

OREGON STATEWIDE ASSESSMENT



# Mathematics

## TEST SPECIFICATIONS and BLUEPRINTS

2012-2014

OFFICE OF  
ASSESSMENT & INFORMATION SERVICES  
THE OREGON DEPARTMENT  
OF EDUCATION

# GRADE 7

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## **Introduction to the Mathematics Test Specifications and Blueprints**

### **Introduction**

The primary purpose of the Test Specifications and Blueprints is to provide the consistency necessary for the development and administration of the Oregon Assessment of Knowledge and Skills (OAKS). OAKS provides critical data for Oregon's accountability system which meets Peer Review Requirements of the Elementary and Secondary Education Act. All students in grades 3 through 8 are required to take the reading and mathematics assessments. All students in grades 5 and 8 are required to take the science assessment. In high school, at grade 11, reading, writing, mathematics, and science are required assessments.

OAKS is also one way for students to demonstrate proficiency in the Essential Skills of reading, writing, and mathematics, which will be necessary for earning a high school diploma beginning with seniors graduating in 2011-2012. The requirement in mathematics to demonstrate proficiency in Applying Mathematics in a Variety of Settings will begin with the class of 2014. In addition, English Language Proficiency Assessment (ELPA) is required for non-English speaking students until they acquire sufficient skills in English to exit the program. Social Sciences is an optional assessment.

Test specifications provide guidelines for item writers, who are typically Oregon teachers, on what content may be tested and how items must be written. These specifications lead to test blueprints that outline test design and the number of questions to be tested in each score reporting category (SRC). The Test Specifications and Blueprints document is an important resource, not only for item writers and reviewers, but for educators administering OAKS and the general public who are interested in understanding the content and format of test items.

### **Background**

The purposes of the Oregon Statewide Assessment Program are (1) to provide information on individual student achievement on performance standards set by the State Board of Education at grade and benchmark levels; (2) to provide information for federal Elementary and Secondary Education Act requirements and for policy decisions by the legislature, the governor, the State Board of Education, and local school districts; (3) to support instructional program improvement efforts; and (4) to inform the public about student achievement in Oregon schools.

The Oregon Statewide Assessment is different from national norm-referenced tests used in many districts and states. The Oregon Statewide Assessment is a criterion-referenced assessment based on the Oregon Content Standards. As a result, the types of scores produced from the Oregon Statewide Assessment are somewhat different from those produced by national norm-referenced tests.

Oregon educators contribute to the test development and alignment process by serving on advisory committees called Content and Assessment Panels. Stakeholders in these committees are involved in each phase of the development of these specifications to assure that they accurately and clearly explain the overall design of the test and describe the specific content that might appear on the test to measure the knowledge and skills described in the content standards.

The Oregon Assessment of Knowledge and Skills test questions use multiple-choice and computer-scored constructed response formats. Each multiple-choice item has only one correct answer while computer-scored constructed response items may have many correct answers. A computer electronically collects and scores responses which are scored against the answer key to produce a raw score. The raw score is

converted to a scale score called a Rasch unit or RIT score. Students receive a scale score based on the number of questions answered correctly compared to the total number of questions on the form—taking into account the difficulty of the questions. Students are not penalized for guessing.

The content of these specifications reflects the skill expectations outlined in the State of Oregon Mathematics Content Standards for Kindergarten through Grade 8, adopted in December 2007, and the Oregon High School Mathematics Content Standards, adopted in June 2009. These standards were developed, in part, to align to the 2006 *Curriculum Focal Points for Pre-kindergarten through Grade 8 Mathematics: A Quest for Coherence*, published by the National Council of Teachers of Mathematics. The high school standards were developed in the same vein as those for grades K-8, to allow students to be accountable for fewer topics, but to understand the concepts more deeply.

### **Statewide and Local Assessments**

Statewide assessments are multiple-choice and computer-scored constructed response tests of knowledge and skills that are developed and scored by the state. Local assessments include performance assessments that may be scored using statewide scoring guides that are administered and scored at the local level (see Appendix F). Local assessments **are not included** in state accountability reports, e.g. AYP reports.

### **Paper/Pencil Administration**

Paper/Pencil fixed form tests are no longer administered in Oregon. All tests are computer-adaptive, as of 2011-2012.

### **Electronic Administration**

For the mathematics OAKS online tests, two testing opportunities are offered each year for students in grades 3-8 to participate in fully-adaptive testing. Three opportunities are offered each year for high school students in grades 9-12 who have had the opportunity to learn the high school content. In this fully-adaptive format, the accuracy of the student's

responses to questions determines the next item the student will see. Having the tests fully adaptive allows for more precision in measurement and less frustration for the students.

Beginning with 2011-2012, students who need to have the test read to them may access the text-to-speech function of OAKS Online. The OAKS Online test delivery system will also be available to students with visual impairments who use Braille, providing the same number of testing opportunities as the general student test. (Beginning with 2011-2012, the paper-based Braille assessments will no longer be available.)

Online practice tests of sample items for each grade are available for students who may need practice using a scrollbar, new item types, or other features of OAKS Online. The practice tests are also adaptive in order to simulate the actual OAKS test; you must use Mozilla Firefox to access the practice tests. Downloadable fixed-form sample tests are also available, with answer keys provided. Sample tests and OAKS Online Practice tests can be found at <http://www.ode.state.or.us/search/page/?id=441>.

### **Transition to Common Core State Standards and Smarter Balanced Common Assessment**

Beginning with the 2014-2015 school year, Oregon will be utilizing assessments based on the Common Core State Standards for English/Language Arts and Mathematics. The 2014-15 assessment for these subjects will comply with all criteria set forth by Smarter Balanced Common Assessment. Oregon is part of the collaborative consortium of states developing Smarter Balanced and will also use common achievement standards. This work is underway and will be in development until the transition is made in fall 2014.

See ([www.ode.state.or.us/go/commoncore](http://www.ode.state.or.us/go/commoncore)) for up-to-date information on the Common Core State Standards and <http://www.smarterbalanced.org/> for information on the Smarter Balanced Common Assessment.

**On the OAKS mathematics tests:**

- Students are strongly encouraged to use calculators. Rulers, manipulatives, and other tools commonly available to all students are also encouraged. No problems require the use of a calculator and no more than a four-function calculator is needed for any problem, although scientific calculators are highly recommended for use at grades 8 and 10. On-screen calculators are included in the OAKS Online tests, but students are also allowed to use the calculators they regularly use for class work. (See the Test Administration Manual for guidelines.)
- For each of the grades 3-8, this statement precedes all the core standards: “It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.” Therefore, any content standard may be assessed using a context or a problem-solving situation.
- Likewise for high school, “It is essential that the high school mathematics content standards be addressed in instructional contexts that promote problem solving, reasoning and proof, communication, making connections, designing and analyzing representations, and reflecting on solutions.” Similarly, any content standard may be assessed using a context or a problem-solving situation.
- For all grades, every student should understand and be able to apply all mathematical concepts and skills from previous grade levels to the standards of their current grade.
- Each OAKS mathematics test item will measure only one Score Reporting Category (SRC). The Score Reporting Categories are the three “core standards” for each grade. Each core standard is associated with four to nine content standards. Grades 3-8 each have approximately 20 content standards. The high school standards include three disciplines of mathematics – Algebra, Geometry, and Statistics. Within each discipline “strand” there are two to three core standards. These core standards provide the major concepts and processes for teaching and learning across the grades. Beneath each of these core standards are from three to eight content standards which provide the details necessary for curriculum and assessment. The score reporting categories are shown in the diagram on the next page.
- The new mathematics standards also frequently mention “fluency” with skills and concepts. See the page following the Score Reporting Categories chart for a complete statement as to the intended meaning of “fluency” for OAKS Online.

**The pages following the Fluency Statement contain a more detailed examination of the test content for mathematics.**

Score Reporting Categories for Oregon Assessment of Knowledge and Skills in Mathematics

Grade	First Core Standard	Second Core Standard	Third Core Standard
3	<b>3.1 <u>Number and Operations:</u></b> Develop an understanding of fractions and fraction equivalence.	<b>3.2 <u>Number and Operations, Algebra, and Data Analysis:</u></b> Develop under-standings of multiplication and division, and strategies for basic multiplication facts and related division facts.	<b>3.3 <u>Geometry and Measurement:</u></b> Describe and analyze properties of two-dimensional shapes, including perimeters.
4	<b>4.1 <u>Number and Operations:</u></b> Develop an understanding of decimals, including the connections between fractions and decimals.	<b>4.2 <u>Number and Operations and Algebra:</u></b> Develop fluency with multiplication facts and related division facts, and with multi-digit whole number multiplication.	<b>4.3 <u>Measurement:</u></b> Develop an understanding of area and determine the areas of two-dimensional shapes.
5	<b>5.1 <u>Number and Operations and Data Analysis:</u></b> Develop an understanding of and fluency with addition and subtraction of fractions and decimals.	<b>5.2 <u>Number and Operations and Algebra:</u></b> Develop an understanding of and fluency with division of whole numbers.	<b>5.3 <u>Geometry, Algebra, and Measurement:</u></b> Analyze 3-D shapes, including volume and surface area
6	<b>6.1 <u>Number and Operations:</u></b> Develop an understanding of and fluency with multiplication and division of fractions and decimals.	<b>6.2 <u>Number and Operations and Probability:</u></b> Connect ratio, rate, and percent to multiplication and division.	<b>6.3 <u>Algebra:</u></b> Write, interpret, and use mathematical expressions and equations.
7	<b>7.1 <u>Number and Operations and Algebra:</u></b> Develop an understanding of operations on all rational numbers and solving linear equations.	<b>7.2 <u>Number and Operations, Algebra and Geometry:</u></b> Develop an understanding of and apply proportionality, including similarity.	<b>7.3 <u>Measurement and Geometry:</u></b> Develop an understanding of and use formulas to determine surface area and volume.
8	<b>8.1 <u>Algebra:</u></b> Analyze and represent linear functions, and solve linear equations and systems of linear equations.	<b>8.2 <u>Data Analysis and Algebra:</u></b> Analyze and summarize data sets.	<b>8.3 <u>Geometry and Measurement:</u></b> Analyze two- and three-dimensional spaces and figures by using distance and angle.
HS	<b><u>Algebra</u></b> (H.1A, H.2A, H.3A)	<b><u>Geometry</u></b> (H.1G, H.2G, H.3G)	<b><u>Statistics</u></b> (H.1S, H.2S)



## Fluency Statement to Accompany Oregon Assessment of Knowledge and Skills Test Specifications and Blueprints

### What are the Main Messages of NCTM's *Principles and Standards (2000)* Regarding Computation?

Computational fluency is an essential goal for school mathematics (p. 152):

#### Embedding Fluency in Conceptual Understanding

- The methods that a student uses to compute should be grounded in understanding (pp. 152-55).
- Students can achieve computational fluency using a variety of methods and should, in fact, be comfortable with more than one approach (p. 155).
- Students should have opportunities to invent strategies for computing using their knowledge of place value, properties of numbers, and the operations (pp. 35 and 220).
- Students should investigate conventional algorithms for computing with whole numbers (pp. 35 and 155).

#### Goals of Fluency

- Students should know the basic number combinations for addition and subtraction by the end of grade 2 and those for multiplication and division by the end of grade 4 (pp. 32, 84, and 153).
- Students should be able to compute fluently with whole numbers by end of grade 5 (pp. 35, 152, and 155).
- Students should be encouraged to use computational methods and tools that are appropriate for the context and purpose, including mental computation, estimations, calculators, and paper and pencil (pp. 36, 145, and 154).

### What is Computational Fluency?

*NCTM Principles and Standards of School Mathematics (2000)* defines computational fluency as having efficient and accurate methods for computing that are based on well understood properties and number relationships.

The National Math Panel Report cites the NCTM definition of computational fluency in its report when it uses this phrase. For further clarity, on page 41 of chapter 3 of the Task Group Reports of the National Mathematics Advisory Panel, there is a discussion of the critical foundations for the study of algebra: (1) fluency with whole numbers, (2) fluency with fractions, and (3) particular aspects of geometry and measurement. The National Mathematics Advisory Panel Final Report (2008), page 17-20, reiterate three clusters of concepts and skills – called Critical Foundations of Algebra – reflecting their judgment about the most essential mathematics for students to learn thoroughly prior to algebra course work.



The excerpt from page 41 of chapter 3 (Report of the Task Group on Conceptual Knowledge and Skills) is below:

### **1. Fluency with whole numbers**

By the end of the elementary grades, children should have a robust sense of number. This sense of number must include understanding place value, and the ability to compose and decompose whole numbers. It must clearly include a grasp of the meaning of the basic operations of addition, subtraction, multiplication, and division, including use of the commutative, associative, and distributive properties; the ability to perform these operations efficiently; and the knowledge of how to apply the operations to problem solving. Computational facility rests on the automatic recall of addition and related subtraction facts, and of multiplication and related division facts. It requires fluency with the standard algorithms for addition, subtraction, multiplication, and division. Fluent use of the algorithms not only depends on the automatic recall of number facts but also reinforces it. A strong sense of number also includes the ability to estimate the results of computations and thereby to estimate orders of magnitude, e.g., how many people fit into a stadium, or how many gallons of water are needed to fill a pool.

### **2. Fluency with Fractions**

Before they begin algebra course work, middle school students should have a thorough understanding of positive as well as negative fractions. They should be able to locate both positive and negative fractions on the number line; represent and compare fractions, decimals, and related percents; and estimate their size. They need to know that sums, differences, products, and quotients (with nonzero denominators) of fractions are fractions, and they need to be able to carry out these operations confidently and efficiently. They should understand why and how (finite) decimal numbers are fractions and know the meaning of percentages. They should encounter fractions in problems in the many contexts in which they arise naturally, for example, to describe rates, proportionality, and probability. Beyond computational facility with specific numbers, the subject of fractions, when properly taught, introduces students to the use of symbolic notation and the concept of generality, both being an integral part of Algebra (Wu, 2001).

### **3. Particular Aspects of Geometry and Measurement**

Middle-grade experience with similar triangles is most directly relevant for the study of algebra: Sound treatments of the slope of a straight line and of linear functions depend logically on the properties of similar triangles. Furthermore, students should be able to analyze the properties of two- and three-dimensional shapes using formulas to determine perimeter, area, volume, and surface area. They should also be able to find unknown lengths, angles, and areas.

