Alabama Item Specifications

Grade 8 Mathematics

Alabama Comprehensive Assessment Program

The draft Alabama Comprehensive Assessment Program (ACAP) item specifications are based upon the development of summative assessments that measure the Alabama Course of Study Standards. The item specifications define the purpose of the ACAP and provide important information regarding the content to be measured. The item specifications serve to provide a road map designed to guide Alabama educators in the development of items and subsequent review of items that best measure the Course of Study Standards for a given grade and content area. Each content-area and grade-level item specification aligned to the given domain, cluster, and standard includes the following key information regarding each domain:

- Evidence statements
- Assessment limits/Content constraints
- Recommended depth-of-knowledge (DOK) or cognitive levels
- Calculator usage
- Item types for measuring a given standard
- Information regarding whether context is allowable
- Sample stem information

Definitions

Course of Study Standards: The Course of Study Standards are a set of content curriculum statements that define what students should know and be able to do at a given grade level. The goal is to prepare students for future opportunities and options in the workplace and for everyday life. Through the implementation of the Alabama Course of Study for Mathematics, students will be well equipped for the workforce upon graduation or ready to pursue higher levels of education in Alabama's colleges and universities.

Domain: A domain is a group of related clusters and content standards. Sometimes standards from different domains may be closely related.

Cluster: A cluster is a group of related content standards. Because mathematics is a connected subject, standards from different clusters may sometimes be closely related.

Standard: The standard defines what students should understand (know) and be able to do at the conclusion of a course or grade. The standard text in the item specification is preceded by a standard identifier (e.g., 4.OA.1) to indicate the student grade level as fourth (4), the domain as Operations and Algebraic Thinking (OA), and the standard number as one (1).

Evidence Statements: Evidence statements are closely aligned to the standard and do not deviate from the requirements of the standard. Standards that are substantial in content do provide for a better opportunity to "unpack the standard," which is the case for many of the Alabama Course of Study Standards. The evidence statements serve that purpose.

Assessment Limits/Content Constraints: Assessment limits and/or content constraints define the range of content knowledge and the degree of difficulty allowable when items are written to measure a given standard.

Depth of Knowledge (DOK): Depth of knowledge involves the cognitive complexity or the nature of thinking regarding a given item. Most recently Webb's depth-of-knowledge levels are used in the development of items for cognitive demand. Therefore, when developing items for depth of knowledge, the item should be as demanding cognitively as what the actual standard expects. Webb's depth of knowledge includes four levels, from the lowest (basic recall) to the highest (extended thinking.) The mathematics ACAP assessment items are written to one of three cognitive levels of complexity:

- Level 1: Recall
- Level 2: Application of a Skill/Concept
- Level 3: Strategic Thinking

Item Types: The ACAP summative assessments are composed of various item types. These item types are described in the following section.

Context: Context provides information regarding the types of stimulus materials that can be used in the items. If a context is allowable, it means that the item may have context. If context is required, then the item measuring the given standard must have context. If no context is noted, then the items measuring the given standard should not have context.

Sample Stem Information: This statement explains what students are expected to do when they respond to a given item.

Item Types

The Alabama Comprehensive Assessment Program (ACAP) summative assessments are composed of various item types. These item types are described below.

Multiple-Choice (MC) Items: MC items have four answer choices, including three distractors and one correct answer. Distractors for mathematics represent common misconceptions, incorrect logic, incorrect application of an algorithm, computational errors, etc. A correct response to an MC item is worth one score point in the mathematics ACAP.

Multiple-Select (MS) Items: MS items are similar in structure to MC items. MC items have a stem and four answer options, one of which is correct. However, unlike an MC item, and MS item has more than four options and more than one correct answer. In other words, there are multiple responses required for a given item. For mathematics, there are two types of MS configurations. One has five answer options of which two are correct, and the other has six answer options of which two or three are correct. Directions for the number of options to select are provided with each item. A correct response to an MS item is worth one score point in the mathematics ACAP.

Short-Answer (SA) Items: SA items are constructed-response items that require a keyed response from the student. As such, they often require a brief series of objective, concise answers of just a few characters entered into a small response space (no extemporaneous test or explanatory work is required). In the mathematics ACAP, this item type is autoscored using scoring guidelines for the correct answer. A correct response to an SA item is worth one score point in the mathematics ACAP.

