

**WEST VIRGINIA**  
**SECRETARY OF STATE**  
**KEN HECHLER**  
**ADMINISTRATIVE LAW DIVISION**

Form #2

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OFFICE OF WEST VIRGINIA  
SECRETARY OF STATE

**NOTICE OF A COMMENT PERIOD ON A PROPOSED RULE**

AGENCY: West Virginia Board of Education TITLE NUMBER: 126

RULE TYPE: Procedural; CITE AUTHORITY W. Va. Code 18-2-5

AMENDMENT TO AN EXISTING RULE: YES  NO

IF YES, SERIES NUMBER OF RULE BEING AMENDED: 44 C (Policy 2520.02)

TITLE OF RULE BEING AMENDED: Criteria of Excellence; Instructional Goals and Objectives For Mathematics

IF NO, SERIES NUMBER OF NEW RULE BEING PROPOSED: \_\_\_\_\_

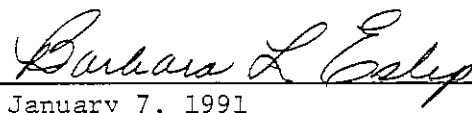
TITLE OF RULE BEING PROPOSED: \_\_\_\_\_

IN LIEU OF A PUBLIC HEARING, A COMMENT PERIOD HAS BEEN ESTABLISHED DURING WHICH ANY INTERESTED PERSON MAY SEND COMMENTS CONCERNING THESE PROPOSED RULES. THIS COMMENT PERIOD WILL END ON February 19, 1991 AT 9:00 a.m.

ONLY WRITTEN COMMENTS WILL BE ACCEPTED AND ARE TO BE MAILED TO THE FOLLOWING ADDRESS.

Bureau of General, Special and Professional Education  
Room B-318, Bldg. #6  
Capitol Complex  
Charleston, WV 25305

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

  
January 7, 1991

ATTACH A **BRIEF** SUMMARY OF YOUR PROPOSAL

FISCAL NOTE WORKSHEET

HD NO \_\_\_\_\_ DRAFT NO \_\_\_\_\_ BILL NO \_\_\_\_\_ RESOLUTION NO \_\_\_\_\_

SUBJECT Mathematics Instructional Objectives Goals and FUND \_\_\_\_\_

SOURCE OF REVENUE:  GENERAL  SPECIAL  OTHER (SPECIFY) \_\_\_\_\_

COST 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 AND ITEM 3 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 EXPENSE					
REPAIRS AND ALTERATIONS					
EQUIPMENT					
OTHER					
2. ESTIMATED TOTAL REVENUES	\$ -0-	\$ -0-	\$ -0-	\$ -0-	\$ -0-

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

IMPACTS  
FISCAL:

STATE STAFF: Instructional Improvement Unit, Office of General Education

DATE

AGENCY

AUTHORIZED REPRESENTATIVE

\_\_\_\_\_

TITLE 126  
PROCEDURAL RULE  
WEST VIRGINIA BOARD OF EDUCATION  
CHAPTER 18-2  
Series 44C  
(Policy 2520.02)

TITLE: Criteria of Excellence: Instructional Goals And Objectives For Mathematics

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Section 1 General

1.1 Scope - The State Board of Education recognizes that curricular programs in the public schools should be current, sequenced to build upon prior learning, and appropriate to the developmental needs of the learner.

1.2 Authority - West Virginia Code 18-2-5

1.3 Filing Date -

1.4 Effective Date -

1.5 Repeal of Former Rule - Procedural Rule 2422.01

Section 2 Instructional Goals

To operationalize the principles of excellence and equity, the Department of Education will develop and the State Board will approve instructional goals for each program of study prior to the adoption of textbooks. Instructional goals are comprehensive statements describing components crucial to the mastery of knowledge, skills, attitudes, and behaviors in individual programs of study.

