locations with simple relationships on a coordinate plane.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data; develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives
Students will:

2.5.1 create, read, and interpret a pictograph with each picture representing greater than or less than a simple unit.
2.5.2 conduct simple experiments with more than two outcomes and use the data to predict which event is more, less, or equally likely to occur if the experiment is repeated.
2.5.3 analyze data represented on a graph using grade level appropriate questions.
2.5.4 formulate questions, collect data, organize and display as a chart/graph.

Third Grade Mathematics Content Standards and Objectives

The third grade objectives extend the students' mathematical skills and concepts through concrete experiences and appropriate technology. These concepts and operations include: whole number operations; comparing and ordering numbers to hundredths and ten thousandths; fractions and decimals; multiplication facts through five. Additional concepts include gathering and organizing data, estimating and performing measurements. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations
Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives
Students will:

3.1.1 read, write, order, and compare numbers to 10,000.
3.1.2 read, write, order, and compare decimals to hundredths with models.
3.1.3 identify place value of each digit utilizing standard and expanded form through 10,000.
3.1.4 estimate to nearer 1000 using rounding, benchmarks, and compatible numbers to determine reasonableness of an answer.
3.1.5 identify fractions as part of a whole/one and as part of a group using models and pictorial representations.
3.1.6 compare and order fractions with like and unlike denominators using concrete models.
3.1.7 add and subtract fractions with like denominators using concrete models and pictorial representations.
3.1.8 recognize and model equivalent fractions using concrete materials.
3.1.9 recognize and model proper and improper fractions and mixed numbers.

Performance Descriptors

- **Distinguished**
  Third grade students performing at the distinguished level choose the operation, solve problems, and justify answers. Students apply their knowledge of benchmarks to solve problems involving comparing, adding, and subtracting decimals and fractions with like denominators; and know multiplication facts through 9's and the corresponding division facts.
- **Mastery**
  Third grade students performing at mastery level represent fractions and decimals using number lines, models and pictures, memorize multiplication facts through 5's and the corresponding division facts, compare numbers from 100ths to 10,000, estimate, add and subtract whole numbers, and use estimation to determine the reasonableness of an answer.

3.1.10 add and subtract 2- and 3-digit whole numbers and money without and with regrouping. 3.1.11 understand multiplication as repeated addition and division as repeated subtraction. 3.1.12 understand meanings of operations and the relationship between multiplication and division (e.g., identity element of multiplication, commutative property, property of zero, fact families, associative property). 3.1.13 memorize basic multiplication facts 0-5 and the corresponding division facts. 3.1.14 model multiplication of 2- and 3-digit numbers by a 1-digit number. 3.1.15 model division of 2- and 3-digit numbers by a 1-digit number. 3.1.16 solve grade level appropriate story	■ **Partial Mastery** Third grade students performing at the partial mastery level represent fractions and decimals using models and pictures, recall multiplication facts through 5's and the corresponding division facts, read and write numbers from 100ths to 10,000, and estimate, add, and subtract whole numbers without regrouping. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives Students will:	**Performance Descriptors**
3.2.1 analyze and complete a geometric pattern. 3.2.2 use input/output model with grade appropriate functions. 3.2.3 identify and write number patterns of 3's and 4's. 3.2.4 identify and write the rule of a given pattern. 3.2.5 write equivalent numerical expressions. 3.2.6 solve grade level appropriate problems involving analysis of change. 3.2.7 represent the idea of a variable as an unknown quantity using a symbol.	■ **Distinguished** Third grade students performing at the distinguished level determine the input, when given the output of a function and use algebraic methods to generalize and write the rules for patterns. ■ **Mastery** Third grade students performing at mastery level use algebraic methods to generalize and write the rules for patterns. ■ **Partial Mastery** Third grade students performing at the partial mastery level use algebraic methods to extend a pattern. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Measurement
Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives	**Performance Descriptors**
Students will: 3.3.1 estimate, measure, compare, order and draw lengths using inches (to the nearest ½ inch), feet, yards, and meters. 3.3.2 estimate and count the number of cubes in a rectangular solid to determine volume. 3.3.3 discover the formula for determining the area of a rectangle. 3.3.4 understand appropriate grade level conversions within a system of measure. 3.3.5 estimate and measure results of mass/weight in ounces, pounds, grams, and kilograms. 3.3.6 read time to 5-minute intervals using analog and digital clocks. 3.3.7 calculate elapsed time to quarter-hour. 3.3.8 read and write amounts of money to $100.00. 3.3.9 role-play making change up to $10.00. 3.3.10 estimate, read, and recognize common temperatures of Celsius and Fahrenheit.	■ **Distinguished** Third grade students performing at the distinguished level estimate and compare measures of length, weight, and temperature, tell time to the nearest five minutes, calculate elapsed time to the quarter hour, and make change up to $10.00 in problem solving situations. ■ **Mastery** Third grade students performing at mastery level estimate and compare measures of length, weight, and temperature, tell time to nearest 5 minutes and calculate elapsed time to the quarter hour, and make change up to $10.00. ■ **Partial Mastery** Third grade students performing at the partial mastery level measure length, weight, and temperature, tell time to nearest 5 minutes, and calculate change. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geometry
Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations;
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives	**Performance Descriptors**
Students will: 3.4.1 identify basic polygons and their components through decagon. 3.4.2 identify and describe a cube, rectangular solid, cylinder, cone and pyramid according to the number of faces, edges and vertices.	■ **Distinguished** Third grade students performing at the distinguished level generalize the similarities and differences among plane and solid figures; describe spatial relationships using coordinate geometry; and draw acute, right, and obtuse angles.

3.4.3 from a plane drawing, construct and identify the solid figure. 3.4.4 identify, determine and draw lines of symmetry. 3.4.5 describe lines and rays. 3.4.6 identify and construct right, obtuse and acute angles. 3.4.7 given a model, draw an example of a flip, slide and turn. 3.4.8 name the location of a point on a one-quadrant grid.	■ **Mastery** Third grade students performing at mastery level identify basic polygons and their components; describe geometric solids according to faces, edges and vertices; and draw acute, right and obtuse angles. Students name the location of a point in the first quadrant. ■ **Partial Mastery** Third grade students performing at the partial mastery level identify basic polygons and their components, describe geometric solids, and identify angles. Students name the location of a point in the first quadrant. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives Students will:	**Performance Descriptors**
3.5.1 collect data from observation, surveys, and experiments, and construct and label the graph. 3.5.2 find the mean from collected data. 3.5.3 use a timeline to determine a sequence of events. 3.5.4 experiment and describe concepts of probability and chance and list possible outcomes from a sampling. 3.5.5 analyze data represented on a graph by generating questions using grade level appropriate questions.	■ **Distinguished** Third grade students performing at distinguished level analyze data from a graph or an experiment by generating questions and calculate the mean. ■ **Mastery** Third grade students performing at the mastery level organize collected data, calculate the mean, and draw conclusions from a graph or an experiment. ■ **Partial Mastery** Third grade students performing at the partial mastery level collect, organize, and display data. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Fourth Grade Mathematics Content Standards and Objectives

The fourth grade objectives emphasize critical thinking skills to create independent problem solvers who possess a personalized set of skills and strategies to solve problems in everyday life. Concepts which are stressed include: multiplication and division of two and three digit numbers, construction and description of objects from different perspectives, estimation, reading temperatures, description of possible outcomes in a given situation, use of calculators and computers, and describing mathematical relationships and patterns in other content areas and the real world. Additional concepts include adding and subtracting like fractions, multiplication of fractions, and adding and subtracting decimals. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

4.1.1	read, write, order, and compare numbers to 1,000,000.
4.1.2	read, write, order, and compare decimals to thousandths with and without models and pictorial representations.
4.1.3	identify place value of each digit utilizing standard and expanded form through 1,000.000.
4.1.4	estimate to nearer 10,000 using rounding, benchmarks, and compatible numbers and identify over and under estimates to determine reasonableness of an answer.
4.1.5	compare and order fractions with like and unlike denominators using pictorial representations.
4.1.6	add and subtract fractions with like and unlike denominators using pictorial representations.
4.1.7	recognize and model equivalent fractions using pictorial representations.
4.1.8	model addition and subtraction of mixed numbers without and with regrouping to solve the algorithm.

Performance Descriptors

- **Distinguished**
  Fourth grade students performing at the distinguished level choose the operation, solve problems, and justify answers. Students add and subtract fractions and decimals; multiply and divide whole numbers in problem solving situations; compare numbers from 1000ths to 1,000,000; and apply order of operations to solve problems.
- **Mastery**
  Fourth grade students performing at mastery level demonstrate mastery of all basic facts, add and subtract fractions and decimals with pictorial representation, multiply and divide whole numbers in problem solving situations, compare numbers from 1000ths to 1,000,000, and apply order of operations to solve problems.

4.1.9	Understand the relationship of fractions to decimals using concrete objects and pictorial representations.	■ **Partial Mastery** Fourth grade students performing at the partial mastery level add and subtract fractions and decimals with pictorial representation, multiply and divide whole numbers in problem solving situations, and compare numbers from 1000ths to 1,000,000. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.
4.1.10	round decimals to the nearest whole, 10^{th}, or 100^{th}.	
4.1.11	add and subtract decimals to the 1000^{th} place.	
4.1.12	apply the distributive property of multiplication over addition.	
4.1.13	memorize basic multiplication facts and corresponding division facts.	
4.1.14	multiply 2-and 3-digit numbers by 1-and 2-digit numbers.	
4.1.15	divide 2-and 3-digit numbers by 1-and 2-digit numbers.	
4.1.16	apply the order of operations in solving problems.	
4.1.17	solve grade level appropriate story problems using multiple strategies.	

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives Students will:		
4.2.1	solve problems, involving patterns.	■ **Distinguished** Fourth grade students performing at the distinguished level write an expression using a variable to represent the unknown quantity in problem-solving situations and predict a pattern to the nth term. ■ **Mastery** Fourth grade students performing at mastery level predict a pattern to the nth term. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level use algebraic methods to extend a pattern. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.
4.2.2	use input/output model with grade appropriate functions.	
4.2.3	understand the relationship between number patterns and multiples.	
4.2.4	use patterns to predict the nth term.	
4.2.5	solve grade level appropriate problems involving analysis of change.	
4.2.6	represent the idea of a variable as an unknown quantity using a letter.	

Standard 3: Measurement
Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement;
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives	**Performance Descriptors**
Students will: 4.3.1 estimate, measure, compare, order and draw lengths using customary and metric units. 4.3.2 determine and compare areas of rectangles and squares by multiplying length and width. 4.3.3 discover the formula for volume of a rectangular prism. 4.3.4 understand appropriate grade level conversions within a system of measure. 4.3.5 read scales of weight, capacity, and temperature and select appropriate unit. 4.3.6 read time to nearest minute. 4.3.7 determine elapsed time in hours/ minutes within a 24-hour period. 4.3.8 count coins and bills and determine correct change.	■ **Distinguished** Fourth grade students performing at the distinguished level solve problems involving measures of volume and capacity, perimeter and area, elapsed time and money, and convert units within a system of measurement. ■ **Mastery** Fourth grade students performing at mastery level estimate and compare measures of volume and capacity, estimate and compare areas of rectangles, tell time to the nearest minute and calculate elapsed time in a 24-hour period, and calculate change in problem solving situations using money. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level measure volume and capacity, determine the area of rectangles, tell time to the nearest minute, and calculate change. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geometry
Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives	**Performance Descriptors**
Students will: 4.4.1 identify plane figures and their components. 4.4.2 compare and contrast quadrilateral shapes. 4.4.3 describe three-dimensional objects from different perspectives. 4.4.4 identify and construct intersecting, parallel, and perpendicular lines.	■ **Distinguished** Fourth grade students performing at the distinguished level match orthogonal drawings and nets to three-dimensional figures, create figures that include given geometric properties, and plot and graph ordered pairs in the first quadrant.

4.4.5 draw, label, compare, and classify acute, right, and obtuse angles. 4.4.6 draw a design with one line of symmetry. 4.4.7 graph/plot ordered pairs on a one-quadrant grid. 4.4.8 draw and identify parts of a circle: center point, diameter, and radius.	■ **Mastery** Fourth grade students performing at mastery level compare and contrast quadrilaterals, describe three-dimensional objects from different perspectives, classify angles, and draw lines that are parallel, perpendicular, and intersecting. Students draw and label parts of a circle and plot and graph ordered pairs in the first quadrant. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level classify lines, angles, and quadrilaterals and identify three-dimensional objects from different perspectives; plot and graph ordered pairs in the first quadrant. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives Students will:	**Performance Descriptors**
4.5.1 understand and reason about the use and misuse of statistics in our society. 4.5.2 read and interpret information represented on a circle graph. 4.5.3 collect, organize, display, read and interpret data from a problem solving situation in line graphs, bar graphs, tally charts and tables with scale increments greater than one. 4.5.4 list all possible outcomes for an experiment using a tree diagram. 4.5.5 determine mean, median, mode and range from collected data.	■ **Distinguished** Fourth grade students performing at distinguished level calculate the mode, median and range; and make inferences and predictions based on data from line graphs, circle graphs and tree diagrams. ■ **Mastery** Fourth grade students performing at the mastery level collect (whole number) data and calculate the mode, median, and range. Students read and interpret data represented by line graphs, circle graphs, and tree diagrams. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level read data represented with line graphs, circle graphs, and tree diagrams. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Fifth Grade Mathematics Content Standards and Objectives

Building on mastery of the basic facts of addition, subtraction, multiplication, and division, the fifth grade objectives place emphasis on developing proficiency in using whole numbers, fractions, and decimals to solve problems. Students will collect, display and analyze data in a variety of ways and solve probability problems. Students will solve problems involving area and perimeter, will classify polygons, plot points on a coordinate plane, and write a number sentence using a variable to solve problems. Students should be actively engaged, continuing to use concrete materials and appropriate technologies such as calculators and computers. Problem solving should be integrated throughout all the strands. The development of a variety of problem-solving strategies should be a major goal of mathematics at this grade level. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

5.1.1 read, write, order and compare all whole numbers.

5.1.2 read, write, order and compare all decimals.

5.1.3 identify place value of each digit utilizing standard and expanded form in any whole number.

5.1.4 estimate whole numbers and decimals, including money, to determine reasonableness of an answer.

5.1.5 identify and use the divisibility rules of 2, 3, 5, 9 and 10.

5.1.6 compare and order fractions, improper fractions and mixed numbers with like and unlike denominators (e.g., greatest common factor, lowest common multiple).

5.1.7 model and write equivalencies of fractions, decimals, percents, and ratios.

5.1.8 add and subtract fractions and mixed numbers.

5.1.9 model multiplication and division of fractions to solve the algorithm.

5.1.10 model multiplication of decimals and division of decimals by a whole number divisor to solve the algorithm.

Performance Descriptors

- **Distinguished**
  Fifth grade students performing at the distinguished level choose the operation, solve problems, and justify answers, multiply and divide fractions and decimals with pictorial representation, add and subtract fractions and mixed numbers and give answers in lowest terms.
- **Mastery**
  Fifth grade students performing at mastery level multiply and divide fractions and decimals with pictorial representation, add and subtract fractions and mixed numbers and give answers in lowest terms, and choose the appropriate operation and solve problems.
- **Partial Mastery**
  Fifth grade students performing at the partial mastery level multiply and divide fractions and decimals with pictorial representation, add and subtract fractions and mixed numbers terms, and choose the appropriate operation to solve problems.
- **Novice**
  Fifth grade students who have not attained partial mastery are at the novice level for this standard.

5.1.11 develop fluency in addition, subtraction, multiplication and division of whole numbers. 5.1.12 solve grade level appropriate story problems using multiple strategies. 5.1.13 state fractions in lowest terms.	

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives Students will:	**Performance Descriptors**
5.2.1 explore a variety of patterns with missing elements (e.g., square numbers, powers, triangular numbers, arithmetic sequences). 5.2.2 use input/output model with grade appropriate functions. 5.2.3 solve grade level appropriate problems involving analysis of change. 5.2.4 write a number sentence using a variable to solve problems. 5.2.5 evaluate an expression given a value for the variable.	■ **Distinguished** Fifth grade students performing at the distinguished level describe how a change in one variable relates to a change in another and write number sentences using a variable to solve problems. ■ **Mastery** Fifth grade students performing at the mastery level write number sentences using a variable to solve problems. ■ **Partial Mastery** Fifth grades students performing at the partial mastery level use algebraic methods to extend a pattern and evaluate an expression. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Measurement

Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives Students will:	**Performance Descriptors**
5.3.1 estimate, measure, compare, order and draw lengths of real objects in parts of an inch up to 1/8 of an inch and millimeters. 5.3.2 determine and compare area of triangles and parallelograms using appropriate formula. 5.3.3 solve problems using the formulas for determining volume of a rectangular prism. 5.3.4 understand the relationship between area and perimeter of a plane figure.	■ **Distinguished** Fifth grade students performing at the distinguished level apply appropriate tools, techniques, and formulas to determine measurements in problem solving situations. Students apply simple unit conversions within a system of measurement to solve problems.

5.3.5 understand appropriate grade level conversions within a system of measure and apply to problem solving situations. 5.3.6 evaluate and/or measure the weight/mass of real objects in ounces, pounds, tons, grams, and kilograms. 5.3.7 calculate elapsed time. 5.3.8 select appropriate customary and metric units and the tools for measuring to desired degree of precision. 5.3.9 determine actual measurement from scale drawings.	■ **Mastery** Fifth grade students performing at mastery level determine and compare area and perimeter of triangles and quadrilaterals using formulas, calculate elapsed time involving more than a 24-hour span, and select appropriate tools, formulas, and/or units of measure in problem solving situations. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level determine area and perimeter of triangles and quadrilaterals and calculate elapsed time within a 24-hour span. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geometry

Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives Students will:	**Performance Descriptors**
5.4.1 classify and compare polygons. 5.4.2 construct a 3 dimensional figure from different views (orthogonal drawings). 5.4.3 measure angles using a protractor. 5.4.4 draw a design with more than one line of symmetry. 5.4.5 recognize the images of figures after reflections, translations and rotations. 5.4.6 draw a similar figure using a scale.	■ **Distinguished** Fifth grade students performing at the distinguished level draw angles using a protractor, create a net when given a solid, and describe a series of motions to show that two shapes are congruent. ■ **Mastery** Fifth grade students performing at mastery level classify and compare polygons, measure angles using a protractor, and draw a design with more than one line of symmetry. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level classify polygons, measure angles using a protractor, and identify more than one line of symmetry when given a figure. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives Students will:	**Performance Descriptors**
5.5.1 collect, organize, display, read and interpret data from a problem-solving situation in a stem and leaf plot. 5.5.2 identify probabilities and solve problems involving the probability of an event by using tree diagrams or by construction of a sample space representing all possible results. 5.5.3 construct, read, or interpret tables, charts, and graphs to draw reasonable inferences or verify predictions. 5.5.4 model situations by carrying out experiments to determine probability. 5.5.5 construct a circle graph.	■ **Distinguished** Fifth grade students performing at distinguished level make inferences and predictions based on data from stem and leaf plots and circle graphs, and carry out probability experiments, interpret a sample space, and compare their predictions to their results. ■ **Mastery** Fifth grade students performing at the mastery level interpret stem and leaf plots and construct circle graphs. Students make predictions, carry out probability experiments, interpret a sample space, and compare their predictions to their results. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level read a stem and leaf plot and verify predictions based on probability experiments. ■ **Novice** Fifth grade students who have not attained partial mastery area at the novice level for this standard.

Sixth Grade Mathematics Content Standards and Objectives

The sixth grade objectives place continued emphasis on the study of whole numbers, decimals and fractions. However, students need opportunities to apply their skills to real life applications. Calculators and computers may be used to solve problems. Decreased attention should be given to paper and pencil computations. Sixth graders will continue to use manipulatives whenever new material is introduced or whenever it is needed to review previously taught material. The areas of probability, statistics, geometry, and pre-algebra will be stressed. Students will use ratios to compare data sets, make geometric constructions of three-dimensional figures, explore thoroughly the algebra strand, and solve problems involving circles, volume and surface area. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

6.1.1 read, write, order, and compare numbers using scientific notation.

6.1.2 identify prime and composite numbers up to 100.

6.1.3 use prime factorization to determine the greatest common factor and least common multiple.

6.1.4 identify and represent integers on a number line.

6.1.5 use estimation to solve problems with whole numbers, fractions and decimals.

6.1.6 solve problems in context involving addition, subtraction, multiplication, and division of whole numbers, fractions, mixed numbers and decimals.

6.1.7 identify, demonstrate, and apply the distributive, commutative, associative and identity properties.

6.1.8 convert between fractions, mixed numbers, decimals and percents.

6.1.9 find the percent of a number.

Performance Descriptors

- **Distinguished**
  Sixth grade students performing at the distinguished level solve problems involving fractions, decimals, and percents less than one and greater than 100, and relatively prime numbers, and use the commutative, associative, identity, and distributive properties to solve problems. Students compare integers and represent numbers with prime factors in exponential form.
- **Mastery**
  Sixth grade students performing at mastery level solve problems involving fractions, decimals and percents. Students use the commutative, associative, identity, and distributive properties to solve problems. Students represent integers with manipulatives and on a number line. Students represent numbers with prime factorizations.
- **Partial Mastery**
  Sixth grade students performing at partial mastery level solve problems involving fractions and decimals and identify commutative, associative, and identity properties and find prime factorization of a number using a factor tree.
- **Novice**
  Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives	Performance Descriptors
Students will: 6.2.1 simplify numerical expressions using order of operations. 6.2.2 identify missing elements in arithmetic and geometric patterns. 6.2.3 explore a variety of patterns, including perfect squares, square roots and exponents. 6.2.4 use input/output models and spreadsheets to evaluate functions. 6.2.5 solve a proportion using cross multiplication. 6.2.6 identify like terms and monomials. 6.2.7 model addition, subtraction, multiplication and division of integers. 6.2.8 locate and plot points within the four quadrants. 6.2.9 use variables to represent and solve real world problems appropriate for the 6th grade using multiple strategies.	■ **Distinguished** Sixth grade students performing at distinguished level solve proportions, plot points in four quadrants, and simplify numerical expressions using order of operations. Students use manipulatives and/or drawings to model monomials, algebraic expressions, patterns, and equations. Students explain patterns in a clear concise manner. ■ **Mastery** Sixth grade students performing at mastery level solve proportions, plot points in four quadrants, and simplify numerical expressions using order of operations. Students use manipulatives and/or drawings to model monomials, algebraic expressions, patterns, and equations. ■ **Partial Mastery** Sixth grade students performing at partial mastery level solve a proportion by cross-multiplying, plot points in the first quadrant, simplify numerical expressions using order of operations, and use manipulatives and/or drawings to model monomials, algebraic expressions and equations. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Measurement

Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives	Performance Descriptors
Students will: 6.3.1 derive approximation for pi using actual measurements. 6.3.2 apply formulas to determine perimeter, circumference and/or area of plane figures including compound figures. 6.3.3 investigate and model volume and surface area. 6.3.4 select appropriate units and determine length, weight/mass and capacity/volume using metric and customary systems. 6.3.5 construct scale drawings.	■ **Distinguished** Sixth grade students performing at distinguished level calculate circumference, area, perimeter of plane figures, volume and surface area of three-dimensional figures, and give solutions in appropriate units. Students determine scale factor of similar plane figures and solve application problems related to measurement. Students convert between units of measure within the metric and customary systems.

	■ **Mastery** Sixth grade students performing at mastery level calculate circumference, area, perimeter of plane figures, volume and surface area of three-dimensional figures, and give solutions in appropriate units. Students determine scale factor of similar plane figures and solve problems related to measurement. Students convert between units of measure within the metric and customary systems. ■ **Partial Mastery** Sixth grade students performing at partial mastery level calculate perimeter and area of plane figures, the circumference of circles and the volume of a rectangular prism. Students determine the scale factor of similar figures, solve simple problems related to measurement and give solutions in appropriate units. Students convert between units of measure within the customary system. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geometry

Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives Students will:	**Performance Descriptors**
6.4.1 classify lines as parallel, intersecting, perpendicular or skew. 6.4.2 determine the sum of measures of angles in polygons. 6.4.3 bisect a line segment using a compass and straightedge. 6.4.4 draw an angle of a given measure. 6.4.5 identify line symmetry and rotational symmetry in plane figures. 6.4.6 define and sketch similar and congruent plane geometric figures.	■ **Distinguished** Sixth grade students performing at distinguished level solve problems involving congruence and similarity of plane figures, calculate the sum of measures of angles in polygons, and compare and contrast line and rotational symmetry in plane figures. ■ **Mastery** Sixth grade students performing at mastery level solve problems involving congruence and similarities of plane figures and calculate the sum of the measures of angles of polygons. Students identify rotational symmetry in plane figures.

	■ **Partial Mastery** Sixth grade students performing at the partial mastery level identify and describe congruence and similarity of plane figures, calculate the sum of the measures of the angles of a triangle and quadrilaterals. Students identify rotational symmetry in plane figures. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data;
- develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives Students will:	**Performance Descriptors**
6.5.1 use spreadsheet software and graphing calculators to collect, organize, display, and read data using appropriate graphs and tables. 6.5.2 interpret data using mean, median, mode, and range. 6.5.3 determine the probability of a given event and express that probability as a ratio, decimal or percent. 6.5.4 determine combinations, permutations and probability using sample spaces (by listing and tree diagrams).	■ **Distinguished** Sixth grade students performing at distinguished level make conjectures about the outcomes of events based on simulations, and construct and interpret graphs, and interpret measures of central tendency and dispersion involving fractions and decimals. Students find combinations and permutations. ■ **Mastery** Sixth grade students performing at mastery level calculate measures of central tendency and dispersion involving fractions and decimals. Students find the probability of an event, use combinations and permutations, and interpret graphs. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level read a histogram and record data; calculate measures of central tendency and dispersion. Students find the probability of an event, and determine combinations. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Seventh Grade Mathematics Content Standards and Objectives

The seventh grade year is an introduction to high school subjects such as algebra, geometry, probability and statistics. With less emphasis on paper/pencil computation, calculators are emphasized in all facets of the mathematics daily work as well as test situations. Students should, by this time, have a mastery of general mathematics topics; however, review of all basic mathematics skills occurs in a relevant context. Problem solving is embedded in the curriculum utilizing a variety of new concepts, while cooperative learning promotes communication skills. Students are routinely permitted to use available technology. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives Students will:	**Performance Descriptors**
7.1.1 compare and order integers, decimals, and fractions using symbols (<,>,=) manipulatives and graphing on a number line. 7.1.2 find powers, squares, and square roots using manipulatives, models, calculators, tables and mental math. 7.1.3 define absolute value and determine its effect on a number or expression. 7.1.4 recognize and write rational numbers in the form a/b. 7.1.5 perform operations with integers (e.g., addition, subtraction, multiplication, division). 7.1.6 apply the commutative, associative, distributive, identity and inverse properties. 7.1.7 solve application problems with whole numbers, decimals, fractions and percents. 7.1.8 use appropriate estimation strategies in problem situations including evaluating the reasonableness of a solution.	■ **Distinguished** Seventh grade students performing at the distinguished level calculate powers, square roots, and absolute values and perform operations with integers. Students solve complex application problems and evaluate the reasonableness of solutions. ■ **Mastery** Seventh grade students performing at mastery level calculate powers, square roots, and absolute values and perform operations with integers. Students solve application problems and evaluate the reasonableness of solutions. ■ **Partial Mastery** Seventh grade students performing at partial mastery level calculate powers, and absolute values; perform addition, multiplication and division with integers; and solve simple application problems. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives

Students will:

7.2.1 find missing elements in a variety of arithmetic and geometric patterns including algebraic sequences and series.

7.2.2 simplify and evaluate numerical and algebraic expressions with whole numbers, integers, absolute value and exponents using the order of operations and exponential rules.

7.2.3 add, subtract, multiply and divide monomials.

7.2.4 find and use the Greatest Common Factor (GCF) and Least Common Multiple (LCM) of a set of monomials or algebraic fractions using prime factorization and exponent rules.

7.2.5 input data into a spreadsheet to create input/output function tables.

7.2.6 input data into a spreadsheet to create input/output function tables.

7.2.7 use ratios and proportions to represent and solve application problems.

7.2.8 write and evaluate complex algebraic expressions for word phrases.

7.2.9 use and apply scientific notation containing positive and negative exponents in problem solving situations.

7.2.10 solve linear equations containing whole numbers, fractions, decimals and integers.

7.2.11 solve inequalities using inverse operations and graph solutions.

7.2.12 plot lines within the Cartesian coordinate plane from a table of values using the graphing calculator and dynamic geometry software.

7.2.13 determine the slope of a line from its graphical representation.

7.2.14 represent and solve real world problems appropriate for 7^{th} grade using multiple strategies.

7.2.15 plot lines within the Cartesian coordinate plane from a table of values using the graphing calculator and dynamic geometry software.

7.2.16 determine the slope of a line from its graphical representation.

Performance Descriptors

- **Distinguished**
  Seventh grade students performing at distinguished level solve linear equations and inequalities, graph solutions, and graph lines within the coordinate plane. Students use ratio and proportion, scientific notation, and absolute value in solving complex problems.
- **Mastery**
  Seventh grade students performing at mastery level solve linear equations and inequalities, graph solutions, and graph lines within the coordinate plane. Students use ratio and proportion, scientific notation, and absolute value in solving problems.
- **Partial Mastery**
  Seventh grade students performing at partial mastery level solve linear equations, graph lines within the coordinate plane, and solve simple problems using ratio and proportion.
- **Novice**
  Seventh grade students who have not attained partial mastery are at the novice level for this standard.

7.2.17 represent and solve real world problems appropriate for 7th grade using multiple strategies. 7.2.18 plot lines within the Cartesian coordinate plane from a table of values using the graphing calculator and dynamic geometry software. 7.2.19 determine the slope of a line from its graphical representation. 7.2.20 represent and solve real world problems appropriate for 7th grade using multiple strategies.	

Standard 3: Measurement

Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives	**Performance Descriptors**
Students will: 7.3.1 use and apply formulas in problem solving situations involving perimeter, circumference, area, surface area, distance and temperature (Celsius, Fahrenheit). 7.3.2 use the concept of volume for prisms, pyramids, and cylinders as the relationship between the area of the base and height. 7.3.3 use the Pythagorean Theorem to find the length of any side of a right triangle. 7.3.4 convert units of measurement between customary and metric systems.	■ **Distinguished** Seventh grade students performing at distinguished level solve problems involving perimeter, circumference, area of two-dimensional figures, and surface area and volume of prisms, pyramids, cones and cylinders and give solutions in appropriate units. Students select the correct formula from a list to solve distance, temperature, and Pythagorean Theorem problems. ■ **Mastery** Seventh grade students performing at mastery level solve problems involving perimeter, circumference, area of two-dimensional figures, and surface area and volume of prisms and pyramids and give solutions in appropriate units. Students use the substitution property to solve distance, temperature, and Pythagorean Theorem problems. ■ **Partial Mastery** Seventh grade students performing at partial mastery level solve problems using given formulas involving perimeter, circumference, area of regular polygons, circles, volume of prisms, and surface area of rectangular prisms. Students calculate slope of a line. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geometry

Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives

Students will:

7.4.1 identify and construct angle-pairs (e.g., adjacent, complementary, supplementary, vertical).

7.4.2 use a formula to determine the sum of the measures of the interior angles of a polygon.

7.4.3 use 2-dimensional representations of 3-dimensional objects to visualize and solve problems.

7.4.4 construct congruent segments and angles, perpendicular bisectors of segments and angle-bisectors.

7.4.5 apply and demonstrate line symmetry.

7.4.6 apply transformations (rotations, reflections, translations) to plane figures using graph paper.

7.4.7 solve ratio and proportion problems including scale drawings and similar polygons.

Performance Descriptors

- **Distinguished**
  Seventh grade students performing at distinguished level solve practical problems involving similar figures, construct and bisect congruent segments and angles using a compass and straightedge. Students identify angle pairs and calculate measures of interior angles of a polygon. Students determine types of symmetry and transformations on a coordinate plane.
- **Mastery**
  Seventh grade students performing at mastery level identify angle pairs and use formulas to calculate measures of interior angles of a polygon. Students determine types of symmetry and transformations on a coordinate plane and construct congruent segments and angles using a compass and straightedge. Students solve practical problems involving scale models.
- **Partial Mastery**
  Seventh grade students performing at the partial mastery level identify angle pairs, determine types of symmetry and transformations on a coordinate plane, and construct congruent segments and angles using a compass and straightedge.
- **Novice**
  Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data; develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives Students will:	Performance Descriptors
8.1.8 make and test conjectures based on probability results of experiments and simulations using appropriate technology. 8.1.8 construct sample spaces by listing, tree diagrams, and frequency distribution tables to determine combinations and permutations. 8.1.8 collect, organize, graphically represent, and interpret data displays including: frequency distributions, line-plots, scatter plots, box and whiskers, and multiple-line graphs using spreadsheet and graphing calculators. 8.1.8 solve application problems involving measures of central tendency (mean, median, mode) and dispersion (range) from data, graphs, tables, and experiments using appropriate technology.	■ **Distinguished** Seventh grade students performing at distinguished level find, use, and interpret interquartile range of a data set; and solve application problems involving measures of central tendency and dispersion. Students collect, organize, and graphically represent frequency distributions, line-plots, scatter plots, box and whisker and multiple-line graphs. Students determine if an event is dependent or independent, calculate the probability, and describe the outcome. ■ **Mastery** Seventh grade students performing at mastery level solve application problems involving measures of central tendency and dispersion. Students collect, organize, and graphically represent frequency distributions, line-plots, scatter plots, box and whisker, and multiple-line graphs. ■ **Partial Mastery** Seventh grade students performing at the partial mastery level calculate measures of central tendency and dispersion; collect, organize, and graphically represent data in frequency distributions, line plots and scatter plots; and compute probability of an independent event. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Eighth Grade Mathematics Content Standards and Objectives

Pre-Geometry with Algebra provides an alternative course for students who do not elect to take Algebra I in the eighth grade or who have not successfully mastered the new skills from *Pre-Algebra with Geometry* in the seventh grade. In addition to reinforcing the concepts presented in *Pre-Algebra with Geometry*, this course extends problem solving to a more sophisticated level. Students will continue to apply integer operations, properties, expressions and equations so as to reinforce these concepts in varied applications. Lessons involving cooperative learning, manipulatives, or technology will strengthen students' understanding of concepts while fostering communication and reasoning skills. Calculator use is emphasized for all mathematical tasks including assessment. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Number and Operations

Students will:

- demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems;
- demonstrate meanings of operations and how they relate to one another; and
- compute fluently and make reasonable estimates

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Number and Operations Objectives

Students will:

8.1.1 compare and order rational and irrational numbers.

8.1.2 utilize the properties of terminating, repeating, and non-repeating decimals, and conversions between fractions, mixed numbers, and decimals.

8.1.3 extend scientific notation to numbers with a wide range of values using a calculator when appropriate.

8.1.4 use powers, squares, and square roots to solve problems.

8.1.5 solve consumer application problems including rates, tips, discounts, sales tax and interest.

8.1.6 use estimation techniques with whole numbers, decimals, percent, fractions and mixed numbers to solve and verify solutions in application problems.

8.1.7 solve application problems with whole numbers, decimals, fractions, percents and integers.

8.1.8 develop computational strategies based on the commutative, associative, and identity properties with emphasis on the inverse and distributive properties.

Performance Descriptors

- **Distinguished**
  Eighth grade students performing at the distinguished level apply properties and solve problems involving pi, non-repeating decimals, scientific notation, powers, and square roots. Students solve complex application problems and justify solutions in a clear concise manner.
- **Mastery**
  Eighth grade students performing at mastery level apply properties and solve problems involving pi, non-repeating decimals, scientific notation, powers, and square roots. Students solve consumer application problems.
- **Partial Mastery**
  Eighth grade students performing at partial mastery level identify properties and solve problems involving rational numbers and solve simple application problems.
- **Novice**
  Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Algebra

Students will:

- demonstrate understanding of patterns, relations, and functions;
- represent and analyze mathematical situations and structures using algebraic symbols;
- use mathematical models to represent and understand quantitative relationships; and
- analyze change in various contexts

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Algebra Objectives Students will:	Performance Descriptors
8.2.1 use order-of-operations and exponents rules to solve application problems with numerical and algebraic expressions containing whole numbers, integers, absolute value, fractions and exponents. 8.2.2 solve one and two step linear equations and inequalities with integers, fractions, and decimal solutions using paper and pencil, and graphing calculators. 8.2.3 use ratio and proportion to create and solve equations. 8.2.4 add and subtract polynomials. 8.2.5 apply algebraic equations and expressions to solve application problems. 8.2.6 apply inductive and deductive reasoning to write a rule from data in a function table. 8.2.7 graph linear equations and inequalities within the Cartesian coordinate plane using ordered pairs, table of values, graphing calculators and dynamic geometry software. 8.2.8 formulate and apply a rule to generate a arithmetic, geometric and algebraic pattern. 8.2.9 determine the slope of a line given two-points or slope/y-intercept equation (y=mx+b). 8.2.10 represent and solve real world problems appropriate for 8th grade using multiple strategies.	■ **Distinguished** Eighth grade students performing at distinguished level solve two-step linear equations and inequalities, and graph linear equations and inequalities. Students select and apply algebraic equations, ratio and proportion, and function rules to solve complex application problems and explain solutions in a clear concise manner. ■ **Mastery** Eighth grade students performing at mastery level solve two-step linear equations and inequalities, and graph linear equations and inequalities. Students select and apply algebraic equations, ratio and proportion, and function rules to solve application problems. ■ **Partial Mastery** Eighth grade students performing at partial mastery level solve two-step linear equations, graph linear equations, and solve problems using ratio and proportion. ■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Measurement

Students will:

- demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement; and
- apply appropriate techniques, tools and formulas to determine measurements

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Measurement Objectives Students will:	Performance Descriptors
8.3.1 estimate and solve application problems involving perimeter, area, surface area and volume of plane and solid geometric figures. 8.3.2 use the concept of volume for cone and pyramids as one-third the product of the area of the base and the height). 8.3.3 solve problems involving missing measurements in plane and solid geometric figures using formulas and drawings including irregular figures, models or definitions. 8.3.4 solve right triangle problems using the Pythagorean Theorem, indirect measurement and definitions.	■ **Distinguished** Eighth grade students performing at distinguished level solve complex application problems involving perimeter, area, surface area, volume, and missing measurements of geometric figures and give solutions in appropriate units explaining solutions in a clear concise manner. Students determine slope of a line given two points and the slope-intercept form of an equation of a line. Students apply the Pythagorean Theorem to solve problems explaining solutions in a clear concise manner.

	■ **Mastery** Eighth grade students performing at mastery level solve application problems involving perimeter, area, surface area, volume, and missing measurements of geometric figures and give solutions in appropriate units. Students determine slope of a line given two points and the slope-intercept form of an equation of a line. Students apply the Pythagorean Theorem to solve problems. ■ **Partial Mastery** Eighth grade students performing at partial mastery level solve simple application problems involving perimeter, area, surface area and volume of geometric figures; calculate slope of a line given two points or slope intercept form of an equation of a line; and calculate length of a side using the Pythagorean Theorem. ■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geometry

Students will:

- analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships;
- specify locations and describe spatial relationships using coordinate geometry and other representational systems;
- apply transformations and use symmetry to analyze mathematical situations; and
- solve problems using visualization, spatial reasoning, and geometric modeling

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Geometry Objectives Students will:	**Performance Descriptors**
8.4.1 investigate the relationship between corresponding, alternate interior, and alternate exterior angles when parallel lines are cut by a transversal using models, pencil/paper and graphing calculator. 8.4.2 classify polyhedrons according to the number and shape of faces; determine the relationship between vertices, faces and edges. 8.4.3 construct perpendicular and angle bisectors. 8.4.4 create geometric patterns including tiling, art design, tessellations and scaling using transformations (rotations, reflections, translations).	■ **Distinguished** Eighth grade students performing at distinguished level create and describe scale models and geometric patterns, solve problems using angle relationships formed by parallel lines cut by a transversal, construct angle bisectors and transformations, and identify relationships between faces, vertices and edges in polyhedra.