## **Content Standards Map**

**The following pages contain an examination of the test content for mathematics.**

- The top row states the core standard (Score Reporting Category).
- The first column lists the content standard. Below the content standard we show “Assessable Academic Vocabulary” - vocabulary that can be used in test items without explanation. Below the vocabulary, we show symbols and notation that can be used without explanation.
- The second column lists Boundaries of Assessable Content to clarify language in the content standard. Below the Boundaries, we show standards from previous grades linked to this standard.
- Finally, the third column gives some sample items that are very similar to the type of questions asked on a test related to the content standard. Previously operational released items are in Times New Roman font, while “ideas” for test items are in **Arial Gray** font.
- Following all the standards pages is a comprehensive list of all the Assessable Academic Vocabulary for the grade level. Assessable Academic Vocabulary from previous grades may also be used without explanation.

**Core Standard: 7.1 Number and Operations and Algebra**

**Score Reporting Category 1**

Develop an understanding of operations on all rational numbers and solving linear equations.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.1.1 Develop, analyze, and apply models (including everyday contexts), strategies, and procedures to compute with integers, with an emphasis on negative integers.

**Assessable Academic Vocabulary:**

difference  
model  
number line  
opposite  
product  
quotient  
sum

**Symbols and Notation:**

**Boundaries of Assessable Content:**

- Items assessing this standard include:
  - developing models, strategies, and/or procedures to compute with integers, with an emphasis on negative integers;
  - analyzing models, strategies, and/or procedures to compute with integers, with an emphasis on negative integers;
  - applying models, strategies, and/or procedures to compute with integers, with an emphasis on negative integers.
- Models include number lines and every day contexts. It will not be assumed that students have had experience with any one model other than a number line. Any other model given will be explained.
- Computations may require the use of order of operations as well as the commutative, associative, and distributive properties.

**Content Connections from Previous Grades:**

4.2, 5.1, 5.2, 6.1

**Sample Items:**

If ■ equals 1 and □ equals -1, what is the value of x?

$$x = \begin{matrix} \blacksquare & \blacksquare \\ \blacksquare & \blacksquare \\ \blacksquare & \blacksquare \end{matrix} + \begin{matrix} \square & \square \\ \square & \square \\ \square & \square \end{matrix}$$

- A. -9
- B. -1
- C. 1
- D. 9

Mrs. Brown gave her class the following mental math problem: Find the product of -8 and -7, multiply your answer by 5, then divide your result by -5.

What is the final number?

- A. -56
- B. 56
- C. -280
- D. 280

**Core Standard: 7.1 Number and Operations and Algebra**

**Score Reporting Category 1**

Develop an understanding of operations on all rational numbers and solving linear equations.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.1.2 Extend knowledge of integers and positive rational numbers to solve problems involving negative rational numbers.

**Assessable Academic Vocabulary:**

difference  
product  
quotient  
sum

**Symbols and Notation:**

**Boundaries of Assessable Content:**

- Items assessing this standard include solving problems involving positive and negative rational numbers.
- Problems may be written as expressions or equations or written in a contextual setting.
- Items may require basic operations with integers and/or negative rational numbers in contextual setting.

**Content Connections from Previous Grades:**

5.1, 6.1, 6.2

**Sample Items:**

Find the missing term:

729, -243, 81, \_\_\_\_

A. -27 B. -9 C. 9 D. 27

Yesterday's high temperature was 5° F. Today's high temperature is -3° F.

What is the difference in temperature?

A. 2° B. 3° C. 5° D. 8°

**Core Standard: 7.1 Number and Operations and Algebra**

**Score Reporting Category 1**

Develop an understanding of operations on all rational numbers and solving linear equations.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.1.3 Develop and use strategies to estimate the result of rational number computations and justify the reasonableness of results.

**Assessable Academic Vocabulary:**

estimate  
justify  
round

**Symbols and Notation:**

≈ “is approximately equal to”

**Boundaries of Assessable Content:**

- Items assessing this standard include developing and using strategies to estimate the result of rational number computations.
- Items assessing this standard include justifying the reasonableness of estimated computations using rational numbers.
- Items may require students to find a single estimated answer, show a strategy used to estimate, or explain the reasonableness of the answer.
- Computations include sums, differences, products, and quotients or a combination of operations.
- Estimations may include rounding, rounding to benchmarks, overestimation, underestimation, or compatible numbers.

**Content Connections from Previous Grades:**

4.1.5, 5.1.3, 6.1.1

**Sample Items:**

A stereo store has a 25% off sale. Allen wants to find out how much a \$300 stereo would cost. Which strategy could Allen use?

- A.  $300 - 25$
- B.  $300 - (300 \times \frac{1}{4})$
- C.  $300 \times \frac{1}{4}$
- D.  $300 - (300 - 25)$

The answer to  $8.659 + 14.07$  is between

- A. 20 and 21
- B. 21 and 22
- C. 22 and 23
- D. 23 and 24

**Core Standard: 7.1 Number and Operations and Algebra**

**Score Reporting Category 1**

Develop an understanding of operations on all rational numbers and solving linear equations.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.1.4 Apply properties of rational numbers and algebra to write and solve linear equations in one variable.

**Assessable Academic Vocabulary:**

linear equation  
solve

**Symbols and Notation:**

**Boundaries of Assessable Content:**

- Items assessing this standard include applying properties of rational numbers and algebra to write and solve linear equations in one variable.
- Items may include only writing or only solving a linear equation in one variable.
- Items may include writing and solving a linear equation in one variable.
- Items may be written directly or within a context.
- Equations may include fractions and/or decimals and/or answers may include fractions or decimals.
- Equations solved are not limited to one-step equations. They may require multiple steps to solve (e.g., distributive property, combine like terms, order of operations)

Appropriate contexts include area, volume, perimeter, rate, ratio and percent.

**Content Connections from Previous Grades:**

5.2.1, 5.5.2

**Sample Items:**

Shawn and Mark want to save \$225.00 together. Shawn has \$16.00 and saves \$10.00 each week. Mark has \$22.00 and saves \$7.00 each week.

Which equation can be used to find the number of weeks it will take them?

- A.  $26x + 29x = 225$
- B.  $38x + 17 = 225$
- C.  $55x = 225$
- D.  $38 + 17x = 225$

Solve the following equation.

$$(2x + 1) - 4 = 136$$

- A.  $x = 67.5$
- B.  $x = 69.5$
- C.  $x = 70$
- D.  $x = 137$

**Core Standard: 7.2 Number and Operations, Algebra and Geometry**  
 Develop an understanding of and apply proportionality, including similarity.

**Score Reporting Category 2**

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.2.1 Represent proportional relationships with coordinate graphs and tables, and identify unit rate as the slope of the related line.

**Assessable Academic Vocabulary:**

coordinate graph  
 line  
 proportional  
 quadrants  
 slope  
 table  
 unit rate

**Symbols and Notation:**

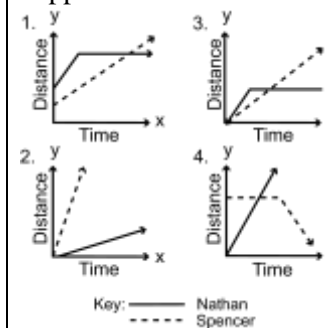
**Boundaries of Assessable Content:**

- Items include representing proportional relationships with coordinate graphs.
- Items include representing proportional relationships with tables.
- Items include identifying unit rate as the slope of the related line.
- Items may give a table or graph or present the proportional relationship in a context.
- Answers will include tables or graphs.
- Graphs may be drawn using all four quadrants.

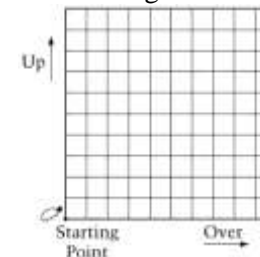
**Content Connections from Previous Grades:**  
 6.2.1

**Sample Items:**

Nathan and Spencer are in a race. They begin the race at the same time from the same place. Part way through the race Nathan falls and does not finish the race. Choose the graph that best describes what happened.



From the starting point on the grid below, a beetle moved in the following way. It moved 1 block up and then 2 blocks over, and then continued to repeat this pattern. Draw lines to show the path the beetle took to reach the right side of the grid.



If the grid were large enough and the beetle continued to move in the same pattern, would the point that is 75 blocks up and 100 blocks over from the starting point be on the beetle's path?

Source: NAEP 2005 Released Item



**Core Standard: 7.2 Number and Operations, Algebra and Geometry**  
 Develop an understanding of and apply proportionality, including similarity.

**Score Reporting Category 2**

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.2.2 Apply ratio and proportionality to solve problems, including percent and simple probability.

**Assessable Academic Vocabulary:**

experimental probability  
 percent of change  
 percent  
 probability  
 proportion  
 theoretical probability

**Symbols and Notation:**

% “percent”

**Boundaries of Assessable Content:**

Problems may be in context of previous learning and involve percent or probability

- Items assessing this standard include applying ratio and proportionality to solving problems.
- Problems involving percent may include percents less than 1% or greater than 100%.
- Problems involving percents may involve percent of change.
- Problems involving probability include theoretical probability or experimental probability. Simple probabilities should be in familiar settings.
- Percents and probabilities may be written as fractions, decimals, or percents.

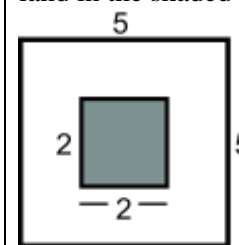
**Content Connections from Previous Grades:**  
 6.2

**Sample Items:**

There are 90 calories in six ounces of juice. How many calories are there in eight ounces of juice?

- A. 110 calories
- B. 120 calories
- C. 130 calories
- D. 140 calories

A dart lands on this game board. What is the probability that it will land in the shaded region?



- A. 8%
- B. 16%
- C. 20%
- D. 29%

**Core Standard: 7.2 Number and Operations, Algebra and Geometry**

**Score Reporting Category 2**

Develop an understanding of and apply proportionality, including similarity.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.2.3 Use coordinate graphs, tables, and equations to distinguish proportional relationships from other relationships, including inverse proportionality.

**Assessable Academic Vocabulary:**

slope

**Symbols and Notation:**

**Boundaries of Assessable Content:**

Standards are focused on proportional relationships. (Speed, circumference Perimeter, gravitational force)





This standard intends that students be able to distinguish between a direct proportion and other types of relations. They need not identify an inverse proportion by name.

- Items assessing this standard include distinguishing proportional relationships from other relationships (including inverse proportionality) using:
  - coordinate graphs
  - tables
  - equations
- Proportional relationships may be given directly or in a context (e.g., speed, circumference of a circle).
- Graphs may be drawn using all four quadrants.

**Content Connections from Previous Grades:**

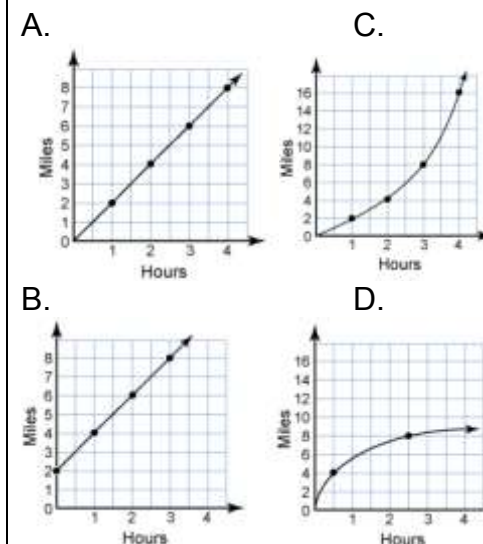
**Sample Items:**

Which represents the increasing pattern in the number of blocks ( $n$ ) in each figure ( $b$ )?

$n$				
$b$	1	2	3	4

- A.  $n = 3b$       C.  $n = b + 3$   
 B.  $n = b \times b$       D.  $n = b^3$

Jim walks at 2 miles per hour. Which graph shows how far he can walk in 4 hours?



**Core Standard: 7.2 Number and Operations, Algebra and Geometry**

**Score Reporting Category 2**

Develop an understanding of and apply proportionality, including similarity.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.2.4 Develop and use scale factors and proportional relationships to solve problems, including similarity and congruence.

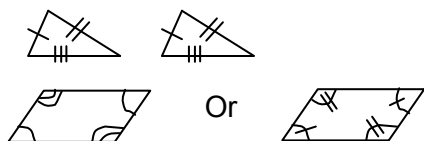
**Assessable Academic Vocabulary:**

congruent  
 corresponding angles  
 corresponding parts  
 corresponding sides  
 scale factor  
 similar

**Symbols and Notation:**

$\cong$  "congruent to"  
 $\sim$  "similar to"  
 $m\angle A$  "measure of angle A"  
 $\overline{AB}$  "segment AB"

Congruency marks for sides and angles:



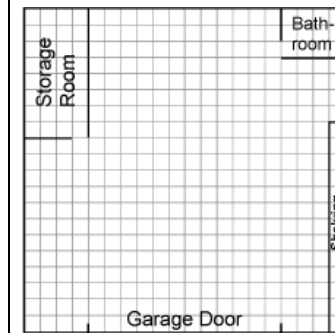
**Boundaries of Assessable Content:**

- Items assessing this standard include developing and using scale factors and proportions to solve problems.
- Problems may involve:
  - similarity and congruence. Students will write and/or solve a proportion to solve for missing sides in figures that are similar or congruent.
  - finding the scale factor between two similar or congruent figures.
  - identifying whether or not figures are similar or congruent.
  - using scale factor in the context of scale drawings and maps.
- Problems may be written directly or within a context.

**Content Connections from Previous Grades:**  
 5.3, 6.2.1

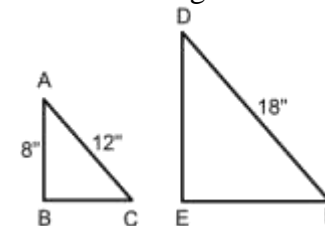
**Sample Items:**

This is a sketch of a 40 foot by 40 foot shop. Using the sketch and scale given, the area of the storage room when built will be \_\_\_\_\_ square feet.



- A. 32
- B. 48
- C. 96
- D. 128

Triangle ABC and triangle DEF are similar triangles. What is the length of  $\overline{DE}$  ?



- A. 10 inches
- B. 12 inches
- C. 14 inches
- D. 20 inches

**Core Standard: 7.2 Number and Operations, Algebra and Geometry**  
**Develop an understanding of and apply proportionality, including similarity.**

**Score Reporting Category 2**

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.2.5 Convert among different units of measurement to solve problems, including rates.

**Assessable Academic Vocabulary:**

convert  
 units of measurement – customary and metric  
 rate

**Symbols and Notation:**

mm “millimeter”  
 cm “centimeter”  
 m “meter”  
 km “kilometer”

- Customary units will be spelled (inch, foot, yard, mile).
- Metric units may be abbreviated.
- Square units may be written using exponents (e.g., cm<sup>2</sup>), “square cm” or “square centimeters.” Cubic units will be similarly written.

