Introduction

The Math Test Specifications provide an overview of the structure and content of Ohio's State Test. This overview includes a description of the test design as well as information on the types of items that will appear on the test. Also included is a test blueprint, a document that identifies the range and distribution of points grouped into various reporting categories (e.g., Fractions, Ratios and Proportions, Functions, Probability). The specifications also provide specific guidelines for the development of all items used for Ohio's math tests.
This document is a resource not only for item writers and test designers, but also for Ohio educators and other stakeholders who are interested in a deeper understanding of the test.

Overview of Structure and Content

Ohio's Learning Standards

In 2017, Ohio adopted revisions to Ohio's Learning Standards for Mathematics which include standards for mathematical content and mathematical practice. Then, based on the 2017 Standards, Ohio adopted revisions to the Model Curriculum, a document that connects standards to instruction. The mathematics assessment items (test questions) align to the 2017 Standards.

Standards for Mathematical Practice

The Standards for Mathematical Practice (SMP) describe skills that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The design of each item on Ohio's state tests encourages students to use one or more Standards for Mathematical Practice. Below is a list of the mathematical practices.

Grade 8 Standards for Mathematical Practice
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Blueprint

Test blueprints serve as a guide for test construction and provide an outline of the content and skills to be measured on the test. They contain information about the number of points of opportunity students will encounter in each reporting category on the math test. The following test blueprint displays the distribution of the content standards and depth of knowledge across the entire test and categories for reporting test results for Grade 8.

Reporting Category	Standards				Approximate Portion of Test
Equations and Expressions	8.EE.5	8.EE.7	8.SP.1	8.SP.3	20% – 29% 11 – 15 points
	8.EE.6	8.EE.8	8.SP.2	8.SP.4	
Functions	8.F.1	8.F.3	8.F.5		20% – 29% 11 – 15 points
	8.F.2	8.F.4			
Geometry	8.G.1	8.G.4	8.G.7		28% – 37% 15 – 19 points
	8.G.2	8.G.5	8.G.8		
	8.G.3	8.G.6	8.G.9		
The Number System	8.NS.1	8.EE.1	8.EE.3		20% – 25% 11 – 13 points
	8.NS.2	8.EE.2	8.EE.4		
				Total Test	52 – 54 points

Modeling and Reasoning*

(minimum 20%)

Depth of Knowledge (DOK) Level	Approximate Portion of Test
1	8 – 16 points
2	25 – 34 points
3	8 – 16 points

Modeling and Reasoning

Modeling and Reasoning are included in the eight Standards for Mathematical Practice within Ohio's Learning Standards. Each grade's blueprint identifies modeling and reasoning as an independent reporting category that will account for a minimum of 20 percent of the overall points on that grade's test.

Depth of Knowledge (DOK)

DOK refers to the complexity of thinking required to complete a task in a given item. Items with a DOK 1 designation focus on the recall of information, such as definitions and terms, and

simple procedures. Items with a DOK 2 designation require students to make decisions, solve routine problems, perform calculations, or recognize patterns. Items with a DOK 3 designation feature higher-order cognitive tasks. These DOK 3 tasks include but are not limited to: critiquing a statement and forming a conclusion; explaining, justifying, or proving a statement; or approaching abstract, complex, open-ended, and non-routine problems. Each grade's blueprint contains information about the number of points of opportunity students will encounter at each DOK level.

Test Design

The assessment is a two-part test, developed in a computer-based format and a paper-based format. Its purpose is to measure student progress and provide information to parents, teachers, and building, district and state administrators. The test will contain technology-enhanced items that require the student to enter a response into the computer interface. The test will be administered near the end of the academic school year or the end of a semester (for high school). The test can be administered in one or two sessions. After the student has completed both parts of the test, his or her scores will be combined to yield a comprehensive test score. Test results are reported back to schools by June 30th.

Performance Level Descriptors (PLDs)

At each grade level/course, PLDs are general statements describing what students should know or be able to do at each performance level.

