

**Test Specifications for the
Washington Assessment of Student Learning
Grade 7 Mathematics
Updated: October 2001**

I. TEST PURPOSE

The purpose of this test is to measure the level of mathematics proficiency that Washington students have achieved by the spring of the seventh grade, according to the Essential Academic Learning Requirements established by the Washington Commission on Student Learning (CSL). The Essential Academic Learning Requirements (EALRs) consist of the mathematics concepts and procedures and four fundamental processes (solves problems, reasons logically, communicates understanding, and makes connections). These concepts and procedures and the processes are grouped into the following content and process strands:

Content Strands		Process Strands	
1. Number Sense	NS	6. Solves Problems and Reasons Logically	SR
2. Measurement	ME	7. Communicates Understanding	CU
3. Geometric Sense	GS	8. Makes Connections	MC
4. Probability and Statistics	PS		
5. Algebraic Sense	AS		

In keeping with the Essential Academic Learning Requirements Technical Manual, (Washington State Commission on Student Learning, July 17, 1998, refined September, 2001), the Essential Academic Learning Requirements-the content and process strands-are viewed as an integrated whole. Each test item will be identified as to the primary content and/or process strand it is assessing.

The following learning targets are intended to summarize the knowledge or Essential Academic Learning Requirements as identified in the mathematics section of the Essential Academic Learning Requirements Technical Manual. The benchmark indicators are identified by numbers in parentheses after each target.

II. CONTENT STRANDS AND LEARNING TARGETS *

Strand 1: Number Sense (NS)

NS01 (Number and Numeration) Demonstrate an understanding of the pictorial and symbolic representations of integers, fractions, decimals, percents, and place value of decimals; compare and order integers, fractions, and decimals (1.1.1, 1.1.2)†

NS02 (Number Theory) Demonstrate an understanding of the properties of the rational number system; demonstrate an understanding of concepts of and processes involving prime and composite numbers, factors and multiples, and divisibility (1.1.1, 1.1.3)

NS03 (Conceptual Understanding of Operations) Demonstrate an understanding of operations on non-negative, rational numbers (1.1.5)

NS04 (Computation) Add, subtract, multiply, and divide non-negative whole numbers, fractions, and decimals using rules for order of operations (1.1.6)

NS05 (Estimation) Identify situations involving non-negative rational numbers in which estimation is sufficient and computation is not required; use estimation to predict computation results and to determine reasonableness of answers (1.1.8, 1.1.9)

NS06 (Ratio and Proportion) Demonstrate an understanding of and apply the concepts of ratio and direct proportion (1.1.4)

NS07 (Mental Arithmetic and Tools) ** Use mental arithmetic, pencil & paper, calculators, and/or computers as appropriate to the task. (1.1.7)

Strand 2: Measurement (ME)

ME01 (Attributes and Dimensions) Demonstrate an understanding of the concepts of and relationships among linear dimensions, perimeter, area, and volume (1.2.1)

ME02 (Calculate) Measure directly and indirectly; calculate and apply procedures for determining perimeter, area, and volume; demonstrate an understanding of the concept of rate and how to calculate rates and determine units (1.2.2, 1.2.3)

* Although wording throughout the learning targets may seem to indicate that all items will assess students' understandings of several concepts or procedures, the *ands* in the targets should be understood to mean *and/or*, since some items, particularly Multiple-Choice items, may focus on only one concept or procedure. However, items will be developed for every concept/procedure.

† The first digit in this number corresponds to the Essential Academic Learning Requirement; the second digit corresponds to the component; the third digit corresponds to the specific benchmark indicator, as presented in the Essential Academic Learning Requirements Technical Manual. To locate the specific wording for any item listed here, refer to the content area section in the Technical Manual.

** Classroom-Based Evidence

ME03 (Approximation and Precision) Demonstrate an understanding of how precision is affected by the unit of measurement; know when to estimate and use estimation to obtain reasonable approximations (1.2.4, 1.2.5)

ME04 (Systems and Tools) Demonstrate an understanding of the appropriate uses of standard units of measurement; demonstrate an understanding of the relationships among units within the U.S. system and within the metric system; select and use tools that will provide an appropriate degree of precision (1.2.6, 1.2.7, 1.2.8)

Strand 3: Geometric Sense (GS)

GS01 (Properties & Relationships) Identify and use properties and relationships of plane geometry to describe shapes and figures; identify, describe, or draw objects in the surrounding environment in geometric terms (1.3.1, 1.3.2)

GS02 (Location) Identify and describe location of objects on a coordinate grid in any of the four quadrants (1.3.5)