8.4.5 use coordinate geometry to represent and examine properties of similar and congruent figures and graph transformations. 8.4.6 create scale models including transformations, ratio, proportion and similar figures using pencil/paper and dynamic geometry software.	■ **Mastery** Eighth grade students performing at mastery level solve problems involving scale models, similar figures, and geometric patterns. Students determine angle relationships when parallel lines are cut by a transversal and construct angle bisectors and transformations. Students identify relationships between faces, vertices and edges in regular polyhedra. ■ **Partial Mastery** Eighth grade students performing at the partial mastery level solve problems with scale models and simple geometric patterns, and determine angle relationships when parallel lines are cut by a transversal. ■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Data Analysis and Probability

Students will:

- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them;
- select and use appropriate statistical methods to analyze data; develop and evaluate inferences and predictions that are based on models; and
- apply and demonstrate an understanding of basic concepts of probability

through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Data Analysis and Probability Objectives Students will:	**Performance Descriptors**
8.5.1 use appropriate technology to solve application problems involving combinations and permutations. 8.5.2 investigate the experimental probability and theoretical probability of an event. 8.5.3 create and extrapolate information from multiple-bar graphs, box and whisker plots, and other data displays using appropriate technology. 8.5.4 analyze problem situations, games of chance, and consumer applications using statistical samplings to determine odds and make predictions. 8.5.5 draw inferences and construct convincing arguments, including misuses of statistical or numeric information, based on data analysis.	■ **Distinguished** Eighth grade students performing at distinguished level extrapolate information to make predictions about data samples and calculate probabilities for compound events. ■ **Mastery** Eighth grade students performing at mastery level solve application problems involving combinations, permutations, games of chance, and statistical samplings. Students, given the results of experiments, calculate the experimental and theoretical probabilities of simple events. ■ **Partial Mastery** Eighth grade students performing at the partial mastery level calculate factorials and theoretical probability of a simple event. Students collect data from a probability experiment.

	■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Algebra/Geometry Preparation Objectives

Algebra/Geometry preparation is an elective course designed to be a bridge between the concrete elementary curriculum and the more formal mathematics curriculum ahead. In this course students will explore algebraic concepts in an informal way to build a foundation for subsequent formal study of algebra. Such informal explorations should emphasize physical models, data, graphs, and other mathematical representations rather than facility with formal algebraic manipulations. The study of geometry is to assist students to represent and make sense of the world. Geometric models will provide a perspective from which students are to analyze and solve problems, and geometric interpretations are to help make abstract representations more easily understood. The study of geometry at this level should simply provide increased opportunities for students to engage in more systematic explorations. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Algebra/Geometry Preparation Objectives

Students will:

AGP.1	identify and use properties of numbers (commutative, associative, distributive, etc).
AGP.2	add, subtract, multiply, and divide decimals, integers, fractions and mixed numbers.
AGP.3	use order relations to compare, order, or locate whole numbers, integers, fractions, and decimals on a number line.
AGP.4	read, interpret, and construct graphs to solve problems.
AGP.5	use data to determine mean, median, mode, and range.
AGP.6	find the probability of complementary events and exclusive events.
AGP.7	estimate, measure, and perform operations involving length, mass, and capacity using customary and metric units.
AGP.8	use a protractor to measure and draw angles.
AGP.9	use a compass to construct congruent angles, bisect angles, and bisect line segments.
AGP.10	estimate and find circumference and area of a circle.
AGP.11	estimate and find the area and perimeter of polygons
AGP.12	estimate and find the surface area and the volume of three-dimensional figures.
AGP.13	identify angle relationships: complementary, supplementary, vertical, and adjacent.
AGP.14	identify angle relationships; involving parallel lines and apply in solving problems (corresponding angles, alternate interior angles, and alternate exterior angles).
AGP.15	investigate similar triangles and apply proportions in problem solving situations.
AGP.16	develop and explore circle relationships, emphasizing the vocabulary of circles.
AGP.17	substitute values, evaluate expressions involving variables, and calculate formulas to solve application problems.
AGP.18	solve equations with at least two operations.

Algebra I Objectives

Algebra I is a course that provides the gateway to all higher mathematics courses. This course uses a conceptual approach to mathematics and does not focus on algorithmic methods. Algebraic representations will be used to generalize, and the algebraic method will be viewed as a problem-solving tool. In planning for instruction, consideration should be given to the student's readiness for abstract concepts. Manipulatives, such as algeblocks, should be used to bridge the gap from the concrete to the abstract. Available technology such as calculators, computers, and graphing utilities are to be used as tools to enhance learning. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Algebra I Objectives

Students will:

AI.1	evaluate algebraic expressions using grouping symbols, order of operations and properties of real numbers with justification of steps.
AI.2	solve multi-step linear equations in one variable and apply skills toward solving practical problems.
AI. 3	solve multi-step linear inequalities in one variable, interpret the results on a number line and apply the skills toward solving practical problems.
AI. 4	solve literal equations for a given variable and apply the skills toward solving practical problems.
AI. 5	analyze a given set of data for the existence of a pattern numerically, algebraically and graphically; determine the domain and range; and determine if the relation is a function.
AI. 6	solve absolute value equations in one variable and interpret the results on a number line.
AI. 7	use the laws of exponents to perform operations on expressions with integral exponents.
AI. 8	determine the slope of a line given an equation of a line, the graph of a line and two points to be identified.
AI. 9	graph linear equations using slope-intercept, point slope, and x- and y-intercepts.
AI.10	write an equation of a line given a graph of a line, two points on the line, the slope and a point, and the slope and y-intercept.
AI.11	solve systems of linear equations numerically and graphically, by the elimination method and by the substitution method.
AI.12	add and subtract polynomials.
AI.13	multiply and divide binomials by binomials or monomials.
AI.14	factor polynomials by using appropriate methods.
AI.15	estimate and simplify square roots into both exact and approximate forms.
AI.16	solve quadratic equations by graphing, factoring and quadratic formula.
AI.17	add, subtract, multiply and divide simple rational expressions.
AI.18	collect, organize, interpret data and predict outcomes using the mean, mode, median, range and standard deviation.
AI.19	perform a linear regression and use the results to predict specific values of a variable, and identify the equation for the line of regression.
AI.20	predict the outcomes of simple events using the rules of probability.
A1.21	use process (flow) charts and histograms, scatter diagrams and normal distribution curves in order to perform statistical process (quality) control.

Applied Mathematics I Objectives

Applied Mathematics I and Applied Mathematics II reflect the content of a complete course in Applied Mathematics. Applied Mathematics I is the first half of the Applied Mathematics course. One Applied Mathematics credit will be given for successful completion of this course. Upon successful completion of both courses, Algebra I credit will be given. Applied Mathematics I is a lab-based course taught with teacher-led, concrete activities. This course is designed to develop algebraic concepts applicable in the work place as well as in traditional areas. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Applied Mathematics I Objectives

Students will:

AM1.1	solve practical problems involving computation using estimation.
AM1.2	write numbers in scientific notation and combine numbers written in scientific notation to solve practical problems.
AM1.3	distinguish between counting and measuring using micrometers, calipers and other precision tools to make measurements.
AM1.4	solve practical problems and interpret results using rational numbers and vectors.
AM1.5	evaluate algebraic expressions using grouping symbols, order of operations and properties of real numbers with justification of steps.
AM1.6	translate word phrases into algebraic expressions or word sentences into equations and inequalities.
AM1.7	justify steps in the solving of equations based on the properties of real numbers.
AM1.8	solve literal equations for a given variable and apply the skills toward solving practical problems.
AM1.9	solve practical problems using a four-step problem solving approach.
AM1.10	solve multi-step linear equations in one variable and apply skills toward solving practical problems.
AM1.11	solve multi-step linear inequalities in one variable, interpret the results on a number line and apply the skills toward solving practical problems.
AMI.12	solve absolute value equations in one variable and interpret the results on a number line.
AM1.13	collect, organize, interpret data, and predict outcomes using the mean, mode, median, range and standard deviation.
AM1.14	estimate and simplify square roots into both exact and approximate forms.
AM1.15	use the laws of exponents to perform operations on expressions with integral exponents.
AM1.16	predict the outcomes of simple events using the rules of probability.

Applied Mathematics II Objectives

Applied Mathematics II is the second half of the Applied Mathematics course. Upon successful completion of both courses, Algebra I credit will be given. Algebraic concepts will be taught using laboratory activities based on several strategies that include the use of the graphing calculator. Working in groups will be used to develop problem solving skills and social skills needed in the work place as well as in traditional areas. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Applied Mathematics II Objectives

Students will:

AM2.1	analyze a given set of data for the existence of a pattern numerically, algebraically and graphically; determine the domain and range; and determine if the relation is a function.
AM2.2	determine the slope of a line given an equation of a line, the graph of a line and two points to be identified.
AM2.3	graph linear equations using slope-intercept, point slope, and x- and y-intercepts.
AM2.4	write an equation of a line given graph of a line, two points on the line, the slope and a point, and the slope and y-intercept.
AM2.5	solve systems of linear equations numerically and graphically, by the elimination method and by the substitution method.
AM2.6	add and subtract polynomials.
AM2.7	multiply and divide binomials by binomials or monomials.
AM2.8	factor polynomials by using appropriate methods.
AM2.9	solve quadratic equations by graphing, factoring and quadratic formula.
AM2.10	add, subtract, multiply and divide simple rational expressions.
AM2.11	use process (flow) charts and histograms, scatter diagrams, and normal distribution curves in order to perform statistical process (quality) control.
AM2.12	perform a linear regression and use the results to predict specific values of a variable. Identify the equation for the line of regression.

Geometry and Applied Geometry Objectives

Geometry is a course designed for students who have successfully completed the objectives for Algebra I. The study of geometry should include experiences and activities that foster in students a feeling for the value of geometry in their lives. Students should be encouraged to develop conjectures by inductive processes using manipulatives and computer software. Cooperative learning groups are particularly effective in allowing students to become proficient in analyzing conjectures and in formulating proofs. Emphasis should be placed on applications to the work place and everyday life and on connections to other branches of mathematics and other disciplines. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Applied Geometry is a course for students who have successfully completed the objectives of Algebra I. Upon completion of this course a geometry credit will be given. Applied Geometry will use manipulatives to enhance the understanding of geometric concepts and terminology. Working in groups will allow students to analyze applications of geometry in their lives and in the work place. Concepts will be taught using laboratory activities including the use of technology as a learning tool. The objectives for Applied Geometry will be the same as those for Geometry. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Geometry Objectives

Students will:

- G.1 represent points, lines, and planes pictorially with proper identification, as well as basic concepts derived from these undefined terms, such as segments, rays and angles.
- G.2 differentiate between inductive and deductive reasoning.
- G.3 use the basic concepts of symbolic logic including identifying the converse, inverse, and contrapositive of a conditional statement and testing the validity of conclusions with Venn Diagrams.
- G.4 construct logical arguments in formal and informal methods with direct and indirect reasoning.
- G.5 apply definitions, theorems, and postulates related to such topics as complementary, supplementary, and vertical angles and angles formed by perpendicular lines.
- G.6 explore the relationship between angles formed by two lines cut by a transversal when lines are and are not parallel, and use the results to develop methods to show parallelism.
- G.7 investigate and verify congruence relationships in triangles.
- G.8 explore and identify properties of quadrilaterals and verify the properties for parallelograms, rectangles, rhombuses, squares, and trapezoids.
- G.9 investigate measures of angles and lengths of segments to determine the existence of triangles (triangle inequality) and the order of sides and angles.
- G.10 apply properties of similar triangles to determine inaccessible heights and distances, construct scaled drawings, and derive the basis for the trigonometric ratios.
- G.11 using trigonometric ratios, determine lengths of sides and measures of angles in right triangles.
- G.12 apply the Pythagorean Theorem and its converse in solving practical problems and in deriving the special right triangle relationships.
- G.13 investigate measures of angles formed by chords, tangents, and secants of a circle and the relationship to its arcs.
- G.14 given a polygon, find angle measures of interior and exterior angles; find length of sides from given data; and use properties of regular polygons to find missing data.
- G.15 develop properties of tessellating figures and use those properties to tessellate the plane.
- G.16 develop and apply formulas for area, perimeter, surface area, and volume and apply them in the modeling of practical problems.
- G.17 develop concepts of analytical geometry such as formulas for distance, slope, and midpoint and apply these to finding dimensions of polygons on the coordinate plane.
- G.18 using various methods, construct a triangle's medians, altitudes, angle and perpendicular bisectors; make conjectures and develop mathematical arguments about their relationships.
- G.19 using transformational geometry, create a reflection, translation, rotation, glide reflection and dilation of a figure; and apply transformations and use symmetry to analyze mathematical situations.
- G.20 compare and contrast other geometry to Euclidean geometry.
- G.21 find or approximate the area of irregularly shaped regions.
- G.22 using the Cartesian coordinate system, find the dimensions of a polygon, given the coordinates of the polygon.

Algebra II Objectives

Listed below are the objectives for Algebra II. It is an underlying assumption that a mastery of Algebra I has been achieved since Algebra II continues the study of concepts introduced in Algebra. Graphing calculators are an integral part of instruction in the Algebra II objectives. Students will have the opportunity to make conjectures and test them by using any graphing utility. Manipulatives and other available technology will be used as appropriate. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Algebra II Objectives

Students will:

A2.1	write equations of lines given various information including parallel and perpendicular lines and vertical and horizontal lines.
A2.2	factor higher order polynomials by applying various methods including factoring by grouping and the sum and difference of two cubes.
A2.3	define and use i to develop the complex number system; simplify powers and products of i.
A2.4	perform basic operations with complex numbers and give answers in simplest form .
A2.5	simplify radicals and expressions involving fractional exponents and convert between the two forms .
A2.6	solve quadratic equations over the set of complex numbers: apply the techniques of factoring and completing the square and the quadratic formula; use the discriminate to determine the nature of the roots; confirm the solutions numerically and graphically; and apply to practical problems.
A2.7	define the components of a matrix: develop and use the appropriate field properties by adding, subtracting, and multiplying; solve a system of linear equations using matrices; and apply skills toward solving practical problems.
A2.8	solve equations containing radicals and exponents.
A2.9	define a function: find the domain, range, zeros; find the inverse of a function; find the value of a function for a given element in its domain; and perform basic operations on functions including composition of functions.
A2.10	explore basic families of functions: recognize linear, quadratic, absolute value, step, and exponential functions; and convert among graphs, tables and equations.
A2.11	solve quadratic inequalities and graph their solution sets.
A2.12	solve and graph the solution set of systems of linear inequalities in two variables by finding the maximum and minimum values of a function over a region using linear program techniques
A2.13	solve practical problems involving direct, inverse, and joint variation.
A2.14	explore the conic sections: recognize, identify, and sketch the graphs of a parabola, circle, ellipse, and hyperbola; and convert between graphs and equations.
A2.15	solve absolute value equations and inequalities graphically, numerically, and algebraically.
A2.16	define a logarithmic function: transform equations from exponential form into logarithmic form; and apply the basic properties of logarithms to simplify or expand an expression.
A2.17	perform a quadratic regression and use the results to predict specific values of a variable. Identify the regression equation.

Conceptual Mathematics Objectives

Conceptual Mathematics is a one-year course for students who have successfully completed the objectives for geometry. This course will include major topics from algebra and geometry and will extend these ideas to practical usage. Basic ideas of probability and statistics and the mathematics of finance will also be included. These, along with other ideas, will be presented in the context of their historical development. Students will be encouraged to be active learners either in cooperative groups or as individuals. It is the purpose of this course to expose students to topics in mathematics that are relevant to any educated person. Full integration of graphing calculators and computer applications such as spreadsheets, database, and Internet use, is essential to effectively master the objectives of this course. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Conceptual Mathematics Objectives

Students will:

CM.1 develop a variety of problem solving strategies (e.g., draw a diagram, look for a pattern, and work backwards).

CM.2 relate mathematical content to its historical development.

CM.3 integrate other disciplines into the study of mathematics through simulations, research, and projects

CM.4 interpret graphs of functions (i.e., linear, quadratic, exponential).

CM.5 solve application problems using linear, quadratic and exponential functions with emphasis on data collection and analysis.

CM.6 use appropriate formulas to solve workplace problems.

CM.7 apply concepts of geometry including the Pythagorean Theorem, similar triangles, and right triangle trigonometry.

CM.8 solve workplace problems involving perimeter, area, surface area and volume.

CM.9 investigate the applications of various geometric shapes and patterns to art, architecture, and nature.

CM.10 determine possible outcomes using tree diagrams and the counting principles of permutations and combinations.

CM.11 apply the basic probability rules in expressing the chances of events occurring using technology when appropriate.

CM.12 create and interpret data using various methods of displaying numerical data, including frequency distributions, graphs, histograms, stem-and-leaf plots, and box-and-whiskers plots, using technology when appropriate.

CM.13 relate the measures of central tendency and the measures of dispersion to a normal distribution.

CM.14 apply the measures of central tendency and the measures of dispersion to workplace situations.

CM.15 use statistical tools for workplace applications such as quality control, marketing and predicting trends.

CM.16 calculate costs, simple and compound interest, finance charges, loan payments and taxes.

CM.17 compare various methods of investing money.

Trigonometry Objectives

Trigonometry is designed for students who have successfully completed Algebra II. Connections between right triangle trigonometry and circular functions should be emphasized. Graphing utilities such as calculators and computers will be used to enhance student learning and to aid in finding the values of trigonometric functions and their inverses. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Trigonometry Objectives

Students will:

T.1 define the six trigonometric functions in terms of a right triangle and find the values of the functions of an angle in standard position, given a point on the terminal side of the angle. Circular function definitions will be connected with trigonometric function definitions .

T.2 find the values of the other trigonometric functions, given the value of one trigonometric function.

T.3 develop recall of the values of the six trigonometric functions of special angles as related to the unit circle.

T.4 use a calculator to find the values of the trigonometric functions for any angle and to find the measure of an angle given the value of one of its trigonometric functions.

T.5	convert angle measures from radians to degrees and vice versa.
T.6	verify trigonometric identities by making substitutions and recalling basic identities.
T.7	solve trigonometric equations that include both infinite solutions and solutions with a restricted domain.
T.8	find the value of inverse trigonometric functions.
T.9	find the area of a triangle given the measures of two sides and the included angle or the measures of three sides (Heron's formula).
T.10	express complex numbers in polar form: perform operations including adding, subtracting, multiplying, and dividing; evaluate powers and roots of complex numbers using De Moivre's Theorem; and graph complex numbers.
T.11	solve practical problems involving triangles using the trigonometric functions, the Pythagorean Theorem, the Law of Sines, and the Law of Cosines.
T.12	recognize the graph of the six trigonometric functions. Given an equation in the form of y=aSin(bx+c)+d, identify the domain and range; determine the period, phase shift, amplitude and vertical shift; and sketch at least one period of the graph.
T.13	model periodic data sets using graphs, tables, and equations.
T.14	recognize and graph the inverse of trigonometric functions. Restrictions on the domain will be included.
T.15	develop and use formulas such as sum or difference of two angles, double-angle, and half-angle.
T.16	perform mathematical operations with vectors and use vectors to solve practical problems.

Probability and Statistics Objectives

Probability and Statistics is one of the most important branches of the mathematical sciences. Knowledge of these topics is critical to decision-making and to the analysis of data. Using concepts of probability and statistics, individuals are able to predict the likelihood of an event occurring, organize and evaluate data, and identify the significance of statements. Connections between content and applications to the students' world will be emphasized. Graphing utilities such as calculators and computers will be used to enhance student learning and to aid in the solution of practical problems. Prerequisites for this course are successful completion of Algebra II and Geometry. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Probability and Statistics Objectives

Students will:

PS.1	distinguish between experimental and theoretical probability.
PS.2	create and interpret data using various methods of displaying circle graphs, histograms, and frequency curves, and make predictions about outliers.
PS.3	determine possible outcomes using tree diagrams and the counting principles of permutations and combinations.
PS.4	express the chances of events occurring either in terms of a probability or odds.
PS.5	use the normal distribution and the binomial distribution including pascal's triangle, to determine probability of events.
PS.6	interpret and calculate measures of central tendency (mean, median, and mode) from data presented in a variety of forms such as charts, tables, and graphs or from data created through experimentation.
PS.7	interpret and calculate measures of dispersions (range and standard deviation) from data presented in a variety of forms such as charts, tables and graphs or from data created through experimentation.

PS.8	describe individual performances in terms of percentiles, z-scores, and t- scores.
PS.9	describe the role of sampling, randomness, bias, and sample size in data collection and interpretation.
PS.10	explain and illustrate the use and misuse of statistics.
PS.11	test the validity of a hypothesis using appropriate statistical concepts.
PS.12	determine the correlation values for given data or for data generated by students and use the results to describe the association of the variables within the given data. Identify whether this association is systematic or predictable.
PS.13	calculate the Chi-Square values for a given population.
PS.14	perform a t-test for a designated set of data, and use the results to test the validity of a hypothesis.
PS.15	perform a regression analysis on a set of data, either given or created through experimentation, and use the results to predict specific values of a variable. Identify the regression equation.
PS.16	perform an analysis of variance (ANOVA) and interpret the results.

Pre-calculus Objectives

Pre-calculus is intended for students who have mastered the concepts of Algebra II. It will extend students' knowledge of functions as well as provide appropriate preparation for a calculus course. Available technology will be used by students and teachers to enhance learning. Graphing utilities are powerful tools for solving and verifying equations and inequalities. They also aid in investigating functions and their inverses. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Pre-calculus Objectives

Students will:

PC.1	investigate and sketch the graphs of polynomials and rational functions using the characteristics of zeros, upper and lower bounds, y-intercepts, symmetry, asymptotes and end behavior, maximum and minimum points and domain and range.
PC.2	solve higher order polynomial equations utilizing techniques such as Descartes' Rule of Signs, upper and lower bounds, and Rational Root Theorem.
PC.3	expand binomials with positive integral exponents by the use of Pascal's triangle and the Binomial Theorem.
PC.4	establish the relationship between exponential and logarithmic functions; graph related functions and include their domain and range.
PC.5	solve equations and practical problems involving exponential and logarithmic expressions: include natural and common logarithms; use laws of exponents; and confirm solutions graphically and numerically.
PC.6	solve problems involving the sum of finite and infinite sequences and series. Sigma (summation) notation will be included.
PC.7	find the limit of a function, a sequence, or a series by graphing, intuitive reasoning, algebraic methods, and numerical substitution.
PC.8	perform mathematical operations with vectors and use vectors to solve practical problems.
PC.9	apply the method of mathematical induction to prove formulas and statements.
PC.11	graph functions and conic sections using translation.
PC.12	investigate properties and solve practical problems of the conic sections.
PC.13	perform a regression analysis on a set of data and use the results to predict specific values of a variable. Identify the regression equation.

READING AND ENGLISH LANGUAGE ARTS

The Reading and English Language Arts content standards, objectives, and performance descriptors develop in three major strands: 1) reading, 2) writing, 3) listening, speaking and viewing. Each strand provides a clear description of what the student in each grade K-12 should know and be able to do. The curriculum through the grade levels is sequential to allow for foundational content and continues in a spiraling effect in order to ensure a rigorous and challenging program of studies for all students.

References to support the development of the Reading and English Language Arts curriculum include International Reading Association, National Council of Teachers of English, West Virginia Instructional Goals and Objectives, and a multitude of national research. Each reference was reviewed and its relevance in producing a solid curriculum for West Virginia students was determined.

Considerations in the development of the Reading and English Language Arts K-12 curriculum included the rigor and challenge that the curriculum would provide students. The curriculum through the grade levels is sequential to allow for foundational content and continues in a spiraling effect in order to ensure a complete mastery of each strand. The Reading and English Language Arts program emphasizes attention to multicultural education which is particularly evident throughout the reading strand. A crucial component of the curriculum involves use of the language arts across all curriculum disciplines as these skills are essential in comprehending any curricular area.

West Virginia's vision for education includes the integration of technology throughout the curriculum so that all West Virginia students have the opportunity to develop technology skills that support learning. Successful learning environments provide opportunities for students to use education technology interwoven with relevant curricular content. West Virginia teachers are responsible for integrating technology appropriately in the students' learning environment.

The three major content standards have defined objectives which explain what the student should know. The examples (e.g.) provided with many of the objectives further clarify skills appropriate to that objective. The examples are not intended to be all inclusive but serve as a guide for the mastery of the objective at the particular grade level. The teacher is strongly encouraged to review the objectives of the previous grade level to serve as a starting point for review and maintenance in the sequential, spiraling curriculum.

The content standards, objectives, and performance descriptors defined herein will serve to ultimately promote a more literate West Virginia society.

Reading and English Language Arts Content Standards K-12

Standard 1: Reading
Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Standard 2: Writing
Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Standard 3: Listening, Speaking, and Viewing
Students will apply their use of spoken, written, and/or visual language to communicate with:

- a variety of audiences; and
- for different purposes.

Kindergarten Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts for the kindergarten student will be an immersion in a print-rich environment to develop an awareness and understanding of spoken and written language. This awareness will be explored through reading, writing, listening, speaking, and viewing which will begin to develop lifelong learning skills. Appropriate literature and language experience, coupled with active student participation, will support this development. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives

Students will:

K.1.1 identify that words are made of phonemes (c/a/t).
K.1.2 identify the sounds in a one-syllable word (play = p/l/a).
K.1.3 recognize and manipulate onset and rime (word families).
K.1.4 use basic elements of phonetic analysis (e.g. common letter/sound relationships; beginning/ending consonant sounds; short/long vowel sounds; word patterns).
K.1.5 recognize and name all lower/upper case letters in random order.
K.1.6 identify level appropriate sight words and vocabulary words (e.g. color words; number words; positional words - top, bottom, in, out; high frequency words - I, it; words for person, places, things, and actions).
K.1.7 recognize basic comprehension concepts (e.g. main idea; setting; characters; sequence; retelling; predicting).
K.1.8 recognize that print conveys meaning (e.g. know that printed letters and words represent spoken language).
K.1.9 recognize how print is organized and read (e.g. front of book; title; hold book correctly; follow words from left to right and top to bottom of page; turn pages left to right; one to one match - print and voice; know the difference between words and letters).
K.1.10 establish a purpose for reading (e.g. for information, for pleasure).
K.1.11 identify author=s purpose (e.g. to persuade, to inform).
K.1.12 make connections in literary work and people in own life and other cultures (e.g. characters; events).
K.1.13 use reading skills and strategies to understand a variety of informational resources to support literacy learning (e.g. environmental print, written directions; signs; captions; labels; technology).
K.1.14 increase amount of independent reading.

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

K.2.1 demonstrate knowledge of conventions of print (e.g. correct directionality; proper writing position; print some upper/lower case letters of the alphabet and numerals 0-9; uniformity in print; write own first and/or last name).

K.2.2 begin to compose written works using appropriate parts of the writing process (e.g. initial attention to planning and drafting; class and individual publishing).

K.2.3 use writing and other methods for self-expression (e.g. drawing pictures; using letters or phonetically spelled words; telling; dictating; making lists).

K.2.4 use a variety of sources to gather information in sharing thoughts and ideas(e.g. pictures; charts; videos; television programs; graphs; computers).

K.2.5 use conventions of spelling in written compositions (e.g. use letter/sound relationships to spell independently; spell some high frequency words appropriate to grade level).

K.2.6 use conventions of capitalization in written compositions (e.g. first and last names; first word of sentence; pronouns).

K.2.7 recognize and use conventions of punctuation in written composition (e.g. period and question mark).

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives

Students will:

K.3.1 listen, recite, and respond to familiar stories, poems, nursery rhymes, songs, and stories with repeated patterns.

K.3.2 understand the main idea or message in visual media (e.g. pictures; cartoons; weather reports; newspaper photos; visual narratives.)

First Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts for the first grade student will be an immersion in a literature-rich environment to develop an awareness of print materials as sources of information and enjoyment. The student will grow in language development through reading, writing, listening, speaking, and viewing that will become lifelong skills. First grade students will learn from reading authentic literature such as fiction, non-fiction, and poetry that reflects cultures, experiences, and ideas. The curriculum will encourage and support active participation by the learner. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives

Students will:

1.1.1 blend or segment the phonemes of most one-syllable words.

1.1.2 Substitute, delete, and manipulate beginning and ending phonemes.

1.1.3 develop a rhythm and rhyme of words (e.g. nursery rhymes; songs; poems; tongue twisters).

1.1.4 use basic elements of phonetic analysis to decode unknown words (sound relationships; beginning/ending consonants; vowel sounds; blends).

1.1.5 use basic elements of structural analysis to decode unknown words (e.g. basic prefixes/suffixes; compound words; root words; spelling patterns; contractions).

1.1.6 understand level appropriate sight words and vocabulary (e.g. high frequency words such as said, was, and where; antonyms - hot, cold; synonyms - rock, stone; multiple meaning words - ball).

1.1.7 use a variety of context clues to determine word meanings (e.g. prior knowledge; reading ahead).

1.1.8 recognize basic comprehension concepts (e.g. story elements; main idea; sequence; cause/effect; prediction).

1.1.9 respond to both literal and interpretive comprehension questions after reading a short story selection that is developmentally appropriate.

1.1.10 explain how print is organized and read (e.g. author; illustrator; difference between letters - words - sentences; aware of the use of capitalization and punctuation as text boundaries).

1.1.11 use meaning clue to aid comprehension and make predictions about content (e.g. pictures; picture captions; title; cover; story structure; story topic; action; events).

1.1.12 read with accuracy and comprehension instructional level texts designed for the first grade to use self-correction strategies (e.g. search for cues; identify miscues; reread; ask for help).

1.1.13 read aloud familiar stories, poems, and passages with fluency and expression (e.g. rhythm, flow, meter, tempo, pitch, tone, intonation) and self-select a variety of literary works.

1.1.14 establish purpose for reading (e.g. for information; for pleasure; to identify a specific viewpoint).

1.1.15 make connections in literary work and people in own life and other cultures (e.g. events; characters; conflicts).

1.1.16 use reading skills and strategies to understand a variety of informational resources to support literacy learning (e.g. environmental print; written directions; signs; captions; labels; informational books).

1.1.17 increase amount of independent reading.

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

1.2.1 use conventions of print (e.g. correct directionality; proper writing position; print upper/lower case letters of the alphabet and numerals; demonstrate uniformity in print; write own first and last name).

1.2.2 compose written works using appropriate parts of the writing process (e.g. initial attention to planning; drafting; rereading for meaning; some self correction; class and individual publishing).

1.2.3 develop a simple story with appropriate sequence (e.g. beginning; middle; end).

1.2.4 Write in a variety of forms or genres (e.g. journal writing; written response to literature; writing poems).

1.2.5 use a variety of sources to gather information to share thoughts and ideas (e.g. informational books; pictures; charts; indexes; videos; television programs; graphs; computers).

1.2.6 use conventions of spelling in written composition (e.g. letter/sound relationships; high frequency words from appropriate grade level list; transition from invented spelling to conventional spelling).

1.2.7 use conventions of capitalization in written composition (e.g. days of week; months of year; names of people; special places; differentiation between common and proper nouns).

1.2.8	use conventions of punctuation in written composition (e.g. period; question mark; exclamation mark).
1.2.9	use the mechanics of grammar in written composition (e.g. nouns; verbs; declarative and interrogative sentences).
1.2.10	use conventions of complete sentences in written composition (e.g. capitalize first word; include a noun and verb; ending punctuation).

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives

Students will:

1.3.1	identify the main idea of messages in visual media (e.g. pictures; cartoons; weather reports; newspaper photos; visual narratives.)
1.3.2	listen, recite, and respond to familiar stories, poems, nursery rhymes, songs, and stories with repeated patterns (e.g. retell in sequence; relate information to own life; describe character - setting - plot; engage in creative and dramatic play; imagine beyond the story).

Second Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts second grade students will continue to be immersed in a literature-rich environment to encourage exploration of various literary forms. The student will apply skills of reading, writing, listening, speaking, and viewing across the curriculum. Students will be able to read with comprehension to write, speak, and listen effectively and to develop both literal and critical thinking skills. Second graders will develop from dependent to independent readers and will begin to make their own choice for recreational and informative reading. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives

Students will:

2.1.1	use basic elements of phonetic analysis (e.g. syllabication; dipthongs; digraphs; variant vowel sounds such as r-controlled).
2.1.2	use basic elements of structural analysis to decode unknown words (e.g. syllables; prefixes; suffixes; root words; compound words; spelling patterns; contractions).
2.1.3	identify and use grade level appropriate sight words and reading vocabulary (e.g. high frequency words; homonyms - I, eye; homophones - read, read; multiple meaning words; synonyms; antonyms).
2.1.4	use a variety of context clues to decode unknown words (e.g. prior knowledge; read ahead; reread).
2.1.5	use reading skills and strategies to understand a variety of familiar literary passages and texts (e.g. fairy tales; folk-tales; fiction; nonfiction; poems; legends; fables; fantasies; chapter books).

2.1.6 use basic comprehension skills to understand a story (e.g., story elements; main idea; sequence; cause/effect; predicting; drawing conclusions; fact or opinion; summarizing; responding creatively to texts).

2.1.7 respond to both literal and interpretive comprehension questions after reading a short story selection that is developmentally appropriate.

2.1.8 use meaning clues to aid comprehension and make predictions about content (e.g., pictures; pictures captions; title; cover; heading; story structure; story topic; action; events; character's behavior).

2.1.9 read with accuracy and comprehension instructional level texts designed for the second grade and use self-correction strategies (e.g., search for cues; identify miscues; reread; ask for help).

2.1.10 read familiar stories, poems, and passages with fluency.

2.1.11 establish a purpose for reading (e.g., for information; for pleasure; to understand specific viewpoints; to follow directions).

2.1.12 describe author's purpose (e.g., to persuade, to inform).

2.1.13 make connections between characters or simple events in a literary work and in own life and other cultures (e.g., events; characters; simple conflicts; themes)

2.1.14 use reading skills and strategies to understand a variety of informational resources to support literacy learning (e.g., environmental print; written directions; signs; captions; labels; informational books).

2.2.15 increase amount of independent reading.

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

2.2.1 use conventions of print (e.g., maintain proper handwriting position; maintain appropriate position of hand/pencil and paper/desk for the correct transition between manuscript and cursive writing).
develop a story with proper sequence (e.g., beginning - middle - end containing a main idea and supporting details).

2.2.3 begin to use the five step writing process (e.g., graphic organizers for pre-writing; descriptive words and details for drafting and revising; use of age appropriate dictionaries for editing and publishing; conferencing to edit: punctuation; capitalization; spelling at developmentally appropriate level).

2.2.4 use a variety of sources to gather information to communicate with others (e.g., dictionaries; informational book; pictures; charts; indexes; videos; television programs; guest speakers; graphic organizers).

2.2.5 use conventions of spelling in written composition (e.g., spell high frequency words from appropriate grade level list; use letter/sound relationships to spell independently; spell phonetically irregular words - one, could, they; transition from invented to conventional spelling).

2.2.6 use conventions of capitalization in written composition (e.g., titles; initials; titles of written works; greeting and closing of a letter).

2.2.7 recognize and use conventions of punctuation in written composition: period (e.g., abbreviations, initials); comma (e.g., dates, greeting/closing of a letter, separate city - state - country, separate items in a list); quotation marks for direct quotes; apostrophe (e.g., contractions, singular possessives).

2.2.8 use the mechanics of grammar in written composition (e.g., correct subject/verb agreement; simple adjectives and adverbs).
write correctly formed and punctuated simple sentences (e.g., declarative; interrogative; exclamation).

Standard 3: Listening, Speaking and Viewing
Students will apply their use of spoken, written, and/or visual language to communicate with
- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives
Students will:

2.3.1 recognize the main idea or intended messages in visual media (e.g., pictures; cartoons; weather reports; newspaper photos; visual narratives).

2.3.2 listen, recite and respond to familiar stories, poems, and songs (e.g., retell in sequence; relate information to own life; describe character - setting - plot; engage in creative and dramatic play; imagine beyond the story).

Third Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts third grade students will learn, practice, and apply strategies focusing on preparing literate, independent, and self-motivated learners. Students will be engaged in reading and responding to a variety of literature using literal and critical comprehension skills. These learners will develop and, as critical thinkers, take responsibility for their own learning. The student will interact with and respond to text in purposeful situations across the curriculum. Proficiency in reading, writing, listening, speaking, and viewing will foster an appreciation for literature and will allow students to make connections between their personal experiences and academic disciplines. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading
Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:
- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives
Students will:

3.1.1 recognize level appropriate sight words and content vocabulary.

3.1.2 recognize level appropriate reading vocabulary (e.g. synonyms, antonyms, homonyms, multi-meaning words).

3.1.3 use reading skills and strategies to comprehend a variety of literary passages and texts (e.g. fairy tales, folk-tales; fiction; nonfiction; myths; poems; fables; fantasies; historical fiction; biographies; autobiographies; chapter books).

Performance Descriptors

- **Distinguished**
  Third grade students performing at the distinguished level read independently above grade level passages/texts to establish a purpose for reading, identify author's purpose, compare connections between characters or simple events in a literary work, and use reading skills and strategies to identify a variety of informational resources to support literacy learning.

3.1.4	use comprehension skills to understand a story (e.g. story elements; sequence; expository works; drawing conclusions; compare/contrast; predict; summarize; infer; paraphrase).	■ **Mastery** Third grade students performing at the mastery level read independently grade level literary texts using comprehension skills to identify story elements, sequence, expository works, draw conclusions, compare/contrast, predict, summarize, make inferences, paraphrase and recognize author's purpose. ■ **Partial Mastery** Third grade students performing at the partial mastery level read grade level passages/texts using basic comprehension skills to interpret a story. Students use meaning clues to aid comprehension and make predictions about content; apply self-correction strategies such as searching for cues, identifying miscues, rereads, self-question, and asking for help. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.
3.1.5	recognize the ways in which language is used in literary text (e.g. simile; metaphor; idioms).	
3.1.6	use graphic organizers and visualization techniques to interpret information (e.g. charts; graphs; diagrams).	
3.1.7	use meaning clues to aid comprehension and make predictions about content across the curriculum (e.g. action; events; story topic; behaviors).	
3.1.8	read with accuracy and comprehension instructional level texts designed for third grade and use self-correction strategies (e.g. search for cues; identify miscues; reread).	
3.1.9	read familiar stories, poems and passages with fluency and expression (e.g. rhythm; flow; meter; tempo; pitch; tone; intonation) and self-select a variety of literary works.	
3.1.10	explain a purpose for reading (e.g. for information; for pleasure; to understand a specific viewpoint)	
3.1.11	recognize author's purpose (e.g. to persuade; to inform).	
3.1.12	compare connections between characters or simple events in a literary work in own life and other cultures (e.g. events; characters; conflicts; themes).	
3.1.13	use reading skills and strategies to identify a variety of informational resources to support literacy learning (e.g. environmental print; written directions; signs; captions; labels; informational books).	
3.1.14	increase amount of independent reading.	

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

3.2.1 demonstrate proper manuscript and cursive writing techniques (e.g. posture; paper placement; pencil grip; letter formation; slant; letter size; spacing; rhythm; alignment).

3.2.2 use the five step writing process (e.g. graphic organizers for prewriting; descriptive words and details for drafting and revising; use of simple dictionaries for editing and publishing; conferencing to edit; punctuation; capitalization; and spelling at developmentally appropriate level).

3.2.3 use paragraph format to write compositions (e.g. beginning - middle - end; main ideas with relevant details; sentence variety - declarative, interrogative; descriptive and transitional words; indentations).

3.2.4 use a variety of strategies to plan research (e.g. identify possible topic by brainstorming; list questions; use idea webs; organize prior knowledge about a topic; develop a course of action for writing; determine how to locate necessary information).

3.2.5 use a variety of sources to gather information (e.g. use dictionaries; encyclopedias; newspapers).

3.2.6 use conventions of spelling in written composition (e.g. spell high frequency words form appropriate grade level list; use letter/sound relationships to spell independently; make structural changes to spell words correctly: spell irregular verbs and irregular plural nouns).

3.2.7 use conventions of capitalization in written composition (e.g. greeting - heading - closing of a letter; first word of a direct quotation).

3.2.8 use conventions of punctuation in written composition (e.g. commas in dates and addresses; greeting/closing of a letter; quotation marks around titles and direct quotations; apostrophes for contractions and possessive nouns).

3.2.9 write a grammatically correct sentence (e.g. correct subject/verb agreement with singular and plural nouns and verbs; correct use of regular and irregular verbs).

3.2.10 use specific mechanics of grammar in written composition (e.g. substitute pronouns for nouns; use pronoun agreements; adjectives; adverbs).

3.2.11 write correctly formed sentences avoiding run-on sentences.