**Boundaries of Assessable Content:**

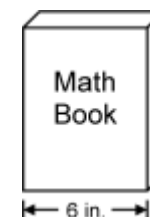
Check out the formula page to see the eligible units to convert for testing purposes.

- Items assessing this standard include converting among different units of measurement to solve problems, including rates.
- Students may be asked to convert any units listed on the formula sheet as well as use the fact that 1 foot = 12 inches and 1 centimeter = 10 millimeters.
- Problems may require one or several steps to determine the correct conversion (e.g. miles per hour to feet per minute).

**Content Connections from Previous Grades:**  
 4.3

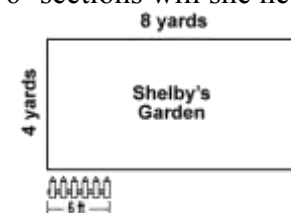
**Sample Items:**

The math book is 6 inches wide.  
 How many centimeters wide is it? (1 inch = 2.54 cm)



- A. 15.24 cm
- B. 12.70 cm
- C. 8.54 cm
- D. 3.46 cm

Shelby has a garden which measures 4 yards by 8 yards. She wants to build a fence around the edge. The fence comes in 6-foot sections. How many 6’ sections will she need to buy?



- A. 4
- B. 12
- C. 16
- D. 18

Convert a measurement in feet per second into the equivalent in miles per hour.

**Core Standard: 7.2 Number and Operations, Algebra and Geometry**  
 Develop an understanding of and apply proportionality, including similarity.

**Score Reporting Category 2**

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.2.6 Apply scale factor to analyze how the change in one measure (e.g., length, area, volume) affects another..

**Assessable Academic Vocabulary:**

- area
- length
- ratio
- scale factor
- volume

**Symbols and Notation:**

- $m^2$  “square meters”
- $m^3$  “cubic meters”
- Metric units may be abbreviated.
- Customary units will not be abbreviated.

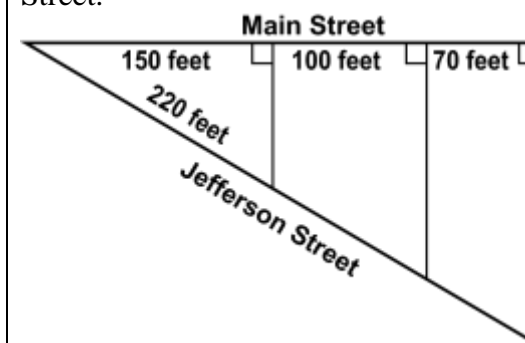
**Boundaries of Assessable Content:**

- Items assessing this standard include applying scale factor to analyze how the change in one measure (e.g., length, area, volume) affects another.
- Problems may include length, perimeter, area, surface area or volume and may involve similar figures. Students may need to find a missing length, given perimeter, area, surface area, or volume given directly in the problem or in a context.
- Problems may be solved using formulas and/or proportions.

**Content Connections from Previous Grades:**  
 5.3, 6.2.5

**Sample Items:**

A developer has a divided triangular lot as shown in the diagram. Find the total length of the developer’s property that fronts Jefferson Street.



- A. 366.67 feet    C. 540.00 feet
- B. 469.33 feet    D. 660.00 feet

A television screen with a 12-inch diagonal has a height of 9 inches. What is the diagonal of a similar television screen with a height of 24 inches?

- A. 12 inches    C. 24 inches
- B. 18 inches    D. 32 inches

Given a rectangular solid, what would be the change in the volume if the height were 3 times taller?

**Core Standard: 7.3 Measurement and Geometry**

**Score Reporting Category 3**

Develop an understanding of and use formulas to determine surface area and volume.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.3.1 Use models to explain the reasonableness of formulas for the circumference and area of circles.

**Assessable Academic Vocabulary:**

area  
circumference  
diameter  
pi ( $\pi$ )  
radius

**Symbols and Notation:**

$\pi$  "pi"  
 $\approx$  "is approximately equal to"

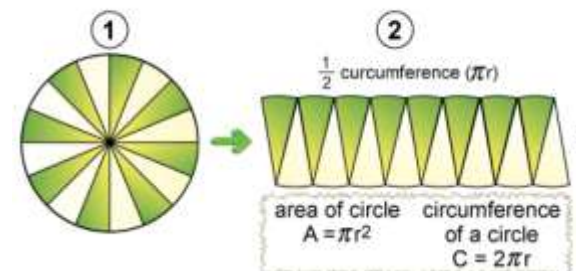
**Boundaries of Assessable Content:**

- Items assessing this standard must include a model to explain the reasonableness of the formula for the circumference of a circle or the area of a circle.
- Reasonableness of the formula will be the connection between the model and the formula for the area or circumference of a circle.

**Content Connections from Previous Grades:**  
6.2.5

**Sample Items:**

Which statement best explains how Figure 2 shows the given formula for area of a circle?



- A. It shows that circumference and area formulas are always equal.
- B. It shows area equals  $(16 \div 2)(\pi r)$
- C. It is a rectangular-like shape, with area equal base ( $\pi r$ ) times height ( $r$ ).
- D. It shows that the radius doubled times  $\pi$  gives the area.

Given a circle with labeled diameter or radius and the circumference, select a formula that would produce the area or circumference – using the numbers instead of variables.

**Core Standard: 7.3 Measurement and Geometry**

**Score Reporting Category 3**

Develop an understanding of and use formulas to determine surface area and volume.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.3.2 Know common estimates of  $\pi$  and use these values to estimate and calculate the circumference and area of a circle

**Assessable Academic Vocabulary:**

area  
circumference  
diameter  
pi ( $\pi$ )  
radius

**Symbols and Notation:**

$\pi$  “pi”  
 $\approx$  “is approximately equal to”

**Boundaries of Assessable Content:**

- Common estimates for pi include 3.14, 3 (rounded to nearest whole number), and  $\frac{22}{7}$ .
- Items assessing this standard include estimating and calculating the circumference and area of a circle.
- Estimating and calculating the circumference or area of a circle involves using a common estimate for pi, NOT leaving a  $\pi$  in the answer which would be the exact answer.
- Problems may be written directly or given in a context.

**Content Connections from Previous Grades:**  
6.2.5

**Sample Items:**

Timmy the Turtle starts his daily exercise, walking around the circular pond. Today, Timmy is tired and only walks half way around. If the radius of the pond is 21 feet, tell approximately how far Timmy the Turtle walked today. (Use  $\pi \approx 3.14$ )

- A. 32.97 ft.
- B. 65.94 ft.
- C. 131.88 ft.
- D. 692.37 ft.



**Core Standard: 7.3 Measurement and Geometry**

**Score Reporting Category 3**

Develop an understanding of and use formulas to determine surface area and volume.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.3.3 Solve problems involving areas and circumferences of circles.

**Assessable Academic Vocabulary:**

area  
circumference  
diameter  
pi ( $\pi$ )  
radius

**Symbols and Notation:**

$\pi$  "pi"  
 $\approx$  "is approximately equal to"

**Boundaries of Assessable Content:**

- Items assessing this standard include solving problems involving areas and circumferences of circles.
- Problems may be written directly or given in a context.
- Students may have to choose whether to find area or circumference.
- Problems may ask students to solve for a missing dimension (e.g., diameter from a circumference) and may involve portions of circles (e.g., half-circle).

**Content Connections from Previous Grades:**

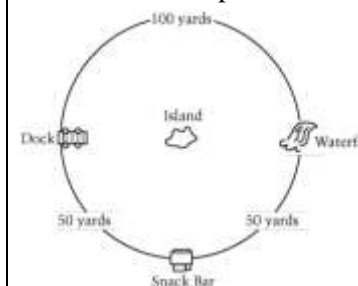
**Sample Items:**

Find the approximate circumference of a circle that has a diameter of 15 mm. (Use  $\pi \approx 3.14$ )

- A. 23.55 mm
- B. 47.10 mm
- C. 94.20 mm
- D. 176.63 mm

Find the area of the circle above.

The distance around a circular pond are shown below. From the snack bar, Jake notices an island in the center of the pond.



Of the following, which is the best approximation of the distance from the snack bar to the center of the island?

- A. 16 yards
- B. 20 yards
- C. 32 yards
- D. 50 yards
- E. 64 yards

Source: NAEP 2007 Released Item

**Core Standard: 7.3 Measurement and Geometry**

**Score Reporting Category 3**

Develop an understanding of and use formulas to determine surface area and volume.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.3.4 Use models to explain the reasonableness of formulas for the surface area of pyramids and cylinders, and volume of pyramids, cylinders, and cones.

**Assessable Academic Vocabulary:**

base  
cone  
cylinder  
face  
height  
prism  
pyramid  
slant height  
surface area  
volume

**Symbols and Notations:**

LA lateral area  
SA area of base & lateral area  
B area of base  
V volume

**Boundaries of Assessable Content:**

- Items assessing this standard must include the use of a model to explain the reasonableness of the formula for:
  - surface area of pyramids
  - surface area of cylinders
  - volume of pyramids
  - volume of cylinders
  - volume of cones
- Formulas will match those given on the ODE formula sheet for grade 7.
- It will not be assumed that students are familiar with any one model. Any model used will be explained in words or in pictures.

**Content Connections from Previous Grades:**

4.3, 5.3

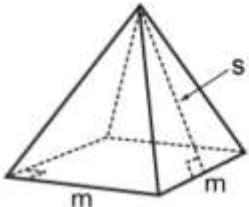
**Sample Items:**

The formula for finding the surface area of a pyramid is

$$SA = (LA) + (BA)$$

LA is lateral area (areas of all faces excluding the base) and BA is base area

For this square-base pyramid, which expression represents lateral area (LA) in the formula?



A.  $\frac{1}{2}ms$

B.  $m^2$

C.  $4\left(\frac{1}{2}ms\right)$

D.  $4\left(\frac{1}{2}ms\right) + m^2$

**Core Standard: 7.3 Measurement and Geometry**  
**Develop an understanding of and use formulas to determine surface area and volume.**

**Score Reporting Category 3**

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.3.5 Find and justify relationships among the formulas for the areas of different polygons when determining surface area.

**Assessable Academic Vocabulary:**

faces  
 polygon  
 surface area

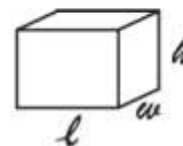
**Symbols and Notation:**

**Boundaries of Assessable Content:**

- Items assessing this standard include finding and justifying relationships among the formulas for the areas of polygons and the surface area of a figure.
- Formulas will be given as listed on the ODE formula sheet for grade 7.
- Items may connect the components of a specific figure to the shapes that make up its surface and show how those formulas go together to make the complete surface area formula.

**Content Connections from Previous Grades:**  
 5.3, 4.3

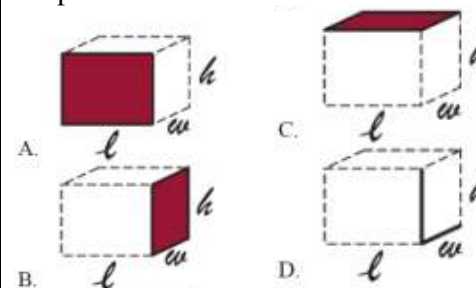
**Sample Items:**



The formula for finding the surface area for this prism is

$$SA = 2(\ell w + wh + \ell h)$$

In this formula, “**wh**” represents which portion of the prism?



**Core Standard: 7.3 Measurement and Geometry**

**Score Reporting Category 3**

Develop an understanding of and use formulas to determine surface area and volume.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.3.6 Solve problems involving surface areas of pyramids and cylinders and volumes of pyramids, cylinders, and cones.

**Assessable Academic Vocabulary:**

cone  
cylinder  
faces  
faces  
pyramid  
surface area  
surface area  
volume

**Symbols and Notations:**

$m^2$  "square meters"  
 $m^3$  "cubic meters"  
AB means area of the base for volume  
Volume is expressed in cubic units  
Surface area is expressed in square units.

**Boundaries of Assessable Content:**

These refer to these basic shapes, compound shapes are in 7.3.7

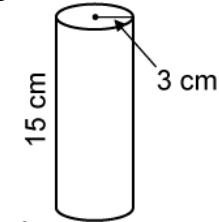
- Items assessing this standard include solving problems involving **surface areas** of
  - pyramids
  - cylinders
- Items assessing this standard include solving problems involving **volumes** of
  - pyramids
  - cylinders
  - cones
- Answers involving  $\pi$
- may be approximated or exact ( $\pi$  left in the answer).
- Students will have access to the ODE formula sheet for grade 7.

**Content Connections from Previous Grades:**

5.3.8, 5.3.9

**Sample Items:**

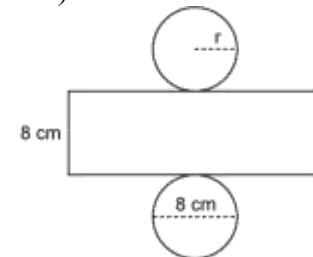
What is the approximate volume of the glass?



- A.  $1695 \text{ cm}^3$
- B.  $424 \text{ cm}^3$
- C.  $283 \text{ cm}^3$
- D.  $141 \text{ cm}^3$

Find the total surface area of the cylinder in square cm.

(Use 3.14 for  $\pi$ )



- A. 200.96
- B. 301.44
- C. 602.88
- D. 803.84

**Core Standard: 7.3 Measurement and Geometry**

**Score Reporting Category 3**

Develop an understanding of and use formulas to determine surface area and volume.

It is essential that these standards be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations.

**Content Standard:**

7.3.7 Estimate and compute the area and volume of complex or irregular shapes by dividing them into basic shapes.

**Assessable Academic Vocabulary:**

area  
 complex shape  
 surface area  
 volume

**Symbols and Notation:**

$m^2$  “square meters”  
 $m^3$  “cubic meters”

**Boundaries of Assessable Content:**

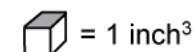
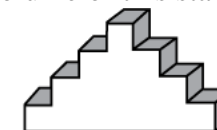
- Items assessing this standard include estimating and computing area of complex or irregular two-dimensional shapes.
- Items assessing this standard include estimating and computing surface area and volume of complex or irregular three-dimensional shapes.
- Basic two-dimensional shapes include triangles, parallelograms (including rhombus, rectangle, square), trapezoids, and circles.
- Basic three-dimensional shapes include prisms, pyramids, cylinders, and cones.