Technology-Enhanced (TE) Items: TE items share the same functional structure as traditional paper- and-pencil test items; however, the expansive features and functions of a computer-based medium allow for the incorporation of technical enhancements into traditional elements of a test item, such as the stem, the stimulus (if any), the response area, or a combination of all three. These items require the use of one or more tools. A correct response to a TE item is worth one score point in the mathematics ACAP. Grade 4 mathematics TE items include the following types:

- **Angle Draw Input:** These TE items provide a student with a given ray, and then the student completes the angle by drawing a second ray.
- **Drag-and Drop-Input**: These TE items provide a student with draggable entities that can be configured to be used once or multiple times.
- **Drop-Down List Input:** These TE items allow a student to select elements in drop-down lists that can be embedded within text or tables.
- **Hot Spot:** These TE items allow for one image to replace another image when a given hot spot is selected.
- **Line Plot Input:** These TE items provide another way for a student to graphically represent data when the structure is provided. Certain labeling on the line plot can be done by the student.
- **Matching:** These TE items allow for the use of text or graphics as the matching objects. The student selects one object and then selects a second object to connect them.
- **Matching Table:** These TE items include a table with multiple rows and columns, and the student makes matches between the given elements in the rows and columns. The table can be customized to allow for only a single selection in a row and/or column or for multiple selections within each.
- **Number Line Input:** These TE items allow a student to create a number line graph that might involve plotting points only or points and lines. Both closed and open points are available, as well as line segments and rays.

Math Reference Sheets

An online reference sheet is available as a pop-up window in certain grades.

Grade	Conversions	Formulas
2	No	No
3	No	No
4	Yes	Yes
5	Yes	Yes
6	Yes	Yes
7	Yes	Yes
8	Yes	Yes

Standards for Mathematical Practices

The Standards for Mathematical Practice are based on important "processes and proficiencies" that have longstanding importance in mathematics education. The first of these are the National Council of Teachers of Mathematics (NCTM) process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report *Adding It Up: Helping Children Learn Mathematics*. These proficiencies include adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations, and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently, and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy). Because these practices are an important part of the curriculum, they will be assessed throughout the mathematics ACAP. The eight Standards for Mathematical Practice are listed below, but more detail is provided in the Alabama Course of Study for Mathematics.

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Domain	NS: The Number System
Cluster	Know that there are numbers that are not rational, and approximate them by rational numbers.
Standard	8.NS.1: Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. [8-NS1]
Evidence Statements	The student will know that numbers that are not rational are called irrational and understand informally that every number has a decimal expansion.
Assessment Limits / Content Constraints	Tasks do not have a context.
DOK(s)	1, 2, or 3
Calculator	NO – a calculator will not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given a number or list of numbers, classify the number(s) as rational or irrational.

Domain	NS: The Number System
Cluster	Know that there are numbers that are not rational, and approximate them by rational numbers.
Standard	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). [8-NS2] 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.
Evidence Statements	The student will use rational approximations of irrational numbers to compare the size of irrational numbers.
Assessment Limits / Content Constraints	Tasks do not have a context.
DOK(s)	1, 2, or 3
Calculator	NO – a calculator will not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given comparisons involving irrational numbers, identify which comparison is correct. Given an irrational number, identify its approximate place on the number line. Given an irrational number, identify or generate a range of numbers that the given number is within. Given an expression involving irrational numbers, estimate the value. Given a point on a number line, identify the rational approximation. Given an estimated value, identify which expression most closely approximates the estimated value.

Domain	EE: Expressions and Equations
Cluster	Work with radicals and integer exponents.
Standard	8.EE.3: Know and apply the properties of integer exponents to generate equivalent numerical expressions. [8-EE1] Example: $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.
Evidence Statements	The student will know and apply the properties of integer exponents.
Assessment Limits / Content Constraints	Tasks do not have a context. Tasks focus on properties and equivalence, not on simplification. Tasks should involve a single common base or a potential common base.
DOK(s)	1, 2, or 3
Calculator	NO – a calculator will not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given an exponential expression, number, or exponential computation, generate or identify its equivalent in another form.