Performance Descriptors

- **Distinguished**
  Third grade students performing at the distinguished level write a descriptive composition that details a beginning, middle, and ending using advanced language mechanics and grammar such as a variety of sentence structure, punctuation, and capitalization.
- **Mastery**
  Third grade students performing at the mastery level write a descriptive paragraph consisting of a beginning, middle, and end using language mechanics and grammar at grade level.
- **Partial Mastery**
  Third grade students performing at the partial mastery level write a three simple sentence paragraph consisting of a beginning, middle, and end using beginning capitalization, ending punctuation, and subject-verb agreement.
- **Novice**
  Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Listening, Speaking and Viewing
Students will apply their use of spoken, written, and/or visual language to communicate with
- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives Students will:	**Performance Descriptors**
3.3.1 listen and respond to familiar stories and poems (e.g., summarize and paraphrase to confirm comprehension; recount personal experiences; imagine beyond the literary form). 3.3.2 define different messages conveyed through visual media (e.g., main ideas and supporting details; facts and opinions; main characters; setting; sequence of events).	■ **Distinguished** Third grade students performing at the distinguished level listen and respond to stories and poems to paraphrase and experience beyond the literary form. Students analyze the characters, setting, and plot to determine the message through visual media. ■ **Mastery** Third grade students performing at the mastery level listen and respond to familiar stories and poems to summarize and recount personal experiences. Students determine messages through visual media to identify main idea and supporting details, fact and opinion, and sequence of events. ■ **Partial Mastery** Third grade students performing at the partial mastery level listen, recite, and respond to familiar stories and poems to retell the story in sequence and relate text to self. Students recognize the main idea or messages in visual media. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Fourth Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts fourth grade students will develop as readers and writers who are independent, self-motivated, and critical thinkers and take responsibility for their own learning. Students will learn to critically evaluate what they read; to express themselves clearly in speaking and writing; to gather and use information through a variety of sources; and to use listening as a reading strategy. Each of these strategies is to be applied in the content areas. At this level, children are provided with a variety of opportunities to interact with a wide range of literary forms, building the foundation for lifelong reading. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives Students will:	**Performance Descriptors**
4.1.1 identify level appropriate vocabulary (e.g. multiple meaning words; synonyms; antonyms; homonyms; content area vocabulary; context clues). 4.1.2 apply structural analysis and context clues to decode and encode words. 4.1.3 recognize the defining characteristics of a variety of literary forms and genres (e.g. fairy tales; folk-tales; fiction; nonfiction; myths; poems; fables; fantasies; biographies; autobiographies; chapter books). 4.1.4 use comprehension skills to understand literary works (e.g. summarize; story elements; skim and scan; define expository text; compare/contrast; imagery; paraphrase; compose personal response; infer; fact and opinion; sequence). 4.1.5 recognize the ways in which language is used in literary texts (e.g. simile; metaphor; idioms; analogies; and puns). 4.1.6 use graphic organizers and visualization techniques to interpret information (e.g. charts; graphs; diagrams; non-verbal symbols). 4.1.7 use meaning clues to aid comprehension and make predictions about content across the curriculum (e.g. pictures; picture captions; titles; headings; story structure; story topic; action - events - character behaviors). 4.1.8 read with accuracy and comprehension instructional level texts designed for the fourth grade and use self-correction strategies (e.g. search for cues; identify miscues; reread). 4.1.9 read orally and silently literary texts across the curriculum with fluent expression. 4.1.10 determine a purpose for reading across the curriculum. 4.1.11 summarize the author's purpose (e.g. to persuade; to inform; to determine a specific viewpoint).	■ **Distinguished** Fourth grade students performing at the distinguished level read independently above grade level passages/texts to explain the purpose for reading, identify figurative language, employ meaning clues to aid comprehension, and predict content across the curriculum. ■ **Mastery** Fourth grade students performing at the mastery level read independently grade level literary texts using comprehension skills to scan and skim, identify imagery, compose a response, and distinguish from fact/opinion. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level read grade level passages/texts to compare self to text and apply pre-reading strategies such as accessing prior knowledge, previewing, and setting a purpose. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

4.1.12	compare self to text in making connections between characters or simple events in a literary work with people and events in one's own and other cultures.	
4.1.13	increase amount of independent reading.	

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives		**Performance Descriptors**
Students will:		■ **Distinguished** Fourth grade students performing at the distinguished level write a multiple paragraph composition that displays a focused, coherent and logical progression of ideas; and considers page format, titles, margins, and indentations. Students apply advanced language mechanics and grammar such as the rules of capitalization, punctuation, and compound complex-sentences.
4.2.1	use conventions of print (e.g. legibility; uniformity in all written work).	■ **Mastery** Fourth grade students performing at the mastery level develop and write a multiple paragraph composition using language mechanics and grammar at grade level.
4.2.2	use the five step writing process (e.g. focused composition; coherent and logical progression of ideas; correct page format - title - paragraphs - margins - indentations).	■ **Partial Mastery** Fourth grade students performing at the partial mastery level write a paragraph with a topic sentence, supporting sentences, and a concluding sentence.
4.2.3	use proper paragraph form in written composition (e.g. indent the first word of a paragraph; use topic sentence; recognize a paragraph as a groups of sentences about one main idea; use an introductory and concluding paragraph; write at least two related paragraphs).	■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.
4.2.4	use strategies to gather and record information for research topics (e.g. notes-maps - charts - graphs - tables; summarize - paraphrase - describe in narrative form; gather direct quotes).	
4.2.5	use strategies to compile information into written reports or summaries (e.g. incorporate notes into a finished product; include simple facts - details - explanations - examples; draw conclusions from relationships and patterns that emerge from data of different sources; use appropriate visual aids and media).	
4.2.6	use conventions of spelling in written composition (e.g. spell high frequency words; spell commonly misspelled words from appropriate grade level list; use dictionary and other resources to spell words; use syllable constructions to spell words; use vowel combinations for correct spelling; use contractions - compound words - roots - suffixes - prefixes in spelling).	

4.2.7 use conventions of capitalization in written composition (e.g. titles of people; proper nouns such as towns - cities - counties - countries - names of streets - holidays; first word of a direct quote; heading - salutation - closing of a letter). 4.2.8 use conventions of punctuation in written composition (e.g. use colons in business letter salutations; use quotation marks in the title of poems - songs - chapters; underline book titles). 4.2.9 use a variety of sentence structure correctly in writing (e.g. simple - compound - complex sentences; avoid sentence run-ons and fragments). 4.2.10 use the mechanics of grammar in written composition (e.g. avoid double negatives; correct verb tenses; use conjunctions - interjections - prepositions; correct subject verb agreement with regular and irregular verbs).	

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives	**Performance Descriptors**
Students will: 4.3.1 listen and respond to different literary forms (e.g. summarize and paraphrase to confirm understanding; recount personal experiences; listen to information and exhibit comprehension; provide reasons in support of opinions; respond to others= ideas). 4.3.2 define a variety of messages conveyed through visual media (e.g. provide information by observing main concept - details - themes or lessons - viewpoints; recognize intended audience).	■ **Distinguished** Fourth grade students performing at the distinguished level recognize oral communication and listening skills to relate ideas and details. Students listen and view in order to understand themes or lessons while recognizing the intended audience. ■ **Mastery** Fourth grade students performing at the mastery level listen and respond to different literary forms to paraphrase, give reasons in support of opinions, and respond to other ideas. Students recognize viewpoints and audiences through visual media and provide oral examples. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level listen and respond to familiar stories and poems to relate personal experiences and summarize details. Students recognize the story elements of visual media. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Fifth Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts fifth grade students will expand and strengthen knowledge and abilities learned in earlier grades. Listening, speaking, and viewing instruction will prepare students for interaction and expression at school, home, and later, in the work place. Reading comprehension and vocabulary skills will enable students to read literal, interpretive, and critical levels for functional and recreational purposes. The earlier development of the writing process will be strengthened and expanded within and across the curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives

Students will:

5.1.1 identify defining characteristics, build background knowledge, and develop reading skills to understand a variety of literary passages and texts by West Virginia, national, and international authors (e.g. fiction; nonfiction; myth; poems; fantasies; biographies; autobiographies; science fiction; tall tales; supernatural tales).

5.1.2 increase amount of independent reading.

5.1.3 determine main idea and locate supporting details in a literary passage and across the curriculum.

5.1.4 analyze text to determine time and sequence.

5.1.5 use comprehension skills (e.g. draw conclusions; predict; use context clues; summarize) and determine the elements of literature (e.g. characterization; conflict; plot) to construct meaning and recognize author's and/or reader's purpose.

5.1.6 identify figurative language in text (e.g. hyperbole; alliteration).

5.1.7 make text connections to self, to other text, and to the world.

5.1.8 identify literary techniques used to interpret literature (e.g. compare/contrast; cause/effect).

5.1.9 read types of poetry that use inversion, rhyme, and rhythm (e.g. diamante; shape; haiku; limerick; name poems; bio poems; cinquain; and quatrain).

Performance Descriptors

- **Distinguished**
  Fifth grade students performing at the distinguished level read independently above grade level passages/texts across the curriculum to apply higher order thinking skills such as analyze text, determine elements of literature to construct meaning, draw and justify conclusions, generalize, and make judgments.
- **Mastery**
  Fifth grade students performing at the mastery level read independently grade level literary texts using comprehension skills to identify, interpret, and evaluate (point of view, conflict, characterization) and to recognize figurative language.
- **Partial Mastery**
  Fifth grade students performing at the partial mastery level read grade level passages/texts to connect self to text and identify critical thinking skills such as rephrasing and responding to what is read. Students identify the defining characteristics and use reading strategies to understand informational texts.
- **Novice**
  Fifth grade students who have not attained partial mastery are at the novice level for this standard.

5.1.10	use resource materials (e.g. dictionary; glossary) to determine the meaning of unknown words or multiple meaning words.	
5.1.11	use denotation to understand meaning.	
5.1.12	use root words, prefixes, and suffixes to spell words, change word meanings, and generate new words appropriate to grade level.	
5.1.13	spell commonly misspelled and easily confused words from appropriate grade level list.	

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives Students will:		**Performance Descriptors**
5.2.1	use pre-writing and drafting strategies to generate topics and plan approaches to writing tasks.	■ **Distinguished** Fifth grade students performing at the distinguished level write multiple paragraph compositions for self-selected purposes to include creative, narrative, and informative topics. Students will apply advanced language mechanics and grammar such as complex sentence structure and vivid transitional words.
5.2.2	use the writing process to develop a composition that contains specific, relevant details.	
5.2.3	use editing strategies to correct errors in organization, content, usage, capitalization, punctuation, and spelling.	■ **Mastery** Fifth grade students performing at the mastery level write multiple paragraph compositions for specific purposes. These include creative, narrative, and informative compositions using language mechanics and grammar at grade level.
5.2.4	use strategies to write for a specific purpose (e.g. creative; narrative; informative; and persuasive).	
5.2.5	use strategies to address specific types of writing (e.g. journal; friendly letter; business letter).	
5.2.6	develop a 3-5 paragraph composition with an introductory paragraph, supporting details paragraph(s), and concluding paragraph.	■ **Partial Mastery** Fifth grade students performing at the partial mastery level write multiple paragraphs to a specific prompt for a composition. Students apply language mechanics and grammar such as punctuation and capitalization rules and organize information by utilizing compound subjects, predicates, modifiers, and phrases.
5.2.7	use a variety of sentence types (e.g. simple; compound; declarative; exclamatory; imperative; interrogative) avoiding run-on sentences and sentence fragments.	
5.2.8	apply capitalization rules (e.g. abbreviations; titles of people; initials).	■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.
5.29	apply punctuation rules (e.g. commas; apostrophes; colons; semicolons; quotation marks).	
5.2.10	write and punctuate simple and compound sentences using conjunctions; interjections; and prepositions correctly.	

5.2.11 identify correct pronoun case and pronoun/antecedent agreement. 5.2.12 identify action, helping, and linking verbs while using correct verb tense and subject/verb agreement. 5.2.13 identify adjectives and adverbs in their comparative and superlative forms. 5.2.14 organize information by correctly combining subjects, predicates, modifiers, and phrases in sentences. 5.2.15 identify the parts of a book, know their purposes, and locate information (e.g. table of contents; index; glossary). 5.2.16 identify and use traditional reference sources for different types of information (e.g. dictionary; thesaurus; newspaper; telephone directory; recipes; menus; schedules; advertisements; order forms). 5.2.17 use card catalog, either hard copy or computer database, to locate sources for research/report topics by title, author, and/or subject. 5.2.18 identify and interpret graphic aids (e.g. maps; charts; graphs; tables; timelines).	

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with:

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives	**Performance Descriptors**
Students will: 5.3.1 recognize and exhibit oral communication skills (e.g., rate, audience etiquette). 5.3.2 identify and correct usage errors in oral communication (e.g., word choice; grammar - I have seen not I have saw). 5.3.3 deliver recitations. 5.3.4 relate personal experiences to oral/visual information. 5.3.5 listen in order to understand a topic (e.g., of a guest speaker; informational video; televised interview; radio news program). 5.3.6 contribute to group discussions by exhibiting an active listening skills.	■ **Distinguished** Fifth grade students performing at the distinguished level deliver an oral presentation across the curriculum through reports, recitations, dramatization, and sequential story retelling. Students exhibit oral communication skills by pitch, tone, and rate. ■ **Mastery** Fifth grade students performing at the mastery level recognize and exhibit oral communication skills and enhance listening comprehension skills by taking notes, organizing, and summarizing spoken ideas and details. Students listen in order to understand a topic, purpose, and perspective in spoken text. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level recognize oral communication and listening skills to classify ideas and details. Students listen in order to determine details and story elements in spoken texts.

	■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Sixth Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts sixth grade students will continue mastery of communication skills. At this level listening, speaking, and viewing strategies require students to gather and process oral information and to effectively express themselves in a variety of situations. Reading objectives strive to promote the development of various vocabulary and comprehension skills that advance the acquisition of literal and inferential knowledge of students and foster recreational reading from a variety of genres, authors, media, and resources. Emphasis is given to develop writing skills that are error-free and demonstrate mastery in mechanics and usage to communicate ideas effectively. The student will utilize these competencies across the curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives Students will:	**Performance Descriptors**
6.1.1 know the defining characteristics, build background knowledge, and use reading skills to understand a variety of West Virginia, national, and international authors (e.g., fiction; nonfiction; myths; poems; fantasies; biographies; autobiographies; science fiction; tall tales; supernatural tales). 6.1.2 increase amount of independent reading. 6.1.3 determine theme and locate supporting details in a literary passage and across the curriculum. 6.1.4 analyze text to determine transitional words/language. 6.1.5 use comprehension skills (e.g., draw conclusions; interpret meaning) and determine the elements of literature (e.g. external conflict; mood) to construct meaning and recognize author's and/or reader's purpose.	■ **Distinguished** Sixth grade students performing at the distinguished level read both functional and recreational materials above grade level. Students identify and classify literary types, draw and justify conclusions and opinions, explain inferences, and interpret author's purpose. ■ **Mastery** Sixth grade students performing at the mastery level read independently grade level literary types, draw and justify conclusions, and summarize grade level passage. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level read grade level materials to recognize literary types, draw conclusions, and develop a simple summary. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

6.1.6 identify figurative language in text (e.g. simile; metaphor; personification). 6.1.7 explain text connections to self, to other text, and to the world. 6.1.8 identify and classify types of poetry that use inversion, rhyme, and rhythm (e.g., diamante; shape; haiku; limerick; name poems; bio poems; cinquain; and quantrain). 6.1.9 use resource materials (e.g. dictionary; glossary; thesaurus) to determine the meaning of unknown words or multiple meaning words. 6.1.10 use connotation and denotation to understand meaning. 6.1.11 use root words, prefixes, and suffixes to spell words, change word meanings, and generate new words appropriate to grade level. 6.1.12 spell commonly misspelled words, easily confused words, and words with irregular endings across the curriculum.	

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives	**Performance Descriptors**
Students will: 6.2.1 use pre-writing and drafting strategies (e.g., drawing; clustering; brainstorming; discussion) to generate topics and plan approaches to writing tasks. 6.2.2 from a prompt, use the writing process to develop a composition that contains specific, relevant details and transitions. 6.2.3 use writing strategies to address specific writing purposes (e.g., creative; journalistic; essay; narrative; informative; persuasive) and address various audiences (e.g., peers; teachers; employers). 6.2.4 edit own writing as well as the writing of others to correct errors in organization, content, usage, mechanics, and spelling. 6.2.5 demonstrate mastery of a 3-5 paragraph composition. 6.2.6 apply capitalization rules (e.g., proper adjectives; names of written works; family relationships; nationalities; religions/religious terms).	■ **Distinguished** Sixth grade students performing at the distinguished level write an effective and elaborate multiple paragraph composition correct in form and language. Students independently construct and organize research notes from print and non-print sources. ■ **Mastery** Sixth grade students performing at the mastery level write a three to five paragraph composition employing grade level grammatical/mechanical conventions. Students apply note-taking skills to organize research data into an outline or graphic representation. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level write a basic composition with a beginning, middle, and end demonstrating grade level command of grammatical and mechanical conventions. Students use fundamental note-taking skills to organize information into a basic format.

6.2.7	apply punctuation rules (e.g., commas; apostrophes in contractions and possessives both singular and plural; colons; semicolons; quotation marks; hyphens).	■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.
6.2.8	write and punctuate simple and compound sentences with conjunctions, interjections, and prepositions.	
6.2.9	identify and use correct pronoun case.	
6.2.10	identify action, helping, and linking verbs while correctly using verb tense and subject/verb agreement in simple and compound sentences.	
6.2.11	use adjectives and adverbs in comparative and superlative form.	
6.2.12	compose sentences that contain compound subjects and compound verbs.	
6.2.13	organize information by combining predicates, modifiers, phrases and/or clauses, and sentences.	
6.2.14	identify and correct run-on sentences, sentence fragments, and redundant words/sentences.	
6.2.15	use the parts of a book, know their purposes, and locate information (e.g. table of contents; index; glossary).	
6.2.16	identify and use traditional reference sources for different types of information (e.g. dictionary; thesaurus; atlas; almanac, encyclopedia; newspaper; telephone directory; recipes; menus; schedules; advertisements; order forms; audiovisual resources).	
6.2.17	begin to demonstrate the ability to identify the source, location, media type, relevancy, and content validity of available resource information.	
6.2.18	identify title, author, subject, call number, publisher, and copyright of resources using the card catalog, either hard copy or computer database.	
6.2.19	use traditional organizers to create, read, interpret, and organize information in the form of tables, graphs, diagrams, and charts.	
6.2.20	organize information into an outline by being able to categorize information into topic, subtopic, and detail.	
6.2.21	identify and use correct note taking skills.	

Standard 3: Listening, Speaking and Viewing
Students will apply their use of spoken, written, and/or visual language to communicate with
- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives	Performance Descriptors
Students will: 6.3.1 recognize and exhibit oral communication skills (e.g. volume; rate; audience etiquette). 6.3.2 retell simple and detailed stories sequentially. 6.3.3 listen in order to comprehend topic and purpose (e.g. of a guest speaker; informational video; televised interview; radio news program). 6.3.4 reach consensus in group discussions or settings.	■ **Distinguished** Sixth grade students performing at the distinguished level communicate effectively with a variety of audiences for different purposes, commanding audience attention. Students' fluent oral reading exhibits accurate pitch, tone, rate, and volume. ■ **Mastery** Sixth grade students performing at the mastery level communicate with a peer audience for different purposes. Students demonstrate receptive audience behavior and identify components of presentations. Students read orally exhibiting elements of pitch, tone, rate, **and volume.** ■ **Partial Mastery** Sixth grade students performing at the partial mastery level communicate in small group situations. Students demonstrate receptive audience behavior. Students read orally in small groups. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Seventh Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts seventh grade students will continue to build, expand, and refine prior learning. Instruction in rigorous listening, speaking and viewing skills will assist in preparing students to interact and express themselves among peers, at home, and in the community. Reading comprehension and vocabulary will develop through the use of a wide variety of literary genre and strategies. Writing will utilize error-free and content-rich communication in gathering, organizing, interpreting, and reporting information gained through reading. The student will be exposed to these objectives not only in the language arts but across the curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives		Performance Descriptors
Students will:		■ **Distinguished** Seventh grade students performing at the distinguished level read both functional and recreational materials above grade level. Students classify literary types, support inferences and paraphrase selections making connections to other texts and global situations. ■ **Mastery** Seventh grade students performing at the mastery level read independently grade level materials to classify literary types, explain inferences, and paraphrase long selections. ■ **Partial Mastery** Seventh grade students performing a the partial mastery level read grade level materials to recognize literary types. Students use simple summarizing and paraphrasing in a simple passage. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.
7.1.1	classify the defining characteristics, build background knowledge, and apply reading skills to understand a variety of literary passages and texts by West Virginia, national, and international authors (e.g., fiction; nonfiction; myths; poems; fantasies; biographies; autobiographies; science fiction; tall tales; supernatural tales).	
7.1.2	increase amount of independent reading.	
7.1.3	relate common themes across a variety of literature.	
7.1.4	use comprehension strategies (e.g., generalize; evaluate; infer; paraphrase) and determine the elements of literature (e.g., internal conflict; point of view) to construct meaning and recognize author's and/or reader's purpose.	
7.1.5	identify figurative language in text (e.g., jargon; idioms).	
7.1.6	make text connections to self, to other text, and to the real world.	
7.1.7	identify literary techniques used to interpret literature (e.g., flashback; stereotype; foreshadowing; propaganda).	
7.1.8	read types of poetry and the use of inversion, rhyme, and rhythm in narrative poems, ballads, and lyrics.	
7.1.9	recognize and understand clipped or shortened words and their meaning.	
7.1.10	compare/contrast connotation and denotation to understand and enhance meaning of words, sentences, and passages.	
7.1.11	use resource materials (e.g., dictionary; glossary; thesaurus) to determine the meaning of unknown words or multiple meaning words.	
7.1.12	use root words, prefixes, and suffixes to spell words, change word meanings, and generate new words appropriate to grade level.	

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

7.2.1 from a prompt, use the writing process to develop a focused composition that contains specific, relevant details and transition.

7.2.2 use editing and revision techniques to vary sentence length, change sentence order, use vivid and concise words, and eliminate organizational errors.

7.2.3 use the writing process to compose various types of writing (e.g., creative; informative; expository; persuasive; articles; essays; journals; letters; poetry; research/reports).

7.2.4 apply capitalization rules (e.g., languages; school subjects; regions of the U.S.; dialogue; lines of poetry).

7.2.5 apply punctuation rules (e.g., commas; apostrophes in possessives and contractions; colons; semicolons; hyphens; dashes; parentheses).

7.2.6 use pronouns, pronoun cases, and antecedents in correct form.

7.2.7 compose and punctuate simple, compound, and complex sentences with and without conjunctions.

7.2.8 organize information by combining subjects, predicates, modifiers, and appositives in a sentence.

7.2.9 use correct verb tense and subject verb agreement (e.g., irregular verbs; compound subjects; indefinite pronouns; intervening phrases).

7.2.10 edit to eliminate run-on sentences, sentence fragments, redundant words/sentences, and misplaced modifiers.

7.2.11 use title page, copyright page, table of contents, appendix, bibliography, glossary, and index to locate specified information.

7.2.12 identify and use traditional reference sources for different types of information (e.g., *Reader's Guide; Books In Print;* newspapers; schedules; advertisements; audiovisual resources).

7.2.13 recognize copyright laws/issues, ethical acquisition, and use of digital information in citing sources for research/report.

Performance Descriptors

- **Distinguished**
  Seventh grade students performing at the distinguished level write an elaborate composition from a prompt that is well-crafted, cohesively organized, and employs sophisticated transitional elements. Students construct a detailed outline to produce a research-based report.
- **Mastery**
  Seventh grade students performing at the mastery level write a focused composition from a prompt with grade level grammatical/mechanical conventions; sentence variety, supporting details, and clear transition. Students develop an outline from research notes to produce a paragraph.
- **Partial Mastery**
  Seventh grade students performing at the partial mastery level write a composition form a prompt with limited grammatical/mechanical conventions; complete sentences, basic details, and evidence of transition. Students produce a simple outline from notes.
- **Novice**
  Seventh grade students who have not attained partial mastery are at the novice level for this standard.

7.2.14 identify the source, location, media type, relevancy, and content validity of available information. 7.2.15 demonstrate the ability to use the card catalog in hard copy or database to identify title, author, subject, call number, publisher, and copyright resources. 7.2.16 develop an outline using prepared notes to write a paragraph.	

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with:

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives Students will:	**Performance Descriptors**
7.3.1 recognize and exhibit oral communication skills (e.g., tone; volume; rate; audience etiquette). 7.3.2 perform dramatizations. 7.3.3 use oral/visual information to foster exploration, questioning, and imagining of a topic. 7.3.4 listen in order to comprehend topic, purpose, and perspective in spoken texts (e.g., of a guest speaker; informational video; televised interview; radio news program). 7.3.5 play a variety of roles in group discussions including active listener and discussion leader. 7.3.6 distinguish between private and public information in research and reporting.	■ **Distinguished** Seventh grade students performing at the distinguished level communicate effectively with a variety of audiences for different purposes. Students deliver an expressive oral presentation exhibiting effective communication skills. Students respond critically to oral and visual information to oral and visual information by exploring and questioning the topic. ■ **Mastery** Seventh grade students performing at the mastery level communicate with an audience for different purposes. Students deliver an oral presentation exhibiting communication skills by using a prepared script. Students respond to oral and visual information by exploring and questioning the topic. ■ **Partial Mastery** Seventh grade students performing at the partial mastery level communicate with a small group for a specific purpose. Students deliver an oral presentation by reading form a prepared script. Students respond to oral and visual information by summarizing the topic. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Eighth Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts eighth grade students will develop strategies that support understanding language in real life situation. Writing will focus on audience stressing mechanics, language expression, and organization of ideas. Reading comprehension and vocabulary will stress development of reading and thinking skills that enable students to comprehend and react critically to various genre of regional, national, and international works. The student will utilize language arts skills across the curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives

Students will:

8.1.1 analyze the defining characteristics, build background knowledge, and apply reading skills to understand a variety of literary passages and texts by West Virginia, national, and international authors (e.g., fiction; nonfiction; myths; poems; fantasies; biographies; autobiographies; science fiction; tall tales; supernatural tales).

8.1.2 relate literary theme to global situations.

8.1.3 use comprehension strategies (e.g., make judgments; hypothesize; critique; analyze) and determine the elements of literature (e.g., internal/external conflict; point of view) to construct meaning and recognize author's and/or reader's purpose.

8.1.4 identify figurative language in text (e.g., onomatopoeia; pun).

8.1.5 make text connections to self, to other text, and to the real world.

8.1.6 identify literary technique used to interpret literature (e.g., irony; satire; persuasive language; analogies).

8.1.7 read and identify types of poetry and the use of inversion, rhyme, and rhythm (e.g., narrative poem; ballad; lyric; epic).

8.1.8 recognize and understand acronyms.

8.1.9 use resource materials (e.g., dictionary; glossary; thesaurus) to determine the meaning of unknown words or multiple meaning words.

8.1.10 use root words, prefixes, and suffixes to spell words, change word meanings, and generate new words appropriate to grade level.

Performance Descriptors

- **Distinguished**
  Eighth grade students performing at the distinguished level read both functional and recreational materials above grade level. Students extend multiple text information by making and supporting judgments, hypothesizing, critiquing, and analyzing abstract themes.
- **Mastery**
  Eighth grade students performing at the mastery level read independently and analyze grade level literary genres, make and support judgments, and hypothesize to connect reader's response with author's purpose.
- **Partial Mastery**
  Eighth grade students performing at the partial mastery level read grade level materials to classify literary types, explain inferences and make judgments, demonstrate literal knowledge of text, and relate text to personal experience.
- **Novice**
  Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

8.2.1 use the writing process to demonstrate the ability to compose a variety of written work (e.g., creative; informative; expository; persuasive; chronological explanatory; compare/contrast; cause/effect; article; essay; journal; letters; reports; poetry).

8.2.2 from a prompt, develop a focused composition that contains specific, relevant details, smooth transition, and vivid, precise words.

8.2. 3 use revision and editing strategies to correct errors in organization, content, usage, capitalization, punctuation, and spelling.

8.2.4 recognize and write a simple thesis statement.

8.2.5 apply all capitalization rules in writing.

8.2.6 Apply punctuation rules in writing (e.g., appositives; phrase; clauses).

8.2.7 compose and punctuate grammatically correct simple, compound, and complex sentences.

8.2.8 identify and correct faulty parallel sentence structure such as phrases and clauses.

8.2.9 edit and revise to eliminate run-on sentences, sentence fragments, redundant words/sentences, and misplaced modifiers.

8.2.10 conduct research using parts of a book to gather, evaluate, and synthesize data from a variety of sources (e.g., print; non-print; people).

8.2.11 identify and use traditional reference sources for different types of information.

8.2.12 independently resolve information conflicts and validate information through assessing, researching, and comparing data.

8.2.13 demonstrate the ability to identify the source, location, media type, relevancy, and content validity of available information.

8.2.14 apply use of card catalog and/or computer databases to identify title, author, subject, call number, publisher, and copyright resources to gather information for a presentation.

Performance Descriptors

- **Distinguished**
  Eighth grade students performing at the distinguished level write an elaborate composition with a concise thesis statement demonstrating command of grammatical/mechanical conventions, vivid word terminology, and sophisticated transitional elements to enhance meaning. Students integrate relevant, valid information in a research-based presentation.
- **Mastery**
  Eighth grade students performing at the mastery level write a composition including a thesis statement designed for a specific audience. Students apply grade level grammatical/mechanical conventions, correct word terminology, and smooth transition. Students identify information that is relevant and valid for a research-based presentation.
- **Partial Mastery**
  Eighth grade students performing at the partial mastery level write a composition with evidence of grammatical/mechanical conventions, correct word terminology, transition, and use of relevant information in a simple research-based presentation.
- **Novice**
  Eighth grade students who have not attained partial mastery are at the novice level for this standard.

8.2.15	use an outline to develop a written and/or oral presentation using graphic representation.	

Standard 3: Listening, Speaking and Viewing
Students will apply their use of spoken, written, and/or visual language to communicate with:
- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives Students will:		Performance Descriptors
8.3.1	recognize and exhibit oral communication skills (e.g., tone; volume; rate; speaking etiquette; audience etiquette).	■ **Distinguished** Eighth grade students performing at the distinguished level plan, design, and deliver an enhanced oral/visual presentation justifying their opinions on global situations. Students evaluate sources and the use of public/private information, and apply communication skills required for various careers.
8.3.2	present an oral report with graphic aids (e.g., tables; graphs; diagrams; charts).	
8.3.3	think critically about oral/visual information presented; relate personal experiences; and apply the information to global situations.	■ **Mastery** Eighth grade students performing at the mastery level plan, design, and deliver an effective oral presentation. Students relate personal experiences to oral/visual information, distinguish between public and private information, and identify communication skills required for various careers.
8.3.4	listen in order to analyze and critique information received in spoken texts (e.g., of a guest speaker; informational video; televised interview; radio news program).	
8.3.5	play a variety of roles in group discussions including active listener, discussion leader, and/or facilitator.	■ **Partial Mastery** Eighth grade students performing at the partial mastery level deliver oral presentations, communicate personal experiences, locate information, and investigate communication skills required for various careers.
8.3.6	properly use private and public information.	■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Ninth Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts ninth grade students will focus on the effective use of written language in educational and occupational endeavors and interpersonal communications. Instructional delivery will be enhanced through a wide range of media. Frequent interaction with a broad array of quality literature will encourage an appreciation for the power of the written and spoken word. All language arts skills and strategies will be utilized across the curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives	Performance Descriptors
Students will: 9.1.1 identify historical, cultural, and biographical influences of literary works. 9.1.2 recognize literary styles according to genre. 9.1.3 increase the amount of independent reading with emphasis on fiction and nonfiction. 9.1.4 develop various reading skills for literary experience, information, and/or performing a task (e.g., skimming; scanning; note taking; SQ3R). 9.1.5 locate specific information in text (e.g. main and supporting ideas; specific facts; statistics; definition). 9.1.6 expand the use of various strategies to establish word meanings (e.g., context clues; affixes; multiple meanings). 9.1.7 recognize and explain the function of illustration within a specific text (e.g., pictures; artwork graphic organizers such as maps - charts - lists - graphs). 9.1.8 recognize literary devices (e.g., personification; symbolism; imagery; metaphor; simile; humor; rhythm; rhyme; meter; alliteration; assonance). 9.1.9 identify literary elements within specific genre (e.g., point of view; theme; conflict; characterization; voice). 9.1.10 recognize the elements, structures, and tone of various genres (e.g., novels; short stories; poetry; drama).	■ **Distinguished** Ninth grade students performing at the distinguished level read, analyze, and evaluate advanced level texts to draw supportable conclusions about historical, cultural, and biographical influences on literary works. Students analyze and evaluate literary devices and elements, author's voice, and modes of characterization. ■ **Mastery** Ninth grade students performing at the mastery level read, analyze, and synthesize grade level texts to explain historical, cultural, and biographical influences on literary works. Students explain literary devices and elements, author's voice, and modes of characterization. ■ **Partial Mastery** Ninth grade students performing at the partial mastery level read grade level texts to identify historical, cultural, and biographical influences on literary works. Students recognize basic literary devices and elements. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives	Performance Descriptors
Students will: 9.2.1 address specific purposes (e.g., narrative; expository; descriptive; persuasive) by employing writing strategies. 9.2.2 generate topics and plan approaches to writing by using pre-writing strategies. 9.2.3 employ drafting strategies for specific writing tasks.	■ **Distinguished** Ninth grade students performing at the distinguished level write compositions, that contain a refined thesis statement, subtle transition, elevated diction, and pertinent sentence structure germane to the writing. Students independently apply the rules of intellectual property.

9.2.4	create a well-developed composition from a prompt.	■ **Mastery** Ninth grade students performing at the mastery level write diverse compositions, that integrate a clear, logical thesis statement; transitional devices, precise diction, varied sentence structure, and a clear, logical progression of supported ideas. Students extend research skills by applying the rules of intellectual property to compositions. ■ **Partial Mastery** Ninth grade students performing at the partial mastery level write compositions, that show evidence of a thesis statement, basic transition, limited diction, complete sentences, and a progression of ideas. Students identify and explain the rules of intellectual property. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.
9.2.5	develop a composition that addresses the assigned topic with a clearly worded and correctly placed thesis statement.	
9.2.6	develop a composition that is focused and coherent and has a clear, logical progression of ideas (e.g., spatial order in a descriptive essay; chronological order in a process essay).	
9.2.7	use different transitional devices (e.g., introductory and transitional phrases/conjunctions) between paragraphs.	
9.2.8	develop a composition that uses complete and varied sentences.	
9.2.9	develop a composition with appropriate and precise word choice.	
9.2.10	use revision and editing strategies to correct errors in organization, content, usage, mechanics, and spelling.	
9.2.11	access and evaluate a variety of sources (e.g., *Reader's Guide*; card catalog, electronic media).	
9.2.12	extend note-taking skills to process and organize information.	
9.2.13	recognize the concept of intellectual property and plagiarism (e.g., media copyright laws; public/private domain).	
9.2.14	develop outlining skills to organize text and composition information by selecting main points and supporting details.	
9.2.15	practice correct use of bibliographic format in research documentation (e.g., MLA; APA).	
9.2.16	recognize choices of pronunciation and spelling (e.g., dictionary; spell check; thesaurus).	
9.2.17	recognize the parts of speech within a sentence.	
9.2.18	recognize the various parts of a sentence (e.g., direct object; predicate adjective; gerund; infinitive).	
9.2.19	identify editing strategies to correct errors in capitalization and punctuation.	
9.2.20	recognize and correct errors in subject/verb agreement.	
9.2.21	recognize and correct errors in pronoun case usage and pronoun/antecedent agreement.	
9.2.22	recognize and correct run-on sentences, fragments, misplaced modifiers, and awkward constructions.	

9.2.23	form supportable predictions; opinions, inferences, and conclusions based upon text.	
9.2.24	expand vocabulary through various literary works.	
9.2.25	identify word etymologies to determine meaning.	

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with:

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives		**Performance Descriptors**
Students will:		■ **Distinguished** Ninth grade students performing at the distinguished level effectively design and communicate intricate directions. Students synthesize meaning from discussion, speech, and media to communicate supportable opinions. ■ **Mastery** Ninth grade students performing at the mastery level effectively communicate complex directions. Students construct meaning from discussion, speech, and media through observation and participation. ■ **Partial Mastery** Ninth grade students performing at the partial mastery level effectively communicate simple directions. Students determine meaning from discussion, speech, and media through observation and/or participation. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.
9.3.1	understand, communicate, and follow complex directions effectively.	
9.3.2	review appropriate classroom communication skills (e.g., asking and answering questions to foster comprehension and communication in the appropriate tone and at the appropriate time).	
9.3.3	review the listening behaviors prior to a school wide audience activity (e.g., staying alert; resisting distractions; identifying and adapting to the speaker=s purpose).	
9.3.4	listen to identify the purpose, make predictions, distinguish fact from opinion, and construct meaning from discussion, speech, or media.	
9.3.5	recognize and correct usage errors in oral language.	

Tenth Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts tenth grade students will use written language for educational, occupational, and personal endeavors. Preparation will include critiquing oral presentations and using listening, speaking, and viewing while reading and writing. Instructional delivery will be enhanced by a wide variety of media. Frequent interaction with a broadened array of literature will encourage an increased appreciation and understanding for the power of the spoken and written word across the curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives		Performance Descriptors
Students will:		■ **Distinguished** Tenth grade students performing at the distinguished level read, synthesize, and evaluate advanced level texts to form supportable predictions, opinions, inferences, and conclusions from implicit ideas. Students research and analyze the impact of historical, cultural, and biographical factors on literary works. Students examine the universality of literature to determine the interrelationship among literary works.
10.1.1	analyze and research historical, cultural, and biographical influences of literary works.	■ **Mastery** Tenth grade students performing at the mastery level read and analyze grade level texts to form supportable predictions, opinions, inferences, and conclusions from implicit ideas. Students research and analyze the impact of historical, cultural, and biographical factors on literary works.
10.1.2	compare and contrast literary styles according to genre.	■ **Partial Mastery** Tenth grade students performing at the partial mastery read grade level texts to form predictions, opinions, inferences, and conclusions. Students identify and explain the impact of historical, cultural, and biographical factors on literary works.
10.1.3	increase the amount of independent reading with emphasis on American, British and World literature.	■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.
10.1.4	employ reading strategies necessary for various reading purposes (e.g., literary experience; information; and task performance).	
10.1.5	continue to use context clues to establish word meaning (e.g., including words with multiple meanings).	
10.1.6	recognize characteristics of author's style, purpose, and tone.	
10.1.7	form supportable predictions, opinions, inferences, and conclusions based upon a text and/or implicit ideas.	
10.1.8	explain the author's choice of literary devices (e.g., personification; symbolism; imagery; metaphor; simile; humor; rhythm; rhyme; meter; alliteration; assonance).	
10.1.9	recognize persuasive language and techniques (e.g., advertisements; junk mail; news stories).	
10.1.10	expand vocabulary through classic literature.	
10.1.11	explain word etymologies to determine meaning.	

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives	Performance Descriptors
Students will: 10.2.1 employ writing strategies to address specific audiences (e.g., narrative; expository; descriptive; persuasive). 10.2.2 use pre-writing strategies to generate topics and plan approaches to writing by using timed writing tasks. 10.2.3 from a writing prompt, create a well-developed composition illustrating various points of view (e.g., omniscient or limited). 10.2.4 develop a composition that addresses the assigned topic with a clearly worded and correctly placed thesis statement which is supported by relevant details. 10.2.5 develop a timed writing that is focused and coherent and has a clear, logical progression of ideas. 10.2.6 use different transitional devices (e.g., introductory and internal transitional phrases/conjunctions). 10.2.7 develop a composition that contains sentence variety. 10.2.8 develop a composition where word choice is vivid, precise, and economical. 10.2.9 correct errors in timed writing to correct errors in organization, content, usage, mechanics (e.g., capitalization; punctuation), and spelling using revision and editing strategies. 10.2.10 access and evaluate a variety of sources (e.g., *Reader's Guide*; card catalog; electronic media; newspapers). newspapers). 10.2.11 extend note-taking skills to process and organize information (e.g., paraphrase; summary; quote). 10.2.12 explain the concept of intellectual property and plagiarism in all media (e.g., media copyright laws; public/private domain). 10.2.13 expand outlining skills to organize text and composition information by selecting main points and supporting details. 10.2.14 practice correct use of bibliographic format in research documentation (e.g., MLA; APA). 10.2.15 explain word etymologies to determine meaning. 10.2.16 compare and contract choice of pronunciation and spelling (e.g. dictionary; spell check; thesaurus). 10.2.17 classify the parts of speech within a sentence.	■ **Distinguished** Tenth grade students performing at the distinguished level write focused compositions, that exhibit a well-discerned and placed thesis statement, sophisticated diction, and insightful detail. Students experiment with point of view leading to the development of a personal voice. Students extend research skills by incorporating information into compositions using correct documentation. ■ **Mastery** Tenth grade students performing at the mastery level write focused compositions. Students integrate a correctly placed thesis statement, vivid and economical diction, specific, relevant details, and various points of view. Students extend research skills incorporating information into compositions using correct documentation. ■ **Partial Mastery** Tenth grade students performing at the partial mastery write basic compositions with limited focus. Students incorporate a thesis statement, simplistic diction, sporadic detail, and a shifting point of view. Students extend research skills by transferring information into compositions using documentation. ■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.