**Content Connections from Previous Grades:**

7.3.6, 4.3.6

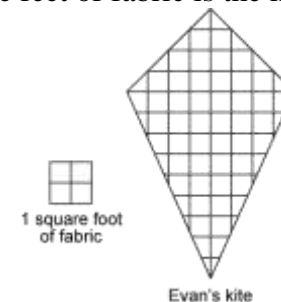
**Sample Items:**

Estimate the volume of this staircase.



- A.  $10 \text{ in}^3$                       C.  $20 \text{ in}^3$   
 B.  $15 \text{ in}^3$                       D.  $25 \text{ in}^3$

Evan is making a kite. Approximately how many square feet of fabric is the kite?



- A. Between 5 and 6  
 B. Between 11 and 14  
 C. Between 21 and 24  
 D. Between 45 and 46

**Assessable Academic Vocabulary Summary List for Grade 7**

(Note: Assessable Academic Vocabulary from previous grades may also be used without explanation.)

area	pi ( $\pi$ )
base	polygon
circumference	prism
complex shape	probability
cone	product
congruent	proportion
convert	proportional
coordinate graph	pyramid
corresponding angles	quadrants
corresponding parts	quotient
corresponding sides	radius
cylinder	rate
diameter	ratio
difference	round
estimate	scale factor
experimental probability	similar
face	slant height
height	slope
justify	solve
length	sum
line	surface area
linear equation	table
model	theoretical probability
number line	unit rate
opposite	units of measurement – customary and metric
percent	volume
percent of change	

*Note:*

*Greatest Common Factors, Least Common Multiples, Primes, Composites, and Prime Factorization, while not mentioned in the standards, are certainly appropriate for instruction beginning in grade 5 or 6. However, for assessment purposes, they may not be assessed by name. These concepts must be introduced through an explanation or a context.*

## Item Specifications

Oregon Assessment of Knowledge and Skills (OAKS) is a statewide assessment scored by the state. It is a required assessment that provides the base for the accountability system. The OAKS also measures proficiency in the Essential Skills and is one way to determine student’s eligibility for a high school diploma or modified diploma beginning with the graduating class of 2014.

### Criteria for All OAKS Test Questions

Test items must:

- be appropriate for students in terms of grade-level difficulty, cognitive complexity, reading level, interests and experience.
- be free of age, gender, ethnic, religious, socioeconomic, or disability stereotypes or bias.
- provide clear and complete instructions to students.

### Graphics Criteria

Graphics are used in OAKS to provide both necessary and supplemental information. Some graphics contain information that is necessary for answering the question, while other graphics illustrate or support the context of the question.

- Graphic displays, their corresponding items and answer choices will appear on the same screen for online items.
- Shading and color will be minimized. It will be used to make a figure’s size, shape or dimensions clear, and not solely for artistic effect.
- When objects or regions of particular colors must be identified from a graphic, the objects or regions will be labeled as to their color.
- Graphics used for computer scored constructed response items are displayed within a grid space and allow students to manipulate answer graphics and answer choices.

### Item Style and Format Criteria for Multiple-Choice Items

- Test items will be in the form of questions - or sentences that require completion.
- Each item will have three, four, or five answer choices. Students will be told in the test directions to choose the best answer from among the choices.
- Answer choices will be arranged one of three ways beneath the question: vertically, horizontally, or in two columns (i.e., A and B in the left column, C and D in the right column).
- Neither “None of the above” nor “All of the above” will be used as one of the answer choices. “There is not enough information to tell” is an allowed answer choice.
- Test items may be worded in the negative (“Which of these is NOT ...”), but this structure will be used only when it offers substantial advantages for the item construction.
- Items should be free of absolute wording, such as “always” and “never,” and may have qualifying words (e.g., least, most, except) printed in CAPS for emphasis.
- Masculine pronouns should NOT be used to refer to both sexes. Plural forms should be used whenever possible to avoid gender-specific pronouns (e.g., instead of “The student will make changes so that he ....,” use “The students will make changes so that they....”).
- An equal balance of male and female names should be used, including names representing different ethnic groups.



- Test items aligned to standards may contain extraneous information.
- Stacked English-Spanish test items are used on electronic tests for the English-Spanish OAKS.
- Each Score Reporting Category will have items with a range of difficulty and complexity levels.
- Each test item will measure only one Score Reporting Category

#### Item Style and Format Criteria for Computer-Scored Constructed Response Items

- Test items will be in the form of questions that ask for at least one object to be created or matched to an existing picture,
- Each item may have many discrete and correct answer choices.
- Test items may be worded so that not all answer choices are used to construct the correct response.
- An equal balance of male and female names should be used including names representing different ethnic groups.
- Test items aligned to standards may contain extraneous information but only to enhance the students' understanding of the question.
- Side-by-side English-Spanish test items of this type are under development.

#### Additional Criteria for Mathematics Test Questions

- Except in translation items (name to numeral, numeral to name), numbers will be expressed as numerals.
- In general, numbers zero through nine should be presented as words, and numbers 10 and above should be presented as numerals. In the item stem, any numbers needed to compute answers should be

- presented as numerals.
- Commas will be used in numbers with four or more digits.
- Decimal numbers less than one will be written with leading zeros.
- All fractions will be written with a horizontal bar separating the numerator and denominator.
- If the answer choices for an item are strictly decimal numerals or integers, they should be arranged in ascending or descending order, with the place values of digits aligned. An exception would be when this ordering of options might give a clue as to the correct option. When the item requires the identification of relative size or magnitude, choices should be arranged as they are presented in the item stem.
- If the answer choices for an item are neither strictly numerical nor denominate numbers, the choices should be arranged by the logic presented in the question or by length.
- Answer choices will include units, as appropriate.
- Computations required in test items will not be so complicated that they take an inordinate amount of time to complete, even with calculators. Instead, reasoning within the context of the items is emphasized.
- Test items will be appropriate for students in the assigned grade in terms of reading level, interests, and experience. For mathematics test items, the reading level should be approximately one grade level below the grade level of the test, except for specifically assessed mathematical terms or concepts.
- Standard units of measure should be spelled out, except in graphics where an abbreviation may be

used (e.g., ft or yd). Abbreviations that also spell a word must be punctuated to avoid confusion. For example, to avoid confusion with the preposition “in,” the abbreviation “in.” should be used for the unit of measure “inches.” If an abbreviation is used in a graphic, an explanation of the meaning of the abbreviation should be included in the stem. Metric units may be abbreviated.

In addition (See: Test Administration Manual at <http://www.ode.state.or.us/go/tam> )

- Students are strongly encouraged to use calculators – either the on-screen calculator, their own, or one provided by the school.
- Rulers, manipulative and other tools commonly available to all students are also encouraged. No problems require the use of a calculator and no more than a four-function calculator is needed for any problem, although scientific calculators are highly recommended for use at grades 8 and 10.
- A reference sheet containing appropriate formulas and conversions is provided to students. If formulas not on the sheet are needed, they should be included with the item.

## Mathematics Test Blueprint

### Introduction

The blueprints used to construct Knowledge and Skills Tests for Mathematics prescribe the:

- Score Reporting Categories (SRC) included on each test,
- The cognitive demand and difficulty level of items as distributed on a test form,
- the number and percentages of test items from each SRC included on each test, and
- the total number and percentages of operational and field test items included for each test.

Teachers and other educators have historically played a vital role in the development of these specifications and blueprints by serving on Content and Assessment Panels and other review groups. These groups have advised the Department as content standards have been developed, and have helped establish priorities on which standards to assess and the weighting of the strands within each content area assessment.

### Alignment of Test Items to Content Standards

Test items are carefully aligned to content standards at the appropriate grade level through a rigorous process at two points in the test item development process:

- At item development workshops, item writers are provided with adopted content standards and content standard elements to which they must write test items; during a peer review process, this alignment is verified by another grade level item developer and the grade-level facilitator..

- Alignment of items to the standards is further verified during a review by members of a Content and Assessment Panel, who ensure items not only match the standards, but also verify overall quality and appropriateness. Reviewers either accept items as a strong match to the targeted standards, edit items to achieve a strong match, or reject items which do not strongly match the standards.

The Appendix to this document includes additional evidence describing procedures ensuring alignment during item, development, including descriptions of Item Development and the Life of an Item.

### Content Coverage

Prior to item writing activities, item databases are reviewed to determine the extent that the available items represent the emphasis and content in the standards. If any content standards are underrepresented in the item pool, they are identified and targeted specifically for additional item development. This assures that the item pools will have sufficient numbers of items aligned to the each of the content standards to allow the test algorithm to deliver tests which follow the blueprint for content, difficulty, and cognitive complexity.

For electronic administration, all tests and the item pools from which they are constructed follow the weighting of each score reporting category as reflected in the chart titled “Weighting of Mathematics Score Reporting Categories.” Items aligned to the same SRC are selected to provide a range of difficulty so that the progressive nature of the test is maintained as students of varied

ability levels are presented with items most appropriate to their ability from that pool. Although a student may not see an item addressing every one of the standards in a single test event, the item pool contains multiple items for each content standard at a variety of difficulty levels and cognitive complexity.

In addition, the adaptive algorithm specifically considers alignment criteria when drawing test items. As a result, we accomplish the dual purpose of creating a test form that is appropriately developed for each student and it meets the criteria set forth for alignment (e.g., balance of representation, depth of knowledge).

In order to report subscores, or scores for SRCs, no fewer than six items will be used for each SRC. Online tests report total test scores and scores for SRCs. (Subscores)

### **Additional Test Design Criteria**

Each item assesses only one SRC at one grade.

Each item assesses only one content standard at one grade.

Online-adaptive test opportunities provide a range and breadth of items within each SRC and content standard. Test pools attempt to provide a minimum of one item at each difficulty level for each content standard. Test pools range in size from 800 to 1500 items.

Key placement cannot be controlled for online-adaptive assessments, so to ensure more random correct keys, item writers are instructed to rotate the correct key for their items during item authoring.

English test blueprints provide the criteria for all English-Spanish tests. Test pools and are designed to match the English test opportunities.

## Weighting of Mathematics Score Reporting Categories

The chart below shows the score reporting categories for each of the grades and the percentage of questions on a test that assess each score reporting category. For example, at grade 5, 35% of the items on a test assess Number and Operations and Data Analysis, which equals about 14 items on a 40-item test. The second chart, on the next page, is an expanded view of the criteria for test weighting.

<b>Grade</b>	<b>Score Reporting Category 1</b>	<b>Weight</b>	<b>Score Reporting Category 2</b>	<b>Weight</b>	<b>Score Reporting Category 3</b>	<b>Weight</b>
<b>3</b>	Number and Operations	35%	Number and Operations, Algebra, and Data Analysis	35%	Geometry and Measurement	30%
<b>4</b>	Number and Operations	35%	Number and Operations and Algebra	35%	Measurement	30%
<b>5</b>	Number and Operations and Data Analysis	35%	Number and Operations and Algebra	35%	Geometry, Algebra, and Measurement	30%
<b>6</b>	Number and Operations	35%	Number and Operations and Probability	35%	Algebra	30%
<b>7</b>	Number and Operations and Algebra	35%	Number and Operations, Algebra and Geometry	35%	Measurement and Geometry	30%
<b>8</b>	Algebra	40%	Data Analysis and Algebra	30%	Geometry and Measurement	30%
<b>HS</b>	Algebra	50%	Geometry	30%	Statistics	20%

## Mathematics Test Blueprint- Grade 7 Content Coverage and Weighting

Score Reporting Categories	Number of OAKS Online Items	Target % of Questions Assessed per Test*	Online Test Pool Size
<b>Number and Operations and Algebra:</b> Develop an understanding of operations on all rational numbers and solving linear equations.	12-16	35%	290
<b>Number and Operations, Algebra and Geometry:</b> Develop an understanding of and apply proportionality, including similarity.	12-16	35%	380
<b>Measurement and Geometry:</b> Develop an understanding of and use formulas to determine surface area and volume.	10-14	30%	220
<b>Operational Item Total</b>	40		890
<b>Field Test Item Total</b>	5		
<b>Total Items on Test</b>	45	100%	

\*During an individual student testing session, the test algorithm selects items from each SRC, targeting the percentages indicated. Furthermore, items are selected to match the target item difficulty level, determined by the student's performance on previous items, and also to match the Cognitive Demand Distribution Goals for the test. The numbers of items available in the item pool for each SRC are sufficient to allow three tests per student each year, without the student seeing any item more than once.

### Target Cognitive Demand and Item Difficulty Distribution

The mathematics test pools are designed so that items having a range of Cognitive Demand and a range of difficulty are included for each student test opportunity. The target item pool difficulty distribution for the Grade 7 test is outlined in the chart. A target range of cognitive demand item delivery is also included. (See Appendix B, Cognitive Demand and RIT by Difficulty for all grades). The three Cognitive Demand levels used to qualify Oregon’s test items are:

- **Recall:** Item requires a student to recall a fact, information or procedure.
- **Skill/Concept:** Item requires a student to use skill or concept, including thinking that requires two or more steps.
- **Strategic Thinking:** Item requires a student to use reason, develop a plan or use a sequence of steps.

Online adaptive tests provide students with questions at the beginning of the test at or about the mean RIT level and as the student responds, the test item delivery system makes adjustments by selecting appropriate items for each student based upon their correct and incorrect responses.

Student scores on each test will vary due to performance and the set of unique test items issued to the student. Generally, students will earn scores between the maximum high and minimum low range. The following are the possible high and low RIT student scores for grade 7 tests, within one or two points, based on a given year’s item pool.

<b>High RIT</b>	290
<b>Low RIT</b>	170

<b>Grade 7 Mathematics</b>	
<b>Target Item Pool Difficulty Distribution Goals</b>	
<b>RIT by Difficulty</b>	
212-226	33%
227-233	33%
234-252	33%
<b>RIT Range</b>	212-252
<b>Mean RIT</b>	231
<b>Target Cognitive Demand Distribution Goals</b>	
Recall	30%
Skill/Concept	50%
Strategic Thinking	20%



## **Achievement Level Descriptors**

Achievement level descriptors describe what students know and can do based on their performance on statewide knowledge and skills tests in the various content areas. These may be used by educators to target instruction and inform parents and students of the expectations for students to be considered proficient at a particular grade level.

The Achievement Level Descriptors are based on a sampling of a larger set of content outlined in the *State of Oregon Content Standards for Kindergarten through Grade 8* (2007) and the *State of Oregon High School Mathematics Standards* (2009). Results for individual students are only one indicator of student ability as measured at the time of testing. These statements give a general description of what most students know and can do within a particular band of achievement and are presented in the order of the way they are reported rather than by importance or test emphasis.

Students who score at or within a particular level of achievement possess the bulk of the abilities described at that level and generally have mastered the skills described in the preceding achievement levels.

