OREGON STATEWIDE ASSESSMENT

Mathematics

TEST SPECIFICATIONS and BLUEPRINTS

2012-2014

OFFICE OF ASSESSMENT & INFORMATION SERVICES
THE OREGON DEPARTMENT OF EDUCATION

GRADE 8

Developed by the Office of Assessment and Information Services

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

Analyze and represent linear functions, and solve linear equations and systems of 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:

8.1.1 Translate among contextual, verbal, tabular, graphical, and algebraic representations of linear functions.

Assessable Academic Vocabulary:

coordinate plane
linear equation

Symbols and Notation:

$y = mx + b$

(x,y) – ordered pairs

Lines should be drawn with arrows on each end showing they are continuous. ↔

Boundaries of Assessable Content::

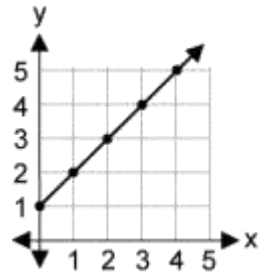
- Items assessing this standard include translating among representations of linear functions to include:
  - within a context
  - verbal (words)
  - tables
  - graphs
  - algebraic representations (equations)
- Items may give a linear function in one form and ask students to express the information in a different form.
- Graphs may be in all four quadrants.
- Linear equations will be written in slope-intercept form as $y = mx + b$.

Content Connections from Previous Grades:

3.3 parallel (concept)
6.3 Translating between verbal and algebraic representations is in sixth grade.

Sample Items:

Which equation best describes the relationship shown in the graph?



A. $y = x + 1$ C. $y = 2x$

B. $y = x - 1$ D. $y = \frac{x}{2}$

Kari has $35 dollars. Once a week Kari gives skateboard lessons at the park. For this job she is paid $12 each week.
How many weeks will it take her to have a total of $155?

x	y
1	47
2	59
3	71
4	—
5	—
.	.
.	.
.	.

A. 6 C. 13
B. 10 D. 16

Core Standard: 8.1 Algebra **Score Reporting Category 1**

Analyze and represent linear functions, and solve linear equations and systems of 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:

8.1.2 Determine the slope of a line and understand that it is a constant rate of change.

Assessable Academic Vocabulary:

no slope (undefined)
rate of change
slope
vertical

Symbols and Notation:

slope is generally written as improper fractions rather than mixed numbers

Boundaries of Assessable Content:

- Items assessing this standard include determining the slope of a line given:
  - the graph of the line
  - two points on the line
  - a table of values for points on the line
- Items assessing this standard include understanding that slope is a constant rate of change.
- Slopes may be written as integers, or improper fractions, or decimals.

Note: The slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$, is not required content, but the formula will be provided on the formula sheet.

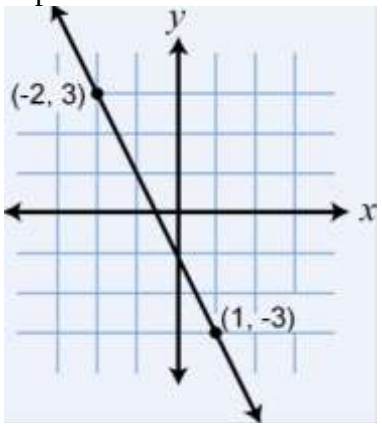
Content Connections from Previous Grades:
4.2, 5.2 (Zero and undefined slope relies on understanding that division by 0 is undefined)
7.2.1

Sample Items:

Determine the slope of the line with points located at $(-3, 2)$ and $(1, 2)$.

A. -2
B. 5
C. 0
D. Undefined

Find the slope of this line.



A. -2
B. $-\frac{1}{2}$
C. $-\frac{1}{3}$
D. -3

Core Standard: 8.1 Algebra **Score Reporting Category 1**

Analyze and represent linear functions, and solve linear equations and systems of 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:

8.1.3 Identify and interpret the properties (i.e. slope, intercepts, continuity, and discreteness) of linear relationships as they are shown in the different representations and recognize proportional relationships (y/x = k or y = kx) as a special case.

Assessable Academic Vocabulary:

continuous
direct variation
discrete
horizontal
intercepts
linear equation
origin
slope
vertical
x-intercept
y-intercept

Symbols and Notation:

$y = kx$

$\frac{y}{x} = k$

$y = mx + b$

Boundaries of Assessable Content:

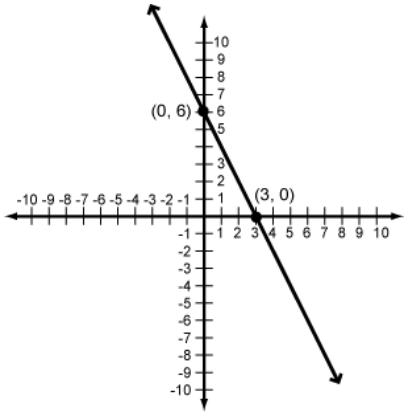
- Items assessing this standard include identifying and interpreting the properties of linear relationships from:
  - tables
  - graphs
  - equations
  - words
- Properties that students will have to identify or interpret include:
  - slope
  - intercepts (*x* and *y*)
  - determining whether a graphical representation of a linear function should be continuous or discrete
- Items assessing this standard include recognizing proportional relationships (y/x=k or y = kx) as special cases.

Content Connections to Previous Grades:

Proportionality: grade 6
Ordered pairs: 5.1
Understanding proportionality: 7.2

Sample Items:

Which of these statements about this graph of a linear equation is not true?



A. The slope is –2.
B. The y-intercept is 6.
C. The x-intercept is 3.
D. The value of y is always twice the value of x.

If the slope of $y = -3 + x$ were changed to 3, how would the new graph compare to the graph of $y = -3 + x$?

A. It would have a different x-intercept.
B. It would have a different y-intercept.
C. It would be parallel.
D. It would be perpendicular.

Core Standard: 8.1 Algebra **Score Reporting Category 1**

Analyze and represent linear functions, and solve linear equations and systems of 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:

8.1.4. Use linear functions and equations to represent, analyze and solve problems, and to make predictions and inferences.

Assessable Academic Vocabulary:

infer
linear equation
predict
rate of change
slope
y-intercept

Symbols and Notation:

y= mx + b

Boundaries of Assessable Content:

- Items assessing this standard include using linear functions and equations to represent problems.
- Items assessing this standard include using linear functions and equations to analyze problems and make predications and inferences.
- Items assessing this standard include using linear functions and equations to solve problems and make predictions and inferences.
- Linear functions and equations may be given in the following forms:
  - tables
  - graphs
  - equations
  - words

Content Connections from Previous Grades:

7.1, 6.3

Sample Items:

Your school charges students $2.00 to attend the after school carnival and 25 cents for every game a student plays.
Which formula will find your total cost (T) for attending the carnival and playing *n* games?

A. $T = 0.25n$
B. $T = 2n + 0.25$
C. $T = 25n + 2$
D. $T = 2 + 0.25n$

Yvette is in a walking race.
She starts 20 meters ahead of the starting line and walks at 2 meters per second.
Which equation show Yvette's distance (d) from the starting line after (t) seconds?