After the Ohio State Mathematics test is scored, each student's performance level is identified based on the combined scores (Part 1 and Part 2). Districts and schools are sent item level reports and the performance level for each student along with the performance level descriptors. Teachers and math coaches can use this information for their instructional design.

Calculator

Calculators are **not** permitted for use on either the paper-based or computer-based mathematics test for grades 3-5. Grades 6 and 7 have a non-calculator part and a calculator part for both the paper-based and the computer-based mathematics test. The calculator designation for items in grades 6 and 7 is decided during development on an item-by-item basis. A calculator may be used on the entire grade 8 and high school End of Course (EOC) paper-based or computer-based mathematics tests. Note that calculator usage may differ for those students with an Individualized Education Plan (IEP) or 504 plan that specifies a calculator accommodation.

- Guidance on Desmos Calculator for Grades 3-8
- Grades 3-8 Handheld Calculator Guidance

- Guidance on Desmos Calculator for High School
- High School Handheld Calculator Guidance

Reference Sheets

A reference sheet may be used on the Ohio State Mathematics Tests by all students in grades four and above. For paper-based testers, the math reference sheets will be included within the student test booklet. For online testers, the math reference sheet is embedded within the testing platform.

Interaction Types

Ohio's State Tests are composed of several interaction types. Currently, there are ten interaction types that may appear on a math computer-based assessment:

- Equation Item (EQ)
- Gap Match Item (GM)
- Grid Item (GI)
- Hot Text Item (HT)
- Inline Choice Item (IC)
- Matching Item (MI)
- Multiple Choice Item (MC)
- Multi Select Item (MS)
- Simulation Item (Sim)
- Table Item (TI)

For paper-based assessments (including those for students with an IEP or 504 plan that specifies a paper-based accommodation), the items may be modified so that they can be scanned and scored electronically or hand-scored.

Interaction Type	Description
Equation Item (EQ)	The student is presented with a keypad that includes a variety of mathematical symbols that can be used to create a response. Responses may be in the form of a number, variable, expression, or equation, as appropriate to the test item. The student enters their response in the response box which may be on a line by itself, or embedded in a sentence or phrase. For paper-based assessments, this interaction type may be replaced with a modified version of the item that can be scanned and scored electronically or the student may be given an answer box to write their answer.

Interaction Type	Description
Gap Match Item (GM)	Given a set of options (e.g., numbers, words, phrases, or sentences) the student hovers over the options which then highlight, indicating that the option is selectable. The student can then click on the object, hold down the mouse button, and drag it to an answer area, indicated by a dotted box, in a graphic, table, or paragraph. For paper-based assessments, the options are associated with a letter, and students write a letter for their response in each response area.
Grid Item (GI)	The student may select numbers, words, phrases, or images to display their response. The student may also use the drag-and-drop feature to place objects into a response area. This interaction type may also require the student to use the point, line, or arrow tools to create a response on a graph or gridded area. For paper-based assessments, the student may be given the response space to draw their answer, or this interaction type may be replaced with another interaction type that assesses the same standard at the same level of difficulty and can be scanned and scored electronically.
Hot Text Item (HT)	**Selectable Hot Text -** Given a set of options (e.g., phrases, sentences, or numbers) the student hovers over the options which then highlight, indicating that the text is selectable ("hot"). The student can then click on an option to select it as their response. For paper-based assessments, a "selectable" hot text item is modified so that it can be scanned and scored electronically. The student fills in a circle to indicate the correct response.
	Drag-and-Drop Hot Text - Given a set of options (e.g., numbers, words, phrases, or sentences) the student hovers over the options which then highlight, indicating that the option is selectable ("hot"). The student can then click on the object, hold down the mouse button, and drag it to a graphic, table, or paragraph. For paper-based assessments, the options are associated with a letter, and students write a letter for their response in each response area.
Inline Choice Item (IC)	Given a sentence, paragraph, or table, the student clicks a blank box embedded within a sentence or table which reveals a drop-down menu containing options for completing a sentence or table. The student then selects an option from the drop-down menu to respond. For paper-based assessments, the interaction is modified so that it can be scanned and scored electronically. The student fills in a circle to indicate the correct response.
Matching Item (MI)	Given column and row headers in a table format, the student checks a box to indicate if information from a column header matches information from a row header. For paper-based assessments, the interaction is modified so that it can be scanned and scored electronically. The student fills in a circle to indicate the correct response.