Achievement Level Descriptors for each subject area were developed by groups of parents, educators, and business people who worked with state officials to establish the minimum scores required for Exceeds, Meets, Nearly Meets and Does Not Yet Meet.

## Oregon Mathematics Achievement Level Descriptors – Grade 7

The achievement level descriptors are cumulative.

	Does Not Yet Meet	Nearly Meets	Meets	Exceeds
<b>General Policy Definitions</b> (Apply to all grades and all subjects)	Students do not demonstrate mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate partial mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate mastery of grade-level knowledge and skills exceeding the requirement for proficiency.
<b>Mathematics Policy Definitions</b> (Apply to all grades)	Students demonstrate limited mastery of mathematical knowledge and skills through the direct application of a concept or procedure in simplified and familiar situations with occasional success.	Students demonstrate partial mastery of mathematical knowledge and skills through the direct application of concepts and procedures in familiar situations with regular success. They are able to explain some of their steps.	Students demonstrate mastery of mathematical knowledge and skills through selecting from an assortment of strategies and integrating concepts and procedures in a variety of situations with consistent success. They are able to explain steps and procedures.	Students demonstrate mastery of mathematical knowledge and skills through the use of multiple reasoning strategies and apply them in new and complex situations with consistent success. They are able to analyze their strategies and solutions.
<b>Mathematics Achievement Level Descriptors</b>  <b>7.1</b> <b><u>Number and Operations and Algebra:</u></b> Develop an understanding of operations on all rational numbers and solving linear equations.	<ul style="list-style-type: none"> <li>Inconsistently apply given models (including everyday contexts), strategies, <b>or</b> procedures to compute with integers.</li> <li>Inconsistently estimate solutions <b>or</b> solve problems involving positive and negative rational numbers.</li> <li>Inconsistently apply properties of rational numbers and algebra to write and solve linear equations in one variable.</li> </ul>	<ul style="list-style-type: none"> <li>Apply given models (including everyday contexts), strategies, <b>or</b> procedures to compute with integers.</li> <li>Estimate solutions <b>or</b> solve problems involving positive and negative rational numbers.</li> <li>Apply properties of rational numbers and algebra to write and solve linear equations in one variable.</li> </ul>	<ul style="list-style-type: none"> <li>Develop, analyze, and apply models (including everyday contexts), strategies, <b>and</b> procedures to compute with integers, with an emphasis on negative integers.</li> <li>Extend knowledge of both positive and negative rational numbers to estimate solutions <b>and</b> solve problems.</li> <li>Apply properties of rational numbers and algebra to write and solve linear equations in one variable and explain steps.</li> </ul>	<ul style="list-style-type: none"> <li>Compute with integers and apply efficient strategies to analyze models (including new and complex situations).</li> <li>Integrate knowledge of both positive and negative rational numbers to estimate solutions and fluently solve problems, and justify strategies.</li> <li>Apply properties of rational numbers and algebra to write and solve complex linear equations in one variable and justify steps clearly.</li> </ul>

## Oregon Mathematics Achievement Level Descriptors – Grade 7

The achievement level descriptors are cumulative.

	Does Not Yet Meet	Nearly Meets	Meets	Exceeds
<b>General Policy Definitions</b> (Apply to all grades and all subjects)	Students do not demonstrate mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate partial mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate mastery of grade-level knowledge and skills exceeding the requirement for proficiency.
<b>Mathematics Policy Definitions</b> (Apply to all grades)	Students demonstrate limited mastery of mathematical knowledge and skills through the direct application of a concept or procedure in simplified and familiar situations with occasional success.	Students demonstrate partial mastery of mathematical knowledge and skills through the direct application of concepts and procedures in familiar situations with regular success. They are able to explain some of their steps.	Students demonstrate mastery of mathematical knowledge and skills through selecting from an assortment of strategies and integrating concepts and procedures in a variety of situations with consistent success. They are able to explain steps and procedures.	Students demonstrate mastery of mathematical knowledge and skills through the use of multiple reasoning strategies and apply them in new and complex situations with consistent success. They are able to analyze their strategies and solutions.
<b>Mathematics Achievement Level Descriptors</b>  <b>7.2</b> <b>Number and Operations, Algebra and Geometry:</b> Develop an understanding of and apply proportionality, including similarity.	<ul style="list-style-type: none"> <li>• Inconsistently identify or represent proportional relationships with coordinate graphs, tables or equations.</li> <li>• Inconsistently solve problems involving ratio, proportion, percent, simple probability, scale factors, similarity or congruence.</li> <li>• Inconsistently convert among different units of measurement, given conversion factors, to solve problems.</li> <li>• Inconsistently recognize how a change in one measure (e.g., length, area, volume) affects another.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and represent proportional relationships with coordinate graphs, tables or equations.</li> <li>• Solve problems involving ratio, proportion, percent, simple probability, scale factors, similarity, or congruence.</li> <li>• Convert among different units of measurement, given conversion factors, to solve problems.</li> <li>• Recognize how a change in one measure (e.g., length, area, volume) affects another.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and represent proportional relationships (including inverse proportionality) with coordinate graphs, tables, and equations. Identify unit rate as the slope of the related line.</li> <li>• Apply ratio and proportionality to solve problems involving ratio, proportion, percent, simple probability, scale factors, similarity and congruence.</li> <li>• Convert among different units of measurement to solve rate problems and explain process.</li> <li>• Apply scale factor to analyze how a change in one measure (e.g., length, area, volume) affects another.</li> </ul>	<ul style="list-style-type: none"> <li>• Integrate knowledge of and explain proportional relationships (including inverse proportionality) with coordinate graphs, tables and equations. Interpret unit rate as the slope of the related line.</li> <li>• Apply proportionality and integrate knowledge of ratios to solve complex problems including percent, probability, scale factors, similarity and congruence and justify thinking.</li> <li>• Convert among different units to solve multi-step problems, including rates, and justify results.</li> <li>• Integrate knowledge of measurement (length, area, volume) and scale factor to analyze and generalize how a change in one measure affects others.</li> </ul>

## Oregon Mathematics Achievement Level Descriptors – Grade 7

The achievement level descriptors are cumulative.

	Does Not Yet Meet	Nearly Meets	Meets	Exceeds
<b>General Policy Definitions</b> (Apply to all grades and all subjects)	Students do not demonstrate mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate partial mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate mastery of grade-level knowledge and skills required for proficiency.	Students demonstrate mastery of grade-level knowledge and skills exceeding the requirement for proficiency.
<b>Mathematics Policy Definitions</b> (Apply to all grades)	Students demonstrate limited mastery of mathematical knowledge and skills through the direct application of a concept or procedure in simplified and familiar situations with occasional success.	Students demonstrate partial mastery of mathematical knowledge and skills through the direct application of concepts and procedures in familiar situations with regular success. They are able to explain some of their steps.	Students demonstrate mastery of mathematical knowledge and skills through selecting from an assortment of strategies and integrating concepts and procedures in a variety of situations with consistent success. They are able to explain steps and procedures.	Students demonstrate mastery of mathematical knowledge and skills through the use of multiple reasoning strategies and apply them in new and complex situations with consistent success. They are able to analyze their strategies and solutions.
<b>Mathematics Achievement Level Descriptors</b>  <b>7.3</b> <b>Measurement and Geometry:</b> Develop an understanding of and use formulas to determine surface area and volume.	<ul style="list-style-type: none"> <li>• Inconsistently use a given model to explain the formulas for the circumference <b>or</b> area of circles, surface area of pyramids <b>or</b> cylinders, <b>or</b> volume of pyramids, cylinders, <b>or</b> cones.</li> <li>• Inconsistently use a given estimate of <math>\pi</math> to estimate or calculate the circumference <b>or</b> area of circles.</li> <li>• Inconsistently apply given formulas for the areas of different polygons when determining surface area.</li> <li>• Inconsistently solve problems involving surface areas of pyramids <b>or</b> cylinders <b>or</b> volumes of pyramids, cylinders, <b>or</b> cones. Inconsistently estimate <b>or</b> compute area <b>or</b> volume of irregular shapes.</li> </ul>	<ul style="list-style-type: none"> <li>• Select and use a given model to explain formulas for the circumference <b>or</b> area of circles; surface area of pyramids <b>or</b> cylinders <b>or</b> volume of pyramids, cylinders, <b>or</b> cones.</li> <li>• Use a given estimate of <math>\pi</math> to estimate or calculate the circumference <b>and</b> area of circles.</li> <li>• Apply given formulas for the areas of different polygons when determining surface area.</li> <li>• Solve problems involving surface areas of pyramids <b>or</b> cylinders <b>or</b> volumes of pyramids, cylinders, <b>or</b> cones. Estimate <b>or</b> compute area or volume of irregular shapes.</li> </ul>	<ul style="list-style-type: none"> <li>• Use models to explain the formulas for the circumference <b>and</b> area of circles; surface area of pyramids <b>and</b> cylinders; <b>and</b> the volume of pyramids, cylinders, <b>and</b> cones.</li> <li>• Select and use estimates of <math>\pi</math> to estimate or calculate the circumference <b>and</b> area of circles.</li> <li>• Apply relationships among formulas for the areas of different polygons when determining surface area.</li> <li>• Solve problems involving surface areas of pyramids <b>and</b> cylinders <b>and</b> volumes of pyramids, cylinders, <b>and</b> cones. Estimate <b>and</b> compute area and volume of complex or irregular shapes by dividing them into basic shapes.</li> </ul>	<ul style="list-style-type: none"> <li>• Use models to explain and justify the formulas for the circumference <b>and</b> area of circles; surface area of pyramids <b>and</b> cylinders; <b>and</b> the volume of pyramids, cylinders, <b>and</b> cones.</li> <li>• Select and use estimates of <math>\pi</math> to estimate or calculate the circumference <b>and</b> area of circles and justify the appropriateness of the estimate.</li> <li>• Apply and justify strategies utilizing relationships among formulas for the areas of different polygons when determining surface area.</li> <li>• Apply strategies to solve complex problems involving surface areas of pyramids <b>and</b> cylinders <b>and</b> volumes of pyramids. Estimate <b>and</b> compute area <b>and</b> volume of complex or irregular shapes and analyze strategies and solutions.</li> </ul>

**LOCAL ASSESSMENTS REQUIRED BY OAR 581-22-0615  
ASSESSMENT OF ESSENTIAL SKILLS**

**Local Performance Assessments**

School districts and public charter schools that offer instruction at grades 3 through 8 or high school must administer annual local performance assessments for students in grades 3 through 8 and at least once in high school for the skill areas of writing, speaking, mathematics problem solving, and scientific inquiry. The purpose of the local performance assessment requirement is to ensure that students in grades 3 through high school are afforded opportunities to learn and to receive feedback regarding their progress toward meeting specific state standards throughout their years in public schools.

A local performance assessment is a standardized measure (e.g., activity, exercise, problem, or work sample scored using an official state scoring guide), embedded in the school district’s or public charter school’s curriculum that evaluates the application of students’ knowledge and skills. Local performance assessments must be designed to closely align with state standards and to promote independent, individual student work.

School districts and public charter schools may either use a work sample scored using an official state scoring guide or a comparable measure adopted by the school district or public charter school to satisfy the local performance assessment requirement. *Appendix E – Work Samples and State Scoring Guides* of the 2009-10 Test Administration Manual provides guidance for those school districts and public charter schools choosing to use a work sample to satisfy this requirement.

**Assessment of Proficiency in the Essential Skills**

As part of the new graduation requirements, high school students must demonstrate proficiency in a set of Essential Skills, which are defined as process skills that cross academic disciplines and are embedded in the content standards. Starting with the graduating class of 2012, high school students must demonstrate proficiency in the Essential Skills of Reading, Writing, Speaking, and Mathematics.

Students may demonstrate proficiency in these Essential Skills using any of the assessment options approved by the State Board of Education.

As of May 2009, the Oregon Assessment of Knowledge and Skills (OAKS) is one of the approved assessment options for the Essential Skills of Reading, Writing, and Mathematics. Another approved option for the Essential Skills of Writing, Speaking, and Mathematics is the completion of work samples scored locally using an official state scoring guide. *Appendix D – Requirements for Assessment of Essential Skills* of the 2009-10 Test Administration Manual provides guidance for those school districts and public charter schools choosing to use a work sample to satisfy this requirement.

The Assessment of Essential Skills Review Panel (AESRP), which consists of experts from school districts and post-secondary education institutions, reviews and recommends additions or changes to the list of approved assessment options. The AESRP bases its recommendations on evidence provided by the school districts, research organizations, and other experts that the proposed assessment option accurately measures the Essential Skill. The State Board of Education then makes the determination whether to adopt the AESRP’s recommendations. ODE anticipates that the State Board of Education will approve additional assessment options based on recommendations from the AESRP in the coming months. In addition, the AESRP is developing a set of criteria for approval by the State Board of Education that school districts and public charter schools may use in developing local assessment options.

# Appendices

The Appendices of this document include ancillary materials provided to students to complete mathematics testing; and additional assessment documents that deal with test construction and design.

Included in this section are:

Appendix A: Oregon Achievement Standards Summary for All Subjects

Appendix B: Cognitive Demand and Item Difficulty Distribution Goals

Appendix C: Item Development Process

Appendix D: Life of an Item

Appendix E: Mathematical Problem Solving Official Scoring Guide Background and Resources

Appendix F: Official Formula Sheet and Conversion Tables

# ACHIEVEMENT STANDARDS

## 2012-13 Achievement Standards Summary

The charts below show the achievement standards (requirements to meet and exceed) for Oregon's Assessments of Knowledge and Skills (OAKS) by content area and grade or benchmark level. All students are required to take reading/literature and mathematics assessments in grades 3-8 and 11; in writing in grades 4, 7, and 11; and science in grades 5, 8, and 11. Assessments in social sciences are optional; however, they may be required by some districts or schools. For detailed assessment information, refer to the 2011-12 Test Administration Manual ([www.ode.state.or.us/go/TAM](http://www.ode.state.or.us/go/TAM)). It provides timelines, options, and procedures that ensure both test reliability and validity from classroom to classroom, teacher to teacher, school to school, and district to district.