A. $d = 20 + 2t$
B. $d = 2 + 20$
C. $d = 20t + 2$
D. $d = 20 + t$

Given an equation, predict the x value for a particular y-value.

Core Standard: 8.1 Algebra **Score Reporting Category 1**

Analyze and represent linear functions, and solve linear equations and systems of 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:

8.1.5 Relate systems of two linear equations in two variables and their solutions to pairs of lines that are intersecting, parallel, or the same line.

Assessable Academic Vocabulary:

collinear
common solution
intersect
parallel
solution
system of linear equations

Symbols and Notation:

∥ Parallel

⊥ Perpendicular

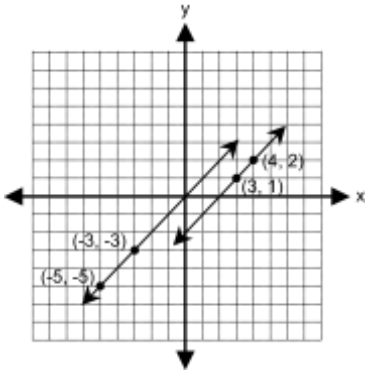
Boundaries of Assessable Content:

- Items assessing this standard involve systems of two linear equations. The focus is on relating the solution to a system of equations to its visual representation.
  - From the solution, the student determines whether the two lines determined by the system of equations are intersecting, parallel, or the same line.
  - From the graph of the system, students determine if a solution exists and, if so, what type of solution it is (i.e. one point, all points on the line, or no solution)
  - From the equations, students determine if lines are parallel, intersecting, or the same line.

Content Connections from Previous Grades:

7.2.1

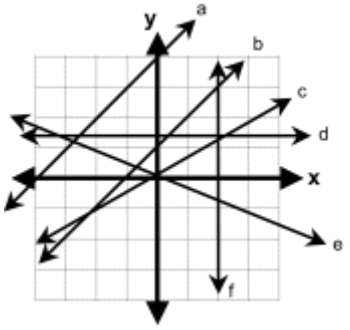
Sample Items:



Two lines are plotted on the same coordinate plane. The first line passes through (-5, -5) and (-3, -3). The second passes through (3, 1) and (4, 2). The two lines are _____.

A. intersecting, not perpendicular
B. intersecting and perpendicular
C. parallel with no common points
D. parallel with infinite common points

Which two lines are parallel?



A. Line c and Line e
B. Line a and Line d
C. Line b and Line c
D. Line a and Line b

Core Standard: 8.1 Algebra **Score Reporting Category 1**

Analyze and represent linear functions, and solve linear equations and systems of 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:

8.1.6 Use informal strategies (e.g., graphs or tables) to solve problems involving systems of linear equations in two variables.

Assessable Academic Vocabulary:

common solution
solution
system of linear equations
table

Symbols and Notation:

Boundaries of Assessable Content:

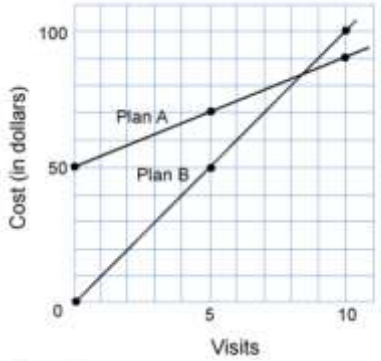
- Items assessing this standard include using informal strategies to solve problems involving systems of linear equations in two variables. The informal strategies include, but are not limited to:
  - graphs
  - tables
- Systems of linear equations may be given directly or within a context. If in a context, students may need to create the equations, table, or graph used to informally solve the system.
- Solutions may include a single point, infinitely many points along a line, or there may be no solution.
- Solutions that are points may be written as an ordered pair or the variables may be independently written with their values.

Content Connections from Previous Grades:

6.3, 7.2.1

Sample Items:

A local health club has two membership plans.
Plan A: Pay \$50 to join and pay \$4 for each visit
Plan B: No joining fee, pay \$10 for each visit
Use the graph to determine the least number of visits that would make Plan A better than plan B.



A. 8
B. 9
C. 80
D. 90

Use the tables shown to find the solutions for the system of equations:

$y = x + 3$
$x + y = 3$

$y = x + 3$

x	y
–3	0
–2	1
–1	2
0	3
1	4

$x + y = 3$

x	y
–1	4
0	3
1	2
2	1
3	0

A. (–3, 0)
B. (0, 3)
C. (3, 0)
D. (0, –3)

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**
Analyze and summarize data sets.

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:

8.2.1 Organize and display data (e.g., histograms, box-and-whisker plots, scatter plots) to pose and answer questions; and justify the reasonableness of the choice of display.

Assessable Academic Vocabulary:

box-and-whisker plot
circle graph
frequency table
histogram
intervals
scatter plot
stem-and-leaf plot

Symbols and Notation:

Look for a "key" on some data displays (e.g., In stem and leaf plot, where 7|1 means 71)

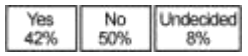
Boundaries of Assessable Content:

- Items assessing this standard include organizing and displaying data to pose and answer questions. Data displays may include the following:
  - histogram
  - box-and-whisker plot
  - scatter plot
  - circle graph
  - stem-and-leaf plot
  - bar graph
  - double bar graph
  - line graph
- Items assessing this standard include justifying the reasonableness of the choice of data display.
- Items may give a data display and ask students to answer questions related to the display or to formulate a question related to the display.
- Data may be displayed using integers, fractions, decimals, and/or percents.

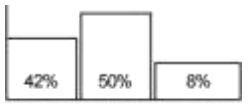
Content Connections from Previous Grades:
5.1.7

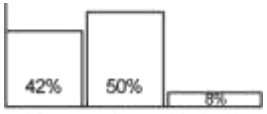
Sample Items:

A survey was taken of voters in a community to determine whether or not a new school would be supported.
Which of the following would BEST represent the results?

A. 

C. 

B. 

D. 

The results of a class survey on whether students liked a new television show are as follows.
25 students liked the new show.
15 students disliked the new show.
5 students had no opinion on the new show.

On the graph below, each ☺ represents 5 students.
Draw the correct number of faces to illustrate the results of the class survey.

☺ = 5 students

Liked	
Disliked	
No Opinion	

Source: NAEP 2005 Released Item

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**
Analyze and summarize data sets.

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:

8.2.2 Use measures of center and spread to summarize and compare data sets.

Assessable Academic Vocabulary:

maximum
mean
measures of center
median
minimum
mode
quartiles
range
statistics

Symbols and Notation:

Boundaries of Assessable Content:

- Items assessing this standard include using measures of center and spread to summarize and compare data sets. These measures include:
  - mean
  - median
  - mode
  - range
  - maximum
  - minimum
  - quartiles and the inter-quartile range
- Items may ask students to find a missing value in a data set given measures of center and/or spread.
- Data sets may be given in the form of a list or in a data display.