Interaction Type	Description
Multiple Choice Item (MC)	The student selects one correct answer from four options. For paper-based assessments, the student fills in a circle to indicate the correct response.
Multi Select Item (MS)	The student is directed to either select an indicated number of correct answers or to select all of the correct answers. Students in grades 3-5 always select an indicated number of correct answers; students in grades 6-8 select an indicated number of correct answers on 50% of the items and select all on 50% of the items; and students taking high school end-of-course tests are always directed to select all correct answers. These items are different from multiple choice items, and require the student to select 2 or more correct answers. For paper-based assessments, the student fills in circles to indicate the correct responses.
Simulation Item (Sim)	Given a set of instructions, the student may interact with any of the following controls to generate data: radio buttons, drop-down menus, slide bars, or selecting a number by clicking arrows. Once the student has set the parameters, they click the start button to begin the simulation and generate a data set. Once the student has enough data, they may answer questions about the data using a different interaction type. For paper-based assessments, this interaction will be replaced with another interaction type that assesses the same standard at the same level of difficulty and can be scanned and scored electronically.
Table Item (TI)	The student types numeric values into a given table. The student may complete the entire table or portions of the table depending on what is being asked. For paper-based assessments, the student writes their responses in the blank boxes of the table.

Specific Guidelines for Item Development

Standards are presented according to reporting categories as shown on grade level or course blueprints.

