FILED IN THE OFFICE OF
THE SECRETARY OF STATE
THIS DATE 11-15-06 3:31 pm
ADMINISTRATIVE LAW DIVISION SH

WEST VIRGINIA BOARD OF EDUCATION
Capitol Building 6, Room 351
1900 Kanawha Boulevard East
Charleston, West Virginia 25305-0330

Telephone: 304-558-3660
Fax: 304-558-0198

November 15, 2006

The Honorable Betty Ireland
Secretary of State
State of West Virginia
Capitol Building 1, Suite 157-K
1900 Kanawha Boulevard, East
Charleston, West Virginia 25305

Dear Secretary Ireland:

I request that the following rules, filed with your office on ~~December~~ November 13, 2006, be withdrawn.

126CSR44A, Policy 2520.1, 21st Century Reading and English Language Arts Content Standards and Objectives for West Virginia Schools

126CSR44B, Policy 2520.2, 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

126CSR44C, Policy 2520.3, 21st Century Science K-8 Content Standards and Objectives for West Virginia Schools

126CSR44D, Policy 2520.4, 21st Century Social Studies Content Standards and Objectives for West Virginia Schools

126CSR44N, Policy 2520.14, 21st Century Learning Skills and Technology Tools Content Standards and Objectives for West Virginia Schools

Thank you for your attention to this matter.

Sincerely,

Steven L. Paine
State Superintendent of Schools

WEST VIRGINIA
SECRETARY OF STATE
BETTY IRELAND
ADMINISTRATIVE LAW DIVISION

Form #5

Do Not Mark In This Box

FILED IN THE OFFICE OF THE SECRETARY OF STATE
THIS DATE 11-15-06 3:35 pm
ADMINISTRATIVE LAW DIVISION

NOTICE OF AGENCY ADOPTION OF A PROCEDURAL OR INTERPRETIVE RULE OR A LEGISLATIVE RULE EXEMPT FROM LEGISLATIVE REVIEW

AGENCY: West Virginia Board of Education TITLE NUMBER: 126

CITE AUTHORITY: W. Va. Constitution, Article XII, §2, W. Va. Code §18-2-5 and §18-9A-22

RULE TYPE: PROCEDURAL ______ INTERPRETIVE ______

EXEMPT LEGISLATIVE RULE X
CITE STATUTE(s) GRANTING EXEMPTION FROM LEGISLATIVE REVIEW
W.Va. Code §§29A-3B-1, et seq.; *W.Va. Board of Education v. Hechler*, 180 W.Va. 451; 376 S.E.2d 839 (1988).

AMENDMENT TO AN EXISTING RULE: YES X NO ___

IF YES, SERIES NUMBER OF RULE BEING AMENDED: 44B

TITLE OF RULE BEING AMENDED: 21st Century Mathematics Content Standards and Objectives for West Virginia Schools (2520.2)

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

TITLE OF RULE BEING PROPOSED: ______

THE ABOVE RULE IS HEREBY ADOPTED AND FILED WITH THE SECRETARY OF STATE. THE EFFECTIVE DATE OF THIS RULE IS July 1, 2008.

Jack McClanahan
Deputy State Superintendent of Schools

TITLE 126
LEGISLATIVE RULE
BOARD OF EDUCATION

SERIES 44B
21st Century Mathematics Content Standards and Objectives for West Virginia Schools (2520.2)

§126-44B-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 2520.2 defines the content standards objectives for mathematics as required by W.Va. 126CSR42 (Policy 2510).

1.2. Authority. - W.Va. Constitution, Article XII, §2, W.Va. Code §18-2-5 and §18-9A-22.

1.3. Filing Date. - November 15, 2006.

1.4. Effective Date. – July 1, 2008.

1.5. Repeal of former rule. - This legislative rule repeals and replaces W. Va. 126CSR44B "Mathematics Content Standards and Objectives for West Virginia Schools (2520.2)" filed February 25, 2003 and effective July 1, 2003.

§126-44B-2. Purpose.

2.1. This policy defines the content standards and objectives for the program of study required by Policy 2510 in mathematics.

§126-44B-3. Incorporation by Reference.

3.1. A copy of the 21st Century Mathematics Content Standards and Objectives for West Virginia Schools is attached and incorporated by reference into this policy. Copies may be obtained in the Office of the Secretary of State and in the West Virginia Department of Education, Office of Instructional Services.

§126-44B-4. Summary of the Content Standards 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 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 for mathematics; an explanation of terms; objectives that reflect a rigorous and challenging curriculum; and performance descriptors.

WEST VIRGINIA
SECRETARY OF STATE

BETTY IRELAND

ADMINISTRATIVE LAW DIVISION

Form #5

Do Not Mark In This Box

FILED IN THE OFFICE OF
THE SECRETARY OF STATE
THIS DATE 11/13/06 2:43pm
ADMINISTRATIVE LAW DIVISION

NOTICE OF AGENCY ADOPTION OF A PROCEDURAL OR INTERPRETIVE RULE OR A LEGISLATIVE RULE EXEMPT FROM LEGISLATIVE REVIEW

AGENCY: West Virginia Board of Education TITLE NUMBER: 126

CITE AUTHORITY: W. Va. Constitution, Article XII, §2, W. Va. Code §18-2-5 and §18-9A-22

RULE TYPE: PROCEDURAL ______ INTERPRETIVE ______

EXEMPT LEGISLATIVE RULE X

CITE STATUTE(s) GRANTING EXEMPTION FROM LEGISLATIVE REVIEW
W.Va. Code §§29A-3B-1, et seq.; *W.Va. Board of Education v. Hechler*, 180 W.Va. 451; 376 S.E.2d 839 (1988).

AMENDMENT TO AN EXISTING RULE: YES X NO ___

IF YES, SERIES NUMBER OF RULE BEING AMENDED: 44B

TITLE OF RULE BEING AMENDED: 21st Century Mathematics Content Standards and Objectives for West Virginia Schools (2520.2)

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

TITLE OF RULE BEING PROPOSED: ______

THE ABOVE RULE IS HEREBY ADOPTED AND FILED WITH THE SECRETARY OF STATE. THE EFFECTIVE DATE OF THIS RULE IS December 14, 2006.

Jack McClanahan
Deputy State Superintendent of Schools

EXECUTIVE SUMMARY
FOR
WEST VIRGINIA BOARD OF EDUCATION POLICY 2520.2
21st CENTURY MATHEMATICS CONTENT STANDARDS AND OBJECTIVES FOR WEST VIRGINIA SCHOOLS

Policy Number and Title: West Virginia Board Of Education Policy 2520.2: *21st Century Mathematics Content Standards and Objectives for West Virginia Schools*

Background: Policies 2520 define the content standards and objectives for the programs of study required by Policy 2510 and establish a standardized format for such.

- The original effective date of Policy 2520 (Instructional Goals and Objectives for West Virginia Schools) was July 1997.
- The West Virginia Board of Education approved initial work on Mathematics content standards in December 2001. The revision placed on comment in November 2002 created a separate policy for each content area, expanded the number of performance levels from 3 to 5, and made minor editorial changes.
- Policy 2520.2 was filed February 25, 2003 and became effective July 1, 2003.

Major Revisions or Reasons for New Policy: A repeal and replace of Policy 2520.2 is being recommended due to the format changes.

- The format of the mathematics CSOs has been redesigned to facilitate easier use by West Virginia educators.
- The mathematics CSOs have been revised to
  - incorporate higher levels of critical thinking skills and problem solving skills,
  - establish an improved alignment with national assessments (NAEP, ACT, and SAT), and
  - incorporate 21st century knowledge and skills that West Virginia students will need to be successful in the global world of the 21st century.

Forty-Two comments were received by teachers, administrators, community members and Norm Webb. Revisions were made in the General, Summary, and the 21st Century Mathematics Content Standards and Objectives for West Virginia.

Impact:

- Students will be better prepared for success on national assessments, in postgraduate studies and in the workplace of the 21st century.
- Students will acquire a higher level of critical thinking and problem solving skills needed for success in post graduate studies and the workplace of the 21st century.
- The revised format will better enable West Virginia educators to focus instruction on the approved CSOs.

/FILED IN THE OFFICE OF
THE SECRETARY OF STATE
THIS DATE 11/13/06 2:43pm
ADMINISTRATIVE LAW DIVISION

TITLE 126
LEGISLATIVE RULE
BOARD OF EDUCATION

SERIES 44B
21st Century Mathematics Content Standards and Objectives for West Virginia Schools (2520.2)

§126-44B-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 2520.2 defines the content standards objectives for mathematics as required by W.Va. 126CSR42 (Policy 2510).

1.2. Authority. - W.Va. Constitution, Article XII, §2, W.Va. Code §18-2-5 and §18-9A-22.

1.3. Filing Date. -. November 13, 2006.

1.4. Effective Date. - December 14, 2006.

1.5. Repeal of former rule. - This legislative rule repeals and replaces W. Va. 126CSR44B "Mathematics Content Standards and Objectives for West Virginia Schools (2520.2)" filed February 25, 2003 and effective July 1, 2003.

§126-44B-2. Purpose.

2.1. This policy defines the content standards and objectives for the program of study required by Policy 2510 in mathematics.

§126-44B-3. Incorporation by Reference.

3.1. A copy of the 21st Century Mathematics Content Standards and Objectives for West Virginia Schools is attached and incorporated by reference into this policy. Copies may be obtained in the Office of the Secretary of State and in the West Virginia Department of Education, Office of Instructional Services.

§126-44B-4. Summary of the Content Standards 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 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 for mathematics; an explanation of terms; objectives that reflect a rigorous and challenging curriculum; and performance descriptors.

West Virginia Department of Education

West Virginia Board of Education Policy 2520.2
21st Century Mathematics Content Standards and Objectives for West Virginia Schools

Steven L. Paine
State Superintendent of Schools

Foreword

A 21st century mathematics curriculum is an increasingly important aspect of developing learners prepared for success in the 21st century. Thus, the West Virginia Board of Education and the West Virginia Department of Education are pleased to present Policy 2520.2, 21st Century Mathematics Content Standards and Objectives for West Virginia Schools. The West Virginia Mathematics Standards for 21st Century Learning includes 21st century *content* standards and objectives as well as 21st century standards and objectives for *learning skills* and *technology tools*. This broadened scope of mathematics curriculum is built on the firm belief that quality engaging instruction must be built on a curriculum that triangulates rigorous 21st century content, 21st century learning skills and the use of 21st century technology tools.

Committees of educators from across the state convened to revise the content standards and objectives. The overarching goal was to build a rigorous, relevant and challenging mathematics curriculum that would prepare students for the 21st century. West Virginia educators, including regular classroom teachers, special education teachers, and teachers representing higher education institutions played a key role in shaping the content standards to align with national standards, rigorous national assessments and research and best practice in the field of mathematics education. The contribution of these professionals was critical in creating a policy that is meaningful to classroom teachers and appears in a format that can easily be used and understood.

Policy 2520.2 is organized around the three major components of a standards-based curriculum: learning standards, instructional objectives and performance descriptors. The learning standards are the *broad descriptions* of what *all* students must know and be able to do at the conclusion of the instructional sequence. The accompanying grade-level objectives are specific descriptors of knowledge, skills and attitudes that when mastered will enable the student to attain the standard. The instructional objectives guide instructional *planning* and provide a basis for determining appropriate *assessments, instructional strategies and resources*. The performance descriptors provide the basis for *assessing* overall student competence of grade level standards. The performance descriptors define the five student performance levels ranging from novice to distinguished. With the ultimate goal of "learning for all," these descriptors allow the teacher, students and parents to judge the *level* of student proficiency in each 21st century learning standard.

In combination, the use of learning standards, instructional objectives and performance descriptors become a comprehensive guide for delivering a rigorous and relevant mathematics curriculum to all West Virginia students. These elements, when used to guide the instructional process and when delivered with the creativity and instructional expertise of West Virginia teachers, will become a powerful resource for preparing students to meet the challenges of the 21st century.

Steven L. Paine
State Superintendent of Schools

Explanation of Terms

Content Standards 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.

Objectives are incremental steps toward accomplishment of content standards. 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.

Performance Descriptors describe in narrative format how students demonstrate achievement of the content standards. West Virginia has designed five performance levels: distinguished, above mastery, mastery, partial mastery and novice. Performance Descriptors serve two functions. Instructionally, they give teachers more information about the level of knowledge and skills students need to acquire. Performance levels and descriptors are also used to categorize and explain student performance on statewide assessment instruments.

Numbering of Standards
The number for each content standard is composed of four parts, each part separated by a period:

- the content area code (M for Mathematics),
- the letter S, for Standard,
- the grade level (exceptions are grades 9-12 mathematics courses) and
- the standard number.

Illustration: M.S.4.1 refers to fourth grade mathematics content standard #1.

Numbering of Objectives
The number of each objective is composed of five parts, each part separated by a period:

- the content area code (M for Mathematics),
- the letter O is for Objective,
- the grade level (exceptions are grades 9-12 mathematics, e.g. PS for Probability and Statistics),
- the number of the content standard addressed, and
- the objective number.

Illustration: M.O.6.2.3 refers to a mathematics sixth grade objective that addresses standard #2 in mathematics, the third objective listed under that standard.

Numbering of Performance Descriptors
The number for each group of three performance descriptors is composed of four parts, each part separated by a period:

- the content area,
- the letters PD, for Performance Descriptors,
- the grade level (See exceptions noted above for grade level under numbering of objectives), and
- the standard number.

Illustration: M.PD.9.2 refers to mathematics performance descriptors for ninth grade, content standard #2.

Unique Electronic Numbers (UENs)
Unique Electronic Numbers (or UENs) are numbers that help to electronically identify, categorize and link specific bits of information. Once Policy 2520.2 is available on the Web, each standard, each objective, and each group of five performance descriptors will have a Unique Electronic Number (UEN) that will always remain the same.

The codes printed in Policy 2520.2 form the basis of the UENs. The only additional set of numbers that will be added to each code to formulate its UEN will be a prefix that indicates the year and month that a particular version of Policy 2520.2 is approved by the State Board of Education.

The prefix for the UENs for each content area in Policy 2520.2 is noted at the top of each page containing standards, objectives and performance descriptors. As sections of 2520.2 are revised, UENs will be changed to reflect the new approval date.

UENs (Unique Electronic Numbers) are unique numbers that facilitate implementation of WV Standards into Electronic formats such as Databases and XML Files. The WV Department of Education encourages everyone who is going to use the WV Content Standards in any kind of electronic distribution, alignment, or software development to use the UENs so that all efforts can be cross-referenced and there is consistency across initiatives.

Illustration: The UEN for fifth grade mathematics standard #2 will be "200602.M.S.5.2".

Abbreviations

Content Area

M	Mathematics

High School Courses
Mathematics

A1	Algebra
A2	Algebra II
CM	Conceptual Mathematics
G	Geometry
PC	Pre-calculus
PS	Probability and Statistics
T	Trigonometry

Other Abbreviations

O	Objective
D	Performance Descriptors
S	Standard (Content Standard)

MATHEMATICS – POLICY 2520.2

These mathematics standards have been written in response to the need to better prepare students for post-secondary education and the 21st Century workplace. 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. Additionally, the authors of these standards used *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence,* released in 2006, to provide guidance as they developed an informed focus on areas of emphasis within the K-8 curriculum. See http://www.nctm.org to access both documents.

The six principles for school mathematics, as articulated in *Principles and Standards for School Mathematics,* address six overarching themes to be considered when focused on the continuous improvement of mathematics education:

1. **Equity.** High expectations and strong support for all students
2. **Curriculum.** Coherent focus on important mathematics that is 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 provide 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.

The standards, objectives and performance descriptors presented in this policy are designed to provide clear, consistent priorities and focus, as well as depth of knowledge. The standards describe what each student of mathematics should be able to accomplish in grades K-12. The objectives spiral upward through the grade levels, eliminating repetition of content and increasing in rigor and depth of knowledge throughout the student's academic career. It is important that all students value mathematics and see themselves as mathematical problem solvers who can communicate mathematically and make connections to other content areas and the real-world application of mathematics.

The vision of the West Virginia Board of Education and the West Virginia Department of Education includes the triangulation of mathematics content, learning skills and technology tools standards within each classroom so that students will be able to think critically, analyze information, comprehend new ideas, communicate, collaborate, solve problems and make decisions. All West Virginia mathematics teachers are responsible for the integration of Policy 2520.14 21st Century Learning Skills and Technology Tools in their classroom instruction.

It is important that teachers of mathematics become familiar with the performance descriptors at each grade level. The Mastery level performance descriptor, supported by the accompanying standard and objectives, describes student proficiency at that grade level. An understanding of the performance descriptors, standards and objectives provides a clear picture of what every student should know, understand and be able to do at each grade level. Teachers are encouraged to become familiar with the performance descriptors and objectives at the previous and subsequent grade level to support a well-articulated curriculum. The abbreviation *e.g.* is used to indicate examples for teaching the objectives.

Mathematics Content Standards K-12

Standard 1: Number and Operations
Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will demonstrate an 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.

Standard 2: Algebra
Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Standard 3: Geometry
Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Standard 4: Measurement
Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Standard 5: Data Analysis and Probability
Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

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 fundamental to the study of mathematics: number, counting, ordering, comparing, classifying, patterning, shape, size, position, numeration, measuring, and problem solving. Emphasis is on experience and growth in mathematics. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade K	Mathematics
Standard 1	Number and Operations
M.S.K.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.K.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Kindergarten students at distinguished level in mathematics count forward to 100 with and without objects. They read, write, order, and compare numbers to 100 using multiple strategies. They group and count by 1's, 2's, 5's, 10's and 20's. They estimate numbers of objects to 100 and can model and identify place value through 99 using standard and expanded form. They model and write addition and subtraction sentences using whole numbers to 18. They interpret the meanings of	Kindergarten students at the above mastery level in mathematics count forward to 50 and backward from 20 with and without objects. They model and identify place value of each digit utilizing standard and expanded form through 50. They read, write, order, and compare numbers to 50. They estimate numbers of objects to 50. They group objects to 50 and can identify place value though 50. They model and identify place value using standard and expanded form through 50. They create addition	Kindergarten students at the mastery level in mathematics count to 20, compare numbers to 20 and group and count manipulatives by 1's, 5's and 10's. They model place value to 20 and use ordinal numbers to identify position. They estimate the number of objects in a group of 20 or less and evaluate the reasonableness of the estimation. They identify halves and wholes and use concrete objects to model addition and subtraction with whole numbers to 10. They model meanings of	Kindergarten students at the partial mastery level in mathematics count forward to 20 and backward from 10. They read, write, and order numbers to 20. They model place value to 10 and estimate objects to 10. They recognize halves and wholes and ordinal positions to 5th. They group objects by ones and tens and identify place value using standard form through 20. They solve addition and subtraction sentences using whole numbers to 10. They solve one-step problems using numbers and pictures.	Kindergarten students at the novice level in mathematics count objects to 10. They match halves and wholes and recognize ordinal numbers to 5th. They copy place values of numbers using standard form. They model addition and subtraction sentences using numbers to 10. They solve one-step problems using pictures.

operations and the relationship between addition and subtraction by creating picture and story problems that can be solved using a variety of strategies. They offer alternative solutions to two-step problems using pictures, numbers and words.	and subtraction sentences using whole numbers to 15 and solve two-step problems using pictures. They present their results offering more than one solution.	operations. They create picture story problems and present and justify their solutions.		

Objectives	Students will
M.O.K.1.1	count forward to 20 and backward from 10 with and without manipulatives.
M.O.K.1.2	read, write, order, and compare numbers to 20 using multiple strategies (e.g. manipulatives, number line).
M.O.K.1.3	group and count manipulatives by ones, fives, and tens.
M.O.K.1.4	model and identify place value of each digit utilizing standard and expanded form through 20.
M.O.K.1.5	Use ordinal numbers 1st – 10th to identify position in a sequence.
M.O.K.1.6	estimate the number of objects in a group of 20 or less and count to evaluate reasonableness of estimation.
M.O.K.1.7	identify and name halves and wholes using concrete models.
M.O.K.1.8	use concrete objects to model addition and subtraction of whole numbers related to sums of 10 or less and write corresponding number sentence.
M.O.K.1.9	model meanings of operations and the relationship between addition and subtraction (e.g., identity element of addition, commutative property) using manipulatives.
M.O.K.1.10	create grade-appropriate picture and story problems, solve using a variety of strategies, present solutions and justify results.

Grade K	Mathematics
Standard 2	Algebra
M.S.K.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.K.2)				
Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Kindergarten students at the distinguished level in mathematics justify classifications of objects by	Kindergarten students at the above mastery level in mathematics justify the classification of self-	Kindergarten students at the mastery level in mathematics justify the classification of self-	Kindergarten students at the partial mastery level in mathematics classify objects by one attribute.	Kindergarten students at the novice level in mathematics sort objects and identify patterns of counting by 10's.

several attributes. They create, extend and describe repeating patterns. They count by 2's, 5's, 10's, and 20's to 100.	selected objects by one attribute and then sort objects in another way and justify the new sort. They create and extend a repeating pattern. They count by 5's and 10's.	selected objects by one attribute. They create and extend a repeating pattern using common objects. They model and identify patterns by 5's and 10's.	They repeat a pattern using common objects and model patterns of 5's and 10's.	They identify a repeating pattern.

Objectives	Students will
M.O.K.2.1	justify the classification of self-selected objects based on attributes.
M.O.K.2.2	create, describe, and extend a repeating pattern using common objects, sound, and movement.
M.O.K.2.3	model and identify patterns of counting by 5's and 10's.

Grade K	Mathematics
Standard 3	Geometry
M.S.K.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.K.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Kindergarten students at the distinguished level in mathematics construct representations of real-world shapes using multiple shapes together. They write about the shapes using numbers and/or words. They use physical models of separate parts to construct more than one whole object.	Kindergarten students at the above mastery level in mathematics use physical materials to construct, identify and classify geometric plane shapes and connect these shapes to the environment. They use physical models of separate parts to construct a whole object.	Kindergarten students at the mastery level in mathematics, using physical materials, construct, identify and classify geometric plane shapes. They recognize and describe basic shapes in the environment and model and describe spatial relationships. They identify the separate parts used to make a whole object.	Kindergarten students at the partial mastery level in mathematics use physical materials to identify and classify geometric plane shapes. They recognize basic shapes in the environment and model spatial relationships.	Kindergarten students at the novice level in mathematics identify geometric plane shapes. They identify basic shapes in the environment and recognize that separate parts are used to make a whole object.

Objectives	Students will
M.O.K.3.1	use physical materials to construct, identify, and classify basic geometric plane shapes:

	• circles • ellipses (oval) • rectangles including squares • triangles
M.O.K.3.2	recognize and describe basic geometric shapes in the environment.
M.O.K.3.3	model and describe spatial relationships: • inside/outside • top/bottom • before/after
M.O.K.3.4	identify the separate parts used to make a whole object.

Grade K	Mathematics
Standard 4	Measurement
M.S.K.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.K.4)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Kindergarten students at the distinguished level in mathematics compare and order objects in nonstandard units of measure according to length, height, and weight. They locate a day of the week on a calendar and identify what day is next in the week. They read time to half hour on an analog and digital clock. They determine the value of a set of coins, pennies, nickels and dimes, up to 20. They use the coins to make change from a dime to pennies, a dime to pennies	Kindergarten students at the above mastery level in mathematics compare objects in nonstandard units of measure according to length, height and weight. They locate a day of the week on a calendar. They read time to the half hour on an analog clock. They determine the value of a set of coins, pennies, nickels and dimes, up to 15. They justify the relationship between the coins through visual representations.	Kindergarten students at the mastery level in mathematics estimate size, compare and order objects by size with respect to a given attribute. They use standard and nonstandard units of measure to find length and compare two objects in non standard units of measure according to length, height and weight. They use the calendar to identify date and the sequence of the days of the week. They read time to the hour with analog and digital clocks. They identify and model the value of	Kindergarten students at the partial mastery in mathematics estimate size of an object and identify objects with respect to an attribute. They use standard and nonstandard units of measure to find length and order objects by length, height and weight. They name the days of the week and the seasons. They read time to the hour on an analog clock. They identify penny, nickel, and dime and determine a value of a set of pennies up to 10.	Kindergarten students at the novice level in mathematics estimate size of an object and order objects with respect to an attribute. They use standard units of measure to find length. They repeat days of the week and repeat the seasons. They match penny, nickel, and dime and determine a set of pennies up to 5.

and a nickel, and a nickel to pennies.		penny, nickel, and dime and determine the value of a set of pennies up to 20. They explain the relationship between the coins.		

Objectives	Students will
M.O.K.4.1	estimate the size of an object and compare and order objects with respect to a given attribute.
M.O.K.4.2	use standard and nonstandard units of measure to find the length of an object.
M.O.K.4.3	compare two objects in nonstandard units of measure, according to one or more of the following attributes: • length • height • weight
M.O.K.4.4	use calendar to identify date and the sequence of days of the week.
M.O.K.4.5	read time to the hour using analog and digital clocks.
M.O.K.4.6	identify the name and value of coins and explain the relationships between: • penny • nickel • dime

Grade K	Mathematics
Standard 5	Data Analysis and Probability
M.S.K.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.K.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Kindergarten students at the distinguished level in mathematics organize and analyze data on a graph. They create simple probability experiments, records results with tallies and interpret results. They make predictions, present	Kindergarten students at the above mastery level in mathematics collect, sort, and organize data into a graph using objects and pictures. They analyze the data on a bar graph. They create simple probability experiments and use tallies	Kindergarten students at the mastery level in mathematics collect, sort and organize data into a graph using objects and pictures. They interpret data represented on a bar graph. They conduct simple probability experiments and	Kindergarten students at the partial mastery level in mathematics collect and sort data in a graph with objects and pictures. They describe the data represented on a bar graph. They conduct simple probability experiments.	Kindergarten students at the novice level in mathematics collect and sort data in a graph using objects. They count the data represented on a bar graph. They label simple probability experiments

their findings and justify their solutions.	to record results in a table. They make predictions based on the results and present their findings.	use tallies to record results in a table. They make predictions based on results.		

Objectives	Students will
M.O.K.5.1	collect, organize, display, and interpret data using a pictograph and bar graph (with and without technology)
M.O.K.5.2	conduct a simple probability experiment and use tallies to record results in a table, make predictions based on results.

First Grade Mathematics Content Standards and Objectives

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; identifying two- and three-dimensional figures; knowing the value of coins; the quick recall of addition and subtraction facts; and gathering, organizing, and explaining data. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 1	**Mathematics**
Standard 1	Number and Operations
M.S.1.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.1.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
First grade students at the distinguished level in mathematics read, write, order, compare and count numbers to 1000. They identify any number as odd/even. They model place value to 1000 in standard and expanded form. They create and model fractions of a whole and of a set (1/6, 1/8). They explain and justify the use of the relationship between addition and subtraction in solving problems. They create and present one-step problems and justify their results. They use concrete	First grade students at the above mastery level in mathematics read, write, order and compare numbers to 200. They identify any ordinal number. They model even/odd numbers to 100. They identify place value to 1000 in standard form and round numbers to the nearer 100. They create models for fractions of a whole and of a set (1/2, 1/3, 1/4). They demonstrate quick recall with basic addition and subtraction facts to 10 and use them to solve real-world problems. They use the	First grade students at the mastery level in mathematics read, write, order, compare, count and estimate numbers to 100 and identify ordinal numbers to 20th. They model even and odd numbers to 20. They model and identify place value to 100 using standard and expanded form and round to the nearer 10. They use models to represent fractions (halves, thirds, fourths) as part of a set and part of a whole. They model meanings of operations and relationship between	First grade students at the partial mastery level in mathematics read, write, and count numbers to 100 and recognize ordinal numbers to 10th. They identify odd and even numbers to 20, and identify place value to 100 using standard form. They identify fractions (halves, fourths) as part of a whole. They recognize the relationship between addition and subtraction of numbers to 18. They recall basic addition facts to 10. They model addition of three numbers with sums of 10 or	First grade students at the novice level in mathematics count to 100 and recite ordinal numbers to 10th.They identify odd and even numbers to 10 and read and write place value to 20 using standard form. They identify halves and wholes. They solve addition and subtraction facts to 10 with manipulatives.

objects to solve addition and subtraction of two-digit numbers requiring regrouping. They create real-world grade-appropriate one- and two-step problems using multiple strategies, present and justify results.	relationship between addition and subtraction to solve problems. They use concrete models to solve addition problems of two-digit numbers with regrouping and present results. They create real-world grade-appropriate one-step problems using multiple strategies, and present and justify results.	addition and subtraction of numbers to 18. They demonstrate quick recall with basic addition and subtraction facts to 10, models and solve two-digit addition and subtraction without regrouping and addition of three numbers with sums less than 18. They create one-step grade-appropriate problems using multiple strategies and present and justify results.	less and present their solutions.	

Objectives	Students will
M.O.1.1.1	count forward to 100 and backward from 20 with and without manipulatives.
M.O.1.1.2	read, write, order, and compare numbers to 100 using multiple strategies (e.g. manipulatives, number line, symbols).
M.O.1.1.3	identify odd and even numbers to 20 and determine if a set of objects has an odd or even number of elements.
M.O.1.1.4	group and count manipulatives by ones, fives, and tens to 100.
M.O.1.1.5	model and identify place value of each digit utilizing standard and expanded form to 100.
M.O.1.1.6	round any two-digit number to the nearest 10.
M.O.1.1.7	use ordinal numbers 1st - 20th to identify position in a sequence.
M.O.1.1.8	estimate the number of objects in a group of 100 or less and count to evaluate reasonableness of estimate.
M.O.1.1.9	identify, name, and explain why a given part is a half, third or fourth of a whole or part of a group, using concrete models.
M.O.1.1.10	use concrete objects to model the addition of two or three addends and subtraction of whole numbers related to sums less than 18 and write the corresponding number sentence.
M.O.1.1.11	model operations, addition and subtraction, and the relationship between addition and subtraction (e.g., identity element of addition, commutative property, fact families, inverse operations) using concrete objects.
M.O.1.1.12	quick recall of basic addition facts with sums to 10 and corresponding subtraction facts.
M.O.1.1.13	model and solve 2-digit addition and subtraction without regrouping.
M.O.1.1.14	create grade-appropriate picture and story problems using a variety of strategies (with and without technology), present solutions and justify results.

Grade 1	Mathematics
Standard 2	Algebra
M.S.1.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.1.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
First grade students at the distinguished level in mathematics identify the sorting rule used by another student. They identify non-examples of the rule. They create an input/output model. They create, analyze and modify number patterns to create new number patterns based on real-life situations. They prove equivalency of both sides of a number sentence and relate to a real-world situation.	First grade students at the above mastery level in mathematics provide a sorting rule and evaluate correctness of resulting sorting by another student. They determine the input when given the rule and function of an input/output model. They create, analyze and modify a number pattern to create new number patterns based on real-life situations. They prove equivalency of both sides of a number sentence.	First grade students at the mastery level in mathematics sort and classify objects by more than one attribute using various strategies including Venn Diagrams. They determine the rule given an input/output model using addition or subtraction. They create and analyze number patterns based on real-life situations using word, AB form, and T-charts and present results. They demonstrate the equivalency of both sides of a number sentence.	First grade students at the partial mastery level in mathematics sort and classify objects by one attribute. They supply the output when given the input and function of an input/output model. They create number patterns based on real-life situations using word, AB form, and T-charts and present results. They recognize and describe the equivalency of both sides of a number sentence.	First grade students at the novice level in mathematics sort objects by one attribute. They recognize and create number patterns. They recognize equivalency of both sides of a number sentence.

Objectives	Students will
M.O.1.2.1	sort and classify objects by more than one attribute, using various strategies, including Venn Diagrams.
M.O.1.2.2	determine the rule or give the output given an input/output model using addition or subtraction.
M.O.1.2.3	identify and write number patterns by 2's, 5's, and 10's.
M.O.1.2.4	create and analyze number patterns based on real-life situations using words, AB form, and T-charts and present results.
M.O.1.2.5	use concrete materials to demonstrate that the quantities on both sides of a grade-appropriate number sentence are equivalent.

Grade 1	Mathematics
Standard 3	Geometry
M.S.1.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.1.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Students at the distinguished level in first grade mathematics construct representations of real-world three-dimensional shapes. They write about the shapes using numbers or words. They classify shapes as open and closed and congruent shapes, justifying their classification orally. They recognize and describe three-dimensional shapes in the environment and describe spatial relationships. They describe spatial relationships. They create pictures with points on a first quadrant grid. They create new figures as the result of combining or decomposing two/three dimensional figures.	Students at the above mastery level in first grade mathematics draw, label, and analyze plane figures. They construct, identify and classify three-dimensional objects and connect these shapes to the environment. They classify shapes as open, closed and congruent shapes. They recognize and describe three-dimensional shapes in the environment and describe spatial relationships. They describe spatial relationships. They find, name and describe locations on a first quadrant grid. They predict and draw the result of combining or decomposing two/three dimensional figures.	Students at the mastery level in first grade mathematics draw, label and sort plane figures. They construct, identify and classify three-dimensional figures. They draw and identify open, closed, and congruent shapes. They recognize and describe three-dimensional shapes in the environment and describe spatial relationships. They describe spatial relationships. They find and name locations on a first quadrant grid. They predict the result of combining or decomposing two/three dimensional figures.	Students at the partial mastery level in first grade mathematics identify plane shapes. They identify three-dimensional figures. They identify open and closed figures and congruent shapes. They identify three-dimensional shapes in the environment.. They name locations on a first quadrant grid. They draw decomposing two/three dimensional figures.	Students at the novice level in first grade mathematics recognize plane shapes and three-dimensional figures. They recognize open, closed and congruent shapes. They point to the location of a point on the first quadrant grid. They recognize three-dimensional shapes when given various shapes with which to choose.

Objectives	Students will
M.O.1.3.1	draw, label, and sort • circle, • rectangles including squares, • triangles, and according to sides and vertices
M.O.1.3.2	use physical materials to construct, identify, and classify three-dimensional figures: • cube • cone • sphere

	• rectangular solid • pyramid • cylinder
M.O.1.3.3	recognize three-dimensional shapes in the environment.
M.O.1.3.4	draw and identify • open and closed figures • congruent plane shapes
M.O.1.3.5	create and describe simple symmetrical designs
M.O.1.3.6	describe spatial relationships: over/under, left/right.
M.O.1.3.7	find and name locations on a first-quadrant grid.
M.O.1.3.8	predict the result of combining or decomposing two or more two-dimensional/three-dimensional shapes.

Grade 1	Mathematics
Standard 4	Measurement
M.S.1.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.1.4)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Students at the distinguished level in first grade mathematics estimate, measure, compare, and order length of objects using customary, metric and nonstandard units justifying the comparison clearly in oral and written form. They use the calendar to identify important dates in the future. They demonstrate how to make change from a $1.00 and justify the procedures in oral and written form.	Students at the above mastery level in first grade mathematics estimate, measure, compare, and order length of objects using customary, metric, and nonstandard units, justifying the comparison. They describe how to use a calendar to determine the date. They read an analog clock to the quarter hour. They justify the change given from $1.00.	Students at the mastery level in first grade mathematics estimate, measure, compare, and order length of objects using customary, metric, and nonstandard units. They select the appropriate units and tools to measure length, height, weight, temperature, and volume. They use a calendar to identify the date, sequence of days of the week, and months of a year. They tell time to the half hour using an analog clock and a digital clock. They explain	Students at the partial mastery level in first grade estimate and measure objects using customary, metric and nonstandard units. Given the appropriate tool. They measure length, height, weight, temperature and volume. They use a calendar to identify the date and name the days of the week. They read time to the hour on an analog clock. They identify the penny, nickel, and dime and their value.	Students at the novice level in first grade use standard units to measure objects. They identify the tools used to measure length, height, weight, and temperature. They use calendar to identify the date. They read time on a digital clock. They recognize penny, nickel and dime.

		the relationship between coins and make change from a dollar.		

Objectives	Students will
M.O.1.4.1	estimate, measure, compare and order using customary, metric, and nonstandard units to determine length to nearer whole unit.
M.O.1.4.2	select appropriate units and tools to measure and compare two objects or events according to one or more of the following attributes: length height weight temperature volume justify selection of units and tools used to measure the attributes and present results.
M.O.1.4.3	use calendar to identify date, sequence of days of the week, and months of the year.
M.O.1.4.4	explain time concept in context of personal experience.
M.O.1.4.5	read time to the half hour using an analog and digital clock.
M.O.1.4.6	identify, count, trade and organize the following coins and bill to display a variety of price values from real-life examples with a total value of 100 cents or less. • penny • nickel • dime • quarter • dollar bill

Grade 1	**Mathematics**
Standard 5	Data Analysis and Probability
M.S.1.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.1.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Students at the distinguished level in first grade mathematics collect, sort, organize, and analyze data using bar graphs and	Students at the above mastery level in first grade mathematics collect, sort, organize, and analyze data using bar graphs and	Students at the mastery level in first grade mathematics collect, sort, organize, and draw conclusions about data	Students at the partial mastery level in first grade mathematics collect, sort, and organize data using bar graphs and pictographs.	Students at the novice level in first grade mathematics collect data. They read pictographs. They conduct simple probability

pictographs. They convey their findings in oral and written form. They create simple probability experiments and make predictions based on their results. They present their findings and justify their solutions.	pictographs. They create simple probability experiments and record data in charts. They make predictions based on the results and present their findings.	using bar graphs and pictographs. They conduct simple probability experiments, record data in a chart and use data to predict which of the events is more likely/less likely to occur.	They conduct simple probability experiments and record data in a chart.	experiments.

Objectives	Students will
M.O.1.5.1	collect, sort, organize, and draw conclusions about data using a bar graph and a pictograph.
M.O.1.5.2	conduct simple experiments, record data on a tally chart or table and use the data to predict which of the events is more likely or less likely to occur if the experiment is repeated.

Second Grade Mathematics Content Standards and Objectives

Second grade objectives help a student to become a more independent problem solver through concrete and technology supported experiences which explore new problem solving strategies, everyday use of mathematical language, and reasonableness and interrelationships of mathematics. Concepts include place value through thousands, estimation, introduction of properties of mathematics, and measurement that including spatial perception. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 2	Mathematics
Standard 1	Number and Operations
M.S.2.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.2.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Second grade students at the distinguished level in mathematics read, write, order, and compare numbers above 1000 and use ordinal numbers to identify position in a sequence. They demonstrate quick recall of basic addition facts and related subtraction facts to 18. They use 2- and 3-digit numbers to solve problems, justifying their results. They create real-world grade-appropriate one and two student problems using multiple strategies, present and justifying procedures in	Second grade students at the above mastery level in mathematics read, write, order and compares numbers above 1000 and use ordinal numbers to identify position in a sequence. They demonstrate quick recall of basic addition facts and related subtraction facts to 18. They add and subtract two- and three-digit numbers with and without grouping. They create real-world grade-appropriate one- and two-step problems using multiple strategies, present and justify results.	Second grade students at the mastery level in mathematics read, write, order and compare numbers to 1000 and identify ordinal numbers to identify position in a sequence. They model and identify place value to 1000 and round numbers to the nearer 10 and 100. They demonstrate quick recall of basic addition facts with sums to 18 and corresponding subtraction facts. They model and justify the relationship between addition and subtraction facts. They	Second grade students at the partial mastery level in mathematics read and write numbers to 1000 and identify ordinal numbers to the 20^{th} position. They identify place value to 1000 and round numbers to the nearer 100. They demonstrate recall of basic addition facts with sums to 18 and corresponding subtraction facts. They model two- and three-digit addition and subtraction without regrouping. They identify and name fractions as part of a whole and part of a set using models. They	Second grade students at the novice level in mathematics read numbers to 1000 and identify ordinal numbers to the 10^{th} position. They model and solve problems involving addition and corresponding subtraction facts to 18. They round numbers less than 50 to the nearer 10. They add and subtract 2-digit numbers without regroups. They recognize fractions as part of a whole. They solve one-step grade-level story problems using multiple strategies.

a clear and concise manner.		model two- and three-digit addition and subtraction with regrouping. They identify, name, and explain fractions as part of whole and as part of a set using models. They create one and two-step grade-appropriate story problems using multiple strategies and present and justify results.	create one-step grade-appropriate story problems using multiple strategies.	

Objectives	Students will
M.O.2.1.1	read, write, order, and compare numbers to 1,000 using multiple strategies (e.g. symbols, manipulatives, number line).
M.O.2.1.2	identify any number as odd or even and determine if a set has and odd or even number of elements.
M.O.2.1.3	count and group concrete manipulatives by ones, tens, and hundreds to 1,000.
M.O.2.1.4	model and identify place value of each digit utilizing standard and expanded form through 1000.
M.O.2.1.5	identify and read any ordinal number to identify position in a sequence.
M.O.2.1.6	round any 3-digit number to both the nearer 10 and 100.
M.O.2.1.7	Identify and explain fractions as part of a whole and as part of a set/group using models.
M.O.2.1.8	model and justify the relationship between addition and subtraction (e.g., identity element of addition, associative property, commutative property, inverse operations, fact families).
M.O.2.1.9	demonstrate quick recall of basic addition facts with sums to 18 and corresponding subtraction facts.
M.O.2.1.10	model 2- and 3-digit addition and subtraction with regrouping using multiple strategies.
M.O.2.1.11	add and subtract 2- and 3-digit numbers without regrouping.
M.O.2.1.12	use rounding to analyze the reasonableness of a sum or a difference.
M.O.2.1.13	create story problems that require one or two-step procedures, using a variety of strategies explain the reasoning used , justify the procedures selected and present the results.

Grade 2	Mathematics
Standard 2	Algebra
M.S.2.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.
Performance Descriptors (M.PD.2.2)	

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Second grade students at the distinguished level in mathematics analyze, describe, extend and create a growing pattern, justifying their mathematical reasoning in a clear and concise manner. They create a rule and then create a pattern to match the rule justifying their reasoning. They write equivalent numerical expressions and defend their reasoning.	Second grade students at the above mastery level in mathematics analyze, describe, extend and create a growing pattern, justifying their reasoning. They create a rule and then create a pattern to match the rule. They write equivalent numerical expressions.	Second grade students at the mastery level in mathematics analyze, describe, extend and create a growing pattern. They identify a rule for a pattern and use it to complete the pattern. They create equivalent numerical expressions.	Second grade students at the partial mastery level in mathematics describe, extend and create a growing pattern. They use a rule to complete a pattern. They describe equivalent numerical expressions.	Second grade students at the novice level in mathematics identify and extend a growing pattern. They recognize a rule used to complete a pattern. They recognize equivalent numerical expressions.

Objectives	Students will
M.O.2.2.1	analyze, describe, extend and create a growing pattern using objects or numbers.
M.O.2.2.2	explain how one variable produces a change in another variable
M.O.2.2.3	describe, complete and extend a variety of counting patterns, according to a given rule.
M.O.2.2.4	create physical models to demonstrate equivalency of two numerical expressions written as a grade-appropriate number sentence.

Grade 2	Mathematics
Standard 3	Geometry
M.S.2.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.2.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Second grade students at the distinguished level in mathematics identify, describe and analyze geometric solids. They communicate their	Second grade students at the above mastery level in mathematics identify, describe and analyze geometric solids. They compare and contrast plane	Second grade students at the mastery level in mathematics identify and describe geometric solids. They compare and contrast plane and solid geometric	Second grade students at the partial mastery level in mathematics identify geometric solids. They compare plane and solid geometric shapes. They	Second grade students at the novice level in mathematics recognize three-dimensional solids. They identify plane and solid geometric shapes.

reasoning in a clear and concise manner. They create shapes and the reflected image. They create paths between locations on a grid. They create similar shapes and justify why they are similar in written form.	and solid geometric shapes communicating their reasoning orally. They create shapes and the reflected image. They combine line segments and angles to form new shapes. They plot and describe multiple paths between locations on a grid. They create similar shapes and justify why they are similar.	shapes. They identify and draw congruent shapes that have been rotated or reflected. They model and draw line segments and angles. They plot and describe the path between locations on a grid. They identify similar shapes.	identify congruent shapes that have been rotated or reflected. They identify line segments and angles. They describe the path between locations on a grid They recognize similar shapes.	They recognize congruent shapes. They locate points on a grid. They recognize line segments and angles.

Objectives	Students will
M.O.2.3.1	identify and describe the following geometric solids according to the number of faces and edges: • rectangular solid • cube • cylinder • cone • pyramid
M.O.2.3.2	compare and contrast plane and solid geometric shapes.
M.O.2.3.3	identify and draw congruent shapes that have been rotated or reflected
M.O.2.3.4	model and draw line segments and angles.
M.O.2.3.5	plot and describe the path between locations on a grid.
M.O.2.3.6	identify similar shapes.

Grade 2	Mathematics
Standard 4	Measurement
M.S.2.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.2.4)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Second grade students at the distinguished level in mathematics estimate measures, select and correctly use the	Second grade students at the above mastery level in mathematics estimate measures, select and correctly use the	Second grade students at the mastery level in mathematics estimate measures, select and correctly use the	Second grade students at the partial mastery level in mathematics select and correctly use the appropriate measuring tool.	Second grade students at the novice level in mathematics, given a measuring tool determines, the measure of an object.

appropriate measuring tool to compare objects and justify their reasoning. They determine the perimeter and area of a given shape using manipulatives and justify their reasoning. They explain the relationship between coins and make change from $1.00 justifying their procedures.	appropriate measuring tool to compare objects. They determine the perimeter and area of a given shape using manipulatives and explain their reasoning. They read time to 5 minute intervals. They compare dates on a calendar. They explain the relationship between coins and make change from $1.00 explaining their procedures.	appropriate measuring tool. They determine the perimeter and the area of a given shape using manipulatives. They order events and read time to the nearest quarter hour using an analog and digital clock. They identify specific dates on a calendar and determine past and future dates. They explain the relationship between coins and make change from $1.00.	They determine the perimeter of a shape and recognize that a shape has area. They order events and read time to half hour on an analog and digital clock. They identify specific dates on a calendar. They count coins to $1.00.	They read time to the nearest hour on an analog clock. They read dates on a calendar. They explain the relationship between coins.

Objectives	Students will
M.O.2.4.1	estimate measures, select and correctly use the appropriate measurement tool to measure the object and determine the reasonableness of the estimate: • length in centimeters and inches, • temperature in Celsius and Fahrenheit, • weight/mass in pounds and kilograms, and justify estimates when communicating results.
M.O.2.4.2	estimate and determine the perimeter of squares, rectangles and triangles.
M.O.2.4.3	estimate and count the number of square units needed to cover a given area using manipulatives.
M.O.2.4.4	order events in relation to time.
M.O.2.4.5	determine past and future days of the week and identify specific dates, given a calendar.
M.O.2.4.6	read time to the quarter hour using an analog and digital clock.
M.O.2.4.7	identify, count and organize coins and bills to display a variety of price values from real-life examples with a total value of one dollar or less and model making change using manipulatives.

Grade 2	Mathematics
Standard 5	Data Analysis and Probability
M.S.2.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.2.5)				
Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Second grade students at the distinguished level in mathematics create, read, and interpret a pictograph and justify their reasoning to the class. They plan and conduct simple probability 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, present and justify the results. They formulate questions, collect data, organize and display data in a chart, table, or bar graph and justify results to the class.	Second grade students at the above mastery level in mathematics create, read and interpret a pictograph and present their reasoning to the class. They plan and conduct simple probability 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 and present the results. They formulate questions, collect data, organize and display data in a chart, table, or bar graph and present the information to the class in oral form.	Second grade students at the mastery level in mathematics create, read, and interpret a pictograph. They 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. They formulate questions, collect data, organize and display data in a chart, table or bar graph.	Second grade students at the partial mastery level in mathematics read and interpret a pictograph. They conduct simple probability experiments and describe the results. They collect and organize data into a chart, table or bar graph.	Second grade students at the novice level in mathematics read a pictograph. They conduct simple probability experiments. They organize data into a table or bar graph.

Objectives	Students will
M.O.2.5.1	create, read, and interpret a pictograph with each picture representing greater than or equal to a single unit.
M.O.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.
M.O.2.5.3	analyze data represented on a graph using grade-appropriate questions.
M.O.2.5.4	formulate questions, collect data, organize and display as a chart, table or bar graph.