Content Connections from Previous Grades:

Sample Items:

In which set is the median equal to the mean?
Set I {30, 46, 47, 60, 62}
Set II {33, 46, 50, 58, 63}
Set III {35, 45, 50, 55, 60}

A. More than one set
B. Set I
C. Set II
D. Set III

The stem-and-leaf plot shows the distribution of recent test scores.
What is the MODE of the scores?

stem	leaf
4	4 4 9
5	4 5
6	2 2 4 5 9
7	1 4 5 6 7 8 9
8	0 2 4 5 6 7 8 9 9 9
9	0 2 3 3 5 6 8 9

9 | 0 means 90

A. 9 B. 44 C. 77.5 D. 89

Alejandra is training for the swim team tryouts. She plans to swim an average (mean) of 5.5 miles a week. So far, she has swum 2 miles the first week, 7 miles the second week, 6 miles the third week, 9 miles the fourth week, 5 miles the fifth week, and 3 miles the sixth week.
How many miles must she swim the seventh week, in order to reach her goal of averaging 5.5 miles per week?

A. 4.6 miles
B. 5.5 miles
C. 6.5 miles
D. 12.5 miles

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**

Analyze and summarize data sets.

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:

8.2.3. Interpret and analyze displays of data and descriptive statistics.

Assessable Academic Vocabulary:

box-and-whisker plot
histogram
inter-quartile range
mean
median
mode
quartiles
range
stem-and-leaf plot

Symbols and Notation:

Boundaries of Assessable Content:

- Items assessing this standard include interpreting and analyzing displays of data.
- Data may be given in the form of a list or a graphical display to include the following:
  - histogram
  - box-and-whisker plot
  - scatter plot
  - circle graph
  - stem-and-leaf plot
  - bar graph
  - line graph
- Items assessing this standard include interpreting and analyzing descriptive statistics. These include measures of center and range.

(Formatting of frequency tables and histograms can have different parameters and we should be careful in how they are presented so as to not confuse students. (e.g., 0-5 and 5-10: some materials deem them overlapping whereas other materials interpret 5-10 as $5 \leq n < 10$ rather than $5 \leq n \leq 10$))

Content Connections from Previous Grades:

5.1.7

Sample Items:

Ms. Speight put the heights of all her students into the stem-and-leaf plot shown. Determine the median height.

	Height in Inches
4	9, 9
5	3, 4, 5, 6, 7, 7, 7, 7, 8, 8
6	1, 3, 5, 6, 6, 7, 7, 8, 8, 9
7	0, 0, 1, 1, 2

7 | 0 = 70 inches

A. 57 inches
B. 61 inches
C. 62 inches
D. 63 inches

Euclid's geometry test scores average 75%. His median score is 80% and his high score is 96%. Which statement is a valid conclusion?

A. His lowest possible score was 54%.
B. One test score must be 75%.
C. One test score might be 80%.
D. There must be a mode score.

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**
Analyze and summarize data sets.

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:

8.2.4 Compare descriptive statistics and evaluate how changes in data affect those statistics.

Assessable Academic Vocabulary:
mean
median
model
outliers
quartiles
range

Symbols and Notation:

Boundaries of Assessable Content:

- Items assessing this standard include comparing descriptive statistics.
- Items assessing this standard include evaluating how changes in data affect descriptive statistics.
- Descriptive statistics are measures of center (mean, median, mode) and range.
- Data may be given as a list of numbers or in a data display.

Content Connections from Previous Grades:

Sample Items:

Cathy's test scores are:
75, 81, 85, 85, 85, 90, 95, 100
If her teacher decides to drop the lowest score, which of these would be affected the most?

A. Mean
B. Median
C. Mode
D. Range

For which set of data are the mode, median, mean and range in order from lease to greatest, with: mode < median < mean < range?

A. 1, 2, 2, 3, 3, 3
B. 1, 1, 1, 2, 2, 3
C. 1, 1, 2, 2, 2
D. 1, 1, 1, 10

This set of data contains 6 values.
If the lowest value is eliminated, which statement is true?

10, 20, 20, 20, 40, 40

A. The range will increase.
B. The mode will increase.
C. The median will decrease.
D. The mean will decrease.

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**

Analyze and summarize data sets.

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:

8.2.5 Describe the strengths and limitations of a particular statistical measure, and justify or critique its use in a given situation.

Assessable Academic Vocabulary:

mean
median
mode
outliers
quartiles
range

Symbols and Notation:

Boundaries of Assessable Content:

- Items assessing this standard describe the strengths and limitations of a particular statistical measure.
- Items assessing this standard include justifying or critiquing the use of a statistical measure in a given situation.
- Statistical measures include mean, median, mode, range and range. Quartiles and outliers may be a part of a justification or critique.

Content Connections from Previous Grades:

Sample Items:

The U.S. Government reported that the median family income in 2006 was $58,402. Why use the median rather than the mean?

A. The mean is not an accurate measure.
B. The median represents the majority of families.
C. Including high income families would probably distort or show the mean.
D. The median better represents low income families.

Tom has collected the four sets of data shown. For which data set is the mean the most appropriate number to use as the average of the set?

A. The shoe sizes of eight of his friends:
$7, 7\frac{1}{2}, 8, 9, 9\frac{1}{2}, 10, 10\frac{1}{2}$
B. The eye colors of his friends:
Blue, Brown, Brown, Green, Hazel, Brown, Blue, Blue
C. The scores on the last math test of his friends:
73, 77, 79, 86, 92, 95, 100
D. The salaries of the pitchers on his favorite team:
$\$50{,}000; \$65{,}000; \$67{,}000; \$70{,}000; \$540{,}000$

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**
Analyze and summarize data sets.

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:

8.2.6 Use sample data to make predictions regarding a population.

Assessable Academic Vocabulary:

population
predict

Symbols and Notation:

Boundaries of Assessable Content:

- Items assessing this standard include using sample data to make predictions regarding a population.
- Sample data may be given in the form of a list or within a data display, to include:
  - histogram
  - box-and-whisker plot
  - scatter plot
  - circle graph
  - stem-and-leaf plot
  - bar graph
  - line graph
  - table
- Items involving scatter plots may or may not include a line of best fit. Students will not be asked to find the equation for a line of best fit.

Content Connections from Previous Grades:

Sample Items:

In a survey of 500 consumers, each was asked to select their favorite cheese-slicers from among four distinct models. The results were as follows: "whatsits": 100, "thingamajigs": 125, "gizmos": 150, and "widgets": 125.
If 600,000 cheese-slicers are sold, then how many of them should be "gizmos?"

A. 120,000 C. 180,000
B. 150,000 D. 420,000

Four friends were shooting free throws with a basketball. The results are in the table. If Cindy and Jenny each take one more free throw, who has the highest probability of making her shot?

	Made	Total Shots
Steven	1	3
Cindy	2	6
Jenny	3	9
José	4	12

A. They both have the same chance.
B. Cindy
C. Jenny
D. There is not enough information.

Given scatter plot, extrapolate or sketch a line-of-best-fit to find a data point not represented on the display.

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**
Analyze and summarize data sets.