10.2.18	recognize the parts of a sentence (e.g., direct object; predicate adjective; gerund; infinitive; word usage variations).	
10.2.19	recognize and correct errors in subject/verb agreement with emphasis on indefinite pronouns.	
10.2.20	use correct verb tense by recognizing appropriate situations for tense shifts.	
10.2.21	recognize and correct errors in sentence structure (e.g., parallelism; redundancy; misplaced modifiers; subordination).	

Standard 3: Listening, Speaking and Viewing
Students will apply their use of spoken, written, and/or visual language to communicate with

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives Students will:		**Performance Descriptors**
10.3.1	communicate and follow intricate directions.	■ **Distinguished** Tenth grade students performing at the distinguished level automatically evaluate and apply conventions of oral language. Students assess the merit of persuasive devices from multiple sources to determine and debate credibility.
10.3.2	employ appropriate classroom communication skills (e.g., asking and answering questions to foster comprehension and communication in appropriate tone and at the appropriate time).	■ **Mastery** Tenth grade students performing at the mastery level recognize and apply conventions of oral language by distinguishing colloquial, dialectical, slang, and formal language. Students construct meaning from multiple sources by analyzing persuasive devices to determine credibility.
10.3.3	listen to a speech (e.g., funeral orations from Shakespeare's *Julius Caesar*) to identify specific examples of central idea, fact versus opinion, and persuasive devices.	■ **Partial Mastery** Tenth grade students performing at the partial mastery level recognize conventions of oral language. Students determine basic meaning from multiple sources by identifying and paraphrasing persuasive language.
10.3.4	recognize and correct usage errors in oral language (e.g., distinguishing colloquial - dialectical - slang - formal versus informal).	■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.
10.3.5	practice and master listening, speaking, and viewing by using a variety of techniques (e.g., videos, power point presentations; audiotape; web pages).	

Eleventh Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts eleventh grade students will refine and enhance foundational literary and communication skills through academic rigor and depth. Career formalization, including college entrance exam preparation and workplace readiness skills, will become a primary focus. Challenging research and writing skills will be emphasized across the curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives

Students will:

11.1.1 research, analyze, and evaluate the historical, cultural, and biographical influences of literary works.

11.1.2 analyze literary styles according to genre.

11.1.3 increase the amount of independent reading with emphasis on classic American, British and World literature.

11.1.4 select appropriate reading strategies necessary for various reading purposes (e.g., literary experience; information; task performance).

11.1.5 analyze characteristics of author's style, purpose, and technique from a variety of selections (e.g., critical review; literary/character analysis).

11.1.6 draw supportable conclusions, make inferences and generalizations, and interpret character traits.

11.1.7 expand vocabulary through various literary works and apply word etymologies to determine meaning.

11.1.8 recognize and interpret various literary devices, in particular, figurative language (e.g., personification; archetypes; allegorical patterns).

11.1.9 analyze types of texts according to content, structure, and tone.

11.1.10 read literary criticism applicable to the genre being studied.

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

11.2.1 employ writing strategies to address specific purposes and audiences (e.g., narrative; expository; descriptive and/or persuasive).

11.2.2 generate topics and plan approaches to writing (e.g., graphic organizers; outlines) using pre-writing strategies.

11.2.3 employ drafting strategies for interdisciplinary writing tasks.

11.2.4 develop a composition form a student-generated clearly worded and correctly placed thesis statement which is supported by relevant details.

11.2.5 develop a composition that is focused and coherent and has a clear, logical progression of ideas.

11.2.6 use vocabulary that is vivid, precise, and economical.

11.2.7	identify and use subtle forms of transition in a composition (e.g., sentence links; repetition of key words or sentences).
11.2.8	identify rhetorical devices (e.g., parallel structure; antithesis; narrative pace).
11.2.9	produce functional writing (e.g., letter of job application; scholarship application; essay; personal letter).
11.2.10	produce a researched essay or project following an accepted format (e.g., MLA; APA).
11.2.11	find and develop personal style and voice in writing.
11.2.12	in functional and research writing, use revisions and editing strategies to correct errors in organization, content, usage, mechanics, and spelling.
11.2.13	access and evaluate information through a variety of sources (e.g., *Reader's Guide*; card catalog; electronic media).
11.2.14	extend efficient note taking skills with careful attention to identifying purpose, main ideas/key facts, and overall themes in order to synthesize information into a well-developed essay.
11.2.15	apply the concept of intellectual property and plagiarism in all media (e.g., media copyright laws; private/public domain).
11.2.16	produce a suitable outline for use in a researched essay or project.
11.2.17	apply choices of pronunciation and spelling (e.g., dictionary; spell check; thesaurus).
11.2.18	analyze the parts of a sentence (e.g., direct object; predicate adjective, gerund; infinitive; word usage variations).
11.2.19	select appropriate editing strategies to correct errors in punctuation.
11.2.20	recognize and correct errors in subject verb agreement and verb tense.
11.2.21	recognize and correct errors in sentence structure and usage (e.g., parallelism; redundancy; misplaced modifiers; subordination).

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with:

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives

Students will:

11.3.1	design and communicate complex directions.
11.3.2	continue to adapt/apply speaking skills in order to participate in a variety of situations (e.g., panel/group discussion; oral presentation).
11.3.3	correct usage errors in oral language (e.g., distinguishing colloquial - dialectical - slang - and formal versus informal language).
11.3.4	practice and master listening, speaking, and viewing objectives (e.g., videos; power point presentations; web pages; evaluating a selection on audiotape).

Twelfth Grade Reading and English Language Arts Content Standards and Objectives

Reading and English Language Arts twelfth grade students will focus and polish personal skills and goals. Experiences such as a senior project or a sophisticated persuasive research paper will culminate the graduation experience. Readiness for the work place or post secondary education is the final educational reality check during the twelfth grade year. The expansion and appreciation of language and literature in spoken and written form is a focus. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Reading

Students will use skills to read for literacy experiences, read to inform, and read to perform a task by:

- identifying and using the dimensions of reading (phonemic awareness, phonics, background knowledge/vocabulary, high frequency words/fluency, comprehension, writing and motivation to read); and
- employing a wide variety of literature in development independent readers.

Reading Objectives

Students will:

12.1.1 research, analyze, and evaluate the historical, cultural, and biographical influences to determine the impact on literary works.
12.1.2 analyze and evaluate author=s choice of genre
12.1.3 increase the amount of independent reading with emphasis on American, British and World literature.
12.1.4 automatically apply appropriate reading strategies necessary for various reading purposes (e.g., literary experience; information; task performance).
12.1.5 analyze and evaluate characteristics of author's style, purpose, and technique from a variety of selections (e.g., critical review; literary/character analysis).
12.1.6 construct supportable conclusions, make inferences and generalizations, and interpret character traits from explicit and implicit ideas.
12.1.7 analyze and evaluate persuasive language and techniques (e.g., advertisements; junk mail; web sites; news stories).
12.1.8 expand vocabulary through various literary works and analyze word and etymologies to determine meaning.
12.1.9 interpret and evaluate the author's choice of various literary devices and techniques, in particular, figurative language (e.g., personification; archetypes; allegorical patterns).
12.1.10 analyze and evaluate types of text according to content, structure, and tone.
12.1.11 read and evaluate literary criticism applicable to the genre being studied.

Standard 2: Writing

Students will employ a wide range of writing strategies to communicate effectively for different purposes by:

- developing the writing process;
- applying grammatical and mechanical properties in writing; and
- gathering and using information for research purposes.

Writing Objectives

Students will:

12.2.1 employ writing strategies to address specific purposes (e.g., narrative; expository; persuasive; research; creative).
12.2.2 generate topics and plan approaches to research writing (e.g., graphic organizers; outlines) using pre-writing strategies.
12.2.3 employ drafting strategies for research writing tasks.
12.2.4 develop a focused composition that has a clear and logical progression of ideas supported by relevant details.
12.2.5 expand the use of vocabulary that is vivid, precise, and economical.
12.2.6 expand the use of subtle forms of transition in a composition (e.g., sentence links; repetition of key words or sentences).
12.2.7 apply rhetorical devices (e.g., parallel structure; antithesis; narrative pace).
12.2.8 write an analysis of a literary selection using terminology and characteristics of the genre and quotations (e.g., apostrophe; symbolism; imagery).
12.2.9 produce functional writing related to life skills (e.g., letter of job application; scholarship application; essay; personal letter).
12.2.10 produce a summative project (e.g., research paper, power point presentation; web page) using an accepted format (e.g., MLA; APA).
12.2.11 refine a personal style and voice in writing.

12.2.12	correct errors in organization, content, usage, mechanics, and spelling through all writing using revisions and editing strategies.
12.2.13	access and evaluate information through a variety of primary and secondary sources (e.g., personal interviews; SIRS; *Congressional Quarterly*).
12.2.14	employ a sound note taking system that can be applied to classroom, library, and/or interview.
12.2.15	integrate the concept of intellectual property and plagiarism in all media (e.g., media copyright laws; private/public domain).
12.2.16	produce a detailed outline for use in a summative project.
12.2.17	analyze and select choice of pronunciation and spelling (e.g., dictionary; spell check; thesaurus).
12.2.18	select appropriate editing strategies to correct all errors in mechanics.
12.2.19	recognize and correct all errors in subject/verb agreement.
12.2.20	correct all errors in sentence structure and usage (e.g., parallelism; redundancy; misplaced modifiers; subordination).

Standard 3: Listening, Speaking and Viewing

Students will apply their use of spoken, written, and/or visual language to communicate with

- a variety of audiences; and
- for different purposes.

Listening, Speaking and Viewing Objectives

Students will:

12.3.1	adapt and apply speaking skills in order to participate in a variety of situations (e.g., panel/group discussion; oral presentation; guest speaker).
12.3.2	correct all usage errors in oral language (e.g., distinguishing colloquial - dialectical - slang, and formal versus informal language).
12.3.3	practice and master listening, speaking, and viewing skills (e.g., videos; power point presentations; web pages; and evaluation a selection on audio tape).

SCIENCE

The science content standards identify what students should know, understand, and be able to do in the natural sciences throughout their K-12 education. Because each content standard utilizes the knowledge and skills of other standards, they are designed to be used as an integrated whole. Although material can be added to the content standards, using only a subset of the standards will leave gaps in the students' scientific literacy.

Doing Science:
- Standard 1 - History and Nature of Science
- Standard 2 - Science as Inquiry

Knowing Science:
- Standard 3 - Unifying Themes
- Standard 4 - Science Subject Matter/Concepts

Context of Science:
- Standard 5 - Scientific Design and Application
- Standard 6 - Science in Personal and Social Perspectives

A three-dimensional instructional strategy model must be utilized to address the science curriculum and assure students' depth of understanding and breadth of knowledge.

Standard 1. History and the Nature of Science
The study of science as a human endeavor provides for the acquisition of ideas leading toward the current knowledge base that represents science content. The nature of science encompasses the basic values and beliefs that make up the scientific world view, how scientists go about their work, and the general culture of scientific enterprise. Studying historical and current discoveries of scientists and scientific milestones provides students with information about how discoveries have influenced current scientific thought and advancements. Students should understand that the continuous development of scientific knowledge shapes history. The study of the history and nature of science clarifies scientific inquiry and the role of science in the development of world cultures.

Standard 2. Science as Inquiry
Science is a process of discovery. Students will engage in active inquiry through investigations and hands-on activities a minimum of 50% of the instructional time. Developing scientific literacy requires a learning environment in which students actively participate in meaningful hands-on activities. These investigations explore the natural world, require critical thinking and develop process skills. Learning activities are sequenced to shape, modify and develop students' knowledge in order for them to become independent inquirers.

Standard 3. Unifying Themes
Broad unifying themes complement the perspectives presented in the other content standards. These themes are fundamental to understanding and unifying the various science disciplines. Major unifying themes are systems, models and changes.

Standard 4. Science Subject Matter/Concepts
Science subject matter focuses on the scientific facts, concepts, principles, theories and models that are important for all students to know, understand and apply. Through the integration of the fields of science and the development of unifying themes, students will understand the interrelationships among biology, chemistry, physics and the earth sciences. Scientifically literate students will make connections in the formal education setting and will apply their knowledge and skills to daily life experiences. The objectives describe the specific subject matter/concepts that students are to master at each grade level.

Standard 5. Scientific Design and Application
Scientific design and application permits the extension of senses, the enhancement of the knowledge base, transportation of materials and information, synthesizing of new products and the modification of the world. Students must learn to use technology to analyze situations, gather relevant information, generate and evaluate creative ideas, pose tangible solutions and communicate their analyses, results and suggestions concisely.

Standard 6. Science in Personal and Social Perspectives
Applying science and technological innovations to personal and social issues such as health, populations, resources and environment helps students to develop decision-making skills. As students expand their conceptual horizons, they should recognize that collective individual actions manifest as societal issues. Students must recognize that society cannot afford to deal only with symptoms; personal and societal actions must be focused on elimination of the causes of problems. Students should recognize that unless imposed by legislation social change involves negotiation among different interest groups. Students must be allowed to encounter and examine social change in a variety of current and historical contexts.

The Role of Technology
West Virginia's vision for education includes the integration of technology throughout the curriculum so that all West Virginia students have the opportunity to develop technology skills that support learning. Successful learning environments provide opportunities for students to use education technology interwoven with relevant curricular content. West Virginia teachers are responsible for integrating technology appropriately in the students' learning environment.

Organization of the Science Program of Study
The West Virginia Science Program of Study is drawn from the National Science Education Standards and the Project 2061 Benchmarks to promote a rigorous and challenging science curriculum. Through experiencing a spiraling, inquiry-based program of study, students in grades K-10 will develop foundational knowledge and skills in the physical sciences, the life sciences, and the earth and space sciences. To assure scientific literacy for all students, a coordinated, integrated approach is utilized in grades. Students in the 11^{th} and 12^{th} grades participate in advanced in-depth laboratory-based elective courses designed to expand their conceptual understanding and enhance their research and laboratory skills.

Standard 1: History and the Nature of Science
Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

Standard 2: Science as Inquiry
Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Standard 3: Unifying Themes
Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Standard 4: Science Subject Matter/Concepts
Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Standard 5: Scientific Design and Application
Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Standard 6: Science in Personal and Social Perspectives
Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Kindergarten Science Content Standards and Objectives

The Coordinated and Thematic Science (CATS) Kindergarten objectives emphasize the process skills. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the physical sciences, the life sciences, and the earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes, and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. CATS Kindergarten enhances the child=s natural curiosity about the environment and augments the awe and wonder of inquiries and discoveries using the senses and by hands-on manipulation of objects to build a strong foundation of concepts blended with safety principles. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

K.1.1 ask questions about themselves and their world.

K.1.2 listen to stories about the lives and discoveries of scientists.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

K.2.1 demonstrate curiosity, initiative, and creativity by asking questions about the environment noting patterns and variations of natural objects (e.g., trees, leaves, animal structures).

K.2.2 explore and describe objects and events using the five senses to develop observational skills and make predictions based on personal observation.

K.2.3 use scientific instruments and everyday materials to investigate the natural world (e.g., hand lens, balance, magnets).

K.2.4 use safe and proper techniques for handling, manipulating, and caring for science materials (e.g., follow safety rules, maintain a clean work area, treat living organisms humanely).

K.2.5 collect and record information in a variety of ways (e.g., drawings, weather calendar, graphs).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives
Students will:
K.3.1 identify models as representations of real things.
K.3.2 observe that change occurs gradually, repetitively, or randomly within the environment.

Standard 4: Science Subject Matter/Concepts
Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives
Students will:
Characteristics of Organisms
K.4.1 using the five senses, identify living and non-living things.
Life Cycles of Organisms
K.4.2 observe the movement, growth, and changes in plants and animals.
Organisms and Environments
K.4.3 observe models of plants and animals in different environments (e.g., terrariums, aquariums, animals and plants in a forest, pond, field).
Properties of Objects and Materials
K.4.4 describe, compare, sort, and group objects in terms of what they are made of (clay, cloth, paper, metal, etc.) and their physical properties of size, shape, color, weight or texture.
K.4.5 identify liquids and solids.
Light, Heat, Electricity and Magnetism
K.4.6 identify colors.
K.4.7 explore changes in energy (e.g., hot/cold and light/dark).
K.4.8 explore magnetic properties of objects.
Position and Motion of Objects
K.4.9 explore the different ways objects can be moved (e.g., straight, circular, fast, and slow).
K.4.10 observe, record, and compare the length of time it takes to travel from one place to another.
Changes in Earth and Sky
K.4.11 observe and record daily changes in weather (e.g., clouds, air temperature).
Objects in the Sky
K.4.12 identify objects in the day and night sky (e.g., moon, stars, sun).
Properties of Earth Materials
K.4.13 observe and compare differences in earth materials.
K.4.14 use a model of the earth to identify that the earth has more water than land.

Standard 5: Scientific Design and Application
Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives.
Students will:
K.5.1 observe the uses of tools and appliances at home and at play.

Standard 6: Science in Personal and Social Perspectives
Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives.
Students will:
K.6.1 working in groups, listen to and be tolerant of different viewpoints.

First Grade Science Content Standards and Objectives

The Coordinated and Thematic Science (CATS) One objectives build on the process skills and add data gathering and reporting. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics, and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes, and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated in all activities. CATS One continues the excitement of learning about the natural world and allows the beginning of experimentation and data collection to emphasize the tools of science and the properties of matter. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science
Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives
Students will:
1.1.2 ask questions about themselves and their world.
1.1.2 discuss the lives and discoveries of scientists after listening to stories about their lives and discoveries.

Standard 2: Science as Inquiry
Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

1.2.1 demonstrate curiosity, initiative, and creativity by questioning observations of changes in the environment (e.g., life cycles; motion of celestial objects; sun and shadow).

1.2.2 accept results of personal discoveries and observations of objects and events (e.g., use of senses).

1.2.3 use scientific instruments and everyday materials to investigate the natural world (e.g., hand lens, balance, magnets, thermometer, seeds, rocks).

1.2.4 use safe and proper techniques for handling, manipulating, and caring for science materials (e.g., follow safety rules, maintain a clean work area, treat living organisms humanely).

1.2.5 collect, record, and compare information using a variety of classification systems (e.g., ordering, sorting, sequencing) and using a variety of communication techniques (e.g., sketches, pictographs, models).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

1.3.1 identify that systems are made of parts that interact with one another.

1.3.2 use models as representations of real things.

1.3.3 observe that changes occur gradually, repetitively, or randomly within the environment.

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

Characteristics of Organisms

1.4.1 classify objects as living or non-living.

1.4.2 identify that most living things need water, food, light and air.

Life Cycles of Organisms

1.4.3 recognize changes in life cycle of living organisms.

1.4.4 identify the parts of growing plants as they develop.

Organisms and Environments

1.4.5 manipulate models that depict movement of living and non-living things in air, water, space, and on land.

Properties of Objects and Materials

1.4.6 recognize that materials are composed of smaller parts that may be seen with a magnifier.

1.4.7 recognize that materials can be recycled and used again, sometimes in different forms.

1.4.8 recognize that water can be a solid or a liquid, and can change from one form to another.

1.4.9 predict and investigate the buoyancy of objects in water.

Light, Heat, Electricity and Magnetism

1.4.10 classify objects as magnetic or non-magnetic.

1.4.11 observe and record shadows at different times of the day.

Position and Motion of Objects
1.4.12 describe the changes in the motion of objects (e.g., slowing, speeding up, curving)
1.4.13 demonstrate that sounds are produced by vibrations.
Changes in Earth and Sky
1.4.14 observe, identify and record changes in weather and effects on living organisms.
1.4.15 recognize that the sun, moon, and stars appear to move.
Objects in the Sky
1.4.16 observe and discuss the importance of objects in the day and night sky.
Properties of Earth Materials
1.4.17 compare land and water features on the Earth.
1.4.18 identify important uses of air.
1.4.19 investigate and compare the properties of soil (e.g., sand, clay, and humus).

Standard 5: Scientific Design and Application
Students will:
- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives
Students will:
1.5.1 distinguish between natural and man-made objects.

Standard 6: Science in Personal and Social Perspectives
Students will:
- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives
Students will:
1.6.1 recognize that a solution to one scientific problem often creates new problems (e.g., recycling, pollution)
1.6.2 listen to and be tolerant of different viewpoints while working in collaborative groups.
1.6.3 recognize that science skills are used in daily life and in most careers
1.6.4 develop respect and responsibility for the environment by engaging in conservation practices (e.g. recycling, trash clean-up, power consumption reduction, etc.)

Second Grade Coordinated and Thematic Science Objectives

The Coordinated and Thematic Science (CATS) Two objectives build upon the early stages of experimentation and maintenance of natural curiosity. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated in all activities. CATS Two will provide opportunities for developmental and academic growth. The activities will introduce the concepts that science and technology are interrelated. The curricular thrust will be to develop early problem-solving skills through observation, experimenting and concluding. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

2.1.1 recognize science as the human's search for an understanding of the world by asking questions about themselves and their world.

2.1.2 discuss the lives and discoveries of scientists of different cultures and backgrounds.

2.1.3 identify and discuss the role of community people in science careers.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

2.2.1 demonstrate curiosity, initiative, and creativity by observing, classifying, and comparing the patterns, variations, and interactions of natural objects in the environment.

2.2.2 manipulate scientific instruments and everyday materials to investigate the natural world (e.g., hand lens, balance, thermometer, metric ruler, magnets, weather instruments, calculators).

2.2.3 measure the length and width of various objects using standard and non-standard units (e.g., metric ruler, paper clips, counting bears).

2.2.4 use safe and proper techniques for handling, manipulating, and caring for science materials (e.g., follow safety rules, maintain a clean work area, treat living organisms humanely).

2.2.5 conduct simple investigations; observe, collect and record information using a variety of classification systems; describe trends of data; and make predictions based on that data (e.g., seasonal changes and plants; temperature and weather).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

2.3.1 identify that systems are made of parts that interact with one another.
2.3.2 use models as representations of real things.
2.3.3 observe that changes occur gradually, repetitively, or randomly within the environment.

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

Characteristics of Organisms

2.4.1 identify that plants and animals have different structures.
2.4.2 identify the structures of physical characteristics of living things and explain their functions (e.g., wings for flying, fins for swimming; roots for support and obtaining water).

Life Cycles of Organisms

2.4.3 sequence pictures of events to illustrate the changes in the life cycle of plants and animals.
2.4.4 relate observations of the butterfly=s life cycle to student=s own growth and change.

Organisms and Environments

2.4.5 observe and compare simple models of different kinds of habitats, including a forest and a stream.

Properties of Objects and Materials

2.4.6 identify materials as a solid, a liquid or a gas and recognize that matter can change from one state to another.
2.4.7 demonstrate that solids, liquids, and gases take up space.

Light, Heat, Electricity and Magnetism

2.4.8 demonstrate that a magnet can attract or repel objects.
2.4.9 recognize that some materials and colors conduct heat better that others.
2.4.10 demonstrate that a shadow is cast when an object blocks light.

Position and Motion of Objects

2.4.11 compare the effects of force on the motion of an object.
2.4.12 recognize that sound can change in pitch and volume.

Changes in Earth and Sky

2.4.13 examine changes in the earth=s surface (e.g., weathering and erosion).
2.4.14 identify the effects of wind movement.
2.4.15 observe and describe different types of precipitation.
2.4.16 compare seasonal changes.
2.4.17 identify how the Earth rotating on its axis causes day/night.

Objects in the Sky

2.4.18 recognize the existence of planets.
2.4.19 understand that the moon has phases.

Properties of Earth Materials

2.4.20 describe how fossils are formed.

2.4.21 match a fossil or a picture of a fossil, with a picture of its original organism (e.g., dinosaur bones, shell, fern).

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

2.5.1 recognize that common objects and events incorporate science (e.g., CD players, velcro, weather) to solve human problems and enhance the quality of life.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

2.6.1 recognize that a solution to one scientific problem often creates new problems (e.g., recycling, pollution, conservation)

2.6.2 listen to and be tolerant of different viewpoints while working in collaborative groups.

2.6.3 recognize that science skills are used daily life and in most careers

2.6.4 develop respect and responsibility for the environment by engaging in conservation practices (e.g., recycling, trash clean-up, power consumption reduction).

Coordinated and Thematic Science Objectives

The Coordinated and Thematic Science (CATS) Three objectives build upon problem-solving and experimentation and move into a more in-depth study of science. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics, and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes, and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated in all activities. CATS Three highlights science-related careers. The study of geology and astronomy expands in CATS Three. Collecting materials, testing the materials, recording data and developing concepts related to physics and chemistry are introduced to expand investigative abilities that lead to logical conclusions. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives	Performance Descriptors
Students will: 3.1.1 recognize that scientific explanations may lead to new discoveries (e.g., new knowledge leads to new questions). 3.1.2 study the lives and discoveries of scientists of different cultures and backgrounds. 3.1.3 explore science careers in the community.	■ **Distinguished** Third grade students performing at the distinguished level cite examples of changes in scientific knowledge over time. Students compare and contrast science careers in the community. ■ **Mastery** Third grade students performing at the mastery level identify that there are changes in scientific knowledge over time; and identify science careers in the community. ■ **Partial Mastery** Third grades students performing at the partial mastery level identify science careers in the community. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives	Performance Descriptors
Students will: 3.2.1 demonstrate curiosity, initiative, and creativity by planning and conducting simple investigations. 3.2.2 recognize that developing solutions to problems takes time, patience, and persistence through individual and cooperative ventures. 3.2.3 support statements with facts found through research in reference books, science-related magazines, and the Internet. 3.2.4 use scientific instruments and everyday materials to investigate the natural world (e.g., graduated cylinder, hand lens, metric ruler, magnets, weather instruments, thermometer, calculators). 3.2.5 use safe and proper techniques for handling, manipulating and caring for science materials (e.g., follow safety rules, maintain a clean work area, treat living organisms humanely).	■ **Distinguished** Third grade students performing at the distinguished level make predictions and inferences. Students use appropriate scientific equipment to measure and collect data (e.g., rulers, scales, beakers). Students identify safe and proper techniques for handling, manipulating, and caring for science materials. ■ **Mastery** Third grade students performing at the mastery level make predictions. Students use appropriate scientific equipment to measure and collect data (e.g., rulers, scales, beakers). Students identify safe and proper techniques for handling, manipulating and caring for science materials.

3.2.6 apply mathematical skills and use metric units (e.g., graphing, calculations, and measurements of length, area, perimeter, volume). 3.2.7 interpret data presented in a table, graph, map or diagram and use it to answer questions. 3.2.8 make predictions and inferences based on patterns of evidence. 3.2.9 test variables (e.g., those that affect plant growth; speed; action of water on soil; shadow formation)	■ **Partial Mastery** Third grade students performing at the partial mastery level use appropriate scientific equipment to measure and collect data (e.g., rulers, beakers). Students identify safe and proper techniques for handling, manipulating, and caring for science materials. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives Students will:	**Performance Descriptors**
3.3.1 identify that systems are made of parts that interact with one another. 3.3.2 use models as representations of real things. 3.3.3 observe that changes occur gradually, repetitively, or randomly within the environment. 3.3.4 observe and question causes of changes (e.g., the effect of push or pull on a moving object, motion related to points of reference, fossils, and weather maps). 3.3.5 given a set of objects, group or order the objects according to an established scheme (e.g., celestial objects, patterns of motion, constellations). 3.3.6 given a set of events, objects, shapes, designs, or numbers, find patterns of constancy or regularity.	■ **Distinguished** Third grade students performing at the distinguished level explain that systems are made of parts that interact with one another. Students compare and contrast the changes that occur within systems. Students construct models to represent real things. ■ **Mastery** Third grade students performing at the mastery level identify that systems are made of parts that interact with one another. Students identify and describe that changes occur within systems. Students identify that models are representations of real things. ■ **Partial Mastery** Third grade students performing at the partial mastery level identify that systems are made of parts that interact with one another. Students identify that models are representation of real things. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts
Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives
Students will:

Characteristics of Organisms

3.4.1 identify the structures of living things, including their systems, and explain their functions (e.g., roots absorb water, circulatory system to move materials).

Life Cycles of Organisms

3.4.2 observe, measure, and record changes in living things (e.g., growth and development, variations within species).

Organisms and Environments

3.4.3 compare physical characteristics and behaviors of living organisms and explain how they are adapted to a specific environment (e.g., beaks and feet in birds, seed dispersal, camouflage, different types of flowers).

3.4.4 observe and describe relationships among organisms in an ecosystem (e.g., sequencing food chains, behavior, adaptations, factors that effect populations, predator-prey relationships).

Properties of Objects and Materials

3.4.5 recognize that substances may move from place to place, but they never appear out of nowhere and never just disappear.

3.4.6 relate the buoyancy of an object to its density.

3.4.7 identify chemical and physical properties.

3.4.8 observe chemical reactions.

3.4.9 relate changes in states of matter to changes in temperature.

3.4.10 investigate the dissolving of solids in liquids.

Light, Heat, Electricity and Magnetism

3. 4.11 recognize energy transformations (e.g., mechanical or electrical energy to heat energy).

3.4.12 investigate the absorption, reflection and refraction of light by objects.

3.4.13 investigate static electricity.

Position and Motion of Objects

3.4.14 recognize that it takes work to move objects over a distance.

Performance Descriptors

- **Distinguished**

  Third grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories:
  - Characteristics of Organisms
  - Life Cycles of Organisms
  - Organisms and Environments
  - Properties of Objects and Materials
  - Light, Heat, Electricity and Magnetism
  - Position and Motion of Objects
  - Changes in Earth and Sky
  - Objects in the Sky
  - Properties of Earth Materials

  Students critique scientific applications; develop justifications for solutions to problems; and generate interconnections among the categories listed above.

- **Mastery**

  Third grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories:
  - Characteristics of Organisms
  - Life Cycles of Organisms
  - Organisms and Environments
  - Properties of Objects and Materials
  - Light, Heat, Electricity and Magnetism
  - Position and Motion of Objects
  - Changes in Earth and Sky
  - Objects in the Sky
  - Properties of Earth Materials

  Students explain interconnections among the categories listed above.

3.4.15 recognize that speed, distance, and time are interrelated. 3.4.16 recognize that the greater a force is exerted on an object, the greater the change of its motion will be. 3.4.17 identify examples of potential and kinetic energy. <u>Changes in Earth and Sky</u> 3.4.18 explain how the rotation of the Earth causes day and night. 3.4.19 identify fossils as a record of time (e.g., what organisms once lived on Earth, where they lived). 3.4.20 explore the eroding of different materials by water and wind (e.g., sand, mud pile and rocks). 3.4.21 describe how volcanoes and earthquakes change the Earth. <u>Objects in the Sky</u> 3.4.22 recognize the relative movement of the Sun and Moon in relationship to the earth=s position. 3.4.23 describe the similarities and differences among the planets. <u>Properties of Earth Materials</u> 3.4.24 identify properties of minerals. 3.4.25 understand that rocks are composed of different minerals. 3.4.26 explain how igneous, sedimentary and metamorphic rocks are formed. 3.4.27 identify geographical features using a model or map (e.g., mountains, rivers, valleys, lakes, glaciers, and volcanoes). 3.4.28 describe the layers of the Earth and their various features.	■ **Partial Mastery** Third grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories: • Characteristics of Organisms • Life Cycles of Organisms • Organisms and Environments • Properties of Objects and Materials • Light, Heat, Electricity and Magnetism • Position and Motion of Objects • Changes in Earth and Sky • Objects in the Sky • Properties of Earth Materials Students identify interconnections among the above categories. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Scientific Design and Application Students will: • demonstrate an understanding of the interdependence between science and technology; • demonstrate the ability to distinguish between natural and man-made objects; • demonstrate abilities of technological design; and • demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.	
Scientific Design and Application Objectives Students will: 3.5.1 cite examples of the uses of science and technology in common daily events and in the community. 3.5.2 explain a simple problem and identify a specific solution describing the use of tools and/or materials to solve the problem or to complete the task.	**Performance Descriptors** ■ **Distinguished** Third grade students performing at the distinguished level describe the uses of science and technology in the community and throughout the world. ■ **Mastery** Third grade students performing at the mastery level identify the uses of science and technology in the community.

	■ **Partial Mastery** Third grade students performing at the partial mastery level identify the uses of science and technology within the home. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives Students will:	**Performance Descriptors**
3.6.1 recognize that a solution to one scientific problem often creates new problems (e.g., recycling, pollution, conservation, waste disposal). 3.6.2 listen to and be tolerant of different viewpoints by engaging in collaborative activities and be willing to modify ideas when new and valid information is presented. 3.6.3 develop respect and responsibility for the environment by engaging in conservation practices. 3.6.4 describe how modern tools and appliances have positively and/or negatively impacted their daily lives.	■ **Distinguished** Third grade students performing at the distinguished level describe the impact that their personal choices have on the quality of life. Students cite and classify resources as renewable or nonrenewable and engage in conservation practices. ■ **Mastery** Third grade students performing at the mastery level identify the impact that personal choices have on the quality of their lives. Students identify resources as renewable or nonrenewable and engage in conservation practices. ■ **Partial Mastery** Third grade students performing at the partial mastery level recognize resources as renewable and nonrenewable and engage in conservation practices. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Coordinated Science Standards and Objectives

The Coordinated and Thematic Science (CATS) Four objectives build on the study of geology, astronomy, chemistry and physics. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes, and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. CATS Four promotes cooperative learning, group decisions, cultural diversity, careers, and expands the development of hands-on exploration. Basic science concepts are developed and problem-solving abilities are augmented. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives	**Performance Descriptors**
Students will: 4.1.1 contrast changes in scientific knowledge resulting from new discoveries (e.g., new knowledge leads to new questions). 4.1.2 study the lives and discoveries of scientists of different cultures and backgrounds. 4.1.3 explore science careers in West Virginia.	■ **Distinguished** Fourth grade students performing at the distinguished level analyze and draw conclusions about changes in scientific knowledge over time. Students compare and contrast science careers in West Virginia. ■ **Mastery** Fourth grade students performing at the mastery level contrast changes in scientific knowledge over time. Students identify science careers in West Virginia. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level identify changes in scientific knowledge over time and identify science careers in West Virginia. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives Students will:	Performance Descriptors
4.2.1 demonstrate curiosity, initiative, and creativity by developing questions that lead to investigations; designing simple experiments; and trusting observations of discoveries when trying new tasks and skills. 4.2.2 recognize that developing solutions to problems requires persistence, flexibility, open-mindedness, and alertness for the unexpected. 4.2.3 support statements with facts found through research in reference books, science-related magazines, multimedia and the Internet. 4.2.4 use scientific instruments and everyday materials to investigate the natural world (e.g., hand lens, telescope, thermometer, balances, magnets, tuning forks, bulbs and batteries, graduated cylinders, calculators, computers). 4.2.5 demonstrate safe and proper techniques for handling, manipulating, and caring for science materials. 4.2.6 construct a hypothesis when provided a problem. 4.2.7 establish variables and controls in an experiment; test variables through experimentation. 4.2.8 interpret data presented in a table, graph, or diagram and use it to answer questions and make decisions. 4.2.9 draw and support conclusions, make predictions and inferences based on patterns of evidence (e.g., weather maps, change of speed in a given amount of time, change in wave motions with changes in energy, and variation of plants). 4.2.10 apply mathematical skills and use metric units in measurements and calculations.	■ **Distinguished** Fourth grade students performing at the distinguished level develop questions and propose solutions; use scientific instruments to make observations, measure and collect data; extract information from charts, tables, and graphs. Students demonstrate safe and proper techniques for handling, manipulating, and caring for scientific materials. ■ **Mastery** Fourth grade students performing at the mastery level develop questions; use scientific instruments to make observations, measure and collect data; extract information from charts, tables, and graphs. Students demonstrate safe and proper techniques for handling, manipulating, and caring for scientific materials. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level develop questions and make observations using scientific instruments. Students demonstrate safe and proper techniques for handling, manipulating, and caring for scientific materials. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Unifying Themes
Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives Students will:	Performance Descriptors
4.3.1 identify that systems are made of parts that interact with one another. 4.3.2 use models as representations of real things.	■ **Distinguished** Fourth grade students performing at the distinguished level explain the relationship between the form of an object or system and its function. Students construct models to represent systems.

4.3.3 observe that changes occur gradually, repetitively, or randomly within the environment. 4.3.4 observe and question causes of changes. 4.3.5 given a set of objects, group or order the objects according to an established scheme. 4.3.6 given a set of events, objects, shapes, designs, or numbers, find patterns of constancy or regularity.	■ **Mastery** Fourth grade students performing at the mastery level identify and describe how modifications to the parts of a system affect interactions between its parts. Students construct models to represent systems. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level identify observable changes to the parts of the system. Students construct models to represent systems. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives	**Performance Descriptors**
Students will: <u>Characteristics of Organisms</u> 4.4.1 describe the different characteristics of plants and animals which help them to survive in different niches and environments. 4.4.2 associate the behaviors of living organisms to external and internal influences (e.g., hunger, climate, seasons). 4.4.3 identify and classify variations in structures of living things including their systems and explain their functions (e.g., skeletons, teeth, plant needles and leaves). <u>Life Cycles of Organisms</u> 4.4.4 compare and sequence changes in plant and animal life cycles. 4.4.5 understand that plants and animals closely resemble their parents and that some characteristics are inherited from the parents and others result from interaction with the environment. <u>Organisms and Environments</u> 4.4.6 identify human uses of plants and animals (e.g., food sources, medicines). 4.4.7 describe environmental barriers to the migration of animals. 4.4.8 construct and explain models of habitats, food chains, and food webs. <u>Properties of Objects and Materials</u> 4.4.9 investigate how properties can be used to identify substances.	■ **Distinguished** Fourth grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories: • Characteristcs of Organisms • Life Cycles of Organisms • Organisms and Environments • Properties of Objects and Materials • Light, Heat, Electricity and Magnetism • Position and Motion of Objects • Changes in Earth and Sky • Objects in the Sky • Properties of Earth Materials Students critique scientific applications: develop justifications for solutions to problems; and generate interconnections among the categories listed above.

4.4.10	investigate and compare the dissolving of different solids in a given liquid.
4.4.11	examine simple chemical changes (e.g., tarnishing, rusting, burning).
4.4.12	understand that materials may be composed of parts that are too small to be seen without magnification.
4.4.13	identify various changes in states of matter to heat loss or gain.
4.4.14	investigate variables that affect the rate of evaporation of a liquid.
4.4.15	understand that materials including air mass, take up space, and are made of parts that are too small to be seen without magnification.
4.4.16	investigate the density of liquids.
Light, Heat, Electricity and Magnetism	
4.4.17	identify different forms of energy and describe energy transformations that occur between them (e.g., electrical to heat, light to mechanical).
4.4.18	examine types and properties of waves (e.g., transverse, longitudinal, frequency, wavelengths).
4.4.19	construct simple electrical circuits.
4.4.20	investigate conductors and nonconductors of electricity.
4.4.21	relate how the color of an object is based upon the absorption or reflection of light..
4.4.22	understand the relationship between a compass and a magnetic field.
Position and Motion of Objects	
4.4.23	relate motion of an object to its frame of reference.
4.4.24	predict and investigate the motion of an object if the applied force is changed.
4.4.25	observe that sounds are produced by vibrating objects and columns of air and explore the relationship between frequency and pitch of sound.
4.4.26	investigate the change in the length, tension, or thickness of the vibrating object on the frequency of vibration (e.g., string, wire, rubber band).
Changes in Earth and Sky	
4.4.27	become familiar with the geologic time scale.
4.4.28	locate and identify patterns of stars and their seasonal changes.
4.4.29	compare and explain the relative time differences to erode materials (e.g., a sand pile, mud pile, rock pile).
4.4.30	investigate the cause and effects of volcanoes, earthquakes, and landslides.
4.4.31	interpret a weather chart or map.