Domain	EE: Expressions and Equations
Cluster	Work with radicals and integer exponents.
Standard	8.EE.4: 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 $\sqrt{2}$ is irrational.
Evidence Statements	The student will use square root and cube root symbols to represent solutions to equations.
Assessment Limits / Content Constraints	Tasks may or may not have a context. Students are not required to simplify expressions such as $\sqrt{8}$ to $2\sqrt{2}$. Students are required to evaluate the square roots of 1, 4, 9, 16, 25, 36, 49, 64, 81, and 100 and the cube roots of 1, 8, 27, and 64.
DOK(s)	1, 2, or 3
Calculator	NO – a calculator will not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a simple quadratic or cubic equation, determine or identify the number of solutions for that equation. Given a simple quadratic or cubic equation, generate or identify the solution to the equation. Given a number in square or cubic root notation, generate or identify the root.

Domain	EE: Expressions and Equations
Cluster	Work with radicals and integer exponents.
Standard	8.EE.5: 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. [8-EE3] 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.
Evidence Statements	The student will use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	NO – a calculator will not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a situation with at least two numbers expressed in the form of a single digit times an integer power of 10, determine how many times as much as the other number one of the numbers is. Given one number expressed in the form of a single digit times an integer power of 10 along with a comparative value (e.g., 10 times as much), determine the other number expressed in the form of a single digit times an integer power of 10.

Domain	EE: Expressions and Equations
Cluster	Work with radicals and integer exponents.
Standard	8.EE.6: Perform operations with numbers expressed in scientific notation, including problems where both decimal 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. [8-EE4]
Evidence Statements	The student will perform operations with numbers expressed in scientific notation. The student will use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.
Assessment Limits / Content Constraints	Tasks have "thin context" or no context. Rules or conventions for significant figures are not assessed. Tasks may involve both decimal and scientific notation. Tasks may require students to recognize 4.5E-2 (or 4.5e-2) from technology as 4.5×10^{-2}.
DOK(s)	1, 2, or 3
Calculator	NO – a calculator will not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a set of quantities, perform one of the four operations.

Domain	EE: Expressions and Equations
Cluster	Understand the connections among proportional relationships, lines, and linear equations.
Standard	8.EE.7: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. [8-EE5] Example: Compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
Evidence Statements	The student will graph and compare proportional relationships.
Assessment Limits / Content Constraints	Tasks may or may not contain context.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a scenario presenting proportional relationships in a variety of methods, interpret the unit rate. Given a scenario presenting proportional relationships in a variety of methods, compare between the relationships.

Domain	EE: Expressions and Equations
Cluster	Understand the connections among proportional relationships, lines, and linear equations.
Standard	8.EE.8: 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*. [8-EE6]
Evidence Statements	The student will use similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line and derive the equation for a line.
Assessment Limits / Content Constraints	Tasks do not have a context. Tasks may require students, when given a non-vertical line in the coordinate plane, to choose two pairs of points and record the rise, run, and slope relative to each pair and verify that they are the same. Tasks may assess simple graphing of lines from a linear equation in slope-intercept form.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given a coordinate plane, use similar triangles to determine key features about the slopes of the triangles. Given information about a line, derive the equation.

Domain	EE: Expressions and Equations
Cluster	Analyze and solve linear equations and pairs of simultaneous linear equations.
Standard	8.EE.9a: Solve linear equations in one variable. [8-EE7] a. 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-EE7a]
Evidence Statements	The student will give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a linear situation where only one unknown is present, solve for that unknown. Given an equation in one variable, determine whether the equation has one solution, infinitely many solutions, or no solution.

Domain	EE: Expressions and Equations
Cluster	Analyze and solve linear equations and pairs of simultaneous linear equations.
Standard	8.EE.9b: Solve linear equations in one variable. [8-EE7] b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions, using the distributive property and collecting like terms. [8-EE7b]
Evidence Statements	The student will solve linear equations with rational number coefficients by using the distributive property and collecting like terms.
Assessment Limits / Content Constraints	Tasks do not have a context.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Solve linear equations that require the distributive property and/or collecting like terms.