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:

8.2.7 Identify claims based on statistical data and evaluate the reasonableness of those claims.

Assessable Academic Vocabulary:

bias
outliers

Symbols and Notation:

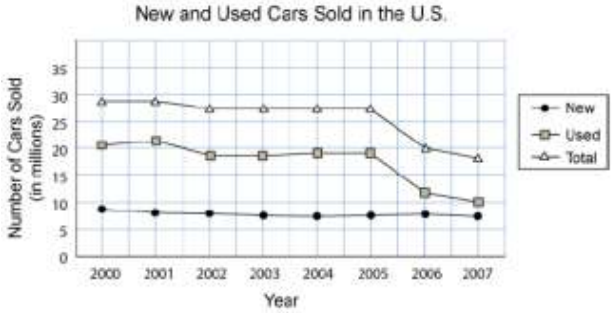
Boundaries of Assessable Content:

- Items assessing this standard include identifying claims based on statistical data and evaluating the reasonableness of those claims.
- Data may be given in the form of a list, in a data display, or as measures of center.
- Bias and outliers may be terms used to explain the unreasonableness of a claim.

Content Connections from Previous Grades:

Sample Items:

Which of the following claims is NOT supported by the data shown?



A. Total car sales declined from 2000 to 2007.
B. Used cars made up more than half of total sales each year.
C. New car sales varied more then used car sales from 2000 to 2007.
D. The greatest decrease in use car sales occurred from 2005 to 2006.

Which statement is supported by the data in the chart?

Members of the U.S. Senate, by gender.		
	Male	Female
1993	93	7
1995	92	8
1997	91	9
1999	91	9
2001	87	13
2003	86	14
2005	86	14
2007	84	16
2009	83	17

A. More women were on the ballot in 2009 than 1993.
B. In the future, half of the senators will be women.
C. Since 1993, the number of women senators has increased.
D. There were more senators in 1993 than in 2009.

Core Standard: 8.2 Data Analysis and Algebra **Score Reporting Category 2**
Analyze and summarize data sets.

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:

8.2.8 Use data to estimate the likelihood of future events and evaluate the reasonableness of predictions.

Assessable Academic Vocabulary:

chance
likelihood
predict

Symbols and Notation:

Boundaries of Assessable Content:

- Items assessing this standard include using data to estimate the likelihood of future events.
- Items assessing this standard include evaluating the reasonableness of predictions using data. Use the data to support or refute the prediction.
- Data may be given in the form of a list, data display, or as measures of center.
- Data may include experimental data as in experimental probability.

Content Connections from Previous Grades:

Sample Items:

Dustin kept track of how many 8th graders signed up for school lunch when pizza was served. His results are in the chart. If he uses the mean average to predict the number of students who will eat school lunch the next time pizza is served, what will his prediction be?

Date pizza was served	# students eating school lunch
Sept 14	214
Oct 5	220
Oct 26	196
Nov 16	192
Dec 7	217
Dec 21	179
Jan 11	205
Feb 1	210
Feb 22	207

A. 195 students
B. 205 students
C. 215 students
D. 225 students

David drew marbles from a bag, replacing them each time. His results are as follows.
Using the same ratios, if he drew and replaced 60 times, how many times would he expect to get a blue?

red	III
blue	𝍸
green	𝍸 II
white	III
black	II

A. 5
B. 15
C. 21
D. 30

Core Standard: 8.3 Geometry and Measurement **Score Reporting Category 3**

Analyze two- and three-dimensional spaces and figures by using distance and angle.

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:

8.3.1 Use properties of parallel lines, transversals, and angles to find missing sides and angles, and to solve problems including determining similarity or congruence of triangles.

Assessable Academic Vocabulary:

adjacent angles	congruent
alternate exterior angles	linear pair
alternate interior angles	parallel lines
complementary angles	similar
corresponding angles	straight angle
same-side interior angles	transversal
supplementary angles	vertical angles

Symbols and Notation:

$\parallel$ "is parallel to"
Δ ABC "triangle ABC"
$\overleftrightarrow{AB}$ "line AB"
$m\angle A$ "measure of angle A"
$\cong$ "congruent to"
~ "similar to"

Congruency marks for sides and angles:

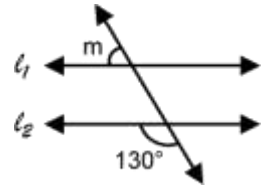
Boundaries of Assessable Content:

- Items assessing this standard include using properties of parallel lines and transversals to find missing angles. Angles include corresponding angles, alternate interior angles, alternate exterior angles, same-side interior angles, vertical angles, and linear pairs.
- Items assessing this standard include finding missing sides and angles in similar or congruent triangles.
- Items assessing this standard include determining whether two triangles are similar or congruent.
- Items assessing this standard include finding measures for vertical angles, supplementary angles, and complementary angles.
- Algebraic equations may need to be written and solved in order to solve for missing sides and angles.

Content Connections from Previous Grades:
7.2 proportionality, 5.3.2

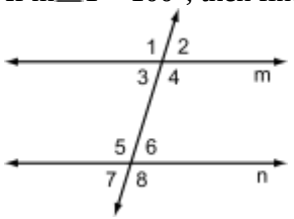
Sample Items:

Find the measure of angle m. (ℓ_1 and ℓ_2 are parallel)



A. 40° C. 50°
B. 45° D. 130°

In the figure, lines *m* and *n* are parallel.
If m$\angle$1 = 100°, then find m$\angle$E.



A. 80° B. 100° C. 110° D. 140°

Core Standard: 8.3 Geometry and Measurement **Score Reporting Category 3**

Analyze two- and three-dimensional spaces and figures by using distance and angle.

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:

8.3.2 Use models to show that the sum of the angles of any triangle is 180 degrees and apply this fact to find unknown angles.

Assessable Academic Vocabulary:

degrees
degrees
equiangular
equilateral
exterior angle
interior angle
isosceles
isosceles
right triangle
right triangle

Symbols and Notation:

ΔABC "Triangle ABC"
$m\angle A$ "measure of angle A"
30° "30 degrees"

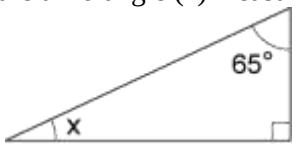
Boundaries of Assessable Content:

- Items assessing this standard include using models to show that the sum of the angles of any triangle is 180 degrees. Any model shown will be clear to students through words or pictures. It is not assumed students have experienced any one particular model.
- Items assessing this standard include applying the fact that the sum of the angles of any triangle is 180 degrees to find unknown angles.
- Items may require students to know that a right triangle has one angle of 90°, that an equilateral triangle has three angles of 60°, and that an isosceles triangle with two congruent sides has base angles that are congruent.
- Algebraic equations may need to be written and solved in order to solve for missing angles.

Content Connections from Previous Grades:
5.3**,** 7.2

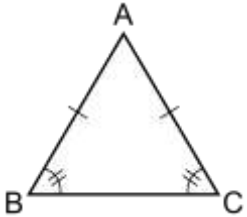
Sample Items:

Alex is building a sandbox for his son, who wants it to be in the shape of a triangle.
What should the third angle (x) measure?



A. $x = 25°$
B. $x = 30°$
C. $x = 65°$
D. $x = 155°$

If the measure of $\angle B = 72°$, what is the measure of $\angle 2A$?



A. 54°
B. 44°
C. 36°
D. 16°

In a triangle, where angles are expressed algebraically in terms of x, find the measures of the three angles.

Core Standard: 8.3 Geometry and Measurement **Score Reporting Category 3**

Analyze two- and three-dimensional spaces and figures by using distance and angle.