Grade 3	MEET	EXCEED
Reading/Literature	211	224
Mathematics	212	219
Writing, Speaking, Science, Social Sciences	No state test	

Grade 6	MEET	EXCEED
Reading/Literature	226	237
Mathematics	227	237
Writing, Speaking, Science, Social Sciences	No state test	

Grade 4	MEET	EXCEED
Reading/Literature	216	226
Writing** • Composite Score • Minimum score in each trait • Conventions score	• 32 to 39* (out of 48) • 3 (out of 6) • Not doubled	• 40 to 48 (out of 48) • 4 (out of 6) • Not doubled
Voice and Word Choice are not included in the achievement standard. *A composite score of 28 to 31 points nearly meets the standard. Scores in this range indicate that the writing is close to meeting the standard and that local performance assessments could be used to provide a more comprehensive view of student proficiency in writing.		
Mathematics	219	227
Speaking, Science, and Social Sciences	No state test	

Grade 7	MEET	EXCEED
Reading/Literature	229	241
Writing** • Composite Score • Minimum score in each trait • Conventions score	• 40 to 49* (out of 60) • 3 (out of 6) • Doubled	• 50 to 60 (out of 60) • 4 (out of 6) • Doubled
Voice and Word Choice are not included in the achievement standard. *A composite score of 35 to 39 points nearly meets the standard. Scores in this range indicate that the writing is close to meeting the standard and that local performance assessments could be used to provide a more comprehensive view of student proficiency in writing.		
Mathematics	232	242
Speaking, Science, and Social Sciences	No state test	

Grade 5	MEET	EXCEED
Reading/Literature	221	230
Mathematics	225	234
Science	226	239
Social Sciences #	215	225
# Optional state test; may be required by districts or schools.		
Writing, Speaking	No state test	

Grade 8	MEET	EXCEED
Reading/Literature	232	242
Mathematics	234	245
Science	235	247
Social Sciences #	231	241
# Optional state test; may be required by districts or schools.		
Writing, Speaking	No state test	

\*\* Due to legislative action during the 2011 session the state writing assessment at grades 4 & 7 were suspended for the 2011-2012 and 2012-2013 school years.

# ACHIEVEMENT STANDARDS

High School	Achievement Standards for Oregon Statewide Assessments <sup>1</sup>		Oregon Assessment of Knowledge and Skills (OAKS) is one option to provide evidence of proficiency in Essential Skills.	
Subject Area	Meets	Exceeds	Notes	Essential Skill
Reading/Literature	236	247	Content of the 2011-2012 OAKS Reading/Literature Assessment is based on the Grade Level Content Standards adopted in 2002-2003.	Read and comprehend a variety of text
<b>Writing</b> • Composite Score • Minimum score allowed in any trait • Conventions score	• 40 to 49 (out of 60) • 3 (out of 6)  • Doubled	• 50 to 60 • 4 (out of 6)  • Doubled	*A composite score of 35 to 39 points nearly meets the standard. Scores in this range indicate that the writing is close to meeting the standard and that local performance assessments could be used to provide a more comprehensive view of student proficiency in writing. • Score on Voice and Word Choice traits are not included in the achievement standard.	Write clearly and accurately.
Mathematics	236	251	Content of the 2011-12 OAKS Mathematics test is based on the Content Standards adopted in 2009 for high school and 2007 for grades K-8.	Apply mathematics in a variety of settings
Science	240	252	Content of the 2011-12 OAKS Science test is based on the Content Standards adopted in 2009.	
Social Sciences	239	249	Optional State Assessment; content of the 2011-12 OAKS Social Sciences Assessment is based on the Content Standards adopted in 2001.	

## Achievement Standards for Demonstrating Proficiency in Essential Skills for High School Diploma<sup>2</sup>

Essential Skill	OAKS Assessment	Required Scores	Other Options
Reading (Class of 2012 & beyond)	Reading/Literature	236 Meets 247 Exceeds	Other approved standardized test; Work samples
Writing (Class of 2013 & beyond)	Writing Performance Assessment	40 Meets 50 Exceeds	Work samples
Apply Mathematics (Class of 2014 & beyond)	Mathematics	236 Meets 251 Exceeds	Other approved standardized test; Work samples

<sup>1</sup> In future years, Achievement Standards may change for the purposes of accountability and earning a high school diploma.

<sup>2</sup> For purposes of demonstrating mastery of Essential Skills, students must meet the achievement standards in effect during their 8<sup>th</sup> grade year. However, students may use achievement standards adopted in their 9<sup>th</sup> through 12<sup>th</sup> grade years that are equal to or lower than the achievement standards approved as of March 1 of the students' 8<sup>th</sup> grade year. In addition, students may demonstrate proficiency in the Essential Skills using additional assessment options adopted in their 9<sup>th</sup> through 12<sup>th</sup> grade years.



# ACHIEVEMENT STANDARDS

## A Look at Work Samples as Required Local Performance Assessments (Grades 3 – 8 and High School)

Local Performance assessments evaluate the application of students' knowledge and skills. OAR 581-022-0615 Assessment of Essential Skills requires students to complete one or more local performance assessments for each assessed skill area per year in grades 3-8 and at least once in high school. The table below outlines the achievement standards for work samples scored with an official state scoring guide and used as a local performance assessment. For detailed assessment information refer to the 2011-12 Test Administration Manual at [www.ode.state.or.us/go/TAM](http://www.ode.state.or.us/go/TAM). It provides work sample guidelines, options, and procedures that help ensure both work sample reliability and validity from classroom to classroom, teacher to teacher, school to school, and district to district.

Skill Area (Official State Scoring Guide)	Grade	Achievement Standard for Purpose of Local Performance Assessment		Notes about Work Samples
		Meets (out of 6)	Exceeds (out of 6)	
Writing	Grade 3	3	4	Grade 3 students are not held to a standard in Sentence Fluency.
	Grades 4-8 and High School	4	5	Voice and Word Choice may be scored but are not required traits. Exemplars reflect expectations at each grade level.
Speaking	Grade 3	3	4	Grade 3 students are not held to a standard in Language.
	Grades 4-8 and High School	4	5	Exemplars reflect expectations at each grade level.
Mathematics Problem Solving <sup>1</sup>	Grades 3-8 and High School	4	5	Exemplars reflect expectations at each grade level.
Scientific Inquiry <sup>2</sup>	Grades 3-8 and High School	4	5	Separate Official scoring guides exist for each grade/band (Grade 3, Benchmark 2 (Grades 4-5), Benchmark 3 (Grades 6-8), and High School).

### Related Web Links:

Official State Scoring Guides: [www.ode.state.or.us/search/page/?id=32](http://www.ode.state.or.us/search/page/?id=32)

Exemplars of scored work samples are currently found on subject-specific assessment pages linked from:

[www.ode.state.or.us/search/page/?id=1307](http://www.ode.state.or.us/search/page/?id=1307)

<sup>1</sup> Revised mathematics problem scoring guide was adopted by the State Board of Education (May 19, 2011) for use beginning with the 2011-2012 school year.

<sup>2</sup> Revised scientific inquiry scoring guides and newly-developed engineering design scoring guides were adopted by the State Board of Education (May 19, 2011) for use beginning with the 2011-2012 school year.

# ACHIEVEMENT STANDARDS

## Using Work Samples to Assess Essential Skills for the Oregon Diploma

Essential Skills graduation requirements are determined based on when a student is first enrolled in grade 9, which is referred to as the cohort year. These requirements are applied to students earning either the regular or modified diploma. Students who entered grade 9 in the 2008-2009 school year (most of whom will graduate in 2012) are required to demonstrate proficiency in the Essential Skill of Reading. The remaining implementation timeline is described in the table below.

Work samples are one assessment option that high school students may use to demonstrate they are proficient in the Essential Skills. Regarding demonstration of proficiency in the Essential Skills, districts must:

- provide students with instruction in and multiple assessment opportunities to demonstrate proficiency in the Essential Skills for the purpose of earning a high school or modified diploma.
- allow students to use assessment options adopted in a student's 9<sup>th</sup> through 12<sup>th</sup> grade years.
- allow students to use achievement standards adopted in their 9<sup>th</sup> through 12<sup>th</sup> grade years that are equal to or lower than the achievement standards approved as of March 1 of the students' 8<sup>th</sup> grade year.

At the high school level, students may use work samples to fulfill both the local performance assessment and the Essential Skills requirements.

The table below describes the achievement standard for work samples scored for the purpose of demonstrating proficiency in the Essential Skills with regard to conferring a high school diploma.

Essential Skill	Number and Types of Work Samples	Scoring Guide	First Implementation	Achievement Standard for Purpose of Conferring High School Diploma (Cut Scores)
Read and comprehend a variety of text	2 total work samples: <ul style="list-style-type: none"> <li>• at least one must be informative</li> <li>• the second may be informative or literary</li> </ul>	Official Reading Scoring Guide	Students who entered grade 9 in 2008-2009	Total score of 12 (6-point scale) across 3 traits with no trait lower than a 3; score of 5 or 6 on all traits to exceed.
Write clearly and accurately	2 total work samples: One must be in either expository or persuasive mode, the other may be in any of the four approved modes: <ul style="list-style-type: none"> <li>• expository</li> <li>• persuasive</li> <li>• narrative (personal)</li> <li>• narrative (fictional)</li> </ul>	Official Writing Scoring Guide	Students who entered grade 9 in 2009-2010	Score of 4 (6-point scale) to meet in each of the 4 required traits; score of 5 or 6 to exceed.
Apply mathematics in a variety of settings	2 total work samples: One each from two of these: <ul style="list-style-type: none"> <li>• algebra</li> <li>• geometry</li> <li>• statistics</li> </ul>	Official Mathematics Problem Solving Scoring Guide	Students who entered grade 9 in 2010-2011	Score of 4 (6-point scale) to meet in each required trait; score of 5 or 6 to exceed.

## Appendix B: Cognitive Demand and Item Difficulty Distribution Goals

Oregon recognizes the importance of Cognitive Demand (Depth of Knowledge) as part of test specification. To that end, we are implementing a strategy to overtly incorporate a test design process that includes the three dimensions of content, difficulty, and depth of knowledge.

- ✓ The first step in the process is convening our content panels to ask for their determination as to the appropriate allocation of Cognitive Demand (Depth of Knowledge), given the content standards.
- ✓ The second is analyzing the gap between the Cognitive Demand (Depth of Knowledge) available in our current item pools against the recommendations of the content panels.
- ✓ The third step involves engaging item writers to write items to fill in the critical gaps. These items would then be reviewed through our standard processes.

We anticipate being able to include Cognitive Demand (Depth of Knowledge) as an explicit part of the test specifications in the near future. The three Cognitive Demand (Depth of Knowledge) levels to be addressed in Mathematics are:

- **Recall:** includes the recall of information such as a fact, definition, term, or implementing a simple procedure. In mathematics, a one-step, well defined and straight-forward algorithmic procedure should be included at this lowest level.
- **Skill/Concept:** includes the engagement of some mental processing beyond a habitual response. A Level 2 assessment item requires students to make some decisions as to how to approach the problem or activity, whereas Level 1 requires students to demonstrate a rote response, follow a set procedure, or perform a clearly defined series of steps.
- **Strategic Thinking:** includes tasks which require reasoning, planning, using evidence, explaining their thinking or to making conjectures, and a higher level of thinking than the previous two levels. The cognitive demands are complex and abstract. The complexity does not result from the fact that there are multiple answers but because the task requires more demanding reasoning.

**2012-2014 Target Difficulty Distribution Goals and Cognitive Demand Distribution Goals for Mathematics**

Grade 3		Grade 4		Grade 5		Grade 6	
<b>Target Item Pool Difficulty Distribution Goals</b>		<b>Target Item Pool Difficulty Distribution Goals</b>		<b>Target Item Pool Difficulty Distribution Goals</b>		<b>Target Item Pool Difficulty Distribution Goals</b>	
187-204	33%	193-212	33%	201-217	33%	202-219	33%
205-212	33%	213-220	33%	218-225	33%	220-228	33%
213-231	33%	221-241	33%	226-246	33%	229-247	33%
<b>RIT Range</b>	187-231	<b>RIT Range</b>	193-241	<b>RIT Range</b>	201-246	<b>RIT Range</b>	202-247
<b>Mean RIT</b>	208	<b>Mean RIT</b>	217	<b>Mean RIT</b>	222	<b>Mean RIT</b>	224
<b>Target Cognitive Demand Distribution Goals</b>		<b>Target Cognitive Demand Distribution Goals</b>		<b>Target Cognitive Demand Distribution Goals</b>		<b>Target Cognitive Demand Distribution Goals</b>	
Recall	35%	Recall	35%	Recall	35%	Recall	30%
Skill/Concept	50%	Skill/Concept	50%	Skill/Concept	50%	Skill/Concept	50%
Strategic Thinking	15%	Strategic Thinking	15%	Strategic Thinking	15%	Strategic Thinking	20%

Grade 7		Grade 8		High School	
<b>Target Item Pool Difficulty Distribution Goals</b>		<b>Target Item Pool Difficulty Distribution Goals</b>		<b>Target Item Pool Difficulty Distribution Goals</b>	
212-226	33%	212-228	33%	213-229	33%
227-233	33%	229-236	33%	230-235	33%
234-252	33%	237-257	33%	236-253	33%
<b>RIT Range</b>	212-252	<b>RIT Range</b>	212-257	<b>RIT Range</b>	213-253
<b>Mean RIT</b>	231	<b>Mean RIT</b>	233	<b>Mean RIT</b>	232
<b>Target Cognitive Demand Distribution Goals</b>		<b>Target Cognitive Demand Distribution Goals</b>		<b>Target Cognitive Demand Distribution Goals</b>	
Recall	30%	Recall	30%	Recall	25%
Skill/Concept	50%	Skill/Concept	50%	Skill/Concept	50%
Strategic Thinking	20%	Strategic Thinking	20%	Strategic Thinking	25%

## Cognitive Complexity/Depth of Knowledge Levels for Mathematics

**RECALL** includes the **recall of information** such as a fact, definition, term, or **implementing a simple procedure**. In mathematics, a one-step, well defined and straight-forward algorithmic procedure should be included at this lowest level. Other key words that signify Recall include “identify,” “recall,” and “measure.” Verbs such as “describe” and “explain” could be classified at different levels, depending on what is to be described and explained. Some examples that represent, but do not constitute all of, Recall performance, are:

- Perform a simple algorithm.
- Recall a fact, term, formula, or property.
- Identify an example of a concept.
- Calculate a sum, difference, product, or quotient.
- Identify an equivalent representation.
- *Evaluate* an expression in an equation or formula for a given variable. (Here, *evaluate* is used in the context of substitution and calculation with open expressions.)
- Answer (Solve) a routine one-step word problem
- Draw or measure simple geometric figures.
- Read or select information from a graph, table, or figure.