- **Mastery**
  Fourth grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories:
  - Characteristics of Organisms
  - Life Cycles of Organisms
  - Organisms and Environments
  - Properties of Objects and Materials
  - Light, Heat, Electricity and Magnetism
  - Position and Motion of Objects
  - Changes in Earth and Sky
  - Objects in the Sky
  - Properties of Earth Materials

  Students explain interconnections among the categories listed above.
- **Partial Mastery**
  Fourth grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories:
  - Characteristics of Organisms
  - Life Cycles of Organisms
  - Organisms and Environments
  - Properties of Objects and Materials
  - Light, Heat, Electricity and Magnetism
  - Position and Motion of Objects
  - Changes in Earth and Sky
  - Objects in the Sky
  - Properties of Earth Materials

  Students identify interconnections among the above categories.
- **Novice**
  Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Objects in the Sky 4.4.32 identify the sun as a star. 4.4.33 describe the orbits of the Sun and Moon. 4.4.34 describe and explain the planets orbital paths. Properties of Earth Materials 4.4.35 describe the rock cycle. 4.4.36 explain the relationship between the rate of cooling and crystal size of igneous rocks . 4.4.37 compare ocean water and fresh water.	

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives Students will:	**Performance Descriptors**
4.5.1 identify and explain a simple problem or task to be completed; identify a specific solution; and list task requirements. 4.5.2 use an appropriate engineering design to solve a problem or complete a task.	■ **Distinguished** Fourth grade students performing at the distinguished level develop an appropriate engineering design for a given task and produce a product or process that exceeds the task requirements. ■ **Mastery** Fourth grade students performing at the mastery level identify an appropriate engineering design for a given task and produce a product or process to meet the task requirements. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level develop an engineering design for a given task and produce a product or process that does not meet the task requirements. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives	Performance Descriptors
Students will: 4.6.1 recognize that a solution to one scientific problem often creates new problems (e.g., recycling, pollution, conservation, waste disposal, need for technology). 4.6.2 listen to and be tolerant of different viewpoints by engaging in collaborative activities and modifying ideas when new and valid information is presented from a variety of resources. 4.6.3 describe the positive and negative consequences of the application of technology on personal health and the environment. 4.6.4 develop respect and responsibility for the environment by engaging in conservation practices.	■ **Distinguished** Fourth grade students performing at the distinguished level compare and contrast the positive and negative consequences of technology applications on personal health, populations, and the environment. ■ **Mastery** Fourth grade students performing at the mastery level describe the positive and negative consequences of technology application on personal health, populations, and the environment. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level list the consequences of technology on personal health, populations, on the environment. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Fifth Grade Science Standards and Objectives

The Coordinated and Thematic Science (CATS) Five objectives identify, compare, classify and explain our living and designed worlds. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics, and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated in all activities. CATS Five reviews earth and the sky, life cycles and habitats of organisms, properties, positions, and motions of objects, and energy. New major concepts introduced at the fifth grade level include changes in properties of matter, structures, functions and adaptations of organisms, and the structure of the earth's system. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives	Performance Descriptors
Students will: 5.1.1 realize that scientists formulate and test their explanations of nature using observation and experiments. 5.1.2 recognize scientific knowledge is subject to modification as new scientific information challenges current explanations.	■ **Distinguished** Fifth grade students performing at the distinguished level compare and contrast the careers and contributions of men and women from diverse cultures and articulate the historical significance of their scientific discoveries.

5.1.3 examine the careers and contributions of men and women of diverse cultures to the development of science 5.1.4 articulate the historical significance of scientific discoveries.	■ **Mastery** Fifth grade students performing at the mastery level explain the careers and contributions of men and women from diverse cultures and articulate the historical significance of their scientific discoveries. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level recognize careers and contributions of men and women from diverse cultures. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry
Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives Students will:	**Performance Descriptors**
5.2.1 cooperate and collaborate to ask questions, find answers, solve problems, conduct investigations to further an appreciation and joy of scientific discovery. 5.2.2 formulate conclusions through close observations, logical reasoning, objectivity, perseverance, and integrity in data collection. 5.2.3 apply skepticism, careful methods, logical reasoning, and creativity in investigating the observable universe. 5.2.4 use a variety of materials and scientific instruments to conduct explorations, investigations, and experiments of the natural world (e.g., barometer, anemometer, microscope, computer). 5.2.5 demonstrate safe techniques for handling, manipulating and caring for science materials, equipment, natural specimens, and living organisms. 5.2.6 utilize experimentation to demonstrate scientific processes and thinking skills (e.g., formulating questions, predicting, forming hypotheses, quantifying, identifying dependent and independent variables). 5.2.7 construct and use charts, graphs, and tables to organize, display, interpret, analyze, and explain data. 5.2.8 use inferential reasoning to make logical conclusions from collected data.	■ **Distinguished** Fifth grade students performing at the distinguished level develop questions, generate hypothesis, propose solutions, and draw conclusions. Students use scientific instruments to make observations, measure, and collect data. Students collect, organize and display their data; extract information from charts, tables and graphs. Students routinely apply safety techniques. ■ **Mastery** Fifth grade students performing at the distinguished level develop questions and propose solutions. Students use scientific instruments to make observations, measure, and collect data. Students collect, organize and display their data; extract information from charts, tables and graphs. Students routinely apply safety techniques. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level develop questions; use scientific instruments to make observations, measure, and collect data; use information from charts, tables and graphs. Students routinely apply safety techniques. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives Students will:	**Performance Descriptors**
5.3.1 compare and contrast the relationship between the parts of a system to the whole system (e.g., take a part or build mechanical, electrical, or biological systems). 5.3.2 construct a variety of useful models of an object, event, or process. 5.3.3 compare and contrast changes that occur in an object or a system to its original state. 5.3.4 identify the influence that a variation in scale will have on the way an object or system works. (e.g., cooling rates of different-sized containers of water, strength of different-sized constructions from the same material, flight characteristics of different-sized model airplanes).	■ **Distinguished** Fifth grade students performing at the distinguished level compare and contrast the relationships between the forms of objects or systems and their functions. Students design models to represent systems. ■ **Mastery** Fifth grade students performing at the mastery level use models to explain the relationship between the form of an object or system and its function. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level identify that there is a relationship between form and function. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives Students will:	**Performance Descriptors**
5.4.1 demonstrate an understanding of the interconnections of biological, earth and space, and physical science concepts. <u>Structure and Function in Living Systems</u> 5.4.2 identify and explain common energy conversions in cycles of matter including photosynthesis and carbon dioxide cycle. 5.4.3 identify the structures of living organisms and explain their function. 5.4.4 observe and identify cells of organisms using a microscope. <u>Life Cycles of Organisms: Reproduction and Heredity</u> 5.4.5 compare variations of plant growth and reproduction.	■ **Distinguished** Fifth grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories: • Structure and Function in Living Systems • Life Cycles of Organisms: Reproduction and Heredity • Populations and Ecosystems • Properties of Objects and Materials • Light, Heat, Electricity and Magnetism • Position and Motion of Objects • Structure of the Earth System • Earth's History

Populations and Ecosystems

5.4.6 explain how the different characteristics of plants and animals help them to survive in different niches and environments including adaptations, natural selection, extinction.

5.4.7 explore the extinction of a species due to environmental conditions.

5.4.8 trace and describe the pathways of the sun=s energy through producers, consumers, and decomposers using food webs and pyramids.

Properties of Objects and Materials

5.4.9 explain that the mass of a material is conserved whether it is together, in parts, or in a different state.

5.4.10 recognize that elements are composed of only one type of matter.

5.4.11 using the periodic table, identify common elements according to their symbols.

5.4.12 identify substances by their relative densities (e.g., floating; sinking).

Light, Heat, Electricity and Magnetism

5.4.13 analyze diagrams of electrical circuits.

5.4.14 use SI (metric) measurement units of volts, amps, and watts as they apply to electricity.

5.4.15 investigate the properties of an electromagnet.

Position and Motion of Objects

5.4.16 describe how the variables of gravity and friction affect the motion of objects.

5.4.17 compare and contrast the change in length, tension, or thickness of the vibrating object on the frequency of vibration.

Structure of the Earth System

5.4.18 describe the layers of the earth and their various features.

5.4.19 identify and describe natural landforms, how they change and impact weather and climate.

5.4.20 use a variety of instruments and sources to collect and display weather data to describe weather patterns (e.g., temperatures, wind direction, wind speed, precipitation).

5.4.21 compare and explain the different rates of weathering, erosion, and deposition in certain materials.

5.4.22 identify land features and elevations on a topographical map.

5.4.23 identify resources as being renewable or non-renewable.

Earth's History

5.4.24 explore and explain how fossils and geologic features can be used to determine the relative age of rocks and rock layers.

5.4.25 identify that the Earth is made of plates (plate tectonics).

Students critique scientific applications; develop justifications for solutions to problems; articulate abstract concepts; and generate interconnections among the categories listed above.

- **Mastery**

  Fifth grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories:

  - Structure and Function in Living Systems
  - Life Cycles of Organisms: Reproduction and Heredity
  - Populations and Ecosystems
  - Properties of Objects and Materials
  - Light, Heat, Electricity and Magnetism
  - Position and Motion of Objects
  - Structure of the Earth System
  - Earth's History

  Students explain interconnections among the categories listed above.

- **Partial Mastery**

  Fifth grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories:

  - Structure and Function in Living Systems
  - Life Cycles of Organisms: Reproduction and Heredity
  - Populations and Ecosystems
  - Properties of Objects and Materials
  - Light, Heat, Electricity and Magnetism
  - Position and Motion of Objects
  - Structure of the Earth System
  - Earth's History

  Students identify interconnections among the above categories.

- **Novice**

  Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives Students will:	**Performance Descriptors**
5.5.1 research everyday applications and interactions of science and technology. 5.5.2 implement engineering solutions for given tasks and measure their effectiveness.	■ **Distinguished** Fifth grade students performing at the distinguished level compare and contrast the interactions between science and technology in daily living. Given a task, students implement an engineering solution, measure, and evaluate its effectiveness. ■ **Mastery** Fifth grade students performing at the mastery level describe the interactions between science and technology in daily living. Given a task, students implement an engineering solution and measure its effectiveness. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level identify interactions between science and technology in daily living. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives Students will:	**Performance Descriptors**
5.6.1 use scientific reasoning and the knowledge of science and technology to make informed personal decisions at the local and global levels. 5.6.2 evaluate and critically analyze mass media reports of scientific developments and events. 5.6.3 critically analyze the effects and impacts of science and technology on global and local problems (e.g., mining, manufacturing, recycling, farming, water quality). 5.6.4 explore the connections between science, technology, society, and career opportunities.	■ **Distinguished** Fifth grade students performing at the distinguished level analyze the causes/effects of science and technology on global and local problems. Students identify and describe the connections between science, technology, society, and career opportunities. ■ **Mastery** Fifth grade students performing at the mastery level analyze the cause/effect of science and technology on global and local problems. Students identify the connections between science, technology, society, and career opportunities.

5.6.5	analyze the positive and negative effects of technology on society and the influence of societal pressures on the direction of technological advances.	■ **Partial Mastery** Fifth grade students performing at the partial mastery level list causes/effects of science and technology on local problems. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

The Coordinated and Thematic Science (CATS) Six objectives demonstrate, differentiate, and apply concepts of the living and designed worlds. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics, and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of major science themes of systems, changes and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated in all activities. CATS Six reviews changes in the properties of matter, structures, functions, and adaptations of organisms, and the structure of the earth's systems. New major concepts introduced at the sixth grade level include motions and forces, ecosystems, diversity of life, energy transformations, plate tectonics, earth's resources and weather. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives Students will:	**Performance Descriptors**
6.1.1 explain that scientists formulate and test their explanations of nature using observation and experiments. 6.1.2 recognize that scientific knowledge is subject to modification as new scientific information challenges current theories. 6.1.3 associate the careers and contributions of men and women of diverse cultures to the development of science. 6.1.4 articulate the historical significance of scientific discoveries as influenced by technological demands, competition, controversy, world events, personalities, and societal issues.	■ **Distinguished** Sixth grade students performing at the distinguished level use historical examples to show how scientists formulate and test their explanations. Students provide evidence of how careers relate with scientific fields of study. ■ **Mastery** Sixth grade students performing at the mastery level explain how scientists formulate and test their explanations. Students associate careers with scientific fields of study. ■ **Partial Mastery** Sixth grades students performing at the partial mastery level recall how scientists formulate and test their explanations. Students match careers with specific scientific fields of study.

	■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives Students will:	**Performance Descriptors**
6.2.1 cooperate and collaborate to ask questions, find answers, solve problems, conduct investigations to further an appreciation and joy of scientific discovery. 6.2.2 formulate conclusions through close observations, logical reasoning, objectivity, perseverance, and integrity in data collection. 6.2.3 apply skepticism, careful methods, logical reasoning, and creativity in investigating the observable universe. 6.2.4 use a variety of materials and scientific instruments to conduct explorations, investigations, and experiments of the natural world (e.g., barometer, anemometer, microscope, computer). 6.2.5 demonstrate safe techniques for handling, manipulating and caring for science materials, equipment, natural specimens, and living organisms. 6.2.6 utilize experimentation to demonstrate scientific processes and thinking skills (e.g., formulating questions, predicting, forming hypotheses, quantifying, identifying dependent and independent variables). 6.2.7 construct and use charts, graphs, and tables to organize, display, interpret, analyze, and explain data. 6.2.8 use inferential reasoning to make logical conclusions from collected data. 6.2.9 use appropriate technology solutions to gather data; graph data; interpret data; and analyze information.	■ **Distinguished** Sixth grade students performing at the distinguished level evaluate selected scientific processes and skills, such as formulating questions, making predictions, and forming hypothesis for a given problem; analyze records for consistency and accuracy; construct appropriate charts, tables, and graphs. Students explain safety techniques and choose proper equipment to solve the problems (Science Subject Matter/Concept appropriate). ■ **Mastery** Sixth grade students performing at the mastery level use scientific processes and skills to formulate questions, make predictions, and form hypothesis; maintain consistent and accurate records; organize data into appropriate charts, tables and graphs. Students explain safety techniques and use proper equipment to solve problems (Science Subject Matter/Concept appropriate). ■ **Partial Mastery** Sixth grade students performing at the partial mastery level identify scientific process and skills used to formulate questions, make predictions, and form hypothesis; maintain consistent and accurate records; select appropriate data on charts, tables, and graphs. Students routinely apply safety techniques and use proper equipment to solve problems (Science Subject Matter/Concept appropriate). ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Unifying Themes
Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives Students will:	**Performance Descriptors**
6.3.1 compare and contrast the relationship between the parts of a system to the whole system (e.g., take apart or build mechanical, electrical, or biological systems). 6.3.2 construct a variety of useful models of an object, event, or process. 6.3.3 compare and contrast changes that occur in an object or a system to its original state. 6.3.4 identify the influence that a variation in scale will have on the way an object or system works. (e.g., cooling rates of different-sized containers of water, strength of different-sized constructions from the same material, flight characteristics of different-sized model airplanes).	■ **Distinguished** Sixth grade students performing at the distinguished level evaluate the accuracy of models (e.g. physical, pictorial) of objects or systems and predict how to manipulate variables to improve the model. ■ **Mastery** Sixth grade students performing at the mastery level design models (e.g. physical, pictorial) of objects or systems and predict how variables affect their function. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level use models (e.g. physical, pictorial) of objects or systems and identify and describe how changing variables effects their function. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts
Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives Students will:	**Performance Descriptors**
6.4.1 demonstrate an understanding of the interconnections of biological, earth and space, and physical science concepts. <u>Structure and Function in Living Systems</u> 6.4.2 describe the interactions of various cycles that provide energy through decomposition, photosynthesis, respiration, transpiration in the food web; nitrogen cycle. 6.4.3 classify living organisms according to their structure and functions. 6.4.4 compare the similarities of internal features of organisms which can be used to infer relatedness.	■ **Distinguished** Sixth grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories: • Structure and Function in Living Systems • Life Cycles of Organisms: Reproduction and Heredity • Populations and Ecosystems • Structure and Properties of Matter • Energy • Motion and Forces • Structure of the Earth System • Earth's History • Earth and the Solar System

6.4.5 explain how abiotic and biotic factors affect the interdependence among organisms. 6.4.6 construct models of plant and animal cells which show the basic parts (e.g., cytoplasm, cell wall, cell membrane, nucleus, chloroplasts). Life Cycles of Organisms: Reproduction and Heredity 6.4.7 compare growth patterns in different plants (e.g., mosses, ferns, perennials, biennials, woody plants, herbaceous plants). Populations and Ecosystems 6.4.8 demonstrate changes in populations of organisms due to limiting environmental factors (e.g., food supply, predators, disease, habitat). 6.4.9 analyze the ecological consequences of human interactions with the environment (e.g., renewable and non-renewable resources). Structure and Properties of Matter 6.4.10 classify and investigate properties and processes (changes) as either physical and chemical. 6.4.11 investigate the composition of matter concluding that matter is composed of tiny particles and that the particles are the same for the same type of matter. 6.4.12 investigate the formation and separation of simple mixtures. 6.4.13 use indicators to identify substances as acidic, basic, or neutral. 6.4.14 identify the symbols of elements. 6.4.15 use the periodic table to identify elements as solids, liquids and gases, metals or nonmetals. 6.4.16 describe properties of matter (e.g., inertia, specific heat, malleability, melting point, density). Energy 6.4.17 investigate the properties electromagnetic spectrum (e.g., wavelengths, frequencies, visible light); relate wave lengths and/or frequency to position on electromagnetic spectrum (e.g., colors, x-ray). 6.4.18 identify factors affecting reflection and refraction (e.g., nature of surfaces, color, density of medium). 6.4.19 explain absorption and reflection of light by different objects of various colors and textures (e.g., transparent, translucent, opaque, different colors). 6.4.20 describe the flow of heat between objects (e.g., hot air rises, absorption and release of heat by metals). 6.4.21 diagram simple parallel and series circuits (e.g., bulbs, battery, wires, switch).	Students critique scientific applications; develop justifications for solutions to problems; articulate abstract concepts; and generate interconnections among the categories listed above. ■ **Mastery** Sixth grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories: • Structure and Function in Living Systems • Life Cycles of Organisms: Reproduction and Heredity • Populations and Ecosystems • Structure and Properties of Matter • Energy • Motion and Forces • Structure of the Earth System • Earth's History • Earth and the Solar System Students explain interconnections among the categories listed above. ■ **Partial Mastery** Sixth grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories: • Structure and Function in Living Systems • Life Cycles of Organisms: Reproduction and Heredity • Populations and Ecosystems • Structure and Properties of Matter • Energy • Motion and Forces • Structure of the Earth System • Earth's History • Earth and the Solar System Students identify interconnections among the above categories. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Motion and Forces 6.4.22 interpret the relationship of mass to gravitational force (e.g., larger the mass the larger the gravitational force, the closer the objects the stronger the force). 6.4.23 examine simple machines and the forces involved; apply the effects of balanced and unbalanced forces on motion of objects. 6.4.24 explain motion in terms of frames of reference and analyze graphs depicting motion and predicted future motion. Structure of the Earth System 6.4.25 track major atmospheric events. 6.4.26 describe and demonstrate the forces and results of plate tectonics. Earth's History 6.4.27 describe changes in the rock record due to geologic and physical events over time. (e.g., rock cycle as it relates to plate tectonics.). Earth and the Solar System 6.4.28 recognize the phases of the Moon. 6.4.29 investigate models of Earth-Moon-Sun relationships (e.g., gravity, time, tides). 6.4.30 compare the Earth's tilt and revolution to the seasonal changes.	

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives Students will:	**Performance Descriptors**
6.5.1 given a set of attributes, produce a product or process and cite how design priorities (e.g., space, safety) and available materials impact the outcome. 6.5.2 evaluate the appropriateness of the materials and procedures in given engineering solutions.	■ **Distinguished** Sixth grade students performing at the distinguished level predict the consequences of using inappropriate materials in engineering solutions. ■ **Mastery** Sixth grade students performing at the mastery level examine engineering solutions and evaluate the appropriateness of the materials and procedures. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level describe the solution of an engineering task and evaluate the appropriateness of the materials and procedures. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives
Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives Students will:	**Performance Descriptors**
6.6.1 use scientific reasoning and the knowledge of science and technology to make informed personal decisions at the local and global levels. 6.6.2 evaluate and critically analyze mass media reports of scientific developments and events. 6.6.3 critically analyze the effects and impacts of science and technology on global and local problems (e.g., mining, manufacturing, recycling, farming, water quality). 6.6.4 explore the connections between science, technology, society, and career opportunities. 6.6.5 analyze the positive and negative effects of technology on society and the influence of societal pressures on the direction of technological advances.	■ **Distinguished** Sixth grade students performing at the distinguished level provide alternative points of view on ways science/technology/society impacts specific health, population, resources and environmental practices. ■ **Mastery** Sixth grade students performing at the mastery level describe how science/technology/society impacts specific health, population, resources and environmental practices. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level identify how science/technology/society impacts specific resources and environmental practices. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Seventh Grade Science Content Standards and Objectives

The Coordinated and Thematic Science (CATS) Seven objectives evaluate, interpret, and predict conditions and phenomena of the living and designed worlds. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics, and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes, and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. CATS Seven reviews motions and forces, ecosystems, diversity of life, energy transformations, plate tectonics, earth's resources, and weather. Major concepts expanded at the seventh grade level include elements, mixtures, and compounds, populations/ecosystems, conservation of matter and energy, and earth's history. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives	Performance Descriptors
Students will: 7.1.1 realize that scientists formulate and test their explanations of nature using observation, experiments and theoretical models. 7.1.2 recognize and appreciate that scientific knowledge is subject to modification as new scientific information challenges current theories. 7.1.3 examine the role of skepticism, careful methods, logical reasoning and creativity in investigating the observable universe. 7.1.4 examine the careers and contributions of men and women of diverse cultures to the development of science. 7.1.5 articulate the historical significance of scientific discoveries as influenced by technological demands, competition, controversy, world events, personalities and societal issues.	■ **Distinguished** Seventh grade students performing at the distinguished level when given a scientific investigation, scrutinize the motives and evaluate the role of skepticism, recognizing bias, methodology, logical reasoning and creativity in scientific investigations. Students predict the impact of current scientific contributions of men and women of diverse cultures on society. ■ **Mastery** Seventh grade students performing at the mastery level explain the role of skepticism, recognizing bias, methodology, logical reasoning and creativity in scientific investigations. Students interpret the impact of the scientific contributions of men and women of diverse cultures on society. ■ **Partial Mastery** Seventh grade students performing at the partial mastery level list examples of the role played by skepticism, recognizing bias, methodology, logical reasoning and creativity in scientific investigations. Students list scientific contributions of men and women of diverse cultures on society. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives	Performance Descriptors
Students will: 7.2.1 cooperate and collaborate to ask questions, find answers, solve problems, conduct investigations to further an appreciation and joy of scientific discovery. 7.2.2 formulate conclusions through close observations, logical reasoning, objectivity, perseverance and integrity in data collection.	■ **Distinguished** Seventh grade students performing at the distinguished level design an experiment that incorporates independent, dependent, controlled variables; use multiple trials in an experiment for reliability; suggest multiple alternative approaches to investigations. Students apply safety techniques and choose the proper equipment to solve problems (Science Subject Matter/Concept appropriate).

7.2.3 use a variety of materials and scientific instruments to conduct explorations, investigations and experiments of the natural world (e.g., barometer, anemometer, microscope, computer). 7.2.4 demonstrate safe techniques for handling, manipulating and caring for science materials, equipment, natural specimens, and living organisms. 7.2.5 utilize experimentation to demonstrate scientific processes and thinking skills (e.g., formulating questions, predicting, forming hypotheses, quantifying, identifying dependent and independent variables). 7.2.6 construct and use charts, graphs, and tables to organize, display, interpret, analyze, and explain data. 7.2.7 use appropriate technology solutions to gather data; graph data; interpret data; and analyze information. 7.2.8 use inferential reasoning to make logical conclusions from collected data.	■ **Mastery** Seventh grade students performing at the mastery level identify independent, dependent, controlled variables; and use multiple trials in an experiment for reliability. Students suggest an alternative approach to investigations. Students apply safety techniques using proper equipment to solve problems (Science Subject Matter/Concept appropriate). ■ **Partial Mastery** Seventh grade students performing at the partial mastery level define independent, dependent, controlled variables and explain why multiple trials in an experiment are necessary for reliability. Students apply safety techniques and use proper equipment to solve problems (Science Subject Matter/Concept appropriate). ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives Students will:	**Performance Descriptors**
7.3.1 compare and contrast the relationship between the parts of a system to the whole system (e.g., take apart or build mechanical, electrical, or biological systems). 7.3.2 construct a variety of useful models of an object, event, or process. 7.3.3 compare and contrast changes that occur in an object or a system to its original state. 7.3.4 identify the influence that a variation in scale will have on the way an object or system works. (e.g., cooling rates of different-sized containers of water, strength of different-sized constructions from the same material, flight characteristics of different-sized model airplanes).	■ **Distinguished** Seventh grade students performing at the distinguished level, given a set of conditions, predict and defend future changes that could occur in an object or system over time. ■ **Mastery** Seventh grade students performing at the mastery level analyze and describe the changes that occur in an object or system over time. ■ **Partial Mastery** Seventh grade students performing at the partial mastery level describe the changes that occur in an object or system over time. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts
Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives
Students will:

7.4.1 demonstrate an understanding of the interconnections of biological, earth and space, and physical science concepts.

Structure and Function in Living Systems

7.4.2 identify and describe disease causing organisms and the diseases they cause such as bacteria, viruses, protozoa, fungi.

7.4.3 explain how the skeletal, muscular, and integumentary systems work together in the human body.

7.4.4 compare the level of organization of cells, tissues, and organs in living things.

7.4.5 construct simple keys to differentiate among living things with similar characteristics.

7.4.6 use pictures to show cyclical processes in nature (e.g., water cycle, nitrogen cycle, and carbon cycle).

Life Cycles of Organisms: Reproduction and Heredity

7.4.7 evaluate how the different adaptations and life cycles of plants and animals help them to survive in different niches and environments (e.g., inherited and acquired adaptations).

7.4.8 analyze how changes in the environment have led to reproductive adaptations through natural selection.

7.4.9 relate how an organisms behavior response is a combination of heredity and environment.

7.4.10 analyze the differences in the growth, development and reproduction of flowering and non-flowering plants.

Populations and Ecosystems

7.4.11 predict the trends of interdependent populations if one of the limiting factors is changed.

7.4.12 evaluate the consequences of the introduction of chemicals into the ecosystem (e.g., environmental consequences, human health risks, mutations).

Structure and Properties of Matter

7.4.13 differentiate among elements, compounds, homogeneous and heterogeneous mixtures.

7.4.14 evaluate types of solutions (e.g., solutes and solvents relative concentrations, conductivity, pH).

Performance Descriptors

- **Distinguished**

  Seventh grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories:
  - Structure and Function in Living Systems
  - Life Cycles of Organisms: Reproduction and Heredity
  - Populations and Ecosystems
  - Structure and Properties of Matter
  - Chemical Reactions
  - Energy
  - Motion and Forces
  - Structure of the Earth System
  - Earth's History
  - Earth and the Solar System

  Students critique scientific applications; develop justifications for solutions to problems; articulate abstract concepts; and generate interconnections among the categories listed above.

- **Mastery**

  Seventh grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories:
  - Structure and Function in Living Systems
  - Life Cycles of Organisms: Reproduction and Heredity
  - Populations and Ecosystems
  - Structure and Properties of Matter
  - Chemical Reactions
  - Energy
  - Motion and Forces
  - Structure of the Earth System
  - Earth's History
  - Earth and the Solar System

  Students explain interconnections among the categories listed above.

Chemical Reactions 7.4.15 study chemical reactions involving acids and bases by monitoring color changes of indicator(s) and identifying the salt formed in the neutralization reaction. 7.4.16 write word equations to describe chemical reactions. Energy 7.4.17 describe the behavior of individual particles and verify the conservation of matter (e.g., melting and freezing of pure substances). 7.4.18 trace the energy flow during phase changes 7.4.19 define characteristics of light and sound waves and describe how sound is perceived by the ear and light is perceived by the eye. 7.4.20 investigate application of lenses to science (e.g., microscopes, telescopes, magnifying glass, periscopes). 7.4.21 identify characteristics of AC and DC circuits. 7.4.22 explain conservation of matter and energy qualitatively and recognize that energy can be changed from one form to another. Motion and Forces 7.4.23 perform experiments with simple machines to demonstrate the relationship between forces and distance; use vectors to represent motion. 7.4.24 explain the effect of gravity on falling objects (e.g., $g = 9.8 m/s^2$, object dropped on earth and on moon). 7.4.25 analyze motion graphically and use vectors to represent direction of motion. Structure of the Earth System 7.4.26 depict and relate causes of tides, surfs and currents. 7.4.27 examine the relationships among air masses, oceans, weather, convection currents and the sun's energy. 7.4.28 interpret and create topographical maps. Earth's History 7.4.29 compare and contrast periods of geologic time using rocks and rock layers. Earth and the Solar System 7.4.30 explain and model using manipulatives how the Earth's tilt and revolution determine the seasonal changes and weather patterns. 7.4.31 recognize the changes involved in the life cycle of a star. 7.4.32 describe and compare the physical characteristics of celestial objects. 7.4.33 compare the characteristics of the members of our solar system.	■ **Partial Mastery** Seventh grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories: • Structure and Function in Living Systems • Life Cycles of Organisms: Reproduction and Heredity • Populations and Ecosystems • Structure and Properties of Matter • Chemical Reactions • Energy • Motion and Forces • Structure of the Earth System • Earth's History • Earth and the Solar System Students identify interconnections among the above categories. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: Scientific Design and Application
Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives Students will:	**Performance Descriptors**
7.5.1 make and compare different proposed solutions to an identified problem in light of specified criteria. 7.5.2 test and evaluate different types of materials and/or design approaches in building objects or completing tasks.	■ **Distinguished** Seventh grade students performing at the distinguished level illustrate the variations between two designs using different materials to solve an engineering problem and defend each design. ■ **Mastery** Seventh grade students performing at the mastery level predict the consequences of using inappropriate materials in engineering solutions. ■ **Partial Mastery** Seventh grade students performing at the partial mastery level distinguish between appropriate and inappropriate materials in engineering solutions. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives
Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives Students will:	**Performance Descriptors**
7.6.1 use scientific reasoning and the knowledge of science and technology to make informed personal decisions at the local and global levels. 7.6.2 evaluate and critically analyze mass media reports of scientific developments and events. 7.6.3 critically analyze the effects and impacts of science and technology on global and local problems (e.g., mining, manufacturing, recycling, farming, water quality). 7.6.4 explore the connections between science, technology, society, and career opportunities.	■ **Distinguished** Seventh grade students performing at the distinguished level analyze the personal motives and societal cost and benefits of health, population, resources, and environmental practices. ■ **Mastery** Seventh grade students performing at the mastery level describe the personal and societal costs and benefits of health, population, resources, and environmental practices.

7.6.5	analyze the positive and negative effects of technology on society and the influence of societal pressures on the direction of technological advances.	■ **Partial Mastery** Seventh grade students performing at the partial mastery level identify the personal and societal cost and benefits of health, population, resources, and environmental practices. ■ **Novice** Seventh grade students who have not attained partial mastery are at the novice level for this standard.

Eighth Grade Science Standards and Objectives

The Coordinated and Thematic Science (CATS) Eight objectives analyze, quantify, and explain conditions and phenomena of the living and designed worlds. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy in the fields of biology, chemistry, physics, and earth and space sciences. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. CATS Eight reviews elements, mixtures, and compounds, populations/ecosystems, conservation of matter and energy, and earth's history. Major concepts introduced at the eighth grade level include reproduction, genetics, behavior, chemical reactions, and environmental concerns. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives Students will:		Performance Descriptors
8.1.1	realize that scientists formulate and test their explanations of nature using observation, experiments and theoretical models.	■ **Distinguished** Eighth grade students performing at the distinguished level make inferences about changes in scientific knowledge using current and historical scientific discoveries. Students trace the development of a key historical discovery. ■ **Mastery** Eighth grade students performing at the mastery level make inferences about changes in science knowledge using current and historical scientific discoveries. ■ **Partial Mastery** Eighth grade students performing at the partial mastery level identify changes that have occurred in scientific knowledge using current or historical discoveries.
8.1.2	recognize and appreciate that scientific knowledge is subject to modification as new scientific information challenges current theories.	
8.1.3	apply skepticism, careful methods, logical reasoning, and creativity in investigating the observable universe.	
8.1.4	examine the careers and contributions of men and women of diverse cultures to the development of science.	
8.1.5	articulate the historical significance of scientific discoveries as influenced by technological demands, competition, controversy, world events, personalities and societal issues.	

	■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry
Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives Students will:	**Performance Descriptors**
8.2.1 cooperate and collaborate to ask questions, find answers, solve problems, conduct investigations to further an appreciation and joy of scientific discovery. 8.2.2 formulate conclusions through close observations, logical reasoning, objectivity, perseverance, and integrity in data collection. 8.2.3 use a variety of materials and scientific instruments to conduct explorations, investigations, and experiments of the natural world (e.g., barometer, anemometer, microscope, computer). 8.2.4 demonstrate safe techniques for handling, manipulating and caring for science materials, equipment, natural specimens, and living organisms. 8.2.5 utilize experimentation to demonstrate scientific processes and thinking skills (e.g., formulating questions, predicting, forming hypotheses, quantifying, identifying dependent and independent variables). 8.2.6 construct and use charts, graphs, and tables to organize, display, interpret, analyze, and explain data. 8.2.7 use appropriate technology solutions to gather, graph and interpret data; and analyze information. 8.2.8 use inferential reasoning to make logical conclusions from collected data.	■ **Distinguished** Eighth grade students performing at the distinguished level design an experiment that solves a problem; collect, organize, and graph the data applying the measurement of central tendency and frequency to draw conclusions. Students apply safety techniques and use proper equipment to solve the problem (Science Subject Matter/Concept appropriate). ■ **Mastery** Eighth grade students performing at the mastery level organize, graph, analyze data and draw conclusions from data collected in experiments; calculate measures of central tendency (mean, median, mode) and frequency. Students routinely apply safety techniques and use proper equipment to solve problems (Science Subject Matter/Concept appropriate). ■ **Partial Mastery** Eighth grade students performing at the partial mastery level organize, graph, and analyze data and draw conclusions from data collected in experiments. Students apply safety techniques and use proper equipment to solve problems (Science Subject Matter/Concept appropriate). ■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Unifying Themes
Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives	Performance Descriptors
Students will: 8.3.1 compare and contrast the relationship between the parts of a system to the whole system (e.g., take apart or build mechanical, electrical, or biological systems). 8.3.2 construct a variety of useful models of an object, event, or process. 8.3.3 compare and contrast changes that occur in an object or a system to its original state. 8.3.4 identify the influence that a variation in scale will have on the way an object or system works. (e.g., cooling rates of different-sized containers of water, strength of different-sized constructions from the same material, flight characteristics of different-sized model airplanes).	■ **Distinguished** Eighth grade students performing at the distinguished level construct a scale model and design a test to show the effects of variation in scale. ■ **Mastery** Eighth grade students performing at the mastery level construct scale models and predict the influences that a variation in scale will have on an object or system. ■ **Partial Mastery** Eighth grade students performing at the partial mastery level compare scale models of an object or system. Describe the effects of variation in scale on the object or system. ■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives	Performance Descriptors
Students will: 8.4.1 demonstrate an understanding of the interconnections of biological, earth and space, and physical science concepts. <u>Structure and Function in Living Systems</u> 8.4.2 identify and explain the structures and functions of cell organelles. 8.4.3 explain how the circulatory, respiratory, and reproductive systems work together in the human body. 8.4.4 compare the variations in cells, tissues, and organs of the circulatory, respiratory, and reproductive systems of different organisms. 8.4.5 demonstrate how living cells obtain the essentials of life through chemical reactions of transpiration, respiration, and photosynthesis. <u>Life Cycles of Organisms: Reproduction and Heredity</u> 8.4.6 analyze how behaviors of organisms lead to species continuity (e.g., reproductive/mating behaviors, seed dispersal). 8.4.7 demonstrate the basic principles of genetics to include Mendel's laws, DNA, monohybrid crosses, production of sperm and egg, production of body cells, genes, chromosomes, inherited traits.	■ **Distinguished** Eighth grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories: • Structure and Function in Living Systems • Life Cycles of Organisms: Reproduction and Heredity • Populations and Ecosystems • Structure and Properties of Matter • Chemical Reactions • Energy • Motion and Forces • Structure of the Earth System • Earth's History • Earth and the Solar System Students critique scientific applications; develop justifications for solutions to problems; articulate abstract concepts; and generate interconnections among the categories listed above.

8.4.8 examine how patterns of human development are similar to other vertebrates.

Populations and Ecosystems

8.4.9 group unknown organisms based on observable characteristics (e.g., use dichotomous keys).

8.4.10 trace, matter and energy flow in a food web as it goes from sunlight to producers to consumers, design an environment in which the chemical and energy needs for the growth, reproduction and development of plants are met (e.g., food pyramids, decomposition).

Structure and Properties of Matter

8.4.11 use the periodic table to locate and classify elements as metallic, non-metallic or metalloid.

8.4.12 trace the development of the model of the atom (e.g. Crookes, Thompson, Becquerel, Rutherford, Bohr).

8.4.13 determine the number of protons, neutrons, and electrons and use information to draw a Bohr model of the atom.

8.4.14 assign an element to its chemical family on the periodic table and note similarities in outer energy level electrons within each family.

8.4.15 evaluate gaseous systems noting the variation in diffusion rates and examine the expansion of gases at elevated temperatures.

Chemical Reactions

8.4.16 conduct and classify chemical reactions by reaction type (synthesis, decomposition, single replacement or double replacement); energy type (endothermic and exothermic); and write word equations for the chemical reactions.

8.4.17 identify chemical reaction factors that might affect the reaction rates including catalysts, temperature changes, light energies, and particle size.

Energy

8.4.18 identify types of energy and their sources (e.g., petroleum refinement, windmills, geothermal).

8.4.19 interpret and illustrate changes in waves as they pass through various mediums (e.g., sound through water and metal, light through thicknesses of glass).

8.4.20 apply the conservation of energy theory to energy transformations (e.g., electrical/heat, heat/mechanical).

8.4.21 quantitatively represent work, power, pressure (e.g., W=fd, P=W/t, pressure =force/area).

- **Mastery**

  Eighth grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories:
  - Structure and Function in Living Systems
  - Life Cycles of Organisms: Reproduction and Heredity
  - Populations and Ecosystems
  - Structure and Properties of Matter
  - Chemical Reactions
  - Energy
  - Motion and Forces
  - Structure of the Earth System
  - Earth's History
  - Earth and the Solar System

  Students explain interconnections among the categories listed above.

- **Partial Mastery**

  Eighth grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories:
  - Structure and Function in Living Systems
  - Life Cycles of Organisms: Reproduction and Heredity
  - Populations and Ecosystems
  - Structure and Properties of Matter
  - Chemical Reactions
  - Energy
  - Motion and Forces
  - Structure of the Earth System
  - Earth's History
  - Earth and the Solar System

  Students identify interconnections among the above categories.

- **Novice**

  Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Motion and Forces 8.4.22 graph and interpret the relationships (e.g., distance versus time, speed versus time, acceleration versus time). 8.4.23 describe Newton's Laws of Motion; identify examples; illustrate qualitatively and quantitatively drawing vector quantities. 8.4.24 illustrate quantitatively mechanical advantage of simple machines. Structure of the Earth System 8.4.25 summarize problems related to water on earth as a life sustaining substance (e.g., quality and quantity of surface and ground water). 8.4.26 identify the principle forces of plate tectonics and related geological events. 8.4.27 relate global patterns of atmospheric movement on local weather and the impact of oceans on weather and climate. Earth's History 8.4.28 relate rock formations to the types of fossil fuels. 8.4.29 describe the factors involved in mining resources. 8.4.30 construct and interpret rock layer models through stratigraphic interpretation. Earth and the Solar System 8.4.31 recognize societal concerns with exploration and colonization of space. 8.4.32 diagram the motions of the Sun, Moon, and Earth and explain the phenomena associated with these motions (e.g., glacial periods, eclipses, tides, meteor showers). 8.4.33 compare and contrast the orbits of planets and comets. 8.4.34 compare and contrast the different types of galaxies (e.g., shape, size, components).	

Standard 5: Scientific Design and Application Students will: • demonstrate an understanding of the interdependence between science and technology; • demonstrate the ability to distinguish between natural and man-made objects; • demonstrate abilities of technological design; and • demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.	
Scientific Design and Application Objectives Students will: 8.5.1 research applications of space technology in everyday life (e.g., velcro, teflon, weather satellites). 8.5.2 compare scientific inquiry and technological design processes. 8.5.3 explain why no technological design is perfect (e.g., constraints lead to tradeoffs). 8.5.4 design and construct engineering solutions to problems according to specified constraints.	**Performance Descriptors** ■ **Distinguished** Eighth grade students performing at distinguished level evaluate the design of an engineering solution to identify the compliance within specific constraints (e.g., environmental issues, aesthetics, financial limitations).