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:

8.3.3 Use models and logical arguments to show that the sum of the angles of any quadrilateral is 360 degrees, and apply this fact to find unknown angles.

Assessable Academic Vocabulary:

isosceles trapezoid
parallelogram
quadrilateral
rectangle
rhombus
right angle
square
trapezoid

Symbols and Notation:

 "right angle"

30° "30 degrees"

⊥ "perpendicular"

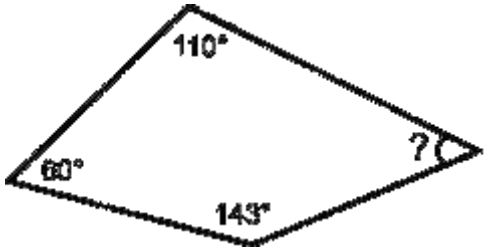
Boundaries of Assessable Content:

- Items assessing this standard include using models and logical arguments to show that the sum of the angles of any quadrilateral is 360 degrees. Any model used will be explained in words or pictures. It is not assumed students are familiar with any one model.
- Items assessing this standard include applying the fact that the sum of the angles of any quadrilateral is 360 degrees to find unknown angles.
- Items may require students to know properties of angles in special quadrilaterals to know which angles may be supplementary or congruent.
- Algebraic equations may need to be written and solved to find missing angles.

Content Connections from Previous Grades:
7.2, 5.3

Sample Items:

In the quadrilateral, 3 of the angles are labeled. What is the measure of the remaining angle?



A. 10° B. 47° C. 60° D. 87°

Given a quadrilateral with all angle measurements in terms of *x*, solve for *x* and find the measures of all four angles.

Core Standard: 8.3 Geometry and Measurement **Score Reporting Category 8.3**

Analyze two- and three-dimensional spaces and figures by using distance and angle.

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:

8.3.4 Use models to explore the validity of the Pythagorean Theorem, and use it to find missing lengths.

Assessable Academic Vocabulary:

diagonal
hypotenuse
leg
Pythagorean Theorem
right triangle

Symbols:


"right angle"


"square root"

Formula
$a^2 + b^2 = c^2$

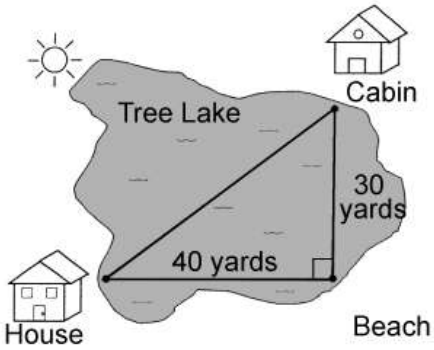
Boundaries of Assessable Content:

- Items assessing this standard include using models to explore the validity of the Pythagorean Theorem. It is not assumed students are familiar with any one model. Any model used will be explained using words or pictures.
- Items assessing this standard include applying the Pythagorean Theorem to find missing lengths in right triangles.
- Answers will be exact positive integers or decimal approximations of square roots.
- Items may draw a right triangle or students may have to know how to draw the right triangle to solve the problem.
- Items may involve figures combined to require use of the Pythagorean Theorem several times.
- Items may require that the Pythagorean Theorem be used to determine if a triangle is a right triangle.

Content Connections from Previous Grades:

Sample Items:

Mrs. Kovack likes to swim in Tree Lake for exercise. She swims from the cabin to the beach, over to the house, then back to the cabin. If she does this four times, how many yards will she swim?



A. 280 yards
B. 480 yards
C. 560 yards
D. 1,200 yards

Core Standard: 8.3 Geometry and Measurement **Score Reporting Category 3**

Analyze two- and three-dimensional spaces and figures by using distance and angle.

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

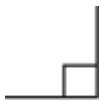
Content Standard:

8.3.5 Apply the Pythagorean Theorem to find distances in a variety of 2- and 3-dimensional contexts, including distances on coordinate graphs.

Assessable Academic Vocabulary:

diagonal
distance
hypotenuse
leg
perfect square

Symbols and Notation:

 (box to show right angle)

√ (square root)

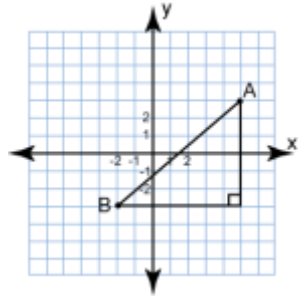
Boundaries of Assessable Content:

- Items assessing this standard include applying the Pythagorean Theorem to find distances in a variety of two-dimensional contexts, including distances on a coordinate graph.
- Items assessing this standard include applying the Pythagorean Theorem to find distances in a three-dimensional context.
- The Pythagorean Theorem may have to be applied more than once to solve a problem.
- Problems may include finding a missing side of a triangle and then finding the perimeter or area of the triangle.
- The right triangle may or may not be drawn in the original problem, this includes a problem in a context or a problem on a coordinate graph.

Content Connections from Previous Grades:
5.1

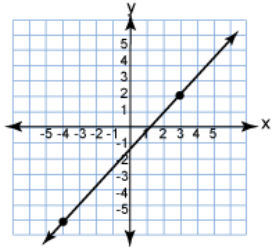
Sample Items:

To the nearest whole number, what is the distance between points A and B?



A. 7
B. 8
C. 9
D. 10

Joan connects point (3, 2) and (– 4, – 6) point . Use what you know about right triangles to calculate the length of the line segment Joan drew (round to the nearest tenth).



A. 7.5 units
B. 8.0 units
C. 10.6 units
D. 10.7 units

(Find the length of the diagonal of a rectangular prism with length 5 cm, width 7 cm, and height 4 cm.)

Core Standard: 8.3 Geometry and Measurement **Score Reporting Category 3**

Analyze two- and three-dimensional spaces and figures by using distance and angle.

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:

8.3.6 Use models and referents to explore and estimate square roots.

Assessable Academic Vocabulary:

irrational
perfect square
rational

Symbols and Notation:

$\sqrt{\ }$ "radical symbol"

± "plus or minus"

Boundaries of Assessable Content:

- Items assessing this standard include using models to explore and estimate square roots. Models may include number lines and coordinate grids. Any other model will be explained in words or pictures. It is not assumed students are familiar with any one model.
- Items assessing this standard include using referents to estimate square roots. In this context, referents refers to perfect squares

Content Connections from Previous Grades:

Sample Items:

My flower garden is a square. It has an area of 1600 ft^2.
What is the length of one side of my garden?

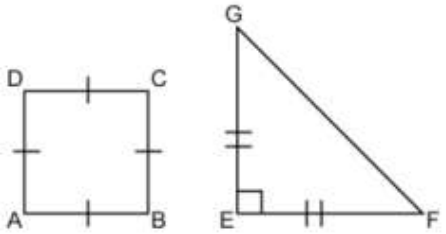
A. 40 feet
B. 160 feet
C. 6,400 feet
D. 1,560,000 feet

Which would represent $\sqrt{17}$?

A. The length of the side of a square of area 17.
B. The length of the diagonal of a right triangle with legs 2 and 3.
C. The area of a square with side length of 17.
D. 17 squares lined up in a row.

The square and isosceles right triangle each have an area of 10 square units.

Which segment has length $\sqrt{10}$ units?