Third Grade Mathematics Content Standards and Objectives

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 thousands; fractions and decimals; recall of multiplication facts with corresponding division facts. Additional concepts include gathering and organizing data, estimating and performing measurements. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 3	**Mathematics**
Standard 1	Number and Operations
M.S.3.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.3.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Third grade students at the distinguished level in mathematics read, write, order, and compare whole numbers and decimals using symbolic representations. They identify place value of each digit utilizing standard and expanded form to 1,000,000.They use symbolic representations to compare fractions as parts of a whole and part of a set, to compare and order fractions, and to add and subtract fractions with like denominators. They justify procedures used to perform	Third grade students at the above mastery level in mathematics read, write, order, and compare whole numbers and decimals using manipulatives and number lines. They identify place value of each digit utilizing standard and expanded form to 100,000. They use pictorials and symbolic representations to compare fractions as parts of a whole and part of a set, to compare and order fractions and to add and subtract fractions with like denominators. They explain procedures used to perform	Third grade students at the mastery level in mathematics read, write, order and compare whole numbers and decimals using manipulatives. They identify place value of each digit utilizing standard and expanded form to 10,000.They use concrete models to represent fractions as part of a whole and part of a set, to compare and order fractions, and to add and subtract fractions. They perform basic computation with addition, subtraction, multiplication of multi-digit	Third grade students at the partial mastery level in mathematics identify whole numbers and decimals. They identify place value of each digit utilizing standard and expanded form to 1,000. They identify fractions as part of a whole and parts of set, and add and subtract fractions with like denominators less than 10. They perform basic computation with 2-digit addition, subtraction and multiplication and division of a 2-digit number by a 1-digit number. They solve grade-appropriate real-world	Third grade students at the novice level in mathematics recognize whole numbers and decimals. They identify place value of each digit utilizing standard form to 1,000. They recognize fractions as parts of a whole and parts of a set. They recognize basic operations as they relate to whole numbers. They identify the operation necessary to solve grade-appropriate real-world problems.

basic computation with addition, subtraction, multiplication and division. They create and analyze grade-appropriate real-world problems justifying the solution and processes in clear, concise manner.	basic computation with addition, subtraction, multiplication and division. They create grade-appropriate real-world problems justifying the reasoning and procedures.	numbers and division of a multi-digit number by a single digit number. They create grade-appropriate real-world problems, justifying the reasoning and procedures selected.	problems.	

Objectives	Students will
M.O.3.1.1	read, write, order, and compare numbers to 10,000 using a variety of strategies (e.g., symbols, manipulatives, number line).
M.O.3.1.2	read, write, order, and compare decimals to hundredths, with manipulatives.
M.O.3.1.3	identify place value of each digit utilizing standard and expanded form to 10,000.
M.O.3.1.4	apply estimation skills (rounding, benchmarks, compatible numbers) to evaluate reasonableness of an answer.
M.O.3.1.5	demonstrate an understanding of fractions as part of a whole/one and as part of a set/group using models and pictorial representations.
M.O.3.1.6	create concrete models and pictorial representations to • compare and order fractions with like and unlike denominators, • add and subtract fractions with like denominators, and verify results.
M.O.3.1.7	use concrete models to demonstrate an understanding of equivalent fractions, proper and improper fractions, and mixed numbers.
M.O.3.1.8	add and subtract 2- and 3-digit whole numbers and money with and without regrouping.
M.O.3.1.9	demonstrate and model multiplication (repeated addition, arrays) and division (repeated subtraction, partitioning).
M.O.3.1.10	use and explain the operations of multiplication and division including the properties (e.g., identity element of multiplication, commutative property, property of zero, associative property, inverse operations).
M.O.3.1.11	recall basic multiplication facts and the corresponding division facts.
M.O.3.1.12	model the distributive property in multiplication of 2- and 3-digit numbers by a 1-digit number.
M.O.3.1.13	use models to demonstrate division of 2- and 3-digit numbers by a 1-digit number.
M.O.3.1.14	create grade-appropriate real-world problems involving any of the four operations using multiple strategies, explain the reasoning used, and justify the procedures selected when presenting solutions.

Grade 3	Mathematics
Standard 2	Algebra
M.S.3.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.3.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Third grade students at the distinguished level in mathematics analyze and extend geometric and numeric patterns, defending their mathematical reasoning in a clear and succinct manner. They use symbol and letter variables to represent an unknown quantity and determine the value of the variable and justify results.	Third grade students at the above mastery level in mathematics analyze and, extend geometric and numeric patterns, justifying their reasoning. They determine the rule which uses two operations when given the input/output. They solve equations and expressions with variables justifying their reasoning. They use symbol and letter variables to represent an unknown quantity and determine the value of the variable and verify the results.	Third grade students at the mastery level in mathematics analyze and extend geometric and numeric patterns. They create an input/output model using addition, subtraction, multiplication and division. They analyze patterns and write rules to represent the pattern. They write equivalent numerical expressions and justify equivalency. They use symbol and letter variables to represent an unknown quantity and determine the value of the variable.	Third grade students at the partial mastery level in mathematics interpret and complete geometric and numeric patterns. They use simple input/output models with rules for addition, subtraction and multiplication. They identify equivalent numerical expressions and recognize that a variable represents an unknown quantity. They use symbol and letter variables to represent an unknown quantity.	Third grade students at the novice level in mathematics reproduce geometric and numeric patterns. They identify input/out models with rules for addition and subtraction. They recognize numerical expressions and variables. They recognize that variables represent an unknown quantity.

Objectives	Students will
M.O.3.2.1	analyze and extend geometric and numeric patterns.
M.O.3.2.2	create an input/output model using addition, subtraction, multiplication or division.
M.O.3.2.3	analyze a given pattern and write the rule.
M.O.3.2.4	write equivalent numerical expressions and justify equivalency.
M.O.3.2.5	use symbol and letter variables to represent an unknown quantity and determine the value of the variable.

Grade 3	Mathematics
Standard 3	Geometry
M.S.3.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.3.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice

Third grade students at the distinguished level in mathematics identify, create, and analyze new polygons by transforming, combining and decomposing polygons. They communicate their understanding of polygons in a clear and concise manner. They construct and identify a solid figure from a plane drawing and communicate their understanding. They create a two-dimensional design with one line of symmetry. They model, describe, draw and analyze lines, rays and angles; they communicate their mathematical understanding in a clear and concise manner. They name the location of a point on a first-quadrant grid and compare its location to another point.	Third grade students at the above mastery level in mathematics identify, create, and analyze new polygons by transforming, combining and decomposing polygons. They construct, identify and analyze solid figures from a plane drawing. They identify, describe and draw lines of symmetry in two-dimensional shapes. They model, describe, draw and analyze lines, rays, and angles. They draw and describe examples of transformations. They name the location of a point on a first-quadrant grid using ordered pairs and describe how to determine ordered pairs.	Third grade students at the mastery level in mathematics identify and create new polygons by transforming, combining and decomposing polygons. They classify geometric solids according to attributes. They construct and identify a solid figure from a plane drawing. They identify, describe and draw lines of symmetry in two-dimensional shapes. They model, describe, and draw lines, rays and angles. They draw an example of transformations. They name the location of a point on a first-quadrant grid using ordered pairs.	Third grade students at the partial mastery level in mathematics create new polygons by transforming and combining polygons. They describe geometric solids. They construct and identify a solid figure from a plane drawing. They identify and draw lines of symmetry in two-dimensional shapes. They identify and draw lines, rays, and angles. They identify the type of transformation. They identify points on the first-quadrant grid.	Third grade students at the novice level in mathematics recognize polygons. They recognize geometric solids. They construct and identify a solid figure from a plane drawing. They identify lines of symmetry in two-dimensional shapes. They identify lines, rays and angles. They recognize transformations. They recognize a point on the first-quadrant grid.

Objectives	Students will
M.O.3.3.1	identify and create new polygons by transforming, combining and decomposing polygons.
M.O.3.3.2	identify, describe, and classify the following geometric solids according to the number of faces, edges, and vertices: • cube • rectangular solid • cylinder • cone • pyramid
M.O.3.3.3	construct and identify a solid figure from a plane drawing.
M.O.3.3.4	identify, describe and draw lines of symmetry in two-dimensional shapes.
M.O.3.3.5	model, describe, and draw • lines

	• rays • angles including right, obtuse, and acute angles.
M.O.3.3.6	draw an example of a flip, slide and turn (reflection, translation, and rotation) given a model.
M.O.3.3.7	name the location of a point on a first-quadrant grid, represent using ordered pairs.

Grade 3	**Mathematics**
Standard 4	Measurement
M.S.3.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.3.4)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Third grade students at the distinguished level in mathematics estimate, measure, compare and order common measurements of objects and communicate their understanding of measurement in a clear and concise manner. They communicate their understanding of perimeter and area in a clear and concise manner. They create real-world problems using time, including elapsed time, and money. They identify, count, organize and solve real-world problems related to money up to $100 and communicate their understanding of money in a concise manner.	Third grade students at the above mastery level in mathematics estimate, measure, compare and order common measurements of objects and communicate their understanding of measurement. They describe how to find the perimeter and area of familiar shapes. They describe how to use an analog clock to tell time in five minute intervals and how to compute elapsed time to the quarter-hour using a clock. They identify, count, organize and solve real-world problems related to money up to $100.	Third grade students at the mastery level in mathematics estimate, measure, compare and order common measurements of objects. They estimate and find the perimeter and area of familiar geometric shapes. They read time to five minute intervals and compute elapsed time to the quarter-hour using a clock. They identify, count and organize coins and bills to display a variety of price values to $100 and make change.	Third grade students at the partial mastery level in mathematics measure and compare common measurements of objects. They use concrete models to determine the perimeter and area of a given rectangle. They read time to the quarter of an hour and compute elapsed time to the half-hour using a clock. They use concrete models to count money to $100 and make change to $10.	Third grade students at the novice level in mathematics measure common objects. They use a concrete model to find the perimeter of a given rectangle. They read time on a digital clock compute elapsed time to the hour using a clock. They use concrete models to count money to $10 and make change to $1.

Objectives	Students will

M.O.3.4.1	estimate, measure, compare, and order common measurements of objects: • length using customary and metric (to the nearest 1/2 inch) • temperature in Celsius and Fahrenheit • mass/weight
M.O.3.4.2	estimate and find the perimeter and area of familiar geometric shapes, using manipulatives, grids, or appropriate measuring tools.
M.O.3.4.3	determine the formula the area of a rectangle and explain reasoning through modeling.
M.O.3.4.4	read time to 5-minute intervals using analog and digital clocks, compute elapsed time to the quarter-hour using a clock.
M.O.3.4.5	identify, count and organize coins and bills to display a variety of price values from real-life examples with a total value of $100 or less and model making change using manipulatives.

Grade 3	**Mathematics**
Standard 5	Data Analysis and Probability
M.S.3.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.3.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Third grade students at the distinguished level in mathematics collect, organize, and analyze grade-appropriate real-world data. They communicate their findings in oral and written form. They compare and construct multiple representations of data. They make predictions based on the results of probability experiments and justify their predictions in a succinct manner. They develop grade-appropriate questions to analyze real-	Third grade students at the above mastery level in mathematics collect, organize, and analyze grade-appropriate real-world data. They identify, construct, and interpret appropriate displays for data. They make predictions based on the results of probability experiments. They evaluate grade-appropriate questions used to analyze real-world data.	Third grade students at the mastery level in mathematics collect and organize grade-appropriate real-world data. They identify and construct appropriate displays for the data. They develop and conduct experiments using concrete objects to determine the likeliness of events and list all outcomes. They analyze real-world data with appropriate grade-appropriate questions.	Third grade students at the partial mastery level in mathematics organize a given set of data. They use given data from a probability experiment to show likeliness of outcomes. They answer questions using a given graph.	Third grade students at the novice level in mathematics use a given form to make a graph of given data. They list outcomes of a probability experiment. They identify important information on a given graph.

world data.	
Objectives	Students will
M.O.3.5.1	collect and organize grade-appropriate real-world data from observation, surveys, and experiments, and identify and construct appropriate ways to display data.
M.O.3.5.2	develop and conduct grade-appropriate experiments using concrete objects (e.g. counters, number cubes, spinners) to determine the likeliness of events and list all outcomes.
M.O.3.5.3	analyze real-world data represented on a graph using grade-appropriate questions.

Fourth Grade Mathematics Content Standards and Objectives

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: quick recall of multiplication and corresponding division facts, multiplication and division of two-and three-digit numbers, construction and description of objects from different perspectives, plotting points in quadrant one of a coordinate plane, 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 targeted include adding and subtracting like fractions, and adding and subtracting decimals. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 4	**Mathematics**			
Standard 1	Number and Operations			
M.S.4.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.			
Performance Descriptors (M.PD.4.1)				
Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fourth grade students at the distinguished level in mathematics read, write, order, compare and contrast whole numbers to the millions place and decimals to the thousandths place using a variety of methods. They further analyze how this can be used in a contextual situation. They create and critique problems and demonstrate an understanding of place value of each digit utilizing standard and expanded form. They design	Fourth grade students at the above mastery level in mathematics read, write, order, and compare and contrast whole numbers to the millions place and decimals to the thousandths place using a variety of methods. They create problems and demonstrate an understanding of place value of each digit utilizing standard and expanded form. They estimate solutions and evaluate the reasonableness of the solution and then justify the	Fourth grade students at the mastery level in mathematics read, write, order, and compare whole numbers to the millions place and decimals to the thousandths place using a variety of methods. They demonstrate an understanding of place value of each digit utilizing standard and expanded form. They estimate solutions and evaluate the reasonableness of that solution and then justify the results. They use concrete	Fourth grade students at the partial mastery level in mathematics read, write, order, and compare whole numbers to the millions place and decimals to the thousandths place using any method. They identify an understanding of place value of each digit utilizing standard and expanded form. They examine solutions and identify the reasonableness of that solution and then explain the results. They use concrete models,	Fourth grade students at the novice level in mathematics read and write whole numbers to the millions place and decimals to the thousandths place using any method. They recognize place value of each digit utilizing standard and expanded form. They state solutions and describe the reasonableness of the solution and recite the results. They use concrete models, benchmark fractions and number lines to recognize fractions as

problems and then estimate the solutions and evaluate the reasonableness of that solution. They justify the results in a computational and real-world situation. They use concrete models, benchmark fractions and number lines to compare, order and model fractions as well as perform operations on fractions. They relate this to real-world situations. They analyze and summarize the relationship of fractions to decimals and communicate this relationship. They investigate various methods and justify the use of the standard algorithm to solve multi-digit whole number multiplication problems and then apply to a real-world problem. They demonstrate quick recall of basic multiplication facts and corresponding division facts and apply this recall to construct real-world problems. They create and critique grade-appropriate real-world story problems using multiple strategies, justify the reason for choosing a strategy and interpret and communicate results.	results in a computational and real-world situation. They use concrete models, benchmark fractions and number lines to compare, order and model fractions as well as perform operations on fractions. They analyze the relationship of fractions to decimals and communicate this relationship. They investigate various strategies and justify the use of the standard algorithm to solve multi-digit whole number multiplication problems. They have quick recall of basic multiplication facts and corresponding division facts and apply this recall to real-world situations. They create and critique grade-appropriate real-world story problems using multiple strategies, justify the reason for choosing a strategy and communicate results.	models, benchmark fractions and number lines to compare and order fractions as well as perform operations on fractions. They analyze the relationship of fractions to decimals. They justify various methods including the standard algorithm to solve multi-digit whole number multiplication problems. They have quick recall of basic multiplication facts and corresponding division facts. They create grade-appropriate real-world story problems using multiple strategies, justify the reason for choosing a strategy and communicate results.	benchmark fractions and number lines to identify fractions as well as perform operations on fractions. They identify the relationship of fractions to decimals. They use various methods including the standard algorithm to solve multi-digit whole number multiplication problems. They recall basic multiplication facts and corresponding division facts. They apply grade-appropriate real-world story problems using multiple strategies, recognize the reason for choosing a strategy and communicate results.	well as perform operations on fractions. They recognize the relationship of fractions to decimals. They recognize the standard algorithm to solve multi-digit whole number multiplication problems. They find basic multiplication facts and corresponding division facts using a hundreds chart. They identify grade-appropriate real-world story problems using any strategy, and communicate results.
Objectives	Students will			

M.O.4.1.1	read, write, order, and compare whole numbers to the millions place and decimals to thousandths place using a variety of strategies (e.g. symbols, manipulatives, number line, pictorial representations).
M.O.4.1.2	demonstrate an understanding of the place value of each digit utilizing standard and expanded form through 1,000,000 with multiples of 10 [(5 X 10,000) + (3 X 1,000) + (4 X 10) + 2].
M.O.4.1.3	estimate solutions to problems including rounding, benchmarks, compatible numbers and evaluate the reasonableness of the solution, justify results.
M.O.4.1.4	using concrete models, benchmark fractions, number line • compare and order fractions with like and unlike denominators • add and subtract fractions with like and unlike denominators • model equivalent fractions • model addition and subtraction of mixed numbers with and without regrouping.
M.O.4.1.5	analyze the relationship of fractions to decimals using concrete objects and pictorial representations.
M.O.4.1.6	round decimals to the nearest whole, 10th, or 100th place.
M.O.4.1.7	add and subtract whole numbers(up to five –digit number) and decimals to the 1000th place, multiply (up to three digits by two-digits, and divide(up to a three digit number with a one and two-digit number) .
M.O.4.1.8	multi-digitsolve multi-digit whole number multiplication problems using a variety of strategies, including the standard algorithm, justify methods used.
M.O.4.1.9	quick recall of basic multiplication facts and corresponding division facts.
M.O.4.1.10	create grade-level real-world appropriate story problems using multiple strategies including simple ratios, justify the reason for choosing a particular strategy and present results.

Grade 4	**Mathematics**
Standard 2	Algebra
M.S.4.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.4.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fourth grade students at the distinguished level in mathematics determine and analyze the rule given an input-output model and explain how change in one variable relates to the	Fourth grade students at the above mastery level in mathematics determine and analyze the rule given an input-output model and explain how change in one variable relates to the	Fourth grade students at the mastery level in mathematics determine the rule given an input- output model and explain how change in one variable relates to the change in the	Fourth grade students at the partial mastery level identify the rule given an input-output model and recognize how change in one variable relates to the change in the second variable. They	Fourth grade students at the novice level recite the rule given an input-output model. They recognize relationships in which quantities change proportionally. They identify

change in the second variable. They construct input-output tables of their own and state the rule. They recognize, describe, and analyze relationships in which quantities change proportionally. They create relationships in which quantities change proportionally. They create real-world problems that contain variables. They represent the idea of a variable and write an expression using a variable to describe that problem and then evaluate that expression. They create and solve real-world problems involving order of operations with variables.	change in the second variable. They find other values. They recognize, describe, and analyze relationships in which quantities change proportionally. They represent the idea of a variable and write an expression using a variable to describe a real-world situation and then evaluate that expression. They create and solve real-world problems involving order of operations.	second variable. They recognize and describe relationships in which quantities change proportionally. They represent the idea of a variable and write an expression using a variable to describe a real-world situation. They solve real-world problems involving order of operations including grouping and the four operations.	recognize relationships in which quantities change proportionally. They identify the idea of a variable and apply an expression using a variable to solve a real-world situation. They describe real-world problems involving order of operations with no group symbols and the four operations.	the idea of a variable and apply an expression using a variable to describe a real-world situation. They describe real-world problems involving order of operations with two operations.

Objectives	Students will
M.O.4.2.1	determine the rule and explain how change in one variable relates to the change in the second variable, given an input/output model using two operations.
M.O.4.2.2	recognize and describe relationships in which quantities change proportionally.
M.O.4.2.3	represent the idea of a variable as an unknown quantity using a letter, write an expression using a variable to describe a real-world situation.
M.O.4.2.4	solve real-world problems involving order of operations including grouping symbols and the four operations,

Grade 4	Mathematics
Standard 3	Geometry
M.S.4.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.4.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fourth grade students at the distinguished level in mathematics identify, classify, compare and contrast and construct two-dimensional and three-dimensional geometric figures and use these figures in real-world problems. They recognize, describe, draw and analyze three-dimensional objects from different perspectives. They construct figures with lines and angles and identify, draw, label, compare and classify the lines and angles. They explore the relationships between properties of angles and lines. They identify and create a two-dimensional design with one or more lines of symmetry and analyze the relationship between lines of symmetry and number of sides of polygons. They graph ordered pairs on a first-quadrant grid, use the coordinate system to investigate the relationship between ordered pairs on the coordinate plane. They draw, identify and explore the relationship between the	Fourth grade students at the above mastery level in mathematics identify, classify, compare and contrast two-dimensional and three-dimensional geometric figures and use these figures to in real-world problems. They recognize, describe, and draw three-dimensional objects from different perspectives. They construct figures with lines and angles and then identify, draw, label, compare and classify the lines and angles. They identify and create a two-dimensional design with one or more lines of symmetry. They graph ordered pairs on a first-quadrant grid, use the coordinate system. They investigate the relationship between ordered pairs on a one quadrant grid. They draw, identify and recognize the relationship between the parts of a circle. They select, analyze, and justify appropriate use of transformations to solve geometry problems. They create transformations.	Fourth grade students at the mastery level in mathematics identify, classify and compare and contrast two-dimensional and three-dimensional geometric figures. They recognize and describe three-dimensional objects from different perspectives. They identify, draw, label, compare and classify lines and angles. They identify and create a two-dimensional design with one line of symmetry. They graph ordered pairs on a first-quadrant grid and use the coordinate system. They draw and identify parts of a circle. They select, analyze, and justify appropriate use of transformations to solve geometry problems.	Fourth grade students at the partial mastery level in mathematics identify and classify two-dimensional and three-dimensional geometric figures. They recognize three-dimensional objects from different perspectives. They identify, draw, and label lines and angles. They identify a two-dimensional design with one line of symmetry. They graph ordered pairs on a first-quadrant grid and identify the coordinate system. They identify parts of a circle. They select and justify appropriate use of transformations to solve geometry problems.	Fourth grade students at the novice level in mathematics identify two-dimensional and three-dimensional geometric figures. They recognize three-dimensional objects. They will identify and label lines and angles. They describe a two-dimensional design with one line of symmetry. They locate ordered pairs on a first-quadrant grid. They identify parts of a circle given terms. They select appropriate use of transformations to solve geometry problems.

parts of a circle. They select, analyze, and justify appropriate use of transformations to solve geometry problems. They use transformations to create tessellations.				

Objectives	Students will
M.O.4.3.1	identify, classify, compare and contrast two-dimensional (including quadrilateral shapes) and three-dimensional geometric figures according to attributes.
M.O.4.3.2	recognize and describe three-dimensional objects from different perspectives.
M.O.4.3.3	identify, draw, label, compare and classify • lines (intersecting, parallel, and perpendicular) • angles (acute, right, obtuse, and straight)
M.O.4.3.4	identify and create a two-dimensional design with one line of symmetry.
M.O.4.3.5	graph/plot ordered pairs on a first-quadrant grid and use the coordinate system to specify location and describe path.
M.O.4.3.6	draw and identify parts of a circle: center point, diameter, and radius.
M.O.4.3.7	select, analyze and justify appropriate use of transformations (translations, rotations, flips) to solve geometric problems including congruency and tiling (tessellations).

Grade 4	Mathematics
Standard 4	Measurement
M.S.4.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will • demonstrate understanding of measurable attributes of objects and the unites, systems, and processes of measurement, and • apply appropriate techniques, tools and formulas to determine measurements.

Performance Descriptors (M.PD.4.4)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fourth grade students at the distinguished level in mathematics select appropriate measuring tools and justify the selection. They apply, convert and recognize the relationship between standard units within a system to estimate, measure, compare and	Fourth grade students at the above mastery level in mathematics select appropriate measuring tools and justify the selection; apply and convert standard units within a system to estimate; measure, compare, and order real-world measurements; and	Fourth grade students at the mastery level in mathematics select appropriate measuring tools, apply and convert standard units within a system to estimate, measure, compare, and order real-world measurements, and justify	Fourth grade students at the partial mastery level in mathematics discover appropriate measuring tools, apply standard units within a system to estimate, measure, compare, and order real-world measurements and justify results. They apply a	Fourth grade students at the novice level in mathematics name appropriate measuring tools, identify standard units within a system to estimate and measure real-world measurements and describe results. They recognize a formula used to

order real-world measurements. They analyze, justify and communicate results both orally and in writing. They construct real-world problems involving area. They investigate formulas for area and select the appropriate one in context to the problem. They demonstrate an understanding of the formula used to determine area and use this formula to compare and contrast areas and communicate to others both orally and in writing. They read time to the minute, calculate elapsed time in hours/minutes within any given period and construct real-world problems involving elapsed time. They create problems that involve counting coins and bills and determining correct change and communicate both orally and in writing.	analyze, justify and communicate results both orally and written. They investigate formulas for area and select the appropriate one in context to the problem. They demonstrate an understanding of the formula used to determine area and use this formula to compare and contrast areas. They read time to the minute and calculate elapsed time in hours/minutes within any given period. They create problems that involve counting coins and bills and determining correct change.	and present results. They demonstrate an understanding of the formula used to determine area and use this formula to compare areas. They read time to the minute and calculate elapsed time in hours/minutes within a 24 hour period. They count coins and bills and determine correct change.	formula used to determine area and use this formula to compare areas. They read time to the minute and calculate elapsed time in hours/minutes within a 24 hour period using either analog or digital clocks. They count coins and/or bills and determine correct change.	determine area. They read time to the quarter hour and calculate elapsed time in hours/minutes within a 24 hour period using either analog or digital clocks. They count coins and/or bills given real-world situations.

Objectives	Students will
M.O.4.4.1	select appropriate measuring tools, apply and convert standard units within a system to estimate, measure, compare and order real-world measurements including: • lengths using customary (to the nearest one-fourth inch) and metric units, • weight, • capacity, • temperature, and justify and present results.
M.O.4.4.2	demonstrate an understanding of the formula used to determine the area of rectangles and squares and use this formula to compare

	areas of rectangles and squares.
M.O.4.4.3	read time to the minute, calculate elapsed time in hours/minutes within a 24-hour period.
M.O.4.4.4	given real-world situations, count coins and bills and determine correct change.

Grade 4	**Mathematics**
Standard 5	Data Analysis and Probability
M.S.4.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.4.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fourth grade students at the distinguished level in mathematics create real-world problems that require them to read and interpret information represented on a circle graph and create problems that can be represented on a circle graph. They construct a real-world situation problem that requires them to collect, organize, display and analyze data in order to answer the grade-appropriate question. They justify, interpret and analyze their results. They design and conduct a simple probability experiment in a real-world situation, list, examine and analyze all possible combinations using a tree diagram, represent the outcomes as a ratio,	Fourth grade students at the above mastery level in mathematics read and interpret information represented on a circle graph and apply problems that can be represented on a circle graph. They create and pose a grade-appropriate question that can be addressed with data. They collect, organize, display and analyze data in order to answer the question. They justify and interpret their results. They design and conduct a simple probability experiment, examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and analyze and present the results.	Fourth grade students at the mastery level in mathematics read and interpret information represented on a circle graph. They pose a grade-appropriate question that can be addressed with data. They collect, organize, display and analyze data in order to answer the question. They design and conduct a simple probability experiment, examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and present the results.	Fourth grade students at the partial mastery level in mathematics read information represented on a circle graph. They solve a grade-appropriate question that can be addressed with data. They collect and display data in order to answer the question. They conduct a simple probability experiment, list possible combinations using a tree diagram, represent the outcomes and present the results.	Fourth grade students at the novice level in mathematics identify information represented on a circle graph. They recognize a grade-appropriate question that can be addressed with data. They display data in order to answer the question. They conduct a simple probability experiment, list some combinations using a tree diagram, and identify the outcomes.

and analyze and present the results both orally and in writing.				

Objectives	Students will
M.O.4.5.1	read and interpret information represented on a circle graph.
M.O.4.5.2	pose a grade-appropriate question that can be addressed with data, collect, organize, display, and analyze data in order to answer the question.
M.O.4.5.3	design and conduct a simple probability experiment using concrete objects, examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and present the results.

Fifth Grade Mathematics Content Standards and Objectives

Fifth grade objectives place emphasis on developing proficiency in using whole numbers, fractions (primary focus on adding and subtracting fractions with like and unlike denominators and mixed numbers), and decimals to solve problems. Additional concepts include collecting, displaying and analyzing data in a variety of ways and solving probability problems. Other problems involve area and perimeter, classifing polygons, plotting points on a coordinate plane, and writing a number sentence using a variable to solve problems. The use of the standard algorithm to solve multi-digit whole number division should be preceded by work with understanding and justifying why the algorithm works. Continued work with concrete materials and appropriate technologies such as calculators and computers is emphasized. 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. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 5	**Mathematics**
Standard 1	Number and Operations
M.S.5.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.5.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fifth grade students at the distinguished level in mathematics compare and contrast, analyze and summarize properties of whole numbers, fractions, mixed numbers and decimals. They understand place value and estimate, and critique solutions to real-world problems involving whole numbers, decimals, fractions, and percents. They examine, identify and develop the	Fifth grade students at the above mastery level in mathematics compare and contrast and analyze whole numbers, fractions, mixed numbers and decimals. They understand place value and estimate and formulate solutions to real-world problems involving whole numbers, decimals, fractions, and percents. They examine and identify the divisibility rules, greatest common factor and lowest	Fifth grade students at the mastery level in mathematics compare whole numbers, fractions, mixed numbers and decimals. They understand place value and estimate solutions to real-world problems involving whole numbers, decimals, fractions, and percents. They identify the divisibility rules, greatest common factor and lowest common multiple. They solve	Fifth grade students at the partial mastery level in mathematics identify whole numbers, fractions, mixed numbers and decimals. They identify place value and apply solutions to real-world problems involving whole numbers, decimals, fractions, and percents. They explain the divisibility rules, greatest common factor and lowest common multiple. They explain application problems with	Fifth grade students at the novice level in mathematics recognize whole numbers, fractions, mixed numbers and decimals. They confirm place value and recognize solutions to real-world problems involving whole numbers, decimals, fractions, and percents. They state the divisibility rules, greatest common factor and lowest common multiple. They confirm that application problems

divisibility rules, greatest common factor and lowest common multiple. They construct, design and solve application problems with fractions, mixed numbers and decimals. They select the most efficient strategy to solve multi-digit whole number division problems and justify the strategy used. They demonstrate fluency in addition, subtraction, multiplication and division of whole numbers and relate this fluency to the properties of whole numbers.	common multiple. They create and solve application problems with fractions, mixed numbers and decimals. They solve multi-digit whole number division problems using a variety of strategies, including the standard algorithm, make comparisons of strategies used. They demonstrate fluency in addition, subtraction, multiplication and division of whole numbers.	application problems with fractions, mixed numbers and decimals. They solve multi-digit whole number division problems using a variety of strategies, including the standard algorithm and justify the solutions They demonstrate fluency in addition, subtraction, multiplication and division of whole numbers.	fractions, mixed numbers and decimals. They solve multi-digit whole number division problems using a variety of strategies, including the standard algorithm They solve addition, subtraction, multiplication and division of whole numbers with accuracy.	contain fractions, mixed numbers and decimals. They solve multi-digit whole number division problems They solve addition, subtraction, multiplication and division of whole numbers.

Objectives	Students will
M.O.5.1.1	read, write, order and compare all whole numbers, fractions, mixed numbers and decimals using multiple strategies (e.g., symbols, manipulatives, number line).
M.O.5.1.2	demonstrate an understanding of place value of each digit utilizing standard and expanded form in any whole number using powers of 10 $[(3 \times 10^5) + (4 \times 10^3) + 7 \times 10^2) + (1 \times 10^1) + 6]$.
M.O.5.1.3	estimate solutions to problems involving whole numbers, decimals, fractions, and percents to determine reasonableness using benchmarks.
M.O.5.1.4	use inductive reasoning to identify the divisibility rules of 2, 3, 5, 9 and 10 and apply the rules to solve application problems.
M.O.5.1.5	determine and apply greatest common factor and lowest common multiple to write equivalent fractions and to real-world problem situations.
M.O.5.1.6	model and write equivalencies of fractions decimals, percents, and ratios.
M.O.5.1.7	analyze and solve application problems and justify reasonableness of solution in problems involving addition and subtraction of: • fractions and mixed numbers • decimals.
M.O.5.1.8	apply the distributive property as it relates to multiplication over addition.
M.O.5.1.9	solve multi-digit whole number division problems using a variety of strategies, including the standard algorithm and justify the solutions.
M.O.5.1.10	demonstrate fluency in addition, subtraction, multiplication and division of whole numbers.
M.O.5.1.11	solve real-world problems involving whole numbers, decimals and fractions using multiple strategies and justify the reasonableness by estimation.

Grade 5	Mathematics
Standard 2	Algebra
M.S.5.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.5.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fifth grade students at the distinguished level in mathematics use inductive reasoning to find missing elements in patterns, analyze results and construct their own patterns. They develop and determine rules from an input/output model as well as from an abstract model and identify and analyze square, prime and composite numbers.	Fifth grade students at the above mastery level in mathematics use inductive reasoning to find missing elements in patterns and analyze results. They develop and determine rules from an input/output model, identify, and describe square, prime and composite numbers.	Fifth grade students at the mastery level in mathematics use inductive reasoning to find missing elements in patterns. They infer rules from an input/output model, identify, and describe square, prime and composite numbers.	Fifth grade students at the partial mastery level in mathematics use inductive reasoning to confirm missing elements in patterns. They determine rules from an input/output model and recognize square, prime and composite numbers.	Fifth grade students at the novice level in mathematics use inductive reasoning models to label missing elements in patterns. They name rules from an input/output model and verify square, prime and composite numbers.

Objectives	Students will
M.O.5.2.1	use inductive reasoning to find missing elements in a variety of patterns (e.g., square numbers, arithmetic sequences).
M.O.5.2.2	given an input/output model using two operations, determine the rule, output or input.
M.O.5.2.3	solve simple equations and inequalities using patterns and models of real-world situations, create graphs of the equations and interpret the results.
M.O.5.2.4	model identify and describe square, prime and composite numbers.

Grade 5	Mathematics
Standard 3	Geometry
M.S.5.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.5.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fifth grade students at the distinguished level in mathematics classify, compare, develop and critique the properties of triangles and construct and compare 3 dimensional shapes. They construct, analyze and compare designs with symmetry and construct circles. They draw and construct similar figures using a scale that involves reducing or enlarging by fractional units.	Fifth grade students at the above mastery level in mathematics classify, compare and determine the properties of triangles and construct 3 dimensional shapes. They create and analyze designs with symmetry and construct circles. They draw similar figures using a scale that involves reducing.	Fifth grade students at the mastery level in mathematics classify and compare triangles and construct 3 dimensional shapes. They create designs with symmetry and construct circles. They draw similar figures using a scale.	Fifth grade students at the partial mastery level in mathematics model triangles and describe 3 dimensional shapes. They identify designs with symmetry and draw circles. They identify similar figures using a scale.	Fifth grade students at the novice level in mathematics recognize triangles and identify 3 dimensional shapes. They recognize designs with symmetry and circles. They recognize similar figures using a scale.

Objectives	Students will
M.O.5.3.1	classify and compare triangles by sides and angles; measure the angles of a triangle using a protractor.
M.O.5.3.2	construct and analyze three-dimensional shapes using properties (i.e. edges, faces or vertices).
M.O.5.3.3	create a design with more than one line of symmetry.
M.O.5.3.4	construct a circle with a given radius or diameter.
M.O.5.3.5	draw a similar figure using a scale, given a real-world situation.

Grade 5	Mathematics
Standard 4	Measurement
M.S.5.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.5.4)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fifth grade students at the distinguished level in mathematics estimate and measure, compare, order	Fifth grade students at the above mastery level in mathematics estimate and measure, compare, and	Fifth grade students at the mastery level in mathematics estimate and measure lengths up to 1/8	Fifth grade students at the partial mastery level in mathematics identify estimate and measure	Fifth grade students at the novice level in mathematics identify lengths up to 1/4 of an inch. They replicate how

and construct lengths up to 1/8 of an inch. They find, develop and analyze strategies to determine volume of a rectangular prism. They construct and solve real-world problems requiring conversion within a system of measurement and interpret the relationship between conversions. They estimate and measure weight/mass of real objects in ounces, pounds, grams and kilograms and compare properties of each unit. They estimate and calculate elapsed time from real-world settings, create real-world problems and analyze the solution. They design a scale drawing and determine the actual measurements of a figure from a scale drawing.	order lengths up to 1/8 of an inch. They find and develop strategies to determine volume of a rectangular prism. They construct and solve real-world problems requiring conversion within a system of measurement. They estimate and measure weight/mass of real objects in ounces, pounds, grams and kilograms and compare properties of each unit. They estimate and calculate elapsed time from real-world settings and create in context problems. They create a scale drawing and determine the actual measurements of a figure from a scale drawing.	of an inch. They find strategies to determine volume of a rectangular prism. They solve real-world problems requiring conversion within a system of measurement. They estimate and measure weight/mass of real objects in ounces, pounds, grams and kilograms. They estimate and calculate elapsed time from real-world settings and determine the actual measurements of a figure from a scale drawing.	lengths up to 1/8 of an inch. They determine volume of a rectangular prism, given a strategy. They identify real-world problems requiring conversion within a system of measurement. They measure weight/mass of real objects in ounces, pounds, grams and kilograms. They estimate elapsed time if given choices from real-world settings and determines the actual measurements of a figure from a scale drawing.	to find volume of a rectangular prism. They recognize real-world problems requiring conversion within a system of measurement. They recognize that weight/mass of real objects is in ounces, pounds, grams or kilograms. They recognize time has elapsed in real-world settings and recognizes measurements of a figure from a scale drawing are different.

Objectives	Students will
M.O.5.4.1	estimate, measure, compare, order and draw lengths of real objects in parts of an inch up to 1/8 of an inch and millimeters.
M.O.5.4.2	model, calculate and compare area of triangles and parallelograms using multiples strategies (including, but not limited to, formulas).
M.O.5.4.3	develop strategies (i.e. finding number of same sized units of volume)to determine the volume of a rectangular prism; solve application problems involving estimating or measuring volume of rectangular prisms.
M.O.5.4.4	describe the effects on the measurements of a two-dimensional shape (such as its perimeter and area) when the shape is changed in some way, justify changes.
M.O.5.4.5	solve real-world problems requiring conversions within a system of measurement.
M.O.5.4.6	estimate and/or measure the weight/mass of real objects in ounces, pounds, grams, and kilograms.
M.O.5.4.7	collect, record, estimate and calculate elapsed times from real-world situations (with and without technology)
M.O.5.4.8	determine the actual measurements of a figure from a scale drawing, using multiple strategies.

Standard 5	Data Analysis and Probability
M.S.5.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.5.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Fifth grade students at the distinguished level in mathematics design experiments or surveys to collect, interpret and analyze data from a problem-solving situation. They design, construct and manipulate sample spaces to predict the probability of a real-world simulation. They collect and organize data into a circle graph, draw conclusions, interpret results and summarize findings from similar data sets.	Fifth grade students at the above mastery level in mathematics collect, interpret and analyze data from a problem-solving situation. They design and construct sample spaces to predict the probability of a real-world simulation. They collect and organize data into a circle graph, draw conclusions and interpret results.	Fifth grade students at the mastery level in mathematics collect and interpret data from a problem-solving situation. They construct sample spaces to predict the probability of a real-world simulation. They organize data into a circle graph and draw conclusions.	Fifth grade students at the partial mastery level in mathematics collect data from a problem-solving situation. They use existing sample spaces to predict the probability of a real-world simulation. They organize data into a circle graph.	Fifth grade students at the novice level in mathematics display data from a problem-solving situation. They identify existing sample spaces to recognize a real-world simulation. They identify data.

Objectives	Students will
M.O.5.5.1	construct a sample space to predict the probability of a real-world simulation and test the prediction with experimentation.
M.O.5.5.2	construct, read, and interpret tables, charts, and graphs including stem and leaf plots to draw reasonable inferences or verify predictions.
M.O.5.5.3	collect and organize real-world data to construct a circle graph (with and without technology), present data and draw conclusions.

Sixth Grade Mathematics Content Standards and Objectives

Sixth grade objectives place continued emphasis on the study of whole numbers, decimals and fractions (primary focus on multiplication and division of fractions and mixed numbers). Introductory work with integers includes understanding why the rules for adding, subtracting, multiplying and dividing integers work. Opportunities to apply these skills to real world situations help to make sense of the mathematics. Calculators, computers and manipulatives may be used to solve problems. Probability, Statistics, Geometry, and Pre-Algebra will be stressed. Concepts of using ratios to compare data sets, making geometric constructions of three-dimensional figures and solving problems involving circles, volume and surface area are emphasized. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 6	Mathematics
Standard 1	Number and Operations
M.S.6.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.6.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Sixth grade students at the distinguished level in mathematics use prime factorization to determine GCF and LCM of more than two numbers for use in problem solving. They create problems and expressions using the distributive, commutative, associative, and identity properties. They state equivalencies among fractions, decimals and percents; between numbers written in scientific and standard notation justifying	Sixth grade students at the above mastery level in mathematics use prime factorization to determine GCF and LCM for use in problem solving. They use the distributive, commutative, associative, identity properties to solve problems. They state equivalencies among fractions, decimals and percents; between numbers written in scientific and standard notation explaining methods used. They solve problems involving whole	Sixth grade students at the mastery level in mathematics determine GCF and LCM to solve problems; finds prime factorization of a number. They apply distributive, commutative, associative and identity properties of addition and multiplication. They state equivalencies among fractions, decimals, and percents; between numbers written in scientific and standard notation. They solve problems involving whole numbers,	Sixth grade students at the partial mastery level in mathematics find GCF and LCM; give prime factorization of a number. They identify examples of distributive, commutative, associative, and identity properties of addition and multiplication. They identify equivalencies among fractions, decimals, and percents. They convert a number from scientific notation to standard notation. They solve problems involving whole	Sixth grade students at the novice level in mathematics find GCF and LCM; give prime factorization of numbers less than 100. They identify examples of commutative and associative properties of addition and multiplication. They determine equivalent fractions, decimals and benchmark percents. They recognize a number written in scientific notation. They solve problems involving whole numbers, fractions, decimals, addition and

the methods used. They create and solve problems involving whole numbers, fractions, decimals, integer operations and comparison, and percent of a number; they justify method used and reasonableness of solution. They write and explain in a clear, concise manner, the effect of multiplying and dividing a number by a number between 0 and 1 inclusive.	numbers, fractions, decimals, integer operations and comparison, and percent of a number. They justify method used and reasonableness of solution. They explain the effects of multiplying and dividing numbers by numbers 0 and 1 inclusive.	fractions, decimals, integer operations and comparison, and percent of a number and justify reasonableness of solution by estimation. They interpret the effect of multiplying and dividing whole numbers, fractions, and decimals by numbers between zero and one, inclusive.	numbers, fractions, decimals; addition, multiplication, division, and comparison of integers. They calculate benchmark percents (10%, 25%, 50%, and 75%) of a number. They interpret the effect of multiplying whole numbers, fractions and decimals by numbers between 0 and 1, inclusive.	comparison of integers. They calculate benchmark percents 25% and 50% of numbers less than 100. They interpret the effect of multiplying whole numbers by numbers between 0 and 1, inclusive.

Objectives	Students will
M.O.6.1.1	demonstrate an understanding of large numbers by converting and comparing numbers in scientific notation and standard notation (with and without technology).
M.O.6.1.2	determine the greatest common factor and least common multiple using multiple strategies to solve real-world problems; find prime factorization of a number.
M.O.6.1.3	compare and order integers using multiple strategies (e.g., symbols, manipulatives, number line).
M.O.6.1.4	analyze and solve real-world problems involving addition, subtraction , multiplication and division of • whole numbers, • fractions, mixed numbers, • decimals, • integers, and justify the reasonableness by estimation.
M.O.6.1.5	apply the distributive, commutative, associative and identity properties to numeric expressions and use to prove equivalency.
M.O.6.1.6	convert between fractions/ratios, mixed numbers, decimals and percents in appropriate real-world problems.
M.O.6.1.7	compute the percent of a number to solve application problems and justify the reasonableness by estimation.
M.O.6.1.8	demonstrate an understanding of the effect of multiplying and dividing, whole numbers, fractions and decimals by numbers including 0, 1 and values between 0 and 1 .
M.O.6.1.9	develop and test hypotheses to derive the rules for addition, subtraction, multiplication and division of integers, justify by using real-world examples and use them to solve problems.

Grade 6	Mathematics
Standard 2	Algebra
M.S.6.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.6.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Sixth grade students at the distinguished level in mathematics write algebraic expressions for word phrases, simplify numeric and evaluate algebraic expressions using order of operations; they use the expressions to solve real-world problems. They present their method and justify solution in a clear, concise manner. They create a rule, express it algebraically, find values by making an input /output table, test it to determine if it is a function, and explain their thinking in a clear, concise manner. They create a geometric or arithmetic sequence, determine any term in the sequence, and express the rule they used algebraically. They solve problems involving real-world proportional situations, explaining the method they used, and by writing a proportion; they relate their method to the proportion. They write and solve one-	Sixth grade students at the above mastery level in mathematics write algebraic expressions for word phrases, simplify numeric and evaluate algebraic expressions using order of operations; they use the expressions to solve real-world problems, and explain their thinking. They determine the rule, output or input, given an input/output table; write the rule as an algebraic expression, identify other values, and explain their thinking in a clear, concise manner. They create a geometric or arithmetic sequence and determine any term in a sequence and explain their rule. They solve problems involving real-world proportional situations and explain the method they used. They write and solve one-step equations to solve real-world problems. They justify the use of the equation and the solution.	Sixth grade students at the mastery level in mathematics write algebraic expressions for word phrases, simplify numeric and evaluate algebraic expressions using order of operations. They use the expressions to solve real-world problems. They determine the rule, output or input, given an input/output table; write the rule as an algebraic expression; and identify other values. They predict the nth term of a pattern. They solve problems involving real-world proportional situations. They write and solve one-step equations to solve real-world problems.	Sixth grade students at the partial mastery level in mathematics write algebraic expressions for word phrases and simplify numeric expressions using order of operations. They find a rule, output or input, given an input/output table; They identify the next three terms of a pattern. They solve a proportion problem involving measurement. They solve one-step equations.	Sixth grade students at the novice level in mathematics write algebraic expressions for word phrases involving one operation and simplify numeric expressions using order of operations. They determine the output, given the rule and the input. They identify the next three terms of a pattern of one operation. They solve a proportion between equivalent fractions. They solve one-step equations with the use of manipulatives.

step equations to solve real-world problems. They present the justification of the use of the equation and their solution, using clear, concise language.				

Objectives	Students will
M.O.6.2.1	simplify numerical expressions and evaluate algebraic expressions using order of operations.
M.O.6.2.2	use inductive reasoning to extend patterns to predict the nth term (e.g., powers and triangular numbers).
M.O.6.2.3	create algebraic expressions that correspond to real-world situations; use the expressions to solve problems.
M.O.6.2.4	determine the rule, output or input; given an input/output model using one operation, write an algebraic expression for the rule and use to identify other input/output values.
M.O.6.2.5	solve real-world proportion problems involving rates, probability and measurements using multiple strategies, justify selection of strategies.
M.O.6.2.6	write and solve one-step equations using number sense, properties of operations and the idea of maintaining equality to represent and solve real-world problems.

Grade 6	**Mathematics**
Standard 3	Geometry
M.S.6.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.6.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Sixth grade students at the distinguished level in mathematics analyze the characteristics of geometric figures to compare and contrast the figures. They compare it to the original figures, given a new figure. They derive the formula to	Sixth grade students at the above mastery level in mathematics analyze the characteristics of geometric figures to compare and contrast the figures. They derive the formula to determine the sum of the measures of the interior angles of a polygon and use	Sixth grade students at the mastery level in mathematics analyze the characteristics of geometric figures to compare the figures. They derive the formula to determine the sum of the measures of the interior angles of a polygon. They use geometric	Sixth grade students at the partial mastery level in mathematics identify the characteristics of geometric figures. They find the sum of the measures of the interior angles of a polygon by partitioning the polygon into triangles. They identify geometric figures; they find	Sixth grade students at the novice level in mathematics identify sides and angles of polygons. They determine the sum of the measures of the angles of a polygon, given a formula. They identify geometric figures; shown two lines in the classroom, they identify

determine the sum of the measures of the interior angles of a polygon and express it algebraically; use the formula to find the sum of the measures of an n-gon; and extend the formula to find the measure of each angle in a regular n-gon. They use geometric representations to solve real-world problems; they apply the concepts of parallel, perpendicular, intersecting, and skew lines to real-world situations and to the edges of polyhedrons; they make conjectures regarding lines and planes. They create designs with rotational and/or line symmetry; they apply transformations to polygons in a coordinate plane, including rotating a quadrilateral or triangle in a coordinate plane about a point not on the polygon; and they describe the method they used, including mathematical notation. They create a non-rectangular polygon on a coordinate plane with a given area; they determine the length of the sides; they name coordinates so the polygon	the formula to find the sum of the measures of an n-gon. They use geometric representations to solve real-world problems; they apply the concepts of parallel, perpendicular, intersecting, and skew lines to real-world situations and to the edges of polyhedrons. They create designs with rotational symmetry and/or line symmetry; they apply transformations to polygons in a coordinate plane and describe the method they used. They create a polygon on a coordinate plane with a given area; they determine the length of the sides; they name coordinates so the polygon can be reproduced.	representations to solve real-world problems; they apply the concepts of parallel, perpendicular, intersecting, and skew lines to real-world situations. They create designs using line and rotational symmetry; they predict, describe, and perform transformations on two-dimensional shapes. They plot polygons on a coordinate grid and determine lengths and areas from the graphs.	examples of parallel, perpendicular, intersecting, and skew lines in the classroom and identify them. They identify line and rotational symmetry. They plot polygons on a coordinate plane.	them as parallel, perpendicular, or intersecting. They identify lines of symmetry. They plot points on a coordinate plane.

can be reproduced.				