	■ **Mastery** Eighth grade students performing at the mastery level design and construct an engineering solution to a given problem with specified constraints (e.g., environmental issues, aesthetics, financial limitations). ■ **Partial Mastery** Eighth grade students performing at the partial mastery level identify the influences of specified constraints (e.g., environmental issues, aesthetics, financial limitations) on an engineering solution. ■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives Students will:	**Performance Descriptors**
8.6.1 use scientific reasoning and the knowledge of science and technology to make informed personal decisions at the local and global levels. 8.6.2 evaluate and critically analyze mass media reports of scientific developments and events. 8.6.3 critically analyze the effects and impacts of science and technology on global and local problems (e.g., mining, manufacturing, recycling, farming, water quality). 8.6.4 explore the connections between science, technology, society, and career opportunities. 8.6.5 analyze the positive and negative effects of technology on society and the influence of societal pressures on the direction of technological advances.	■ **Distinguished** Eighth grade students performing at the distinguished level design a strategy to counteract the negative effects of science/technology/society on a global or local problem. ■ **Mastery** Eighth grade students performing at the mastery level analyze and evaluate effects of science/technology/society on global and local problems. ■ **Partial Mastery** Eighth grade students performing at the partial mastery level describe the science/technology/society effects on a global or local problem. ■ **Novice** Eighth grade students who have not attained partial mastery are at the novice level for this standard.

Ninth Grade Science Content Standards and Objectives

The Coordinated and Thematic Science (CATS) Nine objectives continue the development of foundational knowledge in biology, chemistry, physics, and the earth and sciences. Through a spiraling, inquiry-based program of study, all students will demonstrate scientific literacy across these major fields of science. Subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes, and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50 percent of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated in all activities. Building on the knowledge and skills acquired in CATS Eight, students in CATS Nine will expand and deepen their understanding of major concepts such as energy interactions, genetic probabilities, chemical changes and mineral composition of local rock layers. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives Students will:	**Performance Descriptors**
9.1.1 formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results. 9.1.2 recognize that science has practical and theoretical limitations. 9.1.3 recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent. 9.1.4 conclude that science is a blend of creativity, logic and mathematics. 9.1.5 trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.	■ **Distinguished** Ninth grade students performing at the distinguished level match scientific explanations to historical observations and experimental evidence and identify variability in experimental results. Students describe the historical setting accounting for the evolvement of key historical concepts and principals. ■ **Mastery** Ninth grade students performing at the mastery level paraphrase scientific explanations for historical observations and experimental evidence and support through examples that science is a blend of creativity, logic and mathematics. Students trace the development of key scientific concepts and principles. ■ **Partial Mastery** Ninth grade students performing at partial mastery identify scientific explanations for historical observations and experimental evidence and recognize that science is a blend of creativity, logic and mathematics. Students relate the development of key scientific concepts and principles. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry
Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives Students will:	**Performance Descriptors**
9.2.1 model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity). 9.2.2 demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review). 9.2.3 apply scientific approaches to seek solutions for personal and societal issues. 9.2.4 properly and safely manipulate equipment, materials, chemicals, organisms and models. 9.2.5 conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations). 9.2.6 use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions. 9.2.7 demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying). 9.2.8 design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument).	■ **Distinguished** Ninth grade students performing at the distinguished level analyze those skills and/or values including ethical practices that exemplify scientific inquiry. Students conduct safe experiments and draw conclusions given a complex, real world application. ■ **Mastery** Ninth grade students performing at the mastery level select those skills and/or values, to include ethical practices, that exemplify scientific inquiry. Students conduct safe experiments and draw conclusions given a real world application. ■ **Partial Mastery** Ninth grade students performing at the partial mastery level select those skills and or values including ethical practices that exemplify scientific inquiry. Students conduct safe experiments and choose appropriate conclusions. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Unifying Themes
Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives Students will:	**Performance Descriptors**
9.3.1 analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events. 9.3.2 apply evidence from models to make predictions about interactions and changes in systems. 9.3.3 measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles. 9.3.4 understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).	■ **Distinguished** Ninth grade students performing at the distinguished level use mathematical models incorporating both graphs and equations to predict short- and long-term changes in cyclical and linear biological and physical systems. ■ **Mastery** Ninth grade students performing at the mastery level use mathematical models incorporating both graphs and equations to compare cyclical or linear changes in biological and physical systems that evolve over time. ■ **Partial Mastery** Ninth grade students performing at the partial mastery level use mathematical models incorporating graphs or equations to describe systems in equilibrium and those that are evolving. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts
Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

The Interdependence of Organisms

9.4.4 mathematically illustrate changes in populations of organisms.

9.4.5 identify and describe microscopic organisms and foreign substances in the environment and their harmful effects (e.g., microorganisms, mutagens, carcinogens).

9.4.6 design an environment that demonstrates the interdependence of plants and animals (e.g., energy and chemical cycles, adaptations of structures and behaviors).

Matter, Energy, and Organization in Living Systems

9.4.7 explain how excretory, digestive systems work together in the human body.

9.4.8 identify and compare the structure and function of cell, tissues, and systems of different organisms.

9.4.9 identify the organisms and the chemical processes involved in the decay of materials.

9.4.10 trace the transfer of matter and energy in the chemical/molecular processes of photosynthesis, respiration and fermentation.

Structure and Properties of Matter

9.4.11 using the element's position on the Periodic Table, predict physical and chemical properties.

9.4.12 describe the characteristics of radioactivity substances including alpha particles, beta particles and gamma rays; the half life of a radioactive isotope; a chain reaction; and differentiate between fission and fusion.

9.4.13 identify and demonstrate the characteristics of water as related to energy and bonding.

9.4.14 investigate the relationship between the density of an object, its mass, and its volume.

9.4.15 investigate physical states of matter including descriptions of the behavior of atoms and molecules in terms of the Kinetic Molecular Theory.

Chemical Reaction

9.4.16 write formulas and name compounds given oxidation numbers of monatomic and polyatomic ions.

9.4.17 identify the various types of chemical bonds and the resulting compounds that are formed (e.g., ionic, nonpolar covalent, polar covalent).

9.4.18 experimentally determine the products of chemical reactions, write balanced chemical equations, classify type of reaction; and describe energy changes.

Performance Descriptors

- **Distinguished**

  Ninth grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories:
  - The Cell and Molecular Basis for Heredity
  - The Interdependence of Organisms
  - Matter, Energy, and Organization in Living Systems
  - Structure and Properties of Matter
  - Chemical Reaction
  - Energy
  - Motions and Forces
  - Energy in the Earth System
  - Geochemical Cycles
  - Origin and Changes in the Earth Systems and Universe

  Students critique scientific applications; develop justifications for solutions to problems; articulate abstract concepts; and generate interconnections among the categories listed above.

- **Mastery**

  Ninth grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories:
  - The Cell and Molecular Basis for Heredity
  - The Interdependence of Organisms
  - Matter, Energy, and Organization in Living Systems
  - Structure and Properties of Matter
  - Chemical Reaction
  - Energy
  - Motions and Forces
  - Energy in the Earth System
  - Geochemical Cycles
  - Origin and Changes in the Earth Systems and Universe

  Students explain interconnections among the categories listed above.

Energy

9.4.19 identify, describe, and differentiate various forms of energy and energy transformations.

9.4.20 relate absorption and dissipation of heat to the composition of a material.

9.4.21 demonstrate and diagram a magnetic field using bar magnets and iron fillings.

9.4.22 hypothesize and experiment when different components are substituted in an electrical circuit; define and solve electrical problems involving potential difference, Ohm's aw and power.

Motions and Forces

9.4.23 relate the forces between charged objects to the charge on the objects and the distance between them.

9.4.24 review foundational concepts of kinematics (e.g., speed-distance-time relationships) and dynamics (e.g., Newton's Laws, simple machines).

9.4.25 experiment with a pendulum to determine which variables (amplitude, mass, length) will affect the motion of the pendulum.

9.4.26 investigate types of waves and their properties including interference, diffraction, resonance; differences and similarities between transverse and longitudinal waves; wave equation to determine the relationships among speed, wavelength, and frequency.

Energy in the Earth System

9.4.27 investigate formation and destruction of landforms.

9.4.28 demonstrate the relationships of temperature, air pressure, wind speed, wind direction and humidity as elements of weather.

9.4.29 compare and analyze the characteristics of oceans, including their lateral and vertical motions.

Geochemical Cycles

9.4.30 employ a variety of tests to identify common rock-forming minerals.

9.4.31 analyze and describe common rock samples using grain size and shape, and mineral composition.

9.4.32 use models to describe interactive cycles such as the water, the nitrogen and the carbon dioxide cycles.

Origin and Changes in the Earth Systems and Universe

9.4.33 examine how scientists use seismographic evidence in determining structure and composition of the Earth's interior.

9.4.34 determine the relative age of materials using time-stratigraphic and bio-stratigraphic relationships.

- **Partial Mastery**
  Ninth grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories:
  - The Cell and Molecular Basis for Heredity
  - The Interdependence of Organisms
  - Matter, Energy, and Organization in Living Systems
  - Structure and Properties of Matter
  - Chemical Reaction
  - Energy
  - Motions and Forces
  - Energy in the Earth System
  - Geochemical Cycles
  - Origin and Changes in the Earth Systems and Universe

  Students identify interconnections among the above categories.
- **Novice**
  Ninth grade students who have not attained partial mastery are at the novice level for this standard.

9.4.35 estimate the absolute age of materials using existing radioisotropic data. 9.4.36 describe the effects of the movement of subsurface water. 9.4.37 relate changes in the Earth's surface to the motion of lithospheric plates. 9.4.38 summarize and discuss the evidentiary basis for the Theory of Plate Tectonics. 9.4.39 research and describe the life cycles of various stellar types. 9.4.40 interpret topographic maps, weather maps and charts, and astronomical models such as solar systems, galaxies, constellations, stellar types, and stellar evolution.	

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives Students will:	**Performance Descriptors**
9.5.1 identify the scientific concepts underlying simple technological innovations. 9.5.2 cite examples of the interdependence of science and technology (e.g., new technologies have lead to development of new scientific knowledge). 9.5.3 apply scientific skills and technological tools to design a solution that addresses a personal or societal need. 9.5.4 analyze the consequences of imposed constraints on an engineering solution.	■ **Distinguished** Ninth grade students performing at the distinguished level evaluate the consequences of imposed constraints on engineering solutions and propose a design change. ■ **Mastery** Ninth grade students performing at the distinguished level evaluate the consequences of imposed constraints on engineering solutions and propose a design change. ■ **Partial Mastery** Ninth grade students performing at the partial mastery level describe the consequences of imposed constraints on engineering solutions. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives	Performance Descriptors
Students will: 9.6.1 research uses and values of natural resources. 9.6.2 research current environmental issues (e.g., effects of pollution, solid waste management, local, national, and global issues). 9.6.3 describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge. 9.6.4 explore occupational opportunities in science and technology including the academic preparation necessary. 9.6.5 engage in decision making activities and actions to resolve science-technology-society issues.	■ **Distinguished** Ninth grade students performing at the distinguished level analyze how public policy decisions impact health, population, resources and environmental issues. ■ **Mastery** Ninth grade students performing at the mastery level describe how public policy decisions impact health, population, resources, and environmental issues. ■ **Partial Mastery** Ninth grade students performing at the partial mastery level identify that public policy decisions impact health, population, resources and environmental issues. ■ **Novice** Ninth grade students who have not attained partial mastery are at the novice level for this standard.

Tenth Grade Science Content Standards and Objectives

The Coordinated and Thematic Science (CATS) Ten objectives conclude the development of foundational knowledge of biology, chemistry, physics, and the earth and space sciences. Through the spiraling, inquiry-based program of study, all students will demonstrate scientific literacy across these major fields of science. The subject matter is delivered through a coordinated, integrated approach with an emphasis on the development of the major science themes of systems, changes, and models. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50 percent of the instructional time to develop conceptual understanding and research laboratory skills. Safety instruction is integrated in all activities. Building on the knowledge and skills acquired in CATS Nine, students in CATS Ten will expand their depth of understanding of major concepts such as energy transformation qualifications; cellular biology; molecular genetics; embryology; physical, chemical and nuclear changes; fossils, and environmental concerns. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives	Performance Descriptors
Students will: 10.1.1 formulate scientific explanations based on historical observations and experimental evidence, accounting for variability in experimental results. 10.1.2 recognize that science has practical and theoretical limitations.	■ **Distinguished** Tenth grade students performing at the distinguished level will evaluate scientific explanations in historical context. Students analyze possible sources of variability in experimental results.

10.1.3 recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent. 10.1.4 conclude that science is a blend of creativity, logic and mathematics. 10.1.5 trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.	■ **Mastery** Tenth grade students performing at the mastery level provide scientific evidence for phenomena within historical contexts. Students account for variability in experimental results. ■ **Partial Mastery** Tenth grade students performing at the partial mastery level will evaluate scientific explanation in historical context. Students analyze possible sources of variability in experimental results. ■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives Students will:	**Performance Descriptors**
10.2.1 model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity). 10.2.2 demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review). 10.2.3 apply scientific approaches to seek solutions for personal and societal issues. 10.2.4 properly and safely manipulate equipment, materials, chemicals, organisms and models. 10.2.5 conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations). 10.2.6 use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions. 10.2.7 demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).	■ **Distinguished** Tenth grade students performing at the distinguished level design, conduct, and evaluate safe experiments using appropriate skills, attitudes, and/or values (including ethical practice). Students defend conclusions using scientific evidence. Students evaluate effectiveness of experimental design and propose revisions. ■ **Mastery** Tenth grade students performing at the mastery level design, conduct, and evaluate safe experiments using appropriate skills, attitudes, and/or values (including ethical practice). Students defend conclusions using scientific evidence. ■ **Partial Mastery** Tenth grade students performing at the partial mastery level design, conduct, analyze safe experiments using appropriate skills, attitudes and/or values (including ethical practice). ■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.

10.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument.).	

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives Students will:		**Performance Descriptors**
10.3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.	■ **Distinguished** Tenth grade students performing at the distinguished level design experiments that use mathematical models incorporating both graphs and equations to predict changes in systems. Students describe cyclical and linear systems that evolve over time.
10.3.2	apply evidence from models to make predictions about interactions and changes in systems.	■ **Mastery** Tenth grade students performing at the mastery level use mathematical models incorporating both graphs and equations to predict short- and long-term changes in cyclical and linear biological and physical systems.
10.3.3	measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.	■ **Partial Mastery** Tenth grade students performing at the partial mastery level use mathematical models incorporating both graphs and equations to compare cyclical or linear changes in biological and physical systems that evolve over time.
10.3.4	understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).	■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives Students will:	**Performance Descriptors**
10.4.1 demonstrate an understanding of the interconnections of biological, earth and space, and physical science concepts. <u>The Cell and Molecular Basis for Heredity</u> 10.4.2 identify and explain the structures and functions of cell organelles (e.g., Golgi bodies, endoplasmic reticulum, mitochondria, chloroplasts, ribosomes, lysosomes, vacuoles). 10.4.3 compare the variations in cells, tissues, and organs of different organisms (e.g. endocrine, nervous, digestion and immune systems). 10.4.4 identify mechanisms for the movement of materials into and out of cells (e.g., active and passive transport, endo- and exocytosis). 10.4.5 explore the discovery of DNA and its structure by constructing a model to demonstrate the nucleotide bonding and the double helix structure. 10.4.6 relate the role of DNA analysis to genetic disorders, forensic science, molecular genetics, and biotechnology (e.g., protein synthesis, heredity, cell division, and cellular functions). 10.4.7 review principles of genetics (e.g. number of chromosomes, mutations, crossover, Punnett squares, linkage). <u>Evolution and Interdependence of Organisms</u> 10.4.8 compare the embryonic development of invertebrate and vertebrate animals (e.g., ontogeny and phylogeny, diversity, taxonomy). 10.4.9 construct and manipulate models which show variations in living things (e.g., nervous, endocrine, immune systems). 10.4.10 recognize that fossil records provide a scientific explanation for variation in the species and common ancestors. 10.4.11 relate the role of natural selection to the development, diversity, and or extinction of a species.	■ **Distinguished** Tenth grade students performing at the distinguished level comprehend and apply the knowledge of objectives at the level indicated in Standard 4 in the following categories: • The Cell and Molecular Basis for Heredity • Evolution and Interdependence of Organisms • Matter, Energy, and Organization in Living Systems • Structure and Properties of Matter • Chemical Reaction • Energy • Motions and Forces • Energy in the Earth System • Geochemical Cycles • Origin and Evolution in the Earth Systems and Universe Students critique scientific applications; develop justifications for solutions to problems; articulate abstract concepts; and generate interconnections among the categories listed above. ■ **Mastery** Tenth grade students performing at the mastery level comprehend and apply the knowledge of the objectives at the level indicated in Standard 4 in the following categories: • The Cell and Molecular Basis for Heredity • Evolution and Interdependence of Organisms • Matter, Energy, and Organization in Living Systems • Structure and Properties of Matter • Chemical Reaction • Energy • Motions and Forces • Energy in the Earth System • Geochemical Cycles • Origin and Evolution in the Earth Systems and Universe Students explain interconnections among the categories listed above.

Matter, Energy, and Organization in Living Systems 10.4.12 construct concept maps showing energy flow and cycles of matter between chemical and biological systems including photosynthesis, stored chemical energy, decomposition, carbon and nitrogen cycles). 10.4.13 explain how the nervous, endocrine, and immune systems work together in the human body. 10.4.14 review the needs of growing plants and the environments supplying those needs. 10.4.15 review factors that affect succession, populations and communities (e.g., use maps, graphs, charts, and tables). 10.4.16 trace matter and energy flow through the respiration processes of glycolysis, the Krebs cycle, and electron transport system (e.g., ATP, carbon, oxygen, water). Structure and Properties of Matter 10.4.17 investigate the properties of solutions including density, conductivity, solubility, concentration, pH, and colligative properties. Chemical Reaction 10.4.18 differentiate between physical, chemical, and nuclear changes and reactions. Energy 10.4.19 investigate the relationships among temperature, pressure, and volume in gases and interpret graphs that depict these relationships (e.g., Charles' Law, Boyle's Law, and Gay-Lussac's Law). 10.4.20 measure the change in heat gained or lost during chemical reactions using the specific heat of water (e.g, heat released during burning of food materials, acid-base neutralization). 10.4.21 investigate and measure changes in thermal energy in physical and chemical changes. 10.4.22 recognize that the equation $E=mc^2$ can be used to illustrate the conversion of mass to energy during nuclear reactions. 10.4.23 compare and contrast the characteristics and uses of waves in various parts of the electromagnetic spectrum; calculate the frequency of a particular wavelength. 10.4.24 relate the electromagnetic spectrum to the changes in position of electrons between energy levels of electrons within atoms. 10.4.25 summarize the relationship between frequency and speed (e.g., Doppler effect).	■ **Partial Mastery** Tenth grade students performing at the mastery level demonstrate knowledge of the objectives in Standard 4 in the following categories: • The Cell and Molecular Basis for Heredity • Evolution and Interdependence of Organisms • Matter, Energy, and Organization in Living Systems • Structure and Properties of Matter • Chemical Reaction • Energy • Motions and Forces • Energy in the Earth System • Geochemical Cycles • Origin and Evolution in the Earth Systems and Universe Students identify interconnections among the above categories. ■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.

10.4.26 qualitatively explain the relationship between electricity and magnetism and describe how electrical components of a circuit function. 10.4.27 qualitatively and quantitatively describe the conservation of energy (e.g., thermal, chemical, mechanical). 10.4.28 relate the physical changes in substances to change in temperature and identify and describe the effects of specific heat on heating and cooling objects. Motions and Forces 10.4.29 apply Newton's Laws of Motion depict the relationship among rate, force, momentum and time using kinematics graph and mathematical models. 10.4.30 describe and quantify how machines can provide mechanical advantages. 10.4.31 determine the effect of different forces on vibrating systems (e.g., pendulums, springs). 10.4.32 demonstrate qualitative and quantitative understanding of pressure in various systems (e.g., water pipes, circuits, blood vessels). Energy in the Earth System 10.4.33 relate the characteristics and behavior of mechanical waves to earth processes (e.g., explain the formation of water waves as a function of wind velocity, duration, and fetch). 10.4.34 relate the cause of tides to their height and frequency. 10.4.35 investigate effects of geological events on weather and climate (e.g., ocean currents). 10.4.36 observe and describe the effects of water on the earth's surface (e.g., changes in particle size, slope, velocity). 10.4.37 investigate and compare theories of the source of the Earth's magnetic field and relate Earth's electromagnetic field to the dynamics of the magnetosphere. 10.4.38 discuss theories for the causes of plate tectonics Geochemical Cycles 10.4.39 discuss physical and chemical relationships between minerals in rock cycle. Origin and Evolution in the Earth Systems and Universe 10.4.40 investigate fossils as evidence for evolution and indicators of paleo-environments.	

10.4.41	compare and contrast morphological features of fossils to present-day organisms.	
10.4.42	use fossil evidence to estimate the relative and absolute ages of rock layers.	
10.4.43	compare and contrast the characteristics of Earth and the other planets relative to their distance from the Sun.	
10.4.44	interpret apparent motion of constellations and their relationship to the rotation of the earth.	

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives Students will:		**Performance Descriptors**
10.5.1	investigate and analyze the interdependence of science and technology.	■ **Distinguished** Tenth grade students performing at the distinguished level propose improvements to engineering designs; test and evaluate their modifications; and communicate the effectiveness of their design changes.
10.5.2	research and design solutions to a personal or a societal problem created by technology.	■ **Mastery** Tenth grade students performing at the mastery level compare and test modifications to an engineering design; and communicate the effectiveness of their design changes.
10.5.3	compare and test modifications to an engineering design.	■ **Partial Mastery** Tenth grade students performing at the partial mastery level analyze and suggest an improvement to an engineering design.
10.5.4	utilize technology to communicate designs, results and conclusions.	■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives	Performance Descriptors
Students will: 10.6.1 investigate the effects of natural phenomena on the habitat and habitat change. 10.6.2 research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution). 10.6.3 describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge. 10.6.4 explore occupational opportunities in science and technology including the academic preparation necessary. 10.6.5 engage in decision making activities and actions to resolve science-technology-society issues.	■ **Distinguished** Tenth grade students performing at the distinguished level predict the long-term societal impact of specific health, population, resource, and environmental practices framed by public policy decisions. ■ **Mastery** Tenth grade students performing at the mastery level predict long-term societal impact of specific health, population, resource, and environmental practices framed by public policy decisions. ■ **Partial Mastery** Tenth grade students performing at the partial mastery level describe the long-term societal impact of specific health, population, resource, and environmental practices. ■ **Novice** Tenth grade students who have not attained partial mastery are at the novice level for this standard.

Eleventh and Twelfth Grade Science Content Standards and Objectives

Biology - Technical Conceptual Content Standards and Objectives

This is an advanced level course designed for students who have completed Coordinated and Thematic Science (CATS) 10 and who are interested in the field of technical biology with the scientific knowledge and opportunities to develop the inquiry, problem solving and decision making abilities necessary for their future vocation. Biology - Technical Conceptual (11/12) is an alternative to Advanced Biology (11/12) and is designed to prepare students for technical careers. The course will provide an in-depth study in the chemical nature of life, cellular functions, microbiology, ecology, biotechnology, zoology and botany with application emphasis. It builds on the fundamental concepts developed in CATS 7-10 in a rigorous and integrated manner. Students will engage in active inquires, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

BTC.1.1 formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.

BTC.1.2 recognize that science has practical and theoretical limitations.

BTC.1.3 recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.

BTC.1.4 conclude that science is a blend of creativity, logic and mathematics.

BTC.1.5 trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist=s contributions.

BTC.1.6 integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

BTC.2.1 model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).

BTC.2.2 demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).

BTC.2.3 apply scientific approaches to seek solutions for personal and societal issues.

BTC.2.4 properly and safely manipulate equipment, materials, chemicals, organisms and models.

BTC.2.5 conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).

BTC.2.6 use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions.

BTC.2.7 demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).

BTC.2.8 design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

BTC.3.1 analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.

BTC.3.2 apply evidence from models to make predictions about interactions and changes in systems.

BTC.3.3 measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.

BTC.3.4 understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

BTC.4.1 trace matter and energy transfers occurring during photosynthesis, cell respiration, and fermentation.

BTC.4.2 explore material transport in and out of cells (e.g., diffusion and osmosis).

BTC.4.3 investigate the nature of light in relation to energy transformation in photosynthesis.

BTC.4.4 compare and describe the properties of sound waves and how they affect organisms (e.g. sound pollution, sonography, echolocation, and animal vocalization).

BTC.4.5 review of foundational chemical concepts including atomic structure, bonding, chemical reactions, water, and pH as they relate to living systems.

BTC.4.6 investigate the molecules of life and their function in the living systems.

BTC.4.7 explain common problems related to conservation, use, supply, and quality of water.

BTC.4.8 investigate recycling in relation to human consumption of natural resources.

BTC.4.9 describe landfills and sewage treatment facilities and how they work.

BTC.4.10 investigate interspecific and intraspecific competition.

BTC.4.11 apply sampling techniques to the study of ecosystems.

BTC.4.12 investigate population biology.

BTC.4.13 investigate and analyze the impact that humans have on the quality of the biosphere (e.g. locally, regionally, and globally).

BTC.4.14 use topographic maps and Geographic Information Systems (GIS) to investigate biological systems and patterns (e.g. land use).

BTC.4.15 examine global change over time (e.g. climatic trends, fossil fuel depletion, global warming, ozone depletion).

BTC.4.16 investigate soil and soil organisms.

BTC.4.17 explain the mechanics of composting.

BTC.4.18 discuss and categorize chemical hazards (e.g. flammable, reactive, poisons, corrosive).

BTC.4.19 investigate how electric and magnetic forces affect life.

BTC.4.20 estimate molecular weight through the diffusion of biological stains.

BTC.4.21 review the structure and function of cell membranes.

BTC.4.22 review DNA as it relates to mitosis, meiosis, and protein synthesis.

BTC.4.23 apply techniques of biotechnology to phylogenetics, forensics, paleontology, and human genetics.

BTC.4.24 compare and contrast hydrophytic, mesophytic, and xerophytic plants.

BTC.4.25 investigate the diversity of plants, their habitat, transport system, reproduction, and life cycle.

BTC.4.26 investigate methods of plant propagation (e.g. culturing techniques, hydroponics, cloning, grafting, vegetative propagation).

BTC.4.27 research forest-management practices (e.g. clear cutting, selective cutting, pruning, fire ecology).

BTC.4.28	research and evaluate the importance of cultivated and wild plants to human society, economics, and the environment.
BTC.4.29	compare the characteristics, structures and life cycles of simple to complex organisms.
BTC.4.30	explore animal behavior.
BTC.4.31	investigate and analyze animal distribution.
BTC.4.32	investigate variations in ecosystem productivity.
BTC.4.33	analyze gene expression and embryonic development.
BTC.4.34	research variations in animal reproductive strategies.
BTC.4.35	evaluate the effects of large scale use of fungicides and pesticides on the diversity of organisms.
BTC.4.36	review basic genetics including; incomplete dominance, gene interactions, co-dominance, multiple-alleles, crossing over, genetic recombinations, environmental influences, development, sex, and age
BTC.4.37	analyze karyotypes and pedigrees as diagnostic tools.
BTC.4.38	research genetic engineering through current DNA technology and the social and ethical issues that it raises (e.g. bacterial production of human insulin, DNA, cloning, fingerprinting, etc.).

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

BTC.5.1	summarize technological advances in the biological sciences.
BTC.5.2	investigate and analyze the interdependence of science and technology.
BTC.5.3	apply scientific skills and technological tools to design solutions that address personal and societal needs.
BTC.5.4	describe the scientific concepts underlying technological innovations.
BTC.5.5	use appropriate technology solutions to measure and gather data; interpret data; analyze data; and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

BTC.6.1	investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).
BTC.6.2	research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rain forest pollution).
BTC.6.3	describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.
BTC.6.4	explore occupational opportunities in science and technology including the academic preparation necessary.
BTC.6.5	engage in decision making activities and actions to resolve science-technology-society issues.

Advanced Biology Content Standards and Objectives

This is an advanced level course designed for students who have completed Coordinated and Thematic Science (CATS) 10 and desire a broader, in-depth study of the content found in many biological fields of endeavor. This course is designed to build upon and extend the Biology concepts, skills, and knowledge from the CATS 7-10 program. Students interested in health and scientific related careers will build and expand their laboratory skills and experiences. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

AB.1.1 formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.

AB.1.2 recognize that science has practical and theoretical limitations.

AB.1.3 recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.

AB.1.4 conclude that science is a blend of creativity, logic and mathematics.

AB.1.5 trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.

AB.1.6 integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

AB.2.1 model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).

AB.2.2 demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).

AB.2.3 apply scientific approaches to seek solutions for personal and societal issues.

AB.2.4 properly and safely manipulate equipment, materials, chemicals, organisms and models.

AB.2.5 conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).

AB.2.6 use computers and other electronic technologies (e.g., computer, CBL, probe interfaces, laser discs) to collect, analyze and/or report data, interact with simulations, and conduct research.

AB.2.7 demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).

AB.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument.).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

AB.3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.
AB.3.2	apply evidence from models to make predictions about interactions and changes in systems.
AB.3.3	measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.
AB.3.4	understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

AB.4.1	review foundational chemical concepts including atomic structure, bonding, chemical reactions, water, and pH as they relate to living systems.
AB.4.2	investigate the molecules of life and their function in the living systems.
AB.4.3	identify the structure, functions, and interactions of eukaryotic cell organelles and their products.
AB.4.4	analyze the chemistry and structure of the cell membrane as it relates to import and export of molecules necessary for life, exploring osmosis, diffusion, active and passive transport, and dialysis.
AB.4.5	research the diversity/uniqueness of cell types (compare differences in prokaryotic/eukaryotic, plant/animal cells; explore nerve cells, blood cells, gametes, etc.).
AB.4.6	explore capture and release of energy as demonstrated by photosynthesis, cellular respiration, fermentation, and the role of coenzymes and vitamins.
AB.4.7	recognize and describe the phases of eukaryotic and prokaryotic cell cycles.
AB.4.8	identify the stages of mitotic and meiotic eukaryotic cell division and explain significance of the stages.
AB.4.9	investigate and discuss DNA as the agent of heredity.
AB.4.10	investigate and discuss the importance of replication and mutation in the diversity of life.
AB.4.11	evaluate the advantages of asexual and sexual reproduction.
AB.4.12	identify Mendel's 1st Law and 2nd Law of Genetics and apply these laws to predict phenotypic and genotypic ratios from mono and dihybrid crosses.

AB.4.13	explore basic phenotypic and genotypic genetics beyond Mendel including such things as incomplete dominance, gene interaction, codominance, multi-alleles, crossing over, genetic recombination; and influences of environment, development, sex, and age.
AB.4.14	identify the function of DNA in replication and transfer of the genetic code .
AB.4.15	identify the function of the RNAs; messenger, transfer, and ribosomal in the transcription and translation process of protein formation.
AB.4.16	recognize that differentiation is regulated through the expression of different genes.
AB.4.17	discuss the regulatory process in controlling gene function.
AB.4.18	introduce genetic engineering through current DNA technology practices and the social issues that it raises.
AB.4.19	discuss gene mutations.
AB.4.20	discuss evidence of evolution and natural selection, including examples such as peppered moth, fossil records, biogeography, molecular biology, and comparative anatomy.
AB.4.21	research pioneers and current authors of evolutionary ideas.
AB.4.22	present overview of the taxonomy and systematics of living organisms comparing DNA as the modern basis of classification to older methods based on morphology.
AB.4.23	discuss reasons why viruses are not included in the modern classification system.
AB.4.24	explore the various systems of the human organism and their interactions.
AB.4.24	investigate and discuss homeostasis.
AB.4.25	investigate and discuss responses of organisms to internal and environmental stimuli.
AB.4.26	investigate and discuss that behavioral response is a set of actions determined in part by heredity and in part from experience.
AB.4.27	investigate and discuss that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival.
AB.4.28	investigate and discuss ecology as the interaction of living organisms and their nonliving environment.
AB.4.29	trace the energy flow through an ecosystem.
AB.4.30	investigate and discuss that the number of organisms any environment can support depends on the resources available.

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

AB.5.1	summarize technological advances in the biological sciences.
AB.5.2	investigate and analyze the interdependence of science and technology.
AB.5.3	apply scientific skills and technological tools to design solutions that address personal and societal needs.
AB.5.4	describe the scientific concepts underlying technological innovations.
AB.5.5	use appropriate technology solutions to measure and gather data; interpret data; analyze data, and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives
Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives
Students will:

AB.6.1 investigate and discuss the impact that humans may have on the quality of the biosphere such as depletion of the rainforest, pollution of estuaries, strip mining, depletion of fossil fuels and deterioration of ozone layer.
AB.6.2 investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).
AB.6.3 research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution).
AB.6.4 describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.
AB.6.5 explore occupational opportunities in science and technology including the academic preparation necessary.
AB.6.6 engage in decision making activities and actions to resolve science-technology-society issues.

Human Anatomy and Physiology Content Standards and Objectives

This advanced course is designed for those students wanting a deeper understanding of the structure and function of the human body. The body will be viewed as a whole using anatomical terminology necessary to describe location. Focus will be at both micro and macro levels reviewing cellular functions, biochemical processes, tissue interactions, organ systems, and the interaction of those systems as it relates to the human organism. Systems covered include integumentary, skeletal, muscular, respiratory, circulatory, digestive, excretory, reproductive immunological, nervous and endocrine. This course will be appropriate for college bound students as well as those choosing a health services career cluster. Students will engage in active inquiries, investigation, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science
Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives
Students will:

HAP.1.1 formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.
HAP.1.2 recognize that science has practical and theoretical limitations.
HAP.1.3 recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.

HAP.1.4	conclude that science is a blend of creativity, logic and mathematics.
HAP.1.5	trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist=s contributions.
HAP.1.6	integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

HAP.2.1	model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).
HAP.2.2	demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).
HAP.2.3	apply scientific approaches to seek solutions for personal and societal issues .
HAP.2.4	properly and safely manipulate equipment, materials, chemicals, organisms and models.
HAP.2.5	conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).
HAP.2.6	use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions.
HAP.2.7	demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).
HAP.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

HAP.3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.
HAP.3.2	apply evidence from models to make predictions about interactions and changes in systems.
HAP.3.3	measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.
HAP.3.4	understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

HAP.4.1	demonstrate knowledge of directional terminology necessary for anatomical location such as proximal, dorsal, medial, lateral, visceral, superficial, and deep.
HAP.4.2	review of foundational chemical concepts including atomic structure, bonding, chemical reactions, water, and pH as they relate to living systems.
HAP.4.3	trace the transfer of energy in chemical molecular processes in the human body (e.g., glycolysis, Krebs cycle, electron transport system).
HAP.4.4	identify the role of DNA in transcription and relate to types of RNA and protein synthesis.
HAP.4.5	identify the structure, functions, and interactions of eukaryotic cell organelles and their products.
HAP.4.6	describe the organizational levels, interdependency and the interaction of cells, tissues, organs, organ systems.
HAP.4.7	categorize, by structure and function, the various types of human tissue (e.g. muscle, epithelial, connective, and nervous).
HAP.4.8	relate the structure of the integumentary system to its function as a sensory organ, environmental barrier, and temperature regulator.
HAP.4.9	relate how bone tissue is important to the development of the human skeleton.
HAP.4.10	investigate the structure and function of the skeletal system, including identification of bones, markings on bones, and articulations.
HAP.4.11	show the mechanism of muscle contraction on micro and macro levels.
HAP.4.12	recognize the relationship between the skeletal, neural and muscular systems.
HAP.4.13	research the musculature system including locations, origins, insertions, muscle groups and types of muscles.
HAP.4.14	classify, describe, and investigate the various types of neurons emphasizing structure and function.
HAP.4.15	trace and describe a nervous impulse including a discussion of the sodium-potassium pump.
HAP.4.16	locate, identify, and discuss the structure and function of the parts of the central nervous system.
HAP.4.17	illustrate the nerves and functions of the peripheral nervous system including the autonomic portions.
HAP.4.18	apply the knowledge of the structure of the ear and eye to their function/dysfunction in relationship to environmental perception.
HAP.4.19	discuss the specific role of enzymes and hormones to bodily functions.
HAP.4.20	explore the endocrine system emphasizing glands, hormonal control and problems in hormone production.
HAP.4.21	investigate the male and female reproductive systems including identification of structures and their functions.
HAP.4.22	relate the male and female reproductive systems to human growth and development.
HAP.4.23	compare and contrast the purposes, processes and outcomes of cellular meiosis and mitosis.
HAP.4.24	research the formation of gametes, fertilization and embryonic development.
HAP.4.25	describe potential system failures in the human body due to genetic, nutritional, operational, disease, or environmental influences.
HAP.4.26	analyze the change in DNA activity and how it affects the control of protein synthesis and human inheritance.
HAP.4.27	relate Mendel's laws of inheritance and DNA to genetic diseases such as sickle-cell anemia, chromosomal abnormalities, Tay-Sachs disease, Huntington's disease, etc.
HAP.4.28	identify the cellular processes and the energy and nutritional requirements needed to maintain human metabolism.

HAP.4.29	illustrate how transport mechanisms in cells, tissues, and/or organs depend on osmosis and mixture gradients.
HAP.4.30	examine the role of the digestive system in supplying nutrients (carbohydrates, proteins, lipids, vitamins, minerals, water).
HAP.4.31	explain how structures of the respiratory system are significant to communication, gas exchange, and cellular respiration.
HAP.4.32	illustrate the structure of the circulatory and lymphatic systems and the function of blood to the role of transportation, cellular support and defense.
HAP.4.33	investigate the composition of blood and compatibility of blood types.
HAP.4.34	investigate the immunological system emphasizing its role in defense of the human organism.
HAP.4.35	investigate and research the causative factors, symptoms, prevention, and treatment of diseases.
HAP.4.36	describe the relationship of the excretory system to other organs and systems.
HAP.4.37	identify disorders related to each major system.
HAP.4.38	explore current literature and research related to human anatomy and physiology.

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

HAP.5.1	summarize technological advances in medicine and health.
HAP.5.2	investigate and analyze the interdependence of science and technology.
HAP.5.3	apply scientific skills and technological tools to design solutions that address personal and societal needs.
HAP.5.4	describe the scientific concepts underlying technological innovations.
HAP.5.5	use appropriate technology solutions to measure and gather data; interpret data; analyze data; and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

HAP.6.1	investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).
HAP.6.2	research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution).
HAP.6.3	describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.
HAP.6.4	explore occupational opportunities in science and technology including the academic preparation necessary.
HAP.6.5	engage in decision making activities and actions to resolve science-technology-society issues.

An advanced level course designed for students who have completed Coordinated and Thematic Science Ten (CATS 10) and desire an alternative to a traditional college preparatory course emphasizes real life applications of chemical principles. Mathematical based problem solving is de-emphasized. Chemistry -Technical Conceptual is the study of matter, its compostion, and its changes. Emphasis is placed on the important role chemistry plays in a student=s personal life, career opportunities, environment, and society. Students will engage in active inquiries, investigations, and hand-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research laboratory skills. Safety instruction is integrated into all activities. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

CTC1.1 formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.

CTC1.2 recognize that science has practical and theoretical limitations.

CTC1.3 recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.

CTC1.4 conclude that science is a blend of creativity, logic and mathematics.

CTC1.5 trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.

CTC1.6 integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

CTC.2.1 model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).

CTC.2.2 demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).

CTC.2.3 apply scientific approaches to seek solutions for personal and societal issues.

CTC.2.4 properly and safely manipulate equipment, materials, chemicals, organisms and models.

CTC.2.5 conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).

CTC.2.6 use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions.

CTC.2.7	demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).
CTC.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

CTC3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.
CTC3.2	apply evidence from models to make predictions about interactions and changes in systems.
CTC3.3	measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.
CTC3.4	understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

Atomic Structure

CTC.4.1	review the parts of the atom.
CTC.4.2	review the relationship of an element's group and period position with its properties.
CTC.4.3	compare atomic and ionic electronic structures.