A. $\overline{AB}$
B. $\overline{AC}$
C. $\overline{FG}$
D. $\overline{EG}$

Assessable Academic Vocabulary Summary List for Grade 8

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

adjacent angles
alternate exterior angles
bias
box-and-whisker plot
chance
circle graph
collinear
common solution
complementary angles
congruent
continuous
coordinate plane
corresponding angles
degrees
diagonal
direct variation
discrete
distance
equiangular
equilateral
exterior angle
frequency table
histogram
horizontal
hypotenuse
infer
intercepts
interior angle
inter-quartile range
intersect
intervals
irrational
isosceles
isosceles
isosceles trapezoid
leg
likelihood
linear equation
linear pair
maximum
mean
measures of center
median
minimum
mode
model
no slope (undefined)
origin
outliers
parallel
parallel lines
parallelogram
perfect square
population
predict
Pythagorean Theorem
quadrilateral
quartiles
range
rate of change
rational
rectangle
rhombus
right angle
right triangle
same-side interior angles
scatter plot
similar
slope
solution
square
statistics
stem-and-leaf plot
straight angle
supplementary angles
system of linear equations
table
transversal
trapezoid
vertical
vertical angles
x-intercept
y-intercept

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.

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

Mathematics Test Blueprint- Grade 8
Content Coverage and Weighting

Score Reporting Categories		Number of OAKS Online Items	Target % of Questions Assessed per Test*		Online Test Pool Size
Algebra: Analyze and represent linear functions, and solve linear equations and systems of linear equations.		14-18	40%		340
Data Analysis and Algebra: Analyze and summarize data sets.		10-14	30%		400
Geometry and Measurement: Analyze two- and three-dimensional spaces and figures by using distance and angle.		10-14	30%		290
Operational Item Total		40			1030
Field Test Item Total		5			
Total Items on Test		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 8 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 8 tests, within one or two points, based on a given year's item pool.

High RIT	295
Low RIT	175

Grade 8 Mathematics	
Target Item Pool Difficulty Distribution Goals	
RIT by Difficulty	
212-228	33%
229-236	33%
237-257	33%
RIT Range	212-257
Mean RIT	233
Target Cognitive Demand Distribution Goals	
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 8

The achievement level descriptors are cumulative.

	Does Not Yet Meet	Nearly Meets	Meets	Exceeds
General Policy Definitions (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.**
Mathematics Policy Definitions (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.**
Mathematics Achievement Level Descriptors **8.1** **Algebra**: Analyze and represent linear functions, and solve linear equations and systems of linear equations.	• Inconsistently translate among simple contextual, verbal, tabular, graphical, **or** algebraic representations of linear functions. • Inconsistently find the slope of a line given routine representations. • Inconsistently identify **or** determine the x **or** y intercept of linear relationships. • Inconsistently use linear equations to solve routine problems in one variable. • Inconsistently use informal strategies (e.g., graphs or tables) to solve systems of linear equations in two variables with integer coefficients.	• Translate among routine contextual, verbal, tabular, graphical, **or** algebraic representations of linear functions. • Find the slope of a line given routine representations. • Identify **or** determine the x **and** y intercept of linear relationships. • Use linear equations to solve routine problems and use them to make predictions. • Use informal strategies (e.g., graphs or tables) to solve systems of linear equations in two variables.	• Translate among contextual, verbal, tabular, graphical, **and** algebraic representations of linear functions. • Determine slope of a line and identify the slope as a constant rate of change from multiple representations. • Identify **and** interpret the intercepts of linear relationships in different representations, **and** recognize a proportional relationship (y = kx). • Select and use linear functions and equations to represent and analyze problems to make predictions and inferences. • Use informal strategies (e.g., graphs or tables) to solve problems involving systems of linear equations in two variables; relate the system to a pair of lines that are intersecting, parallel, or the same line.	• Translate among non-routine contextual, verbal, tabular, graphical **and** algebraic representations of linear functions. • Interpret the slope of a line as a constant rate of change from multiple representations and justify reasoning. • Identify **and** interpret continuity and discreteness of linear relationships in different representations, **and** recognize a proportional relationship (y = kx). • Select and use linear functions and equations to represent and analyze complex problems to make predictions and inferences. • Use informal strategies (e.g., graphs or tables) to solve problems involving systems of linear equations in two variables; relate the system to a pair of lines that are intersecting, parallel, or the same line; and explain strategies.

Oregon Mathematics Achievement Level Descriptors – Grade 8

The achievement level descriptors are cumulative.

	Does Not Yet Meet	Nearly Meets	Meets	Exceeds
General Policy Definitions (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.**
Mathematics Policy Definitions (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.**
Mathematics Achievement Level Descriptors **8.2** **Data Analysis and Algebra**: Analyze and summarize data sets.	• Inconsistently organize and create simple data displays (e.g., histograms, box-and-whisker plots, line plots, and scatter plots) to answer questions. • Inconsistently use measures of center and spread to compare two data sets. • Inconsistently interpret and analyze displays of data **or** descriptive statistics. • Inconsistently use sample data to make predictions regarding a population and to estimate the likelihood of future events • Inconsistently identify claims based on data or evaluate the reasonableness of a given claim.	• Organize and create data displays (e.g., histograms, box-and-whisker plots, line plots, and scatter plots) to pose **or** answer questions. • Use measures of center and spread to summarize **or** compare **two** data sets. • Interpret and analyze displays of data **or** descriptive statistics. • Use sample data to make predictions regarding a population or estimate the likelihood of future events. • Identify claims based on data **or** evaluate the reasonableness of a given claim.	• Select, organize, and create data displays (e.g., histograms, box-and-whisker plots, line plots, and scatter plots) to pose **and** answer questions, and explain the choice of display. • Use measures of center and spread to summarize **and** compare data sets. • Interpret and analyze displays of data **and** descriptive statistics. • Use sample data to make predictions about a population in order to estimate the likelihood of future events. Evaluate the reasonableness of the predictions. • Identify claims based on statistical data **and** evaluate the reasonableness of those claims.	• Select, organize and create data displays (e.g., histograms, box-and-whisker plots, line plots, and scatter plots) to pose **and** answer questions, and justify the reasonableness of choice of display. • Use measures of center and spread to summarize and compare complex data sets in a variety of formats. • Interpret and analyze displays of complex data **and** descriptive statistics. • Use complex sample data to make predictions about a population In order to estimate likelihood of future events. Evaluate the reasonableness of the predictions by justifying the strategy used. • Identify claims based on statistical data and evaluate the reasonableness of those claims with multiple examples.

Oregon Mathematics Achievement Level Descriptors – Grade 8

The achievement level descriptors are cumulative.