**SKILL/CONCEPT** includes the engagement of **some mental processing beyond a habitual response**. A Skill/Concept assessment item requires students to make some decisions as to how to approach the problem or activity, whereas Recall requires students to demonstrate a rote response, follow a set procedure, or perform a clearly defined series of steps. Key words that generally distinguish a Skill/Concept item include “classify,” “organize,” “estimate,” and “observe.” These actions imply **more than one step**. For example, to compare data requires first identifying characteristics of objects or phenomena and then grouping or ordering the objects. Some action verbs, such as “explain,” “describe,” or “interpret,” could be classified at different levels depending on the object of the action. For example, interpreting information from a simple graph or reading information from the graph would be at Skill/Concept. Interpreting information from a complex graph that requires some decisions on what features of the graph need to be considered and how information from the graph can be aggregated is at Strategic Thinking. Skill/Concept activities are not limited only to number skills, but may involve visualization skills and probability skills. Some examples that represent, but do not constitute all of, Skill/Concept performance, are:

- Describe non-trivial patterns.
- Apply experimental procedures.
- Observe and collect data.
- Classify, organize and compare data.
- Organize and display data in tables, graphs, and charts.
- Represent a situation mathematically in more than one way.
- Solve a word problem requiring multiple steps.
- Compare figures or statements.
- Interpret a visual representation.
- Extend a pattern.
- Use information from a graph, table, or figure to solve a problem requiring multiple steps.
- Formulate a routine problem, given data and conditions.
- Interpret a simple argument.

**STRATEGIC THINKING** requires reasoning, planning, using evidence, and a **higher level of thinking than the previous two levels**. In most instances, requiring students to explain their thinking is at Strategic Thinking. Activities that require students to make conjectures are also at this level. The cognitive demands at Strategic Thinking are complex and abstract. The complexity does not result from the fact that there are multiple answers but because the task requires more demanding reasoning. An activity that has more than one possible answer and requires students to justify the response they give would most likely be at Strategic Thinking. Some examples that represent, but do not constitute all of, Strategic Thinking performance, are:

- Draw conclusions from observations.
- Cite evidence and develop a logical argument for concepts.
- Explain phenomena in terms of concepts.
- Decide which concepts to apply in order to solve a complex problem.
- Describe how different representations can be used for different purposes.
- Perform or adapt a complex procedure having multiple steps and multiple decision points.
- Identify similarities and differences between procedures and concepts.
- Formulate an original problem, given a situation.
- Solve a non-routine or novel problem.
- Solve a problem in more than one way.
- Explain and justify a solution to a problem.
- Describe, compare, and contrast solution methods.
- Formulate a mathematical model for a complex situation.
- Appraise the assumptions made in a mathematical model.
- Critique or develop a deductive argument.
- Develop a mathematical justification.

**EXTENDED THINKING** involves **high cognitive demands and complex reasoning**, planning, developing and thinking, most likely over an extended period of time. Extended thinking is not considered to be assessable through the OAKS multiple choice items, but could be assessed through appropriate Work Sample or Local Performance Assessment tasks. The extended time period is not a distinguishing factor if the required work is only repetitive and does not require apply significant conceptual understanding and higher-order thinking. For example, if a student has to take the water temperature from a river each day for a month and then construct a graph, this would be classified as a Skill/Concept. However, if the student is to conduct a river study that requires taking into consideration a number of variables, this would be at Extended Thinking. At Extended Thinking, the cognitive demands of the task should be high and the work should be very complex. Students should be required to make several connections – relate ideas within the content area or among content areas – and have to select one approach among many alternative on how the situation should be solved, in order to be at his highest level. Some examples that represent, but do not constitute all of, Extended Thinking performance, are:

- Design and conduct experiments and project
- Develop and prove conjectures
- Connect a finding to related concepts and phenomena
- Synthesize ideas into a new concept.
- Critique experimental designs

## APPENDIX C: ITEM DEVELOPMENT PROCESS

Oregon’s item development process is consistent with industry practice and takes approximately two years, including writing, reviewing, and field-testing new items. Just as the development of Oregon’s content and performance standards is an open, consensus-driven process, the development of test items and prompts to measure those constructs is grounded in a similar philosophy.

### Item Writing

For the Knowledge and Skills (multiple-choice) tests and the Writing Performance Assessment, most item writing takes place during either onsite, remote and/or online item writing workshops, in which Oregon teachers across the five main content areas write and review items. The process remains the same regardless of workshop format.

Item writers are typically Oregon teachers who have received training in item construction, are familiar with test specifications, and have demonstrated skill in writing items that pass content and sensitivity panel review. Item writers receive professional development compensation for their time and travel expenses. Among other security precautions, ODE requires item writers to sign confidentiality forms assuring that they will work with the items in a secure manner.

All items are written to measure specific subdomains of the content standards at a variety of specified levels of cognitive complexity. Cognitive complexity is represented by the

following classification, developed from Bloom’s (1956) educational taxonomy:<sup>1</sup>

- **Recall:** Recall, label, or locate information; define or describe facts or processes.
- **Skill/Concept (Basic Application):** Use information or conceptual knowledge, often requiring two or more steps; summarize, classify, or explain information or processes; make predictions or generalizations; solve problems.
- **Strategic thinking:** Analyze, critique, compare or contrast; create new information; or organize presented information.
- **Extended thinking:** Make connections and extensions (exclusively assessed in the Writing Performance Assessment and local performance assessments).

During the item writing workshop, writers draft items, document rationale of distracters, and conduct peer reviews of each other’s items. Examples of items are provided, and facilitators provide process guidance and additional review. Writers and reviewers evaluate the strength and clarity of the match between the drafted item and the standard it measures. All issues are worked out or solved multiple times by multiple reviewers who verify that distracters are plausible, that answers are correct, and that each item has only a single correct answer.

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<sup>1</sup> Bloom, B. S. (ed.), Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: Handbook I: Cognitive domain*. New York: David McKay.

**Figure 1.**  
**Sample Oregon Item Writing Form**

<b>Writer ID</b> [ ][ ][ ][ ]	<b>Grade</b> <input type="checkbox"/> K-2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> HS <input type="checkbox"/> X Extended	<b>Correct Key</b>	<b>Key Words</b>	<b>Sample Content Area</b>
<input checked="" type="checkbox"/> General Population  <b>SRC</b> <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5		<b>Estimated Item Difficulty</b> <input type="checkbox"/> Easy <input type="checkbox"/> Medium <input type="checkbox"/> Hard  <input type="checkbox"/> MC <input type="checkbox"/> _____	<b>Level of Complexity</b> <input type="checkbox"/> R – Recall <input type="checkbox"/> S/C – Skill & Concept <input type="checkbox"/> ST – Strategic Thinking	<b>Graphic</b> M [ ][ ][ ][ ][ ]  <b>Item ID</b> M [ ][ ][ ][ ][ ][ ]
			<b>Standard Code</b> [ ] . [ ] . [ ] [ ][ ]	<b>Related Essential Skill(s) #</b> (See pg. 8 in notebook)
<b>Foils</b>		<b>Rationale</b> (Why a student might select this option)		
A				
B				
C				
D				

Following item writing workshops, items are entered into the Item Tracking System (ITS). Oregon’s original graphics are initially entered into the ODE’s Comprehensive Item Management System (CIMS) and then transferred to ITS.

Within ITS and CIMS, each item is given a unique item identification number to facilitate the monitoring and tracking of changes to and usage of the item throughout the review process and each item’s history. ITS provides authorized users with access to each item’s alignment and attributes, field-test results and use, response rationales, and previous versions.

Although item writing workshops may still occur annually, ODE has recently moved toward distributed item writing in which consistently strong item writers author additional items throughout the year. Items still go through the review process previously described. Item writers are trained on the use of secure item entry using ITS, and graphic drafts are scanned by the item writers and securely transmitted to ODE.

**Committee/Panel Review**

ODE convenes a series of advisory groups to advise ODE both on assessment-related policy and on item development. ODE seeks to ensure that membership on these advisory groups reflects the demographics of Oregon’s student population. Each advisory group has approximately 15–35 members who serve three-year terms with one-third of the members rotating out each year and being replaced by new representatives. The following table describes the structure of these groups.



### Structure of ODE Assessment-Related Advisory Groups

Committee/Panel	Number of Members	Meeting Frequency	Who Nominates Members?
Assessment Policy Advisory Committee	15–20	2-3 times a year	School districts, COSA, OSBA, OEA, ESDs, and OPTA
Sensitivity Panel	15–20	4–6 times a year	School districts, OEA, ESDs (application process)
English/Language Arts Content and Assessment Panel	35	4-6 times a year	School districts, OEA, ESDs, and self-nominate (application process)
Mathematics Content and Assessment Panel	35	4 - 6 times a year	School districts, OEA, ESDs, and self-nominate (application process)
Science Content and Assessment Panel	35	4- 6 times a year	School districts, OEA, ESDs, and self-nominate (application process)
Social Sciences Content and Assessment Panel	25	1 - 2 times a year	School districts, OEA, ESDs, and self-nominate (application process)
English Language Proficiency Content and Assessment Panel	35	1 – 2 times a year	School districts, OEA, ESDs, and self-nominate (application process)

*Note.* Oregon’s Accommodations and Modifications Review Panel is not described here.  
Source: <http://www.ode.state.or.us/teachlearn/testing/dev/panels/structurecapanel.doc>

Panel members commit up to 6 school days of service with an additional 3 or 4 days during the summer. However, panels will be convened remotely rather than in person as secure technology improvements allow distributed work. Although committee members on district contracts are not compensated for their service, they do receive travel reimbursement for committee travel of more than 70 miles, and substitute teachers are provided for service during the school year. When classroom teacher members work for ODE during non-contract time, they are compensated at an hourly wage as temporary employees

The Assessment Policy Advisory Committee consists of representatives from Oregon school districts, schools, and

ESDs who are knowledgeable about assessment-related issues. The purpose of the Committee is to advise ODE on both the procedural and policy implications of Oregon’s assessment system, as well as the feasibility of proposed improvements to Oregon’s assessment system. Committee members provide input regarding the various elements of the state assessment system such as educational technology, electronic reporting, operational assessment issues, and test administration.

In addition to seeking advice on assessment-related policy, ODE requires that all items generated for use on Oregon statewide assessments must pass a series of rigorous reviews before they can be used in field and operational tests. All items go through both a content and a sensitivity review as part of the

item development process; only those items that measure the grade-level expectations and meet both overall quality and sensitivity criteria are carried forward to the field-test stage.

ODE Content and Assessment Panels exist for each of the content areas for which statewide tests are given: English/Language Arts (this panel reviews Writing and Reading/Literature assessment items), Mathematics, Science, Social Sciences, and English Language Proficiency.

Most members of these panels are classroom teachers, with some representation from higher education, district curriculum and assessment personnel, and related businesses. Criteria for panel selection include the following:

- Knowledge of Oregon’s content standards and expertise in the subject area and its eligible content
- Teaching experience at the grade level or benchmark to which the individual will be assigned
- Geographical location to ensure that all regions of Oregon are represented
- Gender and ethnic diversity to ensure that the panel represents the diversity of Oregon’s student population

Current item writers are not allowed to serve on item review committees. However, in some cases, content and assessment panel experts may be utilized as item writing facilitators.

Items are accepted, rejected, or modified by the Content and Assessment Panel to make sure they represent the constructs embodied in grade-specific content standards and test specifications. In addition to judgments of content relevance,

the panels appraise the technical quality of items, looking for items that are free from such flaws as (a) inappropriate readability level, (b) ambiguity, (c) incorrectly keyed answers and distracters, (d) unclear instructions, and (e) factual inaccuracy. The panels for each content area use the following review process:

1. Three content panel members review each item independently and complete an Item Review Form (IRF) (figure 1) using a pre-assigned reviewer ID.
2. Then, the three content panel members review the item collectively, and item reviewers make a recommendation for each item on the IRF to either (a) accept the item as written, (b) accept the item with revisions, or (c) reject the item (sometimes an alternate question is offered that entails a simple revision).
3. When all three reviewers agree that an item should be accepted or rejected, no further discussion is needed. If one or more of the reviewers feel that an item should be revised, then they attempt to reach a consensus and produce a “master copy” of their recommendation. The same is true if one or two of the reviewers reject an item that another reviewer finds acceptable with or without revisions.
4. In most cases, recommendations are followed and revisions are made, or items are eliminated. The ODE assessment specialist can override the recommendation, but this occurs rarely and only for compelling reasons.

**Figure 2.**  
**Sample Oregon Content and Assessment Panel Item**  
**Review Form**

The form is enclosed in a large rectangular border. At the top, there are two input fields: "CP Reviewer ID" and "Correct Key". Below these are three rows of checkboxes:

- Match to Standard: Strong  Acceptable  Poor
- Overall Quality: Excellent  Acceptable  Poor
- Recommendation: Accept  Accept w/Rev  Reject

To the right of these checkboxes is a button labeled "Master". At the bottom left, there is a box labeled "Sensitivity Panel" containing three checkboxes: "Rcmd: Acc  Acc/Rev  Rej

The content panels perform specific checks on items to confirm that:

- the SRC and subcategory match.
- the key is correct.
- alternate valid interpretations making the distracters correct do not exist.
- the item is grade-level appropriate in content and reading levels.
- the item is of overall high quality (wording and grammar, graphic quality, curricular importance, etc).
- the identified level of difficulty (i.e., easy, medium, hard) is correct.
- Reading/Literature passages are appropriate in content and reading levels. Science and Social Sciences stimuli align to appropriate content and reading skills.
- the level of cognitive complexity (i.e., recall, skill/concept or strategic thinking) is appropriate to the item and correctly identified.

Following review by the content panel, and according to panel feedback, ODE assessment specialists edit and revise items in ITS in preparation for review by the Sensitivity Panel.

All items that pass review by the content specialist are next presented to the sensitivity panel. The sensitivity panel reviews convenes day-long meetings, four to six times a year. The panel reviews items from all grade levels and content areas for bias, controversial content, and overly emotional issues.

In general, the sensitivity panel ensures that items:

- present racial, ethnic, and cultural groups in a positive light.
- do not contain controversial, offensive, or potentially upsetting content.
- avoid content familiar only to specific groups of students because of race or ethnicity, class, or geographic location.
- aid in the elimination of stereotypes.
- avoid words or phrases that have multiple meanings.

Following the sensitivity panels and according to panel feedback, ODE assessment specialists edit and revise items in the ITS system.

## EXPERT REVIEW

Next, ODE assessment specialists submit the new items for review by experts that have experience in the roles of item writer and content and assessment panel member. Expert reviewers add an additional quality control check for the online assessments. Experts have received extensive professional development in ITS to review items in a web-preview format providing the exact rendering provided in the online assessments. Experts review each item and confirm that:

- the key is correct.
- alternate valid interpretations making the distracters correct do not exist.
- the item is grade-level appropriate in content and reading levels.

- the item is of overall high quality (wording and grammar, graphic quality, curricular importance, etc).