Properties of Matter

CTC.4.4	review the classification of matter and the properties of metals and nonmetals.
CTC.4.5	identify sources and uses of elements.
CTC.4.6	use the kinetic molecular theory to explain physical states of matter.
CTC.4.7	perform calculations using the gas laws.
CTC.4.8	apply the principle of distillation to the separation of liquids (e.g., petroleum or water purification).

Bonding
CTC.4.9 review formula writing and ionic and covalent bonding.
CTC.4.10 recognize the impact of water's unusual physical properties.
CTC.4.11 predict solute solubility based on molecular polarity.
Stoichiometry
CTC.4.12 review balancing equations.
CTC.4.13 use dimensional analysis to perform unit conversions and to verify experimental calculations.
CTC.4.14 relate the mole concept to chemical formulas.
CTC.4.15 use moles to measure chemical quantities.
CTC.4.16 determine the percent composition by mass of the elements in a compound.
CTC.4.17 make connections between resource conservation and the Law of Conservation of Matter.
CTC.4.18 illustrate the concept of a limiting reagent.
Solution chemistry
CTC.4.19 review solution properties (e.g., solubility, conductivity, density, pH and colligative).
CTC.4.20 define solutions in terms of saturation.
CTC.4.21 perform solutions concentration calculations (e.g. molarity, ppm).
CTC.4.22 compare and contrast the properties of strong and weak acids and bases.
CTC.4.23 perform an acid-base neutralization reaction.
Electrochemistry
CTC.4.24 construct electrolytic cells to observe the reduction of ions into free metals and write the half reactions that occur.
CTC.4.25 predict reactions of metals with aqueous solutions using the Metal Activity Series.
Reaction Dynamics
CTC.4.26 review temperature and heat.
CTC.4.27 measure the flow of energy into or out of chemical reactions.
CTC.4.28 predict the effect of temperature and catalysts on reaction rates.
CTC.4.29 apply LeChatelier's Principle in determining equilibrium.
Carbon and Petroleum
CTC.4.30 draw and construct models for the first ten alkanes.
CTC.4.31 relate the properties of organic compounds to their functional groups (e.g., alcohol and esters).
CTC.4.32 demonstrate the formation of polymers from smaller molecules.
CTC.4.33 compare and contrast the use of petroleum as either a source of energy or as a fundamental ingredient of synthetic materials.
Nuclear Chemistry
CTC.4.34 review nuclear fusion and fission, isotopes and half-lives.
CTC.4.35 compare the penetrating energies of nuclear radiation.
CTC.4.36 balance simple nuclear equations.
CTC.4.37 explain practical applications of nuclear technology (e.g., radioactive dating, radioisotopes in medicine).

Standard 5: Scientific Design and Application
Students will:
- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives
Students will:
CTC.5.1 summarize technological advances in chemistry.
CTC.5.2 investigate and analyze the interdependence of science and technology.
CTC.5.3 apply scientific skills and technological tools to design solutions that address personal and societal needs.
CTC.5.4 describe the scientific concepts underlying technological innovations.
CTC.5.5 use appropriate technology solutions to measure and gather data; interpret data; analyze data; and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

CTC.6.1	investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).
CTC.6.2	research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution).
CTC.6.3	describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.
CTC.6.4	explore occupational opportunities in science and technology including the academic preparation necessary.
CTC.6.5	engage in decision making activities and actions to resolve science-technology-society issues.

Advanced Chemistry

An advanced level course designed for students who have completed Coordinated and Thematic Science Ten (CATS 10) and desire a broader, in-depth study of the content found in the science field of chemistry. *Advanced Chemistry* (Eleven/Twelve) is the advanced study of matter, its composition, and its changes. This course is designed to build upon and extend the Chemistry concepts, skills, and knowledge from the CATS 7-10 program. This course is designed to prepare a student for college chemistry, requiring a strong mathematical base. The relationship between chemistry concepts and mathematics will be emphasized. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

AC.1.1	formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.
AC.1.2	recognize that science has practical and theoretical limitations.
AC.1.3	recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.
AC.1.4	conclude that science is a blend of creativity, logic and mathematics.
AC.1.5	trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.

AC.1.6	integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

AC.2.1	model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).
AC.2.2	demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).
AC.2.3	apply scientific approaches to seek solutions for personal and societal issues.
AC.2.4	properly and safely manipulate equipment, materials, chemicals, organisms and models.
AC.2.5	conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).
AC.2.6	use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions.
AC.2.7	demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).
AC.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument.).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

AC.3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.
AC.3.2	apply evidence from models to make predictions about interactions and changes in systems.
AC.3.3	measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.
AC.3.4	understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

AC.4.1 review foundational chemical concepts including chemical symbols representing elements, ions, and formulas; balanced-equations; atomic structure including subatomic particles and atomic models; use of periodic table to locate and classify elements; states of matter; colligative properties; kinetic molecular theory; chemical and physical properties; and chemical and physical changes.

Atomic Structure

AC.4.2 research and evaluate the contributions of Dalton, Planck, Einstein, and de Broglie, Heisenberg, and Schrodinger to the evolution of the atomic theory.

AC.4.3 identify four types of electron clouds (s, p, d, f).

AC.4.4 write electron configurations and complete diagrams for electron position.

AC.4.5 describe the quantum number (n, l, m, s) for electrons.

AC.4.6 associate electron configuration of elements with element location on periodic table.

AC.4.7 write electron dot structures for representative elements.

Bonding

AC.4.8 predict the formulas of ionic compounds, molecular compounds, and acids.

AC.4.9 analyze the periodic table to predict trends in atomic size, ionic size, electronegativity, ionization energy, and electron affinity.

AC.4.10 using the periodic table, predict the type of bonding that occurs between atoms and differentiate among properties of ionic, covalent, and metallic bonds.

AC.4.11 construct models to explain the structure and geometry of organic and inorganic molecules and the lattice structures of crystals.

AC.4.12 describe the formation of sigma and pi bonds, and hybrid orbitals.

AC.4.13 define and describe the types of intermolecular forces.

AC.4.14 recognize simple organic functional groups and name simple organic compounds.

Stoichiometry

AC.4.15 use dimensional analysis to preform unit conversions and to verify experimental calculations.

AC.4.16 use the Avogadro constant to define the mole and to calculate molecular and molar mass as well as a molar volume.

AC.4.17 use molar mass to calculate the molarity of solutions, percentage composition, empirical formulas, and formulas of hydrates.

AC.4.18 experimentally determine the empirical formulas of hydrates.

AC.4.19 predict the products and write balanced equations for the general types of chemical reactions.

AC.4.20 do stoichiometric calculations including mass-mass, mass-volume, volume-volume to determine percent yield and heat of reaction.

AC.4.21 perform calculations using the combined and ideal gas laws.

AC.4.22 identify the limiting reactant and predict the theoretical yield.

Equilibrium

AC.4.23 experimentally determine the factors that influence the rate of reaction.

AC.4.24 apply LeChatelier's principle to explain the effect of changes in concentration, pressure, volume, and temperature on an equilibrium system.

AC.4.25 calculate equilibrium constants and concentration of products and reactants.

Solution Chemistry

AC.4.26 name and define acids and bases using Arrhenius, Bronsted-Lowry and Lewis definitions.

AC.4.27 predict the products upon adding water to both acidic and basic anhydrides.

AC.4.28 write and balance net ionic equations.

AC.4.29 solve problems using the solubility product constants.

AC.4.30 calculate the pH and/or pOH for various solutions and relate to the pH scale.

AC.4.31 conduct titrations and perform calculations for both acid-base and oxidation-reduction reactions.

Electrochemistry

AC.4.32 define oxidation and reduction in terms of electron transfer within reactions.

AC.4.33 construct electrolytic cells, write and balance the half-cell reactions and calculate cell voltage.

Reaction Dynamics

AC.4.34 calculate the enthalpy change in reactions using the heat of formation.

AC.4.35 evaluate the factors driving chemical reactions including enthalpy and entropy and their interrelationship.

AC.4.36 use calculated Gibbs Free Energy values to predict spontaneity of chemical reactions.

Nuclear Chemistry

AC.4.37 write balanced nuclear equations and make predications using half-life values.

AC.4.38 predict nuclear stability using proton-neutron diagrams.

AC.4.39 list the biological effects of radiation and the units used to measure radiation.

AC.4.40 compare and contrast fusion and fission reactions.

AC.4.41 research the application of nuclear technology.

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

AC.5.1 summarize technological advances in chemistry.

AC.5.2 investigate and analyze the interdependence of science and technology.

AC.5.3 apply scientific skills and technological tools to design solutions that address personal and societal needs.

AC.5.4 describe the scientific concepts underlying technological innovations.

AC.5.5 use appropriate technology solutions to measure and gather data; interpret data; analyze data; and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

AC.6.1 investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).

AC.6.2 research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution).

AC.6.3 describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.

AC.6.4 explore occupational opportunities in science and technology including the academic preparation necessary.

AC.6.5 engage in decision making activities and actions to resolve science-technology-society issues.

As responsible citizens on this planet, students must be able to recognize their role as caretakers of the earth in order to protect its fragile environment. This is possible only if students have a deep understanding of the earth and its processes. Advanced Environmental Earth Science (11/12) is designed for students who have completed Coordinated and Thematic Science Ten (CATS 10) and desire to build on the fundamentals of geology, oceanography, meteorology and astronomy developed in CATS 7-10 in a rigorous and integrated manner with the traditional disciplines of biology, chemistry and physics where appropriate. As stewards of the earth, an emphasis on environment should be included within the traditional earth science disciplines. Ecology, economics, politics and social considerations all combine to help students develop an understanding of how humans effect and are effected by their environment. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

AES.1.1	formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.
AES.1.2	recognize that science has practical and theoretical limitations.
AES.1.3	recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.
AES.1.4	conclude that science is a blend of creativity, logic and mathematics.
AES.1.5	trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.
AES.1.6	integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

AES.2.1	model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).
AES.2.2	demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).
AES.2.3	apply scientific approaches to seek solutions for personal and societal issues.
AES.2.4	properly and safely manipulate equipment, materials, chemicals, organisms and models.

AES.2.5	conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).
AES.2.6	use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions.
AES.2.7	demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).
AES.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

AES.3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.
AES.3.2	apply evidence from models to make predictions about interactions and changes in systems.
AES.3.3	measure changes in systems using graph and equations relating these to rate, scale, patterns, trends and cycles.
AES.3.4	understand that different characteristics, properties or relationships withing a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives

Students will:

<u>Dynamic Earth</u>

AES.4.1	review foundational earth science concepts including rocks and minerals, properties of waves, constructing and interpreting weather maps, surface features found on maps, climatic relationships to biomes, use of data gathering instruments, temperature-phase change relationships.
AES.4.2	identify and describe the structure, origin, and evolution of the lithosphere, hydrosphere, atmosphere, and biosphere.

<u>Geology</u>

AES.4.3	identify components of the solid earth and the natural processes relating to its development.
AES.4.4	list, identify, and sequence eras, epochs, and periods in relation to earth history and geologic development.

AES.4.5	utilize fossil evidence to estimate the relative and absolute ages of rock layers (time-stratographic and biostratographic).
AES.4.6	estimate the absolute age of materials using existing radioisotopic data.
AES.4.7	identify the type and composition of various minerals.
AES.4.8	investigate and explain the processes of the rock cycle.
AES.4.9	explain the relationship between pressure and temperature to the formation and reformation of rocks.
AES.4.10	identify and describe agents and processes of degradation (e.g., weathering by gravity, wind, water, and ice).
AES.4.11	identify and describe tectonic forces relating to internal energy production and convection currents.
AES.4.12	understand the cause and effect relationships of degradational and tectonic forces with respect to the dynamic earth and its surface (e.g., volcanoes, earthquakes).
AES.4.13	construct and/or interpret information on topographic maps.
Oceanography	
AES.4.14	identify and describe properties of our oceans (e.g., composition, physical features of the ocean floor, and life within the oceans).
AES.4.15	compare and contrast characteristics of the oceans, including their lateral and vertical motions.
AES.4.16	investigate the evolution of the ocean floor that results in the creation of new materials and features.
AES.4.17	investigate the stratification of the ocean (colligative properties and biological zonation).
Meteorology	
AES.4.18	investigate and explain, heat transfer in the atmosphere and its relationship to meteorological processes (e.g., pressure, winds, evaporation, condensation, and precipitation).
AES.4.19	predict the effects of ocean currents on climate.
AES.4.20	compare and contrast meteorological processes related to air masses, weather systems, and forecasting.
AES.4.21	examine global change over time (e.g., climatic trends, fossil fuel depletion, global warming, ozone depletion).
Astronomy	
AES.4.22	research theories concerning origins of the universe.
AES.4.23	apply Newton's Law of Universal Gravitation to the motion of celestial objects.
AES.4.24	investigate the solar system including origin theories, comparing and contrasting the planets, planetary motions, and other celestial bodies.
AES.4.25	investigate celestial bodies and their evolution.
AES.4.26	explain the relationships between location, navigation and time.
AES.4.27	compare ancient and modern methods and tools used to study astronomy.
AES.4.28	investigate the electromagnetic spectrum as related to observable phenomena in the universe.
Environment	
AES.4.29	describe the relationship between earth processes and natural disasters and draw conclusions concerning their human impact.
AES.4.30	explore the relationships between human consumption of natural resources and the stewardship responsibility for reclamations including disposal of hazardous and non-hazardous waste.
AES.4.31	investigate and describe in detail the physical and chemical properties of water.
AES.4.32	explain common problems related to the conservation, use, supply and the quality of water.
AES.4.33	explore the relationships between the extraction and use of natural resources and the impact on the environment.
AES.4.34	research alternative energy sources.
AES.4.35	understand the fragile nature of the Earth.
AES.4.36	research and explain how the political system influences environmental decisions.
AES.4.37	investigate which federal and state agencies have responsibility for environmental monitoring and actions.
AES.4.38	develop decision-making skills with respect to addressing environmental problems.

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

AES.5.1 summarize technological advances in the earth sciences.

AES.5.2 investigate and analyze the interdependence of science and technology.

AES.5.3 apply scientific skills and technological tools to design solutions that address personal and societal needs.

AES.5.4 describe the scientific concepts underlying technological innovations.

AES.5.5 use appropriate technology solutions to measure and gather data; interpret data; analyze data; and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

AES.6.1 research and explain how the political system influences environmental decisions.

AES.6.2 investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).

AES.6.3 research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution).

AES.6.4 describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.

AES.6.5 explore occupational opportunities in science and technology including the academic preparation necessary.

AES.6.6 engage in decision making activities and actions to resolve science-technology-society issues.

Physics-Technical Conceptual (11/12)

Physics-Technical Conceptual (11/12) is a course designed for students who have completed Coordinated and Thematic Science Ten (CATS 10) and desire an in-depth study in physics to prepare them for technical careers. This course is an alternative to the traditional mathematical approach to physics. Curriculum organization and delivery for Physics-Technical Conceptual may be addressed by either of two approaches.

- **A thematic approach would cover the physics principles as applied to four energy systems: mechanical, fluid, thermal, and electrical that make up both simple and complex technological devices and equipment. This approach would emphasize the analogies in mechanical, fluid, thermal, and electrical systems. Incorporated in the instruction is the mathematics needed to understand and apply the principles.**
- **A topic approach would cover the physics principles in a traditional sequence with an emphasis on conceptual understanding. While mathematics is de-emphasized, laboratory work will require traditional physics measurements to be made. Emphasis will be on the concepts which underlie the natural laws of the universe.**

Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

PTC.1.1 formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.

PTC.1.2 recognize that science has practical and theoretical limitations.

PTC.1.3 recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.

PTC.1.4 conclude that science is a blend of creativity, logic and mathematics.

PTC.1.5 trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.

PTC.1.6 integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

PTC.2.1	model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).
PTC.2.2	demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).
PTC.2.3	apply scientific approaches to seek solutions for personal and societal issues .
PTC.2.4	properly and safely manipulate equipment, materials, chemicals, organisms and models.
PTC.2.5	conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).
PTC.2.6	use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions.
PTC.2.7	demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).
PTC.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

PTC.3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.
PTC.3.2	apply evidence from models to make predictions about interactions and changes in systems.
PTC.3.3	measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.
PTC.3.4	understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives.

Students will;

PTC.4.1	qualitatively and quantitatively analyze mechanical systems (e.g., force, work, rate, resistance, energy, power, force transformations).
PTC.4.2	use both given information and lab collected data to calculate velocity and acceleration along linear and circular paths.
PTC.4.3	draw free body diagrams to illustrate the forces acting on objects and perform simple calculations involving velocity, acceleration and net force; research the applications of force and acceleration in modern design and technology.
PTC.4.4	apply graphical and algebraic solutions to vector problems.
PTC.4.5	identify the relationship between potential energy and kinetic energy in gravitational and elastic potential/kinetic energy systems; recognize the conservation of energy in simple harmonic motion.
PTC.4.6	calculate work, energy, power and efficiency in mechanical systems.
PTC.4.7	construct models and/or working systems that show applications of technology to solve problems involving mechanical systems.
PTC.4.8	qualitatively and quantitatively analyze fluid systems (e.g., pressure, work, rate, resistance, energy, power, force transformations).
PTC.4.9	identify and apply the properties of solids, liquids and gases to explain their behavior at different pressures and temperatures.
PTC.4.10	identify and apply Bernoulli's principle to floating objects; identify the buoyant force acting on floating and submerged objects.
PTC.4.11	calculate the pressure of a solid object on a surface and the pressure exerted by a fluid at a given depth; relate the measure of pressure in kPapressure in N/m^2.
PTC.4.12	construct models and/or working systems that show applications of technology to solve problems involving fluid systems.
PTC.4.13	qualitatively and quantitatively analyze thermal systems (e.g., temperature, rate, resistance, energy).
PTC.4.14	perform conversions between Fahrenheit, Celsius, and Kelvin temperature scales.
PTC.4.15	define specific heat capacity; use the specific heat equation to calculate heat gained or lost during phase changes and heat lost when objects cool.
PTC.4.16	investigate and analyze the different rates of heat transfer by different materials.
PTC.4.17	construct models and/or working systems that show applications of technology to solve problems involving heat flow and heat exchange.
PTC.4.18	investigate and apply the reflective, refractive and diffractive properties of waves to study mechanical and electromagnetic waves.
PTC.4.19	use the relationship between wavelength, velocity and frequency to calculate the speed of waves; recognize that the speed of light is a constant.
PTC.4.20	construct models and/or working systems that show applications of technology to solve problems involving energy transfer by wave motion.
PTC.4.21	research and describe new developments in optical technology.
PTC.4.22	qualitatively and quantitatively analyze electrical systems (e.g., voltage, work, rate, resistance, energy, power, force transformations).
PTC.4.23	investigate the nature of electrical and magnetic fields; recognize the basic properties of electrical charge and differentiate between conductorsand insulators.
PTC.4.24	draw and construct electrical circuits; apply Ohm's law to calculate PTC.4.25 construct models and/or working systems that show applications of technology to solve problems involving use of electricity.
PTC.4.26	recognize and distinguish between Einstein's General and Special Theories of Relativity and research evidences to support these theories.
PTC.4.27	recognize the products of nuclear decay and write decay chain equations. Voltage drops in series and parallel circuits.

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

PTC.5.1 investigate, analyze, synthesize, and evaluate those devices in the home that were developed from the understanding of science and technology.

PTC.5.2 investigate and analyze the interdependence of science and technology.

PTC.5.3 apply scientific skills and technological tools to design solutions that address personal and societal needs.

PTC.5.4 describe the scientific concepts underlying technological innovations.

PTC.5.5 use appropriate technology solutions to measure and gather data; interpret data; analyze data; and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

PTC.6.1 investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).

PTC.6.2 research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution)

PTC.6.3 describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.

PTC.6.4 explore occupational opportunities in science and technology including the academic preparation necessary.

PTC.6.5 engage in decision making activities and actions to resolve science-technology-society issues.

An advanced level course designed for students who have completed Coordinated and Thematic Science Ten (CATS 10) and desire a broader, in-depth study of the content found in the science field of physics. As a college preparatory course, *Advanced* Physics (Eleven/Twelve) is a laboratory driven, advanced study of nature=s universal laws with emphasis on process skills. This course is designed to build upon and extend the Physics concepts, skills, and knowledge from the CATS 7-10 program. The course emphasizes a mathematical approach to the areas of kinematics, dynamics, thermodynamics, light and optics, electricity and magnetism, and modern physics. Students will engage in active inquiries, investigations, and hands-on activities for a minimum of 50% of the instructional time to develop conceptual understanding and research/laboratory skills. Safety instruction is integrated into all activities. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: History and the Nature of Science

Students will:

- demonstrate an understanding of the history of science and the evolvement of scientific knowledge;
- demonstrate an understanding of science as a human endeavor encompassing the contributions of diverse cultures and scientists; and
- demonstrate an understanding of the nature of science.

History and the Nature of Science Objectives

Students will:

AP.1.1	formulate scientific explanations based on the student's observational and experimental evidence, accounting for variability in experimental results.
AP.1.2	recognize that science has practical and theoretical limitations.
AP.1.3	recognize that science is based on a set of observations in a testable framework that demonstrate basic laws that are consistent.
AP.1.4	conclude that science is a blend of creativity, logic and mathematics.
AP.1.5	trace the development of key historical concepts and principles describing their impact on modern thought and life by identifying the scientist's contributions.
AP.1.6	integrate the history of science with cultural history to demonstrate that scientists work within their historical surroundings and are affected by them.

Standard 2: Science as Inquiry

Students will:

- demonstrate the abilities necessary to do scientific inquiry;
- demonstrate understanding about scientific inquiry; and
- demonstrate the ability to think and act as scientists

by engaging in active inquiries, investigations and hands-on activities a minimum of 50% of the instructional time.

Science as Inquiry Objectives

Students will:

AP.2.1	model and exhibit the skills, attitudes and/or values of scientific inquiry (e.g., curiosity, logic, objectivity, openness, skepticism, appreciation, diligence, integrity, ethical practice, fairness, creativity).
AP.2.2	demonstrate ethical practices for science (e.g., established research protocol, accurate record keeping, replication of results and peer review).
AP.2.3	apply scientific approaches to seek solutions for personal and societal issues.
AP.2.4	properly and safely manipulate equipment, materials, chemicals, organisms and models.
AP.2.5	conduct explorations in a variety of environments (e.g., laboratories, museums, libraries, parks and other outdoors locations).
AP.2.6	use appropriate technology solutions (e.g., computer, CBL, probe interfaces, software) to measure and collect data; interpret data; analyze and/or report data, interact with simulations; conduct research; and to present and communicate conclusions.

AP.2.7	demonstrate science processes within a problem solving setting (e.g., observing, measuring, calculating, communicating, comparing, ordering, categorizing, classifying, relating, hypothesizing, predicting, inferring, considering alternatives, and applying).
AP.2.8	design, conduct, evaluate and revise experiments (e.g., identify questions and concepts that guide investigations; design investigations; identify independent and dependent variables in experimental investigations; manipulate variables to extend experimental activities; use technology and mathematics to improve investigations and communications; formulate and revise scientific explanations and models using logic and evidence; recognize alternative explanations; communicate and defend a scientific argument).

Standard 3: Unifying Themes

Students will:

- demonstrate an understanding of interdependent themes present in the natural and designed world (e.g., systems, order, and organization; evidence, models, and explanation; constancy, change, and measurement; equilibrium and evolution; form and function);
- demonstrate the ability to identify, construct, test, analyze, and evaluate systems, models, and changes; and
- demonstrate the ability to draw conclusions about and predict changes in natural and designed systems.

Unifying Themes Objectives

Students will:

AP.3.1	analyze systems to understand the natural and designed world; use systems analysis to make predictions about behaviors in systems; recognize order in units of matter, objects or events.
AP.3.2	apply evidence from models to make predictions about interactions and changes in systems.
AP.3.3	measure changes in systems using graphs and equations relating these to rate, scale, patterns, trends and cycles.
AP.3.4	understand that different characteristics, properties or relationships within a system might change as its dimensions are increased or decreased (e.g., scale up, scale down).

Standard 4: Science Subject Matter/Concepts

Students will:

- demonstrate knowledge, understanding, and applications of scientific facts, concepts, principles, theories, and models as delineated in the objectives;
- demonstrate an understanding of the interrelationships among physics, chemistry, biology, and the earth and space sciences; and
- apply knowledge, understanding, and skills of science subject matter/concepts to daily life experiences.

Science Subject Matter/Concepts Objectives.

Students will:

Mechanics

AP.4.1	review Newton's Laws of Motion.
AP.4.2	using both given information and laboratory collected data, calculate velocity and acceleration along linear and circular paths.
AP.4.3	solve multi-step problems involving velocity, acceleration and net force.
AP.4.4	apply both graphical, algebraic, and trigonometric solutions to vector, problems involving two or more vectors; calculate both vector components and resultants including projectile motion in both one and two dimensions.
AP.4.5	apply the concepts of potential and kinetic energy to final velocity of an object-independent of path; evaluate the conservation of energy and momentum in simple harmonic motion.
AP.4.6	investigate and calculate the work, energy, power, mechanical advantage, and efficiency using simple machines involving linear and rotational motion.

Fluids

AP.4.7	define fluids and determine the magnitude of buoyant force exerted on floating and submerged objects; explain why some objects float or sink.
AP.4.8	relate the pressure exerted by a fluid to its depth; calculate the pressure exerted by a fluid.

AP.4.9 examine the motion of a fluid; apply Bernoulli's equation to solve fluid problems; recognize the effects of Bernoulli's principle on fluid motion.

AP.4.10 define the general properties of an ideal gas; apply the Ideal Gas Law to predict the properties of an ideal gas under different conditions.

Thermodynamics

AP.4.11 distinguish between temperature and heat; relate these to kinetic energy and internal energy of matter; apply the principle of conservation of energy to calculate changes in potential, kinetic and internal energy.

AP.4.12 investigate and apply concepts of specific heat, heat of fusion and vaporization to calculate phase changes of materials, and perform calculations using the specific heat equation; interpret phase diagrams.

Waves, Sound and Optics

AP.4.13 investigate and apply the reflective, refractive and diffractive properties of waves to study mechanical and electromagnetic waves.

AP.4.14 relate the wavelength, velocity and frequency of waves with the equation velocity=frequency x wavelength and use it to perform calculations.

AP.4.15 analyze the properties of sound waves and perform appropriate calculations; relate the physical properties of sound waves to the way sound is perceived.

AP.4.16 define Doppler shift and identify applications.

AP.4.17 apply ray optics diagrams to lenses and mirrors, use the lens/mirror equation and the magnification equation to solve optics problems.

AP.4.18 investigate and analyze optical applications in technology.

Electricity and Magnetism

AP.4.19 measure and draw electrical and magnetic fields; describe applications of electrical and magnetic fields.

AP.4.20 recognize the basic properties of electrical charge, charging by conduction and induction, and differentiate between conductors and insulators; calculate electrical force using Coulomb's law.

AP.4.21 recognize that circuits are closed loops; define units of electrical measure.

AP.4.22 construct and analyze electrical circuits and calculate Ohm's law problems for series, parallel and complex circuits including voltage drops; calculate power and energy in electrical systems.

Astronomy and Modern Physics

AP.4.23 describe the orbital relationships within the solar system; apply Kepler's Laws to calculate orbital periods.

AP.4.24 apply Newton's law of Universal Gravitation to derive relationships to calculate acceleration of gravity on other planets and orbital velocities.

AP.4.25 research and evaluate evidence of the Big Bang model of the universe.

AP.4.26 describe Einstein's special theory of relativity and its basic development through assumptions and logical consequences.

AP.4.27 describe nuclear reactions and discuss applications of nuclear energy.

Standard 5: Scientific Design and Application

Students will:

- demonstrate an understanding of the interdependence between science and technology;
- demonstrate the ability to distinguish between natural and man-made objects;
- demonstrate abilities of technological design; and
- demonstrate the ability to utilize technology to gather data and communicate designs, results and conclusions.

Scientific Design and Application Objectives

Students will:

AP.5.1 investigate, analyze, synthesize, and evaluate those devices in the home that were developed from the understanding of science and technology.

AP.5.2 investigate and analyze the interdependence of science and technology.

AP.5.3 apply scientific skills and technological tools to design solutions that address personal and societal needs.

AP.5.4 describe the scientific concepts underlying technological innovations.

AP.5.5	use appropriate technology solutions to measure and gather data; interpret data; analyze data; and to present and communicate conclusions.

Standard 6: Science in Personal and Social Perspectives

Students will:

- demonstrate the ability to evaluate personal and societal benefits when examining health, population, resource and environmental issues;
- demonstrate the ability to evaluate the impact of different points of view on health, population, resource and environmental practices;
- predict the long-term societal impact of specific health, population, resource and environmental practices; and
- demonstrate an understanding of public policy decisions as related to health, population, resource and environmental issues.

Science in Personal and Social Perspectives Objectives

Students will:

AP.6.1	investigate the effects of natural phenomena on the environment (e.g., oceanographic, meteorologic).
AP.6.2	research current environmental issues (e.g., depletion of fossil fuels, global warming, destruction of rainforest pollution).
AP.6.3	describe the impact of cultural, technological, and economic influences on the evolving nature of scientific thought and knowledge.
AP.6.4	explore occupational opportunities in science and technology including the academic preparation necessary.
AP.6.5	engage in decision making activities and actions to resolve science-technology-society issues.

SOCIAL STUDIES

Social Studies, as a field of study, embodies the essence of mankind and interconnects the past, present and the future. It investigates where people live and how they participate as citizens. It manifests how they change, prosper and live in an increasingly culturally diverse, interconnected world. Social Studies, an academic area within the K-12 curriculum, is responsible for enabling students to understand the social world and become respectable citizens.

The West Virginia Content Standards and Objectives have been written in an effort to bring order to the vast, rich and powerful substance of social studies. With this philosophy as a guide, members of the Social Studies Curriculum Refinement Committee developed five content standards for all West Virginia students. Identifying what students should know and be able to do has been the foundation of West Virginia's Content Standards and Objectives in social studies. As Abigail Adams wrote, " Learning is not attained by chance; it must be sought for with order and attended with diligence." Each content standard is a statement of a core learning expectation for all students.

West Virginia's vision for education includes the integration of technology throughout the curriculum so that all West Virginia students have the opportunity to develop technology skills that support learning. Successful learning environments provide opportunities for students to use education technology interwoven with relevant curricular content. West Virginia teachers are responsible for integrating technology appropriately in the students' learning environment.

The Social Studies Content Standards and Objectives establish the foundation of five core disciplines: citizenship, civics/government, economics, geography and history. Each discipline offers a distinct strategy for examining the world and providing students with specific intellectual and conceptual tools for analyzing causes and consequences. The organization of separate content standards for each discipline suggests their unique contribution to an understanding of the world; it does not imply they be taught in isolation. Social studies is by its very nature integrative. The important social issues require insights from across the disciplines. Citizenship, civics/government, economics, geography and history each offer distinct approaches and develop specific skills for examining common subject matter, which can be integrated when addressing a particular issue or event. Below is a brief explanation of the specific importance of each core discipline.

Citizenship

Citizenship education will prepare students to become informed and active citizens who accept their responsibilities, understand their privileges and rights and participate actively in society and government as effective citizens. They must be able to research issues, form reasoned opinions, support their positions and engage in the political prospect. The students will learn respect for the rights of others, a concern for the common good and a commitment to basic democratic principles.

Civics/government

Civics directly addresses citizenship education in the context of political systems. Students study the assumptions upon which governments are founded and the strategies governments employ to achieve their goals. With respect to the United States, students learn the underlying principles of representative democracy, the constitutional separation of powers and the rule of law. Students will understand the need for authority and government and the exercise of rights and responsibilities. Students must learn and practice intellectual and participation skills essential for an involved citizenry. In order to develop these skills, the curriculum must extend beyond the school to include experiences in the workplace and service in the community.

Economics

Economics analyzes the production, allocation, distribution and use of resources. Students examine the inherent relationship between costs and benefits and the values associated with them. Understanding economic principles, whole economies and the interactions between different types of economies helps students comprehend the exchange of information, capital and products across the globe. Learners will investigate economic principles and their application to historical situations. Then learners will work cooperatively and individually to analyze how basic economic principles affect their daily lives by examining real problems and situations. The economic principles should include an understanding of scarcity and choice, productivity, markets and prices, supply and demand, competition, role of government, international trade factors and consumer decisions.

Geography

Geography organizes life situations in terms of where they occur. People interact with the natural world in culturally distinct ways to produce unique places, and those places change over time. The methods and perspectives of geography give students a spatial understanding of the world, and the ability to evaluate information in spatial terms. Students will examine the varying ways that peoples interact with their environments, and appreciate the diversity of the places those interactions create.

History

History organizes events and phenomena in terms of when they occurred and examines where, how and why they took place. Students study how individuals and societies have changed and interacted over time. They gather historical data, examine, analyze and interpret this data, and present their results in a clear, critical manner. They organize events through chronologies and evaluate cause-and-effect relationships among them. Students analyze how individuals, groups and nations have shaped cultural heritages. Through the study of history, students learn about states, nations, locations, settlements, formations, governments, economic developments and cultural history.

Plato informed our study of social studies when he wrote these words, "The direction in which education starts a man will determine his future life." Social studies education must begin early to insure that students develop an understanding and appreciation of the United States as a powerful and proud nation. As we enter the twenty-first century, the United States remains an international leader and role model for democracy. Social Studies education is the heart and soul that provides students with the knowledge necessary to understand the strength and challenges of our country and the skills to make it even greater one day.

Standard 1: Citizenship
Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Standard 2: Civics / Government
Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Standard 3: Economics
Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Standard 4: Geography
Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Standard 5: History
Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

Kindergarten Social Studies Content Standards and Objectives

Social studies in kindergarten will introduce children to the lives of interesting people in history, time sequence using historic events, geographic direction and economic choices. The social studies program begins the formal introduction of what constitutes a good citizen of the United States. Children will learn the roles of good citizens regarding responsibilities, privileges and rights. Teachers will emphasize the importance of following rules, respecting the rights of others, self-control, honesty, courage, justice and leadership. The objectives for elementary West Virginia Social Studies may be integrated throughout the K-3 curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Citizenship

Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives

Students will:

K.1.1 demonstrate an understanding that a good citizen takes turns and shares, takes responsibility for doing daily chores, cares for personal belongings and shows respect for what belongs to others.

K.1.2 identify examples of courage and patriotism.

K.1.3 identify the need for rules and the consequences for breaking rules and how to resolve disagreements peacefully.

K.1.4 be given the opportunity to recite the Pledge of Allegiance, sing patriotic songs and celebrate national holidays.

K.1.5 give examples and explain why citizens voluntarily contribute their time and talents to the community.

Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/Government Objectives

Students will:

K.2.1 explain why rules are important and participate in developing rules.

K.2.2 give examples of authority figures in the home, school and community.

K.2.3 identify traditional patriotic symbols such as state and national flags and be given the opportunity to participate in patriotic activities such as standing for the National Anthem.

Standard 3: Economics

Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives

Students will:

K.3.1 identify occupations within the local community.
K.3.2 identify the basic needs of people (shelter, food and clothing).
K.3.3 identify the economic concept of the difference between needs and wants.
K.3.4 identify the economic concept of the exchange of money for goods and services.
K.3.5 identify the economic concept of saving for the future.
K.3.6 recognize that some goods and services are provided by the government (schools, parks, police and fire departments).

Standard 4: Geography

Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives

Students will:

K.4.1 identify landmasses versus bodies of water using a globe or a map.
K.4.2 demonstrate knowledge of left/right, up/down, near/far and above/under using locations on a map or picture.
K.4.3 identify community symbols (e.g., traffic signs, traffic lights, street and highway markers) and map symbols (e.g., legend references to land, water, roads and cities).
K.4.4 name the four seasons and describe the characteristics of each season.
K.4.5 name types of weather, describe the characteristics of each type, and describe what people wear in different types of weather.
K.4.6 compare and contrast characteristics of life in the city (urban) and country (rural).

Standard 5: History

Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives

Students will:

K.5.1 collect data and sequence time, places, people and events as they relate to the student's own life.
K.5.2 build a sense of empathy toward other people, times, and cultures.
K.5.3 begin to identify sources of information to answer questions.
K.5.4 explore the past through stories of people, heroes, pictures, songs, holidays, customs, traditions, and legends.
K.5.5 investigate the culture of Native Americans.
K.5.6 identify characteristics of communities, families and family life.

First Grade Social Studies Content Standards and Objectives

Social studies in grade one explores the role of the citizen in the schools, family, and community. Students will learn responsibilities, privileges and rights, patriotic traditions, symbols, functions of money and the connection of the past to the present. Conflict resolution, consumer roles and good safety practices will be introduced. Students will be introduced to geographic features and regions. A variety of graphic skills will be incorporated, including graphs, charts, timelines and other data collection activities. Economic concepts of basic needs and community occupations will be explored. The objectives for elementary West Virginia Social Studies may be integrated throughout the K-3 curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Citizenship

Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives

Students will:

1.1.1 express opinions and accept opinions of others in solving problems and/or resolving conflicts.
1.1.2 recognize examples of honesty, caring and trustworthiness in the home and at school.
1.1.3 participate in developing classroom rules and identifying consequences of breaking rules.
1.1.4 demonstrate respect and responsibility for self and others' materials and belongings.
1.1.5 be given the opportunity to recite the Pledge of Allegiance, participate in patriotic singing, and celebrate national holidays.
1.1.6 explain volunteerism and participate in school/community projects.
1.1.7 demonstrate and give examples of appropriate behavior in dangerous situations (e.g., fire, poison, traffic, strangers and drugs.

Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/ Government Objectives

Students will:

1.2.1 identify and practice various group roles (e.g., group leader, recorder, reporter, collector) in the classroom.
1.2.2 explain why different forms of governments are necessary.
1.2.3 describe the roles of government leaders and identify the president, governor and local authorities.
1.2.4 recognize the need for authority figures.
1.2.5 explain the difference between rules and laws, establish criteria for determining if a rule or law is fair, and identify the consequences for breaking rules.

Standard 3: Economics

Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives

Students will:

1.3.1 make choices from among needs and wants, and predict the consequences of those choices.
1.3.2 demonstrate the exchange of goods and services (using money or other goods and services).
1.3.3 compare and contrast occupations in the community.
1.3.4 recognize that all people share the same basic needs.

Standard 4: Geography

Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment. (Physical Systems);
- identify, analyze and explain how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of the environment and society (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives

Students will:

1.4.1 construct a simple map of a familiar area (such as the school) incorporating cardinal directions and map symbols.
1.4.2 locate the United States and West Virginia on a globe or world map.
1.4.3 identify major geographic features (e.g., rivers, lakes, mountains, oceans) using a United States map.
1.4.4 sequence the seasons of the year, days of the week and months.
1.4.5 identify basic natural resources (e.g., water, plants, soil, air).
1.4.6 describe how climate/weather affects the way people live (e.g., food, clothing, shelter, recreation).
1.4.7 construct and interpret simple maps using cardinal directions, location, a scale and symbols in a legend.

Standard 5: History

Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives

Students will:

1.5.1 identify ways communities change over time (e.g., landscape, buildings, jobs, population).
1.5.2 investigate and contrast family history through two generations (parents, grandparents) and make comparisons to present-day living using sources such as timelines, interviews, pictures and graphs.
1.5.3 identify characteristics of the past and contributions of heroic people using sources as stories, folk tales, pictures, poems, songs, legends, holidays and customs.
1.5.4 build a sense of empathy for others by investigating racial and cultural differences through celebrations, holidays and family traditions.
1.5.5 identify different types of families (e.g., single parent, extended, multi-generational).
1.5.6 participate in the collection and organization of historical data.

Second Grade Social Studies Content Standards and Objectives

Second grade social studies expands the roles of citizenship. Students will learn the functions of government, local folklore, symbols and traditions. The roles and responsibilities of each child as a citizen in a democratic community and nation will be emphasized. They will explore volunteer and service activities, conservation and environmental preservation. The use of conflict resolution will be reinforced. Students will continue to learn about geographic places and regions and participate in map activities. Students will learn the economic concepts of needs/wants, bartering and saving/spending. The objectives for elementary West Virginia Social Studies may be integrated throughout the K-4 curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Content Standard 1: Citizenship

Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives

Students will:

2.1.1 choose and participate in a project of volunteer service.
2.1.2 identify and examine examples of honesty, trustworthiness, compassion and empathy in daily life experiences.
2.1.3 model the personal responsibilities of good citizenship in the classroom (e.g., responsibility, self-control).
2.1.4 recite the Pledge of Allegiance and participate in national celebrations.
2.1.5 identify and practice components of conflict resolution within the school community.

Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/Government Objectives

Students will:

2.2.1 identify the three levels (local, state, federal) of government.
2.2.2 compare and contrast rules and laws.
2.2.3 recognize the need for authority figures and identify the characteristics of responsible leaders.
2.2.4 explain how and why laws/rules can provide order and predictability.

Standard 3: Economics

Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives

Students will:

2.3.1 make economic choices and predict the consequences of those choices.
2.3.2 explore various occupations and how job opportunities in the community have changed.
2.3.3 practice bartering as an alternative method of securing goods/services and needs/wants, and compare to present ways of acquiring goods and services.
2.3.4 identify how people in different cultures have the same needs, but meet their needs in different ways.
2.3.5 explain the role of banks in saving for the future purchase of goods and services.
2.3.6 construct, read and interpret a variety of graphs, charts and tables.

Standard 4: Geography

Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain, and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives

Students will:

2.4.1 recognize West Virginia by shape and relative location.
2.4.2 demonstrate knowledge of cardinal directions, a compass rose and map legends on a map.
2.4.3 identify the United States and/or world regions on a map.
2.4.4 examine a variety of maps and globes to identify and describe major geographic features (e.g., rivers, lakes, oceans, islands, continents, mountains).
2.4.5 identify basic natural resources (e.g., water, plants, soil, air) and how people use these resources.
2.4.6 locate major communities in the county and state, and explain the processes that have caused them to change.
2.4.7 use a map scale to construct class and school maps.

Standard 5: History
Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives
Students will:

2.5.1 gather information and data using family artifacts, photos and interviews in order to compare different life styles, and use this information to construct a timeline of family history through three generations.
2.5.2 explore the history of the community by identifying locally significant sites and people.
2.5.3 explore, compare and contrast the past contributions of heroic people using sources such as stories, folk tales, pictures, poems, songs, legends, holidays and customs.
2.5.4 investigate current events using various media (e.g., student newspaper, television, news broadcasts).
2.5.5 read children's books about different cultures, and compare the variety of traditions, languages, structures of families and community life.
2.5.6 examine the lives and cultures of Native Americans and early settlers through stories, legends, myths and folklore.
2.5.7 use and draw conclusions from various historic data collection methods (e.g., graphs, charts, timelines).

Third Grade Social Studies Content Standards and Objectives

Third grade social studies presents a study of the broader community to introduce state and nation. Students will explain community changes due to technology, human interaction with the environment and the movement of people. Students will practice citizenship in the school and community and study government at local, state and national levels. Supply and demand, taxation and budgeting within the context of the community will be introduced. The objectives for elementary West Virginia Social Studies may be integrated throughout the K-4 curriculum. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Citizenship
Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives Students will: 3.1.1 identify and practice principles of honesty, fairness and justice in experiences at home, school and in the community. 3.1.2 identify and model the personal and civic responsibilities of good citizenship in the classroom, school and community. 3.1.3 explain the significance of patriotic symbols, holidays, celebrations and famous people. 3.1.4 explain the importance of respect and protection of minorities. 3.1.5 give examples of how people working together can accomplish goals that individuals working alone cannot. 3.1.6 explain and cite examples of how groups can make a difference in the community. 3.1.7 introduce the concept of the common good.	**Performance Descriptors** ■ **Distinguished** Third grade students performing at the distinguished level evaluate how the responsibilities of citizenship such as honesty, justice, patriotism, and respect at school, at home, in the community and in the state are important for the common good and predict situations where students will use these responsibilities. ■ **Mastery** Third grade students performing at the mastery level explain and demonstrate the responsibilities of citizenship, such as honesty, justice, patriotism, and respect at school, at home, in the community and in the state. ■ **Partial Mastery** Third grade students performing at the partial mastery level recognize, recall, and label the responsibilities of citizenship such as honesty, justice, patriotism, and respect at school, at home, in the community and in the state. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Content Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/Government Objectives Students will: 3.2.5 explain the importance of government in the classroom, school, community and state. 3.2.5 explain that citizens are united by commonly held principles and beliefs. 3.2.5 identify the three levels (local, state, federal) of government and the responsibilities of each level. 3.2.5 review majority rule and give examples of that concept in a democracy. 3.2.5 apply criteria in evaluating rules and laws (strengths and weaknesses, design and purpose, enforcement, bias).	**Performance Descriptors** ■ **Distinguished** Third grade students performing at the distinguished level analyze government in order to determine its importance in the classroom, school, community and state. They evaluate school rules. They describe majority rule as it relates to democracy.

	■ **Mastery** Third grade students performing at the mastery level explain government and its importance in the classroom, school, community and state. They compare and contrast school rules/laws as to their strengths and weaknesses. They relate majority rule to that concept in a democracy. ■ **Partial** Third grade students performing at the partial mastery level define government and identify its importance in the classroom, school, community and state. They identify classroom rules. ■ **Novice** Third grade students who have not attained partial mastery are at this level for this standard.

Standard 3: Economics

Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives Students will:	**Performance Descriptors**
3.3.1 explain the concept of scarcity by citing examples of limited supplies and scarce resources. 3.3.2 explain why budgeting is a critical skill. 3.3.3 explain supply and demand with appropriate examples. 3.3.4 examine the economic impact of various occupations. 3.3.5 summarize how banks serve as intermediarie between savers and borrowers. 3.3.6 explain the relationship between government taxation and the provision of public services. 3.3.7 illustrate the path of a product from the raw material to the consumer.	■ **Distinguished** Third grade students at the distinguished level classify how budgeting and occupational choices change because of scarcity, production, consumption, and taxation on the occupations and budgets of people, and the provisions of public services. ■ **Mastery** Third grade students at the mastery level explain within the context of the community how scarcity, supply, demand, savings, taxation, steps in production, consumption, public services, and advertising affect personal budgeting and occupational choice.

3.3.8 show how competition for products increases with advertising. 3.3.9 create and use graphs, charts, maps and oth sources to illustrate the use of resourc demand for products and the supply of goo services.	■ **Partial Mastery** Third grade students at the partial mastery level define within the context of the community how scarcity, supply, demand, savings, taxation, steps in production, consumption, public services, advertising, personal budgeting, and occupational choice. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geography

Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives Students will:	**Performance Descriptors**
3.4.1 describe and use the basic elements of maps and globes (e.g., title, legend, cardinal directions, scale, grid, parallels, meridians). 3.4.2 identify north, south, east, west, borders, lines of longitude and latitude, equator, north and south poles and time zones using a map. 3.4.3 identify world geographic features (e.g., peninsulas, islands, continents, straits, mountains, rivers, deserts, oceans, seas, harbors, gulfs, forests, oases). 3.4.4 locate states and capitals on a United States map. 3.4.5 compare and contrast climate, weather, and location with regard to people's clothing, food, shelter and jobs. 3.4.6 describe the various elements of the environment (water, soil, weather, climate, topography), and explain how people affect and are affected by them. 3.4.7 describe how people in the community make their living from the environment and identify activities that individuals can do to keep the environment clean. 3.4.8 construct, read and interpret data from various types of maps, globes, charts, graphs and timelines (e.g., population, products, climate).	■ **Distinguished** Third grade students performing at the distinguished level identify and explain the elements of maps and globes and define geographic vocabulary, use a wide variety of maps and globes to locate major world geographic features, and analyze the interaction between people and environment with regard to personal directions, latitude and longitude, states and capitals. ■ **Mastery** Third grade students performing at the mastery level identify the basic elements of maps and globes and define geographic vocabulary, use a variety of maps and globes to locate major world geographic features, and describe the interaction between people and environment with regard to personal directions, latitude and longitude, states and capitals.

	■ **Partial Mastery** Third grade students performing at the partial mastery level sometimes identify the basic elements of maps and globes and define simple geographic vocabulary. Use simple maps and globes to locate major world geographic features. Sometimes recognize the interaction between people and environment with regard to personal direction, states and capitals. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: History

Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives Students will:	**Performance Descriptors**
3.5.1 explain the historical significance of major events, people and their contributions to the United States. 3.5.2 construct a timeline representing the settlement of a community/region. 3.5.3 compare and contrast present cultures to the cultures of people of other historical time periods (e.g., source of food, clothing, shelter, products used). 3.5.4 make historical inferences by analyzing artifacts and pictures. 3.5.5 discuss and draw conclusions about current events. 3.5.6 explore American heroes, customs and traditions using various forms of literature. 3.5.7 explain the importance of respect for diversity in the heritage, culture, ideas and opinions of others.	■ **Distinguished** Third grade students performing at the distinguished level evaluate the significance of key individuals and major historical events in early American history. Using folklore and literature, they draw conclusions about lifestyles and cultures. Students describe their local community and extend the concept of community to state, nation, and the world. ■ **Mastery** Third grade students performing at the mastery level identify key individuals and major historical events in early American history. Using folklore and literature, they compare and contrast past and present cultures. Students describe their local community and extend the concept of community to state and nation.

3.5.8 compare and contrast different stories or accounts about past events, people, places or situations, and identify how they contribute to our understanding of the past. 3.5.9 sequence and discuss a series of pictures that reflect historic change (e.g., transportation, technology, agriculture, events in history). 3.5.10 organize information from various reference sources to prepare short reports and presentations.	■ **Partial Mastery** Third grade students performing at the partial mastery level identify key individuals and major historical events in early American history. Using folklore and literature, they list characteristics of cultures past and present. Students describe their local community. ■ **Novice** Third grade students who have not attained partial mastery are at the novice level for this standard.

Fourth Grade Social Studies Content Standards and Objectives

Fourth grade social studies is an introduction to the growth of the United States from exploration and colonization (When The Three Worlds Meet) to the conclusion of the American Revolution. Students will analyze the assimilation of immigrant groups, development of improved technology, major historical figures and events. Students will also learn about the physical geography of North America and its influence upon diverse cultures. Data collection and the essential roles of citizens in the democratic process will be emphasized. Roles of elected officials, economic trade offs and the need for taxation will be introduced. Students will learn how the economic concepts of competition, advertising, budgeting and taxation impact production and consumption. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Citizenship

Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives	Performance Descriptors
Students will: 4.1.1 identify public agencies in the community that provide services and investigate opportunities for volunteerism. 4.1.2 work independently and cooperatively to accomplish goals. 4.1.3 identify commonly held democratic values, principles and beliefs expressed in the Declaration of Independence and the significance of patriotic symbols, holidays, celebrations and famous people. 4.1.4 describe forms of diversity in early American society, giving examples of the strengths/contributions of each. 4.1.5 evaluate the qualities of responsible leadership by individuals and in groups. 4.1.6 explain the responsibilities, privileges and rights of United States citizenship and the importance of civic life. 4.1.7 describe ways in which groups of people in schools/communities can manage conflict peacefully.	■ **Distinguished** Fourth grade students performing at the distinguished level explain the basic democratic values, principles, and beliefs expressed in the Declaration of Independence and analyze how they relate to rights and responsibilities of Americans today, and then, find examples of them in today's news and activities. They assess and critique the significance of US and WV patriotic symbols, holidays, and celebrations. They generate strategies which will enhance conflict resolution skills. ■ **Mastery** Fourth grade students performing at the mastery level compare and contrast the principles, values, and beliefs expressed in the Declaration of Independence, and draw conclusions about the significance of U.S. and WV patriotic symbols, holidays, and celebrations. They also describe the rights and responsibilities of American and WV citizenship and then employ strategies to manage conflict peacefully. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level name some of the principles, values, and beliefs expressed in the Declaration of Independence and summarize some significances of the US and WV patriotic symbols, holidays, and celebrations. They also identify the rights and responsibilities of American and WV citizenship and then model strategies for managing conflict peacefully. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/Government Objectives Students will:	**Performance Descriptors**
4.2.1 explain how the rule of law and limited government protect individual rights and the common good. 4.2.2 explain the rights of minorities in the democratic process and the right to dissent responsibly. 4.2.3 identify historical conflicts concerning individual rights and how those conflicts were resolved.	■ **Distinguished** Fourth grade students performing at the distinguished level will verify the protection of minority rights in a democracy, cite examples of conflicts concerning individual rights and draw conclusions about how they have been resolves. They analyze symbols and celebrations and rank famous West Virginians according to the significance of their contributions. They compare and contrast the parts of government at the local, county and state levels. ■ **Mastery** Fourth grade students performing at the mastery level explain how the rights of minorities are protected in a democracy and how conflicts concerning individual rights have been resolved. They explain state symbols, celebrations, and famous West Virginians and describe their contributions. They define parts of the government at the local, county, and state levels. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level will list examples of how the rights of minorities are protected in a democracy. They will recall how conflicts concerning individual rights have been resolved. They will identify state symbols, celebrations, and famous West Virginians. They will list the parts of the government at the local, county, and state levels. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Content Standard 3: Economics

Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives Students will:	**Performance Descriptors**
4.3.1 explain the concept of trade-offs (e.g., developing hypothetical budgets in simulated situations). 4.3.2 using print and media sources, analyze advertisements and their impact upon consumer choices. 4.3.3 analyze the factors that shaped the economy in the colonies and the Americas. 4.3.4 give examples of people as consumers and producers of goods. 4.3.5 explain the concept of taxation and its relationship to public services. 4.3.6 describe how slavery and indentured servitude influenced the early economy of the United States. 4.3.7 predict how competition in the market place affects prices. 4.3.8 analyze a product chart for price comparison. 4.3.8 construct and use charts, graphs, tables and grids to display data.	■ **Distinguished** Fourth grade students at the distinguished level apply the concepts of production, consumption and scarcity to explain the roles of taxation, slavery, indentured servitude, and natural resources in the economic development of the colonies and the American Revolution. Students explain how occupational choices are affected by resource use. ■ **Mastery** Fourth grade students at the mastery level use the factors of production, scarcity, land use, and how the choices of consumers and producers of goods impacted taxation, slavery, indentured servitude, and natural resources to explain the economic development of the colonies and the American Revolution. Students identify how natural resources and geographic features affect the economic development of West Virginia and the occupational choices of citizens. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level define factors of production, scarcity, land use and taxation and cite an example of each. Students identify occupations based on the natural resources and geographic features of West Virginia. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Content Standard 4: Geography

Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives

Students will:

4.4.1 identify and locate North, South and Central American countries and bodies of water.

4.4.2 use geographic terms to describe the physical features of the Americas (e.g., mountains, rivers, grasslands, oases).

4.4.3 analyze the effect of geographic factors in the development of transportation routes and settlement patterns in the Americas.

4.4.4 identify physical barriers to transportation in the Americas and how people adapted to the barriers (e.g., Appalachian and Rocky Mountains, Great Plains, Rain Forest, Isthmus of Panama).

4.4.5 compare and contrast the physical, economic and political changes caused by geographic conditions and human intervention.

4.4.6 analyze and compare the effects of geographic factors upon people's jobs, food, clothing, shelter, services and interaction with the outside world.

4.4.7 identify geographic factors that affect population density and other patterns on the earth.

4.4.8 describe different climate types.

4.4.9 locate on a map the sites of the American Indian nations before the arrival of the Europeans.

4.4.10 utilize map skills to locate places and to construct maps (e.g., symbols in a legend/key; lines of demarcation [Equator, Prime Meridian, latitude and longitude, time zones, borders, coast lines] scales; directions [cardinal and intermediate]; and geographic barriers).

Performance Descriptors

- **Distinguished**
  Fourth grade students performing at the distinguished level independently identify and locate the countries of the Americas, states of the United States and counties of West Virginia on blank maps. The students use grade level terminology in drawing conclusions about the interaction of people and environment of West Virginia and the United States in regard to physical features, natural resources, climate, transportation, migration and settlement. They compare, contrast and analyze regions of both West Virginia and the United States.
- **Mastery**
  Fourth grade students performing at the mastery level identify and locate the countries of Americas, states of the United States, and the counties of West Virginia on blank maps. The students use grade level geographic terminology to describe the interaction of people and the environment of West Virginia and the United States with regard to physical features, natural resources, climate, transportation, migration and settlement. They compare and contrast regions of both West Virginia and the United States.
- **Partial Mastery**
  Fourth grade students performing at the partial mastery level locate some of the countries of the Americas, states of the United States and the counties of West Virginia on blank maps, and define simple geographic terms, recognize the interaction of people and environment of West Virginia and the United States with regard to physical features, natural resources, climate, transportation, migration and settlement. Locate selected regions of both West Virginia and the United States.

	■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: History

Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives Students will:	**Performance Descriptors**
4.5.1 interpret data presented in timelines. 4.5.2 order chronologically selected historical figures and episodes, and explain their importance in the stories of Native Americans, explorers, settlers and colonists in North America. 4.5.3 identify major leaders and events from America's colonization through the Revolutionary War. 4.5.4 identify the influence of various factors on the founding of the original colonies. 4.5.5 identify areas and patterns of early American settlement and depict territorial expansion and population distribution in the United States through maps, charts, pictures and research projects. 4.5.6 explore ways in which early explorers and settlers adapted to, used and changed the environment of the state or region. 4.5.7 identify and describe European explorers of the 15th and 16th centuries, their reasons for exploring, the information gained from their journeys and what happened as a result of their travels. 4.5.8 explore how and why family and community life differed in various regions of colonial North America. 4.5.9 compare the family lives of different groups and strata in colonial times including the roles and responsibilities of men, women, children and the elderly. 4.5.10 explain how African Americans came to America and how slavery developed.	■ **Distinguished** Fourth grade students performing at the distinguished level connect early exploration and colonization of North America to the spread of cultural, religious and political ideology. They assess the significant events and differing beliefs leading to the Revolutionary War. Students use primary and secondary sources to draw conclusions about colonial life. Students trace and describe the economic, social, political and cultural history of West Virginia as reflected in folklore and heritage. ■ **Mastery** Fourth grade students performing at the mastery level explain the early exploration and colonization of North America. Students identify significant events leading to the Revolutionary War. They use primary and secondary sources to describe colonial life. Students will trace and describe the economic, social, political and cultural history of West Virginia as reflected in folklore and heritage. ■ **Partial Mastery** Fourth grade students performing at the partial mastery level trace and describe the early exploration and colonization of North America. Students identify key events leading to the Revolutionary War. They describe the economic, social, political and cultural history of West Virginia as reflected in folklore and heritage. ■ **Novice** Fourth grade students who have not attained partial mastery are at the novice level for this standard.

4.5.11	describe factors that led to the colonists' break with Great Britain and research major events of the Revolutionary War (e.g. Stamp Act, Boston Tea Party, Bunker Hill, Yorktown)	
4.5.12	describe ways in which language, stories, music, folk tales and artistic creations serve as expressions of culture and influence the behavior of people living in a particular culture.	
4.5.13	compare and contrast the cultures of the colonists and Native Americans and describe the changes that occurred when they came into contact with one another.	
4.5.14	explain the similarities and differences in backgrounds, motivations and occupational skills between people in the English settlements and those in the French and Spanish settlements.	
4.5.15	evaluate the choices made and roles undertaken in the American Revolution by different classes and groups and what they hoped or feared from revolution.	
4.5.16	analyze various sources for reconstructing the past such as documents, letters, diaries, maps, photos and others.	
4.5.17	explain why Americans and those who led them (e.g., George Washington, Benjamin Franklin, Thomas Jefferson) went to war to win independence from England.	
4.5.18	analyze and interpret information from pictures and news sources related to historical events and people.	
4.5.19	suggest appropriate reference sources to answer specific questions, collect information and prepare short reports.	
4.5.20	sequence major historical events in United States history on a timeline (e.g., discovery of America, Boston Tea Party, Revolutionary War).	

Elementary West Virginia Studies Content Standards and Objectives

The objectives for West Virginia Studies explore historic, geographic, economic, and civic concepts. These objectives shall be taught as a separate fourth grade unit. The relationship among geographic factors, settlement patterns, and economic development of West Virginia will be explored in this course. The cultural heritage of the various groups who settled West Virginia will be researched through classroom activities. The course content will reflect West Virginia's unique characteristics as well as its relationship to the nation. Teachers are encouraged to introduce students to geographic places and regions. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Citizenship

Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives

The students will:

WV.1.1 explain why various civic dispositions, such as the act of voting as a West Virginia citizenship, is a responsibility, a privilege and a right.

WV.1.2 propose solutions and investigate opportunities for public volunteerism concerning a local problem.

WV.1.3 explain that students are citizens of their classroom, community, state and nation.

WV.1.4 take and defend a position as to why fulfilling one's civic responsibility is important.

Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/Government Objectives

The students will:

WV.2.1 identify state symbols, the state capitol, the Governor, celebrations, holidays and famous West Virginians.

WV.2.2 recognize and be given the opportunity to recite the State Motto and sing the State Song.

WV.2.3 identify the roles and functions of the government (e.g., legislative, executive, judicial branches) at the local, county and state levels.

Standard 3: Economics

Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives

The students will:

WV.3.1 identify the effect of natural resources and geographic features upon the economic development of counties and the state.

WV.3.2 identify the major occupations of people in the private and public sectors of our state.

Standard 4: Geography

Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives

Students will:

WV.4.1 locate West Virginia on a United States map, and identify bordering states.

WV.4.2 locate and describe the four geographic regions of West Virginia and the major communities contained within each region.

WV.4.3 locate student's county and county seat on a West Virginia map.

WV.4.4 analyze the impact of West Virginia's geography on transportation, settlement, jobs, clothing, food, shelter, services, and interaction with the outside world and changes over time.

WV.4.5 describe West Virginia's climate and weather.

WV.4.6 recognize the difference between renewable and nonrenewable resources

WV.4.7 identify student's state, town, county and address.

WV.4.8 use maps to explore West Virginia's population, products, resources, transportation, state parks, forests and scenic/recreational resources.

WV.4.9 find an absolute West Virginia location (e.g., using a grid system) and a relative location (e.g., direction and reference to neighboring states, rivers and mountain ranges).

Standard 5: History

Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives

Students will:

WV.5.1 explain and trace the economic, social and political history of West Virginia.
WV.5.2 describe the cultural life of West Virginia as reflected in folklore and heritage.
WV.5.3 compare and contrast past and present lifestyles of West Virginians.
WV.5.4 use reference sources to answer specific questions, collect information and prepare short reports about West Virginia.

Fifth Grade Social Studies Content Standards and Objectives

The fifth grade social studies program is a basic overview of the United States from its emergence as a new nation. Students will understand the significance of major events of each historical era. Students will examine documents relating to the establishment of the nation and the new government. They will continue to examine the role of citizenship in the school and community. Students will examine the movement in the nation from rural to urban and from agriculture to industry focusing on the economic impact of these moves. Students will learn how government decisions impact the economy. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Citizenship

Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives	Performance Descriptors
Students will: 5.1.1 describe how groups and institutions work to meet the individual needs and promote the common good. 5.1.2 explain the political process and describe its importance in decision-making. 5.1.3 explain the consent of the governed as the source of authority of government. 5.1.4 explain the importance of citizens having and supporting common democratic values and principles expressed in the nation's core documents. 5.1.5 identify and analyze differences between individual responsibilities, privileges and rights of American citizenship.	■ **Distinguished** Fifth grade students performing at the distinguished level justify and defend the roles of an American citizen in relation to responsibilities, rights, involvement in political process and decision making, source of governmental power, and the belief in common values and principles as defined by our core documents. ■ **Mastery** Fifth grade students performing at the mastery level identify, explain, and examine the roles of an American citizen in relation to responsibilities, rights, involvement in political process, and decision making, source of governmental power, and the belief in common values and principles as defined by our core documents. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level recognize and recall some of the roles of an American citizen in relation to responsibilities, rights, involvement in political process, and decision making, source of governmental power, and the belief in common values and principles as defined by our core documents. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/Government Objectives Students will:	**Performance Descriptors**
5.2.1 give examples of how government does or does not provide for the needs and wants of people, establish order and manage conflict. 5.2.2 participate in exercises that demonstrate knowledge of trial by jury. 5.2.3 list and explain the weaknesses of the Articles of Confederation. 5.2.4 list the individual rights and responsibilities in the Bill of Rights. 5.2.5 identify the first three articles of the Constitution and outline the basic functions of the three branches of government. 5.2.6 explain and illustrate how a bill becomes a law. 5.2.7 analyze the importance of government in the classroom, the school, the community, state and nation.	■ **Distinguished** Fifth grade students performing at the distinguished level compare and contrast the Articles of Confederation, U.S. Constitution, and Bill of Rights to determine how each meets the needs and wants of the people. They create a bill to address a particular need or want and work through the legislative process. ■ **Mastery** Fifth grade students performing at the mastery level explain how government does or does not provide for the needs and wants of the people, (i.e., the failure of the Articles of Confederation, the development of the Constitution, and the Bill of Rights). They describe the steps taken for a bill to become law and recognize that laws evolve to meet the needs and wants of the people. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level identify some needs and wants of the people that government provides/addresses, and list the basic rights in the Bill of Rights. They will identify laws at the local, state, and national levels. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Economics
Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives Students will:	**Performance Descriptors**
5.3.1 identify the roles of consumers in the United States economy. 5.3.2 apply the concept of supply and demand to a specific United States situation. 5.3.3 explain the economic impact of slavery upon the development of the United States. 5.3.4 list geographic factors that can enhance or limit economic activities in various United States regions. 5.3.5 describe the impact of industrialization on the economy of the United States. 5.3.6 explain the function of agriculture in the economic development of the United States. 5.3.7 apply the concepts of sales, expenses and profits to a real life event (e.g., school-related situation such as sports events, concession stand, snack machines).	■ **Distinguished** Fifth grade students at the distinguished level construct possible solutions for a selected long-term economic problem that was present through the nineteenth and twentieth centuries and construct a model showing possible solutions. ■ **Mastery** Fifth grade students at the mastery level explain the role of geographic factors, agriculture, slavery, industrialization, supply and demand, and competition, in the development of the United States economy and individual consumer habits from the emergence of a new nation to the present. ■ **Partial Mastery** Fifth grade students at the partial mastery level describe examples of geographic factors, agriculture, slavery, industrialization, supply and demand, and competition, which have influenced United States economy from the Revolutionary War to the present. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geography
Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives Students will:	Performance Descriptors
5.4.1 read, interpret and draw conclusions from United States maps (e.g., special purpose maps, graphs, charts, tables, timelines). 5.4.2 measure distances using a scale, and apply the concept of cardinal and intermediate directions. 5.4.3 use a map to locate a country by hemisphere and its proximity to the equator. 5.4.4 locate, identify and contrast the major rivers, landforms, natural resources, climate regions, major soil regions and deserts of the United States. 5.4.5 describe the development of the United States' urban areas. 5.4.6 discuss and define the various regions of the United States. 5.4.7 identify and locate each of the fifty United States within their regions. 5.4.8 explain the relationship of the environment to cultures in the United States. 5.4.9 relate the United States' westward expansion to natural resources and physical geography. 5.4.10 use geography to describe historical events. 5.4.11 describe how people have changed the environment of the United States.	■ **Distinguished** Fifth grade students performing at the distinguished level use, construct and draw conclusions from U.S. maps and other resources, and acquire, process and effectively report on the various regions of the United States from the early explorers perception to current times. They explain the physical processes responsible for the major rivers, mountains, soils and deserts of the United States, and analyze and evaluate how human activity and environment shaped the United States, and use and apply geographic perspective and tools to discuss the evolution of cultures in the United States. ■ **Mastery** Fifth grade students performing at the mastery level use and acquire information from United States maps and other resources. Discuss the various regions of the United States from the early explorers perception to current times. They will explain the physical processes responsible for the major rivers, mountains, soils and deserts of the United States, and analyze how human activities and the environment shaped the United States. ■ **Partial Mastery** Fifth grade students performing at the partial mastery level relate information from United States maps and resources, and identify the various regions of the United States from the perceptions of the early explorers to the current times. They discuss the physical processes responsible for the major rivers, mountains, soils, and deserts of the United States, and identify human activities and environment that shaped the United States. Students use simple geographic tools to explain evolution of cultures in the United States. ■ **Novice** Fifth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: History

Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives

Students will:

5.5.1 describe and analyze the events and the historic figures responsible for such documents as the United States Constitution, the Bill of Rights and the Emancipation Proclamation.

5.5.2 create a timeline showing the arrival of major immigrant groups and describe their experiences and the influence of each culture upon American society.

5.5.3 describe the development of transportation in the United States and explain its impact on settlement, industry and residential patterns.

5.5.4 explain why maintaining historical records and landmarks is important to the United States.

5.5.5 interpret quotes of famous Americans from various periods of history.

5.5.6 explain how important figures reacted to their times and why they were significant to the history of our democracy (e.g., George Washington, Thomas Jefferson, Abraham Lincoln, Sojourner Truth, Susan B. Anthony, Eleanor Roosevelt and Martin Luther King, Jr.).

5.5.7 describe how regional folk heroes and other popular figures have contributed to the cultural history of the United States (e.g., frontiersmen such as Daniel Boone, cowboys, mountain men such as Jedediah Smith, American Indian Chiefs including Geronimo and outlaws such as Billy the Kid).

5.5.8 explain how songs, symbols and slogans demonstrate freedom of expression and the role of protest in democracy (e.g., the abolition of slavery, women's suffrage, labor movements, the civil rights movement).

Performance Descriptors

- **Distinguished**
  Fifth grade students performing at the distinguished level evaluate the significance of people, places, documents, ideas, and events in their correct historical period and context from the post-Revolutionary War era to the present. They determine factors which led to the ascent of the United States to a world power and analyze the role of the United States in significant nineteenth and twentieth century events.
- **Mastery**
  Fifth grade students performing at the mastery level identify people, places, documents, ideas, and events in their correct historical period and context from the post - Revolutionary War era to the present. They explain the ascent of the United States to a world power and describe significant nineteenth and twentieth century events.
- **Partial Mastery**
  Fifth grade students performing at the partial mastery level identify key people, places, documents, ideas, and events in their correct historical period and context from the post - Revolutionary War era to the present.
- **Novice**
  Fifth grade students who have not attained partial mastery are at the novice level for this standard.

5.5.9	assess the significance of the new Constitution of 1787, including the struggles over its ratification and the reasons for the addition of the Bill of Rights.	
5.5.10	describe issues faced by Washington when he became the first United States President.	
5.5.11	identify and explain social and technological changes that took place during the Industrial Revolution in the United States.	
5.5.12	list the reasons for westward expansion and explain how it affected the inhabitants of the American West (e.g., Native Americans).	
5.5.13	understand the effects of government policies on Native American nations and their land holdings.	
5.5.14	analyze the impact of slavery and the Abolitionist Movement upon the development of the United States.	
5.5.15	identify causes, major events and important people of the Civil War.	
5.5.16	explain how various reconstruction plans succeeded or failed.	
5.5.17	identify events which led to the United States becoming a world power.	
5.5.18	identify the opposing sides in World War I and explain why the United States entered the war.	
5.5.19	describe the effects of the Great Depression on the people of the United States.	
5.5.20	identify the causes and effects of World War II.	
5.5.21	identify significant leaders in the Civil Rights Movement (e.g., John Fitzgerald Kennedy, Martin Luther King Jr., Rosa Parks, Lyndon Johnson).	

Sixth Grade Social Studies Content Standards and Objectives

Sixth grade social studies will provide an interdisciplinary examination of selected world regions: North America, South America, Western Europe and the Middle East. Students will study for example, historical development, characteristics of places, connections between regions and their impact on modern cultures. Students will learn how governments are developed and the roles of citizens in each emerging state/nation. Emphasis will be placed on how environment, technology and resources have helped to determine economic relations and conflicts between these regions. Various economic systems will be introduced. West Virginia teachers are responsible for analyzing the benefits of technology for learning and for integrating technology appropriately in the students' learning environment. See the related grade-level Technology Standards and Objectives.

Standard 1: Citizenship

Students will:

- describe, demonstrate and employ the civic dispositions of good citizenship (Civic Dispositions);
- develop a respect for symbols, ideas and concepts of the United States and describe the roles of significant individuals (Respect For People, Events, and Symbols);
- develop and employ the civic skills necessary for effective citizenship by using criteria to make judgments, arrive at and defend positions and evaluate the validity of the positions or data (Evaluation Skills);
- demonstrate and employ the participatory skills of interacting, monitoring and influencing that are essential for informed, effective and responsible citizenship, including participation in civic life to shape public policy (Participatory Skills); and
- explain and practice the responsibilities, privileges and rights of United States citizens (Civic Life).

Citizenship Objectives	**Performance Descriptors**
Students will: 6.1.1 describe ways in which nations interact with one another and try to resolve problems. 6.1.2 evaluate, take and defend positions on the purposes that government should serve. 6.1.3 explain how nations benefit when they resolve conflicts peacefully. 6.1.4 compare and contrast the role of American citizens and citizens in selected regions. 6.1.5 analyze and evaluate the influence of various forms of citizen action on public policy. 6.1.6 evaluate the effectiveness of public opinion in influencing and shaping public policy development and decision making. 6.1.7 compare and contrast responsibilities, privileges and rights of United States citizenship in selected regions.	■ **Distinguished** Sixth grade students performing at the distinguished level predict how the roles of American citizens and citizens in other nations may change in the future and assess the influence of those citizens' actions on public policy. They also judge and defend the benefits of resolving international conflicts peacefully. ■ **Mastery** Sixth grade students performing at the mastery level compare and contrast the roles of American citizens to citizens in other nations and analyze the influence of those citizens' actions on public policy. They also survey the benefits of resolving international conflicts peacefully. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level identify the roles of citizens in world regions and identify some of the influences of those citizens' actions on public policy. They also demonstrate some of the benefits of resolving international conflicts peacefully. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 2: Civics / Government

Students will:

- identify, examine and analyze the purposes and basic principles of the United States government (Purposes of government);
- explain, evaluate and analyze the origins and meaning of the principles, ideals and core democratic values expressed in the foundational documents of the United States (Ideals of United States Democracy);
- identify, examine and explain the structure, function and responsibilities of governments and the allocation of power at the local, state and national levels (United States Government and Politics); and
- analyze how the world is organized politically and describe the role and relationship of the United States to other nations and to world affairs (United States Government and World Affairs).

Civics/Government Objectives	Performance Descriptors
Students will: 6.2.1 evaluate competing ideas about the purposes of government. 6.2.2 analyze and explain how various types of government meet needs and wants of citizens, manage conflict and establish security. 6.2.3 explain the impact of strong leadership on historic world events. 6.2.4 explain the purpose of political parties and special interest groups and their influence on the political process. 6.2.5 illustrate the political divisions of nations. 6.2.6 identify and give examples of different forms of government, and classify them as either limited or unlimited. 6.2.7 distinguish between governmental and nongovernmental international organizations and describe their functions.	■ **Distinguished** Sixth grade students performing at the distinguished level analyze various forms of governments and they compare the structures of governments for the power given to leaders. They identify strong leadership and evaluate their actions and the consequences. They will determine the function of governmental and non-governmental organizations. ■ **Mastery** Sixth grade students performing at the mastery level will explain the impact of strong leadership on historical world events. They will differentiate among various forms of government and distinguish between governmental and non-governmental organizations. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level recognize characteristics that make a strong leader. They list world leaders past and present and match them to their form of government. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 3: Economics

Students will:

- analyze the role of economic choices in scarcity, supply and demand, resource allocation, decision making, voluntary exchange and trade offs (Choices);
- research, critique and evaluate the roles of private and public institutions in the economy (Institutions);
- compare and contrast various economic systems and analyze their impact on individual citizens (Economic Systems);
- describe and demonstrate how the factors of production apply to the United States economic system (Factors of Production);
- analyze the elements of competition and how they impact the economy (Competition); and
- examine and evaluate the interdependence of global economies (Global Economies).

Economics Objectives	Performance Descriptors
Students will: 6.3.1 explain the economic reasons for immigration and migration. 6.3.2 demonstrate an understanding that competition among sellers results in lower prices. 6.3.3 compare the basic characteristics of communism, socialism and capitalism. 6.3.4 explain and outline the steps in producing and marketing goods. 6.3.5 assess the economic impact of technology on regions.	■ **Distinguished** Sixth grade students at the distinguished level evaluate economic systems in selected nations in relation to the United States economic system. ■ **Mastery** Sixth grade students at the mastery explain the impact of technology, trade cartels, and treaties, on the production, marketing, and consumption of goods and services, and employment in selected nations.

6.3.6 explain how trade cartels affect the world economy (e.g., Organization of Petroleum Exporting Countries). 6.3.7 trace the development of treaties and organizations related to trade. 6.3.8 compare production and consumption of goods and services in different countries.	■ **Partial Mastery** Sixth grade students at the partial mastery level describe jobs and types of technology used in production, marketing, and consumption of goods and services, define and recognize trade cartels and treaties related to selected nations. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 4: Geography

Students will:

- interpret, use and construct maps, globes and other geographic tools to locate and derive information about personal directions, people, places and environments (The World in Spatial Terms);
- describe the physical and human characteristics of place and explain how the lives of people are rooted in places and regions (Places and Regions);
- describe and explain the physical processes that shape the earth's surface and create, sustain and modify the cultural and natural environment (Physical Systems);
- identify, explain and analyze how the earth is shaped by the movement of people and their activities (Human Systems);
- analyze the interaction of society with the environment (Environment and Society); and
- explain geographic perspective and the tools and techniques available for geographic study (Uses of Geography).

Geography Objectives Students will:	**Performance Descriptors**
6.4.1 determine the time at one location when informed of the time at another location using a world time zone map. 6.4.2 use map tools (legends, keys and scales) to interpret information (e.g., climate, landforms, resources). 6.4.3 identify changes in population due to shifts from agricultural to industrial/urban development. 6.4.4 locate and identify the continents, major climates, major bodies of water and natural resources (e.g., knowledge of landforms such as peninsulas, mountain ranges, plateaus, river valleys, lakes), and compare and analyze the relationship of people and the environment with regard to population, settlement and trade. 6.4.5 locate the major waterways of North America, South America, Western Europe and The Middle East, and explain their impact on exploration, settlement and trade. (e.g., discuss how the opening of the Erie Canal contributed to the rise of New York City).	■ **Distinguished** Sixth grade students performing at the distinguished level explain the physical and human processes that shape the earth's surface and predict future changes. Students construct and/or use complex time zone maps, globes and population pyramids to derive information about their place in the world. They use maps to draw conclusions about the effects of geography on population density, distribution and movement. Students compare and contrast the selected regions of the world with respect to migration including economics, religion and language. They analyze and evaluate the characteristics of the new geographic frontiers.

6.4.6 draw conclusions about the effects of geography on transportation, culture, economic activities, population density and distribution using maps. 6.4.7 explain the changing nature of earth's surface (e.g., earthquakes, volcanoes). 6.4.8 compare and contrast general characteristics of the population of selected regions with regard to economics, religion, language and movement. 6.4.9 interpret information from a population growth graph and a population pyramid (e.g., discuss the age of the population, growth potential, life expectancy). 6.4.10 examine changes in the commercial form and function (e.g., agriculture center to trade center to industrial center) of urban areas in different regions of the world.	■ **Mastery** Sixth Grade students performing at the mastery level describe and explain the physical and human processes that shape the earth's surface. They Construct and/or use time zone maps, globes, population pyramids to derive information about their place in the world. Use maps to draw conclusions about the effects of geography on population density, distribution and movement. Students describe selected regions of the world with respect to migration including economics, religion and language. They identify the new geographic frontiers. ■ **Partial Mastery** Sixth grade students performing at the partial mastery level identify the physical and human processes that shape the earth's surface. Students use grade level geographic tools to recognize their place in the world. Students use simple maps to describe the effects of geography on population density, distribution and movement. Identify the movement of economics, religion and language from selected regions of the world. Locate the new geographic frontiers. ■ **Novice** Sixth grade students who have not attained partial mastery are at the novice level for this standard.

Standard 5: History

Students will:

- examine, analyze and explain historical relationships using chronology to sequence and organize events and people in history (Chronology);
- use the processes and resources of historical inquiry to gather, examine, compare, analyze and interpret historical data (Skills and Application);
- examine, analyze and synthesize historical knowledge of major events, individuals, cultures and the humanities in West Virginia, the United States and the world (Culture and Humanities);
- use historical knowledge to analyze local, state, national, global interdependence (Interpretation and Evaluation); and
- examine political institutions and theories that have developed and changed over time (Political Institutions).

History Objectives Students will:	**Performance Descriptors**
6.5.1 identify and evaluate contributions of classical civilizations and cite reasons for their rise and fall. 6.5.2 explain the basic tenets of major monotheistic religions and their impact on western civilizations. 6.5.3 identify the contributions and characteristics of Arab/Islamic society and Judea-Christian societies.	■ **Distinguished** Sixth grade students performing at the distinguished level evaluate the significance of people, places, documents, ideas, and events in their correct historical period and context. They examine the contributions of the civilizations of North America, South America, Europe, and the Middle East and assess how those contributions advanced that culture and influenced other cultures.