	Does Not Yet Meet	Nearly Meets	Meets	Exceeds
General Policy Definitions (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.**
Mathematics Policy Definitions (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.**
Mathematics Achievement Level Descriptors **8.3** **<u>Geometry</u> and <u>Measurement</u>**: Analyze two- and three-dimensional spaces and figures by using distance and angle.	• Inconsistently use properties of parallel lines, transversals, and angles to find missing sides and angles **or** to solve problems including similarity and congruence. • Inconsistently use models to show a triangle has an interior angle sum of 180^0**, or** that a quadrilateral has an interior angle sum of 360^0, **or** to solve for a missing angle when the angles are given as real numbers. • Inconsistently use the Pythagorean Theorem to find the hypotenuse of a right triangle **or** to find the distance between two points on a coordinate plane. • Inconsistently use perfect squares to estimate square roots.	• Use properties of parallel lines, transversals, and angles to find missing sides and angles **or** to solve problems including similarity and congruence. • Use models to show a triangle has an interior angle sum of 180^0**, and** that a quadrilateral has an interior angle sum of 360^0, **and** to solve for a missing angle when the angles are given as real numbers. • Use the Pythagorean Theorem to find a missing side in a right triangle **or** to find the distance between points on a coordinate plane. • Use perfect squares to estimate square roots.	• Select and use properties of parallel lines, transversals, and angles to find missing sides and angles expressed in algebraic terms **and** to solve problems including similarity and congruence. • Use models to show a triangle has an interior angle sum of 180^0, **and** that a quadrilateral has an interior angle sum of 360^0, **and** to solve for a missing angle(s) when the angles involve variable expressions and/or real numbers. • Select and use the Pythagorean Theorem to find a missing side in a right triangle **and** to find the distance between points on a coordinate plane. • Estimate square roots using referents and models. (e.g., perfect squares, number lines, or coordinate grids)	• Use properties of parallel lines, transversals, and angles to find missing sides and angles expressed in algebraic terms often requiring multiple steps **and** to solve problems including similarity and congruence. • Use models to show and justify a triangle has an interior angle sum of 180^0, **and** that a quadrilateral has an interior angle sum of 360^0, **and** to solve for a missing angle(s) where a multi-step equation could be applied. • Apply the Pythagorean Theorem to find a missing side in a right triangle in a multi-triangle setting which requires several applications of the theorem. Extend knowledge of the theorem to find distances in three–dimensional settings • Estimate square roots using referents and models, and justify the strategy used.

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 AERSP 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). 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 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 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 6	MEET	EXCEED
Reading/Literature	226	237
Mathematics	227	237
Writing, Speaking, Science, 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 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.

OREGON DEPARTMENT OF EDUCATION

ACHIEVEMENT STANDARDS

High School	Achievement Standards for Oregon Statewide Assessments[1]		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
Writing • 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[2]

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

[1] In future years, Achievement Standards may change for the purposes of accountability and earning a high school diploma.

[2] For purposes of demonstrating mastery of Essential Skills, students must meet the achievement standards in effect during their 8th grade year. However, students may use achievement standards adopted in their 9th through 12th grade years that are equal to or lower than the achievement standards approved as of March 1 of the students' 8th grade year. In addition, students may demonstrate proficiency in the Essential Skills using additional assessment options adopted in their 9th through 12th 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. 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[1]	Grades 3-8 and High School	4	5	Exemplars reflect expectations at each grade level.
Scientific Inquiry[2]	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
Exemplars of scored work samples are currently found on subject-specific assessment pages linked from:
www.ode.state.or.us/search/page/?id=1307

[1] 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.

[2] 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 9th through 12th grade years.
- allow students to use achievement standards adopted in their 9th through 12th grade years that are equal to or lower than the achievement standards approved as of March 1 of the students' 8th 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: • at least one must be informative • the second may be informative or literary	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: • expository • persuasive • narrative (personal) • narrative (fictional)	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: • algebra • geometry • statistics	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	
Target Item Pool Difficulty Distribution Goals		**Target Item Pool Difficulty Distribution Goals**		**Target Item Pool Difficulty Distribution Goals**		**Target Item Pool Difficulty Distribution Goals**	
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%
RIT Range	187-231	**RIT Range**	193-241	**RIT Range**	201-246	**RIT Range**	202-247
Mean RIT	208	**Mean RIT**	217	**Mean RIT**	222	**Mean RIT**	224
Target Cognitive Demand Distribution Goals		**Target Cognitive Demand Distribution Goals**		**Target Cognitive Demand Distribution Goals**		**Target Cognitive Demand Distribution Goals**	
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	
Target Item Pool Difficulty Distribution Goals		**Target Item Pool Difficulty Distribution Goals**		**Target Item Pool Difficulty Distribution Goals**	
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%
RIT Range	212-252	RIT Range	212-257	RIT Range	213-253
Mean RIT	231	Mean RIT	233	Mean RIT	232
Target Cognitive Demand Distribution Goals		**Target Cognitive Demand Distribution Goals**		**Target Cognitive Demand Distribution Goals**	
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 works 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.

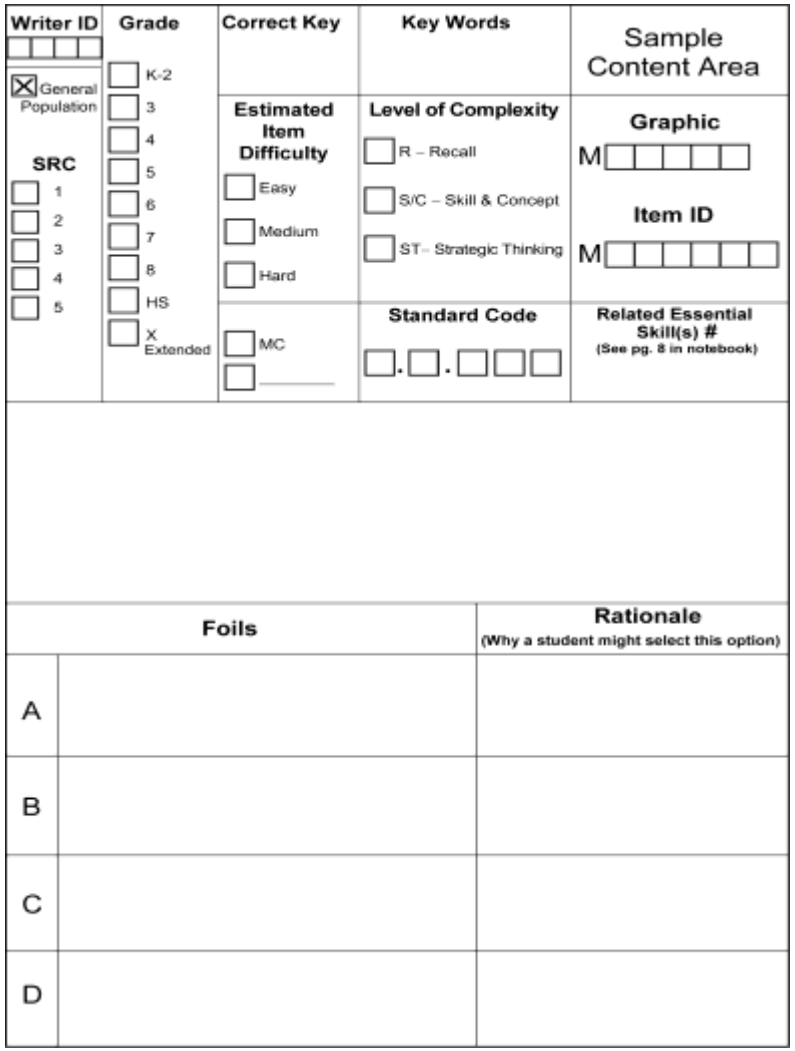
All items are written to measure specific subdomains of the content standards at a variety of specified levels of cognitive complexity. Cognitive complexity is represented by the following classification, developed from Bloom's (1956) educational taxonomy:[1]

- **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.