Domain	EE: Expressions and Equations
Cluster	Analyze and solve linear equations and pairs of simultaneous linear equations.
Standard	8.EE.10a: Analyze and solve pairs of simultaneous linear equations. [8-EE8] a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersections of their graphs because points of intersection satisfy both equations simultaneously. [8-EE8a]
Evidence Statements	The student will understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs.
Assessment Limits / Content Constraints	Tasks do not have a context.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given a situation where a system of linear equations is given graphically, determine the point of intersection. Given a coordinate pair, identify the graph of a linear system that has the coordinate pair as a solution.

Domain	EE: Expressions and Equations
Cluster	Analyze and solve linear equations and pairs of simultaneous linear equations.
Standard	8.EE.10b: Analyze and solve pairs of simultaneous linear equations. [8-EE8] b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. [8-EE8b] Example: $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.
Evidence Statements	The student will solve systems of two linear equations in two variables.
Assessment Limits / Content Constraints	Tasks have whole-number or integer coefficients, with one coefficient in either or both equations possibly being zero. Tasks may assess solving by inspection.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a system of linear equations, identify the solution of the system of equations. Given the graph of a system of linear equations, identify the solution of the system of equations.

Domain	EE: Expressions and Equations
Cluster	Analyze and solve linear equations and pairs of simultaneous linear equations.
Standard	8.EE.10c: Analyze and solve pairs of simultaneous linear equations. [8-EE8] c. Solve real-world and mathematical problems leading to two linear equations in two variables. [8-EE8c] 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.
Evidence Statements	The student will solve real-world and mathematical problems leading to two linear equations in two variables.
Assessment Limits / Content Constraints	Tasks may have three equations, but students are required to analyze only two equations at a time.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a context-based problem that can be modeled by a system of linear equations, determine the solution.

Domain	F: Functions
Cluster	Define, evaluate, and compare functions.
Standard	8.F.11: 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.) [8-F1]
Evidence Statements	The student will understand that a function is a rule that assigns to each input exactly one output and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
Assessment Limits / Content Constraints	Tasks do not involve the "vertical line test." Some of the functions in tasks are nonnumerical. Tasks should involve clearly defined inputs and outputs. Functions are limited to those with real number inputs and outputs. Tasks may require students to graph functions in the coordinate plane or read inputs and outputs from the graph of a function in the coordinate plane. Tasks may require students to tell whether a set of points in the plane represents a function.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a relation in a variety of representations, determine whether the relation is a function.

Domain	F: Functions
Cluster	Define, evaluate, and compare functions.
Standard	8.F.12: Compare properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [8-F2] Example: Given a linear function represented by a table of values and linear function represented by an algebraic expression, determine which function has the greater rate of change.
Evidence Statements	The student will compare properties of two functions each represented in a different way.
Assessment Limits / Content Constraints	Tasks have "thin context" or no context. Equations can be presented in forms other than $y = mx + b$.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given two different linear functions presented in different ways, make a comparison of one or more properties of the two functions.

Domain	F: Functions
Cluster	Define, evaluate, and compare functions.
Standard	8.F.13: 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. [8-F3] 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.
Evidence Statements	The student will interpret the equation defining a linear function.
Assessment Limits / Content Constraints	Tasks have "thin context" or no context. Equations can be presented in forms other than $y = mx + b$. Tasks may require students to give examples of equations that are nonlinear or pairs of points to show a function is nonlinear.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a relation presented in verbal form, with a graph, by an equation, or by a set of ordered pairs, determine whether the relation is a linear function. Given a set of functions, identify the function that is or is not linear.

Domain	F: Functions
Cluster	Use functions to model relationships between quantities.
Standard	8.F.14: 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 linear function in terms of the situation it models and in terms of its graph or a table of values. [8-F4]
Evidence Statements	The student will construct a function to model a linear relationship between two quantities, determine the rate of change and initial value of the function, and interpret the rate of change and initial value of a linear function in terms of the situation it models.
Assessment Limits / Content Constraints	Tasks may or may not have a context.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a unit rate of change in a situation, determine the corresponding equation and vice versa. Given a linear relationship presented in a variety of methods, determine or analyze or identify different attributes related to the function.