Objectives	Students will
M.O.6.3.1	analyze characteristics using defining properties of • lines, • angles, • polygons, • triangles, and compare these geometric figures.
M.O.6.3.2	use inductive reasoning with the measures of interior angles in polygons and derive the formula to determine the sum of the measures of the interior angles.
M.O.6.3.3	apply the concepts of parallel, perpendicular, intersecting, and skew lines to real-world situations (i.e. roads and routes).
M.O.6.3.4	create designs using line and rotational symmetry.
M.O.6.3.5	predict, describe, and perform transformations on two-dimensional shapes • translations • rotations • reflections
M.O.6.3.6	use geometric representations to solve real-world problems.
M.O.6.3.7	plot polygons on coordinate grids, determine lengths and areas from the graph.

Grade 6	Mathematics
Standard 4	Measurement
M.S.6.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.6.4)				
Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Sixth grade students at the distinguished level in mathematics collect data by examination and by graphing, determine an approximation for pi. They develop a formula for the circumference of a circle from this information. They determine formulas for perimeter of polygons, area	Sixth grade students at the above mastery level in mathematics collect data, by examination, determine an approximation for pi. They develop a formula for the circumference of a circle from this information. They determine formulas for perimeter of polygons, area of parallelograms and	Sixth grade students at the mastery level in mathematics determine an approximation for pi using actual measurements. They determine formulas for perimeter of polygons, area of parallelograms and triangles, circumference and area of circles, volume of rectangular prisms, and	Sixth grade students at the partial mastery level in mathematics measure and state that the distance around a circle is about three times the diameter. They calculate the area of rectangles and identify through modeling the formula for the area of a triangle and the volume of a	Sixth grade students at the novice level in mathematics states that the distance around a circle is about three times the diameter. They identify the formula for area of a rectangle and model the formula for volume of a rectangular prism. They identify the surfaces of a rectangular

of parallelograms and triangles, circumference and area of circles, volume of rectangular prisms, and perimeter and area of composite figures; they justify the formulas; they use these formulas in problem solving situations. They describe surface area of rectangular prisms and cylinders; they find the surface area of rectangular prisms; they find the volume of cylinders, including those in real-world situations; they justify the methods and their answers; they express formulas algebraically. They construct scale drawings, and describe mathematically in writing the method they used.	triangles, circumference and area of circles, volume of rectangular prisms, and perimeter and area of composite figures; they use these formulas in problem solving situations. They describe surface area of rectangular prisms and cylinders; they find the surface area of rectangular prisms; they find the volume of cylinders, including those in real-world situations; they justify the methods and their answers. They construct scale drawings of regular polygons, and explain the method they used. They demonstrate and compare the relationship between area and perimeter of plane figures. They apply the formulas for area of rectangles and the volume of a rectangular prism.	perimeter and area of composite figures. They describe surface area of rectangular prisms and cylinders; they find the surface area of rectangular prisms; they find the volume of cylinders, including those in real-world situations. They construct scale drawings of regular polygons.	rectangular prism. They identify and find the area of the surfaces of a rectangular prism. They identify similar polygons and construct scale drawings of rectangles.	prism. They identify similar polygons.

Objectives	Students will
M.O.6.4.1	determine an approximation for pi using actual measurements.
M.O.6.4.2	develop and test hypotheses to determine formulas for • perimeter of polygons, including composite figures • area of parallelograms • area of triangles • area of composite figures made of parallelograms and triangles • circumference of a circle • area of a circle • volume of a rectangular prism
M.O.6.4.3	investigate, model and describe surface area of rectangular prisms and cylinders; develop strategies to determine the surface area of rectangular prisms
M.O.6.4.4	develop strategies to determine volume of cylinders; solve real-world problems involving volume of cylinders, justify the results.

M.O.6.4.5	given a two-dimensional polygon, construct a scale drawing given the scale factor.

Grade 6	**Mathematics**
Standard 5	Data Analysis and Probability
M.S.6.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.6.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Sixth grade students at the distinguished level in mathematics design an experiment from a problem-solving situation in order to collect, organize, display, and interpret data in bar, line, and circle graphs, stem and leaf plots, and/or frequency tables. They draw conclusions from the data and justify the use of the graphical representation they used. They create a data set for a specific mean, median, mode and range. They design an experiment involving either fair or unfair probability, determine the theoretical probability, make a prediction based on it, experiment and draw conclusions from their findings. They compare and contrast combinations and permutation; they find and explain ways to	Sixth grade students at the above mastery level in mathematics design an experiment from a problem-solving situation in order to collect, organize, display, and interpret data in bar, line, and circle graphs, stem and leaf plots, and/or frequency tables. They justify the use of the graphical representation they used. They recognize and explain how additional data in a set would affect the measures of central tendency. They create a probability experiment, determine the theoretical probability, make a prediction, experiment and draw conclusions from their findings. They list permutations and combinations; they explore ways to determine the number of combinations	Sixth grade students at the mastery level in mathematics collect, organize, display, and interprets data in bar, line and circle graphs, stem and leaf plots, and frequency tables. They collect and interpret real-world data using mean, median, mode, and range; they determine the effect of outliers. They predict outcomes of events and express probability as a ratio, decimal, or percent. They determine permutations and combinations.	Sixth grade students at the partial mastery level in mathematics organize and display data in bar, line, and circle graphs, stem and leaf plots, and frequency tables. They determine mean, median, mode, median and range. They determine probability of an event and express it as a fraction. They list combinations of simple data.	Sixth grade students at the novice level in mathematics display data in bar and line graphs. They determine median, mode and range from a set of data. They identify probability of an event using a coin or a cube. They name combinations from simple real-world situations.

determine the number of combinations and permutations; they find and describe ways that this information is useful in real-world situations.	and permutations.			

Objectives	Students will
M.O.6.5.1	collect, organize, display, read, interpret and analyze real-world data using appropriate graphs and tables (with and without technology).
M.O.6.5.2	collect and interpret real-world data, formulate questions using mean, median, mode, and range and determine the effect of outliers on the data (with and without technology).
M.O.6.5.3	perform simple probability events using manipulatives; predict the outcome given events using experimental and theoretical probability; express experimental and theoretical probability as a ratio, decimal or percent.
M.O.6.5.4	determine combinations and permutations of given real-world situations by multiple strategies, including creating lists.

Seventh Grade Mathematics Content Standards and Objectives

Seventh grade objectives place emphasis on preparing students to take Algebra I in the eighth grade year. With less emphasis on paper/pencil computation, calculators are emphasized in all facets of the mathematics daily work as well as test situations. Review of all basic mathematics skills occurs in a relevant context. Problem solving is embedded in the curriculum, a variety of new concepts are utilized, and cooperative learning promotes communication skills. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 7	**Mathematics**
Standard 1	**Number and Operations**
M.S.7.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.7.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Seventh grade students at the distinguished level in mathematics compare, order, differentiate among and between rational and irrational numbers; and convert between decimal and fraction representations of rationals (including repeating decimals). They identify a number between any two given numbers and justify their thinking. They model the relationship between perfect squares and square roots and estimate and evaluate square root by estimation and calculation and justify	Seventh grade students at the above mastery level in mathematics compare, order, differentiate among and between rational and irrational numbers; and convert between decimal and fraction representations of rationals (including repeating decimals). They model the relationship between perfect squares and square roots and estimate and evaluate square root by estimation and calculation. They justify the use of the commutative, associative, distributive, identity, and inverse	Seventh grade students at the mastery level in mathematics compare, order, and differentiate among and between rational and irrational numbers. They model the relationship between perfect squares and square roots and estimate and evaluate square root. They justify the use of the commutative, associative, distributive, identity, and inverse properties to simplify numeric expressions. They analyze and solve real-world problems, demonstrate fluency in	Seventh grade students at the partial mastery level in mathematics compare, order, and differentiate among rational numbers. They evaluate square root of perfect squares and identify between which whole numbers the square root of a number from 1-144 is found. They use and identify the commutative, associative, distributive, identity, and inverse properties when appropriate to simplify numeric expressions involving whole numbers. They analyze and solve real-world	Seventh grade students at the novice level in mathematics compare and order integers, terminating decimals, and fractions. They evaluate square root of perfect squares. They use the commutative, associative, distributive, identity, and inverse properties to simplify numeric expressions involving whole numbers. They analyze and solve real-world problems with calculator assistance, and demonstrate fluency in performing the whole number operations required

the use of this method. They justify the use of the commutative, associative, distributive, identity, and inverse properties to simplify numeric and algebraic expressions; they explain the connection between simplifying numeric and algebraic expressions. They analyze and solve real-world problems, demonstrate fluency in performing the operations required to solve them; in a clear, concise manner, justify solutions and explain the process used in solving. Using the laws of exponents for expressions with numeric and variable bases, they generalize by expressing the rules algebraically; they solve problems using numbers in scientific notation.	properties to simplify numeric and algebraic expressions. They analyze and solve real-world problems, demonstrate fluency in performing the operations required to solve them, justify solutions, and explain the process used in solving. They extend the laws of exponents for expressions with numeric bases to expressions with variable bases; they solve problems using numbers in scientific notation.	performing the operations required to solve them, and justify solutions. They find and justify laws of exponents for expressions with numeric bases; they solve problems using numbers in scientific notation.	problems with calculator assistance, but demonstrate fluency in performing the whole number operations required to solve them; justify solutions. They apply laws of positive exponents to expressions with numeric bases. They solve problems using numbers in scientific notation with positive exponents.	to solve them. They evaluate powers with positive exponents and convert between numbers in scientific notation with positive exponents and standard form.

Objectives	Students will
M.O.7.1.1	compare, order, and differentiate among integers, decimals, fractions, and irrational numbers using multiple representations (e.g., symbols, manipulatives, graphing on a number line).
M.O.7.1.2	model the relationship between perfect squares and square roots using physical representations; estimate square root and evaluate using technology.
M.O.7.1.3	using simple computation and problem-solving situations, demonstrate fluency and justify solutions in performing operations with rational numbers including negative numbers for • adding • subtracting • multiplying • dividing
M.O.7.1.4	justify the use of the commutative, associative, distributive, identity and inverse properties to simplify numeric expressions.
M.O.7.1.5	analyze and solve grade-appropriate real-world problems with whole numbers, integers, decimals, fractions and percents including

	problems involving • discounts, • interest, • taxes, • tips, • percent increase or decrease, and justify solutions including using estimation and reasonableness.
M.O.7.1.6	use inductive reasoning to find and justify the laws of exponents with numeric bases
M.O.7.1.7	solve problems using numbers in scientific notation (positive and negative exponents) with and without technology, and interpret from real life contexts.

Grade 7	**Mathematics**
Standard 2	**Algebra**
M.S.7.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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 contents.

Performance Descriptors (M.PD.7.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Seventh grade students at the distinguished level in mathematics express a rule algebraically and extend the sequence in arithmetic and geometric sequence. They plot lines on a coordinate plane, determine the slope, and solve problems algebraically, in a clear, concise manner, justify solution, and explain the process used in solving. They simplify and evaluate algebraic expressions with whole numbers, fractions, integers, absolute value,	Seventh grade students at the above mastery level in mathematics create a rule and extend the sequence in arithmetic and geometric sequences. They plot lines on a coordinate plane, determine the slope, and solve problems algebraically, justifying solutions, and explain the process used in solving. They evaluate algebraic expressions with whole numbers, fractions, integers, absolute value, and exponents, using order	Seventh grade students at the mastery level in mathematics find missing elements in arithmetic and geometric sequences. They plot lines on a coordinate plane, determine the slope, and solve problems algebraically justifying solutions. They evaluate algebraic expressions with whole numbers, integers, absolute value, and exponents, using order of operations. They create input/output function tables to predict values in problem	Seventh grade students at the partial mastery level in mathematics identify which operation is used to create a sequence and identify it as an arithmetic or geometric sequence. They plot lines on a coordinate plane, determine the slope, and solve problems algebraically. They evaluate algebraic expressions with whole numbers, and integers using order of operations. They solve one-step linear equations involving	Seventh grade students at the novice level in mathematics identify which operation is used to create a sequence. They plot lines on a coordinate plane and identify the slope as being positive or negative. They evaluate algebraic expressions using whole numbers and the order of operations. They solve one-step linear equations involving whole numbers. They complete input/output function tables. They solve proportions. They solve

and exponents, using order of operations. They create input/output function tables to predict values in problem solving situations and express the rule algebraically. They distinguish between proportional and non-proportional situations, write and solve a proportion for a proportional situation, and justify the solution. They solve multi-step linear equations containing rational numbers and solve and graph multi-step inequalities.	of operations. They create input/output function tables to predict values in problem solving situations and state the rule. They write and solve a proportion for a proportional situation and justify the solution. They solve one-step linear equations containing rational numbers and solve and graphs basic inequalities.	solving situations. They solve problems involving proportional situations. They solve one-step linear equations containing rational numbers and solve basic inequalities.	integers. They complete input/output function tables to predict values in problem solving situations. They recognize that two equal ratios form a proportion and solve one-step equations and inequalities involving whole numbers.	one-step equations involving whole numbers.

Objectives	Students will
M.O.7.2.1	use inductive reasoning to find missing elements in a variety of arithmetic and geometric patterns including algebraic sequences and series.
M.O.7.2.2	evaluate algebraic expressions with whole numbers, integers, absolute value and exponents using the order of operations.
M.O.7.2.3	solve problems by creating an input/output function table(including, but not limited to, spreadsheets) to predict future values, given a real-world situation involving rational numbers.
M.O.7.2.4	analyze proportional relationships in real-world situations, select an appropriate method to determine the solution and justify reasoning for choice of method to solve.
M.O.7.2.5	solve one-step linear equations and inequalities using a variety of strategies containing rational numbers with integer solutions; graph solutions, and justify the selection of the strategy and the reasonableness of the solution.
M.O.7.2.6	plot lines within the Cartesian coordinate plane from a table of values to solve mathematical real-world problems.
M.O.7.2.7	determine the slope of a line from its graphical representation.
M.O.7.2.8	represent algebraically and solve real-world application problems and justify solutions.
M.O.7.2.9	identify a real life problem involving proportionality; make a hypothesis as to the outcome; develop, justify, and implement a method to collect, organize, and analyze data; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project using words, graphs, drawings, models, or tables.

Grade 7	Mathematics
Standard 3	Geometry
M.S.7.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.7.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Seventh grade students at the distinguished level in mathematics identify and construct angle-pairs, congruent segments and angles, perpendicular bisectors of segments, and angle-bisectors. They find the missing measure in an angle-pair, identify corresponding, alternate-interior and alternate-exterior angles given a measure. They apply line, rotational symmetry and transformations. They solve real-world problems involving scale by writing proportions and creating scale models and use compound geometric figures.	Seventh grade students at the above mastery level in mathematics identify and construct angle-pairs, congruent segments and angles, perpendicular bisectors of segments, and angle-bisectors. They find the missing measure in an angle-pair given a measure. They apply line symmetry and transformations and recognize rotational symmetry. They solve real-world problems involving scale by writing proportion and use compound geometric figures.	Seventh grade students at the mastery level in mathematics identify and construct angle-pairs, congruent segments and angles, perpendicular bisectors of segments, and angle-bisectors. They apply line symmetry and transformations. They solve real-world problems involving scale and use compound geometric figures.	Seventh grade students at the partial mastery level in mathematics identify and construct angle-pairs, angles, congruent segments and bisectors of segments. They identify line symmetry and transformations. They solve ratio and proportion and real-world problems involving geometric figures.	Seventh grade students at the novice level in mathematics identify angle-pairs, congruent segments and angles. They recognize line symmetry and transformations. They solve simple ratio and proportion problems with simple geometric figures.

Objectives	Students will
M.O.7.3.1	identify and construct • angle-pairs adjacent, complementary, supplementary, vertical • congruent segments and angles • perpendicular bisectors of segments • angle-bisectors
M.O.7.3.2	apply line symmetry to classify plane figures.
M.O.7.3.3	apply rotations, reflections, translations to plane figures and determine the coordinates of its transformation.
M.O.7.3.4	pose and solve ratio and proportion problems including scale drawings and similar polygons.

M.O.7.3.5	solve problems and explain the relationships among scale factor and area and volume including • square of a scale factor • cube of a scale factor
M.O.7.3.6	solve mathematical real-world problems using compound geometric figures.

Grade 7	**Mathematics**
Standard 4	**Measurement**
M.S.7.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will: • demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurements, and • apply appropriate techniques, tools and formulas to determine measurements.

Performance Descriptors (M.PD.7.4)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Seventh grade students at the distinguished level in mathematics solve real-world problems (including those that have missing measures) involving perimeter, circumference, area, surface area, distance and temperature and volume of prisms and cylinders and develop formulas; they convert units of measure. They create and solve problems involving the Pythagorean Theorem and indirect measurement in right triangles.	Seventh grade students at the above mastery level in mathematics solve real-world problems involving perimeter, circumference, area, surface area, distance and temperature and volume of prisms and cylinders and develop formulas; they convert units of measure. They use the Pythagorean Theorem, indirect measure, and definitions to solve right-triangle application problems.	Seventh grade students at the mastery level in mathematics solve real-world problems involving perimeter, circumference, area, surface area, distance and temperature and volume of prisms and cylinders they convert units of measure. They use the Pythagorean Theorem to find the length of any side of a right triangle.	Seventh grade students at the below mastery level in mathematics solve problems involving perimeter, circumference, area, surface area, distance and temperature; they convert units of measure. They use the Pythagorean Theorem to find the length of the hypotenuse of a right triangle.	Seventh grade students at the novice level in mathematics solve problems involving perimeter, circumference, area and, surface area; they convert units of measure. They state the Pythagorean Theorem.

Objectives	Students will
M.O.7.4.1	select and apply an appropriate method to solve (including, but not limited to, formulas) justify the method and the reasonableness of the solution, given a real-world problem solving situation involving • perimeter • circumference • area • surface area of prisms (rectangular and triangular)

	• volume of prisms and cylinders • distance and temperature (Celsius, Fahrenheit)
M.O.7.4.2	use the Pythagorean Theorem to find the length of any side of a right triangle and apply to problem solving situations.
M.O.7.4.3	convert units of measurement, linear, area and volume, within customary and metric systems.

Grade 7	**Mathematics**
Standard 5	**Data Analysis and Probability**
M.S.7.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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

Performance Descriptors (M.PD.7.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Seventh grade students at the distinguished level in mathematics determine theoretical probability of compound, independent events, make and test predictions, and explain their thinking. They create and solve problems involving combinations and permutations. They collect, organize, graphically represent, analyze, and interpret data displays; solve problems using measures of central tendency to interpret the data; and solve problems using measures of central tendency that involve missing data.	Seventh grade students at the above mastery level in mathematics determine theoretical probability of compound, independent events, and make and test predictions. They use appropriate technology to solve application problems involving combinations and permutations. They collect, organize, graphically represent, analyze, and interpret data displays; and solve problems using measures of central tendency to interpret the data.	Seventh grade students at the mastery level in mathematics determine theoretical probability to make, test predictions. They determine combinations and permutations by constructing sample spaces. They collect, organize, graphically represent, analyze, and interpret data displays and solve problems using measures of central tendency.	Seventh grade students at the partial mastery level in mathematics predict the outcome of an event given its probability and test their prediction and identify the theoretical and experimental probability. They list combinations and permutations of three items. They collect, organize, graphically represent data displays and solve problems using measures of central tendency.	Seventh grade students at the novice level in mathematics predict the outcome of an event given its probability and test their prediction. They recognize a situation involving a combination and a permutation. They collect and organize data and determine measures of central tendency.

Objectives	Students will
M.O.7.5.1	determine theoretical probability of an event, make and test predictions through experimentation.

M.O.7.5.2	determine combinations and permutations by constructing sample spaces (e.g., listing, tree diagrams, frequency distribution tables).
M.O.7.5.3	collect, organize, graphically represent, and interpret data displays including frequency distributions, line-plots, scatter plots, box and whiskers, and multiple-line graphs.
M.O.7.5.4	analyze and solve application problems involving measures of central tendency (mean, median, mode) and dispersion (range) from data, graphs, tables, and experiments using appropriate technology to compare two sets of data.

Eighth Grade Mathematics Content Standards and Objectives

Eighth grade objectives provide an alternative course for students who do not take Algebra I in the eighth grade. In addition to reinforcing the concepts presented in seventh grade, this course extends problem solving to a more sophisticated level. Linear equations, systems of linear equations, proportional reasoning and rate of change are emphasized in the Algebra strand in preparation for the formal Algebra I course. Lessons involving cooperative learning, manipulatives, or technology strengthen understanding of concepts while fostering communication and reasoning skills. Calculator use is emphasized for all mathematical tasks including assessment. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 8	**Mathematics**
Standard 1	**Number and Operations**
M.S.8.1	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.8.1)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Eighth grade students at the distinguished level in mathematics analyze, describe and compare the characteristics of rational and irrational numbers and use rational and irrational numbers to create and solve problems. They create and solve problems involving powers and radicals; they solve problems using numbers in scientific notation. They analyze and solve application problems involving properties of rational and irrational	Eighth grade students at the above mastery level in mathematics analyze, describe and compare the characteristics of rational and irrational numbers ; and use rational and irrational numbers; they add, subtract, multiply and divide with rational and irrational numbers. They solve problems involving powers and radicals; they solve problems using numbers in scientific notation. They analyze and solve application problems involving rational and	Eighth grade students at the mastery level in mathematics analyze, describe and compare the characteristics of rational and irrational numbers They solve problems using powers and square roots; they solve problems using numbers in scientific notation They analyze and solve application problems involving any rational numbers (e.g. rates, tips, discounts, sales tax, and interest) and verify solutions using estimation techniques.	Eighth grade students at the partial mastery level in mathematics describe, order and compare rational and irrational numbers. They evaluate powers of integers; they solve problems using numbers in scientific notation. They analyze and solve application problems involving no more than two operations with whole numbers, integers, decimals, fractions, and percents (e.g. rates, tips, discounts, sales tax, and interest) and verify solutions	Eighth grade students at the novice level in mathematics compare and order rational and irrational numbers by converting to and comparing their decimal forms. They evaluate powers of integers; they convert between numbers in scientific notation and standard form. They solve application problems involving one operation with whole numbers, integers, decimals, fractions, and percents (e.g. rates, tips, discounts, sales tax, and interest) and verify solutions

number, radicals, and powers and, in a clear, concise manner, justify solutions and explain the process used in solving.	irrational numbers, verify solutions using estimation techniques, and explain the process used in solving.		using estimation techniques.	using estimation techniques.

Objectives	Students will
M.O.8.1.1	analyze, describe and compare the characteristics of rational and irrational numbers.
M.O.8.1.2	analyze and solve application problems with • powers, • squares, • square roots, • scientific notation, and verify solutions using estimation techniques.
M.O.8.1.3	analyze and solve grade-appropriate real-world problems with • whole numbers, • decimals, • fractions, • percents, percent increase and decrease, • integers, and including, but not limited to, rates, tips, discounts, sales tax and interest and verify solutions using estimation techniques.

Grade 8	Mathematics
Standard 2	Algebra
M.S.8.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.8.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Eighth grade students at the distinguished level in mathematics formulate an algebraic expression from data in a table arithmetic, geometric, or algebraic pattern; they analyze the	Eighth grade students at the above mastery level in mathematics formulate an algebraic expression from data in a table arithmetic, geometric, or algebraic pattern; they analyze the	Eighth grade students at the mastery level in mathematics formulate a rule from data in a table to generate an arithmetic, geometric, or algebraic pattern; they analyze tables	Eighth grade students at the partial mastery level in mathematics complete a table to predict values in a problem solving situation involving an arithmetic, geometric, or algebraic	Eighth grade students at the novice level in mathematics create a table of values for and graph linear equations; they identify the slope of a line from its graph as being positive or negative. They

table and rule to determine and explain whether or not there exists a functional relationship. They solve multi-step linear equations and literal equations and solve and graph multi-step inequalities in one variable with variables on both sides. They graph linear equations and inequalities; they determine the slope of a line given the graph of the line, two points, or the slope/intercept equation; they determine the equation of a line, given the graph or a table of values. They solve problems by creating and simplifying polynomial expressions; they justify their process and solution.	table and rule to determine if a function relationship exists. They solve multi-step linear equations and solve and graph multi-step inequalities in one variable with variables on both sides. They graph linear equations and inequalities; they determine the slope of a line given the graph of the line, two points, or the slope/intercept equation; they determine the equation of a line, given the graph. They generate and apply expressions and equations, including proportions, to solve problems and justify solutions; they add and subtract polynomials to solve problems.	and rules to determine if a functional relationship exists. They solve two-step linear equations and solve and graph two-step inequalities with rational solutions. They graph linear equations and inequalities; they determine the slope of a line given the graph of the line, two points, or the slope/intercept equation. They generate and apply expressions and equations, including proportions, to solve real-world problems; they add and subtract polynomials limited to two variables and positive exponents.	pattern; they analyze the table and rule to determine if a function relationship exists. They solve one and two-step linear equations and solve and graph one and two-step inequalities involving integers. They create a table of values for and graph linear equations; they determine the slope of a line from its graph. They write and simplify algebraic expressions with whole numbers, integers, rational numbers, absolute value, and exponents using order of operations; they add and subtract polynomials limited to two variables and no exponents	solve one and two-step linear equations and solve and graph one and two-step inequalities involving whole numbers. They complete a table to generate an arithmetic, geometric, or algebraic pattern; they analyze the table and rule to determine if a function relationship exists. They write algebraic expressions for word phrases, solve proportions, and identify like terms in monomials; they add and subtract polynomials limited to two variables and no exponents.

Objectives	Students will
M.O.8.2.1	use a variety of strategies to solve one and two-step linear equations and inequalities with rational solutions; defend the selection of the strategy; graph the solutions and justify the reasonableness of the solution.
M.O.8.2.2	identify proportional relationships in real-world situations, then find and select an appropriate method to determine the solution; justify the reasonableness of the solution.
M.O.8.2.3	add and subtract polynomials limited to two variables and positive exponents.
M.O.8.2.4	use systems of linear equations to analyze situations and solve problems.
M.O.8.2.5	apply inductive and deductive reasoning to write a rule from data in an input/output table, analyze the table and the rule to determine if a functional relationship exists.
M.O.8.2.6	graph linear equations and inequalities within the Cartesian coordinate plane by generating a table of values (with and without technology).
M.O.8.2.7	formulate and apply a rule to generate an arithmetic, geometric and algebraic pattern.
M.O.8.2.8	determine the slope of a line using a variety of methods including • graphing • change in y over change in x • equation
M.O.8.2.9	represent and solve real-world grade-appropriate problems using multiple strategies and justify solutions.

M.O.8.2.10	identify a real life problem involving change over time; make a prediction as to the outcome; develop, justify, and implement a method to collect, organize, and analyze data; generalize the results to make a conclusion; compare the prediction and the result of the investigation; present the problem using words, graphs, drawings, models, or tables.

Grade 8	**Mathematics**
Standard 3	**Geometry**
M.S.8.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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 transformation and use symmetry to analyze mathematical situations, and • solve problems using visualization, spatial reasoning, and geometric modeling.

Performance Descriptors (M.PD.8.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Eighth grade students at the distinguished level in mathematics apply relationships among angles formed by parallel lines cut by a transversal to determine missing measures and justify their solution; they construct perpendicular and angle bisectors. They use transformations to create Escher-like tessellations. They create scale models of three-dimensional prisms; they use ratio, proportion to determine scale factor in similar figures. They solve problems involving intersections and unions of plane and solid figures. They make and test conjectures concerning relationships between the	Eighth grade students at the above mastery level in mathematics apply relationships among angles formed by parallel lines cut by a transversal to determine missing measures; they construct perpendicular and angle bisectors. They use transformations to create tessellations. They create scale models of three-dimensional rectangular prisms; they use ratio, proportion to determine scale factor in similar figures. They prove conjectures involving regular polygons and uses coordinate geometry to solve problems involving similar figures and transformations. They	Eighth grade students at the mastery level in mathematics recognize relationships among angles formed by parallel lines cut by a transversal; they construct perpendicular and angle bisectors. They create geometric patterns and transformations to predict results of combining, subdividing and changing shapes of plane figures and solids. They create scale models; they use ratio, proportion to determine scale factor in similar figures. They make and test conjectures concerning regular polygons, cross section of a solid such as a cylinder, cone and pyramid, or the intersection of two or more geometric figures in	Eighth grade students at the partial mastery level in mathematics identify the classifications of angles formed by parallel lines cut by a transversal (alternate interior angles, alternate exterior angles, corresponding angles) and recognize congruent angles pairs formed by parallel lines cut by a transversal; they recognize perpendicular and angle bisectors. They identify geometric patterns and transformations to predict results of combining, subdividing and changing shapes of plane figures and solids. They create scale models of rectangles and right triangles; they use ratio, proportion to	Eighth grade students at the novice level in mathematics identify the classifications of angles formed by parallel lines cut by a transversal (alternate interior angles, alternate exterior angles, and corresponding angles); they recognize perpendicular and angle bisectors. They recognize geometric patterns, transformations and results of combining, subdividing and changing shapes of plane figures and solids. They create scale models of rectangles; they use ratio, proportion to determine scale factor in similar figures. They test conjectures concerning regular polygons, cross section of a solid such as a

dimensions of geometric figures; state and justify the results and refine the conjecture. They classify polyhedrons according to the number and shape of faces; and use inductive reasoning to determine and algebraically state the relationship between vertices, faces and edges.	make and test conjectures concerning regular polygons, cross section of a solid such as a cylinder, cone and pyramid, or the intersection of two or more geometric figures in the plan; refine the conjecture. They classify polyhedrons according to the number and shape of faces; use inductive reasoning to determine and state the relationship between vertices, faces and edges.	the plan; justify the results. They classify polyhedrons according to the number and shape of faces and use inductive reasoning to determine the relationship between vertices, faces and edges.	determine scale factor in similar figures. They make and test conjectures concerning regular polygons, cross section of a solid such as a cylinder, cone and pyramid, or the intersection of two or more geometric figures in the plan; state the results. They classify polyhedrons according to the number and shape of faces and determine the number of vertices, faces and edges.	cylinder, cone and pyramid, or the intersection of two or more geometric figures in the plan; state the results. They determine the number of vertices, faces and edges and distinguish between prisms and pyramids

Objectives	Students will
M.O.8.3.1	justify the relationships among corresponding, alternate interior, alternate exterior and vertical angles when parallel lines are cut by a transversal using models, pencil/paper, graphing calculator, and technology.
M.O.8.3.2	classify polyhedrons according to the number and shape of faces; use inductive reasoning to determine the relationship between vertices, faces and edges (edges + 2 = faces + vertices).
M.O.8.3.3	identify, apply, and construct perpendicular and angle bisectors with and without technology) given a real-world situation,.
M.O.8.3.4	create geometric patterns including tiling, art design, tessellations and scaling using transformations (rotations, reflections, translations) and predict results of combining, subdividing, and changing shapes of plane figures and solids.
M.O.8.3.5	create scale models of similar figures using ratio, proportion with pencil/paper and technology and determine scale factor
M.O.8.3.6	make and test a conjecture concerning • regular polygons, • the cross section of a solid such as a cylinder, cone, and pyramid, • the intersection of two or more geometric figures in the plane (e.g., intersection of a circle and a line), and justify the results.

Grade 8	Mathematics			
Standard 4	Measurement			
M.S.8.4	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will • demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurements, and • apply appropriate techniques, tools, and formulas to determine measurements.			
Performance Descriptors (M.PD.8.4)				
Distinguished	Above Mastery	Mastery	Partial Mastery	Novice

Eighth grade students at the distinguished level in mathematics determine the volume of prisms, pyramids, cylinders, cones, and spheres in real-world problem situations; they explain and justify the reasonableness of their method and solution in a clear, concise manner. They solve problems involving missing measurements in plane and solid geometric figures; they justify the results in a clear, concise manner. They create and solve problems involving the Pythagorean Theorem and indirect measurement in right triangles; they justify the results in a clear, concise manner.	Eighth grade students at the above mastery level in mathematics determine the volume of prisms, pyramids, cylinders, cones, and spheres in real-world problem situations; they explain and justify the reasonableness of their method and solution. They solve problems involving missing measurements in plane and solid geometric figures; they justify the results. They create and solve problems involving the Pythagorean Theorem and indirect measurement in right triangles.	Eighth grade students at the mastery level in mathematics determine the volume of prisms, pyramids, cylinders, cones, and spheres in real-world problem situations and justify the reasonableness of the solution. They solve problems involving missing measurements in plane and solid geometric figures. They use the Pythagorean Theorem, indirect measure, and definitions to solve right-triangle application problems.	Eighth grade students at the partial mastery level in mathematics determine the volume of prisms, cylinders, cones, and pyramids in real-world problem situations and justify the reasonableness of the solution. They solve problems involving missing measurements in rectangular prisms and plane geometric figures. They use the Pythagorean Theorem to find unknown sides of right triangles.	Eighth grade students at the novice level in mathematics determine the volume of prisms, cylinders, and pyramids in real-world problem situations and justify the reasonableness of the solution. They solve problems involving missing measurements in plane geometric figures. They use the Pythagorean Theorem to find the hypotenuse of right triangles.

Objectives	Students will
M.O.8.4.1	select and apply an appropriate method to solve; justify the method and the reasonableness of the solution of problems involving volume of • prisms • cylinders • cones • pyramids • spheres given real-world problem solving situations.
M.O.8.4.2	solve problems involving missing measurements in plane and solid geometric figures using formulas and drawings including irregular figures, models or definitions.
M.O.8.4.3	solve right triangle problems where the existence of triangles is not obvious using the Pythagorean Theorem and indirect measurement in real-world problem solving situations.

Grade 8	Mathematics
Standard 5	Data Analysis and Probability
M.S.8.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.8.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Eighth grade students at the distinguished level in mathematics make hypotheses, collect data, create and extrapolate information from multiple data displays and construct convincing arguments based on data analysis. They use appropriate technology to solve application problems involving combinations and permutations and investigation compound probability of dependent and independent events; they compare and contrast simple probability with compound probability and dependent events with independent events; they design and conduct experiments involving compound probability, dependent events, or independent events.	Eighth grade students at the above mastery level in mathematics collect data, create and extrapolate information from multiple data displays and construct convincing arguments based on data analysis. They use appropriate technology to solve application problems involving combinations and permutations and investigation compound probability of dependent and independent events; they compare and contrast simple probability with compound probability and dependent events with independent events.	Eighth grade students at the mastery level in mathematics create and extrapolate information from multiple data displays and construct convincing arguments based on data analysis. They use appropriate technology to solve application problems involving combinations and permutations and investigation compound probability of dependent and independent events.	Eighth grade students at the partial mastery level in mathematics create and extrapolate data from multiple displays and draw conclusions based on data analysis. They determine combinations and permutations by constructing sample spaces and determine experimental and theoretical probability of compound independent events.	Eighth grade students at the novice level in mathematics extrapolate information from data displays. They determine combinations and permutations by constructing sample spaces and determine experimental and theoretical probability of simple events.

Objectives	Students will
M.O.8.5.1	determine and explain whether a real-world situation involves permutations or combinations, then use appropriate technology to

	solve the problem.
M.O.8.5.2	compare the experimental and theoretical probability of a given situation (including compound probability of a dependent and independent event).
M.O.8.5.3	create and extrapolate information from multiple-bar graphs, box and whisker plots, and other data displays using appropriate technology.
M.O.8.5.4	analyze problem situations, games of chance, and consumer applications using random and non-random samplings to determine probability, make predictions, and identify sources of bias.
M.O.8.5.5	draw inferences, make conjectures and construct convincing arguments involving • different effects that changes in data values have on measures of central tendency • misuses of statistical or numeric information, based on data analysis of same and different sets of data.

ALGEBRA I CONTENT STANDARDS AND OBJECTIVES

Algebra I objectives provide the gateway to all higher mathematics courses. An emphasis on conceptual development and multiple representations will be used to draw generalizations and to serve as a tool for solving real-world problems. Algeblocks may be used to bridge the gap from the concrete to the abstract. Available technology such as calculators, computers, and interactive utilities are to be used as tools to enhance learning. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 9-12	**Mathematics: Algebra I**
Standard 2	**Algebra**
M.S.A1.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.A1.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Algebra I students at the distinguished level formulate and simplify algebraic expressions (including polynomial) for use in equations and inequalities; they develop and justify each step in the simplification process using order of operation and properties of real numbers. They create, solve, and provide clear, concise mathematical reasoning and justification of solutions for: multi-step linear equations, absolute value equations, linear inequalities (in one variable), quadratic	Algebra I students at the above mastery level formulate and simplify algebraic expressions (including polynomial) for use in equations and inequalities; they justify each step in the simplification process using order of operation and properties of real numbers. They create, solve, and provide mathematical reasoning and justification of solutions for: multi-step linear equations, absolute value equations, linear inequalities (in one variable), quadratic	Algebra I students at the mastery level formulate and simplify algebraic expressions (including polynomial) for use in equations and inequalities. They derive and use the laws of exponents on expressions with integral exponents. They create, solve, and judge the reasonableness of solutions for: multi-step linear equations, absolute value equations, linear inequalities (in one variable), quadratic equations and systems of linear equations; select and	Algebra I students at the partial mastery level formulate and simplify algebraic expressions, with integer coefficients, (including polynomial) for use in equations and inequalities. They create solve, and judge the reasonableness of solutions for: multi-step linear equations, absolute value equations, linear inequalities (in one variable), quadratic equations and systems of linear equations that contain only integral coefficients; select and solve appropriate	Algebra I students at the novice level formulate and simplify algebraic expressions, with whole number coefficients (including polynomial) for use in equations and inequalities. They create, solve, and judge the reasonableness of solutions for: multi-step linear equations, absolute value equations, linear inequalities (in one variable), quadratic equations and systems of linear equations that contain only whole number coefficients; select and

equations and systems of linear equations; select and solve appropriate literal equations. They design investigations or experiments and gather data and display the data in a variety of graphs and tables to make and support inferences and predictions, including those based on the rate of change; they justify steps and summarize results in clear, concise manner. They analyze data to prove the existence of a pattern numerically, algebraically and graphically; they write equations from the patterns and make and justify inferences and predictions in a clear, concise manner. They use multiple representations to model real-life situations involving exponential growth and decay equations comparing equations $y = 2^x$ and $y=(½)^x$ for integral values of x and summarize the relationship in a clear, concise manner. They develop and explain methods of factoring through the use of area models; write the linear factors of a higher order polynomial by examining a graph; use factoring in	equations and systems of linear equations; select and solve appropriate literal equations. They gather data and display the data in a variety of graphs and tables to make and support inferences and predictions, including those based on the rate of change; they justify steps and summarize results in clear concise manner. They analyze data to prove the existence of a pattern numerically, algebraically and graphically; they write equations from the patterns and make and justify inferences and predictions. They use multiple representations to model real-life situations involving exponential growth and decay equations comparing equations $y = 2^x$ and $y=(½)^x$ for integral values of x. They develop and explain methods of factoring through the use of area models; recognize how factored forms of quadratic equations are related to x-intercepts on a graph; use factoring in problem solving situations; and add, subtract, multiply, and divide polynomials, rational and radical expressions.	solve appropriate literal equations. They gather data and display the data in a variety of graphs and tables to make and support inferences and predictions, including those based on the rate of change. They use a variety of methods to determine the slope of a line and perform linear regressions. They analyze data to prove the existence of a pattern numerically, algebraically and graphically; they write equations from the patterns and make inferences and predictions. They describe real-life situations involving exponential growth and decay equations comparing equations $y = 2^x$ and $y=(½)^x$ for integral values of x. They develop and explain methods of factoring through the use of area models and add, subtract, multiply, and divide polynomials, rational and radical expressions. They use simulations and rules of probability to compute and interpret expected value; and design experiments to solve problems using concepts of sample space and probability distribution	literal equations. They gather data and display the data in a variety of graphs and tables to identify patterns and make predictions, including those based on the rate of change. They use a variety of methods to determine the slope of a line and perform linear regressions. They analyze data to prove the existence of a pattern numerically, algebraically and graphically; they write equations from the patterns. They identify real-life situations involving exponential growth and decay equations comparing equations $y = 2^x$ for integral values of x. They model and explain factoring through the use of area models and add, subtract, multiply, and divide polynomials, rational and radical expressions. They use simulations and rules of probability to compute and interpret expected value; and conduct experiments to solve problems using concepts of sample space and probability distribution.	solve appropriate literal equations. They gather data and display the data in a variety of graphs and tables to make predictions from an identified pattern, including those based on the rate of change. They analyze data to prove the existence of a pattern numerically, algebraically and graphically. They recognize real-life situations involving exponential grown and decay equations comparing equations $y = 2^x$ for integral values of x. They model factoring through the use of area models and add, subtract, multiply, and divide polynomial, rational, and radical expressions. They use simulations and rules of probability to compute expected value, and conduct experiments to solve problems using concepts of sample space and probability distribution.

problem solving situations; and add, subtract, multiply, and divide polynomials, rational and radical expressions. They use simulations and rules of probability to compute and interpret expected value; and identify problem situations and design experiments to solve these using concepts of sample space, probability distribution and justifying the reasonableness of the approach in a clear, concise manner.	rules of probability to compute and interpret expected value; and identify problem situations and design experiments to solve these using concepts of sample space and probability distribution.			

Objectives	Students will
M.O.A1.2.1	formulate algebraic expressions for use in equations and inequalities that require planning to accurately model real-world problems.
M.O.A1.2.2	create and solve multi-step linear equations, absolute value equations, and linear inequalities in one variable, (with and without technology); apply skills toward solving practical problems such as distance, mixtures or motion and judge the reasonableness of solutions.
M.O.A1.2.3	evaluate data provided, given a real-world situation, select an appropriate literal equation and solve for a needed variable.
M.O.A1.2.4	develop and test hypotheses to derive the laws of exponents and use them to perform operations on expressions with integral exponents.
M.O.A1.2.5	analyze a given set of data and prove the existence of a pattern numerically, algebraically and graphically, write equations from the patterns and make inferences and predictions based on observing the pattern.
M.O.A.1.2.6	determine the slope of a line through a variety of strategies (e.g. given an equation or graph).
M.O.A1.2.7	analyze situations and solve problems by determining the equation of a line given a graph of a line, two points on the line, the slope and a point, or the slope and y intercept.
M.O.A1.2.8	extrapolate data represented by graphs, tables and formulas to make inferences and predictions on rate of change (slope) and justify when communicating results within a project based investigation.
M.O.A1.2.9	create and solve systems of linear equations graphically and numerically using the elimination method and the substitution method, given a real-world situation.
M.O.A1.2.10	simplify and evaluate algebraic expressions • add and subtract polynomials • multiply and divide binomials by binomials or monomials
M.O.A1.2.11	create polynomials to represent and solve problems from real-world situations while focusing on symbolic and graphical patterns.
M.O.A1.2.12	use area models and graphical representations to develop and explain appropriate methods of factoring.

M.O.A1.2.13	simplify radical expressions • through adding, subtracting, multiplying and dividing • exact and approximate forms
M.O.A1.2.14	solve quadratic equations by • graphing (with and without technology), • factoring • quadratic formula and draw reasonable conclusions about a situation being modeled.
M.O.A1.2.15	describe real life situations involving exponential growth and decay equations including $y=2^x$ and $y=(½)^x$; compare the equation with attributes of an associated table and graph to demonstrate an understanding of their interrelationship.
M.O.A1.2.16	simplify and evaluate rational expressions • add, subtract, multiply and divide • determine when an expression is undefined.
M.O.A1.2.17	perform a linear regression (with and without technology), • compare and evaluate methods of fitting lines to data. • identify the equation for the line of regression, • examine the correlation coefficient to determine how well the line fits the data • use the equation to predict specific values of a variable.
M.O.A1.2.18	compute and interpret the expected value of random variables in simple cases using simulations and rules of probability (with and without technology).
M.O.A1.2.19	gather data to create histograms, box plots, scatter plots and normal distribution curves and use them to draw and support conclusions about the data.
M.O.A1.2.20	design experiments to model and solve problems using the concepts of sample space and probability distribution.
M.O.A1.2.21	use multiple representations, such as words, graphs, tables of values and equations, to solve practical problems; describe advantages and disadvantages of the use of each representation.

Geometry Content Standards and Objectives

Geometry objectives are designed for students who have completed the objectives for Algebra I. Study includes experiences and activities that foster in students a feeling for the value of geometry in their lives. Emphasis is placed on development of 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 both formal and informal proofs. Emphasis should be placed on connections to other branches of mathematics and other disciplines, and on workplace applications. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 9-12	**Mathematics: Geometry and Applied Geometry**
Standard 3	**Geometry**
M.S.G.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.G.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Geometry students at the distinguished level create arguments involving parallel and perpendicular lines, right triangles, congruent and similar figures, convex and concave quadrilaterals, other polygons, tessellating figures, and circles. They transfer the principles of formal and informal proof to situations that integrate geometry with other disciplines. They construct a problem that can be solved using the properties	Geometry students at the above mastery level investigate, make conjectures, justify, compare and contrast, apply and critique arguments involving properties of parallel and perpendicular lines, right triangles, congruent and similar figures, convex and concave quadrilaterals, other polygons, tessellating figures and circles. They construct and represent geometric figures pictorially	Geometry students at the mastery level investigate, make conjectures, justify, compare and contrast and apply, as appropriate relationships involving the properties of parallel and perpendicular lines, right triangles, congruent and similar figures, convex and concave quadrilaterals, other polygons, tessellating figures, and circles. They represent geometric figures pictorially with proper identification and distinguish	Geometry students at the partial mastery level investigate and apply relationships involving the properties of parallel and perpendicular lines, right triangles, congruent and similar figures, convex and concave quadrilaterals, other polygons, tessellating figures, and circles. They use symbolic logic to construct arguments. They apply undefined terms, definitions, postulates, and theorems to construct	Geometry students at the novice level investigate relationships involving the properties of parallel and perpendicular lines, right triangles, congruent and similar figures, convex and concave quadrilaterals, other polygons, tessellating figures, and circles. They apply undefined terms, definitions, postulates, and theorems to solve problems and will distinguish between inductive and deductive reasoning. They identify

of similar triangles, the Pythagorean Theorem, or trigonometric ratios, solve it, and interpret the results. They apply principles of transformational geometry to families of algebraic functions. They solve problems and prove, both formally and informally, conjectures using properties of geometric solids. They develop arguments about basic properties of non-Euclidean geometries like finite, hyperbolic, or spherical geometries.	with proper identification and distinguish between undefined and defined terms. They draw and justify conclusions in real-world settings and construct counterexamples or prove a conjecture as they differentiate and apply inductive and deductive reasoning. They investigate the proof of and apply the Pythagorean Theorem, draw conclusions that include two and three dimensions, and derive and solve formulas using nets. They use symbolic logic to construct logical arguments, test the validity of conclusions and interpret truth tables. They apply undefined terms, definitions, postulates, and theorems to construct and critique formal and informal proofs. They discover and use the properties of similar triangles to verify, justify and solve the trigonometric ratios by applying the results to design and construct a physical model that illustrates the use of a scale drawing in a real-world situation, and determine the measure of inaccessible heights or distances and interpret the	between undefined and defined terms. They investigate measures of angles and draw conclusions for the relationship to its arcs. They draw and justify conclusions in real-world settings as they differentiate and apply inductive and deductive reasoning. In a problem solving situation, they apply the Pythagorean Theorem and its converse, draw conclusions that include two and three dimensions, and solve formulas using nets. They use symbolic logic to construct logical arguments and test the validity of conclusions. They apply undefined terms, definitions, postulates, and theorems to construct formal and informal proofs. They use the properties of similar triangles to verify and justify the trigonometric ratios by applying the results to construct a physical model that illustrates the use of a scale drawing in a real-world situation and determine the measure of inaccessible heights or distances. They create and apply concepts using transformational geometry	informal proofs and will distinguish between inductive and deductive reasoning. They use the properties of similar triangles to construct scale drawings. They use transformational geometry to construct transformations and explore congruencies. They use analytical geometry to apply formulas and to verify properties of geometric figures. They explain the similarities and differences of basic geometric forms in Euclidean and spherical geometry.	corresponding parts of similar triangles. They use transformational geometry to construct transformations. They use analytical geometry to apply formulas. They investigate basic properties of segments, lines, parallel lines, and triangles in spherical geometry.

	results. They create, apply and analyze transformational geometry to construct transformations and explore congruencies and similarities, and develop and justify logical arguments. They apply and summarize concepts of analytical geometry to develop and apply formulas to construct and prove arguments and to solve practical problems. They research applications of and compare and contrast the properties of Euclidean geometry with non-Euclidean geometries. They construct a triangle's medians, altitudes, angle and perpendicular bisectors and develop and justify logical concepts to be used in solving real-world problems.	to construct transformations and explore congruencies and similarities and develop logical arguments. They apply concepts of analytical geometry to develop and apply formulas, to construct arguments, and to solve practical problems. They compare and contrast the properties of Euclidean geometry with other geometries. They construct a triangle's medians, altitudes, angle and perpendicular bisectors and develop logical concepts to be used in solving real-world problems.		