Following the expert review in most cases, recommendations are followed and revisions are made, or items are eliminated. The ODE assessment specialist can override the recommendation, but this occurs rarely and only for compelling reasons.

## FIELD TESTING

Once the items have been reviewed by the content and assessment panel, the sensitivity panel, and an expert reviewer, all Mathematics, Reading/Literature, Science, and Social Sciences test items are field tested. Field test items identified by the ODE assessment specialists are embedded in the operational tests by content area. As students take the operational tests, they also respond to approximately 5-8 field test items embedded in the test.

ODE then receives data files of the student responses, which ODE analyzes to determine whether the field test items are behaving as expected. The ODE assessment specialists eliminate those items which the data analysis indicate performed weakly. ODE assessment staff calibrate the difficulty level for those items that performed successfully in preparation for using the item operationally.

## TRANSLATION OF ITEMS TO SPANISH

Concurrent with the field testing of items in English, all Mathematics, Science, and Social Sciences test items are translated into Spanish. All required grade-level and benchmark-level statewide tests for Mathematics and Science are offered in English-Spanish tests. English-Spanish tests are also available for Social Sciences. Stacked English-Spanish items are used on electronic tests. Side-by-side English-Spanish and English-Russian Paper/Pencil assessments are available in Mathematics and Science.

Following translation by ODE’s translation vendor, the translated items are reviewed by ODE’s Spanish- and Russian-speaking experts to ensure that each item accurately conveys the intent of the English text. While the procedure described below specifically addresses Spanish translation, ODE follows a similar procedure for translation of Paper/Pencil items into Russian.

The following linguistic guidelines are used by ODE’s translation vendor and Spanish-speaking experts:

- Students are expected to have subject knowledge and use proper terminology/vocabulary for that subject. In other words, what is expected from English-speaking students is also expected from Spanish-speaking students.
- ODE uses formal Spanish (usted, not tú) for test items and includes proper verb conjugation.
- ODE strives to use Global Spanish language that will be interpreted and understood by all Spanish speakers from anywhere in the world. Global Spanish language includes words used worldwide by most Spanish speakers.

After the ODE Spanish reviewers complete a review of the newly translated items, extensive research is conducted by a small group of reviewers on any word that has not met group consensus. Every attempt is made to choose the most correct

translation based upon grade level and cultural relevance. A variety of resources are used for selecting the proper translated words including: dictionaries from Mexico, South America and Spain (e.g. Diccionario Hispanoamericano de Dudas, Diccionario de Matemáticas), and ODE’s list of translated terms for Science at <http://www.ode.state.or.us/search/page/?id=517> and for Mathematics at <http://www.ode.state.or.us/search/page/?id=500>.

## ADDITIONAL EXPERT REVIEW OF ITEMS

On an annual basis, ODE assessment specialists review items from the field test pool for inclusion within the operational test. This level of review acts as an additional quality control for the online assessments. In addition, whenever ODE transitions to a different test delivery system, ODE submits all of its Reading/Literature, Mathematics, Science, and Social Sciences items for an additional level of expert review to ensure that all items appear consistently from year to year when presented to students.

## ITEM USE AND RELEASE

Approximately every three years, ODE releases one sample test for each content area and grade-level and benchmark-level comprised of items used on previous test forms. These items are no longer secure and are taken out of the pool of eligible test items.

Released items are provided in the form of practice tests. Practice tests for Reading/Literature, Mathematics, Social Sciences, and Science are available on ODE’s Website at <http://www.ode.state.or.us/search/page/?id=1222>.

Sample Writing prompts are also available at <http://www.ode.state.or.us/teachlearn/subjects/elarts/writing/assessment/usingsampleprompts.pdf>

**1 Phase 1 Item Writing**

**SITES**

A. Assessment staff schedules and coordinates item writing activities, and recruits Oregon teachers to construct items to be entered into an item database



**WRITING**

B. Item Writing: Teachers receive professional development training on item development, including a focus on standards alignment and item content and format. Items are written explicitly to measure Oregon academic content standards.



**REVIEW**

C. Teachers review items written by their peers.



**ENTRY**

D. After items are written, assessment staff enter items into a database.



**Bank of POTENTIAL items**

NEXT PHASE

**2 Phase 2 Item Review**

**SORT**

A. Assessment Specialist sorts and organizes items for review.



**REVIEW**

B. Subject Specific Content and Assessment Panels, consisting of Oregon teachers, review test items with respect to content validity and grade appropriateness.



**EDIT**

C. Assessment Specialist edits and revises items according to content panel feedback.



**REVIEW**

D. Sensitivity Panel reviews items in two-day meetings, generally held four times a year.



**EDIT**

E. Assessment Specialist edits and revises items according to Sensitivity Panel feedback.



**Bank of REVIEWED items**

D-1 NEXT PHASE

**3 Phase 3 Field Testing**

**FIELD TEST**

A. Assessment Specialist identifies items to be field tested.



**EMBED**

B. Field test items are embedded in an operational test.



**TEST**

C. Students complete operational tests with embedded field test items.



**PROCESS**

D. Data files of student responses are submitted to ODE for analysis.



**Bank of FIELD items**

**4 Phase 4 Data Analysis of Field Test Items**

**ANALYZE**

A. Assessment staff generates psychometric data to determine if the item “behaves” as expected.



**REVIEW**

B. Assessment Specialist reviews data to determine which items should be “dropped” because of weak performance.



**CALIBRATE**

C. Assessment staff calibrate the difficulty of field test items that meet the successful criteria.



Bank of **CALIBRATED** items

NEXT PHASE

**5 Phase 5 Test Construction**

**SELECT**

A. Assessment Specialist selects items for operational testing.



**RANGE**

B. Assessment Specialist balances items across Score Reporting Categories (SRCs) (such as Geometry in Mathematics or Vocabulary in Reading/Literature) and range of difficulty according to test specifications.



**CONSTRUCT**

C. Assessment staff construct tests, online test pools, and finalize Administration Manual.



**REVIEW**

D. Assessment staff and expert reviewers proofread test items and stimuli for errors.



**FINAL**

E. Final Operational Tests and pools are prepared.

D-2

NEXT PHASE

**6 Phase 6 Data Analysis of Operational Test Items**

**PRESENTED**

A. Tests are sent to contractor for print distribution or delivery online.



**SCORES**

B. Students complete the operational test and receive instant scores when using online delivery.



**TEST**

C. Assessment staff analyze item statistics to verify the item performs as expected



**PROCESS**

D. Assessment staff analyze item statistics to make sure items are not biased against a particular subgroup (e.g., students with disabilities, ethnic groups, or gender).



**TARGET**

E. Item performance tables which describe how well each item performs are used to review items and pools of items to identify any additional items to be dropped.



## Mathematics Problem Solving Official Scoring Guide

(<http://www.ode.state.or.us/search/page/?=32>)

The *Mathematics Problem Solving Official Scoring Guide* was adopted by the State Board of Education in May 2011 for scoring work samples beginning with the 2011-2012 school year. This scoring guide reflects significant efforts of Oregon educators working to capture the essentials of problem solving, based on the following:

- Over-arching statement in the *Mathematics Content Standards for Kindergarten through Grade 8 and High School* that it is essential that these standards be addressed in instructional contexts that promote problem solving, reasoning, communication, making connections, designing and analyzing representations, and reflecting on solutions.

(<http://www.ode.state.or.us/teachlearn/real/standards/sbd.aspx>)

- Essential Skill Apply Mathematics in a Variety of Settings

*This skill includes all of the following:*

- Interpret a situation and apply workable mathematical concepts and strategies, using appropriate technologies where applicable.
- Produce evidence, such as graphs, data, or mathematical models, to obtain and verify a solution.
- Communicate and defend the verified process and solution, using pictures, symbols, models, narrative or other methods.

(<http://www.ode.state.or.us/teachlearn/certificates/diploma/essential-skills-definitions.pdf>)

- Language and intent of the National Council of Teachers of Mathematics' Process Standards

(<http://www.nctm.org/standards/content.aspx?id=322>)

- Standards for Mathematical Practice, from the Common Core State Standards (2010)

(<http://www.corestandards.org/the-standards/mathematics/introduction/standards-for-mathematical-practice>)

This scoring guide reflects input by the Oregon Council of Teachers of Mathematics (OCTM), Oregon Mathematics Specialists, and ODE's mathematics content panel during 2009-10, and at the 2010 Oregon Math Leaders Conference.

The most recent version of the *Mathematics Problem Solving Official Scoring Guide* and other support documents may be accessed at <http://www.ode.state.or.us/search/page/?=32>. The Plain Language Student Versions may be accessed at <http://www.ode.state.or.us/search/page/?=2667>.

Sample anchor papers, student versions, and other support materials are under development. Professional development on the new scoring guide is being piloted in training sessions during the 2010-11 school year by the OCTM Professional Development Cadre and extensive training opportunities are planned for the 2011-2012 school year. Refer to the Work Sample Resources web page for mathematics for updated support documents and training opportunities. (<http://www.ode.state.or.us/search/page/?id=2707>)



## Use of Formula and Conversion Sheets

The Formula and Conversion Sheets have been revised to reflect the content in the 2007 Grades 3-8 and 2009 High School Standards. They are reorganized to be used in Grade 3-5, Grades 6-8, and in High School. While **all students may have access to any of the sheets**, these show the information appropriate to the grade levels. Note that grade 3 standards do not necessitate any formulas or conversion factors, based on the standards. Also, variables are not introduced until grade 6, so the formulas for grades 4-6 are stated in words. Grade 6 standards do not necessitate any formulas other than those needed for grades 4 and 5, since grade 6 has no new geometry content, however, in grade 6, students may be using variables, so students in grade 6 may prefer either the formula sheet for grades 3-5 or the one for grades 6-8.

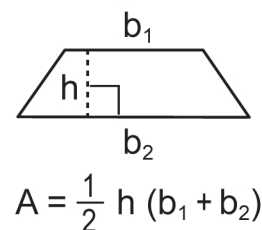
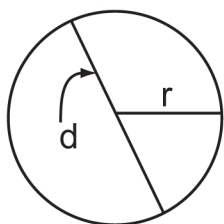
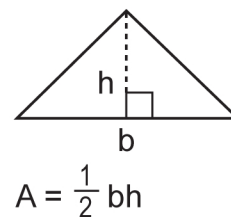
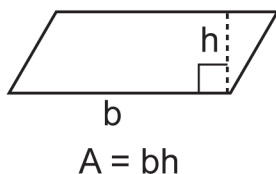
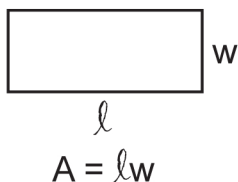
All Formula and Conversion Sheets in English and Spanish are available at <http://www.ode.state.or.us/search/page/?=2346>

The Formula and Conversion Sheets may be used during classroom instruction at any time.

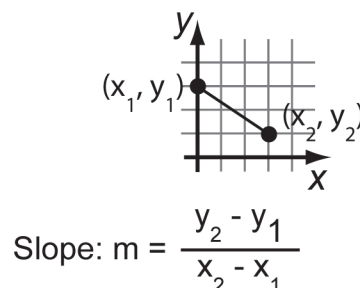
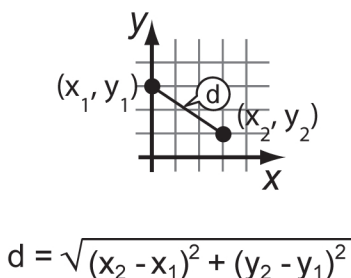
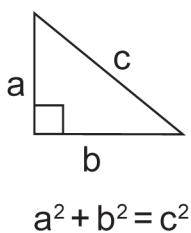
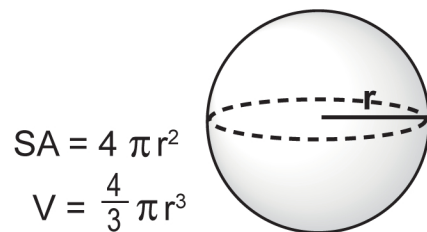
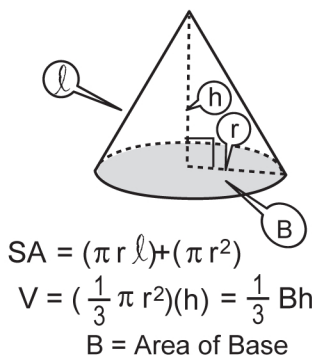
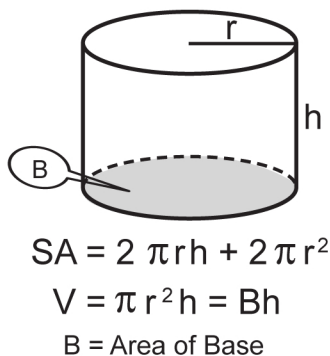
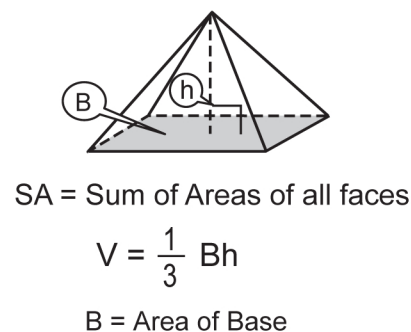
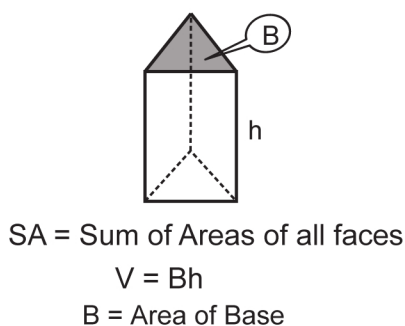
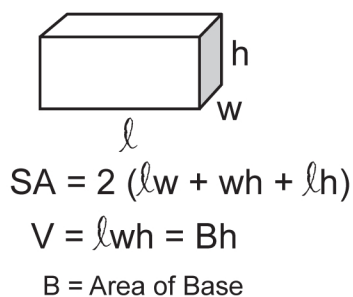
MEASUREMENTS

1 meter = 100 centimeters  
 1 kilometer = 1000 meters  
 1 gram = 1000 milligrams  
 1 kilogram = 1000 grams  
 1 liter = 1000 cubic centimeters  
 1 yard = 3 feet  
 1 mile = 5280 feet  
 1 hour = 60 minutes  
 1 minute = 60 seconds  
 1 pound = 16 ounces  
 1 ton = 2000 pounds  
 1 cup = 8 fluid ounces  
 1 pint = 2 cups  
 1 quart = 2 pints  
 1 gallon = 4 quarts

AREA (A)



SURFACE AREA (SA) and VOLUME (V)





**Oregon Department of Education**

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