Section 3 Instructional Objectives

The Department of Education will derive instructional objectives from approved goal statements. These instructional objectives will further define the knowledge, skills, attitudes, and behaviors so that learners may have the opportunity to develop in each program of study, thus providing both direction/uniformity to local school districts and the desired flexibility to use the instructional objectives appropriate to the specific needs of the district.

Section 4 Program Assurances

The Department of Education will consider instructional goals and objectives in the selection and adoption of textbooks and statewide student evaluation instruments.

Section 5 Professional Preparation Programs

Professional preparation programs and evaluation systems will be developed and implemented in a manner that (1) addresses the programs of study through approved instructional goals and recommended instructional objectives, and (2) the knowledge and skills required to successfully assist students in mastering those goals.

Section 6 Requirements for Local School Districts

The Board shall require local school districts, following adoption of the Program of Study: Instructional Goals, to: (1) review and revise county curriculum guides to include, but not be limited to, the state Program of Studies: Instructional Goals; (2) develop criteria from the newly adopted program for use in the selection of textbooks; and (3) provide direction to instructional staff to implement the adopted Program of Studies: Instructional Goals.

Section 7 Guidelines and Technical Assistance

Finally, the Department of Education will develop guidelines and provide technical assistance and leadership programs related to the implementation of this policy.

INSTRUCTIONAL GOALS: MATHEMATICS PROGRAM OF STUDY  
Proposed Regulations 2520.02

MATHEMATICS PROGRAM OF STUDY

INSTRUCTIONAL GOALS

Early Childhood Education

(Grades K - 4)

**Area of Study: Mathematics**

Changes in a technological society demand that the study of mathematics empowers students to be independent problem solvers. Research shows that students best acquire these skills through active involvement with concrete materials at all levels. The K-4 mathematics curriculum reflects this.

The curriculum has been structured with a knowledge that students acquire skills over an extended period of time based on their experiences. Therefore, it has not been developed simply for paper and pencil mastery by grade level, but rather through active learning using concrete materials, manipulatives, calculators, and computers. At every level it is imperative that students model or demonstrate concepts with concrete materials before putting pencil to paper. Success demands high expectations of all students.

The goal of the Mathematics Program of study in Early Childhood is that students will become mathematically literate so that they will become productive citizens in our society. The local school district shall therefore provide learners multiple opportunities through appropriate activities which develop the ability to:

Mathematics as Problem Solving

- Use mathematics as a tool to solve problems;
- Incorporate the problem solving process as the focus of all instruction.

Mathematics as Communication

- Clarify students' understanding through reading, writing, speaking, and listening;
- Make mathematics meaningful to themselves and to others.

### Mathematics as Reasoning

- Recognize reasoning as a process that can grow out of every mathematical activity;
- Learn to justify the thinking process;
- Learn that mathematics makes sense.

### Mathematical Connections

- Engage in tasks that help the student make and use connections across mathematical topics;
- Engage in tasks that help the student make connections between mathematics and other disciplines;
- Engage in tasks that help the student make connections to daily living.

### Estimation

- Use good judgment to identify reasonable results;
- Use logical reasoning to make decisions in daily life.

### Number Sense and Numeration

- Link number sense and numeration to concrete materials;
- Manipulate materials to link the students' world and the world of mathematics.

### Concept of Whole Number Operations

- Apply operations meaningfully and with flexibility;
- Make mathematical connections between language, symbols, and operations.

### Whole Number Computation

- Solve problems using physical materials or model procedures;
- Link the manipulation of materials to the steps of the procedures which accompany mastery of basic facts and development of algorithms;
- Understand the relevance of math computations to daily life situations.

### Geometry and Spatial Sense

- Represent and describe in an orderly manner the three-dimensional world in which we live;
- Gain an intuitive feel for one's surroundings and the objects in them.

### Measurement

- Select the appropriate unit of measurement;
- Compare the estimate to the actual measurement.

### Statistics and Probability

- Collect, organize, describe, display, and interpret data;
- Use data to make decisions and predictions.