Domain	F: Functions
Cluster	Use functions to model relationships between quantities.
Standard	8.F.15: 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. [8-F5]
Evidence Statements	The student will describe the functional relationship between two quantities by analyzing a graph or sketching a graph that exhibits the features of a function that has been described.
Assessment Limits / Content Constraints	Tasks may or may not have a context.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given the graph of a relationship, identify key features of the relationship. Given a situation in verbal form, interpret the information and identify its corresponding graph.

Domain	G: Geometry
Cluster	Understand congruence and similarity using physical models, transparencies, or geometry software.
Standard	8.G.16a: Verify experimentally the properties of rotations, reflections, and translations: [8-G1] a. Lines are taken to lines, and line segments are taken to line segments of the same length. [8-G1a]
Evidence Statements	The student will verify experimentally the properties of rotations, reflections, and translations: lines are taken to lines, and line segments are taken to line segments of the same length.
Assessment Limits / Content Constraints	Tasks do not have a context.
DOK(s)	1, 2, or 3
Calculator	NEUTRAL – a calculator may or may not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given a congruence transformation, identify the effect of that transformation on a line or line segment.

Domain	G: Geometry
Cluster	Understand congruence and similarity using physical models, transparencies, or geometry software.
Standard	8.G.16b: Verify experimentally the properties of rotations, reflections, and translations: [8-G1 b. Angles are taken to angles of the same measure. [8-G1b]
Evidence Statements	The student will verify experimentally the properties of rotations, reflections, and translations: angles are taken to angles of the same measure.
Assessment Limits / Content Constraints	Tasks do not have a context.
DOK(s)	1, 2, or 3
Calculator	NEUTRAL – a calculator may or may not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given a congruence transformation, identify the effect of that transformation on an angle.

Domain	G: Geometry
Cluster	Understand congruence and similarity using physical models, transparencies, or geometry software.
Standard	8.G.16c: Verify experimentally the properties of rotations, reflections, and translations: [8-G1] c. Parallel lines are taken to parallel lines. [8-G1c]
Evidence Statements	The student will verify experimentally the properties of rotations, reflections, and translations: parallel lines are taken to parallel lines.
Assessment Limits / Content Constraints	Tasks do not have a context.
DOK(s)	1, 2, or 3
Calculator	NEUTRAL – a calculator may or may not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given a congruence transformation, identify the effect of that transformation on a set of parallel lines.

Domain	G: Geometry
Cluster	Understand congruence and similarity using physical models, transparencies, or geometry software.
Standard	8.G.17: 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. [8-G2]
Evidence Statements	The student will 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, the student will describe a sequence that exhibits the congruence between them.
Assessment Limits / Content Constraints	Tasks do not have a context. Figures may be drawn in the coordinate plane but do not include the use of coordinates. Tasks require students to make connections between congruence and transformations.
DOK(s)	1, 2, or 3
Calculator	NEUTRAL – a calculator may or may not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given two congruent figures on a coordinate grid, determine which single transformation or two transformations were used to obtain the resulting image. Given a pair of congruent figures, determine a series of transformations that shows congruence between the two given figures.

Domain	G: Geometry
Cluster	Understand congruence and similarity using physical models, transparencies, or geometry software.
Standard	8.G.18: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. [8-G3]
Evidence Statements	The student will use coordinates to describe the effect of dilations, translations, rotations and reflections on two-dimensional figures.
Assessment Limits / Content Constraints	Tasks have "thin context" or no context. Tasks require the use of coordinates in the coordinate plane. For items involving dilations, tasks must state the center of dilation. The center of dilation can be the origin, the center of the original shape, or a vertex of the original shape.
DOK(s)	1, 2, or 3
Calculator	NEUTRAL – a calculator may or may not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a figure on a coordinate grid, the student will perform a single transformation or two transformations to describe the effects or to describe a key attribute of the resulting image.