[1] 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



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/structurecapanels.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:

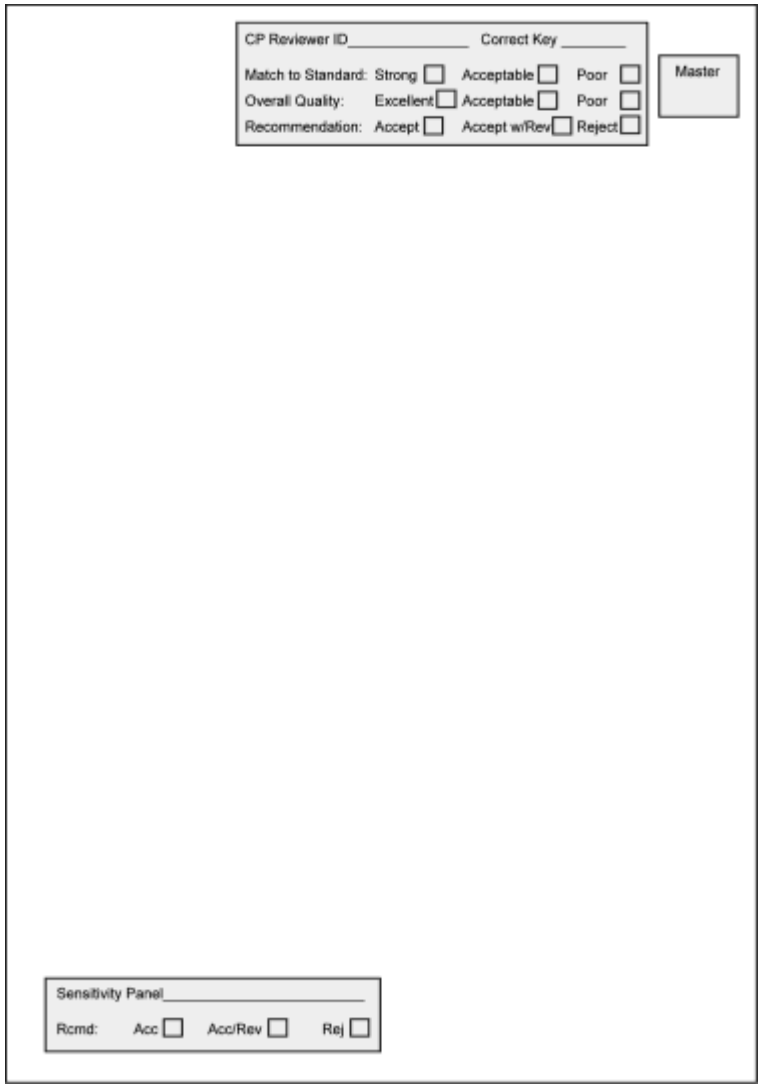
1. Three content panel members review each item independently and complete an Item Review Form (IRF) (figure 1) using a pre-assigned reviewer ID.

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 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

OFFICE OF ASSESSMENT & INFORMATION SERVICES
THE OREGON DEPARTMENT OF EDUCATION

The complete two-year Lifecycle of a Knowledge and Skills Item
Mathematics, Reading/Literature, Science, Social Sciences

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

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

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The complete two-year Lifecycle of a Knowledge and Skills Item
Mathematics, Reading/Literature, Science, Social Sciences

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.

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 was 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

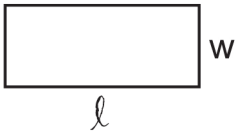
1 liter = 1000 cubic centimeters

1 yard = 3 feet
1 mile = 5280 feet
1 hour = 60 minutes
1 minute = 60 seconds

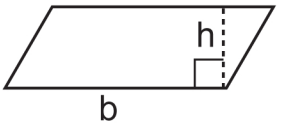
1 pound = 16 ounces
1 ton - 2000 pounds

1 cup - 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts

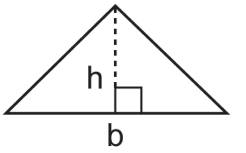
AREA (A)



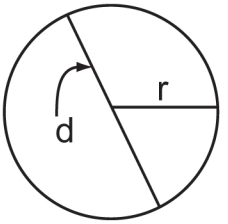
$A = \ell w$



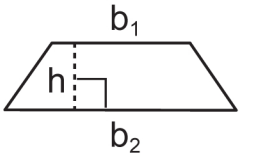
$A = bh$



$A = \frac{1}{2} bh$

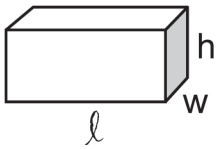


$A = \pi r^2$
$C = 2 \pi r = \pi d$

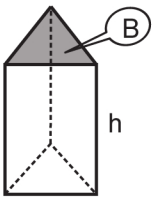


$A = \frac{1}{2} h (b_1 + b_2)$

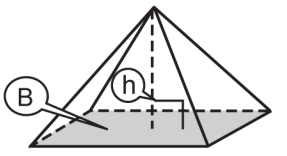
SURFACE AREA (SA) and VOLUME (V)



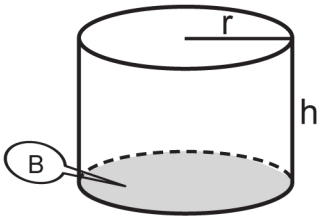
$SA = 2 (\ell w + wh + \ell h)$
$V = \ell wh = Bh$
B = Area of Base



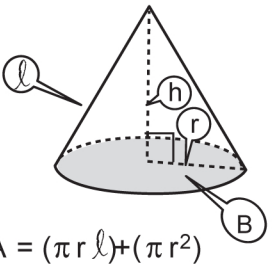
SA = Sum of Areas of all faces
$V = Bh$
B = Area of Base



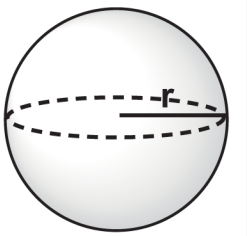
SA = Sum of Areas of all faces
$V = \frac{1}{3} Bh$
B = Area of Base



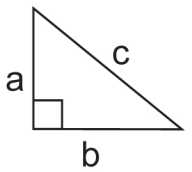
$SA = 2 \pi rh + 2 \pi r^2$
$V = \pi r^2 h = Bh$
B = Area of Base



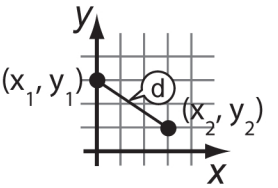
$SA = (\pi r \ell) + (\pi r^2)$
$V = (\frac{1}{3} \pi r^2)(h) = \frac{1}{3} Bh$
B = Area of Base



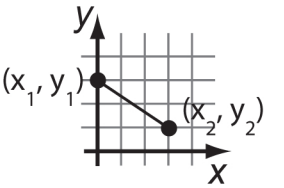
$SA = 4 \pi r^2$
$V = \frac{4}{3} \pi r^3$



$a^2 + b^2 = c^2$



$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$



Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Oregon Department of Education

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