GS03 (Symmetry, Congruence & Similarity) Demonstrate an understanding of symmetry, congruence, and similarity (1.3.3)

GS04 (Transformations) Demonstrate an understanding of and apply simple geometric transformations using combinations of translations (slides) or reflections (flips) or rotations (turns) (1.3.6)

GS05 (Environment) ** Identify, describe, or draw objects in the surrounding environment in geometric terms (1.3.2)

GS06 (Constructions) ** Perform geometric constructions using a variety of tools and technologies (1.3.4)

Strand 4: Probability and Statistics (PS)

PS01 (Probability and Experimentation) Demonstrate an understanding of chance, and use counting procedures and calculations to determine the probability of a simple event; compare results of experiments and simulations with mathematical expectations (1.4.1, 1.4.2, 1.4.3)

PS02 (Data Collection) Demonstrate an understanding of how to collect a random sample of data to represent a population (1.4.4)

PS03 (Data Organization and Analysis) Organize and display data in appropriate forms; calculate and appropriately use range and measures of central tendency to describe data; identify how statistics can be used to support different points of view (1.4.5, 1.4.6, 1.4.7)

PS04 (Analysis and Inference) Demonstrate an understanding of and make inferences based on analysis of experimental results, statistical data, and simple graphical representations (1.4.9)

** Classroom-Based Evidence

PS05 (Prediction and Comparison) ** Predict outcomes of experiments and simulations; conduct experiments; compare predictions with experimental results (1.4.8)

PS06 (Collect Data) ** Collect a random sample of data that represents a described population (1.4.4)

Strand 5: Algebraic Sense

AS01 (Patterns) Recognize, extend, and create patterns and sequences; represent number patterns with tables, graphs, and rules (1.5.1, 1.5.2)

AS02 (Representation) Symbolically represent situations that involve simple expressions, equations, and inequalities using =, >, <, , (1.5.4, 1.5.3)

AS03 (Operations) Evaluate expressions and formulas; solve single-variable equations (1.5.5, 1.5.6)

** Classroom-Based Evidence

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III. PROCESS STRANDS AND LEARNING TARGETS

Strand 6: Solves Problems and Reasons Logically (SP/RL)

SR01 (Define Problems) Define problems by identifying the question(s) to be answered (that which is unknown and to be made known through problem solution) and by identifying the known information, missing information, and/or extraneous information (2.2.2, 2.2.1, 2.2.3, 2.1.3)

SR02 (Analysis) Compare, contrast, and interpret information from a variety of sources (3.1.1)

SR03 (Strategies, Concepts, and Procedures) Organize and synthesize information from multiple sources, use viable strategies and appropriate concepts, procedures, and tools to construct solutions (2.3.1, 2.3.2, 2.3.3)

SR04 (Predict, Verify, and Evaluate) Make or test conjectures based on an analysis of problem situations; check for reasonableness of results; evaluate procedures and results (3.2.1, 3.3.1, 3.3.3, 3.3.4)

SR05 (Construct Solutions with Justifications) Construct solutions to problems; support arguments and justify results using evidence; validate thinking and mathematical ideas using models, known facts, patterns, relationships, and/or counter-examples (2.3.3, 3.3.2, 3.1.2)

SR06 (Testing Conjectures) ** Make inferences and predictions based on analysis of new problem situations; test conjectures and inferences and explain why they are true or false (3.2.1, 3.3.1)

SR07 (Flexibility) ** Recognize when an attempted approach is unproductive and try to modify it or try a new approach (2.1.4)

Strand 7: Communicates Understanding (CU)

CU01 (Gather Information) Develop a plan to gather information; extract mathematical information from multiple sources (4.1.1, 4.1.2)

CU02 (Organize, Represent and Express) Clearly organize, represent, and express mathematical information, and ideas in ways appropriate for the given audience and purpose (4.2.1, 4.3.1, 4.3.2)

CU03 (Collect Information from a Variety of Sources) ** Develop and follow a plan for collecting information; read, listen, and observe to extract mathematical information from multiple sources including technology, pictures, diagrams, physical models, oral narratives, and symbolic representations (4.1.1, 4.1.2, 4.1.3)

** Classroom-Based Evidence

Strand 8: Makes Connections (MC)

MC01 (Connections within Mathematics) Relate and use conceptual and procedural understandings among a variety of mathematical content strands; relate and use equivalent mathematical models and representations. (5.1.1, 5.1.2)

MC02 (Connections to other Disciplines) ** Identify mathematical patterns and ideas in other disciplines; use mathematical thinking and modeling in other disciplines. (5.2.1, 5.2.2)

MC03 (Connections with Real Life) ** Recognize the widespread use of mathematics in daily life and the extensive use of mathematics outside the classroom. (5.3.1)