Objectives	Students will
M.O.G.3.1	represent geometric figures, such as points, lines, planes, segments, rays, and angles pictorially with proper identification and distinguish between undefined and defined terms.
M.O.G.3.2	differentiate and apply inductive and deductive reasoning, justify conclusions in real-world settings.
M.O.G.3.3	use the basic concepts of symbolic logic including identifying the converse, inverse, and contrapositive of a conditional statement and test the validity of conclusions with methods that include Venn Diagrams.
M.O.G.3.4	validate conclusions by constructing logical arguments using both formal and informal methods with direct and indirect reasoning.
M.O.G.3.5	construct formal and informal proofs by applying definitions, theorems, and postulates related to such topics as • complementary, • supplementary, • vertical angles, • angles formed by perpendicular lines, and justify the steps.

M.O.G.3.6	compare and contrast the relationships between angles formed by two lines cut by a transversal when lines are parallel and when they are not parallel, and use the results to develop concepts that will justify parallelism.
M.O.G.3.7	make conjectures and justify congruence relationships with an emphasis on triangles and employ these relationships to solve problems.
M.O.G.3.8	identify general properties of and compare and contrast the properties of convex and concave quadrilaterals • parallelograms • rectangles • rhombuses • squares • trapezoids
M.O.G.3.9	draw conclusions in problem solving situations that include two and three dimensions of figures based on the properties of similarity.
M.O.G.3.10	investigate measures of angles and lengths of segments to determine the existence of a triangle (triangle inequality) and to establish the relationship between the measures of the angles and the length of the sides (with and without technology).
M.O.G.3.11	verify and justify the basis for the trigonometric ratios by applying properties of similar triangles and use the results to find inaccessible heights and distances. Using the ratios of similar triangles to find unknown side lengths and angle measures, construct a physical model that illustrates the use of a scale drawing in a real-world situation.
M.O.G.3.12	apply the Pythagorean Theorem and its converse to solve real-world problems and derive the special right triangle relationships (i.e. 30-60-90, 45-45-90).
M.O.G.3.13	investigate measures of angles formed by chords, tangents, and secants of a circle and draw conclusions for the relationship to its arcs.
M.O.G.3.14	find angle measures of interior and exterior angles; given a polygon, find the length of sides from given data; and use properties of regular polygons to find any unknown measurements of sides or angles.
M.O.G.3.15	develop properties of tessellating figures and use those properties to tessellate the plane.
M.O.G.3.16	derive and justify formulas for area, perimeter, surface area, and volume using nets and apply them to solve real-world problems.
M.O.G.3.17	apply concepts of analytical geometry such as formulas for distance, slope, and midpoint and apply these to finding dimensions of polygons on the coordinate plane.
M.O.G.3.18	construct a triangle's medians, altitudes, angle and perpendicular bisectors using various methods; and develop logical concepts about their relationships to be used in solving real-world problems.
M.O.G.3.19	create and apply concepts using transformational geometry and laws of symmetry, of a • reflection, • translation, • rotation, • glide reflection, • dilation of a figure, and develop logical arguments for congruency and similarity.
M.O.G.3.20	compare and contrast Euclidean geometry to other geometries (i.e. spherical, elliptic) using various forms of communication such as development of physical models, oral or written reports.
M.O.G.3.21	approximate the area of irregularly shaped regions based on the approximations and the attributes of the related region, develop a

	formula for finding the area of irregularly shaped regions. Plan, organize and present results by justifying conclusions.

Algebra II Content Standards and Objectives

Algebra II objectives emphasize the use of investigation to more advanced functions, using them to solve real-world problems. Focus is on multiple representations to develop conjectures, testing and justifying validity. Calculators, computers, and interactive utilities are an integral part of instruction. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 9-12	**Mathematics: Algebra II**
Standard 2	**Algebra**
M.S.A2.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.A2.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Algebra II students at the distinguished level pose and solve problems, which require strategies that implement properties of lines. They pose problems and choose to solve using variations, quadratic equations over the set of complex numbers, systems of linear equations using matrices, quadratic inequalities, systems of linear inequalities, or absolute value inequalities and defend their choice. Their solutions synthesize the use of words, interval notation, graphs, tables, and equations and are well	Algebra II students at the above mastery level analyze practical situations to develop and use equations of lines to solve problems. They solve practical problems involving variations, quadratic equations over the set of complex numbers, systems of linear equations using matrices, quadratic inequalities, systems of linear inequalities, and absolute value inequalities by using words, interval notation, graphs, tables, and equations. They generate, analyze, and explain solutions by	Algebra II students at the mastery level determine, compare and contrast equations of lines. They solve problems involving variations, quadratic equations over the set of complex numbers, systems of linear equations using matrices, quadratic inequalities, systems of linear inequalities, and absolute value inequalities. They use words, interval notation, graphs, tables and equations to generate and analyze solutions. They extend techniques of factoring polynomials by applying methods of	Algebra II students at the partial mastery level, given sets of points, determine the equations of lines. They generate tables of values to graph and analyze quadratic functions. They solve problems involving direct and inverse variations, quadratic equations over the set of real numbers, systems of two linear equations with integral coefficients using matrices, radical and exponential equations, systems of two linear inequalities, and absolute value equations. They express solutions in both	Algebra II students at the novice level, given a graph determine the equation of lines. They solve problems involving direct variation, quadratic equations over the set of rational numbers, systems of two linear equations with integral coefficients using substitution or elimination, systems of two linear inequalities, and absolute value equations, and express solutions in numerical form. They factor polynomials using greatest common factor; binomials and trinomials using area models; and the difference

organized and clearly written. They identify situations that result with more than one solution and justify their reasoning when choosing an answer. They generate, analyze, and explain solutions by comparing and contrasting the use of multiple representations in a clear, concise manner. They extend techniques of factoring polynomials by applying methods of grouping, graphical representation, and the sum and difference of two cubes and explain how the factored form of an equation can be used to find solutions to practical problems and from a graphical representation, predicts a factored form equation that yields the same approximate roots. When solving practical problems, they exhibit understanding of properties about and fluency with operations on matrices, complex numbers, radicals, and expressions with fractional exponents; justify the solution process; and give the solution in simplest form in a clear, concise manner. They simplify and	comparing and contrasting the use of multiple representations in a clear, concise manner. They extend techniques of factoring polynomials by applying methods of grouping, graphical representation, and the sum and difference of two cubes and explain how the factored form of an equation can be used to find solutions to practical problems. They exhibit understanding of properties about and fluency with operations on matrices, complex numbers, radicals, and expressions with fractional exponents when determining the simplest form of solutions to equations and can justify the solution process. They simplify and expand expressions using properties of logarithms and compare properties of logarithms using laws of exponents. They convert between graphical and algebraic forms of conic sections and between exponential and logarithmic forms of functions and can analyze and describe characteristics of each form. They solve practical	grouping, graphical representation, and the sum and difference of two cubes to solve equations. They exhibit understanding of properties about and fluency with operations on matrices, complex numbers, radicals, and expressions with fractional exponents when determining the simplest form of solutions to equations. They simplify and expand expressions using properties of logarithms. They convert between graphs and equations of conic sections and between exponential and logarithmic functions. They determine the constraints and feasible region of a solution for a system of linear inequalities and then use linear programming to determine the optimum value of a function. They analyze, explain, and use functions by finding zeros, maximum and minimum values, and inverses; expressing domain and range in interval notation; performing basic function operations including composition; and generating and extending families of functions using transformations. They	numerical and graphical forms. They factor quadratic trinomials when the coefficient of the quadratic term is greater than one, and the sum or difference of cubes. They simplify radical expressions, find the determinant of a 3 X 3 matrix, multiply square matrices, multiply complex numbers, and simplify powers of "i". They sketch the graph of an ellipse, identifying the major and minor axes. They identify the base and exponent of a logarithmic equation. They determine the feasible region and the optimum value of a function, given the constraints for a system of linear inequalities. They explore and use functions by finding zeros, express the domain and range in interval notation, and determine the domain of functions resulting from function operations. They make predictions about data values and patterns and sequences, given a recursive model. They convert among graphs, equations, and table of values to solve practical problems.	of two squares and trinomials into two binomials, when the coefficient of the quadratic term is one. They convert between fractional exponents and radical form of a monomial, add and subtract matrices, multiply a matrix by a scalar, find the determinant of a 2 X 2 matrix, and add and subtract complex numbers. They determine the conic type and sketch a parabola and a circle. They identify the base and exponent of an exponential expression. They determine the optimum value for a function, given the graph of a feasible region. They determine the domain and range of a function and add, subtract, multiply, and divide functions. They identify a quadratic pattern using a table of data values or a recursive sequence. They convert between graphs and tables of values to solve practical problems.

expand expressions using properties of logarithms and justify properties of logarithms using laws of exponents. They convert between graphical and algebraic forms of conic sections and between exponential and logarithmic forms of functions and can analyze and describe characteristics of each form. They estimate solutions to simple problems by synthesizing knowledge about the related forms. They pose and solve practical problems by determining the constraints and feasible region of a solution for a system of linear inequalities and then use linear programming to determine the optimum value of a function. They explain why the use of linear programming yields an optimal solution with all explanations and solutions given in a clear, concise manner. They synthesize knowledge about finding zeros, maximum and minimum values, and inverses; expressing domain and range in interval notation; performing basic function operations including composition; and	problems by determining the constraints and feasible region of a solution for a system of linear inequalities and then use linear programming to determine the optimum value of a function and interpret the results in a clear, concise manner. They synthesize knowledge about finding zeros, maximum and minimum values, and inverses; expressing domain and range in interval notation; performing basic function operations including composition; and generating and extending families of functions using transformations to solve problems. They generate quadratic regressions and both closed form and recursive equations to make predictions about data values, patterns, and sequences and explain how the situation, equations, and predictions, are interrelated. They analyze teacher generated practical problems and synthesize the use of words, graphs, equations, and tables of values to give solutions and justify their results in a clear and concise manner.	generate quadratic regressions and both closed form and recursive equations to make predictions about data values, patterns, and sequences. They convert among words, graphs, equations and tables of values to solve problems.		

generating and extending families of functions using transformations to solve problems. Their solutions synthesize the use of words, graphs, tables, and equations and are well organized and clearly written. They justify the solution process. They choose practical situations to make predictions about data values, patterns, and sequences using quadratic regressions or closed form and recursive equations explaining the process and prediction in a clear and concise manner. They pose practical problems, find solutions using a variety of strategies, synthesize the use of words, tables, graphs, and equations to give solutions and communicate results and justify the solution process in a clear and concise manner. They identify situations that result in more than one solution and justify their reasoning when choosing an answer.				

Objectives	Students will
M.O.A2.2.1	determine equations of lines including parallel, perpendicular, vertical and horizontal lines, and compare and contrast the properties of these equations.
M.O.A2.2.2	factor higher order polynomials by applying various methods including factoring by grouping and the sum and difference of two cubes; analyze and describe the relationship between the factored form and the graphical representation.
M.O.A2.2.3	define complex numbers, simplify powers of 'i', perform basic operations with complex numbers, and give answers as complex

	numbers in simplest form.
M.O.A2.2. 4	simplify expressions involving radicals and fractional exponents, convert between the two forms, and solve equations containing radicals and exponents.
M.O.A2.2. 5	solve quadratic equations over the set of complex numbers: apply the techniques of factoring, completing the square, and the quadratic formula; use the discriminate to determine the number and nature of the roots; identify the maxima and minima; use words, graphs, tables, and equations to generate and analyze solutions to practical problems..
M.O.A2.2.6	develop and use the appropriate field properties of matrices by adding, subtracting, and multiplying; solve a system of linear equations using matrices; and apply skills toward solving practical problems.
M.O.A2.2.7	define a function and find its zeros; express the domain and range using interval notation; 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.
M.O.A2.2.8	analyze families of functions and their transformations; recognize linear, quadratic, radical, absolute value, step, piece-wise, and exponential functions; analyze connections among words, graphs, tables and equations when solving practical problems with and without technology.
M.O.A2.2.9	solve quadratic inequalities, graph their solution sets, and express solutions using interval notation.
M.O.A2.2.10	solve and graph the solution set of systems of linear inequalities in two variables by finding the maximum or minimum values of a function over the feasible region using linear programming techniques.
M.O.A2.2.11	solve practical problems involving direct, inverse and joint variation.
M.O.A2.2.12	analyze the conic sections; identify and sketch the graphs of a parabola, circle, ellipse, and hyperbola and convert between graphs and equations.
M.O.A2.2.13	solve absolute value inequalities graphically, numerically and algebraically and express the solution set in interval notation.
M.O.A2.2.14	define a logarithmic function, transform between exponential and logarithmic forms, and apply the basic properties of logarithms to simplify or expand an expression.
M.O.A2.2.15	perform a quadratic regression, determine the regression equation and use the results to predict specific values of a variable.
M.O.A2.2.16	describe and illustrate how patterns and sequences are used to develop recursive and closed form equations; analyze and describe characteristics of each form.

Conceptual Mathematics Content Standards and Objectives

Conceptual Mathematics objectives include major topics from algebra and geometry and extend these ideas to practical usage. Basic ideas of probability and statistics and the mathematics of finance are included. These big ideas are to be presented in the context of their historical development. Full integration of calculators, computers, and interactive utilities are essential for mastery. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 9-12	**Mathematics: Conceptual Mathematics**
Standard 2	**Algebra**
M.S.CM.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD. CM.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Conceptual Mathematics students at the distinguished level research, apply, compare and design a variety of problem solving strategies to solve real-world problems. They develop and solve application problems using linear, quadratic and exponential functions and interpret their graphs. They assess how these application problems are related to real-world situations. They conduct research and design experiments to collect data and analyze and interpret	Conceptual Mathematics students at the above mastery level research,apply and compare a variety of problem solving strategies to solve real-world problems. They develop and solve application problems using linear, quadratic and exponential functions and interpret their graphs. They design experiment to collect data and analyze this data in a real-world situation. They research, describe and illustrate how to calculate costs, interest, loan	Conceptual Mathematics students at the mastery level apply and compare a variety of problem solving strategies to solve real-world problems. They solve application problems using linear, quadratic and exponential functions and interpret their graphs. They collect data and analyze this data in a real-world situation. They describe and illustrate how to calculate costs, interest, loan payments, finance charges and taxes and analyze how these functions are used to solve real-world	Conceptual Mathematics students at the partial mastery level compare a variety of problem solving strategies to solve real-world problems. They apply application problems using linear, quadratic and exponential functions and explain their graphs. They describe data used in real-world situations. They describe how to calculate costs, interest, loan payments, finance charges and taxes and relate how these functions are used to solve real-world problems as well as compare various	Conceptual Mathematics students at the novice level recognize a variety of problem solving strategies to solve real-world problems. They recognize application problems using linear, quadratic and exponential functions and explain their graphs. They recognize data used in real-world situations. They identify formulas that are used to calculate costs, interest, loan payments, finance charges and taxes and recognize how these functions are used to solve real-world problems as well

this data in a real-world situation. They research, and design problems related to real-world situations that involve calculating costs, interest, loan payments, finance charges and taxes. They analyze and recommend how to use these functions to optimize their budget. They research and critique various methods of investing money.	payments, finance charges and taxes and analyze how these functions are used to solve real-world problems as well as research and compare various methods of investing money.	problems as well as compare various methods of investing money.	methods of investing money.	as name various methods of investing money.

Objectives	Students will
M.O.CM.2.1	use a variety of problem solving strategies (e.g., draw a diagram, look for a pattern, work backwards) to solve real-world problems.
M.O.CM.2.2	interpret graphs of functions including linear, quadratic, and exponential.
M.O.CM.2.3	solve application problems using linear, quadratic and exponential functions with emphasis on data collection and analysis.
M.O.CM.2.4	choose the appropriate formulas to solve workplace problems and judge the reasonableness of the solutions.
M.O.CM.2.5	describe and illustrate how calculating costs, simple and compound interest, finance charge, loan payment and tax functions are used to solve real-world problems.
M.O.CM.2.6	compare various methods of investing money.

Grade 9-12	Mathematics: Conceptual Mathematics
Standard 3	Geometry
M.S.CM.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD. CM.3

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Conceptual Mathematics students at the distinguished level apply and analyze concepts of	Conceptual Mathematics students at the above mastery level analyze and apply concepts of geometry.	Conceptual Mathematics students at the mastery level apply concepts of geometry. They compute	Conceptual Mathematics students at the partial mastery level identify concepts of geometry.	Conceptual Mathematics students at the novice level recognize concepts of geometry. They recognize

geometry and use this knowledge to solve real-world problems. They research and compare methods to compute measures and then compute measures to solve real-world problems using relationships. They research and analyze the connection between geometric shapes and patterns, art, architecture, and nature. They design a project that incorporates these connections.	They compare methods to compute measures and then compute measures to solve real-world problems using relationships. They research and analyze the connection between geometric shapes and patterns art, architecture, and nature.	measures to solve real-world problems using relationships. They analyze the connection between geometric shapes and patterns, art, architecture, and nature.	They use measures to solve real-world problems using relationships. They model the connection between geometric shapes and patterns, art, architecture, and nature.	that measures can be used to solve real-world problems using relationships. They describe the connection between geometric shapes and patterns, art, architecture, and nature.

Objectives	Students will
M.O.CM.3.1	apply concepts of geometry including the Pythagorean Theorem, similar triangles, and right triangle trigonometry.
M.O.CM.3.2	compute measures to solve real-world problems, using relationships involving perimeter, area, surface area and volume of geometric figures.
M.O.CM.3.3	analyze the connections of various geometric shapes and patterns to art, architecture, and nature.

Grade 9-12	Mathematics: Conceptual Mathematics
Standard 3	Data Analysis and Probability
M.S.CM.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD CM.5)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Conceptual Mathematics students at the distinguished level research and relate mathematical content to its historical development and integrate other disciplines into the	Conceptual Mathematics students at the above mastery level research and relate mathematical content to its historical development and integrate other disciplines into the study of	Conceptual Mathematics students at the mastery level relate mathematical content to its historical development and integrate other disciplines into the study of mathematics. They	Conceptual Mathematics students at the partial mastery level describe mathematical content as it relates to its historical development and relates how other disciplines are	Conceptual Mathematics students at the novice level recognize that mathematical content is related to its historical development and see how other disciplines are integrated into the study

study of mathematics. They research and critique a variety of methods and then determine possible outcomes. They develop, interpret and analyze conclusions. They research, design and conduct probability investigations and then determine, analyze and communicate the results. They relate the results to other disciplines and present these results in a variety of methods. They research the best statistical tools and use them for workplace applications. They relate and apply the measures of central tendency to workplace situations and analyze the results.	mathematics. They determine possible outcomes using a variety of methods and develop and interpret conclusions. They design and conduct probability investigations and determine, analyze and communicate the results. They present these results in a variety of methods. They research the best statistical tools and use them for workplace applications. They relate and apply the measures of central tendency to workplace situations and analyze the results.	determine possible outcomes using a variety of methods and develop conclusions. They design and conduct probability investigations and then determine, analyze and communicate the results. They use statistical tools for workplace applications. They relate and apply the measures of central tendency to workplace situations.	integrated into the study of mathematics. They identify possible outcomes using a variety of methods and develop conclusions. They conduct probability investigations and then determine and communicate the results. They use statistical tools for workplace applications. They apply the measures of central tendency to workplace situations.	of mathematics. They recognize possible outcomes using a variety of methods and develop conclusions. They conduct probability investigations and then communicate the results. They recognize that there are statistical tools that are used for workplace applications. They describe the measures of central tendency.

Objectives	Students will
M.O.CM.5.1	relate mathematical content to its historical development.
M.O.CM.5.2	integrate other disciplines into the study of mathematics through simulations, research, and projects.
M.O.CM.5.3	determine possible outcomes using tree diagrams and the counting principles of permutations and combinations, develop conclusions and offer solutions for new situations, using real-world data.
M.O.CM.5.4	design and conduct probability investigations and then determine, analyze, and communicate the results.
M.O.CM.5.5	collect 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.
M.O.CM.5.6	relate the measures of central tendency and the measures of dispersion to a normal distribution.
M.O.CM.5.7	apply the measures of central tendency and the measures of dispersion to workplace situations.
M.O.CM.5.8	use statistical tools for workplace applications such as quality control, marketing and predicting trends.

Trigonometry Content Standards and Objectives

Trigonometry objectives emphasize making connections between right triangle trigonometry and circular functions. Calculators, computers, and interactive utilities will be used to enhance student learning. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 9-12	**Mathematics: Trigonometry**
Standard 3	**Geometry**
M.S.T.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.T.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Trigonometry students at the distinguished level define and relate the six trigonometric functions in right triangles and circular functions and apply in problem solving. They convert from degrees to radians (and vice versa); and test hypothesis or hypotheses to derive formulas to find arclength, area of a sector, angular velocity and linear velocity and apply these concepts to real-world problems; and graph the trigonometric functions and the inverse functions and apply to real-	Trigonometry students at the above mastery level define and relate the six trigonometric functions in right triangles and circular functions and apply in problem solving. They convert from degrees to radians (and vice versa) and test hypothesis and derive formulas to find arclength, area of a sector, angular velocity and linear velocity and graph the trigonometric functions and apply to real-world problems and graph the inverse functions. They evaluate the functions of any angle	Trigonometry students at the mastery level define and relate the six trigonometric functions in right triangles and circular functions, and apply in problem solving. They convert from degrees to radians (and vice versa) and develop formulas to find arclength, area of a sector, angular velocity and linear velocity and graph the trigonometric functions and the inverse functions and apply to real-world problems. They evaluate the functions of any angle and the inverse functions (with and without restricted	Trigonometry students at the partial mastery level identify the six trigonometric functions as defined with right triangles and circular functions. They convert degrees to radians and use formulas to find arclength, area of a sector, angular velocity and linear velocity and identify the graphs of the trig functions. They evaluate the functions of any angle and the inverse functions and solve trigonometric equations with infinite and finite solutions (over a restricted domain). They solve triangles using	Trigonometry students at the novice level recognize the six trigonometric functions as defined with right triangles. They recognize radians and formulas to find arclength, area of a sector, angular velocity and linear velocity and recognize the graphs of the trig functions. They evaluate the functions of any angle and the inverse functions and solve trigonometric equations with finite solutions (over a restricted domain). They recognize the Law of Sines and the Law of Cosines and

world problems. They evaluate the functions of any angle and the inverse functions (with and without restricted domains) and solve trigonometric equations yielding infinite solutions, finite solutions, or no solution (over a restricted domain) and apply to real-world problems. They determine appropriate use for the Law of Sines and the Law of Cosines and apply to real-world situations, and they find the area of triangles and figures made up of multiple -shapes using Heron's formula. They convert complex numbers to polar form, perform computations and use DeMoivre's Theorem, as well as graph on the polar coordinate system and apply models to real-world situations. They verify the basic identities to prove other identities and derive the formulas for sum and difference of angles, half-angle formulas, and double angle formulas and apply them in real-world situations. They perform graphical and algebraic addition of vectors in 2D vectors, apply to real-world	and the inverse functions (with and without restricted domains) and solve trigonometric equations yielding infinite solutions, finite solutions or no solution (over a restricted domain). They determine appropriate use for the Law of Sines and the Law of Cosines to solve triangles and apply Heron's formula to find the area of triangles and figures constructed of multiple shapes. They convert complex numbers to polar form, perform computations and use DeMoivre's Theorem, as well as graph in the polar coordinate plane and compare the graph to real-world situations. They verify the basic identities and use them to verify other identities and use formulas for sum and difference of angles, half-angle formulas, and double angle formulas and evaluate them. They perform graphical and algebraic addition of vectors in 2D and apply to real-world problems and use graphs, tables and equations to model periodic data sets and to analyze real-world problems	domain) and solve trigonometric equations yielding both infinite and finite solutions (over a restricted domain). They determine the appropriate use for the Law of Sines and the Law of Cosines and solve triangles and apply Heron's formula to find the area of a triangle. They convert complex numbers to polar form, perform computations and use DeMoivre's Theorem, as well as graph in the polar coordinate plane. They verify the basic identities and use them to verify other identities and use formulas for sum and difference of angles, half-angle formulas, and double angle formulas. They perform graphical and algebraic addition of vectors in 2D and use graphs, tables and equations to model periodic data sets and to analyze real-world problems.	the Law of Sines and the Law of Cosines and find the area of triangles using Heron's formula. They identify complex numbers to polar form, perform operations and use DeMoivre's Theorem and identify the graph on the polar coordinate plane. They identify basic identities to verify other identities and use formulas for sum and difference of angles, half-angle formulas, and double angle formulas. They identify vectors in 2D and use graphs, tables and equations to model periodic data sets.	find the area of triangles using Heron's formula. They recognize complex numbers to polar form and the graphs on the polar coordinate system and DeMoivre's Theorem. They recognize basic identities and formulas for sum and difference of angles, half-angle formulas, and double angle formulas. They recognize vectors in 2D and use graphs, tables and equations to model periodic data sets.

problems and identify 3D vectors and real-world uses and use graphs, tables and equations to model periodic data sets and to analyze real-world problems				

Objectives	Students will
M.O.T.3.1	apply the right triangle definition of the six trigonometric functions of an angle to determine the values of the function values of an angle in standard position given a point on the terminal side of the angle. • determine the value of the other trigonometric functions given the value of one of the trigonometric functions and verify these values with technology. • using geometric principles and the Pythagorean Theorem, determine the six function values for the special angles and the quadrantal angles and use them in real-world problems. • compare circular functions and the trigonometric function values to draw inferences about coterminal angles and co-functions.
M.O.T.3.2	convert angle measures from degrees to radians (and vice versa) and apply this concept to • create a data set, analyze, and formulate a hypotheses to test and develop formulas for the arclength, area of a sector, and angular velocity and use the formula for application in the real-world. • compare and contrast the concepts of angular velocity and linear velocity and demonstrate by graphical or algebraic means relationship between them and apply to real-world problems.
M.O.T.3.3	using various methods, basic identities and graphical representation • verify trigonometric identities • prove the sum and difference to two angles, double-angles, and half-angle identities
M.O.T.3.4	justify and present the solutions of trigonometric equations that include both infinite and finite (over a restricted domain) solutions.
M.O.T.3.5	find the value of the inverse trigonometric functions using special angle trigonometric function values and technology. • draw inferences of restricted domain to recognize and produce a graph of the inverse trigonometric functions. • prove conjectures made about the solution of the equations such as x = sin (arcsin y), x = sin (arcos y) being sure to consider restrictions of the domain.
M.O.T.3.6	identify a real life problem utilizing graphs of trigonometric functions and/or the inverse functions; make a hypothesis as to the outcome; develop, justify, and implement a method to collect, organize, and analyze data; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project using words, graphs, drawings, models, or tables.
M.O.T.3.7	model periodic data sets using graphs, tables, and equations and use them to analyze real-world problems such as electricity and harmonic motion.
M.O.T.3.8	investigate real-world problems within a project based investigation involving triangles using the trigonometric functions, the law of sines and the law of cosines, justify and present results.
M.O.T.3.9	develop and test a hypothesis to 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) and use these formulas to find total area of figures constructed of multiple shapes.
M.O.T.3.10	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. • graph complex numbers in the polar coordinate plane and make conjectures about some polar graphs and real-world situations such as the paths that the planets travel.
M.O.T.3.11	create graphical and algebraic representations for performing vector operations and analyze these to solve real-world problems such as force analysis and navigation.

Probability and Statistics Content Standards and 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 real-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. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools and content standards and objectives.

Grade 9-12	Mathematics: Probability and Statistics
Standard 5	Data Analysis and Probability
M.S.PS.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.PS.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Probability and Statistics students at the distinguished level investigate the types of probability, determine probability and odds using multiple counting principles and distributions and apply the concepts to real-world problems. They create data and compare and contrast the measures of central tendency and the measures of dispersions. They differentiate, make predictions about and support the analysis of	Probability and Statistics students at the above mastery level interpret the types of probability and determine probability and odds using multiple counting principles and distributions. They create data and distinguish between the measures of central tendency and of dispersions. They make predictions about and support the analysis of individual performance, characteristics of samples and justify statistical concepts to test validity of a hypothesis	Probability and Statistics students at the mastery level distinguish types of probability and determine probability and odds using multiple counting principles and distributions. They create data and interpret the measures of central tendency and of dispersions. They analyze individual performance and characteristics of samples, use and justify statistical concepts to test validity of a hypothesis, and determine correlation as applied in real-	Probability and Statistics students at the partial mastery level identify the types of probability and multiple counting principles and distributions to determine probability and odds. They interpret the measures of central tendency and of dispersions. They recognize differences in the descriptors for individual performance, characteristics of samples, use statistical concepts to test validity of a hypothesis, and determine correlation for a set of data. They identify the	Probability and Statistics students at the novice level recognize the types of probability and multiple counting principles and distributions to determine probability and odds. They find the measures of central tendency and of dispersions. They distinguish between descriptors of individual performance, characteristics of samples, and use statistical concepts to analyze validity and determine correlation for a

individual performance, characteristics of samples and analyze and justify using statistical concepts to test validity of a hypothesis and of correlation as applied in real-world situations. They use a set of data created through experimentation to perform, analyze, predict and interpret a regression analysis and perform, interpret and present with justifications the results of an analysis of variance using ANOVA.	and of correlation as applied in real-world situations. They perform, analyze, predict and interpret a regression analysis and perform and interpret the results of an analysis of variance using ANOVA.	world situations. They perform a regression analysis and perform and interpret the results of an analysis of variance.	regression equation and explain the results of the variance analysis.	set of data. They recognize the regression equation and explain the results of the variance analysis.

Objectives	Students will
M.O.PS.5.1	distinguish between experimental and theoretical probability.
M.O.PS.5.2	using a real-world problem solving investigation, create and interpret data using various methods of displaying circle graphs, histograms, and frequency curves, make predictions, include information concerning outliers, present and justify results.
M.O.PS.5.3	determine possible outcomes using tree diagrams and the counting principles of permutations and combinations.
M.O.PS.5.4	express the chances of events occurring either in terms of a probability or odds.
M.O.PS.5.5	use the normal distribution and the binomial distribution including Pascal's triangle, to determine probability of events.
M.O.PS.5.6	analyze 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.
M.O.PS.5.7	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.
M.O.PS.5.8	analyze individual performances in terms of percentiles, z-scores, and t- scores.
M.O.PS.5.9	analyze the role of sampling, randomness, bias, and sample size in data collection and interpretation.
M.O.PS.5.10	test the validity of a hypothesis using statistical concepts including a t-test, justify results.
M.O.PS.5.11	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.
M.O.PS.5.12	calculate the Chi-Square values for a given population.
M.O.PS.5.13	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.
M.O.PS.5.14	perform an analysis of variance (ANOVA) and interpret the results.

Pre-Calculus Content Standards and Objectives

Pre-Calculus objectives extend students' knowledge of functions and equations (e.g., higher-order functions, exponential, and logarithmic) as well as provide 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. The West Virginia Standards for 21st Century Learning include the following components: 21st Century Content Standards and Objectives and 21st Century Learning Skills and Technology Tools. All West Virginia teachers are responsible for classroom instruction that integrates learning skills, technology tools, and content standards and objectives.

Grade 9-12	**Mathematics: Pre-Calculus**
Standard 2	**Algebra**
M.S.PC.2	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.PC.2)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Pre-Calculus students at the distinguished level investigate and formulate a solution to a real-world problem using equations of higher order polynomials, exponential, and logarithmic forms. They solve problems involving finite and infinite sequences and series, and formulate a hypothesis about evaluating limits. They consider and justify the use of math induction to prove formulas and statements. They compare and contrast the Binomial Theorem and Pascal's Triangle and use them to	Pre-Calculus students at the above mastery level hypothesize and develop a plan to solve higher order polynomials, exponential, and logarithmic equations. They solve problems involving finite and infinite sequences and series and evaluate limits using a variety of methods. They investigate, plan, and construct a method for proving formulas and statements. They expand binomials by applying the Binomial Theorem and Pascal's Triangle and relate the expansion to a real-	Pre-Calculus students at the mastery level determine the reasonableness of the solution of higher order polynomials, exponential, and logarithmic equations. They evaluate finite and infinite sequences and series to find or estimate a limit. They differentiate the process of proving formulas and statements with math induction. They expand binomials by applying the Binomial Theorem and Pascal's Triangle. They interpret the techniques of curve sketching to graph polynomials and rational	Pre-Calculus students at the partial mastery level examine the solutions of higher order polynomials, exponential, and logarithmic equations. They distinguish finite and infinite sequences and series and find or estimate a limit. They apply math induction to find formulas and statements. They identify the Binomial Theorem and Pascal's Triangle as methods for expanding binomials. They graph polynomials and rational, exponential and logarithmic functions. They identify graphical and	Pre-Calculus students at the novice level confirm the solutions of higher order polynomials, exponential and logarithmic equations. They identify finite and infinite sequences and series, and find or estimate a limit. They identify math induction process to prove formulas and statements. They recognize the Binomial Theorem and Pascal's Triangle. They recognize the graphs of polynomials and rational exponential and logarithmic functions. They recognize graphical and algebraic

expand binomials in relation to a real-world problem. They compare and contrast the graphs of polynomials and formulate a set of rules to aid in graphing and produce and support a solution to a real-world problem involving rational, exponential and logarithmic functions. They design and execute an approach to solve a real-world problem involving three-dimensional vectors.	world situation. They identify a real-world problem which requires the graphs of polynomials, rational, and exponential and logarithmic functions, produce and support a solution to the problem. They compare and contrast and produce the graphical and algebraic procedures to add two dimensional vectors and apply to real-world problems.	exponential and logarithmic functions. They produce graphical and algebraic means to add vectors in two dimensions and apply to real-world problems.	algebraic procedures to add two dimensional vectors.	procedures to add two dimensional vectors.

Objectives	Students will
M.O.PC.2.1	investigate and sketch the graphs of polynomials and rational functions by analyzing and using the characteristics of zeros, upper and lower bounds, y-intercepts, symmetry, asymptotes and end behavior, maximum and minimum points, and domain and range.
M.O.PC.2.2	solve higher order polynomial equations utilizing techniques such as Descartes' Rule of Signs, upper and lower bounds, and the Rational Root Theorem.
M.O.PC.2.3	relate Pascal's Triangle and the Binomial Theorem; use both to expand binomials with positive integral exponents.
M.O.PC.2.4	establish and explain the inverse relationship between exponential and logarithmic functions; graph related functions and include their domain and range using interval notation.
M.O.PC.2.5	compare laws of exponents to properties of logarithms; solve equations and practical problems involving exponential and logarithmic expressions, including natural and common logarithms; confirm solutions graphically and numerically.
M.O.PC.2.6	solve problems involving the sum of finite and infinite sequences and series, including Sigma notation.
M.O.PC.2.7	use tables of values, graphs, conjectures, algebraic methods, and numerical substitution to find or estimate the limit of a function, a sequence or a series.
M.O.PC.2.8	analyze and describe the geometry of vectors, perform mathematical operations with vectors and use vectors to solve practical problems.
M.O.PC.2.9	apply the method of mathematical induction to prove formulas and statements.
M.O.PC.2.10	apply parametric methods to represent motion of objects.
M.O.PC.2.11	use multiple representations, such as words, graphs, tables, and equations, to solve practical problems involving logarithmic, exponential, polynomial, rational, and radical functions; explain how the representations are related to each other, as well as to the problem.

Grade 9-12	Mathematics: Pre-Calculus
Standard 3	Geometry

M.S.PC.3	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.PD.3)

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice
Pre-Calculus students at the distinguished level hypothesize, organize, and formulate a solution to a real-world problem using the conic sections, develop and present along with a written explanation of the solution, and illustrate the use of transformations and/or the graphs of other functions.	Pre-Calculus students at the above mastery level analyze, interpret, and graph using the characteristics and transformations of the sections created when a 3D conical solid is intersected by a plane, graph other functions using transformations, and apply to a real-world situation.	Pre-Calculus students at the mastery level analyze, interpret, and graph the sections created when a 3D conical solid is intersected by a plane and graph other functions using transformations.	Pre-Calculus students at the partial mastery level graph equations representing specific conic sections and identify the graphs and the transformations used on other functions.	Pre-Calculus students at the novice level identify the graphs of equations representing specific conic sections and other functions using transformations.

Objectives	Students will
M.O.PC.3.1	graph functions and conic sections using transformations.
M.O.PC.3.2	analyze and describe properties of conic sections; explain the interrelationship among the properties; solve practical problems involving conic sections.

Grade 9-12	Mathematics: Pre-Calculus
Standard 5	Data Analysis and Probability
M.S.PC.5	Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, 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.

Performance Descriptors (M.PD.PC.5

Distinguished	Above Mastery	Mastery	Partial Mastery	Novice

Pre-Calculus students at the distinguished level compare and contrast exponential and/or logarithmic regressions and relate and defend a solution to a real-world problem.	Pre-Calculus students at the above mastery level summarize and critique the results of an analysis performed on an exponential and/or logarithmic regression.	Pre-Calculus students at the mastery level investigate, analyze, hypothesize, and develop a regression equation on a given set of data, exponential and/or logarithm.	Pre-Calculus students at the partial mastery level explain the regression equation for an exponential and/or logarithmic regression performed on a set of data.	Pre-Calculus students at the novice level select a regression equation for an exponential and/or logarithmic regression performed on a set of data.

Objectives	Students will
M.O.PC.5.1	perform an exponential and or logarithmic regression analysis on a set of data, write the regression equation and use the results to predict specific values of a variable.

FORM HD 201
(10-66)

FISCAL NOTE WORKSHEET
(Submit 4 Copies)

F. O ______ DRAFT NO ______ BILL NO ______ RESOLUTION NO ______

SUBJECT State Board Policy 2520.2: Mathematics Content Standards and Objectives for WV Schools FUND ______

SOURCE OF REVENUE: ☐ GENERAL FUND ☐ SPECIAL ☐ OTHER (SPECIFY) ______

COST OF ESTIMATE BASED ON: ☐ AN ORIGINAL ESTIMATE ☐ BUDGET BILL ☐ OTHER (SPECIFY) ______

INCOME ESTIMATE BASED ON: ☐ AN ORIGINAL ESTIMATE ☐ BUDGET BILL ☐ OTHER (SPECIFY) ______

SHOW OVER-ALL EFFECT IN ITEMS 1 AND 2 & GIVE EXPLANATION OF BREAKDOWN BY FISCAL YEAR INCLUDING LONG-RANGE EFFECT

EFFECT OF PROPOSAL	ANNUAL		FISCAL YEAR		
	INCREASE	DECREASE	CURRENT	NEXT	THEREAFTER
1. ESTIMATED TOTAL COST	$ 0	$ 0	$ 0	$ 0	$ 0
PERSONAL SERVICES CURRENT EXPENSES REPAIRS/ALTERATIONS EQUIPMENT OTHER	$ 0	$ 0	$ 0	$ 0	$ 0
2. ESTIMATED TOTAL REVENUES	$ 0	$ 0	$ 0	$ 0	$ 0

EXPLANATION OF ABOVE ESTIMATES (INCLUDING LONG-RANGE EFFECT):

DATE	AGENCY	AUTHORIZED REPRESENTATIVE
9/26/06	West Virginia Department of Education	Steven L Paine

Policy 2520.2: Mathematics Content Standards and Objectives
Comment Log
10/5/06 – 11/3/06

Action	Type
N: No Response	- Negative
NA: Not Accepted	+ Positive
A: Accepted	o Neutral

Date	Individual Organization	Comments	Action/ Type	Rationale
§126-44B-1 General				
10-05	Paula Taylor High school math teacher ptaylor@schs.kana.k12.wv.us KAnawha County Schools 663 Forest Circle So. Charleston WV 25303	The Algebra II Content Standards do not include operatons with rational expresions and equations with rational expressions. Example: (x^2 - 9)/(x-3) + 4/ (2x-6) I feel this is an important part of the Algebra II curriculum in preparing students for trig and precalculus.	-neg NA	Rational expressions are found in Algebra I CSOs. The Algebra II teacher will further develop operations with rational expressions.
10-06	Beverly Hilpert Teacher bhilpert@access.k12.wv.us Weir High School Weir High School Red Rider Rd. Weirton WV 26062	Alg. I for 85% of 8th grade students is unrealistic. A select group can be successful at that grade level, but most cannot. Alg/Geom prep is necessary for some students as a bridge between middle school and Applied Math I,II. Consumer math should be a requirement for all students. Requiring all students to have 4 math courses above Alg I is unrealistic and in many cases, unnecessary.	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997).
10-23	M. Jane Merendino teaching fellow	I have just returned from the National Council of Teachers' of Mathematics Conference in	-neg NA	West Virginia has completed this draft of revisions of our Content Standards & Objectives using the NCTM

	mmerendino@fairmontstate.edu Fairmont State university 10 diana dr 1201 Locust ave Fairmont WV 26554	Atlantic City. I was privileged to attend a luncheon in which Randy Charles , one of the authors of NCTM latest documents Focal Points, was the speaker. I also had an hour to talk with Skip Fennell, NCTM President and Jim Rubillo Executive Director. I told them about our process in WV of revising and increasing the rigor of our math standards. It appears we are right in line with what they are proposing as good standards. However, we have room for improvement and I believe now is the time to do this. When I was on the revision team we had a deadline to complete the document and the team I worked with spent many hours discussing issues about importance of certain skills and concepts. I remember asking if we could bold face some of the objectives. This new document, Focal Points, does just that. In the words of Skip " it is going to take a lot of courage for one state to take a stand and say we don't need probability in the first grade" . If we compare our grade level content to that of Singapore or Japan or China you will see no reference to much of the content we have in their elementary course content. Our elementary students carry around a 600 page text and many of our teachers believe they must cover every page. I have seen this as I go into classrooms across my county to work with student teachers. It is time to stop this covering the text and get to uncovering the math. I believe, and much research supports, that if we could narrow our course content in the elementary level and zero in on great professional development for teachers , provide them with embedded professional development in their classrooms on content knowledge and student learning, the achievement of our students would soar. What		Curriculum Focal Points as suggested by NCTM President Skip Fennell. He said in a recent article that he envisioned curriculum developers putting the Curriculum Focal Points and a local or state curriculum side by side when refining their current curricula. He hoped that curriculum developers would determine how much time to devote to the focal points and then build other topics around those primary topics. The WVDE Office of Instruction utilized the document in precisely this manner. Our content standards and objectives have been recently crafted with the focal points addressed throughout K-8.

		is needed is a balanced approach. I know Lou Maynus has asked us to read the Focal Points document. I hope we have a chance to incorporate the message of that document into our CSOS.		
10-23	Paula Taylor teacher ptaylor@schs.kana.k12.wv.us Kanawha County Schools 1 Eagle Way S. Chas. WV 25309	I think algebra 1 needs to be taught at the middle schools, but, my concern is that Pre-algebra is being de-emphasized. For students who are not mature enough for the abstract algebra course, pre-algebra is a great transition course. It gives students an algebra foundation to be successful in algebra. It also gives students a graduation credit as many struggle to complete 3 credits - algebra 1 and one higher in math. We have students who must repeat algebra 1 and geometry. They are seniors taking geometry. Without pre-algebra, they would not be able to graduate. I am a proponent of calculator use, but there are still basics our students need ot know - lining up decimal places, how to get common denominators, factors, rules for integer operations. When they get to algebra, trig, precal, and calculus, many problems require basic math knowledge and are in variables that can't be put into a calculator. Knowing the "HOW" of mathemaitcs is part of the deeper understanding we are searching for in higher order thinkingand in standards based curriculum	-neg NA	The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on data from a nationally representative sample of students from the high school class of 1992 who attended a four-year college. The study found that taking a full schedule of academically demanding courses in high school, including mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006).
10-24	Beverly Eye Mathmetics teacher beye@access.k12.wv.us Pendleton County High School P.O. Box 40 147 Maple Avenue Franklin WV 26807	I see a need for an Algebra III class for students who have taken Algebra I during their 8th grade. Not all of these students will want to take a precal class their senior year and may opt to not even take a math class that year. I know that there are some schools in the state who are offering Algebra III. I have also heard that colleges are really wanting students to be very good with their algebra skills. Would you please send me a copy of the	+pos A	We do want to develop Algebra III CSOs in the future and are working toward this objective.

		CSOs that they are using.		
10-25	Joan Ann Schneider Fairmont, wv 26354	We have used the mapper for three years. I understand the readoning behind its institution. I, just, don't agree that it works! Some people will try hard to do what is expected exactly as it should be done. Others will shortcut the system. Neither of these types of people make any difference!Students have always been from various backgrounds. Some are encouraged to excell, others are not. The seed to want to learn comes from parenting, while educators water and nourish causing the desire to be fulfilled. I love education and being an educator! I look for "the few" who really want to learn and try my best to help them. Accomplishing this becomes evermore difficult with discipline issues, special education needs, parents overshadowing our every move, an everincreasing demand on the educators time. West Virginia is a wonderful place to live and work. I just wish someone, somewhere would give teaching and teachers the respect we deserve. Large sums of money are sent! in all sorts of directions within the educational fields, but not sent to the people who make all the "miracles" bhappen. I have taught junior-high for the past twenty-five years, or more. We are always left out,ie: class size, backing and authority to handle discipline problems, pay increases for all teachers. We are certainly not left out when it comes to expecting more and more work out of us. We are blamed and accused of "not being good teachers" when students fail. I get tired of the blame. Try rewarding and appreciating the many unpaid hours I have given in the twenty-eight years I have taught. Curriculum Mapper is a waste of time! I don't	O N	

		have time to waste! I have a job to do! I deserve to be paid at the same rate as others in the nation doing what I do, not be ranked at the bottom of the list. You want to see "test scores" improve? Start by improving the morale of educators! Pay us a respectable wage, give us the respect we deserve.		
10/30	Margaret K. Sine Wetzel County Schools Email: mksine@access.k12.wv.us Principal 510 N. Second Ave. City/State/Zip: Paden City, WV 26159 Principal	The format of the document is easy to use. The performance descriptors clearly define the skills expected for those students who score above the basic mastery level-- particluly beneficial to those who have been focusing on the basic objectives.	+pos	Thank you.
10/31/06	Pattie Cowan pacowanis@comcast.net Teacher 84 Bancroft Way City/State/Zip: Weirton, WV 26062 Role: Teacher	NUmber & Operations Performance Descriptors Comments-Partial Mastery and Novice are confusing. Teachers don't have any problems assessing Partial Mastery & Novice. If we are giving a Performance Descriptor for the Content Standard-maybe mastery of half of the objectives at that grade level could be partial mastery. The Above Mastery and Distinguished Descriptors at Grades K-2 are very confusing and wordy - and I believe will cause teachers to panic when they see them. They will think they have to teach those objectives under that descriptor. Above Mastery at the Kindergarten level could simply be-Demonstrate an understanding of numbers to 50, ways of representing numbers to 50, and relationships among numbers and number systems. They choose, combine, and apply effective strategies for answering quantitative questions. They communicate results offering	-neg NA	Definition of Partial Mastery is according to the objectives not the total curriculum. Professional Development is required to assist teachers in not feeling panicked. Alignment Study revealed insufficient rigor in specified objectives.

		more than one solution (This is stated in Focal Points for Kindergarten.) Distinguished-Demonstrate an understanding of numbers to 100, ways of representing numbers to 100, and relationships among numbers and number systems. They choose, combine, and apply effective strategies for answering quantitative questions. They communicate results offering more than one solution (This is stated in Focal Points for Kindergarten.) They create picture and story problems. Above Mastery at the First Grade level could simply be-Demonstrate an understanding of numbers to 200, ways of representing numbers to 200, and relationships among numbers and number systems First Grade Performance Descriptors in Number & Operations Mastery-They use models to represent (add- and explain)fractions (halves, thirds, fourths) They demonstrate quick recall with basic addition and subtraction facts to 10, models (should be model, and solve ... Change to-Develop and use strategies to help with the quick recall of facts. Eliminate (and addition of three numbers with sums less than 18). It is no longer an objective in first grade. Change -They create one-step grade-appropriate problems to solve one-step grade-appropriate problems. Above Mastery at the first grade level could simply be-Demonstrate an understanding of numbers to 200, ways of representing		

		numbers to 200, and relationships among numbers and number systems. The Focal Points for First Grade states the children use sophisticated strategies based on the properties of addition (e.g., "making tens") to solve addion and subtraction problems involving basic facts. Distinguished at the first grade level could simply be-Demonstrate an understanding of numbers to 1000, ways of representing numbers to 1000, and relationships among numbers and number systems. focal Points for first grade-They use a variety of models to model "part-whole", adding to, taking away from, and comparing situations to develop an understanding of the meanings of addition and subtraaction and sophisticated strategies to solve arithmetic problems. They create real-world grade-level appropriate one-and two-step problems , present and justify results. Second Grade Performance Descriptors for Number & Operations Above Mastery at the second grade level could simply be-Demonstrate an understanding of numbers above 1000, ways of representing numbers above 1000, and relationships among numbers and number systems. Focal Points for Second Grade-Children compose and decompose multidigit numbers using place value and properties of operations to create equivalent representations of given numbers. They create real-world grade-appropriate one-and two-step problems, present and justify results. Distinguished in the second grade-Demonstrate an understanding of numbers above 1000, ways of representing numbers		

		above 1000, and relationships among numbers and number systems. Focal Points for Second Grade-Children compose and decompose multidigit numbers using place value and properties of operations to create equivalent representations of given numbers. they use 2- and 3-digit numbers to solve problems, justifying their results. They create real-world grade-appropriate one-and two-step problems, present and justify procedures in a clear and concise manner.		
10/31/06	Margaret K. Sine Wetzel County Schools mksine@access.k12.wv.us Principal 510 N. Second Ave. Paden City, WV 26159 Principal	The format of the document is easy to use. The performance descriptors clearly define the skills expected for those students who score above the basic mastery level--particluly beneficial to those who have been focusing on the basic objectives.	+pos A	
10/31	Sandy droop1982@yahoo.com	I am the parent of a ninth grade student who did not have standards-based math, and a fifth grade student who started standards based math last year. I am totally against standards based math. Parents do not understand it, older children do not understand it, most teachers do not understand it. It is very hard to find anyone to help students,(even hiring a tutor) because all you hear is I don't know how you do standards-based math. This is very fustrating as a parent, as I know for my son it is frustrating to the children. I think that had this been implemented in kindergarten it is possible that it may have been ok, but not to change them over in the middle. The children in my son's grade do not even know their multiplication tables or how to do division. These to me are things they will use in	N	

		everyday life, not the thing that they are doing now. I think that it is sad that children are left behind to implement new standards or techniques. It is sad that you can f! ind now help for your children.		
10/31	Glenn Long Point Pleasant High School jlong@access.k12.wv.us Special Education Teacher Rt 1 Box 4 Point Pleasant, WV 25550 Role: Teacher	I find it hard to believe that the State Department would be pushing Integrated Math on one hand, and completely omit it from the CSO's Making the requirements for Math credit start at Alg I may be OK for the general education population, but for many Special Education students we will in effect be denying them a chance to graduate. Please continue to allow one class below Alg I to count toward graduation requirements.	N	
11/1	Drema Harris Wyoming East High School daharris@access.k12.wv.us Math teacher Box 390 Warrior Way New Richmond, WV 24867 Teacher	While this is the last year I will be teaching, due to retirement at the end of the year, I feel I must comment on the proposed CSO's for mathematics. For most of my teaching experience, I have taught either Algebra 1 or Algebra 2. I have found that I am having to spend more and more time reteaching things that the students were supposed to already know. I feel that by dropping the applied curriculum teachers in the future will have to spend even more time going over material that the students didn't get the first time. Not all students are ready for Algebra when they come to high school. Dropping the applied math will do the students a tremendous disservice. I hope that you reconsider this proposal.	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997).

11/1	Karen Stewart Wyoming East High School kstewart@access.k12.wv.us Math teacher Box 390 Warrior Way New Richmond, WV 24867 Teacher	I have spent my entire teaching experience teaching students ninth and tenth grade math. While some students are able to jump into Algebra 1 with no difficulties, many freshmen are not ready for such a difficult course. Many students who face Algebra 1 as the introductory high school math course may give up before they even get started. I'm having trouble teaching all the CSO's now because I must spend too much time reviewing material. Please reconsider your attempts to do away with the applied curriculum.	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997).
11/1	Beverly K. Taylor Wyoming East High Email: bktaylor@access.k12.wv.us Librarian Box 390 Warrior Way New Richmond, WV 24867 Teacher	hile I am currently a librarian, I was a full-time math teacher on the high school level for 24 years. I now teach one Algebra 1 class. While it is admirable that we are trying to raise our state standards, I believe that dropping the applied courses will do a disservice to our students. Not all students will be able to handle Algebra 1, Algebra 2, and Geometry as their three required math classes. The student who comes to us having passed eighth grade math with a D- will not have a successful high school experience if he/she is immediately thrown into Algebra 1. I'm afraid the frustration that will come from being forced into a class he/she is not ready for will cause many students to just give up and quit. Please reconsider your dropping of these applied classes.	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997). The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on

				data from a nationally representative sample of students from the high school class of 1992 who attended a four-year college. The study found that taking a full schedule of academically demanding courses in high school, including mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006).
11/1	Pattie Cowan Organization: Email: pacowanis@comcast.ne t Title: Teacher	Performance Descriptors for Measurement Kindergarten- Mastery-Kindergarten students at the mastery level in mathematics estimate size, compare and order objects by size with respect to a given attribute. They use standard and nonstandard units of measure to find length and compare two objects in non standard units of measure according to length, height and weight. They use the calendar to identify date and the sequence of the days of the week. They read time to the hour with analog and digital clocks. They identify and model the value of penny, nickel, and dime and determine the value of a set of pennies up to 20. They explain the relationship between the coins. Eliminate (determine the value of a set of pennies up to 20). It is no longer an objective	-neg NA	Using correct mathematics terminology is appropriate. Wording is aligned with Norm Webb's depth of knowledge report.

		in Kindergarten. First Grade -Measurement Performance decriptors Mastery Students at the mastery level in first grade mathematics estimate, measure, compare, and order length of objects using customary, metric, and nonstandard units. They select the appropriate units and tools to measure length, height, weight, temperature, and volume. They use a calendar to identify the date, sequence of days of the week, and months of a year. They tell time to the half hour using an analog clock and a digital clock. They explain the relationship between coins and make change from a dollar. Explain the relationship between coins needs to be added to the money objective and the making change from a dollar is not a mastery objective in the first grade. Mastery Second grade students at the mastery level in mathematics estimate measures, select and correctly use the appropriate measuring tool. They determine the perimeter and the area of a given shape using manipulatives. They order events and read time to the nearest quarter hour using an analog and digital clock. They identify specific dates on a calendar and determine past and future dates. They explain the relationship between coins and make change from $1.00. The last sentence needs to be more specific-so it matches the objective. identify, count and organize coins and bills to display a variety of price values with a total value of one dollar or less and model making		

		change using manipulatives. Measurement Content Standards Kindergarten M.O.K.4.3 compare two objects in nonstandard units of measure, according to one or more of the following attributes: • length • height • weight Maybe it should read-compare and order two objects... The Focal Points for Measurement-state "ordering objects by measurable attributes." M.O.K.4.6 identify the name of penny, nickel, and dime and model the value. identify the name and value of coins and explain the relationships between: • penny • nickel • dime Maybe you can be more specific in the explanation of the relationships. e.g. 5 pennies = 1 nickel 2 nickels = one dime M.O.1.4.3 use calendar to identify date, sequence of days of the week, and months of the year. Should read- use calendar to identify date and sequence days of the week, and months of the year. M.O.1.4.6 identify, count and organize the following coins and bill to		

		display a variety of price values from real-life examples with a total value of 100 cents or less. • penny • nickel • dime • quarter • dollar bill First Grade Students should master trading coins at this level. I think this should be added to the objective.		
11/2	Deborah Brown Westside High School dblbrown@access.k12.wv.us Mathematics Teacher P.O. Box 1439 Pineville, WV 24874 Teacher	After thirty-two years of teaching experience, I have found that students have very different learning abilities. Because expectations must be high and students must meet those expectations to some level of success, it is necessary to present mathematical concepts in different ways to students of differing abilities. We like to believe that all students can learn all mathematical concepts to be presented in the high school setting. But that is just not realistic. We currently have only thirty-five to forty percent of our incoming freshmen who are at ninth grade level in mathematics. This makes it unrealistic for the other sixty to sixty-five percent to enter algebra 1 immediately upon entering the ninth grade. The courses currently offered in the high school (applied math 1, applied math 2, and applied geometry) provide the opportunity for these sixty to sixty-five percent of the students to succeed and graduate. However, the	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997). The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on data from a nationally representative sample of students from the high school class of 1992 who attended a four-year college. The study found that taking a full schedule of academically demanding courses in high school, including

		courses listed in Policy 2520.2 do not offer the same opportunity for these students to succeed and will therefore prevent some students from graduating. We must continue to meet the needs of those students who will graduate high school and continue their education by attending college as well as those who will go directly into the work force. Please reconsider the mathematics course list to include courses below algebra 1 that will present an occasion for every student to be successful.		mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006).
11/2	Amy Powell Organization: Westside High Schoo Email: alpowell@access.k12.wv.us Title: Math Teacher Address1: HC 65, Box 275 Address2: Rt. 971 City/State/Zip: Clear Ford , WV 24822	As a secondary math teacher, who teaches or has taught all math classes below Trigonometry, I am concerned with possible repercussions of eliminating the applied classes, including Algebra / Geometry Prep, from the high school curriculum. While I understand the need for striving for better thinking and reasoning skills for all students, I also understand that not all students come to us prepared for high school. The needs for those students performing below grade level should be met before pushing them into classes that they are not ready for. Many of these students struggle to pass Applied Math 1 and 2. If they are forced to take Algebra I immediately upon entering high school (even over a 2 year period), many will become frustrated, eventually deciding to quit high school. Within the group of students who do pass Algebra I will be a group of students who will never pass Algebra 2 (or Conceptual Math).	-neg NA	The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on data from a nationally representative sample of students from the high school class of 1992 who attended a four-year college. The study found that taking a full schedule of academically demanding courses in high school, including mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006). Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to

		Please reconsider eliminating the applied courses from the high school curriculum. I'm afraid that the fall-out will be tremendous. We will lose many of our students who presently are able to successfully graduate.		eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997).
11/2	Westside High School Math Department alpowell@access.k12.wv.us Address1: HC 65 Box 275 Address2: Rt. 971 Clear Fork, WV 24822	As secondary mathematics teachers who have a combined total of 129 years of experience, we would like to express our concern with WVBOE Policy 2520.2. Most of our concern lies with the elimination of the courses Algebra/Geometry Prep, Applied Math 1, Applied Math 2, and Applied Geometry. In our experience, we have found that students have very different learning abilities and require different teaching methods. Not all students learn on the same level and in the same manner. We agree that it is absolutely necessary for the teacher to have high expectations no matter what the student's learning ability. Because expectations must be high, and students must meet those expectations to achieve some level of success, it is necessary to present mathematical concepts in different ways to students of different abilities. We are aware that the purpose of eliminating the above courses is to help all students develop higher-order thinking skills.	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997). The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on data from a nationally representative sample of students from the high school class of 1992 who attended a

		However, just because one suddenly expects a specific level of thinking skills doesn't mean the students will suddenly produce that level of skills. These skills are developed over time, beginning at a lower level. It would be an injustice for us to expect all students to have already acquired a specific level of thinking and reasoning skills before they start high school. In our school (which we believe is a typical high school), 60 percent of our students who enter ninth grade are not on grade level in math. Many of these students are not able to perform higher level thinking skills that are necessary for Algebra I or above. Why not start those students out in Algebra/Geometry Prep and help them develop their thinking and reasoning skills over time? Expecting all students to take Algebra I as their lowest high school math class is unrealistic. Should this policy pass, there will be a significant time lapse before the problems produced by this situation could be rectified. Presently, students are able to take the Applied courses and successfully graduate. However, with all students having to take the classes listed in the policy, many students will never pass all of their required math courses. As a result, drop-out rates will skyrocket, graduation rates will plummet, and high schools and counties will never meet AYP. Although this policy will be beneficial to the students on the higher end of the spectrum, we believe that the students on the other end will become lost in the process. Please reconsider passing this detrimental policy for the sake of those students who, in the end, will be harmed by this change in policy. Deborah Brown		four-year college. The study found that taking a full schedule of academically demanding courses in high school, including mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006).

		Elizabeth Powell Amy Powell Debra Bowling Rena Argabright		
11/2	Debbie Bowling Organization: Westside High School Email: dlbowlin@access.k12.wv.us Title: Teacher Address1: 410 Lusk Ave Address2: City/State/Zip: Mullens, WV 25882	I am concerned about the apparent deletion of Algebra/Geometry Prep and the Applied Math classes from the high school courses. In our high school approximately 60% of the students entering 9th grade are not prepared for an Algebra I class. We have been moderately successful teaching these students through the Applied Math classes. I am very fearful that we are headed for a high failure rate and a high drop-out rate because of this policy change. I do have high expectation for my students at their ability level, while recognizing the fact that not all students have the same abilities and strengths. Please reconsider this poliey change and reinstate the Applied Math classes in the high school curriculum.	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997). The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on data from a nationally representative sample of students from the high school class of 1992 who attended a four-year college. The study found that taking a full schedule of academically demanding courses in high school, including mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study

				also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006).
11/2	Cynthia Burke Sherrard Junior High caburke@access.k12.wv.us Title: Teacher Address1: 1000 Fairmont Pike Wheeling, WV 26003 Teacher	Increasing the rigor of the CSOs can be the first step in improving mathematics in West Virginia, but it cannot be the only step. Teachers will need more classroom time with students (42-45 minutes a day is not enough). Students also need some accountability in their own education. Permitting students to fail mathematics and English in grade 5, grade 6, grade 7, and grade 8 without consequence devalues education. Students are sent to the high school where, for the first time in their academic careers, they need to earn credits to graduate. They are sent to the high school without having been required to acquire the skills needed to achieve success. They have been not been encouraged to develop a work ethic or academic skills. Please don't stop the reform with the CSOs--find a way to give us more time for mathematics during the school day and a way to encourage student accountability.	+pos -neg NA	
11/2	Elizabeth Powell Organization: Westside High School Email: epowell@access.k12.wv.us	I am a secondary mathematics teacher who has been teaching for thirty-two years. I have seen many different policies come and go. Although I did not always agree with everything in the policies, I could see the		Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to

	Title: Math Teacher Address1: P.O. Box 213 Address2: City/State/Zip: Kopperston, WV 24854 Role: Teacher	reasoning behind most of changes, and did my best to comply. However, I am not as sure about Policy 2520.2 and the elimination of the courses that help prepare students for Algebra. Students come to us from many different backgrounds and experiences, and not all of them are ready to jump right into Algebra 1. The idea behind this (developing higher level thinking skills) has its merits, but in reality I see the "struggling" students getting frustrated and eventually dropping out of school. Since teachers are held accountable for the performance of their students, they, too, will become more and more frustrated as they try to bring their students up to the expected level. Eventually, they will leave the profession discouraged. As for me, I will go ahead and retire - and leave this problem to the "newer" teachers that haven't left the state yet. However, I cannot just quit without predicting that our system - and especially our students - will suffer.		mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997). The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on data from a nationally representative sample of students from the high school class of 1992 who attended a four-year college. The study found that taking a full schedule of academically demanding courses in high school, including mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006).
11/3	Rena Argabright Organization: Westside High School	I am a secondary math teacher at Westside High School in Wyoming County. I have taught math for 18 years. I am strongly	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics

	Email: Title: Teacher Address1: HC 65 Box 275 Address2: City/State/Zip: Clearfork, WV 2482	against the new Policy 2520.2 that would eliminate the Applied Math courses and the Algebra/Geometry Prep class. Presently, I am teaching Algebra/Geometry Prep, Applied Math I, and Applied Math II. Certainly, I hold high expectations for all my students and push them to achieve to the best of their ablilities. However, I am very much aware of the students who feel overwhelmed with the material, for instance, that is taught in Applied Math II. To place these students in Algebra I or higher would be an injustice to them and would, I believe, doom them to failure. Please reconsider the elimination of these courses from the math curriculum. Rena Argabright		achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997). The need for more and effective instruction in mathematics is documented in a February 2006 study by the U.S. Department of Education. The study findings are based on data from a nationally representative sample of students from the high school class of 1992 who attended a four-year college. The study found that taking a full schedule of academically demanding courses in high school, including mathematics beyond Algebra II, was the single most significant pre-collegiate variable in determining if students graduated from college. The study also found significant disconnects between the high school curriculum and the expectations of the first year of college, suggesting the need to increase the level of challenging academic content in high school. This need to offer a more challenging high school curriculum is even more critical for poor and minority students, as they are less likely than higher socioeconomic and white students to attend high schools that offer challenging curriculum. States moving to increase unit requirements for graduations must also attend to content requirements if they expect to make a difference in student performance (Adelman, 2006).
11/3	Joyce L. Evans Organization: Math Task Force	I just read three pages of comments by Susan Barrett of Nicholas County and I agree with all of them. We must be sure they spiral and	-neg N	

	Email: jlevans@access.k12.wv.us Title: teacher Address1: 543 Pike Avenue Address2: 628 Walnut Street City/State/Zip: Monongah, WV 26554	are age appropriate. The difference of one word can change rigor. With the new Focal Points from NCTM with have even more help to make WV lead. Did elementary teachers work on these new revisions? I cannot help but question based on what I read. Thanks		
§126-44B-4 Summary of the Content Standards and Objectives				
10-12	richard burdiss teacher rcbxenon@1st.net parkersburg south H.S. 10101 state route 550 vincent oh 45784	I think it will be for the good of the students to take more mathematics above the level of Algebra.	+pos	Thank you.
10-25	Jacquie McPeake WWHS jmcpeake@access.k12.wv.us PO Box 147 City/State/Zip: Piney View, WV 25906	I do not see Calculus or AP Calculus. I wonder if we should include other courses due to our increasing standards. Maybe an Algebra III, College Preparation Class, and maybe a General Mathematics(checkbook, interest, budgets, stocks, investments).	-neg +pos	We are planning to develop an Algebra III Course and a Calculus course.
11/1	Pattie Cowan pacowanis@comcast.net Teacher	M.O.1.3.5 create and describe simple symmetrical designs This is too difficult for first grade. They need to identify and draw a line of symmetry before they can create and describe at the mastery level M.O.1.3.7 find and name locations on a first-quadrant grid. Too difficult-Should read find and name locations on a coordinate grid.	-neg NA	Alignment Study revealed insufficient rigor in specified objectives.

§126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools				
10-10	Kim Snider Math Teacher kesnider@access.k12.wv.us Weir High 100 Red Rider Rd Weirton WV 26047	There is no way you can expect these students to pass Alg 1 in 8th grade unless their basic skills are improved in the elementary schools. Several of our students wouldn't make it through their math classes if it weren't for being able to take the Applied 1 and 2, or even waiting till they are freshmen to take Alg 1. Please really think this change through.	-neg	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997).
10-12	Amanda Shrewsbury Teacher abshrews@access.k12.wv.us PikeView High School 3566 Eads Mill Road Princeton WV 24740	I know that for many people, the cognitive level that is abstract NEVER develops. I don't understand why anyone would set so many students back by making standards once met in college, met in the 8th grade. And, even if we set aside the people who never will develop the capability, there are those that do not develop it until their 18th or 19th birthday. Setting this many people up to fail be making algebra in 8th grade mandatory may look	-neg	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age.

		good on paper, but will not be effective. We are trying to decrease dropout rates also. Kids get so discouraged when they cannot complete a task. Earlier required Algebra will not effect the kids who can do - it will cause the ones who can't to look more seriously at dropping out. I am very dissapointed at even the mention of 8th grade Algebra. To me, it shows a disconnect between teachers, students, and the powers that be. Please look at the data once more. 8th grade Algebra that is required does not make good sense.		Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997). There are four primary cognitive structures (i.e., development stages) according to Piaget: sensory motor, pre-operations, concrete operations, and formal operations. In the sensory motor stage (0-2 years), intelligence takes the form of motor actions. Intelligence in the pre-operation period (3-7 years) is intuitive in nature. The cognitive structure during the concrete operational stage (8-11 years) is logical but depends upon concrete referents. **In the final stage of formal operations (12-15 years), thinking involves abstractions.** At an early age, the routine use of concrete objects is essential to help students connect real things and events with their abstract representations. The ability to picture and do things in their heads will be enhanced by frequent reference to real-world applications. Students should be encouraged to describe all sorts of things mathematically-in terms of numbers, shapes, and operations. It is true that mathematical investigations sooner or later involve certain processes, but the order is not fixed and the emphasis placed on each process varies greatly. Each of the three parts of the cycle-representation, manipulation, and validation-should be studied in its own right as part of what constitutes learning mathematics. Students should have the chance to use the entire cycle in carrying out their own mathematical investigations. The purpose of this experience is to produce not professional mathematicians but adults who are familiar with mathematical inquiry. Each part of the cycle poses some learning challenges. The process of representing something by a symbol or expression is taken by many students to refer only to "real things." "Let A stand for the area of the floor in this room" is easier for young students to grasp than "Let Y equal the

				area of any rectangle." First, students have to be convinced that substituting abstract symbols for actual quantities is worth the effort. Then they need to work their way toward the realization that using symbols to represent abstractions, and abstractions of abstractions, also pays off in solving problems. Perhaps this means bringing students to see that in the world of mathematics, numbers, shapes, operations, symbols, and symbols that summarize sets of symbols are as "real" as blocks, cows, and dollars (American Association for the Advancement of Science, 1993).
10-12	Gregory Miller Mathematics Facilitator, 7-12 gsmiller@access.k12.wv.us Mingo Co. Schools Rt. 2 Box 310 Williamson wv 25661	The Algebra I CSOs are more vibrant than in the previous version. The use of analysis, synthesis, and evaluation in the CSO's show more rigor and relevance. The verbage needs to be cleaned up though. Some of the changes look like an afterthought. For example: M.O.A1.2.7, M.O.A1.2.14, M.O.A1.2.18, and M.O.A1.2.3. The rest of the CSOs are not as far-reaching as those for Algebra I. Some more effort to deepen them would strengthen the document. The other issue is the lack of CSOs for courses listed in the new Policy 2510. A course exists called "College Transistion Mathematics" under "Electives Required To Be Offered" effective 1 July 2008. There are no CSOs for that course. Under optional electives, there are CSOs for some but not others. CSOs exist for Conceptual Mathematics and Prob/Stat, but not for Alg/Geo Prep, Calculus, and Integrated Math I-IV. Consistency needs to occur. Either all the courses need to have approved CSOs or none. Finally, some part of the document needs to address the standards and objectives contained on the 10th grade version of the WESTEST.	+pos -neg	Wording changes made. CSOs exist for the courses except the Integrated Mathematics Courses that are only taught at a few schools throughout the state. We will work toward writing those when we do Algebra III and Calculus The College transition mathematics course will be tailored to meet the needs of individual students. Tenth grade assessments are defined according to current course offerings.

10-13	SUE SADOSKI MATHEMATICS TEACHER PREMIERMATHMOM@COMCAST.NET MARSHALL COUNTY SCHOOLS RR 5 BOX 140D MOUNDSVILLE WV 26041	I don't understand why we would eliminate the lower level courses that help prepare students for the higher level courses. Not all students are capable of mastering Algebra 1 at the ninth grade level. We are only setting these kids up for failure!	-neg NA	Masini and Taylor (2000) report research documenting that the number of mathematics topics covered prior to eighth grade is positively correlated to mathematics achievement, while the number of new topics presented at the eighth-grade level is negatively correlated to mathematics achievement. Regardless of the math skills before high school, taking algebra in the middle school is strongly related to achievement gains in high school. The math curriculum must provide students with opportunities to learn mathematics at an early age. Research from the past 15 years provides a clear picture of the impact of a standards-based math curriculum. Students who take rigorous mathematics courses are much more likely to go to college than those who do not. The gateway to advanced mathematics in high school is algebra. We also know that achievement in mathematics is based on the type of courses a student takes, not the type of school attended (U.S. Department of Education, 1997).
10-23	Rosa Southall Title I Math Specialist rsouthall@kcs.kana.k12.wv.us Kanawha County Edison Bldg. 122 3rd Ave. South Charleston W.V. 25303-1434	Thanks for consolidating some of the CSO's. The wording change doesn't matter but some of the phrases are a little wording and may cause some concern on interpretation. Thanks for the opportunity to comment	+pos NA	

10-30	Susan Barrett Nicholas County Schools sbarrett@mountain.net Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Address1: 102 Airport Road Fenwick, WV 26202	K.1.8 – "Use concrete objects to model addition and subtraction of Whole numbers related to sums of 10 or less and write corresponding number sentence." The performance descriptor at partial mastery asks students to "solve addition and subtraction sentences using whole numbers to 10." Objects are not mentioned. The mastery performance descriptor says "use concrete objects to model addition and subtraction…." As written, partial mastery is more difficult than mastery. K.1.10 – "Create grade-appropriate picture and story problems, solve using a variety of strategies, present solutions and justify results." This seems a bit much to expect at the mastery level. By setting the objective so high at mastery, the performance descriptors for above mastery and distinguished are far above what is appropriate for five-year-old students ("They offer alternative solutions to two-step problems using pictures, numbers, and words.") Suggestion – "Represent and solve grade-appropriate picture and story problems using a variety of strategies, including modeling with objects, drawing pictures, and writing numbers." The emphasis in kindergarten and first grade should be on representation, not justification and multiple solutions. See the Curriculum Focal Points. Algebra K.2.1 – "Justify the classification of self-selected objects based on	-neg NA -neg NA	Do Not Accept. This comment repeatedly refers to the initial revisions to Policy 2520.2 that were placed on comment in July 2006. This revised policy was reviewed by numerous organizations and individuals. Dr. Norman Webb of the Wisconsin Center for Education Research and others who work with him reviewed the standards in terms of depth of knowledge, level of rigor, alignment across grades and appropriateness as the standards, objectives and performance descriptors compared to those of other states. This review stated, "The expectations for K-8 were primarily judged to expect students t engage in recall or recognition.(Depth of Knowledge Level1) and conceptual or procedural thinking (Depth of Knowledge Level 2). The average depth of knowledge rating at each grade level, K-7, ranged from 1.32 to 1.63 on a scale of 1-4. The average depth of knowledge at grade 8 was 2.00. Upon receipt of this study, we assembled a team of certified mathematics teachers, the majority of which have received National Board Certification and/or other recognitions related to their expertise in the teaching of mathematics as well as representatives of higher education. This team studied the CSOs, the study from Dr. Webb and the NCTM Curriculum Focal Points and used this information to prepare the Content Standards and Objectives for Mathematics currently on comment. Modeling a problem is more rigorous than just counting to solve a problem. A child must demonstrate the process as well as count the items for a total. Alignment Study revealed insufficient rigor in specified

		attributes." If the objective is written at the mastery level, then it should say "based on one attribute" to match the performance descriptor. Kindergarten students are just beginners.	-neg NA	objectives.
		They need many sorting and classifying experiences. This objective seems unnecessarily wordy. The objective used to read, "Sort and classify objects by one attribute." That seems clear and to the point and appropriate for five-year-olds.	-neg NA	Objectives do not limit the number of sorting and classifying experiences a teacher provides her students.
		Measurement K.4.4 – "Use calendar to identify date and the sequence of the days of The week." This is less rigorous than the old objective, which said, "Name the days of the week and seasons of the year." The intent was for students to recite from memory, not read from a calendar. Most calendars in kindergarten classrooms are built a day at a time, so finding the date would be finding the last number put on the calendar. That seems appropriate for five-year-olds just learning what a calendar is and getting a grip on the passage of time. Identifying the date on a calendar could certainly wait until first grade.		Identifying the date from a calendar is more rigorous than simple reciting the days of the week and the seasons of the year. Building a calendar is an appropriate developmental activity for kindergarten, however the objective goes further to ask a child not only to identify today, but to be able to identify a day last week, yesterday, tomorrow…This allows for vocabulary building in mathematics. This is not too difficult for a Kindergarten child to accomplish.
		K.4.6 – "Identify the name and value of coins and explain the relationships between: penny, nickel, dime."	-neg NA	Alignment Study revealed insufficient rigor in specified objectives.
		This objective combines two kindergarten objectives on money, but in doing so, changes the intent of the objective. The old objectives		A kindergarten student should be able to organize a box of items according to an attribute such as color, then count the number of items and analyze data using a pictograph with

		called for students to identify the name and value of penny, nickel, and dime and count a collection of pennies with a value up to 20 cents. The performance descriptor still says this at mastery level. Trading coins or explaining the relationship between coins of different values is more appropriate for first grade, which is where it was, or for above mastery and distinguished performance levels at kindergarten. Data Analysis and Probability K.5.1 – "Collect, organize, display, and interpret data using a pictograph and bar graph (with and without technology)." This is not developmentally appropriate. Beginning experiences in data collection should involve collecting real data, building physical graphs, and counting to analyze results. The suggestions in the Curriculum Focal Points for data analysis at kindergarten are on target; K.5.1 is not.		and without technology. This is developmentally appropriate. West Virginia has completed the revisions of our Content Standards & Objectives using the NCTM Curriculum Focal Points as suggested by NCTM President Skip Fennell. He said in a recent article that he envisioned curriculum developers putting the Curriculum Focal Points and a local or state curriculum side by side when refining their current curricula. He hoped that curriculum developers would determine how much time to devote to the focal points and then build other topics around those primary topics. The WVDE Office of Instruction utilized the document in precisely this manner. Our content standards and objectives have been recently crafted with the focal points addressed throughout K-8. It is our hope that with the Curriculum Focal Points document guiding curriculum decisions, textbook companies will follow the lead toward lessoning the "mile wide and inch deep" criticism of U.S. texts. Wording preference –unnecessary change.
		First Grade – Number and Operations 1.1.3 – "Identify odd and even numbers to 20 and determine if a set of objects has an odd or even number of elements." Reordering the words would put the emphasis on modeling and understanding what makes a number odd or even, which is where is should be at the first grade level. Many students can recite the even numbers to 20 if they can count by twos, but that is not the same as understanding why those numbers are even.	-neg NA	To model an odd or even number shows understanding of the concept through a concrete representation rather than to identify (point out which is odd or even) a number of odd or even objects.
		Suggestion – "Determine if a set of objects has an odd or even number of elements and		First grade students should be able to count by fives. It has been added here to be sure it is included in counting by

		identify odd and even numbers to 20." The performance descriptors need some work. This would be a good place to use "explain" or "justify" rather than having students model or identify higher odd and even numbers at the above mastery and distinguished levels. The partial mastery and novice descriptors ask students to identify odd and even numbers. This seems more difficult than modeling odd and even numbers because it is less concrete, yet "model" is the verb used at mastery and above mastery.	-neg NA	groups.
		1.1.4 – "Group and count manipulatives by ones, fives and tens to 100." Kindergarten has grouping and counting by ones, fives, and tens. Fives has been added to the objective in first grade since the objectives were posted this summer. In my opinion, the purpose of this objective is to build understanding of place value, and therefore, fives does not belong. The intent is to help children connect counting a large group of objects to the base ten system; they form groups of ten and then tell how many objects are in the set by counting tens and ones. The first grade objectives include counting by fives under the algebra strand. The focus of 1.1.4 is connecting to place value. Suggestion – "Group manipulatives to count by tens and ones to 100."	-neg	Using a concrete model to expose first grade students to the concept of fraction is developmentally appropriate and builds mathematical vocabulary. West Virginia has completed the revisions of our Content Standards & Objectives using the NCTM Curriculum Focal Points as suggested by NCTM President Skip Fennell. He said in a recent article that he envisioned curriculum developers putting the Curriculum Focal Points and a local or state curriculum side by side when refining their current curricula. He hoped that curriculum developers would determine how much time to devote to the focal points and then build other topics around those primary topics. Wording preference models Curriculum Focal Points… "quick recall"
		1.1.9 – "Identify, name, and explain why a given part is a half, third, or fourth of a whole or part of a group, using concrete models." Explaining why has been added to the objective since the summer, but it doesnot appear in		No suggestion made to improve objective-suggestion is made toward the amount of instruction that should take place on a particular objective.

		the performance descriptors at any level. Is this something expected of all students? If we are following the Curriculum Focal Points, fractions do not appear at all until third grade, where the recommendation is "Understand and represent commonly used fractions, such as ¼, 1/3, and ½." Adding explaining why at first grade seems to be out of line with the NCTM document.	-neg NA	
		1.1.12 – "Quick recall of basic addition facts with sums to 10 and corresponding subtraction facts." The objective in use now reads, "Memorize basic addition facts with sums to 10 and corresponding subtraction facts." The objective on comment this summer read, "Demonstrate fluency with basic addition facts with sums to 10 and corresponding subtraction facts." There was a lot of discussion on this objective, as well as the related ones in second, third, and fourth grades about mastering basic facts. The committee was searching for a way to promote a more standards-based approach without giving up the recommendation that students develop the computational fluency that leads to success at higher grade levels in more complex computation and problem solving situations. In a traditional approach, basic facts are learned through rote practice leading (hopefully) to memorization. In a standards-based approach, basic addition and subtraction facts are learned through repeated practice with composing and decomposing numbers and applying strategies like doubles, doubles plus one, comp! lements of ten, etc. These strategies help students become mathematically	-neg NA	Wording preference- Asking a child to create problems using a variety of strategies…examples: use manipulatives, draw pictures, Strategies are used to solve the problem of how to create a problem. Future companion document will help teachers that do not understand fully what the objective is asking the student to do. Included statement in performance descriptor

		Powerful thinkers and lead to stronger mental math and estimation skills at all levels. I believe the objective must include some mention of strategies that promote number sense rather than rote memorization. If first graders become proficient in those strategies, then quick recall of all the single-digit addition and subtraction facts by the end of second grade is a realistic expectation. See the Curriculum Focal Points for first and second grades.	-neg NA	Alignment Study revealed insufficient rigor in specified objectives.
		Suggestion – "Develop and apply strategies that lead to quick recall of the basic addition facts to 10 and the related subtraction facts." It would be good if we could include some of those strategies in the objective with an e.g.		Using correct mathematics terminology prepares students for the mathematics on the horizon, according to Debra Ball, University of Michigan Demonstrating is more rigorous than just telling.
		1.1.14 – "Create grade-appropriate picture and story problems using a variety of strategies (with and without technology), present solutions and justify results." According to the Curriculum Focal Points, there should be a great deal of emphasis on representing addition and subtraction situations with a variety of models at the first grade level. They practice a variety of strategies in solving addition and subtraction problems. Strategies are methods for solving problems, not for creating them. Asking them	-neg NA	Instructional suggestion rather than objective suggestion.

		to create problems using a variety of strategies doesn't make sense. Suggestion – "Represent and solve addition and subtraction story problems using a variety of strategies; present and justify solutions using pictures, numbers, or words." Algebra 1.2.4 – "Create and analyze number patterns based on real-life situations using words, AB form, and T-charts and present results." The objective did say, "Identify and represent number patterns using words, AB form, and T-charts." The emphasis on representation has been removed, and that was the focus of the objective – translating a pattern from one form to another. "Analyze and create" were the verbs used with repeating patterns and that is now in kindergarten (see K.2.2). Students at the above mastery and distinguished levels could create and analyze number patterns in addition to representing and identifying patterns. Suggestion – stick with "Identify and represent number pattern using words, AB form, and T-charts." 1.2.5 – "Use concrete materials to demonstrate that the quantities on both sides of a grade-appropriate number sentence are equivalent." The performance descriptors call for students to demonstrate equivalency at the mastery	-neg NA	The last sentence of the objective states "presenting results". This is directly taken from Norm Webb's report. Suggestion to leave it as in the original document. Alignment Study revealed insufficient rigor in specified objectives. Alignment Study revealed insufficient rigor in specified objectives. Added "trading coins".

		level and to describe equivalency at the partial mastery level. Demonstrating is more concrete than describing. If you demonstrate equivalency, it seems like that would be the same as proving it, which is what is called for at the above mastery level.	-neg NA	West Virginia has completed this draft of revisions of our Content Standards & Objectives using the NCTM Curriculum Focal Points as suggested by NCTM President Skip Fennell. He said in a recent article that he envisioned curriculum developers putting the Curriculum Focal Points and a local or state curriculum side by side when refining their current curricula. He hoped that curriculum developers would determine how much time to devote to the focal points and then build other topics around those primary topics. The WVDE Office of Instruction utilized the document in precisely this manner. Our content standards and objectives have been recently crafted with the focal points addressed throughout K-8.
		Geometry 1.3.1 – "Draw, label, and sort circle, rectangles including squares, triangles and according to sides and vertices." The kindergarten objective (K.3.1) says, "Use physical materials to construct, identify, and classify basic geometric plane shapes: circles, ellipses (oval), rectangles including squares, and triangles." The kindergarten objective seems more challenging except for the sides and vertices. The word "describe" has been removed from the objective.	NA	
		Suggestion – "Identify, sort, and draw circles, rectangles including squares, and triangles and describe according to sides and vertices." The performance descriptor at partial mastery uses "identify" while mastery calls for the student to "sort" shapes, which seems more difficult. How is label different from identify?	+neg A	The wording is in alignment with Norm Webb's specifications for increasing rigor to level 3 & 4. Deleted "without"
		1.3.5 – "Create and describe simple symmetrical designs." The objective was, "Identify and draw a line of symmetry." The new objective is quite a leap in difficulty. The current objective at fourth grade (4.3.6) reads "Draw a design with one line of symmetry." The Curriculum Focal Points at first grade call for composing	-neg NA	"Develop" is one of the words Norm Webb's report guards against using. Added "using multiple strategies".

		and decomposing geometric shapes as a means of "developing a background … of such properties as congruence and symmetry." The fourth grade recommendations include using transformations of basic shapes to create designs with symmetry. First graders could meet the proposed objective by folding and cutting paper, but does that mean they understand symmetry? As they stand now, there is nothing in the first grade performance descriptors about symmetry at all. Suggestion – either delete this objective and hold off on symmetry until higher grades, go back to "identify and draw a line of symmetry" or write performance descriptors that tell what the student is expected to do.	-neg NA	Suggestion to go back to original document.
		1.3.4 – "Draw and identify open and closed shapes and congruent plane shapes." Suggestion – "Identify and draw open and closed shapes and congruent plane shapes" to reflect the order of difficulty of the two verbs.		This kind of thinking in mathematics better prepares students for finding formulas.
		1.3.7 – "Find and name locations on a first-quadrant grid." Students need to find and name a square region in a simple coordinate grid system. Saying first quadrant is not really appropriate as it seems like you are talking about locations of points instead of regions (like finding A4 on a map). The coordinate point system is not introduced until third grade. Suggestion – "Find and name locations in a simple coordinate grid system."	-neg NA	Changed word from identify to describe. This would fit nicely in a companion document.
		1.3.8 – "Predict the result of combining or decomposing two or more two-dimensional		

		/three dimensional shapes." At the first grade level, describing the result of combining or decomposing shapes seems more appropriate than predicting. Describing and determining how they are alike and different is what is recommended in the Curriculum Focal Points for first grade. There is nothing about this objective in the performance descriptors at any performance level in first grade geometry. Measurement – 1.4.2 – "Select appropriate units and tools to measure and compare two objects or events according to one or more of the following attributes: length, height, weight, temperature, volume. Justify selection of units and tools used to measure the attributes and present results."Selecting the appropriate unit of measurement is currently listed in the fourth and fifth grade measurement CSOs. If you are asking a first grader to choose between meters and pounds to measure an object's length, this is appropriate. If you are asking a first grader to choose between meters and centimeters, it is not. Height and length are the same attribute and don't need to be listed separately. Selecting appropriate units is mentioned in the Curriculum Focal Points for third and	-neg NA -neg NA	Added "plot and describe points" to the performance descriptor. Corrected typographic error-deleted the word "a" Alignment Study Changed the Novice Performance Descriptor to "explain the relationship between coins". Alignment Study revealed insufficient rigor in specified objectives.

		fourth grades, not in first grade. There is nothing in the second grade about selecting appropriate units, another indication that this objective is out of sequence. The last sentence of the objective is unnecessary; presenting results doesn't make sense.	-neg NA	Probability is needed for scientific inquiry in later grades. It was this team's decision to leave probability in at the lower grade levels.
		1.4.3 – "Use calendar to identify date, sequence of days of the week, and months of the year." This is less rigorous than the objective we currently have for first grade. Naming the days of the week is currently a kindergarten objective and is expected to be done without using a calendar. Naming the months of the year is a first grade objective but it is expected to be done without using a calendar. Suggestion – leave the objective the way it is now: "Name the months of the year and find a date on a monthly calendar." Leave naming the days of the week in kindergarten.	-neg NA	
		1.4.6 – "Identify, count, and organize the following coins and bill to display a variety of price values from real-life examples with a total value of 100 cents or less: penny, nickel, dime, quarter, dollar bill." Two objectives have been combined and a third one on money has been eliminated. These changes have altered the intent of the objective. The current objectives ask kindergarten	-neg A	
		students to identify the name and value of the penny, nickel, and dime. First	-neg NA	

		graders added the quarter and dollar and were asked to count and trade pennies, nickels, and dimes. This was plenty for first grade. Many students struggle with counting money, but it was a realistic objective. Throwing in counting a collection of coins including quarters makes it more difficult; this is currently in second grade and is one of the more challenging objectives for many children. Trading coins for other coins of equivalent value was taken out of the first grade objective, and this is a critical step in mastering both counting a collection of coins and in making change. In addition, the performance descriptors do not match the objective – the mastery level calls for making change from a dollar. This is currently ! in second grade and needs to stay there. Ask any second grade teacher – this is difficult for most students and takes lots of practice to master by the end of the year. Making change requires a deeper level of understanding than counting a collection of coins. Counting coins needs to be mastered first. Suggestion leave 1.4.7 and 1.4.8 the way they are written now. (1.4.7 – Identify and model the value of quarter and dollar. 1.4.8 – Count and trade a collection of pennies,	-neg NA -neg NA -neg NA -neg A	

		nickels, and dimes with a total value of 100 cents or less.) The current objective 1.4.9 regarding making change up to a dime could be eliminated so students would not have to begin making change until second grade. I could not find anything at all on money skills in the Curriculum Focal Points. Data Analysis and Probability 1.5.2 – "Conduct simple experiments, record data on a tally chart or table and use the data to predict which of the events is more likely or less likely to occur if the experiment is repeated." This objective sounds almost exactly the same as K.5.2. It seems more appropriate for first grade. Tally marks are more commonly used to record data or to keep count than as a part of a probability experiment. As they read now, tally marks are never mentioned in the performance descriptors at first grade. Predicting the likelihood of an event is not mentioned in the Curriculum Focal Points until seventh grade. Second Grade Number and Operations 2.1.2 – "Identify any number as odd or even and determine if a set has an odd or even number of elements." Determining if a set of objects has an odd or even number of elements is more of a first grade skill. This would be a good place to use	-neg NA -neg A -neg NA	

		a word like justify or explain. The goal is for students to demonstrate understanding of the concept of odd and even, and to apply that understanding to any number. It would not be necessary to use objects to model the number, nor would it be satisfactory to merely state that the number ends with 2,4,6,8 or 0 if it is even.	-neg NA -neg A -neg NA	
		2.1.3 – "Count and group concrete manipulatives by ones, tens, and hundreds to 1,000." Suggestion – "Group manipulatives to count by ones, tens, and hundreds to 1000." 2.1.13 – "Create story problems that require one or two-step procedures, using a variety of strategies explain the reasoning used, justify the procedures selected, and present the results." This is really wordy. If you solve the problem, you present results. If you explain the reasoning used, you have justified the procedures selected. Creating story problems seems like it belongs at the above mastery or distinguished level. If it's in the objective, then it's expected at mastery level. If second graders can solve one or two-step problems and justify their solutions verbally or in writing, that would be plenty to expect at the mastery level.	+pos -neg A -neg N -neg A	

		2.1.10 – "Model 2- and 3-digit addition and subtraction with regrouping." 2.1.11 – "Add and subtract 2- and 3-digit numbers without regrouping." The performance descriptor at mastery level says students model addition and subtraction with and without regrouping. These need to be separated. Modeling problems that do not involve regrouping is on first grade level; all second graders should be able to add and subtract 2- and 3-digit numbers when regrouping is not required (pencil/paper computation). Modeling problems that involve regrouping is mastery level at second grade. Pencil/paper computation is not at mastery level until third grade. Objective 2.1.10 could be strengthened and more aligned with a standards-based approach by changing it to say something like, "Develop and apply multiple strategies for solving 2- and 3- digit addition and subtraction problems with regrouping (e.g., using place value models, the hundred chart, number lines)." Algebra 2.2.2 – "Explain how one variable produces a change in another variable." The meaning of this objective is not clear. There is nothing in the performance descriptors on this objective. What is it the student is expected to do to demonstrate	-neg NA -neg A -neg NA -neg NA	

		mastery? There is nothing in the current CSOs on variables until third grade. There is nothing in the Curriculum Focal Points on variables at second grade. The Curriculum Focal Points (page 31) at seventh grade call for students to, "Investigate how a change in one variable relates to a change in a second variable." This objective is inappropriate for second grade. This objective replaces, "Given an input/output model, determine the rule, input, or output." There was a deliberate inclusion of input/output at each grade level from first through fifth with a progression to more difficult skills at each succeeding grade. Second graders at mastery level were expected to give the input when the output is known. This "backwards thinking" is the new part of the objective at that level; it is not at mastery level in first grade. Suggestion – go back to what 2.2.2 said, "Given an input/output model, determine the rule, input, or output." 2.2.3 – "Identify, complete, and extend a variety of counting patterns, according to a given rule." If you identify the counting pattern, you are identifying the rule. There is no point asking students to identify a rule that is given. If you complete or extend		

		the counting pattern, you are applying the rule. The rule does not have to be given; giving the rule decreases the rigor of the objective. Suggestion – either take out "identify" at the beginning of the sentence or take out "according to a given rule" at the end of the sentence. 2.2.4 – "Create physical models to demonstrate equivalency of two numerical expressions written as a grade-appropriate number sentence." "Create" is not a sensible verb here; "use" would be more appropriate. There is nothing in the performance descriptors at novice, partial mastery, or mastery level on this objective. Including an example might be helpful here to help differentiate this objective from the one in first grade. First graders need to model equivalency of something like 11 = 4 + 7 while second graders model something like 4 + 7 = 9 + 2. Geometry The performance descriptors have a few problems. I'm not sure what the difference is between "recognize" and "identify" but these verbs are used to distinguish novice, partial mastery, and mastery in regard to similar shapes, line segments, and angles. There is nothing in the performance descriptors at all about 2.3.5, "Plot and describe the path between locations on a grid."		

		There is a typo in the above mastery performance descriptor. It says, "… compare and contract…" instead of "…compare and contrast…" 2.3.6 – "Identify similar shapes." The above mastery and distinguished levels call for students to create similar shapes and justify why they are similar. Similarity involves proportional reasoning; having students recognize or identify similar shapes is plenty difficult for second graders. Creating similar shapes is a fifth grade objective. Measurement 2.4.2 – There is a typo in the objective. Take out "a" before "perimeter of a squares, rectangles…" 2.4.7 – "Identify, count, and organize coins and bills to display a variety of price values from real-life examples with a total value of one dollar or less and model making change using manipulatives." This objective replaces two objectives, one on counting coins and one on making change. The verbs "read" and "write" have also been removed. Learning to use dollars-and-cents notation is a second grade skill. The proposed change in first grade puts counting coins, including quarters, up to a dollar there instead of in second. Counting coins and making		

		change are two different skills and would be better kept as two objectives. Making change is more difficult and is one of the hardest skills for second graders to master. There was a gradual progression of difficulty that was built into the proposed objectives before; these latest changes undo the effort to provide that scaffolding for students. The objective as proposed is also unnecessarily wordy. Suggestion – go back to two separate objectives. The wording could be changed without changing the meaning by saying, "Read, write, and use coins to represent a variety of price values up to one dollar." and "Use coins to model maki!ng change up to a dollar." In the proposed performance descriptors, the novice level says students "count coins to $1.00." That is a mastery level skill. Partial mastery calls for the student to "explain the relationship between coins." This is easier than what is at the novice level. Many students can tell you that it takes two nickels to make a dime but cannot count a quarter, a dime, and two nickels together. Data Analysis and Probability 2.5.1 – "Create, read, and interpret a pictograph with each picture representing greater than or equal to a single unit."		

		The performance descriptor at partial mastery and/or novice should say something about reading and interpreting a pictograph with each picture representing a single unit. Most students can do that; it's when the picture stands for 2 or 5 or 10 that it becomes more difficult. 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." Predicting is only mentioned at the distinguished level. If it's in the objective, is it not an expectation at mastery level? Or go with the Curriculum Focal Points, which call for predicting the likelihood of an event at seventh grade.		
10/31/06	Rhonda M. Jelich Organization: Clay Elementary School Email: rjelich@access.k12.wv.us Title: Assistant Principal/Curriculum Coordinator Address1: po Box 600 Address2: City/State/Zip: Clay, West Virginia 25043 Role: Principal	These standards are not teacher friendly. Too many objectives have been combined to make a large objective, that includes too much information. Simply removing objectives would have been better than combining objectives.	-neg N	
10/31/06	Janie Merendino	I wish to address the content strand of	-neg	

	Organization: Fairmont State University Email: mmerendino@fairmontstate.edu Title: teacher educator Address1: 10 diana dr Address2: City/State/Zip: Fairmont, wv 26554 Role: Teacher	numbers and operations. Third grade has comparing frasctions with unlike denominators. Can we include denominators less than 12? If students really develop understanding of those fractions, understanding with all will happen intuitively. I would also reccommend in third grade to include solving story problems that represent all meaning of multiplication: 1D - repeated addition, 2D arrays and 3D combinations.	N	
10/31	Janie Merendino Fairmont State University mmerendino@fairmontstate.edu teacher educator 10 diana dr Fairmont, WV 26554 Teacher	As I reflect on our proposed CSOS and read NCTM's curriculum focal points several concerns arise. I choose the area of measurement to begin. Research reveals volume is a developemntal skill and I see it in the first grade csos. I also see perimeter in the 3rd grade. The Focal Points suggest a focus on linear measurement only in grades K - 4. I agree. Children need lots of time with comparing and estimating linear measurements before they talk about volume atrributes. The properties of measurement such as transitivity and conservation and the indirect relationship of unit size to amount needs fully developed at this level. The attributes of volume may be mentiioned, but not a tested cso at this level.	-neg N	
10/31	Janie Merendino Fairmont State University mmerendino@fairmontstate.edu teacher educator Fairmont, wv 26554	Comments from CSOS involving measurement: In sixth grade we should include find missing measures of length from area and volume and consider leaving surface area to seventh grade. If we listen to research of Debbie Ball and the authors of Curriculum Focal Points we would do well to leave more out rather than to include it in our CSOS.	-neg N	

11/1	Tammy Bell Organization: Smithville Elementary teacherchick@zoomint ernet.net teacher HC 68 Box 4 Smithville, WV 26178 Teacher	I believe that the jargon that is used is very complicated for teacher use (make it simple). Currently, 3rd graders are having to learn 0's through 5's and 10's in multiplication. 4th graders add the 6's through 9's. 5th graders become more fluent and so on. This has been ok. I believe the 4th grade CSO that you have written about 3 digit by 2 digit multiplication is very complicated for a 4th grader. My 5th graders just finished this and my "A" students struggled with it. I think we are rushing the developmental readiness of our students. I, also, think exponents in 5th grade is ridiculous. Those who teach math everyday all day and are fluent in it (and develop the CSO's) need to take time to think about how much we can actually "cram" in the kids' heads.	-neg NA	Alignment Study revealed insufficient rigor in specified objectives.
11/3	Name: Susan Barrett Organization: Nicholas County Schools Email: sbarrett@mountain.net Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member Address1: 102 Airport Road Address2: City/State/Zip: Fenwick, WV 26202 Role: Teacher	3.1.5 - "Demonstrate an understanding of fractions as part of a whole/one and as part of a set/group using models and pictorial representations." This is almost exactly the same as 2.1.7, "Identify and explain fractions as part of a whole and as part of a set/group using models." Suggestion - eliminate 3.1.5 and focus on equivalent fractions in third. 3.1.6 - "Create concrete models and pictorial representations to compare and order fractions with like and unlike denominators, add and		Do Not Accept. This comment repeatedly refers to the initial revisions to Policy 2520.2 that were placed on comment in July 2006. This revised policy was reviewed by numerous organizations and individuals. Dr. Norman Webb of the Wisconsin Center for Education Research and others who work with him reviewed the standards in terms of depth of knowledge, level of rigor, alignment across grades and appropriateness as the standards, objectives and performance descriptors compared to those of other states. This review stated, "The expectations for K-8 were primarily judged to expect students t engage in recall or

		subtract fractions with like denominators, and verify results." "Use" might be a better verb than "create" since the models already exist; not sure how they would "verify results" since I thought that's what they were doing with the models.	-neg A	recognition.(Depth of Knowledge Level1) and conceptual or procedural thinking (Depth of Knowledge Level 2). The average depth of knowledge rating at each grade level, K-7, ranged from 1.32 to 1.63 on a scale of 1-4. The average depth of knowledge at grade 8 was 2.00. Upon receipt of this study, we assembled a team of certified mathematics teachers, the majority of which have received National Board Certification and/or other recognitions related to their expertise in the teaching of mathematics as well as representatives of higher education. This team studied the CSOs, the study from Dr. Webb and the NCTM Curriculum Focal Points and used this information to prepare the Content Standards and Objectives for Mathematics currently on comment.
		3.1.9 - "Demonstrate and model multiplication (repeated addition, arrays) and division (repeated subtraction, partitioning). Suggestion - add "to solve real-world problems" to the end of the objective to put it in context. Kids (and teachers) do not always connect the modeling to the real world.		
		3.1.11 - "Recall basic multiplication facts and the corresponding division facts." Adding something to the objective connecting recall to understanding would make it more aligned with the Curriculum Focal Points (see page 15) and with a standards-based approach. Suggestion - "Use a variety of strategies to build fluency with basic multiplication facts and the corresponding division facts." The objective could include strategies with an e.g, including connecting counting patterns to multiples, using area models, number lines, arrays, etc. Quick recall of the facts is in fourth grade, which aligns perfectly with the Curriculum Focal Points.		
		3.1.12 - "Model the distributive property in multiplication of 2- and 3-digit numbers by a 1-digit number." This objective would be stronger if it included "Use manipulatives to..." at the beginning of the sentence. It would then lead directly into 3.1.13 which uses models for division. (Maybe "Use manipulatives to model division...."	-neg A	

		would work even better for 3.1.13). Students would illustrate the property in a way that builds understanding. Many teachers are not clear on how third graders are supposed to use the distributive property because the teachers have only a superficial understanding of the property themselves. The distributive property is the basis for several of the alternative multiplication algorithms used in the standards-based programs and the foundation for higher math as well. This is the opportunity to build understanding. I notice that the distributive property is not mentioned in the new fourth grade objectives at all; what was in fourth has been moved to fifth. If that's the way it's going to be, then it might be better to move this objective to fourth grade.' 3.1.14 - "Create grade-appropriate real-world problems involving any of the four operations using multiple strategies, explain the reasoning used, and justify the procedures selected when presenting solutions." If the first word is changed from "Create" to "Solve" the objective would make more sense. Strategies are ways to solve problems, not ways to create them. If you want students to write their own word problems, that would be super for the above mastery and/or distinguished performance levels. Performance Descriptors - Place value (3.1.3) is not mentioned at all at any performance level. Estimation (3.1.4) is not mentioned. Addition and subtraction computation should be at the mastery level, but multiplication and division are new and developing skills and pencil/paper computation comes at fourth	-neg A -neg A	Added place value to performance descriptors. Added statements to the performance descriptors. Added statements to the performance descriptors Added statements to performance descriptors. Added statements to performance descriptors.

		grade. Computation in all four operations is currently listed at mastery level. Third graders should be able to read, write, order, and compare whole numbers to 10,000 without manipulatives at the mastery level, but decimals are new and using manipulatives would be very appropriate for mastery at third grade. With fractions, representing and identifying fractions without models is fine at the mastery level, but comparing, adding and subtracting fractions at mastery level should include manipulatives or pictures. With problem solving, identifying the operation needed to solve a problem is often more difficult for students than actually doing the computation, but it is listed at the novice level in ! the performance descriptors. There is nothing about the properties (3.1.10, 3.1.12) at any of the performance levels. Algebra Performance Descriptors - The distinguished level p.d. only addresses one objective. What's the difference between "interpret" and "analyze" with respect to patterns? Writing equivalent expressions is not addressed in the performance descriptors. Suggestion - "Write equivalent numerical expressions and justify using numbers, words, or objects" at mastery, "Evaluate two or more numerical expressions to determine equivalence" at partial mastery, and "Identify equivalent numerical expressions" at novice. Suggestions for input/output - "They complete an input/output model and identify the rule using addition, subtraction, multiplication, and division" at partial mastery and "Complete an		

		input/output model when given a rule using addition, subtraction, multiplication, and division" at novice level. Geometry 3.3.1 - "Identify and create new polygons by transforming, combining and decomposing polygons." This objective replaces, "Identify basic polygons and their components through decagons." 3.3.6 - "Draw an example of a flip, slide and turn (reflection, translation, and rotation) given a model." Both objectives have transformations, which seems unnecessary. Suggestion - change 3.1.1 to, "Identify, describe, analyze, compare, and classify basic polygons by their sides and angles." This is really close to what the Curriculum Focal Points say for third grade. How about one for identifying, classifying, etc and one for changing by transforming, decomposing, etc. Two objectives, 3.3.3 and 3.3.4, are not mentioned in the performance descriptors at all. Measurement 3.4.2 - "Estimate and find the perimeter and area of familiar geometric shapes, using manipulatives, grids, or appropriate measuring tools." 3.4.3 - "Determine the formula the area of a rectangle and explain reasoning through modeling." Combining the objectives on perimeter and area in 3.4.2 does not work. The only shape third graders work with in area is the rectangle. The emphasis is on connecting the		

		formula for area of a rectangle to their work with arrays and area models in multiplication. Perimeter of rectangles was covered in second grade and is extended in third grade to include all polygons. Finding perimeter is a measurement skill at this level, while area is a concept connecting knowledge in number and operations, geometry, and measurement. Suggestion - leave area out of 3.4.2 Go back to, "Estimate and determine the perimeter of any polygon." Performance Descriptors Elapsed time is not mentioned at all in the performance descriptors. Data Analysis and Probability There is nothing in the performance descriptors at any level on listing all outcomes, which is part of 3.5.2 and is a new skill.		
11/2	Pattie Cowan pacowanis Teacher	Data Analysis & Probability M.O.K.5.1 collect, organize, display, and interpret data using a pictograph and bar graph (with and without technology) M.O.K.5.2 conduct a simple probability experiment and use tallies to record results in a table, make predictions based on results. Kindergarten students need to sort real objects-and create graphs with these real objects. The Curriculum Focal Points and connections for Kindergarten states that children sort objects and use one or more attributes to solve problems. Using tallies is difficult even for a first grade student. This is		Do Not Accept. This comment repeatedly refers to the initial revisions to Policy 2520.2 that were placed on comment in July 2006. This revised policy was reviewed by numerous organizations and individuals. Dr. Norman Webb of the Wisconsin Center for Education Research and others who work with him reviewed the standards in terms of depth of knowledge, level of rigor, alignment across grades and appropriateness as the standards, objectives and performance descriptors compared to those of other states. This review stated, "The expectations for K-8 were primarily judged to expect students t engage in recall or recognition.(Depth of Knowledge Level1) and conceptual or procedural thinking (Depth of Knowledge Level 2). The average depth of knowledge rating at each grade level, K-7, ranged from 1.32 to 1.63 on a scale of 1-4. The average depth of knowledge at grade 8 was 2.00.

		too difficult for a Kindergarten student.		Upon receipt of this study, we assembled a team of certified mathematics teachers, the majority of which have received National Board Certification and/or other recognitions related to their expertise in the teaching of mathematics as well as representatives of higher education. This team studied the CSOs, the study from Dr. Webb and the NCTM Curriculum Focal Points and used this information to prepare the Content Standards and Objectives for Mathematics currently on comment.
11/2	Susan Barrett Organization: Nicholas County Schools sbarrett@mountain.net : Math Coach, WV Math Task Force Member, WV Elementary Math Cadre 102 Airport Road City/State/Zip: Fenwick, WV 26202	Fourth Grade > Number and Operations > 4.1.4 – "Using concrete models, benchmark fractions, number line, > compare and order fractions with like and unlike denominators, add and subtract fractions with like and unlike denominators, model equivalent fractions, model addition and subtraction of mixed numbers with and without regrouping." > This new objective combines four objectives and never requires > students to move past the concrete stage in any of the skills involved. Yet in fifth grade, M.O.5.1.7 expects students to "Analyze and solve application of problems and justify reasonableness of solution in problems involving addition and subtraction of fractions and mixed numbers and decimals." There is no objective that addresses the computation skills of adding and subtracting fractions! This is a big oversight as it typically occupies WEEKS of instructional time in fourth and fifth grades. It is not reasonable to assume that somehow between fourth and fifth grades students will	-neg NA	Do Not Accept. This comment repeatedly refers to the initial revisions to Policy 2520.2 that were placed on comment in July 2006. This revised policy was reviewed by numerous organizations and individuals. Dr. Norman Webb of the Wisconsin Center for Education Research and others who work with him reviewed the standards in terms of depth of knowledge, level of rigor, alignment across grades and appropriateness as the standards, objectives and performance descriptors compared to those of other states. This review stated, "The expectations for K-8 were primarily judged to expect students t engage in recall or recognition.(Depth of Knowledge Level1) and conceptual or procedural thinking (Depth of Knowledge Level 2). The average depth of knowledge rating at each grade level, K-7, ranged from 1.32 to 1.63 on a scale of 1-4. The average depth of knowledge at grade 8 was 2.00. Upon receipt of this study, we assembled a team of certified mathematics teachers, the majority of which have received National Board Certification and/or other recognitions related to their expertise in the teaching of mathematics as well as representatives of higher education. This team studied the CSOs, the study from Dr. Webb and the NCTM Curriculum Focal Points and used this information to prepare the Content Standards and Objectives for Mathematics currently on comment.

		figure out on their own how to find common denominators, add, subtract, and reduce fractions and mixed numbers with and without regrouping. The Curriculum Focal Points for fifth grade say students "develop fluency with standard procedures for adding and subtracting fractions and decimals." > > 4.1.7 – "Add and subtract whole numbers (up to 5-digit numbers) and > decimals to the 1000th place, multiply (up to three digits by two digits, and divide (up to a three digit number with a one and two-digit number). > This also combines two objectives from the previous version of the CSOs. Addition and subtraction at fourth grade with both whole numbers are all about computational fluency; these are established skills that only need to refined. Double digit multiplication and long division are new and should include something indicating a connection to understanding. The Curriculum Focal Points for grade 4 recommends that students "develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers." In grade 5, the recommendation is that students "develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multidigit dividends." The proposed CSO does not go beyond students learning rote procedures. > > 4.1.8 – "Justify the use of the standard algorithm to solve multidigit > whole number		Students certainly need to be able to compute adding and subtracting fractions and this is required. However, an objective states what the child should accomplish at each level by the end of the school year. The teacher will need to teach those basic skills but it expected that a child will be able to analyze and solve application of problems involving fractions. This should not be taught in isolation.

		multiplication problems." > I have two problems with this proposed objective. First, in the > standards- based math problems used in our state (Everyday Math and Investigations), emphasis is on reasoning and developing ways to solve multi-digit multiplication problems. Both programs use illustrations of the distributive property to build understanding. Neither program expects students to master or even use the standard algorithm in fourth grade. If this objective is part of our CSOs, teachers in standards-based programs will need to teach the standard algorithm; teachers using traditional series will teach only the standard algorithm. Second, asking ten-year-olds to "justify the use of the standard algorithm" is unreasonable unless justifying means something like "because my teacher told me to put a zero here." I would be interested in reading fourth grade teachers' explanations of how and why the algorithm works; I suspect many would struggle to explain it clearly and concisely. > > 4.1.10 – "Create grade-level real-world appropriate story problems > using multiple strategies including simple ratios, justify the reason for choosing a particular strategy and present results." > The word "solve" has been left out. Strategies are ways to solve a > problem, and are not a part of creating a problem.		4.1.8 This objective was previously changed to "solve multi-digit whole number multiplication problems using a variety of strategies, including the standard algorithm, justify methods used". Curriculum Focal Points states "They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers, understand why the procedure works (based on place value and properties of operations), and use them to solve problems". Teaching to a particular textbook is not within the scope of the Content Standards and Objectives.

		> > Including simple ratios in the objective comes out of nowhere since > there is no objective in number and operations up to this point that addresses ratio at all. It might be more appropriate to build understanding of the concept before asking students to apply ratios in a problem-solving situation. Ratios are mentioned in the proposed 4.5.3, but representing outcomes in a probability experiment as a fraction rather than a ratio might make more sense there (see Curriculum Focal Points for grade 7). In the first round of revisions when we looked at NAEP alignment, ratio was a weak area in our CSOs. I don't think we've done much to improve it. There is a proposed algebra CSO that says, "recognize and describe relationships in which quantities change proportionally." That sounds a lot like ratios, but it doesn't say that. What will teachers make of that? The performance descriptors do nothing to help clarify the meaning. The Curriculum Focal points have no references to ratio unt! > il grade 6. > > The performance descriptors need some work; there are a few that don't > make sense. I know the revision committee was under the gun in trying to get all the changes in, but let's be sure they are clear before they become policy. A few quotes - "They identify grade-appropriate real-world story problems using any strategy, and communicate results." "They research, summarize, and analyze the		Building understanding is certainly required in order to apply ratios in problem solving. The objective does not state to do this without understanding first. Yes, this is ratio.

		relationship of fractions to decimals and communicate this relationship.” > > Algebra > 4.2.2 – “Recognize and describe a relationship in which quantities > change proportionally.” > See comments above on ratio and proportion. See also Curriculum Focal > Points for grades 6 and 7 (Number and Operations, Algebra, and Geometry). > > 4.2.4 – “Solve real-world problems involving order of operations > including grouping symbols and the four operations.” > Order of operations has to do with conventions used in written computation. It would be a stretch for a fourth grader to apply that in a real world problem solving situation. The performance descriptor at the distinguished level calls for students to “create and solve real-world problems involving order of operations with variables.” > The objective on comment this summer was, “Incorporate the order of operations (parentheses and four operations) in solving problems and writing expressions.” Writing expressions following the order of operations takes some higher-level thinking and added rigor to the objective. > > Geometry		Example: Identify the story problem that goes with this story... Deleted research.

		> 4.3.1 – "Identify, classify, compare and contrast two-dimensional > (including quadrilateral shapes) and three-dimensional geometric figures according to attributes." > Three-dimensional figures have been added to this objective, but they > were already included in the third grade objective. The content focus at fourth grade was on quadrilaterals. > > The performance descriptors list tessellations only at the > distinguished level but it is part of the objective. > > Measurement > The performance descriptors at the above mastery and distinguished > levels call for students to investigate formulas for area and select the appropriate one, but the objectives at fourth grade only include the formula for area of a rectangle. Parallelograms and triangles are covered in fifth grade. > > Data Analysis and Probability > 4.5.3 – "Design and conduct a simple probability experiment using > concrete objects, examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and present the results."		The student should be able to solve real-world problems involving order of operations.

		> The current objective focuses on tree diagrams as a way of > representing possible combinations. Typical problems involve things like determining the number of different choices of ice cream sundaes with two flavors and three toppings. The new objective shifts the emphasis to analyzing a probability experiment, which seems to be the recommendation for grade 7 in the Curriculum Focal Points. This objective could really be left out of fourth grade altogether.		Scientific inquiry requires understanding of probability at the 5th grade level.
11/2	Susan Barrett Nicholas County Schools Email: sbarrett@mountain.net Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Address1: 102 Airport Road City/State/Zip: Fenwick, WV 26202	Fifth Grade Number and Operations 5.1.6 - "Model and write equivalencies of fractions (limited to denominators of 10 and 100), decimals, percents, and ratios." Students in fourth grade work with the relationship of fractions to decimals (4.1.5). Fifth graders should be able to write percent and decimal equivalents for common fractions like 1/2, 1/3, 1/4, 3/4, 2/5, etc. By putting "limited to denominators of 10 and 100" in the fifth grade objective, it decreases the rigor and misses a good opportunity to promote the kind of number sense and fluency that is at the heart of standards-based math. 5.1.7 - "Analyze and solve application problems and justify reasonableness of solution in problems involving addition and subtraction of fractions, mixed numbers, and decimals." 5.1.11 - "Solve real-world problems involving whole numbers, decimals, and fraction using multiple strategies and justify the reasonableness by estimation." These objectives are almost the same, except	-neg A -neg A -neg A	Deleted "limited to denominators of 10 and 100" Changed wording in CSO and Performance Descriptor. Added word "describe".

		that 5.1.11 includes whole numbers. In my comments on fourth grade, I noted a big hole in objectives addressing fractions between 4.1.4 and 5.1.7. There is no objective that addresses the computation skills of adding and subtracting fractions. This is a big oversight as it typically occupies WEEKS of instructional time in fourth and fifth grades. It is not reasonable to assume that somehow between fourth and fifth grades students will figure out on their own how to find common denominators, add, subtract, and reduce fractions and mixed numbers with and without regrouping. The Curriculum Focal Points for fifth grade say students "develop fluency with standard procedures for adding and subtracting fractions and decimals." This step can't be skipped. 5.1.9 - "Justify the use of the standard algorithm to solve multidigit whole number division problems." I see two problems with this objective. Students in at least one of the standards-based programs are not taught the standard long division algorithm. Instead they are taught the partial quotients algorithm, which builds on understanding of place value, estimation skills, and the idea of repeated subtractions to find a quotient. Having taught both algorithms, I would never go back to the standard one because it does not build any kind of number sense or estimation skills; it is a rote procedure that many elementary teachers would struggle to justify or explain in any kind of coherent way. Insisting on the use of the standard algorithm will take instruction away from building understanding, and seems contradictory to the approach we have been	-neg A	Corrected and added word "recognize" Added "calculating elapsed time" performance descriptors.

		promoting with standards-based math. The objective could easily be improved by saying, "Justify the use of an efficient algorithm to solve multidigit whole number division problems." The fourth grade objective on justifying the multiplica! tion algorithm could be adjusted in the same way. The performance descriptors need more work. Please don't send them out the way they are! Students at the novice level in fifth grade are not expected to do more than "recognize whole numbers, fractions, mixed numbers, and decimals...confirm place value and recognize solutions to real world problems...confirm that application problems contain fractions, mixed numbers and decimals..." Surely we can expect more than that at fifth grade! The verbs seem out of sequence in addressing divisibility rules, greatest common factor, and least common multiple. At novice level, they "state the divisibility rules, GCF, and LCM." At partial mastery, the verb is "explain" which is more difficult than the mastery level of "identify" and the above mastery level of "examine and identify." Algebra 5.2.4 - "Model and identify square, prime, and composite numbers." Adding the word "describe" to the objective would raise the rigor because it would demand an understanding of what makes a number square, prime, or composite. Geometry The last sentence in the performance		

		descriptor at novice level says, "They identify similar figures using a scale recognize." Measurement No level of the performance descriptors calls for students to do anything beyond estimating elapsed time, yet the objective clearly calls for calculating elapsed time which is more difficult. Several of the descriptors show very low expectations for fifth graders. Novice level only requires students to "recognize real-world problems requiring conversion within a system of measurement" and "recognize that time has elapsed..." At partial mastery, they "identify real-world problems requiring conversion within a system of measurement." Our students can and should do better than that. How about giving them the equivalent measures or conversion factors for support at the levels below mastery?		
11/2	Susan Barrett Organization: Nicholas County Schools Email: sbarrett@mountain.net Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member Address1: 102 Airport Road Address2: City/State/Zip: Fenwick, WV 26202	Thank you for this opportunity to comment on the revisions proposed for the K-6 CSOs. Please do not interpret the length of my comments as a criticism of those who have worked so diligently on this project. Many of the proposed changes strengthen the original draft. But a lot is at stake here, and I believe it is critical that we take the necessary time and effort to be sure the new document is the best it can be.		
11/3	Susan Goodwin sgoodwin@fairmontstate.edu	As I compare the CSO's to the new Curriculum Focal Points from NCTM I am struck by the difference between the two. For	-neg n	**abstract thinking** n. Thinking characterized by the ability to use concepts and to

	Professor of Mathematics 312 Cherry St. Bridgeport, WV 26330	instance, in 4th grade students will plot and describe points in the first quadrant using an ordered pair according to the CSO's. NCTM talks about creating a line plot. These are different skills. Students are being asked to find probability as a ratio almost before they have much experience with fractions. The new CSO's seemed to demand abstract reasoning long before the time most children develop this ability. Consequently, even though they are taught skills, they do not retain because they are not developmentally ready. Please lets ground students in basics. I do not mean rote mathematics. Students should justify reasoning, solve non-standard problems, connect to real world, use multiple representations, and communicate mathematically. This does not necessitate students solving algebra problems in the fourth grade.		make and understand generalizations, such as of the properties or pattern shared by a variety of specific items or events. There are four primary cognitive structures (i.e., development stages) according to Piaget: sensory motor, pre-operations, concrete operations, and formal operations. In the sensory motor stage (0-2 years), intelligence takes the form of motor actions. Intelligence in the pre-operation period (3-7 years) is intuitive in nature. The cognitive structure during the concrete operational stage (8-11 years) is logical but depends upon concrete referents. In the final stage of formal operations (12-15 years), thinking involves abstractions. At an early age, the routine use of concrete objects is essential to help students connect real things and events with their abstract representations. The ability to picture and do things in their heads will be enhanced by frequent reference to real-world applications. Students should be encouraged to describe all sorts of things mathematically-in terms of numbers, shapes, and operations. It is true that mathematical investigations sooner or later involve certain processes, but the order is not fixed and the emphasis placed on each process varies greatly. Each of the three parts of the cycle-representation, manipulation, and validation-should be studied in its own right as part of what constitutes learning mathematics. Students should have the chance to use the entire cycle in carrying out their own mathematical investigations. The purpose of this experience is to produce not professional mathematicians but adults who are familiar with mathematical inquiry. Each part of the cycle poses some learning challenges. The process of representing something by a symbol or expression is taken by many students to refer only to "real things." "Let A stand for the area of the floor in this room" is easier for young students to grasp than "Let Y equal the area of any rectangle." First, students have to be convinced that substituting abstract symbols for actual quantities is worth the effort. Then they need to work their way toward the realization that using symbols to represent abstractions,

				and abstractions of abstractions, also pays off in solving problems. Perhaps this means bringing students to see that in the world of mathematics, numbers, shapes, operations, symbols, and symbols that summarize sets of symbols are as "real" as blocks, cows, and dollars (American Association for the Advancement of Science, 1993).
11/3	Sheila Pell Marshall County Schools sjpell@access.k12.wv.us Math Facilitator/Trainer Address1: 2700 4th Street Address2: City/State/Zip: Moundsville, WV 26041 Teacher	In the 4th grade performance descriptors(M.PD.4.1), it refers to the "standard algorithm" for multi-digit whole number multiplication. It says students will recognize, use, justify or investigate and justify this algorithm. I'm concerned that the wording is restrictive and will cause teachers to teach only that algorithm as we always have, instead of allowing students to develop their understanding by exploring other ways to multiply. In objective M.O.4.4.1 it lists lengths using customary and metric units, but for weight, capacity, and temperature it is not clear that both systems will be studied.	-neg NA	The objective reads now "solve using multiple strategies".
11/3	Dennine LaRue alarue@fairmontstate.edu temporary assistant professor of mathematics 1324 Overhill Rd, : Fairmont, WV 26554	In comparing the standards and objectives of West Virginia with those recommended by the NCTM, I am disturbed by the much higher level of abstract thought processes we are requiring for our elementary students, than what the NCTM has recommended. Elementary students should be able to explain what they are doing and why, but should not yet be required to produce this in a symbolic format which they will eventually learn. The average student at this age needs more concrete manipulatives. As they proceed though the mathematics program, they should move toward more abstract thought processes and be able to communicate that in symbolic format(the universal language	-neg NA	**abstract thinking** n. Thinking characterized by the ability to use concepts and to make and understand generalizations, such as of the properties or pattern shared by a variety of specific items or events. There are four primary cognitive structures (i.e., development stages) according to Piaget: sensory motor, pre-operations, concrete operations, and formal operations. In the sensory motor stage (0-2 years), intelligence takes the form of motor actions. Intelligence in the pre-operation period (3-7 years) is intuitive in nature. The cognitive structure during the concrete operational stage (8-11 years) is logical but depends upon concrete referents. In the final stage of formal operations (12-15 years), thinking involves

		of mathematics). I agree that the more we expect, the more progress students will make. Yet, I fear we are expecting more abstractness than most students are developmentally ready for in the lower grades. Their brains are still growing even after their bodies are adult sized. For example, in grade 4, why should students(mastery level) be writing points from the Cartesian coordinate system as ordered pairs. This can wait until algebra. They can understand the concept without writing it symbolically. It is not necessary in fourth grade. There are numerous other examples. First, I respectfully request that the CSO's be reread in light of the NCTM standards (which I feel are reasonable). Secondly, please consider the level of abstract versus concrete reasoning required by the wordings of the CSO's. Some are just too precise. I teach general studies math classes in college(ACT 19), and many of these students are lacking in basic skills. Somewhere they were pushed along too quickly. As college students, they should be thinking more abstractly. By this age developmentally, their brains should physically be ready for abstract thought. Yet, routinely I must move from concrete to abstract thought processes within a class period. I cannot start with the abstract. I believe it is because in elementary school and middle school they missed the lower thinking skill levels of Bloom's taxonomy. Students pushed to abstract thinking too early resort to memorization with no real understanding to get through the material. Due to this memorization, I think there are		abstractions. At an early age, the routine use of concrete objects is essential to help students connect real things and events with their abstract representations. The ability to picture and do things in their heads will be enhanced by frequent reference to real-world applications. Students should be encouraged to describe all sorts of things mathematically-in terms of numbers, shapes, and operations. It is true that mathematical investigations sooner or later involve certain processes, but the order is not fixed and the emphasis placed on each process varies greatly. Each of the three parts of the cycle-representation, manipulation, and validation-should be studied in its own right as part of what constitutes learning mathematics. Students should have the chance to use the entire cycle in carrying out their own mathematical investigations. The purpose of this experience is to produce not professional mathematicians but adults who are familiar with mathematical inquiry. Each part of the cycle poses some learning challenges. The process of representing something by a symbol or expression is taken by many students to refer only to "real things." "Let A stand for the area of the floor in this room" is easier for young students to grasp than "Let Y equal the area of any rectangle." First, students have to be convinced that substituting abstract symbols for actual quantities is worth the effort. Then they need to work their way toward the realization that using symbols to represent abstractions, and abstractions of abstractions, also pays off in solving problems. Perhaps this means bringing students to see that in the world of mathematics, numbers, shapes, operations, symbols, and symbols that summarize sets of symbols are as "real" as blocks, cows, and dollars (American Association for the Advancement of Science, 1993).

		more and more students needing remedial work in college. Background: I have a child in college, also majoring in mathematics. She would have been ready for the abstract thinking process shown in the CSO's. My daughter says that I was teaching her to think mathematically from the time she was born. This is not the case for the average child. Is there a way that students can be met at the level of thought that is appropriate for them in their development?		

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 11:19 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 23:18:43)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Cynthia Burke
Organization: Marshall County Schools
Email: caburke@access.k12.wv.us
Title: Teacher
Address1: 1000 Fairmont Pike
Address2:
City/State/Zip: Wheeling, WV 26003
Role: Teacher
Posted: 2006-11-03 23:18:43
Posted from IP: 65.246.44.210

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

In addressing the current CSOs, time is always the greatest challenge. I have concerns about the amount of time I spend on each topic, attempting to teach for understanding while trying to meet the current CSOs. I feel that more time during the day needs to be allotted to mathematics and know that counties will not address this without state mandates.

Teaching for depth of knowledge while addressing the breadth of the CSOs is a constant pressure throughout the school year. The year ends long before I feel that my students have achieved mastery.

I do feel that the new CSOs no longer read like a script of skills. This is a real improvement.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 11:08 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 23:08:26)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
#
Name: Sheila Ruddle
Organization: Pendleton Co. Schools
Email: sruddle@access.k12.wv.us
Title: Teacher
Address1: P.O. Box 476
Address2:
City/State/Zip: Franklin, WV 26807
Role: Teacher
Posted: 2006-11-03 23:08:26
Posted from IP: 65.246.44.210

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

My greatest concern is time. I don't feel that I am able to address and do justice to the current CSOs, and I am going to feel even more pressure with the new ones. I continually struggle with teaching with depth and making sure that I "cover" everything. However,in looking at the new CSOs, I'm hopeful that they will provide more unity than the old ones and therefore allow me to teach more in depth rather than addressing many disjointed topics. I feel that I know what to teach and even how to teach it, but perhaps I need professional development on how to manage to teach it. Professional development needs to be offered on the CSOs with teachers at all grade levels together so that we can see how the curriculum flows across grade levels. In order for this curriculum to "work" I have to assume that the CSOs at earlier grade levels have been addressed, as teachers in grades above mine will assume that I have addressed the CSOs at my grade.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 3:42 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 15:41:45)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Dennine LaRue
Organization:
Email: alarue@fairmontstate.edu
Title: temporary assistant professor of mathematics
Address1: 1324 Overhill Rd,
Address2:
City/State/Zip: Fairmont, WV 26554
Role: Community Member
Posted: 2006-11-03 15:41:45
Posted from IP: 129.71.73.254

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

In comparing the standards and objectives of West Virginia with those recommended by the NCTM, I am disturbed by the much higher level of abstract thought processes we are requiring for our elementary students, than what the NCTM has recommended.

Elementary students should be able to explain what they are doing and why, but should not yet be required to produce this in a symbolic format which they will eventually learn. The average student at this age needs more concrete manipulatives. As they proceed though the mathematics program, they should move toward more abstract thought processes and be able to communicate that in symbolic format(the universal language of mathematics).

I agree that the more we expect, the more progress students will make.
Yet, I fear we are expecting more abstractness than most students are developmentally ready for in the lower grades. Their brains are still growing even after their bodies are adult sized.

For example, in grade 4, why should students(mastery level) be writing points from the Cartesian coordinate system as ordered pairs. This can wait until algebra. They can understand the concept without writing it symbolically. It is not necessary in fourth grade. There are numerous other examples.

First, I respectfully request that the CSO's be reread in light of the NCTM standards (which I feel are reasonable). Secondly, please consider the level of abstract versus concrete reasoning required by the wordings of the CSO's. Some are just too precise.

I teach general studies math classes in college(ACT 19), and many of these students are lacking in basic skills. Somewhere they were pushed along too quickly. As college students, they should be thinking more abstractly.
By this age developmentally, their brains should physically be ready for abstract thought. Yet, routinely I must move from concrete to abstract thought processes within a class period. I cannot start with the abstract.
I believe it is because in elementary school and middle school they missed the lower thinking skill levels of Bloom's taxonomy. Students pushed to abstract thinking too early resort to memorization with no real understanding to get through the material.

Due to this memorization, I think there are more and more students needing remedial work in college.

Background: I have a child in college, also majoring in mathematics. She would have been ready for the abstract thinking process shown in the CSO's.
My daughter says that I was teaching her to think mathematically from the time she was born. This is not the case for the average child. Is there a way that students can be met at the level of thought that is appropriate for them in their development?

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 3:21 PM
To: fibanez@wvde.state.wv.us; cljwilli@ACCESS.K12.WV.US
Subject: Comment Received for Policy 2520.2 (2006-11-03 15:21:25)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Susan Goodwin
Organization:
Email: sgoodwin@fairmontstate.edu
Title: Professor of Mathematics
Address1: 312 Cherry St.
Address2:
City/State/Zip: Bridgeport, WV 26330
Role: Community Member
Posted: 2006-11-03 15:21:25
Posted from IP: 129.71.73.254

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

As I compare the CSO's to the new Curriculum Focal Points from NCTM I am struck by the difference between the two. For instance, in 4th grade students will plot and describe points in the first quadrant using an ordered pair according to the CSO's. NCTM talks about creating a line plot. These are different skills. Students are being asked to find probability as a ratio almost before they have much experience with fractions. The new CSO's seemed to demand abstract reasoning long before the time most children develop this ability. Consequently, even though they are taught skills, they do not retain because they are not developmentally ready. Please lets ground students in basics. I do not mean rote mathematics. Students should justify reasoning, solve non-standard problems, connect to real world, use multiple representations, and communicate mathematically. This does not necessitate students solving algebra problems in the fourth grade.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 2:50 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 14:50:25)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Bonnie Ritz
Organization: Marshall County Schools
Email: britz@access.k12.wv.us
Title: Director of Curriculum and Instruction
Address1: 2700 Fourth Street
Address2:
City/State/Zip: Moundsville , WV 26041
Role: School System Staff
Posted: 2006-11-03 14:50:25
Posted from IP: 168.216.234.206

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Some words are restrictive and may encourage teacher to teach only an algorithm as has been done in the past. We need to encourage teachers to allow students to develop their understanding by exploring multiple ways to solve problems. (performance descriptors)

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Friday, November 03, 2006 2:48 PM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-11-03 14:48:09)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Sheila Pell
Organization: Marshall County Schools
Email: sjpell@access.k12.wv.us
Title: Math Facilitator/Trainer
Address1: 2700 4th Street
Address2:
City/State/Zip: Moundsville, WV 26041
Role: Teacher
Posted: 2006-11-03 14:48:09
Posted from IP: 168.216.195.59

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

In the 4th grade performance descriptors(M.PD.4.1), it refers to the "standard algorithm" for multi-digit whole number multiplication. It says students will recognize, use, justify or investigate and justify this algorithm. I'm concerned that the wording is restrictive and will cause teachers to teach only that algorithm as we always have, instead of allowing students to develop their understanding

by exploring other ways to multiply.
In objective M.O.4.4.1 it lists lengths using customary and metric units, but for weight, capacity, and temperature it is not clear that both systems will be studied.

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools
----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 9:57 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 09:57:04)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Susan Barrett
Organization: Nicholas County Schools
Email: sbarrett@mountain.net
Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member
Address1: 102 Airport Road
Address2:
City/State/Zip: Fenwick, WV 26202
Role: Teacher
Posted: 2006-11-03 09:57:04
Posted from IP: 168.216.69.128

Comments for section 126-44B-1 General

Thank you for this opportunity to comment on the revisions proposed for the K-6 CSOs. Please do not interpret the length of my comments as a criticism of those who have worked so diligently on this project. Many of the proposed changes strengthen the original draft. But a lot is at stake here, and I believe it is critical that we take the necessary time and effort to be sure the new document is the best it can be.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Sixth Grade

6.1.2 – "Determine the greatest common factor and least common multiple using multiple strategies to solve real-world problems; find prime factorization of a number."

The first part of the objective is a repeat of fifth grade content and could be left off. The new part is prime factorization.

6.1.4 – "Analyze and solve real-world problems involving addition, subtraction, multiplication, and division of whole numbers, fractions, mixed numbers, decimals, integers, and justify reasonableness by estimation."

The latest revision of the objectives removed "Model and calculate multiplication and division of fractions and mixed numbers" and "Model and calculate multiplication and division of decimals by a whole number divisor"

from the fifth grade objectives. I assumed that meant these concepts and skills would be covered in sixth grade. But 6.1.4 is the only objective that comes close, and its focus is application problems. The concept building and the computation skills have been left out of the objectives! If teachers base their instruction on the CSOs, fifth grade teachers will assume the sixth grade teacher will cover it; sixth grade teachers will assume their students learned how to multiply and divide fractions and decimals in fifth grade. That's a big hunk of content to leave out. The Curriculum Focal Points for grade 6 for Number and Operations state in boldface type that students should be "developing an understanding of and fluency with multiplication and division of frac!

tions and decimals." The document goes on to say, "Students use common procedures to multiply and divide fractions and decimals efficiently and accurately. They multiply and divide fractions and decimals to solve problems, including multistep problems and problems involving measurement." You can't skip the first two recommendations and expect students to be able to master the third recommendation.

Algebra

This comment pertains to the 4th, 5th and 6th grade algebra objectives.

6.2.3 – "Create algebraic expressions that correspond to real-world situations; use the expressions to solve problems."

4.2.3 "...write an expression using a variable to describe real-world situation."

Is there two years worth of difference between those two objectives? They seem almost the same.

6.2.4 – "Determine the rule, output or input; given an input/output model using one operation, write an algebraic expression for the rule and use to identify other input/output values."

The only thing that makes this objective more difficult than the one at third grade (see 3.2.2) is writing an algebraic expression for the rule, which is something often done in third, fourth, and fifth grade classrooms as a routine part of writing the rule for input/output tables.

6.2.6 – "Write and solve one-step equations using number sense, properties of operations and the idea of maintaining equality to represent and solve real-world problems."

5.2.3 – "Solve simple equations and inequalities using patterns and models of real-world situations, create graphs of the equations and interpret the results."

Since both are asking students to solve equations based on real-world situations, isn't including graphing equations and inequalities and interpreting the results more difficult than writing and solving equations?
In addition, the performance descriptors for fifth grade do not address this objective at any level.

Measurement
6.4.2 – "Develop and test hypotheses to determine formulas for perimeter of polygons, including composite figures, area of parallelograms, area of triangles, area of composite figures made of parallelograms and triangles, circumference of a circle, area of a circle, and volume of a rectangular prism."
Formulas for perimeter and for area of parallelograms and triangles were covered in grades 3, 4, and 5. Why limit compound figures to parallelograms and triangles?

There are several instances of subject/verb agreement errors and typos in the performance descriptors for sixth grade. I have neither the time nor the energy to list them all here, but I hope someone proofreads the document before it goes to the state board and is distributed statewide.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 8:41 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 08:40:33)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Susan Barrett
Organization: Nicholas County Schools
Email: sbarrett@mountain.net
Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member
Address1: 102 Airport Road
Address2:
City/State/Zip: Fenwick, WV 26202
Role: Teacher
Posted: 2006-11-03 08:40:33
Posted from IP: 168.216.69.128

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Fifth Grade

Number and Operations

5.1.6 – "Model and write equivalencies of fractions (limited to denominators of 10 and 100), decimals, percents, and ratios."

Students in fourth grade work with the relationship of fractions to decimals (4.1.5). Fifth graders should be able to write percent and decimal equivalents for common fractions like ½, 1/3, ¼, ¾, 2/5, etc. By putting "limited to denominators of 10 and 100" in the fifth grade objective, it decreases the rigor and misses a good opportunity to promote the kind of number sense and fluency that is at the heart of standards-based math.

5.1.7 – "Analyze and solve application problems and justify reasonableness of solution in problems involving addition and subtraction of fractions, mixed numbers, and decimals."

5.1.11 – "Solve real-world problems involving whole numbers, decimals, and fraction using multiple strategies and justify the reasonableness by estimation."

These objectives are almost the same, except that 5.1.11 includes whole numbers.

In my comments on fourth grade, I noted a big hole in objectives addressing fractions between 4.1.4 and 5.1.7. There is no objective that addresses the computation skills of adding and subtracting fractions. This is a big oversight as it typically occupies WEEKS of instructional time in fourth and fifth grades. It is not reasonable to assume that somehow between fourth and fifth grades students will figure out on their own how to find common denominators, add, subtract, and reduce fractions and mixed numbers with and without regrouping. The Curriculum Focal Points for fifth grade say students "develop fluency with standard procedures for adding and subtracting fractions and decimals." This step can't be skipped.

5.1.9 – "Justify the use of the standard algorithm to solve multidigit whole number division problems."

I see two problems with this objective. Students in at least one of the standards-based programs are not taught the standard long division algorithm. Instead they are taught the partial quotients algorithm, which builds on understanding of place value, estimation skills, and the idea of repeated subtractions to find a quotient. Having taught both algorithms, I would never go back to the standard one because it does not build any kind of number sense or estimation skills; it is a rote procedure that many elementary teachers would struggle to justify or explain in any kind of coherent way. Insisting on the use of the standard algorithm will take instruction away from building understanding, and seems contradictory to the approach we have been promoting with standards-based math. The objective could easily be improved by saying, "Justify the use of an efficient algorithm to solve multidigit whole number division problems." The fourth grade objective on justifying the multiplica! tion algorithm could be adjusted in the same way.

The performance descriptors need more work. Please don't send them out the way they are! Students at the novice level in fifth grade are not expected to do more than "recognize whole numbers, fractions, mixed numbers, and decimals...confirm place value and recognize solutions to real world problems...confirm that application problems contain fractions, mixed numbers and decimals..." Surely we can expect more than that at fifth grade!

The verbs seem out of sequence in addressing divisibility rules, greatest common factor, and least common multiple. At novice level, they "state the divisibility rules, GCF, and LCM." At partial mastery,

the verb is "explain"
which is more difficult than the mastery level of "identify" and the above mastery level of "examine and identify."

Algebra
5.2.4 – "Model and identify square, prime, and composite numbers."
Adding the word "describe" to the objective would raise the rigor because it would demand an understanding of what makes a number square, prime, or composite.

Geometry
The last sentence in the performance descriptor at novice level says, "They identify similar figures using a scale recognize."

Measurement
No level of the performance descriptors calls for students to do anything beyond estimating elapsed time, yet the objective clearly calls for calculating elapsed time which is more difficult.

Several of the descriptors show very low expectations for fifth graders.
Novice level only requires students to "recognize real-world problems requiring conversion within a system of measurement" and "recognize that time has elapsed..." At partial mastery, they "identify real-world problems requiring conversion within a system of measurement." Our students can and should do better than that. How about giving them the equivalent measures or conversion factors for support at the levels below mastery?

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 8:34 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 08:33:52)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Rena Argabright
Organization: Westside High School
Email:
Title: Teacher
Address1: HC 65 Box 275
Address2:
City/State/Zip: Clearfork, WV 24822
Role: Teacher
Posted: 2006-11-03 08:33:52
Posted from IP: 168.216.111.198

Comments for section 126-44B-1 General

I am a secondary math teacher at Westside High School in Wyoming County. I have taught math for 18 years. I am strongly against the new Policy 2520.2 that would eliminate the Applied Math courses and the Algebra/Geometry Prep class. Presently, I am teaching Algebra/Geometry Prep, Applied Math I, and Applied Math II. Certainly, I hold high expectations for all my students and push them to achieve to the best of their ablilities. However, I am very much aware of the students who feel overwhelmed with the material, for instance, that is taught in Applied Math II. To place these students in Algebra I or higher would be an injustice to them and would, I believe, doom them to failure. Please reconsider the elimination of these courses from the math curriculum.
Rena Argabright

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 2:00 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 13:59:42)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Susan Barrett
Organization: Nicholas County Schools
Email: sbarrett@mountain.net
Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member
Address1: 102 Airport Road
Address2:
City/State/Zip: Fenwick, WV 26202
Role: Teacher
Posted: 2006-11-02 13:59:42
Posted from IP: 168.216.124.105

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Third Grade –
Number and Operations

3.1.5 – "Demonstrate an understanding of fractions as part of a whole/one and as part of a set/group using models and pictorial representations."
This is almost exactly the same as 2.1.7, "Identify and explain fractions as part of a whole and as part of a set/group using models." Suggestion – eliminate 3.1.5 and focus on equivalent fractions in third.

3.1.6 – "Create concrete models and pictorial representations to compare and order fractions with like and unlike denominators, add and subtract fractions with like denominators, and verify results."
"Use" might be a better verb than "create" since the models already exist; not sure how they would "verify results" since I thought that's what they were doing with the models.

3.1.9 – "Demonstrate and model multiplication (repeated addition, arrays) and division (repeated subtraction, partitioning).
Suggestion – add "to solve real-world problems" to the end of the objective to put it in context. Kids (and teachers) do not always connect the modeling to the real world.

3.1.11 – "Recall basic multiplication facts and the corresponding division facts."
Adding something to the objective connecting recall to understanding would make it more aligned with the Curriculum Focal Points (see page 15) and with a standards-based approach. Suggestion – "Use a variety of strategies to build fluency with basic multiplication facts and the corresponding division facts." The objective could include strategies with an e.g, including connecting counting patterns to multiples, using area models, number lines, arrays, etc. Quick recall of the facts is in fourth grade, which aligns perfectly with the Curriculum Focal Points.

3.1.12 – "Model the distributive property in multiplication of 2- and 3-digit numbers by a 1-digit number."
This objective would be stronger if it included "Use manipulatives to..." at the beginning of the sentence. It would then lead directly into 3.1.13 which uses models for division. (Maybe "Use manipulatives to model division...."
would work even better for 3.1.13). Students would illustrate the property in a way that builds understanding. Many teachers are not clear on how third graders are supposed to use the distributive property because the teachers have only a superficial understanding of the property themselves. The distributive property is the basis for several of the alternative multiplication algorithms used in the standards-based programs and the foundation for higher math as well. This is the opportunity to build understanding.
I notice that the distributive property is not mentioned in the new fourth grade objectives at all; what was in fourth has been moved to fifth. If that 's the way it's going to be, then it might be better to move this objective to fourth grade.'

3.1.14 – "Create grade-appropriate real-world problems involving any of the four operations using multiple strategies, explain the reasoning used, and justify the procedures selected when presenting solutions."
If the first word is changed from "Create" to "Solve" the objective would make more sense. Strategies are ways to solve problems, not ways to create them. If you want students to write their own word

problems, that would be super for the above mastery and/or distinguished performance levels.

Performance Descriptors –
Place value (3.1.3) is not mentioned at all at any performance level.
Estimation (3.1.4) is not mentioned. Addition and subtraction computation should be at the mastery level, but multiplication and division are new and developing skills and pencil/paper computation comes at fourth grade.
Computation in all four operations is currently listed at mastery level.
Third graders should be able to read, write, order, and compare whole numbers to 10,000 without manipulatives at the mastery level, but decimals are new and using manipulatives would be very appropriate for mastery at third grade. With fractions, representing and identifying fractions without models is fine at the mastery level, but comparing, adding and subtracting fractions at mastery level should include manipulatives or pictures. With problem solving, identifying the operation needed to solve a problem is often more difficult for students than actually doing the computation, but it is listed at the novice level in !
the performance descriptors. There is nothing about the properties (3.1.10, 3.1.12) at any of the performance levels.

Algebra
Performance Descriptors –
The distinguished level p.d. only addresses one objective. What's the difference between "interpret" and "analyze" with respect to patterns?
Writing equivalent expressions is not addressed in the performance descriptors. Suggestion – "Write equivalent numerical expressions and justify using numbers, words, or objects" at mastery, "Evaluate two or more numerical expressions to determine equivalence" at partial mastery, and "Identify equivalent numerical expressions" at novice. Suggestions for input/output – "They complete an input/output model and identify the rule using addition, subtraction, multiplication, and division" at partial mastery and "Complete an input/output model when given a rule using addition, subtraction, multiplication, and division" at novice level.

Geometry
3.3.1 – "Identify and create new polygons by transforming, combining and decomposing polygons." This objective replaces, "Identify basic polygons and their components through decagons."
3.3.6 – "Draw an example of a flip, slide and turn (reflection, translation, and rotation) given a model."
Both objectives have transformations, which seems unnecessary. Suggestion – change 3.1.1 to, "Identify, describe, analyze, compare, and classify basic polygons by their sides and angles." This is really close to what the Curriculum Focal Points say for third grade. How about one for identifying, classifying, etc and one for changing by transforming, decomposing, etc.

Two objectives, 3.3.3 and 3.3.4, are not mentioned in the performance descriptors at all.

Measurement
3.4.2 – "Estimate and find the perimeter and area of familiar geometric shapes, using manipulatives, grids, or appropriate measuring tools."
3.4.3 – "Determine the formula the area of a rectangle and explain reasoning through modeling."
Combining the objectives on perimeter and area in 3.4.2 does not work. The only shape third graders work with in area is the rectangle. The emphasis is on connecting the formula for area of a rectangle

to their work with arrays and area models in multiplication. Perimeter of rectangles was covered in second grade and is extended in third grade to include all polygons. Finding perimeter is a measurement skill at this level, while area is a concept connecting knowledge in number and operations, geometry, and measurement.
Suggestion – leave area out of 3.4.2 Go back to, "Estimate and determine the perimeter of any polygon."

Performance Descriptors
Elapsed time is not mentioned at all in the performance descriptors.

Data Analysis and Probability
There is nothing in the performance descriptors at any level on listing all outcomes, which is part of 3.5.2 and is a new skill.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 4:02 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 16:02:21)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
################
#
Name: Elizabeth Powell
Organization: Westside High School
Email: epowell@access.k12.wv.us
Title: Math Teacher
Address1: P.O. Box 213
Address2:
City/State/Zip: Kopperston, WV 24854
Role: Teacher
Posted: 2006-11-02 16:02:21
Posted from IP: 168.216.102.46

Comments for section 126-44B-1 General

I am a secondary mathematics teacher who has been teaching for thirty-two years. I have seen many different policies come and go.
Although I did not always agree with everything in the policies, I could see the reasoning behind most of changes, and did my best to comply. However, I am not as sure about Policy 2520.2 and the elimination of the courses that help prepare students for Algebra. Students come to us from many different backgrounds and experiences, and not all of them are ready to jump right into Algebra 1.

The idea behind this (developing higher level thinking skills) has its merits, but in reality I see the "struggling" students getting frustrated and eventually dropping out of school. Since teachers are held accountable for the performance of their students, they, too, will become more and more frustrated as they try to bring their students up to the expected level.
Eventually, they will leave the profession discouraged. As for me, I will go ahead and retire – and leave this problem to the "newer" teachers that haven't left the state yet.

However, I cannot just quit without predicting that our system – and especially our students – will suffer.

Elizabeth Powell

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 6:28 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 18:28:14)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Susan Barrett
Organization: Nicholas County Schools
Email: sbarrett@mountain.net
Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member
Address1: 102 Airport Road
Address2:
City/State/Zip: Fenwick, WV 26202
Role: Teacher
Posted: 2006-11-02 18:28:14
Posted from IP: 69.43.4.251

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Third Grade –
Number and Operations

3.1.5 – "Demonstrate an understanding of fractions as part of a whole/one and as part of a set/group using models and pictorial representations."
This is almost exactly the same as 2.1.7, "Identify and explain fractions as part of a whole and as part of a set/group using models." Suggestion – eliminate 3.1.5 and focus on equivalent fractions in third.

3.1.6 – "Create concrete models and pictorial representations to compare and order fractions with like and unlike denominators, add and subtract fractions with like denominators, and verify results."
"Use" might be a better verb than "create" since the models already exist; not sure how they would "verify results" since I thought that's what they were doing with the models.

3.1.9 – "Demonstrate and model multiplication (repeated addition, arrays) and division (repeated subtraction, partitioning).
Suggestion – add "to solve real-world problems" to the end of the objective to put it in context. Kids (and teachers) do not always connect the modeling to the real world.

3.1.11 – "Recall basic multiplication facts and the corresponding division facts."
Adding something to the objective connecting recall to understanding would make it more aligned with the Curriculum Focal Points (see page 15) and with a standards-based approach. Suggestion – "Use a variety of strategies to build fluency with basic multiplication facts and the corresponding division facts." The objective could include strategies with an e.g, including connecting counting patterns to multiples, using area models, number lines, arrays, etc. Quick recall of the facts is in fourth grade, which aligns perfectly with the Curriculum Focal Points.

3.1.12 – "Model the distributive property in multiplication of 2- and 3-digit numbers by a 1-digit number."
This objective would be stronger if it included "Use manipulatives to..." at the beginning of the sentence. It would then lead directly into 3.1.13 which uses models for division. (Maybe "Use manipulatives to model division...."
would work even better for 3.1.13). Students would illustrate the property in a way that builds understanding. Many teachers are not clear on how third graders are supposed to use the distributive property because the teachers have only a superficial understanding of the property themselves. The distributive property is the basis for several of the alternative multiplication algorithms used in the standards-based programs and the foundation for higher math as well. This is the opportunity to build understanding.
I notice that the distributive property is not mentioned in the new fourth grade objectives at all; what was in fourth has been moved to fifth. If that 's the way it's going to be, then it might be better to move this objective to fourth grade.'

3.1.14 – "Create grade-appropriate real-world problems involving any of the four operations using multiple strategies, explain the reasoning used, and justify the procedures selected when presenting solutions."
If the first word is changed from "Create" to "Solve" the objective would make more sense. Strategies are ways to solve problems, not ways to create them. If you want students to write their own word

problems, that would be super for the above mastery and/or distinguished performance levels.

Performance Descriptors –
Place value (3.1.3) is not mentioned at all at any performance level.
Estimation (3.1.4) is not mentioned. Addition and subtraction computation should be at the mastery level, but multiplication and division are new and developing skills and pencil/paper computation comes at fourth grade.
Computation in all four operations is currently listed at mastery level.
Third graders should be able to read, write, order, and compare whole numbers to 10,000 without manipulatives at the mastery level, but decimals are new and using manipulatives would be very appropriate for mastery at third grade. With fractions, representing and identifying fractions without models is fine at the mastery level, but comparing, adding and subtracting fractions at mastery level should include manipulatives or pictures. With problem solving, identifying the operation needed to solve a problem is often more difficult for students than actually doing the computation, but it is listed at the novice level in !
the performance descriptors. There is nothing about the properties (3.1.10, 3.1.12) at any of the performance levels.

Algebra
Performance Descriptors –
The distinguished level p.d. only addresses one objective. What's the difference between "interpret" and "analyze" with respect to patterns?
Writing equivalent expressions is not addressed in the performance descriptors. Suggestion – "Write equivalent numerical expressions and justify using numbers, words, or objects" at mastery, "Evaluate two or more numerical expressions to determine equivalence" at partial mastery, and "Identify equivalent numerical expressions" at novice. Suggestions for input/output – "They complete an input/output model and identify the rule using addition, subtraction, multiplication, and division" at partial mastery and "Complete an input/output model when given a rule using addition, subtraction, multiplication, and division" at novice level.

Geometry
3.3.1 – "Identify and create new polygons by transforming, combining and decomposing polygons."
This objective replaces, "Identify basic polygons and their components through decagons."
3.3.6 – "Draw an example of a flip, slide and turn (reflection, translation, and rotation) given a model."
Both objectives have transformations, which seems unnecessary. Suggestion – change 3.1.1 to, "Identify, describe, analyze, compare, and classify basic polygons by their sides and angles." This is really close to what the Curriculum Focal Points say for third grade. How about one for identifying, classifying, etc and one for changing by transforming, decomposing, etc.

Two objectives, 3.3.3 and 3.3.4, are not mentioned in the performance descriptors at all.

Measurement
3.4.2 – "Estimate and find the perimeter and area of familiar geometric shapes, using manipulatives, grids, or appropriate measuring tools."
3.4.3 – "Determine the formula the area of a rectangle and explain reasoning through modeling."
Combining the objectives on perimeter and area in 3.4.2 does not work. The only shape third graders work with in area is the rectangle. The emphasis is on connecting the formula for area of a rectangle

to their work with arrays and area models in multiplication. Perimeter of rectangles was covered in second grade and is extended in third grade to include all polygons. Finding perimeter is a measurement skill at this level, while area is a concept connecting knowledge in number and operations, geometry, and measurement.
Suggestion – leave area out of 3.4.2 Go back to, "Estimate and determine the perimeter of any polygon."

Performance Descriptors
Elapsed time is not mentioned at all in the performance descriptors.

Data Analysis and Probability
There is nothing in the performance descriptors at any level on listing all outcomes, which is part of 3.5.2 and is a new skill.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 6:30 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 18:29:54)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Pattie Cowan
Organization:
Email: pacowanis
Title: Teacher
Address1:
Address2:
City/State/Zip: ,
Role: Teacher
Posted: 2006-11-02 18:29:54
Posted from IP: 67.163.214.194

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----
Data Analysis & Probability
M.O.K.5.1 collect, organize, display, and interpret data using a pictograph and bar graph (with and without technology)
M.O.K.5.2 conduct a simple probability experiment and use tallies to record

results in a table, make predictions based on results.

Kindergarten students need to sort real objects-and create graphs with these real objects. The Curriculum Focal Points and connections for Kindergarten states that children sort objects and use one or more attributes to solve problems.

Using tallies is difficult even for a first grade student. This is too difficult for a Kindergarten student.

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 6:31 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 18:30:31)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Susan Barrett
Organization: Nicholas County Schools
Email: sbarrett@mountain.net
Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member
Address1: 102 Airport Road
Address2:
City/State/Zip: Fenwick, WV 26202
Role: Teacher
Posted: 2006-11-02 18:30:31
Posted from IP: 69.43.4.251

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Fourth Grade

Number and Operations

4.1.4 – "Using concrete models, benchmark fractions, number line, compare and order fractions with like and unlike denominators, add and subtract fractions with like and unlike denominators, model equivalent fractions, model addition and subtraction of mixed numbers with and without regrouping." This new objective combines four objectives and never requires students to move past the concrete stage in any of the skills involved. Yet in fifth grade, M.O.5.1.7 expects students to "Analyze and solve application of problems and justify reasonableness of solution in problems involving addition and subtraction of fractions and mixed numbers and decimals." There is no objective that addresses the computation skills of adding and subtracting fractions! This is a big oversight as it typically occupies WEEKS of instructional time in fourth and fifth grades. It is not reasonable to assume that somehow between fourth and fifth grades students will figure out on their own how to find common denominators, add, subtract, and reduce fractions and mixed numbers with and without regrouping. The Curriculum Focal Points for fifth grade say students "develop fluency with standard procedures for adding and subtracting fractions and decimals."

4.1.7 – "Add and subtract whole numbers (up to 5-digit numbers) and decimals to the 1000th place, multiply (up to three digits by two digits, and divide (up to a three digit number with a one and two-digit number).

This also combines two objectives from the previous version of the CSOs.

Addition and subtraction at fourth grade with both whole numbers are all about computational fluency; these are established skills that only need to refined. Double digit multiplication and long division are new and should include something indicating a connection to understanding. The Curriculum Focal Points for grade 4 recommends that students "develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers." In grade 5, the recommendation is that students "develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multidigit dividends." The proposed CSO does not go beyond students learning rote procedures.

4.1.8 – "Justify the use of the standard algorithm to solve multidigit whole number multiplication problems."

I have two problems with this proposed objective. First, in the standards-based math problems used in our state (Everyday Math and Investigations), emphasis is on reasoning and developing ways to solve multi-digit multiplication problems. Both programs use illustrations of the distributive property to build understanding. Neither program expects students to master or even use the standard algorithm in fourth grade. If this objective is part of our CSOs, teachers in standards-based programs will need to teach the standard algorithm; teachers using traditional series will teach only the standard algorithm. Second, asking ten-year-olds to "justify the use of the standard algorithm" is unreasonable unless justifying means something like "because my teacher told me to put a zero here." I would be interested in reading fourth grade teachers' explanations of how and why the algorithm works; I suspect many would struggle to explain it clearly and concisely.

4.1.10 – "Create grade-level real-world appropriate story problems using multiple strategies including simple ratios, justify the reason for choosing a particular strategy and present results."

The word "solve" has been left out. Strategies are ways to solve a problem, and are not a part of creating a problem.

Including simple ratios in the objective comes out of nowhere since there is no objective in number and operations up to this point that addresses ratio at all. It might be more appropriate to build understanding of the concept before asking students to apply ratios in a problem-solving situation. Ratios are mentioned in the proposed 4.5.3, but representing outcomes in a probability experiment as a fraction rather than a ratio might make more sense there (see Curriculum Focal Points for grade 7). In the first round of revisions when we looked at NAEP alignment, ratio was a weak area in our CSOs. I don't think we've done much to improve it. There is a proposed algebra CSO that says, "recognize and describe relationships in which quantities change proportionally." That sounds a lot like ratios, but it doesn't say that. What will teachers make of that? The performance descriptors do nothing to help clarify the meaning. The Curriculum Focal points have no references to ratio unt!
il grade 6.

The performance descriptors need some work; there are a few that don't make sense. I know the revision committee was under the gun in trying to get all the changes in, but let's be sure they are clear before they become policy.
A few quotes - "They identify grade-appropriate real-world story problems using any strategy, and communicate results." "They research, summarize, and analyze the relationship of fractions to decimals and communicate this relationship."

Algebra
4.2.2 – "Recognize and describe a relationship in which quantities change proportionally."
See comments above on ratio and proportion. See also Curriculum Focal Points for grades 6 and 7 (Number and Operations, Algebra, and Geometry).

4.2.4 – "Solve real-world problems involving order of operations including grouping symbols and the four operations."
Order of operations has to do with conventions used in written computation.
It would be a stretch for a fourth grader to apply that in a real world problem solving situation. The performance descriptor at the distinguished level calls for students to "create and solve real-world problems involving order of operations with variables."
The objective on comment this summer was, "Incorporate the order of operations (parentheses and four operations) in solving problems and writing expressions." Writing expressions following the order of operations takes some higher-level thinking and added rigor to the objective.

Geometry
4.3.1 – "Identify, classify, compare and contrast two-dimensional (including quadrilateral shapes) and three-dimensional geometric figures according to attributes."
Three-dimensional figures have been added to this objective, but they were already included in the third grade objective. The content focus at fourth grade was on quadrilaterals.

The performance descriptors list tessellations only at the distinguished level but it is part of the objective.

Measurement
The performance descriptors at the above mastery and distinguished levels call for students to investigate formulas for area and select the appropriate one, but the objectives at fourth grade only include the formula for area of a rectangle. Parallelograms and triangles are covered in fifth grade.

Data Analysis and Probability
4.5.3 – "Design and conduct a simple probability experiment using concrete objects, examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and present the results."
The current objective focuses on tree diagrams as a way of representing possible combinations. Typical problems involve things like determining the number of different choices of ice cream sundaes with two flavors and three toppings. The new objective shifts the emphasis to analyzing a probability experiment, which seems to be the recommendation for grade 7 in the Curriculum Focal Points. This objective could really be left out of fourth grade altogether.

Veronica Barron

From: cljwilli@access.k12.wv.us
Sent: Thursday, November 02, 2006 3:47 PM
To: lmaynus@access.k12.wv.us
Cc: cljwilli@access.k12.wv.us
Subject: Fwd: Comment Received for Policy 2520.2 (2006-11-02 18:28:14)

Forwarded Message:
> To: fibanez@wvde.state.wv.us, cljwilli@access.k12.wv.us
> From: Nobody <nobody@wvde.state.wv.us>
> Subject: Comment Received for Policy 2520.2 (2006-11-02 18:28:14)
> Date: Thu, 2 Nov 2006 18:28:14 -0500
> -----
> Please save this email in a "Comments Received Online" folder.
> Your folder will be a backup. All comments are saved in our database.
> The Complete Comments Report from the database can be found here:
> http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
> This is an encrypted URL. Please Bookmark it.
>
> Comment Received for Policy 2520.2
>
###
###############
#
> Name: Susan Barrett
> Organization: Nicholas County Schools
> Email: sbarrett@mountain.net
> Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre
Member
> Address1: 102 Airport Road
> Address2:
> City/State/Zip: Fenwick, WV 26202
> Role: Teacher
> Posted: 2006-11-02 18:28:14
> Posted from IP: 69.43.4.251
>
>
> Comments for section 126-44B-1   General
> --
>
>
> Comments for section 126-44B-2   Purpose
> --
>
>
> Comments for section 126-44B-3   Incorporation by Reference
> --

>
>
> Comments for section 126-44B-4   Summary of the Content Standards and
Objectives
> ---
>
>
> Comments for section 126-44B   21st Century Mathematics Content
Standards
and Objectives
for West Virginia Schools
> ---
> Third Grade –
> Number and Operations
>
> 3.1.5 – "Demonstrate an understanding of fractions as part of a
> whole/one
and as part of a
set/group using models and pictorial representations."
> This is almost exactly the same as 2.1.7, "Identify and explain
> fractions
as
part of a
whole and as part of a set/group using models." Suggestion – eliminate 3.1.5 and focus on equivalent fractions in third.
>
> 3.1.6 – "Create concrete models and pictorial representations to
> compare
and
order
fractions with like and unlike denominators, add and subtract fractions with like denominators, and verify results."
> "Use" might be a better verb than "create" since the models already
> exist;
not sure how
they would "verify results" since I thought that's what they were doing with the models.
>
> 3.1.9 – "Demonstrate and model multiplication (repeated addition,
> arrays)
and division
(repeated subtraction, partitioning).
> Suggestion – add "to solve real-world problems" to the end of the
objective
to put it in
context. Kids (and teachers) do not always connect the modeling to the real world.
>
> 3.1.11 – "Recall basic multiplication facts and the corresponding
> division

facts."
> Adding something to the objective connecting recall to understanding
> would
make it more
aligned with the Curriculum Focal Points (see page 15) and with a standards- based approach. Suggestion – "Use a variety of strategies to build fluency with basic multiplication facts and the corresponding division facts." The objective could include strategies with an e.g, including connecting counting patterns to multiples, using area models, number lines, arrays, etc. Quick recall of the facts is in fourth grade, which aligns perfectly with the Curriculum Focal Points.
>
> 3.1.12 – "Model the distributive property in multiplication of 2- and
> 3-
digit numbers by a
1-digit number."
> This objective would be stronger if it included "Use manipulatives
> to..." at
the beginning
of the sentence. It would then lead directly into 3.1.13 which uses models for division.
(Maybe "Use manipulatives to model division...." would work even better for 3.1.13).
Students would illustrate the property in a way that builds understanding.
Many teachers
are not clear on how third graders are supposed to use the distributive property because the teachers have only a superficial understanding of the property themselves.
The
distributive property is the basis for several of the alternative multiplication algorithms used in the standards-based programs and the foundation for higher math as well. This is the opportunity to build understanding.
> I notice that the distributive property is not mentioned in the new
> fourth
grade
objectives at all; what was in fourth has been moved to fifth. If that's the way it's going to be, then it might be better to move this objective to fourth grade.
'
>
> 3.1.14 – "Create grade-appropriate real-world problems involving any
> of
the
four
operations using multiple strategies, explain the reasoning used, and justify the procedures selected when presenting solutions."
> If the first word is changed from "Create" to "Solve" the objective
> would
make more sense.
Strategies are ways to solve problems, not ways to create them. If you want students to write their own word problems, that would be super for the above mastery and/or distinguished performance levels.
>
> Performance Descriptors –

> Place value (3.1.3) is not mentioned at all at any performance level.
Estimation (3.1.4)
is not mentioned. Addition and subtraction computation should be at the mastery level, but multiplication and division are new and developing skills and pencil/paper computation comes at fourth grade. Computation in all four operations is currently listed at mastery level. Third graders should be able to read, write, order, and compare whole numbers to 10,000 without manipulatives at the mastery level, but decimals are new and using manipulatives would be very appropriate for mastery at third grade. With fractions, representing and identifying fractions without models is fine at the mastery level, but comparing, adding and subtracting fractions at mastery level should include manipulatives or pictures. With problem solving, identifying the operation needed to solve a problem is often more difficult for students than actually doing the computation, but it is listed at the novice level in !
> the performance descriptors. There is nothing about the properties
(3.1.10,
3.1.12) at
any of the performance levels.
>
> Algebra
> Performance Descriptors –
> The distinguished level p.d. only addresses one objective. What's the
difference between
"interpret" and "analyze" with respect to patterns? Writing equivalent expressions is not addressed in the performance descriptors. Suggestion – "Write equivalent numerical expressions and justify using numbers, words, or objects" at mastery, "Evaluate two or more numerical expressions to determine equivalence" at partial mastery, and "Identify equivalent numerical expressions" at novice. Suggestions for input/output – "They complete an input/output model and identify the rule using addition, subtraction, multiplication, and division" at partial mastery and "Complete an input/output model when given a rule using addition, subtraction, multiplication, and division" at novice level.
>
> Geometry
> 3.3.1 – "Identify and create new polygons by transforming, combining
> and
decomposing
polygons."
> This objective replaces, "Identify basic polygons and their components
through decagons."

> 3.3.6 – "Draw an example of a flip, slide and turn (reflection,
translation,
and rotation)
given a model."
> Both objectives have transformations, which seems unnecessary.
Suggestion –
change 3.1.1
to, "Identify, describe, analyze, compare, and classify basic polygons by their sides and angles." This is really close to what the Curriculum Focal Points say for third grade. How about one for identifying, classifying, etc and one for changing by transforming, decomposing, etc.
>

> Two objectives, 3.3.3 and 3.3.4, are not mentioned in the performance
descriptors at all.
>
> Measurement
> 3.4.2 – "Estimate and find the perimeter and area of familiar
> geometric
shapes, using
manipulatives, grids, or appropriate measuring tools."
> 3.4.3 – "Determine the formula the area of a rectangle and explain
reasoning
through
modeling."
> Combining the objectives on perimeter and area in 3.4.2 does not work.
> The
only shape
third graders work with in area is the rectangle. The emphasis is on connecting the formula for area of a rectangle to their work with arrays and area models in multiplication. Perimeter of rectangles was covered in second grade and is extended in third grade to include all polygons. Finding perimeter is a measurement skill at this level, while area is a concept connecting knowledge in number and operations, geometry, and measurement. Suggestion – leave area out of 3.4.2 Go back to, "Estimate and determine the perimeter of any polygon."
>
>
> Performance Descriptors
> Elapsed time is not mentioned at all in the performance descriptors.
>
> Data Analysis and Probability
> There is nothing in the performance descriptors at any level on
> listing
all
outcomes,
which is part of 3.5.2 and is a new skill.
>
>
>

Veronica Barron

From:	cljwilli@access.k12.wv.us
Sent:	Thursday, November 02, 2006 3:48 PM
To:	lmaynus@access.k12.wv.us
Cc:	cljwilli@access.k12.wv.us
Subject:	Fwd: Comment Received for Policy 2520.2 (2006-11-02 18:29:54)

Forwarded Message:
> To: fibanez@wvde.state.wv.us, cljwilli@access.k12.wv.us
> From: Nobody <nobody@wvde.state.wv.us>
> Subject: Comment Received for Policy 2520.2 (2006-11-02 18:29:54)
> Date: Thu, 2 Nov 2006 18:29:54 -0500
> -----
> Please save this email in a "Comments Received Online" folder.
> Your folder will be a backup. All comments are saved in our database.
> The Complete Comments Report from the database can be found here:
> http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
> This is an encrypted URL. Please Bookmark it.
>
> Comment Received for Policy 2520.2
>
##
###############
#
> Name: Pattie Cowan
> Organization:
> Email: pacowanis
> Title: Teacher
> Address1:
> Address2:
> City/State/Zip: ,
> Role: Teacher
> Posted: 2006-11-02 18:29:54
> Posted from IP: 67.163.214.194
>
>
> Comments for section 126-44B-1 General
> ---
>
>
> Comments for section 126-44B-2 Purpose
> ---
>
>
> Comments for section 126-44B-3 Incorporation by Reference
> ---
>

>
> Comments for section 126-44B-4 Summary of the Content Standards and Objectives
> ---
> Data Analysis & Probability
> M.O.K.5.1 collect, organize, display, and interpret data using a pictograph and bar graph
(with and without technology)
> M.O.K.5.2 conduct a simple probability experiment and use tallies to record results in a
table, make predictions based on results.
>
> Kindergarten students need to sort real objects-and create graphs with these
real objects.
The Curriculum Focal Points and connections for Kindergarten states that children sort objects and use one or more attributes to solve problems.
>
> Using tallies is difficult even for a first grade student. This is
> too difficult for a Kindergarten student.
>
>
>
> Comments for section 126-44B 21st Century Mathematics Content Standards
and Objectives
for West Virginia Schools
> ---
>
>
>
>

Veronica Barron

From:	cljwilli@access.k12.wv.us
Sent:	Thursday, November 02, 2006 3:49 PM
To:	lmaynus@access.k12.wv.us
Cc:	cljwilli@access.k12.wv.us
Subject:	Fwd: Comment Received for Policy 2520.2 (2006-11-02 18:30:31)

Forwarded Message:
> To: fibanez@wvde.state.wv.us, cljwilli@access.k12.wv.us
> From: Nobody <nobody@wvde.state.wv.us>
> Subject: Comment Received for Policy 2520.2 (2006-11-02 18:30:31)
> Date: Thu, 2 Nov 2006 18:30:31 -0500
> -----
> Please save this email in a "Comments Received Online" folder.
> Your folder will be a backup. All comments are saved in our database.
> The Complete Comments Report from the database can be found here:
> http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
> This is an encrypted URL. Please Bookmark it.
>
> Comment Received for Policy 2520.2
>
##
#
> Name: Susan Barrett
> Organization: Nicholas County Schools
> Email: sbarrett@mountain.net
> Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre
Member
> Address1: 102 Airport Road
> Address2:
> City/State/Zip: Fenwick, WV 26202
> Role: Teacher
> Posted: 2006-11-02 18:30:31
> Posted from IP: 69.43.4.251
>
>
> Comments for section 126-44B-1 General
> --
>
>
> Comments for section 126-44B-2 Purpose
> --
>
>
> Comments for section 126-44B-3 Incorporation by Reference
> --

>
>
> Comments for section 126-44B-4 Summary of the Content Standards and
Objectives
> ---
>
>
> Comments for section 126-44B 21st Century Mathematics Content
Standards
and Objectives
for West Virginia Schools
> ---
> Fourth Grade
> Number and Operations
> 4.1.4 – "Using concrete models, benchmark fractions, number line,
> compare
and order
fractions with like and unlike denominators, add and subtract fractions with like and unlike denominators, model equivalent fractions, model addition and subtraction of mixed numbers with and without regrouping."
> This new objective combines four objectives and never requires
> students to
move past the
concrete stage in any of the skills involved. Yet in fifth grade, M.O.5.1.7 expects students to "Analyze and solve application of problems and justify reasonableness of solution in problems involving addition and subtraction of fractions and mixed numbers and decimals." There is no objective that addresses the computation skills of adding and subtracting fractions! This is a big oversight as it typically occupies WEEKS of instructional time in fourth and fifth grades. It is not reasonable to assume that somehow between fourth and fifth grades students will figure out on their own how to find common denominators, add, subtract, and reduce fractions and mixed numbers with and without regrouping. The Curriculum Focal Points for fifth grade say students "develop fluency with standard procedures for adding and subtracting fractions and decimals."
>
> 4.1.7 – "Add and subtract whole numbers (up to 5-digit numbers) and
decimals
to the 1000th
place, multiply (up to three digits by two digits, and divide (up to a three digit number with a one and two-digit number).
> This also combines two objectives from the previous version of the CSOs.
Addition and
subtraction at fourth grade with both whole numbers are all about computational fluency; these are established skills that only need to refined. Double digit multiplication and long division are new and should include something indicating a connection to understanding. The Curriculum Focal Points for grade 4 recommends that students "develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers." In grade 5, the recommendation is that students "develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multidigit dividends." The proposed CSO does not go beyond students learning rote procedures.

>
> 4.1.8 – "Justify the use of the standard algorithm to solve multidigit
whole
number
multiplication problems."
> I have two problems with this proposed objective. First, in the
> standards-
based math
problems used in our state (Everyday Math and Investigations), emphasis is on reasoning and developing ways to solve multi-digit multiplication problems. Both programs use illustrations of the distributive property to build understanding. Neither program expects students to master or even use the standard algorithm in fourth grade. If this objective is part of our CSOs, teachers in standards-based programs will need to teach the standard algorithm; teachers using traditional series will teach only the standard algorithm.
Second, asking ten-year-olds to "justify the use of the standard algorithm"
is
unreasonable unless justifying means something like "because my teacher told me to put a zero here." I would be interested in reading fourth grade teachers'
explanations of how
and why the algorithm works; I suspect many would struggle to explain it clearly and concisely.
>
> 4.1.10 – "Create grade-level real-world appropriate story problems
> using
multiple
strategies including simple ratios, justify the reason for choosing a particular strategy and present results."
> The word "solve" has been left out. Strategies are ways to solve a
problem,
and are not a
part of creating a problem.
>
> Including simple ratios in the objective comes out of nowhere since
> there
is
no objective
in number and operations up to this point that addresses ratio at all. It might be more appropriate to build understanding of the concept before asking students to apply ratios in a problem-solving situation. Ratios are mentioned in the proposed 4.5.3, but representing outcomes in a probability experiment as a fraction rather than a ratio might make more sense there (see Curriculum Focal Points for grade 7). In the first round of revisions when we looked at NAEP alignment, ratio was a weak area in our CSOs.
I don't
think we've done much to improve it. There is a proposed algebra CSO that says, "recognize and describe relationships in which quantities change proportionally." That sounds a lot like ratios, but it doesn't say that. What will teachers make of that? The performance descriptors do nothing to help clarify the meaning. The Curriculum Focal points have no references to ratio unt!
> il grade 6.
>

> The performance descriptors need some work; there are a few that don't
make
sense. I know
the revision committee was under the gun in trying to get all the changes in, but let's be sure they are clear before they become policy. A few quotes - "They identify grade-appropriate real-world story problems using any strategy, and communicate results."
"They research, summarize, and analyze the relationship of fractions to decimals and communicate this relationship."
>
> Algebra
> 4.2.2 – "Recognize and describe a relationship in which quantities
> change
proportionally."

> See comments above on ratio and proportion. See also Curriculum Focal
Points
for grades 6
and 7 (Number and Operations, Algebra, and Geometry).
>
> 4.2.4 – "Solve real-world problems involving order of operations
> including
grouping
symbols and the four operations."
> Order of operations has to do with conventions used in written
computation.
It would be a
stretch for a fourth grader to apply that in a real world problem solving situation. The performance descriptor at the distinguished level calls for students to "create and solve real-world problems involving order of operations with variables."
> The objective on comment this summer was, "Incorporate the order of
operations
(parentheses and four operations) in solving problems and writing expressions." Writing expressions following the order of operations takes some higher-level thinking and added rigor to the objective.
>
> Geometry
> 4.3.1 – "Identify, classify, compare and contrast two-dimensional
(including
quadrilateral
shapes) and three-dimensional geometric figures according to attributes."
> Three-dimensional figures have been added to this objective, but they
> were
already
included in the third grade objective. The content focus at fourth grade was on quadrilaterals.
>
> The performance descriptors list tessellations only at the
> distinguished
level but it is
part of the objective.

>
> Measurement
> The performance descriptors at the above mastery and distinguished
> levels
call for
students to investigate formulas for area and select the appropriate one, but the objectives at fourth grade only include the formula for area of a rectangle.
Parallelograms and triangles are covered in fifth grade.
>
> Data Analysis and Probability
> 4.5.3 – "Design and conduct a simple probability experiment using
> concrete
objects,
examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and present the results."
> The current objective focuses on tree diagrams as a way of
> representing
possible
combinations. Typical problems involve things like determining the number of different choices of ice cream sundaes with two flavors and three toppings. The new objective shifts the emphasis to analyzing a probability experiment, which seems to be the recommendation for grade 7 in the Curriculum Focal Points. This objective could really be left out of fourth grade altogether.
>
>
>

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, November 03, 2006 8:02 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-03 08:01:32)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
#
Name: Joyce L. Evans
Organization: Math Task Force
Email: jlevans@access.k12.wv.us
Title: teacher
Address1: 543 Pike Avenue
Address2: 628 Walnut Street
City/State/Zip: Monongah, WV 26554
Role: Teacher
Posted: 2006-11-03 08:01:32
Posted from IP: 72.84.42.85

Comments for section 126-44B-1 General

I just read three pages of comments by Susan Barrett of Nicholas County and I agree with all of them. We must be sure they spiral and are age appropriate.The difference of one word can change rigor. With the new Focal Points from NCTM with have even more help to make WV lead. Did elementary teachers work on these new revisions? I cannot help but question based on what I read. Thanks

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 10:23 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 10:22:54)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Deborah Brown
Organization: Westside High School
Email: dblbrown@access.k12.wv.us
Title: Mathematics Teacher
Address1: P.O. Box 1439
Address2:
City/State/Zip: Pineville, WV 24874
Role: Teacher
Posted: 2006-11-02 10:22:54
Posted from IP: 168.216.16.50

Comments for section 126-44B-1 General

After thirty-two years of teaching experience, I have found that students have very different learning abilities. Because expectations must be high and students must meet those expectations to some level of success, it is necessary to present mathematical concepts in different ways to students of differing abilities.

We like to believe that all students can learn all mathematical concepts to be presented in the high school setting. But that is just not realistic.
We currently have only thirty-five to forty percent of our incoming freshmen who are at ninth grade level in mathematics. This makes it unrealistic for the other sixty to sixty-five percent to enter algebra 1 immediately upon entering the ninth grade.

The courses currently offered in the high school (applied math 1, applied math 2, and applied geometry) provide the opportunity for these sixty to sixty-five percent of the students to succeed and graduate. However, the courses listed in Policy 2520.2 do not offer the same opportunity for these students to succeed and will therefore prevent some students from graduating.

We must continue to meet the needs of those students who will graduate high school and continue their education by attending college as well as those who will go directly into the work force. Please reconsider the mathematics course list to include courses below algebra 1 that will present an occasion for every student to be successful.

Sincerely,
Deborah Brown

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

---

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 10:03 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 10:03:29)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Amy Powell
Organization: Westside High Schoo
Email: alpowell@access.k12.wv.us
Title: Math Teacher
Address1: HC 65, Box 275
Address2: Rt. 971
City/State/Zip: Clear Ford , WV 24822
Role: Teacher
Posted: 2006-11-02 10:03:29
Posted from IP: 168.216.102.6

Comments for section 126-44B-1 General

As a secondary math teacher, who teaches or has taught all math classes below Trigonometry, I am concerned with possible repercussions of eliminating the applied classes, including Algebra / Geometry Prep, from the high school curriculum.

While I understand the need for striving for better thinking and reasoning skills for all students, I also understand that not all students come to us prepared for high school. The needs for those students performing below grade level should be met before pushing them into classes that they are not ready for.

Many of these students struggle to pass Applied Math 1 and 2. If they are forced to take Algebra I immediately upon entering high school (even over a
2 year period), many will become frustrated, eventually deciding to quit high school. Within the group of students who do pass Algebra I will be a group of students who will never pass Algebra 2 (or Conceptual Math).

Please reconsider eliminating the applied courses from the high school curriculum. I'm afraid that the fall-out will be tremendous. We will lose many of our students who presently are able to successfully graduate.

Amy Powell
Westside High School Math Teacher

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools
----

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Thursday, November 02, 2006 10:00 AM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-11-02 09:59:32)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Westside High School Math Department
Organization:
Email: alpowell@access.k12.wv.us
Title:
Address1: HC 65 Box 275
Address2: Rt. 971
City/State/Zip: Clear Fork, WV 24822
Role: Teacher
Posted: 2006-11-02 09:59:32
Posted from IP: 168.216.102.6

Comments for section 126-44B-1 General

As secondary mathematics teachers who have a combined total of 129 years of experience, we would like to express our concern with WVBOE Policy 2520.2. Most of our concern lies with the elimination of the courses Algebra/Geometry Prep, Applied Math 1, Applied Math 2, and Applied Geometry.

In our experience, we have found that students have very different learning abilities and require different teaching methods. Not all students learn on the same level and in the same manner.

We agree that it is absolutely necessary for the teacher to have high expectations no matter what the student's learning ability. Because expectations must be high, and students must meet those expectations to achieve some level of success, it is necessary to present mathematical concepts in different ways to students of different abilities.

We are aware that the purpose of eliminating the above courses is to help all students develop higher-order thinking skills. However, just because one suddenly expects a specific level of thinking skills doesn't mean the students will suddenly produce that level of skills. These skills are developed over time, beginning at a lower level. It would be an injustice for us to expect all students to have already acquired a specific level of thinking and reasoning skills before they start high school.

In our school (which we believe is a typical high school), 60 percent of our students who enter ninth grade are not on grade level in math. Many of these students are not able to perform higher level thinking skills that are necessary for Algebra I or above. Why not start those students out in Algebra/Geometry Prep and help them develop their thinking and reasoning skills over time?

Expecting all students to take Algebra I as their lowest high school math class is unrealistic. Should this policy pass, there will be a significant time lapse before the problems produced by this situation could be rectified. Presently, students are able to take the Applied courses and successfully graduate. However, with all students having to take the classes listed in the policy, many students will never pass all of their required math courses. As a result, drop-out rates will skyrocket, graduation rates will plummet, and high schools and counties will never meet AYP.

Although this policy will be beneficial to the students on the higher end of the spectrum, we believe that the students on the other end will become lost in the process. Please reconsider passing this detrimental policy for the sake of those students who, in the end, will be harmed by this change in policy.

Deborah Brown
Elizabeth Powell
Amy Powell
Debra Bowling
Rena Argabright

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, November 02, 2006 9:39 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-02 09:38:44)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#

Name: Debbie Bowling
Organization: Westside High School
Email: dlbowlin@access.k12.wv.us
Title: Teacher
Address1: 410 Lusk Ave
Address2:
City/State/Zip: Mullens, WV 25882
Role: Teacher
Posted: 2006-11-02 09:38:44
Posted from IP: 168.216.102.109

Comments for section 126-44B-1 General

I am concerned about the apparent deletion of Algebra/Geometry Prep and the Applied Math classes from the high school courses. In our high school approximately 60% of the students entering 9th grade are not prepared for an Algebra I class. We have been moderately successful teaching these students through the Applied Math classes. I am very fearful that we are headed for a high failure rate and a high drop-out rate because of this policy change.
I do have high expectation for my students at their ability level, while recognizing the fact that not all students have the same abilities and strengths.
Please reconsider this poliey change and reinstate the Applied Math classes in the high school curriculum.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Wednesday, November 01, 2006 8:52 PM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-11-01 20:52:19)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Cynthia Burke
Organization: Sherrard Junior High
Email: caburke@access.k12.wv.us
Title: Teacher
Address1: 1000 Fairmont Pike
Address2:
City/State/Zip: Wheeling, WV 26003
Role: Teacher
Posted: 2006-11-01 20:52:19
Posted from IP: 67.165.59.54

Comments for section 126-44B-1 General

Increasing the rigor of the CSOs can be the first step in improving mathematics in West Virginia, but it cannot be the only step. Teachers will need more classroom time with students (42-45 minutes a day is not enough).
Students also need some accountability in their own education. Permitting students to fail mathematics and English in grade 5, grade 6, grade 7, and grade 8 without consequence devalues education. Students are sent to the high school where, for the first time in their academic careers, they need to earn credits to graduate. They are sent to the high school without having been required to acquire the skills needed to achieve success. They have been not been encouraged to develop a work ethic or academic skills.
Please don't stop the reform with the CSOs--find a way to give us more time for mathematics during the school day and a way to encourage student accountability.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Wednesday, November 01, 2006 10:03 AM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-11-01 10:02:53)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Drema Harris
Organization: Wyoming East High School
Email: daharris@access.k12.wv.us
Title: Math teacher
Address1: Box 390
Address2: Warrior Way
City/State/Zip: New Richmond, WV 24867
Role: Teacher
Posted: 2006-11-01 10:02:53
Posted from IP: 168.216.58.217

Comments for section 126-44B-1 General

While this is the last year I will be teaching, due to retirement at the end of the year, I feel I must comment on the proposed CSO's for mathematics.
For most of my teaching experience, I have taught either Algebra 1 or Algebra 2. I have found that I am having to spend more and more time reteaching things that the students were supposed to already know. I feel that by dropping the applied curriculum teachers in the future will have to spend even more time going over material that the students didn't get the first time. Not all students are ready for Algebra when they come to high school. Dropping the applied math will do the students a tremendous disservice. I hope that you reconsider this proposal.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Wednesday, November 01, 2006 10:00 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-01 10:00:05)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Karen Stewart
Organization: Wyoming East High School
Email: kstewart@access.k12.wv.us
Title: Math teacher
Address1: Box 390
Address2: Warrior Way
City/State/Zip: New Richmond, WV 24867
Role: Teacher
Posted: 2006-11-01 10:00:05
Posted from IP: 168.216.58.217

Comments for section 126-44B-1 General

I have spent my entire teaching experience teaching students ninth and tenth grade math. While some students are able to jump into Algebra 1 with no difficulties, many freshmen are not ready for such a difficult course. Many students who face Algebra 1 as the introductory high school math course may give up before they even get started. I'm having trouble teaching all the CSO's now because I must spend too much time reviewing material. Please reconsider your attempts to do away with the applied curriculum.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Wednesday, November 01, 2006 9:39 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-01 09:38:43)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
#
Name: Beverly K. Taylor
Organization: Wyoming East High School
Email: bktaylor@access.k12.wv.us
Title: Librarian
Address1: Box 390
Address2: Warrior Way
City/State/Zip: New Richmond, WV 24867
Role: Teacher
Posted: 2006-11-01 09:38:43
Posted from IP: 168.216.58.217

Comments for section 126-44B-1 General

While I am currently a librarian, I was a full-time math teacher on the high school level for 24 years. I now teach one Algebra 1 class. While it is admirable that we are trying to raise our state standards, I believe that dropping the applied courses will do a disservice to our students. Not all students will be able to handle Algebra 1, Algebra 2, and Geometry as their three required math classes. The student who comes to us having passed eighth grade math with a D- will not have a successful high school experience if he/she is immediately thrown into Algebra 1. I'm afraid the frustration that will come from being forced into a class he/she is not ready for will cause many students to just give up and quit. Please reconsider your dropping of these applied classes.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4   Summary of the Content Standards and Objectives

----

Comments for section 126-44B   21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Wednesday, November 01, 2006 8:42 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-11-01 08:42:12)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Tammy Bell
Organization: Smithville Elementary
Email: teacherchick@zoominternet.net
Title: teacher
Address1: HC 68 Box 4
Address2:
City/State/Zip: Smithville, WV 26178
Role: Teacher
Posted: 2006-11-01 08:42:12
Posted from IP: 168.216.90.109

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

I believe that the jargon that is used is very complicated for teacher use (make it simple). Currently, 3rd graders are having to learn 0's through 5's and 10's in multiplication. 4th graders add the 6's through 9's. 5th graders become more fluent and so on. This has been ok. I believe the 4th grade CSO that you have written about 3 digit by 2 digit multiplication is very complicated for a 4th grader. My 5th graders just finished this and my "A" students struggled with it. I think we are rushing the developmental readiness of our students. I, also, think exponents in 5th grade is ridiculous. Those who teach math everyday all day and are fluent in it (and develop the CSO's) need to take time to think about how much we can actually "cram" in the kids' heads.

Veronica Barron

From: cljwilli@access.k12.wv.us
Sent: Monday, October 30, 2006 12:58 PM
To: lmaynus@access.k12.wv.us
Cc: cljwilli@access.k12.wv.us
Subject: Fwd: Comment Received for Policy 2520.2 (2006-10-30 11:07:26)

Forwarded Message:
> To: fibanez@wvde.state.wv.us, cljwilli@access.k12.wv.us
> From: Nobody <nobody@wvde.state.wv.us>
> Subject: Comment Received for Policy 2520.2 (2006-10-30 11:07:26)
> Date: Mon, 30 Oct 2006 11:07:26 -0500
> -----
> Please save this email in a "Comments Received Online" folder.
> Your folder will be a backup. All comments are saved in our database.
> The Complete Comments Report from the database can be found here:
> http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
> This is an encrypted URL. Please Bookmark it.
>
> Comment Received for Policy 2520.2
>
##
###############
#
> Name: Margaret K. Sine
> Organization: Wetzel County Schools
> Email: mksine@access.k12.wv.us
> Title: Principal
> Address1: 510 N. Second Ave.
> Address2:
> City/State/Zip: Paden City, WV 26159
> Role: Principal
> Posted: 2006-10-30 11:07:26
> Posted from IP: 168.216.129.17
>
>
> Comments for section 126-44B-1 General
> ---
> The format of the document is easy to use. The performance
> descriptors
clearly define the
skills expected for those students who score above the basic mastery level-- particluly beneficial to those who have been focusing on the basic objectives.
>
> Comments for section 126-44B-2 Purpose
> ---
>

>
> Comments for section 126-44B-3   Incorporation by Reference
> ---
>
>
> Comments for section 126-44B-4   Summary of the Content Standards and
Objectives
> ---
>
>
> Comments for section 126-44B   21st Century Mathematics Content
Standards
and Objectives
for West Virginia Schools
> ---
>
>
>
>

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Monday, October 30, 2006 10:02 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-30 22:02:17)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Pattie Cowan
Organization:
Email: pacowanis@comcast.net
Title: Teacher
Address1: 84 Bancroft Way
Address2:
City/State/Zip: Weirton, WV 26062
Role: Teacher
Posted: 2006-10-30 22:02:17
Posted from IP: 67.163.214.194

Comments for section 126-44B-1 General

NUmber & Operations Performance Descriptors Comments-Partial Mastery and Novice are confusing. Teachers don't have any problems assessing Partial Mastery & Novice. If we are giving a Performance Descriptor for the Content Standard-maybe mastery of half of the objectives at that grade level could be partial mastery. The Above Mastery and Distinguished Descriptors at Grades K-2 are very confusing and wordy -and I believe will cause teachers to panic when they see them. They will think they have to teach those objectives under that descriptor.

Above Mastery at the Kindergarten level could simply be-Demonstrate an understanding of numbers to 50, ways of representing numbers to 50, and relationships among numbers and number systems. They choose, combine, and apply effective strategies for answering quantitative questions. They communicate results offering more than one solution (This is stated in Focal Points for Kindergarten.)

Distinguished-Demonstrate an understanding of numbers to 100, ways of representing numbers to 100, and relationships among numbers and number systems. They choose, combine, and apply effective strategies for answering quantitative questions. They communicate results offering more than one solution (This is stated in Focal Points for Kindergarten.) They create picture and story problems.

Above Mastery at the First Grade level could simply be-Demonstrate an understanding of numbers to 200, ways of representing numbers to 200, and relationships among numbers and number systems

First Grade Performance Descriptors in Number & Operations Mastery-They use models to represent (add- and explain)fractions (halves, thirds, fourths) They demonstrate quick recall with basic addition and subtraction facts to 10, models (should be model, and solve ...

Change to-Develop and use strategies to help with the quick recall of facts.

Eliminate (and addition of three numbers with sums less than 18). It is no longer an objective in first grade.

Change -They create one-step grade-appropriate problems to solve one-step grade-appropriate problems.

Above Mastery at the first grade level could simply be-Demonstrate an understanding of numbers to 200, ways of representing numbers to 200, and relationships among numbers and number systems. The Focal Points for First Grade states the children use sophisticated strategies based on the properties of addition (e.g., "making tens") to solve addion and subtraction problems involving basic facts.

Distinguished at the first grade level could simply be-Demonstrate an understanding of numbers to 1000, ways of representing numbers to 1000, and relationships among numbers and number systems. focal Points for first grade-They use a variety of models to model "part-whole", adding to, taking away from, and comparing situations to develop an understanding of the meanings of addition and subtraaction and sophisticated strategies to solve arithmetic problems. They create real-world grade-level appropriate one-and two-step problems , present and justify results.

Second Grade Performance Descriptors for Number & Operations

Above Mastery at the second grade level could simply be-Demonstrate an understanding of numbers above 1000, ways of representing numbers above 1000, and relationships among numbers and number systems. Focal Points for Second Grade-Children compose and decompose multidigit numbers using place value and properties of operations to create equivalent representations of given numbers. They create real-world grade-appropriate one-and two-step problems, present and justify results.

Distinguished in the second grade-Demonstrate an understanding of numbers above 1000, ways of representing numbers above 1000, and relationships among numbers and number systems. Focal Points for Second Grade-Children compose and decompose multidigit numbers using place value and properties of operations to create equivalent representations of given numbers. they use 2-and 3-digit numbers to solve problems, justifying their results. They create real-world grade-appropriate one-and two-step problems, present and justify procedures in a clear and concise manner.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Number & Operations-Second Grade
M.O.2.1.1-read, write, order, and compare numbers to 1,000 using multiple strategies (e.g. symbols, manipulatives, number line)

Change the word strategies to representations. Specify symbols-greater than, less than.

M.O.2.1.2-Identify any number as odd or even and determine if a set has and odd or even number of elements

Spelling error-and should be an before the word odd First grade determines if a set has an odd or even number of elements. I don't think you need to write this again in the second grade.

M.O. 2.1.3 count and group concrete manipulatives by ones, tens, and hundreds to 1,000

Should read-count to group concrete manipulutives, by hundreds, tens, and ones to 1,000

M.O.1.1.9 demonstrate quick recall of basic addition facts with sums to 18 and corresponding subtraction facts

The Curriculum Focal Points in Number and Operations states:Developing understandings of addition and subtraction and strategies for basic addition facts and related subtraction facts. I think developing strategies is vital in this objective. (e.g.modeling "part-whole", adding 0, plus 1, plus 2, doubles, making tens, -0, -1, -2)

M.O.2.1.13 create story problems that require...
Mastery should be-Solve story problems- Creating a story problem is above mastery at this level.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Tuesday, October 31, 2006 10:05 AM
To: fibanez@wvde.state.wv.us; cljwilli@ACCESS.K12.WV.US
Subject: Comment Received for Policy 2520.2 (2006-10-31 10:04:59)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Janie Merendino
Organization: Fairmont State University
Email: mmerendino@fairmontstate.edu
Title: teacher educator
Address1: 10 diana dr
Address2:
City/State/Zip: Fairmont, WV 26554
Role: Teacher
Posted: 2006-10-31 10:04:59
Posted from IP: 129.71.73.254

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

As I reflect on our proposed CSOS and read NCTM's curriculum focal points several concerns arise. I choose the area of measurement to begin.

Research reveals volume is a developemntal skill and I see it in the first grade csos. I also see perimeter in the 3rd grade. The Focal Points suggest a focus on linear measurement only in grades K - 4. I agree.

Children need lots of time with comparing and estimating linear measurements before they talk about volume atrributes. The properties of measurement such as transitivity and conservation and the indirect relationship of unit

size to amount needs fully developed at this level. The attributes of

volume may be mentiioned, but not a tested cso at this level.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Tuesday, October 31, 2006 10:10 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-31 10:09:40)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Janie Merendino
Organization: Fairmont State University
Email: mmerendino@fairmontstate.edu
Title: teacher educator
Address1: 10 diana dr
Address2:
City/State/Zip: Fairmont, wv 26554
Role: Teacher
Posted: 2006-10-31 10:09:40
Posted from IP: 129.71.73.254

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

I wish to address the content strand of numbers and operations. Third grade has comparing frasctions with unlike denominators. Can we include denominators less than 12? If students really develop understanding of those fractions, understanding with all will happen intuitively. I would also reccommend in third grade to include solving story problems that represent all meaning of multiplication: 1D - repeated addition, 2D arrays and 3D combinations.

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Tuesday, October 31, 2006 10:29 AM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-10-31 10:29:14)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Janie Merendino
Organization: Fairmont State University
Email: mmerendino@fairmontstate.edu
Title: teacher educator
Address1:
Address2:
City/State/Zip: Fairmont, wv 26554
Role: Teacher
Posted: 2006-10-31 10:29:14
Posted from IP: 129.71.73.254

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Comments from CSOS involving measurement: In sixth grade we should include find missing measures of length from area and volume and consider leaving surface area to seventh grade. If we listen to research of Debbie Ball and the authors of Curriculum Focal Points we would do well to leave more out rather than to include it in our CSOS.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Tuesday, October 31, 2006 1:43 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-31 13:42:48)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Glenn Long
Organization: Point Pleasant High School
Email: jlong@access.k12.wv.us
Title: Special Education Teacher
Address1: Rt 1 Box 4
Address2:
City/State/Zip: Point Pleasant, WV 25550
Role: Teacher
Posted: 2006-10-31 13:42:48
Posted from IP: 168.216.37.168

Comments for section 126-44B-1 General

I find it hard to believe that the State Department would be pushing Integrated Math on one hand, and completely omit it from the CSO's

Making the requirements for Math credit start at Alg I may be OK for the general education population, but for many Special Education students we will in effect be denying them a chance to graduate. Please continue to allow one class below Alg I to count toward graduation requirements.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

---

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Tuesday, October 31, 2006 8:08 PM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-10-31 20:07:47)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name:
Organization:
Email:
Title:
Address1:
Address2:
City/State/Zip: ,
Role:
Posted: 2006-10-31 20:07:47
Posted from IP: 67.163.214.194

Comments for section 126-44B-1 General

Performance Descriptors-First Grade-Algebra Mastery-ADD-They determine the rule or give output given an input/output model using addition or subraction.

Performance Descriptors-Second Grade-Algebra Mastery-ADD-They identify, complete, and extend a variety of counting patterns.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

M.O.K.2.1 justify the classification of self-selected objects based on attributes.
Should be- justify the classification of self-selected objects based on one attribute.

M.O.K.2.2 create, describe, and extend a repeating pattern using common objects, sound, and movement.

Should be identify, describe, and extend a repeating pattern using common objects, sound, and movement. Create a pattern is above mastery.

First Grade-Algebra

M.O.1.2.4 create and analyze number patterns based on real-life situations using words, AB form, and T-charts and present results.

This objective is confusing. I am not sure what number patterns based on real-life situations you are referring to. There is something missing in this objective. First graders need to identify, interpret, and create repeating patterns, too.

M.O.2.2.2 explain how one variable produces a change in another variable
The vocabulary is very difficult for this grade level. Two objectives have been eliminated in Algebra. I think you need to be more specific with this objective. Maybe you can give some examples.

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Tuesday, October 31, 2006 8:18 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-31 20:17:35)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Pattie Cowan
Organization:
Email: pacowanis@comcast.net
Title: Teacher
Address1:
Address2:
City/State/Zip: ,
Role: Teacher
Posted: 2006-10-31 20:17:35
Posted from IP: 67.163.214.194

Comments for section 126-44B-1 General

Performance Descriptors-Geometry
First Grade-Mastery
Identify and draw a line of symmetry and find and name locations on a coordinate grid.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----
Geometry-First Grade
M.O.1.3.5 create and describe simple symmetrical designs

This is too difficult for first grade. They need to identify and draw a line of symmetry before they can create and describe at the mastery level

M.O.1.3.7 find and name locations on a first-quadrant grid.
Too difficult-Should read find and name locations on a coordinate grid.

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Tuesday, October 31, 2006 8:50 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-31 20:50:04)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Pattie Cowan
Organization:
Email: pacowanis@comcast.net
Title: Teacher
Address1:
Address2:
City/State/Zip: ,
Role: Teacher
Posted: 2006-10-31 20:50:04
Posted from IP: 67.163.214.194

Comments for section 126-44B-1 General

Performance Descriptors for Measurement
Kindergarten-
Mastery-Kindergarten students at the mastery level in mathematics estimate size, compare and order objects by size with respect to a given attribute.
They use standard and nonstandard units of measure to find length and compare two objects in non standard units of measure according to length, height and weight. They use the calendar to identify date and the sequence of the days of the week. They read time to the hour with analog and digital clocks. They identify and model the value of penny, nickel, and dime and determine the value of a set of pennies up to 20. They explain the relationship between the coins.

Eliminate (determine the value of a set of pennies up to 20). It is no longer an objective in Kindergarten.

First Grade -Measurement Performance decriptors Mastery Students at the mastery level in first grade mathematics estimate, measure, compare, and order length of objects using customary, metric, and nonstandard units. They select the appropriate units and tools to measure length, height, weight, temperature, and volume. They use a calendar to identify the date, sequence of days of the week, and months of a year. They tell time to the half hour using an analog clock and a digital clock. They explain the relationship between coins and make change from a dollar.

Explain the relationship between coins needs to be added to the money objective and the making change from a dollar is not a mastery objective in the first grade.

Mastery

Second grade students at the mastery level in mathematics estimate measures, select and correctly use the appropriate measuring tool. They determine the perimeter and the area of a given shape using manipulatives. They order events and read time to the nearest quarter hour using an analog and digital clock. They identify specific dates on a calendar and determine past and future dates. They explain the relationship between coins and make change from $1.00.

The last sentence needs to be more specific-so it matches the objective.

identify, count and organize coins and bills to display a variety of price values with a total value of one dollar or less and model making change using manipulatives.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Measurement Content Standards

Kindergarten

M.O.K.4.3 compare two objects in nonstandard units of measure, according to one or more of the following attributes:

- length
- height
- weight

Maybe it should read-compare and order two objects... The Focal Points for Measurement-state "ordering objects by measurable attributes."

M.O.K.4.6 identify the name of penny, nickel, and dime and model the value.

identify the name and value of coins and explain the relationships between:

- penny
- nickel
- dime

Maybe you can be more specific in the explanation of the relationships.

e.g. 5 pennies = 1 nickel

2 nickels = one dime

M.O.1.4.3 use calendar to identify date, sequence of days of the week, and months of the year.

Should read- use calendar to identify date and sequence days of the week, and months of the year.

M.O.1.4.6 identify, count and organize the following coins and bill to display a variety of price values from real-life examples with a total value of 100 cents or less.

- penny
- nickel
- dime
- quarter
- dollar bill

First Grade Students should master trading coins at this level. I think this should be added to the objective.

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Monday, October 30, 2006 4:28 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-30 16:27:41)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Susan Barrett
Organization: Nicholas County Schools
Email: sbarrett@mountain.net
Title: Math Coach, WV Math Task Force Member, WV Elementary Math Cadre Member
Address1: 102 Airport Road
Address2:
City/State/Zip: Fenwick, WV 26202
Role: Teacher
Posted: 2006-10-30 16:27:41
Posted from IP: 168.216.16.50

Comments for section 126-44B-1 General

The foreword refers to "learning standards" but everywhere else in the document they are refeered to as "content standards."

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

Comments on the K-2 CSOs and Performance Descriptors Kindergarten – Number and Operations
K.1.8 – "Use concrete objects to model addition and subtraction of whole numbers related to sums of 10 or less and write corresponding number sentence."
The performance descriptor at partial mastery asks students to "solve addition and subtraction sentences using whole numbers to 10." Objects are not mentioned. The mastery performance descriptor says "use concrete objects to model addition and subtraction...." As written, partial mastery is more difficult than mastery.

K.1.10 – "Create grade-appropriate picture and story problems, solve using a variety of strategies, present solutions and justify results."
This seems a bit much to expect at the mastery level. By setting the objective so high at mastery, the performance descriptors for above mastery and distinguished are far above what is appropriate for five-year-old students ("They offer alternative solutions to two-step problems using pictures, numbers, and words.") Suggestion – "Represent and solve grade-appropriate picture and story problems using a variety of strategies, including modeling with objects, drawing pictures, and writing numbers." The emphasis in kindergarten and first grade should be on representation, not justification and multiple solutions. See the Curriculum Focal Points.

Algebra
K.2.1 – "Justify the classification of self-selected objects based on attributes."
If the objective is written at the mastery level, then it should say "based on one attribute" to match the performance descriptor. Kindergarten students are just beginners. They need many sorting and classifying experiences. This objective seems unnecessarily wordy. The objective used to read, "Sort and classify objects by one attribute." That seems clear and to the point and appropriate for five-year-olds..

Measurement
K.4.4 – "Use calendar to identify date and the sequence of the days of the week."
This is less rigorous than the old objective, which said, "Name the days of the week and seasons of the year." The intent was for students to recite from memory, not read from a calendar. Most calendars in kindergarten classrooms are built a day at a time, so finding the date would be finding the last number put on the calendar. That seems appropriate for five-year-olds just learning what a calendar is and getting a grip on the passage of time. Identifying the date on a calendar could certainly wait until first grade.

K.4.6 – "Identify the name and value of coins and explain the relationships between: penny, nickel, dime."
This objective combines two kindergarten objectives on money, but in doing so, changes the intent of the objective. The old objectives called for students to identify the name and value of penny, nickel, and dime and count a collection of pennies with a value up to 20 cents. The performance descriptor still says this at mastery level. Trading coins or explaining the relationship between coins of different values is more appropriate for first grade, which is where it was, or for above mastery and distinguished performance levels at kindergarten.

Data Analysis and Probability
K.5.1 – "Collect, organize, display, and interpret data using a pictograph and bar graph (with and

without technology)."
This is not developmentally appropriate. Beginning experiences in data collection should involve collecting real data, building physical graphs, and counting to analyze results. The suggestions in the Curriculum Focal Points for data analysis at kindergarten are on target; K.5.1 is not.

First Grade –
Number and Operations
1.1.3 – "Identify odd and even numbers to 20 and determine if a set of objects has an odd or even number of elements."
Reordering the words would put the emphasis on modeling and understanding what makes a number odd or even, which is where is should be at the first grade level. Many students can recite the even numbers to 20 if they can count by twos, but that is not the same as understanding why those numbers are even. Suggestion – "Determine if a set of objects has an odd or even number of elements and identify odd and even numbers to 20." The performance descriptors need some work. This would be a good place to use "explain" or "justify" rather than having students model or identify higher odd and even numbers at the above mastery and distinguished levels. The partial mastery and novice descriptors ask students to identify odd and even numbers. This seems more difficult than modeling odd and even numbers because it is less concrete, yet "model" is the verb used at mastery and above mastery.

1.1.4 – "Group and count manipulatives by ones, fives and tens to 100."
Kindergarten has grouping and counting by ones, fives, and tens. Fives has been added to the objective in first grade since the objectives were posted this summer. In my opinion, the purpose of this objective is to build understanding of place value, and therefore, fives does not belong. The intent is to help children connect counting a large group of objects to the base ten system; they form groups of ten and then tell how many objects are in the set by counting tens and ones. The first grade objectives include counting by fives under the algebra strand. The focus of 1.1.4 is connecting to place value. Suggestion – "Group manipulatives to count by tens and ones to 100."

1.1.9 – "Identify, name, and explain why a given part is a half, third, or fourth of a whole or part of a group, using concrete models."
Explaining why has been added to the objective since the summer, but it does not appear in the performance descriptors at any level. Is this something expected of all students? If we are following the Curriculum Focal Points, fractions do not appear at all until third grade, where the recommendation is "Understand and represent commonly used fractions, such as ¼, 1/3, and ½." Adding explaining why at first grade seems to be out of line with the NCTM document.

1.1.12 – "Quick recall of basic addition facts with sums to 10 and corresponding subtraction facts." The objective in use now reads, "Memorize basic addition facts with sums to 10 and corresponding subtraction facts." The objective on comment this summer read, "Demonstrate fluency with basic addition facts with sums to 10 and corresponding subtraction facts." There was a lot of discussion on this objective, as well as the related ones in second, third, and fourth grades about mastering basic facts. The committee was searching for a way to promote a more standards-based approach without giving up the recommendation that students develop the computational fluency that leads to success at higher grade levels in more complex computation and problem solving situations. In a traditional approach, basic facts are learned through rote practice leading (hopefully) to memorization. In a standards-based approach, basic addition and subtraction facts are learned through repeated practice

with composing and decomposing numbers and applying strategies like doubles, doubles plus one, comp!
lements of ten, etc. These strategies help students become mathematically powerful thinkers and lead to stronger mental math and estimation skills at all levels. I believe the objective must include some mention of strategies that promote number sense rather than rote memorization. If first graders become proficient in those strategies, then quick recall of all the single-digit addition and subtraction facts by the end of second grade is a realistic expectation. See the Curriculum Focal Points for first and second grades. Suggestion – "Develop and apply strategies that lead to quick recall of the basic addition facts to 10 and the related subtraction facts." It would be good if we could include some of those strategies in the objective with an e.g.

1.1.14 – "Create grade-appropriate picture and story problems using a variety of strategies (with and without technology), present solutions and justify results."
According to the Curriculum Focal Points, there should be a great deal of emphasis on representing addition and subtraction situations with a variety of models at the first grade level. They practice a variety of strategies in solving addition and subtraction problems. Strategies are methods for solving problems, not for creating them. Asking them to create problems using a variety of strategies doesn't make sense. Suggestion – "Represent and solve addition and subtraction story problems using a variety of strategies; present and justify solutions using pictures, numbers, or words."
Algebra
1.2.4 – "Create and analyze number patterns based on real-life situations using words, AB form, and T-charts and present results."
The objective did say, "Identify and represent number patterns using words, AB form, and T-charts." The emphasis on representation has been removed, and that was the focus of the objective – translating a pattern from one form to another. "Analyze and create" were the verbs used with repeating patterns and that is now in kindergarten (see K.2.2). Students at the above mastery and distinguished levels could create and analyze number patterns in addition to representing and identifying patterns. Suggestion – stick with "Identify and represent number pattern using words, AB form, and T-charts."

1.2.5 – "Use concrete materials to demonstrate that the quantities on both sides of a grade-appropriate number sentence are equivalent."
The performance descriptors call for students to demonstrate equivalency at the mastery level and to describe equivalency at the partial mastery level.
Demonstrating is more concrete than describing. If you demonstrate equivalency, it seems like that would be the same as proving it, which is what is called for at the above mastery level.

Geometry
1.3.1 – "Draw, label, and sort circle, rectangles including squares, triangles and according to sides and vertices."
The kindergarten objective (K.3.1) says, "Use physical materials to construct, identify, and classify basic geometric plane shapes: circles, ellipses (oval), rectangles including squares, and triangles." The kindergarten objective seems more challenging except for the sides and vertices. The word "describe" has been removed from the objective.
Suggestion – "Identify, sort, and draw circles, rectangles including squares, and triangles and describe according to sides and vertices." The performance descriptor at partial mastery uses "identify" while mastery calls for the student to "sort" shapes, which seems more difficult. How is label different from identify?

1.3.5 – "Create and describe simple symmetrical designs."
The objective was, "Identify and draw a line of symmetry." The new objective is quite a leap in difficulty. The current objective at fourth grade (4.3.6) reads "Draw a design with one line of symmetry." The Curriculum Focal Points at first grade call for composing and decomposing geometric shapes as a means of "developing a background ... of such properties as congruence and symmetry." The fourth grade recommendations include using transformations of basic shapes to create designs with symmetry. First graders could meet the proposed objective by folding and cutting paper, but does that mean they understand symmetry? As they stand now, there is nothing in the first grade performance descriptors about symmetry at all. Suggestion – either delete this objective and hold off on symmetry until higher grades, go back to "identify and draw a line of symmetry" or write performance descriptors that tell what the student is expected to do.

1.3.4 – "Draw and identify open and closed shapes and congruent plane shapes."
Suggestion – "Identify and draw open and closed shapes and congruent plane shapes" to reflect the order of difficulty of the two verbs.

1.3.7 – "Find and name locations on a first-quadrant grid."
Students need to find and name a square region in a simple coordinate grid system. Saying first quadrant is not really appropriate as it seems like you are talking about locations of points instead of regions (like finding A4 on a map). The coordinate point system is not introduced until third grade. Suggestion – "Find and name locations in a simple coordinate grid system."

1.3.8 – "Predict the result of combining or decomposing two or more two-dimensional /three dimensional shapes."
At the first grade level, describing the result of combining or decomposing shapes seems more appropriate than predicting. Describing and determining how they are alike and different is what is recommended in the Curriculum Focal Points for first grade. There is nothing about this objective in the performance descriptors at any performance level in first grade geometry.

Measurement –
1.4.2 – "Select appropriate units and tools to measure and compare two objects or events according to one or more of the following attributes:
length, height, weight, temperature, volume. Justify selection of units and tools used to measure the attributes and present results."
Selecting the appropriate unit of measurement is currently listed in the fourth and fifth grade measurement CSOs. If you are asking a first grader to choose between meters and pounds to measure an object's length, this is appropriate. If you are asking a first grader to choose between meters and centimeters, it is not. Height and length are the same attribute and don't need to be listed separately. Selecting appropriate units is mentioned in the Curriculum Focal Points for third and fourth grades, not in first grade.
There is nothing in the second grade about selecting appropriate units, another indication that this objective is out of sequence. The last sentence of the objective is unnecessary; presenting results doesn't make sense.

1.4.3 – "Use calendar to identify date, sequence of days of the week, and months of the year."
This is less rigorous than the objective we currently have for first grade.
Naming the days of the week is currently a kindergarten objective and is expected to be done without

using a calendar. Naming the months of the year is a first grade objective but it is expected to be done without using a calendar. Suggestion – leave the objective the way it is now: "Name the months of the year and find a date on a monthly calendar." Leave naming the days of the week in kindergarten.

1.4.6 – "Identify, count, and organize the following coins and bill to display a variety of price values from real-life examples with a total value of 100 cents or less: penny, nickel, dime, quarter, dollar bill."
Two objectives have been combined and a third one on money has been eliminated. These changes have altered the intent of the objective. The current objectives ask kindergarten students to identify the name and value of the penny, nickel, and dime. First graders added the quarter and dollar and were asked to count and trade pennies, nickels, and dimes. This was plenty for first grade. Many students struggle with counting money, but it was a realistic objective. Throwing in counting a collection of coins including quarters makes it more difficult; this is currently in second grade and is one of the more challenging objectives for many children.
Trading coins for other coins of equivalent value was taken out of the first grade objective, and this is a critical step in mastering both counting a collection of coins and in making change. In addition, the performance descriptors do not match the objective – the mastery level calls for making change from a dollar. This is currently !
in second grade and needs to stay there. Ask any second grade teacher – this is difficult for most students and takes lots of practice to master by the end of the year. Making change requires a deeper level of understanding than counting a collection of coins. Counting coins needs to be mastered first. Suggestion – leave 1.4.7 and 1.4.8 the way they are written now.
(1.4.7 – Identify and model the value of quarter and dollar. 1.4.8 – Count and trade a collection of pennies, nickels, and dimes with a total value of 100 cents or less.) The current objective 1.4.9 regarding making change up to a dime could be eliminated so students would not have to begin making change until second grade. I could not find anything at all on money skills in the Curriculum Focal Points.

Data Analysis and Probability
1.5.2 – "Conduct simple experiments, record data on a tally chart or table and use the data to predict which of the events is more likely or less likely to occur if the experiment is repeated."
This objective sounds almost exactly the same as K.5.2. It seems more appropriate for first grade. Tally marks are more commonly used to record data or to keep count than as a part of a probability experiment. As they read now, tally marks are never mentioned in the performance descriptors at first grade. Predicting the likelihood of an event is not mentioned in the Curriculum Focal Points until seventh grade.

Second Grade
Number and Operations
2.1.2 – "Identify any number as odd or even and determine if a set has an odd or even number of elements."
Determining if a set of objects has an odd or even number of elements is more of a first grade skill. This would be a good place to use a word like justify or explain. The goal is for students to demonstrate understanding of the concept of odd and even, and to apply that understanding to any number.
It would not be necessary to use objects to model the number, nor would it be satisfactory to merely state that the number ends with 2,4,6,8 or 0 if it is even.

2.1.3 – "Count and group concrete manipulatives by ones, tens, and hundreds to 1,000."
Suggestion – "Group manipulatives to count by ones, tens, and hundreds to 1000."

2.1.13 – "Create story problems that require one or two-step procedures, using a variety of strategies explain the reasoning used, justify the procedures selected, and present the results."
This is really wordy. If you solve the problem, you present results. If you explain the reasoning used, you have justified the procedures selected.
Creating story problems seems like it belongs at the above mastery or distinguished level. If it's in the objective, then it's expected at mastery level. If second graders can solve one or two-step problems and justify their solutions verbally or in writing, that would be plenty to expect at the mastery level.

2.1.10 – "Model 2- and 3-digit addition and subtraction with regrouping."
2.1.11 – "Add and subtract 2- and 3-digit numbers without regrouping."
The performance descriptor at mastery level says students model addition and subtraction with and without regrouping. These need to be separated.
Modeling problems that do not involve regrouping is on first grade level; all second graders should be able to add and subtract 2- and 3-digit numbers when regrouping is not required (pencil/paper computation). Modeling problems that involve regrouping is mastery level at second grade. Pencil/paper computation is not at mastery level until third grade.
Objective 2.1.10 could be strengthened and more aligned with a standards-based approach by changing it to say something like, "Develop and apply multiple strategies for solving 2- and 3-digit addition and subtraction problems with regrouping (e.g., using place value models, the hundred chart, number lines)."

Algebra
2.2.2 – "Explain how one variable produces a change in another variable."
The meaning of this objective is not clear. There is nothing in the performance descriptors on this objective. What is it the student is expected to do to demonstrate mastery? There is nothing in the current CSOs on variables until third grade. There is nothing in the Curriculum Focal Points on variables at second grade. The Curriculum Focal Points (page 31) at seventh grade call for students to, "Investigate how a change in one variable relates to a change in a second variable." This objective is inappropriate for second grade.

This objective replaces, "Given an input/output model, determine the rule, input, or output." There was a deliberate inclusion of input/output at each grade level from first through fifth with a progression to more difficult skills at each succeeding grade. Second graders at mastery level were expected to give the input when the output is known. This "backwards thinking" is the new part of the objective at that level; it is not at mastery level in first grade. Suggestion – go back to what 2.2.2 said, "Given an input/output model, determine the rule, input, or output."

2.2.3 – "Identify, complete, and extend a variety of counting patterns, according to a given rule."
If you identify the counting pattern, you are identifying the rule. There is no point asking students to identify a rule that is given. If you complete or extend the counting pattern, you are applying the rule. The rule does not have to be given; giving the rule decreases the rigor of the objective.
Suggestion – either take out "identify" at the beginning of the sentence or take out "according to a given rule" at the end of the sentence.

2.2.4 – "Create physical models to demonstrate equivalency of two numerical expressions written as a grade-appropriate number sentence."
"Create" is not a sensible verb here; "use" would be more appropriate. There is nothing in the performance descriptors at novice, partial mastery, or mastery level on this objective. Including an example might be helpful here to help differentiate this objective from the one in first grade. First graders need to model equivalency of something like 11 = 4 + 7 while second graders model something like 4 + 7 = 9 + 2.

Geometry
The performance descriptors have a few problems. I'm not sure what the difference is between "recognize" and "identify" but these verbs are used to distinguish novice, partial mastery, and mastery in regard to similar shapes, line segments, and angles.

There is nothing in the performance descriptors at all about 2.3.5, "Plot and describe the path between locations on a grid."

There is a typo in the above mastery performance descriptor. It says, "...compare and contract..." instead of "...compare and contrast..."

2.3.6 – "Identify similar shapes."
The above mastery and distinguished levels call for students to create similar shapes and justify why they are similar. Similarity involves proportional reasoning; having students recognize or identify similar shapes is plenty difficult for second graders. Creating similar shapes is a fifth grade objective.

Measurement
2.4.2 – There is a typo in the objective. Take out "a" before "perimeter of a squares, rectangles..."

2.4.7 – "Identify, count, and organize coins and bills to display a variety of price values from real-life examples with a total value of one dollar or less and model making change using manipulatives." This objective replaces two objectives, one on counting coins and one on making change. The verbs "read" and "write" have also been removed. Learning to use dollars-and-cents notation is a second grade skill. The proposed change in first grade puts counting coins, including quarters, up to a dollar there instead of in second. Counting coins and making change are two different skills and would be better kept as two objectives. Making change is more difficult and is one of the hardest skills for second graders to master. There was a gradual progression of difficulty that was built into the proposed objectives before; these latest changes undo the effort to provide that scaffolding for students. The objective as proposed is also unnecessarily wordy. Suggestion – go back to two separate objectives. The wording could be changed without changing the meaning by saying, "Read, write, and use coins to represent a variety of price values up to one dollar." and "Use coins to model maki!
ng change up to a dollar."

In the proposed performance descriptors, the novice level says students "count coins to $1.00." That is a mastery level skill. Partial mastery calls for the student to "explain the relationship between coins." This is easier than what is at the novice level. Many students can tell you that it takes two nickels to make a dime but cannot count a quarter, a dime, and two nickels together.

Data Analysis and Probability

2.5.1 – "Create, read, and interpret a pictograph with each picture representing greater than or equal to a single unit."
The performance descriptor at partial mastery and/or novice should say something about reading and interpreting a pictograph with each picture representing a single unit. Most students can do that; it's when the picture stands for 2 or 5 or 10 that it becomes more difficult.

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."
Predicting is only mentioned at the distinguished level. If it's in the objective, is it not an expectation at mastery level? Or go with the Curriculum Focal Points, which call for predicting the likelihood of an event at seventh grade.

Veronica Barron

From:	sbarrett@mountain.net
Sent:	Monday, October 30, 2006 4:56 PM
To:	cljwilli@access.k12.wv.us
Cc:	llmaynus@access.k12.wv.us; sbarrett@mountain.net
Subject:	K-2 CSOs
Attachments:	Comments on the K-2 CSOs and PDs 10-24-06.doc

Comments on the K-2 CSOs and P...

I am attaching my comments on the proposed K-2 CSOs in mathematics. My comments are lengthy, and I have spent too many hours working on this to take the chance that the online comment form won't get all of this to you.

I mean no disrespect to the people who were involved in the latest revision of the CSOs. I understand that fresh eyes can add a new perspective to the tedious process of writing and revising objectives. Many of the proposed changes are improvements. However, I have serious reservations about several of the revisions in the latest version. Perhaps if somebody who worked on the last draft was present when the rewrite was done, the number of items in the objectives and performance descriptors that are out of line would not be as great. I know that it is critical that these objectives and descriptors be as good as they can possibly be, as new assessments will be based on them, teachers will adjust their teaching to meet them, and we will have to live with what they say for several years.

With 28 years of teaching elementary math at K-6, experience on writing two rounds of CSOs and PDs, developing the IMA for second grade, membership on the Math Task Force and the WV Elementary Math Cadre, and numerous presentations on standards-based math in counties and schools around the state, I feel that I have the necessary background to stand behind these comments. But I am one teacher and this is a huge project, one that is surely worthy of discussion before it becomes official policy. I hope that there will be a forum for discussion with practicing elementary teachers before these objectives are finalized.

I referred to the NCTM Curriculum Focal Points in framing my comments. I believe in increasing the rigor of our CSOs, but I think we need to be guided by common sense and by what is developmentally appropriate for our students.

I am still working on comments on the proposed CSOs for grades 3-5. I will get those to you some time in the next three days.

Susan Barrett

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Monday, October 30, 2006 11:07 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-30 11:07:26)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
#

Name: Margaret K. Sine
Organization: Wetzel County Schools
Email: mksine@access.k12.wv.us
Title: Principal
Address1: 510 N. Second Ave.
Address2:
City/State/Zip: Paden City, WV 26159
Role: Principal
Posted: 2006-10-30 11:07:26
Posted from IP: 168.216.129.17

Comments for section 126-44B-1 General

The format of the document is easy to use. The performance descriptors clearly define the skills expected for those students who score above the basic mastery level--particluly beneficial to those who have been focusing on the basic objectives.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Monday, October 30, 2006 6:49 AM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-10-30 06:49:05)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Pattie Cowan
Organization:
Email: pacowanis@comcast.net
Title: Teacher
Address1: 84 Bancroft Way
Address2:
City/State/Zip: Weirton, WV 26062
Role: Teacher
Posted: 2006-10-30 06:49:05
Posted from IP: 67.163.214.194

Comments for section 126-44B-1 General

Carla & Lou,
Good morning! I have been busy reviewing the CSO's. I have completed grades K-2. I don't know if I will have time to review 3-5. I have begun typing my possible revisions for Number & Operations K-1. I will continue when I get home from work today. I do have some concerns and questions about the Performance Descriptors. I have reviewed them, too. During summer training sessions with teachers, I have discovered that most teachers have not been using the Performance Descriptors because they don't understand how to use them. They have been assessing children similar to the Reading Assessment-by the number of problems the children get correct, rather than the actual performance of the task. My question-" Will the children be given a performance descriptor for each objective or will they be given a performance descriptor for each content standard? I will send you my comments for the Performance Descriptors, too.

Thank you for asking for my input.
Pattie Cowan

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Number and Operations

M.O.K.1.2 read, write, order, and compare numbers to 20 using multiple strategies(e.g. manipulatives, number line).

Change the word strategies to representations.

An important representation is to use models and pictures, draw lines to show one-to one correspondence.

M.O.K.1.10 create grade-appropriate picture and story problems......

Kindergarten should be modeling picture and story problems at the Mastery level. Creating would be above mastery or distinguished at this level.

M.O.1.1.2 read, write, order, and compare numbers to 100 using multiple strategies(e.g. manipulatives, number line, symbols).

Change the word strategies to representations.
Add one-to-one correspondence with pictures in the e.g.
Specify symbols-greater than, less than.

M.O.1.1.3 identify odd and even numbers to 20 and determine if a set of objects has an odd or even number of elements.

The children need to model first to help identify at this level.

M.O.1.1.4 group and count manipulatives by ones, fives, and tens to 100.

Objective should read -group to count manipulatives in tens and ones to 100.

M.O.1.1.11 model operations, addition and subtraction...

Should read-model meanings of operations ...

M.O.1.1.12 quick recall of basic addition facts with sums to 10 and corresponding subtraction facts.

The Curriculum Focal Points in Number and Operations states:Developing understandings of addition and subtraction and strategies for basic addition facts and related subtraction facts. I think developing strategies is vital in this objective. (e.g.modeling "part-whole", adding 0, plus 1, plus 2, doubles, making tens, -0, -1, -2)

M.O.1.1.14 create grade-appropriate picture and story problems...
Before the children can create problems, they first must model, draw,and solve grade-appropriate picture and story problems. Maybe the objective could read- draw, solve, and create...

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Sunday, October 29, 2006 2:24 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-29 14:23:35)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Rhonda M. Jelich
Organization: Clay Elementary School
Email: rjelich@access.k12.wv.us
Title: Assistant Principal/Curriculum Coordinator
Address1: po Box 600
Address2:
City/State/Zip: Clay, West Virginia 25043
Role: Principal
Posted: 2006-10-29 14:23:35
Posted from IP: 65.54.154.116

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

These standards are not teacher friendly. Too many objectives have been combined to make a large objective, that includes too much information.
Simply removing objectives would have been better than combining objectives.

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Friday, October 27, 2006 6:41 PM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-10-27 18:41:26)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Sandy
Organization:
Email: droop1982@yahoo.com
Title:
Address1:
Address2:
City/State/Zip: ,
Role: Parent-Family
Posted: 2006-10-27 18:41:26
Posted from IP: 170.215.151.250

Comments for section 126-44B-1 General

I am the parent of a ninth grade student who did not have standards-based math, and a fifth grade student who started standards based math last year.
I am totally against standards based math. Parents do not understand it, older children do not understand it, most teachers do not understand it. It is very hard to find anyone to help students,(even hiring a tutor) because all you hear is I don't know how you do standards-based math. This is very fustrating as a parent, as I know for my son it is frustrating to the children. I think that had this been implemented in kindergarten it is possible that it may have been ok, but not to change them over in the middle. The children in my son's grade do not even know their multiplication tables or how to do division. These to me are things they will use in everyday life, not the thing that they are doing now. I think that it is sad that children are left behind to implement new standards or techniques. It is sad that you can f!
ind now help for your children.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, October 27, 2006 12:48 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-27 12:47:36)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Joan Ann Schneider
Organization:
Email:
Title:
Address1:
Address2:
City/State/Zip: Fairmont, wv 26354
Role: Teacher
Posted: 2006-10-27 12:47:36
Posted from IP: 168.216.132.36

Comments for section 126-44B-1 General

We have used the mapper for three years. I understand the readoning behind its institution. I, just, don't agree that it works! Some people will try hard to do what is expected exactly as it should be done. Others will shortcut the system. Neither of these types of people make any difference! Students have always been from various backgrounds. Some are encouraged to excell, others are not. The seed to want to learn comes from parenting, while educators water and nourish causing the desire to be fulfilled. I love education and being an educator! I look for "the few"
who really want to learn and try my best to help them. Accomplishing this becomes evermore difficult with discipline issues, special education needs, parents overshadowing our every move, an everincreasing demand on the educators time. West Virginia is a wonderful place to live and work. I just wish someone, somewhere would give teaching and teachers the respect we deserve. Large sums of money are sent!
in all sorts of directions within the educational fields, but not sent to the people who make all the "miracles" bhappen. I have taught junior-high for the past twenty-five years, or more. We are always left out,ie: class size, backing and authority to handle discipline problems, pay increases for all teachers. We are certainly not left out when it comes to expecting more and more work out of us. We are blamed and accused of "not being good teachers" when students fail. I get tired of the blame. Try rewarding and appreciating the many unpaid hours I have given in the twenty-eight

years I have taught. Curriculum Mapper is a waste of time! I don't have time to waste! I have a job to do! I deserve to be paid at the same rate as others in the nation doing what I do, not be ranked at the bottom of the list. You want to see "test scores" improve? Start by improving the morale of educators! Pay us a respectable wage, give us the respect we deserve.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools
----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Wednesday, October 25, 2006 6:59 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-25 06:58:37)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
#
Name: Jacquie McPeake
Organization: WWHS
Email: jmcpeake@access.k12.wv.us
Title:
Address1: PO Box 147
Address2:
City/State/Zip: Piney View, WV 25906
Role: Principal
Posted: 2006-10-25 06:58:37
Posted from IP: 168.216.80.254

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----
I do not see Calculus or AP Calculus. I wonder if we should include other courses due to our increasing standards. Maybe an Algebra III, College Preparation Class, and maybe a General Mathematics(checkbook, interest, budgets, stocks, investments).

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Tuesday, October 24, 2006 4:49 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-24 16:49:19)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Beverly Eye
Organization: Pendleton County High School
Email: beye@access.k12.wv.us
Title: Mathmetics teacher
Address1: P.O. Box 40
Address2: 147 Maple Avenue
City/State/Zip: Franklin, WV 26807
Role: Teacher
Posted: 2006-10-24 16:49:19
Posted from IP: 168.216.225.188

Comments for section 126-44B-1 General

I see a need for an Algebra III class for students who have taken Algebra I during their 8th grade. Not all of these students will want to take a precal class their senior year and may opt to not even take a math class that year. I know that there are some schools in the state who are offering Algebra III. I have also heard that colleges are really wanting students to be very good with their algebra skills. Would you please send me a copy of the CSOs that they are using.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, October 06, 2006 10:12 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-06 10:11:59)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Beverly Hilpert
Organization: Weir High School
Email: bhilpert@access.k12.wv.us
Title: Teacher
Address1: Weir High School
Address2: Red Rider Rd.
City/State/Zip: Weirton, WV 26062
Role: Teacher
Posted: 2006-10-06 10:11:59
Posted from IP: 168.216.136.119

Comments for section 126-44B-1 General

Alg. I for 85% of 8th grade students is unrealistic. A select group can be successful at that grade level, but most cannot. Alg/Geom prep is necessary for some students as a bridge between middle school and Applied Math I,II.
Consumer math should be a requirement for all students. Requiring all students to have 4 math courses above Alg I is unrealistic and in many cases, unnecessary.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Tuesday, October 10, 2006 11:57 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-10 11:56:40)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: Kim Snider
Organization: Weir High
Email: kesnider@access.k12.wv.us
Title: Math Teacher
Address1: 100 Red Rider Rd
Address2:
City/State/Zip: Weirton, WV 26047
Role: Teacher
Posted: 2006-10-10 11:56:40
Posted from IP: 168.216.235.138

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

There is no way you can expect these students to pass Alg 1 in 8th grade unless their basic skills are improved in the elementary schools. Several of our students wouldn't make it through their math classes if it weren't for being able to take the Applied 1 and 2, or even waiting till they are freshmen to take Alg 1.

Please really think this change through.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, October 12, 2006 10:30 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-12 10:30:04)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
#
Name: Amanda Shrewsbury
Organization:
Email: abshrews@access.k12.wv.us
Title: Teacher
Address1: PikeView High School
Address2: 3566 Eads Mill Road
City/State/Zip: Princeton, WV 24740
Role: Teacher
Posted: 2006-10-12 10:30:04
Posted from IP: 168.216.25.249

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----
I know that for many people, the cognitive level that is abstract NEVER develops. I don't understand why anyone would set so many students back by making standards once met in college, met in the 8th grade. And, even if we set aside the people who never will develop the capability, there are those that do not develop it until their 18th or 19th birthday. Setting this many people up to fail be making algebra in 8th grade mandatory may look good on paper, but will not be effective.

We are trying to decrease dropout rates also. Kids get so discouraged when they cannot complete a task. Earlier required Algebra will not effect the kids who can do - it will cause the ones who can't to look more seriously at dropping out.

I am very dissapointed at even the mention of 8th grade Algebra. To me, it shows a disconnect between teachers, students, and the powers that be.

Please look at the data once more. 8th grade Algebra that is required does not make good sense.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, October 12, 2006 11:44 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-12 11:44:03)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
#
Name: Gregory Miller
Organization: Mingo Co. Schools
Email: gsmiller@access.k12.wv.us
Title: Mathematics Facilitator, 7-12
Address1: Rt. 2 Box 310
Address2:
City/State/Zip: Williamson, wv 25661
Role: Professional Support
Posted: 2006-10-12 11:44:03
Posted from IP: 168.216.81.251

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

The Algebra I CSOs are more vibrant than in the previous version. The use of analysis, synthesis, and evaluation in the CSO's show more rigor and relevance. The verbage needs to be cleaned up though. Some of the changes look like an afterthought. For example: M.O.A1.2.7, M.O.A1.2.14, M.O.A1.2.18, and M.O.A1.2.3.

The rest of the CSOs are not as far-reaching as those for Algebra I. Some more effort to deepen them would strengthen the document.

The other issue is the lack of CSOs for courses listed in the new Policy 2510. A course exists called "College Transistion Mathematics" under "Electives Required To Be Offered" effective 1 July 2008. There are no CSOs for that course. Under optional electives, there are CSOs for some but not others. CSOs exist for Conceptual Mathematics and Prob/Stat, but not for Alg/Geo Prep, Calculus, and Integrated Math I-IV. Consistency needs to occur. Either all the courses need to have approved CSOs or none.

Finally, some part of the document needs to address the standards and objectives contained on the 10th grade version of the WESTEST.

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, October 12, 2006 3:54 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-12 15:54:22)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
##
###############
#
Name: richard burdiss
Organization: parkersburg south H.S.
Email: rcbxenon@1st.net
Title: teacher
Address1: 10101 state route 550
Address2:
City/State/Zip: vincent , oh 45784
Role: Teacher
Posted: 2006-10-12 15:54:22
Posted from IP: 168.216.74.203

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----
I think it will be for the good of the students to take more mathematics above the level of Algebra.

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Friday, October 13, 2006 12:35 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-13 12:35:00)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: SUE SADOSKI
Organization: MARSHALL COUNTY SCHOOLS
Email: PREMIERMATHMOM@COMCAST.NET
Title: MATHEMATICS TEACHER
Address1: RR 5 BOX 140D
Address2:
City/State/Zip: MOUNDSVILLE, WV 26041
Role: Teacher
Posted: 2006-10-13 12:35:00
Posted from IP: 168.216.158.93

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

I don't understand why we would eliminate the lower level courses that help prepare students for the higher level courses. Not all students are capable of mastering Algebra 1 at the ninth grade level. We are only setting these kids up for failure!

Veronica Barron

From:	Nobody [nobody@wvde.state.wv.us]
Sent:	Monday, October 23, 2006 9:33 AM
To:	fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject:	Comment Received for Policy 2520.2 (2006-10-23 09:32:45)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Paula Taylor
Organization: Kanawha County Schools
Email: ptaylor@schs.kana.k12.wv.us
Title: teacher
Address1: 1 Eagle Way
Address2:
City/State/Zip: S. Chas., WV 25309
Role: Teacher
Posted: 2006-10-23 09:32:45
Posted from IP: 168.216.57.92

Comments for section 126-44B-1 General

I think algebra 1 needs to be taught at the middle schools, but, my concern is that Pre-algebra is being de-emphasized. For students who are not mature enough for the abstract algebra course, pre-algebra is a great transition course. It gives students an algebra foundation to be successful in algebra. It also gives students a graduation credit as many struggle to complete 3 credits - algebra 1 and one higher in math. We have students who must repeat algebra 1 and geometry. They are seniors taking geometry.
Without pre-algebra, they would not be able to graduate.
I am a proponent of calculator use, but there are still basics our students need ot know - lining up decimal places, how to get common denominators, factors, rules for integer operations. When they get to algebra, trig, precal, and calculus, many problems require basic math knowledge and are in variables that can't be put into a calculator.
Knowing the "HOW" of mathemaitcs is part of the deeper understanding we are searching for in higher order thinkingand in standards based curriculum

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives

---

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

---

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Monday, October 23, 2006 9:23 AM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-23 09:22:52)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: M. Jane Merendino
Organization: Fairmont State university
Email: mmerendino@fairmontstate.edu
Title: teaching fellow
Address1: 10 diana dr
Address2: 1201 Locust ave
City/State/Zip: Fairmont, WV 26554
Role: Teacher
Posted: 2006-10-23 09:22:52
Posted from IP: 129.71.73.254

Comments for section 126-44B-1 General

I have just returned from the National Council of Teachers' of Mathematics Conference in Atlantic City. I was privileged to attend a luncheon in which Randy Charles , one of the authors of NCTM latest documents Focal Points, was the speaker. I also had an hour to talk with Skip Fennell, NCTM President and Jim Rubillo Executive Director. I told them about our process in WV of revising and increasing the rigor of our math standards.
It appears we are right in line with what they are proposing as good standards. However, we have room for improvement and I believe now is the time to do this. When I was on the revision team we had a deadline to complete the document and the team I worked with spent many hours discussing issues about importance of certain skills and concepts. I remember asking if we could bold face some of the objectives. This new document, Focal Points, does just that. In the words of Skip " it is going to take a lot of courage for one state to take a !
stand and say we don't need probability in the first grade" . If we compare our grade level content to that of Singapore or Japan or China you will see no reference to much of the content we have in their elementary course content. Our elementary students carry around a 600 page text and many of our teachers believe they must cover every page. I have seen this as I go into classrooms across my county to work with student teachers. It is time to stop this covering the text and get to uncovering the math. I believe, and much research supports, that if we could narrow our course content in the

elementary level and zero in on great professional development for teachers , provide them with embedded professional development in their classrooms on content knowledge and student learning, the achievement of our students would soar. What is needed is a balanced approach. I know Lou Maynus has asked us to read the Focal Points document.
I hope we have a chance to incorporate t!
he message of that document into our CSOS.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools
----

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Monday, October 23, 2006 2:51 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-23 14:50:47)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
###############
#
Name: Rosa Southall
Organization: Kanawha County
Email: rsouthall@kcs.kana.k12.wv.us
Title: Title I Math Specialist
Address1:
Address2: Edison Bldg. 122 3rd Ave.
City/State/Zip: South Charleston, W.V. 25303-1434
Role: Professional Support
Posted: 2006-10-23 14:50:47
Posted from IP: 168.216.103.112

Comments for section 126-44B-1 General

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----

Thanks for consolidating some of the CSO's. The wording change doesn't matter but some of the phrases are a little wording and may cause some concern on interpretation. Thanks for the opportunity to comment

Veronica Barron

From: Nobody [nobody@wvde.state.wv.us]
Sent: Thursday, October 05, 2006 7:19 PM
To: fibanez@wvde.state.wv.us; cljwilli@access.k12.wv.us
Subject: Comment Received for Policy 2520.2 (2006-10-05 19:18:38)

Please save this email in a "Comments Received Online" folder.
Your folder will be a backup. All comments are saved in our database.
The Complete Comments Report from the database can be found here:
http://129.71.2.32/r.html?id=161a6377deabd130653b46da6f301d35
This is an encrypted URL. Please Bookmark it.

Comment Received for Policy 2520.2
###
#
Name: Paula Taylor
Organization: KAnawha County Schools
Email: ptaylor@schs.kana.k12.wv.us
Title: High school math teacher
Address1: 663 Forest Circle
Address2:
City/State/Zip: So. Charleston, WV 25303
Role: Teacher
Posted: 2006-10-05 19:18:38
Posted from IP: 75.108.229.191

Comments for section 126-44B-1 General

The Algebra II Content Standards do not include operatons with rational expresions and equations with rational expressions.
Example: (x^2 - 9)/(x-3) + 4/ (2x-6) I feel this is an important part of the Algebra II curriculum in preparing students for trig and precalculus.

Comments for section 126-44B-2 Purpose

Comments for section 126-44B-3 Incorporation by Reference

Comments for section 126-44B-4 Summary of the Content Standards and Objectives
----

Comments for section 126-44B 21st Century Mathematics Content Standards and Objectives for West Virginia Schools

----