Domain	G: Geometry
Cluster	Understand congruence and similarity using physical models, transparencies, or geometry software.
Standard	8.G.19: 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. [8-G4]
Evidence Statements	The student will 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, and translations. Given two similar figures, the student will describe a sequence that exhibits the similarity between them.
Assessment Limits / Content Constraints	Tasks do not have a context. Figures may be drawn in the coordinate plane but do not include the use of coordinates. Tasks require students to make connections between similarity and transformations.
DOK(s)	1, 2, or 3
Calculator	NEUTRAL – a calculator may or may not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Not Allowable
Sample Stem Information (as applicable)	Given two similar figures on a coordinate grid, determine which single transformation or two transformations were used to obtain the resulting image. Given a pair of similar figures, determine a series of transformations that shows similarity between the two given figures.

Domain	G: Geometry
Cluster	Understand congruence and similarity using physical models, transparencies, or geometry software.
Standard	8.G.20: 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. [8-G5] Example: Arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give argument in terms of transversals why this is so.
Evidence Statements	The student will 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 about the angle-angle criterion for similarity of triangles.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	NEUTRAL – a calculator may or may not be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a triangle or information about a triangle, determine facts about either interior or exterior angles. Given a diagram created by or consisting of parallel lines and transversals, determine an angle relationship.

Domain	G: Geometry
Cluster	Understand and apply the Pythagorean Theorem.
Standard	8.G.21: Explain a proof of the Pythagorean Theorem and its converse.
Evidence Statements	The student will explain a proof of the Pythagorean Theorem and its converse.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a right triangle, determine a true relationship of the right triangle. Given a right triangle, explain a proof of the Pythagorean Theorem and its converse.

Domain	G: Geometry
Cluster	Understand and apply the Pythagorean Theorem.
Standard	8.G.22: Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. [8-G7]
Evidence Statements	The student will apply the Pythagorean Theorem to determine unknown side lengths in right triangles in two and three dimensions.
Assessment Limits / Content Constraints	Tasks have “thin context” or no context.
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a verbal description of a right triangle, apply the Pythagorean Theorem to determine an unknown side length. Given a right triangle, apply the Pythagorean Theorem to determine an unknown side length. Given a real-world situation, apply the Pythagorean Theorem to solve a problem.

Domain	G: Geometry
Cluster	Understand and apply the Pythagorean Theorem.
Standard	8.G.23: Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. [8-G8]
Evidence Statements	The student will apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given two points on a coordinate grid, determine the distance between the two points.

Domain	G: Geometry
Cluster	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
Standard	8.G.24: Know the formulas for the volumes of cones, cylinders, and spheres, and use them to solve real-world and mathematical problems. [8-G9]
Evidence Statements	The student will know the formulas for the volumes of cones, cylinders, and spheres and use them to solve problems.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a three-dimensional figure (cone, cylinder, or sphere), find the volume of the figure.

Domain	SP: Statistics and Probability
Cluster	Investigate patterns of association in bivariate data.
Standard	8.SP.25: Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. [8-SP1]
Evidence Statements	The student will construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a scatter plot for bivariate data, describe patterns of association using a variety of methods.

Domain	SP: Statistics and Probability
Cluster	Investigate patterns of association in bivariate data.
Standard	8.SP.26: Know 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. [8-SP2]
Evidence Statements	The student will know that straight lines are used to model relationships between two quantitative variables. The student will informally fit a straight line to data and assess the closeness of the data to the points on the line.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a scatter plot for bivariate data, suggest or describe or investigate a linear association between the two quantities. Given a scatter plot for bivariate data, informally fit a straight line to the data and assess the closeness of the data to the points on the line.

Domain	SP: Statistics and Probability
Cluster	Investigate patterns of association in bivariate data.
Standard	8.SP.27: Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. [8-SP3] 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.
Evidence Statements	The student will use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a situation of bivariate data dealing with a linear model, interpret key features of the linear model.

Domain	SP: Statistics and Probability
Cluster	Investigate patterns of association in bivariate data.
Standard	8.SP.28: 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. [8-SP4] 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?
Evidence Statements	The student will understand that patterns of association can be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table.
Assessment Limits / Content Constraints	
DOK(s)	1, 2, or 3
Calculator	YES – a calculator will be available for items
Item Type(s)	MC, MS, SA, TE
Context	Allowable
Sample Stem Information (as applicable)	Given a two-way table, interpret the data in the table. Given a partially completed two-way table, complete the table and draw conclusions.