### Fractions and Decimals

- Use models to see the relationships between fractions, decimals, and whole numbers;
- Use fractions and decimals to describe real life situations.

### Patterns and Relationships

- Understand the connections among mathematical topics through relationships and patterns in numbers, geometry, and measurement;
- Understand how mathematics applies to the world in which the student lives through relationships and patterns in numbers, geometry, and measurement.

Instructional Goals: Mathematics Program of Study  
Proposed Regulations 2520.02

MATHEMATICS PROGRAM OF STUDY

INSTRUCTIONAL GOALS

Middle Childhood Education

(Grades 5 - 8)

Area of Study: Mathematics

The mission of the mathematics program of study in middle childhood is to lead students in understanding and appreciating mathematics as a coherent body of knowledge rather than a vast collection of isolated facts and rules. The students' knowledge of numbers, computation, estimation, measurement, geometry, statistics and probability, patterns and functions, and fundamental algebra should be expanded. This must concurrently involve parents, teachers, administrators, and the community. Toward this end, school districts shall provide learners with multiple opportunities to:

Mathematics as Problem Solving

- Engage in experiences with problem solving as methods of inquiry and application;
- Solve mathematical problems that require the learner to work cooperatively and to use technology;
- Address relevant mathematical ideas;
- Experience the power and usefulness of mathematics.

Mathematics as Communications

- Use mathematical language to communicate mathematical ideas;
- Explain, conjecture and defend ideas orally and in writing;
- Develop a deeper understanding of mathematical concepts and principles;
- Work in small group and cooperative explorations in order to maximize active involvement in discussion, questioning, clarification, and summarization of problems;
- Communicate complex thoughts and information in a concise and precise manner.

### Mathematics as Reasoning

- Engage in experiences that develop mathematical reasoning abilities;
- Use mathematical reasoning as a powerful way to make sense of the world.

### Mathematical Connections

- Observe the interaction and connection of mathematics with other school subjects and with everyday society;
- Illustrate the usefulness of mathematics in solving problems which describe and model real-world phenomena.

### Number and Number Relationships

- Engage in experiences which lead to a lasting sense of number and number relations;
- Develop concepts of fractions, ratios, decimals and percents, and the multiple representations of these numbers.

### Number Systems and Number Theory

- Explore number systems and number theory;
- Recognize that the underlying structure of number systems bonds the many individual facets of mathematics into a useful, interesting, and logical whole.

### Computation and Estimation

- Develop the concepts underlying computation and estimation in various contexts;
- Engage in meaningful experiences in geometry, probability, measurement, and other areas of mathematics;
- Solve problems for which exact answers are inappropriate;
- Predict and then check computation results.

### Patterns and Functions

- Explore and describe patterns and functions;
- Analyze, represent, and generalize relationships of patterns and functions.

### Algebra

- Use algebraic concepts and processes as a bridge between concrete elementary topics and more formal mathematics;
- Explore algebraic concepts in an informal way to build a foundation for the formal study of algebra.

### Statistics and Probability

- Understand how information is processed and translated into usable knowledge;
- Collect, organize, process, represent, and interpret data;
- Experiment and simulate probability models;
- Explore statistics and probability in real-world situations.

### Geometry

- Investigate and use ideas and relationships from geometry of one, two, and three dimensions;
- Discover relationships and develop spatial perception by constructing, drawing, measuring, comparing, transforming, and classifying geometric figures and models;
- Use geometric investigation to bridge the gap between prior informal geometric exploration and future formal geometry.

### Measurement

- Engage in estimation and measurement activities which require interaction between students and their environment;
- Use measurement concepts and skills to solve real-world problems and investigate mathematical applications.