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Understand the connections between proportional relationships, lines, and linear equations.** ***8.EE.5*** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*
Content Limits	• Items may use all types of rational numbers. • Items pertain only to direct proportional relationships.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Understand the connections between proportional relationships, lines, and linear equations.** ***8.EE.6*** Use similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation *y* = *mx* for a line through the origin and the equation *y* = *mx* + *b* for a line intercepting the vertical axis at *b*.
Content Limits	• Items may use all types of rational numbers. • All triangles will be right triangles and in a coordinate grid.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Analyze and solve linear equations and pairs of simultaneous linear equations.** ***8.EE.7*** Solve linear equations in one variable. ***8.EE.7a*** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). ***8.EE.7b*** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
Content Limits	• Items may use all types of rational numbers. • Equations can be more complex than the forms $px + r = q$ and $p(x + r) = q$.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Analyze and solve linear equations and pairs of simultaneous linear equations.** ***8.EE.8*** Analyze and solve pairs of simultaneous linear equations graphically. ***8.EE.8a*** Understand that the solution to a pair of linear equations in two variables corresponds to the point(s) of intersection of their graphs, because the point(s) of intersection satisfy both equations simultaneously. ***8.EE.8b*** Use graphs to find or estimate the solution to a pair of two simultaneous linear equations in two variables. Equations should include all three solution types: one solution, no solution, and infinitely many solutions. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* ***8.EE.8c*** Solve real-world and mathematical problems leading to pairs of linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* (Limit solutions to those that can be addressed by graphing.)
Content Limits	• Items may use all types of rational numbers. • For 8b and 8c, items are not required to have a graph, but the equations will be easily graphable. • Axes can be numbered with scales other than 1.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.SP STATISTICS AND PROBABILITY*** **Investigate patterns of association in bivariate data.** ***8.SP.1*** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering; outliers; positive, negative, or no association; and linear association and nonlinear association. (GAISE Model, steps 3 and 4)
Content Limits	• Items may use all types of rational numbers. • Axes can be numbered with scales other than 1.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.SP STATISTICS AND PROBABILITY*** **Investigate patterns of association in bivariate data.** ***8.SP.2*** Understand that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. (GAISE Model, steps 3 and 4)
Content Limits	• Items may use all types of rational numbers. • The trend/association will be linear. • Judgment about the association and linear fit will be based solely on visual inspection; calculations will not be required.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.SP STATISTICS AND PROBABILITY*** **Investigate patterns of association in bivariate data.** ***8.SP.3*** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* (GAISE Model, steps 3 and 4)
Content Limits	• Items may use all types of rational numbers. • Only linear equations are used. • Data are required for all items.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**EXPRESSIONS AND EQUATIONS**
Content Standard	***8.SP STATISTICS AND PROBABILITY*** **Investigate patterns of association in bivariate data.** ***8.SP.4*** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
Content Limits	• Items may use all types of rational numbers. • Only categorical variables are used. • Rows and columns are limited to 2 categories each. • Total and subtotal cells may or may not be given.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**FUNCTIONS**
Content Standard	***8.F FUNCTIONS*** **Define, evaluate, and compare functions.** ***8.F.1*** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. Function notation is not required in Grade 8.
Content Limits	• Function notation is not permitted. • Nonlinear relations may be included for the purpose of identifying a function.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**FUNCTIONS**
Content Standard	***8.F FUNCTIONS*** **Define, evaluate, and compare functions.** ***8.F.2*** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*
Content Limits	• Function notation is not permitted. • Functions will be linear.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**FUNCTIONS**
Content Standard	***8.F FUNCTIONS*** **Define, evaluate, and compare functions.** ***8.F.3*** Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*
Content Limits	• Function notation is not permitted.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**FUNCTIONS**
Content Standard	***8.F FUNCTIONS*** **Use functions to model relationships between quantities.** ***8.F.4*** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x*, *y*) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
Content Limits	• Function notation is not permitted. • Functions will be linear. • Context may require the graphing of discrete linear functions. • Axes can be numbered with scales other than 1.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**FUNCTIONS**
Content Standard	***8.F FUNCTIONS*** **Use functions to model relationships between quantities.** ***8.F.5*** Describe qualitatively the functional relationship between two quantities by analyzing a graph, e.g., where the function is increasing or decreasing, linear or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Content Limits	• Function notation is not permitted. • Graphs may display linear and/or nonlinear relationships. • Graphs are described from left to right. • Graphs may refer to quantitative or qualitative measures (e.g., the axes of graphs may or may not have scales). • Functional relationships will be continuous.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand congruence and similarity using physical models, transparencies, or geometry software.** ***8.G.1*** Verify experimentally the properties of rotations, reflections, and translations (include examples both with and without coordinates). ***8.G.1a*** Lines are taken to lines, and line segments are taken to line segments of the same length. ***8.G.1b*** Angles are taken to angles of the same measure. ***8.G.1c*** Parallel lines are taken to parallel lines.