MC04 (Career Connections) ** Investigate the use of mathematics within several careers/occupations of interest. (5.3.2)

MC05 (Historical Connections) ** Describe examples of the contributions of various cultures to the historical development of number systems, measurement, and patterns; describe examples of the contributions of both women and men to the development of number systems, measurement, and patterns. (5.2.3)

** Classroom-Based Evidence

IV. CONTENT ORGANIZATION

The seventh-grade mathematics assessment will consist of 42 items or questions, resulting in 65 points. Items were written at a reading level appropriate to a seventh-grade audience; thus, item development will aim for at least one grade below seventh grade level readability. Test forms will include the following item types:

- Multiple-Choice items: The student will have four responses to choose from: the correct answer and three distractors. There will be 27 Multiple-Choice items per form, worth 1 point each.
- Short-Answer items (including enhanced Multiple-Choice[†]): The student must construct a short response. For example, the student may be asked to write a sentence or equation; complete a table, graph, or chart; draw a picture; construct a diagram; or carry out a calculation. There will be 11 Short-Answer items per form, worth 2 points each. No more than 25% of the Short-Answer items in a test form will be enhanced Multiple-Choice*.
- Extended-Response items: The student will construct a longer response than that for a Short-Answer item. For example, the student maybe asked to create a graph showing the appropriate data, labeled axes, and title; create and/or extend tables, diagrams, or pictures; provide a lengthy written explanation, a written explanation with number sentences, pictures, and/or diagrams. There will be 4 Extended-Response items per form, each worth 4 points.

Multiple-Choice and Short-Answer items will be used to assess targets in the content strands. All three item-types will be used to assess targets in the process strands. Each item in a process strand will indicate the appropriate content target, if any, in its item code.

The mathematics test will be administered in two parts. It is intended that each of the two parts of the operational test will contain about 21 items in approximately the following proportions: 13-14 Multiple-Choice, 5-6 Short-Answer, and 2 Extended-Response.

The test will be administered in two separate sessions, each of which will be about 80-90 minutes. Though the test is not specifically a timed test, total testing time for standard administration should take about 2 1/2 hours.

Each test form will contain a variety of items so that all strands or Essential Academic Learning Requirements are addressed. The two parts of the test will be constructed so as to separate the items for which tools (such as rulers or calculators) must not be used from the items for which tools are encouraged and may be required.

Types of tools that may be used for the "tools section" of the assessment include the following: calculators, protractors, rulers, pattern blocks, and other classroom manipulatives.

[†] Enhanced Multiple-Choice items are items in which the student selects from a list of four possible responses and then explains the reason(s) for choosing that response.

*Note: No more than 3 Short-Answer items will be enhanced Multiple-Choice items.

V. ITEM/TEST SCORING

Each Multiple-Choice item is worth 1 point, each Short-Answer item is worth 2 points, and each Extended-Response item is worth 4 points. Thus, in a 42-item test, 27 Multiple-Choice items would be worth 27 points, 11 Short-Answer items would be worth 22 points, and 4 Extended-Response items would be worth 16 points, making a total of 65 possible points. Multiple-Choice items would account for 42% of the total points, while the constructed-response items (both Short-Answer and Extended-Response items) would account for 58% of the total points. This distribution is shown below:

Type	Number of Items	Total Points
Multiple-Choice	27	27
Short-Answer	11	22
Extended-Response	4	16
Total	42	65

VI. REPORTING SCHEMA AND ITEM DISTRIBUTION

All Essential Academic Learning Requirements (the content and process strands) will be addressed in each test form. Items will be classified according to their primary content or process strand.

Distribution according to item type is shown below:

Current Test Map for Grade 7 Mathematics: Number of Items and Number of Points in Each Strand

Essential Academic Learning Requirement	Strand	Multiple-Choice Items	Short-Answer Items	Extended-Response Items	Total Number of Points
Concepts & Procedures of Mathematics	Number Sense (6)*	3-5	1-2	0	6-7
	Measurement (4)*	3-5	1-2	0	6-7
	Geometric Sense (4)*	3-5	1-2	0	6-7
	Probability and Statistics (4)*	3-5	1-2	0	6-7
	Algebraic Sense (3)*	3-5	1-2	0	6-7
Solves Problems & Reasoning Logically (5)*		0-2	2-3	2-3	12-14
Communicates Understanding (2)*		0	1-2	1-2	8-10
Makes Connections (1)*		2-4	1-2	0	6-7
Total Number of Items		27	11	4	42
Total Number of Points		27	22	16	65

**Numbers in parentheses represent the number of learning targets in each strand that are assessed via the Washington Assessment of Student Learning. These and the remaining learning targets in each strand should also be assessed via classroom-based assessments.*

VII. GENERAL CONSIDERATIONS

Each Multiple-Choice item will have four responses: the correct answer and three distractors. Distractors will be developed based on the types of errors students are most likely to make.

For test development purposes, item codes will accompany each item and will provide information regarding the content and/or process strand addressed, learning target addressed, item format, and correct answer key. The following abbreviations will be used to indicate content and process strands in the codes:

Content Strands		Process Strands	
1. Number Sense	NS	6. Solves Problems and Reasons Logically	SR
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The scoring criteria will focus on the understanding of mathematical ideas, information, and solutions, and will disregard conventions of writing (sentence structure, word choice, usage, grammar, spelling, and mechanics), as long as the wording of the response does not interfere with the mathematical communication.

All items will avoid language that shows bias, offends, or disadvantages a particular group of students. That is, items will not display unfair representations of genders, races, persons with disabilities, or cultural and religious groups.

VIII. NOTATIONAL CONSIDERATIONS FOR GRADE 7 MATHEMATICS (FOR ITEMS AND STIMULUS MATERIALS)

- In the item stems, numbers (other than years) having more than three digits to the left of the decimal point will include commas to group digits in the usual manner (e.g., 435,000).
- Physical quantities such as length should generally be labeled or accompanied by units. Standard abbreviations (e.g., cm or cu ft) may be used. The unit should be spelled out if any confusion is possible.
- Variables are always italicized. The variable x will not be used to avoid confusion with the multiplication sign.
- The symbols “ \times ” and “ \bullet ” can be used to indicate multiplication.
- The symbol “ \div ” and a fraction bar “ $/$ ” can be used to indicate division.
- Fractions will have horizontal lines separating numerator and denominator ($1/2$).
- Large numbers may be used in certain contexts, such as in a chart or graph with a heading such as “in millions”.

IX. GENERAL ISSUES

- A stimulus that gives information might precede a question or a set of questions. A stimulus may include brief written material and/or a graphic, such as a simple diagram, graph, chart, table, or drawing.
- Stimulus materials for items will be factually correct and have a readability targeted for a sixth grade or lower readability. A test item will focus on what is essential and consequential in the stem and will minimize the impact of, or need for, outside knowledge. The amount of reading will be kept to a minimum so that each item is clear and precise.
- Character names on each form will be representative of the range of ethnic diversity of Washington students. The names will generally be short and simple to read.
- To the extent possible, no stem, or response for one item will serve as a clue to the correct response for another item.
- Graphs, tables, or figures must be clearly associated with their intended items. Graphics will appear either on the same page as the stimulus or on the facing page. If there is any reasonable chance of confusion, page references will direct students to look at the appropriate graphic.
- Test items will be independent in the sense that the answer for any test item does not depend on knowing the correct answer to another item, so items are not "linked." Note: Linkage will be avoided among different items, not necessarily to parts within a single item. For instance, an enhanced Multiple-Choice item may ask students to explain their reason for selecting a particular response. This is not linking between items.
- When appropriate, several items may center around particular stimulus materials (e.g., graph, chart, or scenario), in which case, these items will generally appear on the same page or the page facing the stimulus materials.
- All items must clearly indicate what is expected in a response and must help students focus their response. General directions that allow the student more freedom in response format may read as follows: "Show or explain your thinking using words, numbers, and/or pictures."
- Items in each form are to be balanced by gender and should be gender-neutral for active/passive roles.
- Items testing application and problem solving will involve understandable, realistic situations familiar to seventh grade students.
- Pictorial representations will be realistic and authentic for seventh graders.
- On items for which tools are encouraged or required, students may be given the opportunity to use any punch-out or overlay manipulatives provided, or may use those classroom manipulatives or tools with which they are most familiar/comfortable, as long as nothing about the tools would introduce bias into the results.
- Tools may include calculators, protractors, rulers, pattern blocks, base ten blocks, and any other classroom manipulatives.
- The responses or distractors will be arranged in a logical order, i.e., numerical or chronological order or according to the length of the distractors.
- Answer keys will be approximately equally distributed among As, Bs, Cs and Ds.

- The responses "Both of the above," "All of the above," "None of the above," and "Neither of the above" will not be used, and the use of the word "not" will generally be avoided in the item stem.
- Care will be taken not to use items for which wrong methods yield the correct response. For example, "Simplify the fraction $64/16$ " is a poor item, since the correct response can be obtained by canceling the two sixes.
- Specific rules for Multiple-Choice, Short-Answer, and Extended-Response items are given in the Item Specifications.