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Instructional Goals: Mathematics Program of Study  
Proposed Regulations 2520.02

MATHEMATICS PROGRAM OF STUDY

INSTRUCTIONAL GOALS

ADOLESCENT EDUCATION

(Grades 9 - 12)

Area of Study: Mathematics

The mission of the mathematics curriculum for adolescent education prescribes that all students learn to value mathematics, become confident in their ability to do mathematics, become mathematical problem solvers, communicate mathematically, and learn to reason mathematically. Toward this end the local school districts shall therefore provide learners multi-opportunities to:

Mathematics as Problem Solving

- Use problem solving techniques with increasing confidence;
- Investigate and understand mathematical content and solve problems from within and outside mathematics;
- Recognize and formulate problems from within and outside mathematics while applying the process of mathematical modeling to real world problems and everyday life situations.

Mathematics as Communication

- Continue the development of language and symbolism that will allow all students to communicate mathematically;
- Listen to, read about, write about, speak about, reflect on, and demonstrate mathematical ideas;
- Work in small group and cooperative explorations in order to maximize active involvement in discussion, questioning, clarification, and summarization of problems.

### Mathematics as Reasoning

- Reinforce and extend logical reasoning skills;
- Experience inductive reasoning and understand the interplay between conjecturing and inductive reasoning;
- Experience deductive reasoning including indirect proofs and proofs by mathematical induction.

### Mathematical Connections

- Investigate the connections and interplay of various mathematics concepts and their applications to real world situations and other disciplines;
- Apply and translate different representations of the same mathematical concepts.

### Algebra

- Study and apply algebraic concepts and methods;
- Use Algebra as the language through which mathematics is communicated;
- Represent situations that involve variable quantities;
- Use tables and graphs as tools to interpret expressions, equations, and inequalities.
- Use and value the connections between Algebra and other areas of mathematics.

### Geometry

- Interpret and draw two dimensional and three dimensional objects;
- Classify figures in terms of congruence and similarity;
- Deduce properties of figures from given assumptions.
- Use and value the connections between Geometry and other areas of mathematics.
- Express generalizations discovered through investigations.

### Statistics

- Study data analysis and statistics;
- Collect, represent, and process data;
- Involve students in simulations and sampling, fitting curves, testing hypotheses, and drawing inferences;
- Apply the aforementioned techniques in solving problems and evaluating statistical claims encountered in the students' daily lives.

### Probability

- Use experimental and theoretical probability;
- Interpret and judge the validity of statistical claims;
- Make informed predictions about the likelihood of events.

### Measurement

- Have extensive concrete experiences using measurements;
- Estimate and make measurements;
- Describe and compare phenomena by use of measurements;
- Extend the concepts of perimeter, area, volume, angle measure, capacity, mass, and weight;
- Select appropriate tools and units of measurements;
- Develop formulas and procedures for determining measures to solve problems.

### Trigonometry

(College Intending Students)

- Understand triangular and circular functions, their properties, and graphs;
- Apply general graphing techniques to trigonometric functions;
- Understand the connections between trigonometric functions and polar coordinates, complex numbers, and series.

COMMENT LOG  
MATHEMATICS INSTRUCTIONAL GOALS  
(Regulations 2520.02)

Directions: Please use this form in commenting by section on the proposed regulations on Mathematics Instructional Goals.

NAME OF INDIVIDUAL/ORGANIZATION: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

COUNTY: \_\_\_\_\_

I approve the proposed 1990 revisions of the Mathematics Instructional Goals without change.

I suggest additional revisions as noted on the attached pages.

Please submit comments by February 15, 1991 to:

Brenda Parnell, Coordinator  
Mathematics  
West Virginia Department of Education  
Capitol Complex, Building 6, Room 330  
1900 Kanawha Boulevard, East  
Charleston, WV 25305

## COMMENT FORM

### Proposed 1990 Revisions of Mathematics Instructional Goals

Section	Comments
Instructional Goals Early Childhood (Grades K-4)	
Instructional Goals Middle Childhood (Grades 5 - 8)	
Instructional Goals Adolescent Education (Grades 9 - 12)	