Content Limits	• Sequences will be limited to no more than two transformations. • Figures may or may not be given on a coordinate plane.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand congruence and similarity using physical models, transparencies, or geometry software.** ***8.G.2*** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. (Include examples both with and without coordinates.)
Content Limits	• Dilation may be used as a distractor option in selected response items. However, stating "dilation" is not sufficient for identifying a transformation that does not maintain congruence, since dilation by a factor of 1 does maintain congruence. • Sequences will be limited to no more than two transformations. • Figures may or may not be given on a coordinate plane.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand congruence and similarity using physical models, transparencies, or geometry software.** ***8.G.3*** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
Content Limits	• The use of coordinates or the coordinate plane is required. • Coordinate values of x and y must be integers. • Sequences will be limited to no more than two transformations. • In items that require the student to draw a transformed figure using a dilation or a rotation, the center of the transformation will be given. • Limit the center of rotation to the origin or a vertex on the figure. • Limit the center of dilation to the origin, a defined point inside the shape, or a vertex on the figure. • When a coordinate grid is given, all original figures and transformations, given or not given, will fit onto that coordinate grid.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand congruence and similarity using physical models, transparencies, or geometry software.** ***8.G.4*** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. (Include examples both with and without coordinates.)
Content Limits	• Sequences will be limited to no more than two transformations. • Stating "dilation" is not sufficient for identifying a transformation that does not maintain congruence, since dilation by a factor of 1 does maintain congruence. • Figures may or may not be given on a coordinate plane.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand congruence and similarity using physical models, transparencies, or geometry software.** ***8.G.5*** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
Content Limits	• Facts are limited to angle sum, exterior angles of triangles, angles created when parallel lines are cut by a transversal and the angle-angle criterion for similarity of triangles.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand and apply the Pythagorean Theorem.** ***8.G.6*** Analyze and justify an informal proof of the Pythagorean Theorem and its converse.
Content Limits	• For the converse of the Pythagorean Theorem, only perfect squares are used. • Items that apply the Pythagorean Theorem are aligned to 8.G.7 or 8.G.8.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand and apply the Pythagorean Theorem.** ***8.G.7*** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
Content Limits	• If the triangle is part of a three-dimensional figure, a graphic of the three-dimensional figure will be included.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Understand and apply the Pythagorean Theorem.** ***8.G.8*** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Content Limits	• Points must either be at the intersection of two grid lines or their coordinates must be given.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**GEOMETRY**
Content Standard	***8.G GEOMETRY*** **Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.** ***8.G.9*** Solve real-world and mathematical problems involving volumes of cones, cylinders, and spheres.
Content Limits	• Items may use all types of rational numbers. • Items that require the use of π in their calculations should accept answers using approximations of π from 3.14 to $\frac{22}{7}$.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**THE NUMBER SYSTEM**
Content Standard	***8.NS THE NUMBER SYSTEM*** **Know that there are numbers that are not rational, and approximate them by rational numbers.** ***8.NS.1*** Know that real numbers are either rational or irrational. Understand informally that every number has a decimal expansion which is repeating, terminating, or is non-repeating and non-terminating.
Content Limits	• Irrational numbers are limited to expressions involving π or radicals. • Irrational expressions will only use one operation.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**THE NUMBER SYSTEM**
Content Standard	***8.NS THE NUMBER SYSTEM*** **Know that there are numbers that are not rational, and approximate them by rational numbers.** ***8.NS.2*** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions, e.g., π^2. *For example, by truncating the decimal expansion of* $\sqrt{2}$*, show that* $\sqrt{2}$ *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
Content Limits	• Irrational numbers are limited to expressions involving π or radicals. • Irrational expressions will only use one operation.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**THE NUMBER SYSTEM**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Work with radicals and integer exponents.** ***8.EE.1*** Understand, explain, and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27.$
Content Limits	• Exponents will be integers. • Bases will be whole numbers, fractions, or decimals. • Variables will be used only for unknown exponents. (*Example,* $3^2 \bullet 3^x = 3^6$*)*
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**THE NUMBER SYSTEM**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Work with radicals and integer exponents.** ***8.EE.2*** Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
Content Limits	• Items will include square roots and cube roots. • Radicands will be positive rational numbers. • Items may require the identification of both solutions of the equation $x^2 = p$.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**THE NUMBER SYSTEM**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Work with radicals and integer exponents.** ***8.EE.3*** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3×10^8; and the population of the world as 7×10^9; and determine that the world population is more than 20 times larger.*
Content Limits	• All numbers will be able to be written in the form $a \times 10^b$ where a and b are integers and $1 \leq a < 10$. • Exponents may be positive or negative.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**THE NUMBER SYSTEM**
Content Standard	***8.EE EXPRESSIONS AND EQUATIONS*** **Work with radicals and integer exponents.** ***8.EE.4*** Perform operations with numbers expressed in scientific notation, including problems where both decimal notation and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities, e.g., use millimeters per year for seafloor spreading. Interpret scientific notation that has been generated by technology.
Content Limits	• Items may use all types of rational numbers. • Exponents may be positive or negative.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional