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.

Mathematics 1 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 the categories for reporting test results for Mathematics 1.

Reporting Category	Standards				Approximate Portion of Test
Algebra	N.Q.1	A.SSE.1	A.CED.1a	A.REI.1	23% – 28% 13 – 15 points
	N.Q.2	A.SSE.3c	A.CED.2a	A.REI.3	
	N.Q.3		A.CED.3		
			A.CED.4b		
Number and Quantity Functions	A.REI.5	F.IF.1	F.IF.7ae	F.LE.1	32% – 39% 18 – 21 points
	A.REI.6a	F.IF.2	F.IF.9a	F.LE.2	
	A.REI.10	F.IF.3	F.BF.1ai	F.LE.5	
	A.REI.11	F.IF.4a	F.BF.2		
	A.REI.12	F.IF.5a	F.BF.4a		
Geometry	G.CO.1	G.CO.6	G.CO.11	G.GPE.5	19% – 24% 11 – 13 points
	G.CO.2	G.CO.7	G.CO.12	G.GPE.7	
	G.CO.3	G.CO.8	G.CO.13	G.C.2	
	G.CO.4	G.CO.9	G.CO.14	G.C.3	
	G.CO.5	G.CO.10			
Statistics	S.ID.1	S.ID.5	S.ID.7		18% – 22% 10 – 12 points
	S.ID.2	S.ID.6c	S.ID.8		
	S.ID.3				
				Total Test	54 – 56 points

Modeling and Reasoning* (minimum 20%)

Depth of Knowledge (DOK) Level	Approximate Portion of Test
1	8 – 16 points
2	25 – 40 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.

Modeling is best interpreted not as a collection of isolated topics but in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

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.
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.

Interaction Type	Description
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.
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	**ALGEBRA**
Content Standard	***N.Q QUANTITIES*** **Reason quantitatively and use units to solve problems.** ***N.Q.1*** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★
Content Limits	• Rational numbers • Linear or simple exponential equations and graphs • Formulas may contain exponential or first-degree factors or terms. • Items may require students to convert between or within the metric and U.S. customary systems.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***N.Q QUANTITIES*** **Reason quantitatively and use units to solve problems.** ***N.Q.2*** Define appropriate quantities for the purpose of descriptive modeling.★
Content Limits	• Rational numbers • Linear or exponential equations and graphs
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***N.Q QUANTITIES*** **Reason quantitatively and use units to solve problems.** ***N.Q.3*** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★
Content Limits	• Rational numbers
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**ALGEBRA**
Content Standard	***A.SSE SEEING STRUCTURE IN EXPRESSIONS*** **Interpret the structure of expressions.** ***A.SSE.1*** Interpret expressions that represent a quantity in terms of its context. ★ ***A.SSE.1a*** Interpret parts of an expression, such as terms, factors, and coefficients. ***A.SEE.1b*** Interpret complicated expressions by viewing one or more of their parts as a single entity.
Content Limits	• Linear or simple exponential expressions
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***A.SSE SEEING STRUCTURE IN EXPRESSIONS*** **Write expressions in equivalent forms to solve problems.** ***A.SSE.3*** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ ***A.SSE.3c*** Use the properties of exponents to transform expressions for exponential functions. *For example, 8^t can be written as 2^{3t}.*
Content Limits	• Exponents in exponential expressions will not contain fractions when a student is asked to create an equivalent expression in the form a^t, where a is a nonzero variable.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***A.CED CREATING EQUATIONS*** **Create equations that describe numbers or relationships.** ***A.CED.1*** Create equations and inequalities in one variable and use them to solve problems. *Include equations and inequalities arising from linear, quadratic, simple rational, and exponential functions.*★ a. Focus on applying linear and simple exponential expressions. (A1, M1)
Content Limits	• Linear or simple exponential equations and inequalities
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***A.CED CREATING EQUATIONS*** **Create equations that describe numbers or relationships.** ***A.CED.2*** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★ a. Focus on applying linear and simple exponential expressions. (A1, M1)
Content Limits	• Linear or simple exponential equations
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***A.CED CREATING EQUATIONS*** **Create equations that describe numbers or relationships.** ***A.CED.3*** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*★ (A1, M1)
Content Limits	• Linear equations and inequalities in one or two variables
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***A.CED CREATING EQUATIONS*** **Create equations that describe numbers or relationships.** ***A.CED.4*** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.★ b. Focus on formulas in which the variable of interest is linear. For example, rearrange Ohm's law V = IR to highlight resistance R. (M1)
Content Limits	• The variable of interest should 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	**ALGEBRA**
Content Standard	***A.REI REASONING WITH EQUATIONS AND INEQUALITIES*** **Understand solving equations as a process of reasoning and explain the reasoning.** ***A.REI.1*** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
Content Limits	• Linear equations • Items may require students to recognize property names (e.g., items may list, or require the student to select the distributive property, addition property of equality, identity property, or inverse property as a justification for a step). • The Addition Property of Equality and Multiplication Property of Equality can be used instead of Subtraction Property of Equality and Division Property of Equality, respectively.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**ALGEBRA**
Content Standard	***A.REI REASONING WITH EQUATIONS AND INEQUALITIES*** **Solve equations and inequalities in one variable.** ***A.REI.3*** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Content Limits	• Linear equations and inequalities • The equation or inequality is given. • Coefficients may be rational numbers or letters.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***A.REI REASONING WITH EQUATIONS AND INEQUALITIES*** **Solve systems of equations.** ***A.REI.5*** Verify that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
Content Limits	• Linear systems in two variables only • Items may require students to know property names (e.g., Distributive Property, Addition Property of Equality, Identity Property, or Inverse Property) as a justification for a step. • The Addition Property of Equality and Multiplication Property of Equality can be used instead of Subtraction Property of Equality and Division Property of Equality, respectively.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***A.REI REASONING WITH EQUATIONS AND INEQUALITIES*** **Solve systems of equations.** ***A.REI.6*** Solve systems of linear equations algebraically and graphically. a. Limit to pairs of linear equations in two variables. (A1, M1)
Content Limits	• Linear equations in two variables
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***A.REI REASONING WITH EQUATIONS AND INEQUALITIES*** **Represent and solve equations and inequalities graphically.** ***A.REI.10*** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
Content Limits	• Equations may be linear or simple exponential in two variables.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***A.REI REASONING WITH EQUATIONS AND INEQUALITIES*** **Represent and solve equations and inequalities graphically.** ***A.REI.11*** Explain why the *x*-coordinates of the points where the graphs of the equation *y = f(x)* and *y = g(x)* intersect are the solutions of the equation *f(x) = g(x)*; find the solutions approximately, e.g., using technology to graph the functions, making tables of values, or finding successive approximations.
Content Limits	• Equations may be linear or simple exponential in two variables.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***A.REI REASONING WITH EQUATIONS AND INEQUALITIES*** **Represent and solve equations and inequalities graphically.** ***A.REI.12*** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
Content Limits	• All inequalities are linear.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.IF INTERPRETING FUNCTIONS*** **Understand the concept of a function, and use function notation.** ***F.IF.1*** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y = f(x)*.
Content Limits	• Items may involve equations of functions, set notation for functions, or visual representations of functions. • Sequences represented recursively or explicitly will use function notation.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.IF INTERPRETING FUNCTIONS*** **Understand the concept of a function, and use function notation.** ***F.IF.2*** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
Content Limits	• Functions may be linear or simple exponential.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.IF INTERPRETING FUNCTIONS*** **Understand the concept of a function, and use function notation.** ***F.IF.3*** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n + 1) = f(n) + f(n − 1) for n ≥ 1.*
Content Limits	• Items will use function notation. • Functions represented explicitly may be linear or simple exponential. • Precision is important when defining the input of a sequence, especially with regard to the first term.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.IF INTERPRETING FUNCTIONS*** **Interpret functions that arise in applications in terms of the context.** ***F.IF.4*** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include the following: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*★(A2, M3) a. Focus on linear and exponential functions. (M1)
Content Limits	• Functions may be linear or simple exponential. • Key features include, intercepts; increasing, decreasing, positive, or negative intervals; and end behavior.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.IF INTERPRETING FUNCTIONS*** **Interpret functions that arise in applications in terms of the context.** ***F.IF.5*** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★ a. Focus on linear and exponential functions. (M1)
Content Limits	• Functions may be linear or simple exponential. • Include items connecting context, graphs, and tables
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.IF INTERPRETING FUNCTIONS*** **Analyze functions using different representations.** ***F.IF.7*** Graph functions expressed symbolically and indicate key features of the graph, by hand in simple cases and using technology for more complicated cases. Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.★ ***F.IF.7a*** Graph linear functions and indicate intercepts. (A1, M1) ***F.IF.7e*** Graph simple exponential functions, indicating intercepts and end behavior. (A1, M1)
Content Limits	• Functions may be linear or simple exponential. • The emphasis of items is on creating graphs.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.IF INTERPRETING FUNCTIONS*** **Analyze functions using different representations.** ***F.IF.9*** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* (A2, M3) a. Focus on linear and exponential functions. (M1)
Content Limits	• Functions may be linear or simple exponential. • Must use at least two different representations
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.BF BUILDING FUNCTIONS*** **Build a function that models a relationship between two quantities.** ***F.BF.1*** Write a function that describes a relationship between two quantities.★ ***F.BF.1a*** Determine an explicit expression, a recursive process, or steps for calculation from context. i. Focus on linear and exponential functions. (A1, M1)
Content Limits	• Items may use function notation or show some of the terms that appear in a sequence. • Functions may be linear or simple exponential.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.BF BUILDING FUNCTIONS*** **Build a function that models a relationship between two quantities.** ***F.BF.2*** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.★
Content Limits	• Items may use function notation or show some of the terms that appear in a sequence. • Functions may be linear or simple exponential. • Precision is important when defining the input of a sequence, especially with regard to the first term.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.BF BUILDING FUNCTIONS*** **Build new functions from existing functions.** ***F.BF.4*** Find inverse functions. ***F.BF.4a*** Informally determine the input of a function when the output is known. (A1, M1)
Content Limits	• Students are not expected to know or use the formal notation for inverse functions, f^{-1}.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.LE LINEAR, QUADRATIC, AND EXPONENTIAL MODELS*** **Construct and compare linear, quadratic, and exponential models, and solve problems.** ***F.LE.1*** Distinguish between situations that can be modeled with linear functions and with exponential functions.★ ***F.LE.1a*** Show that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals. ***F.LE.1b*** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. ***F.LE.1c*** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
Content Limits	• Functions may be linear or exponential.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.LE LINEAR, QUADRATIC, AND EXPONENTIAL MODELS*** **Construct and compare linear, quadratic, and exponential models, and solve problems.** ***F.LE.2*** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).★
Content Limits	• Functions may be linear or exponential. • Items will use function notation. • Be precise when defining the input of a sequence, especially with regard to the first term.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**NUMBER AND QUANTITY FUNCTIONS**
Content Standard	***F.LE LINEAR, QUADRATIC, AND EXPONENTIAL MODELS*** **Interpret expressions for functions in terms of the situation they model.** ***F.LE.5*** Interpret the parameters in a linear or exponential function in terms of a context.★
Content Limits	• Functions may be linear or simple exponential.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**GEOMETRY**
Content Standard	***G.CO CONGRUENCE*** **Experiment with transformations in the plane.** ***G.CO.1*** Know precise definitions of ray, angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and arc length.
Content Limits	None
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	***G.CO CONGRUENCE*** **Experiment with transformations in the plane.** ***G.CO.2*** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not, e.g., translation versus horizontal stretch.
Content Limits	• Transformations limited to the following: ○ dilations with a positive scale factor and an indicated center of dilation ○ translations ○ rotations with an indicated center of rotation ○ reflections across lines (lines of reflections may be lines other than a horizontal line, vertical line, $y = x$, or $y = -x$) • Items may involve multiple transformations. • Items may require the student to identify or create a rule using ordered pair notation to describe a series of transformations for any point (*x*, *y*).
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	***G.CO CONGRUENCE*** **Experiment with transformations in the plane.** ***G.CO.3*** Identify the symmetries of a figure, which are the rotations and reflections that carry it onto itself. ***G.CO.3a*** Identify figures that have line symmetry; draw and use lines of symmetry to analyze properties of shapes. ***G.CO.3b*** Identify figures that have rotational symmetry; determine the angle of rotation, and use rotational symmetry to analyze properties of shapes.
Content Limits	None
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	***G.CO CONGRUENCE*** **Experiment with transformations in the plane.** ***G.CO.4*** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
Content Limits	None
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	***G.CO CONGRUENCE*** **Experiment with transformations in the plane.** ***G.CO.5*** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using items such as graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
Content Limits	• Transformations limited to the following: ○ dilations with a positive scale factor and an indicated center of dilation ○ translations ○ rotations with an indicated center of rotation ○ reflections across lines (lines of reflections may be lines other than a horizontal line, vertical line, $y = x$, or $y = -x$) • Items may require the student to identify or create a rule using ordered pair notation to describe a series of transformations for any point (*x*, *y*).
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	***G.CO CONGRUENCE*** **Understand congruence in terms of rigid motions.** ***G.CO.6*** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

Content Limits	• Transformations limited to the following:
	  ○ translations
	  ○ rotations with an indicated center of rotation
	  ○ reflections across lines (lines of reflections may be lines other than a horizontal line, vertical line, $y = x$, or $y = -x$)
	• Dilations may appear in selected response items as distractors. If used, the dilations would have a positive scale factor and an indicated center of dilation.
	• Items may involve multiple transformations.
	• Items may require the student to identify or create a rule using ordered pair notation to describe a series of transformations for any point (*x*, *y*).
	• Items that describe the connection between congruence and transformations should assess knowledge of this line of reasoning - "Two shapes are congruent if one can be mapped onto another using reflections, rotations, translations, and/or dilations with scale factor 1 on the other. All of these transformations maintain angle measure and side lengths. Therefore, congruent figures have equal corresponding angle measures and equal corresponding pairs of side lengths.

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	***G.CO CONGRUENCE*** **Understand congruence in terms of rigid motions.** ***G.CO.7*** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
Content Limits	• Transformations limited to translations, rotations, and reflections, although dilations may appear in selected response items as distractors. • Items may involve multiple transformations. • Items may require the student to identify or create a rule using ordered pair notation to describe a series of transformations for any point (*x*, *y*).
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	***G.CO CONGRUENCE*** **Understand congruence in terms of rigid motions.** ***G.CO.8*** Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
Content Limits	• Transformations limited to translations, rotations, and reflections, although dilations may appear in selected response items as distractors. • Items may involve multiple transformations. • Items may require the student to identify or create a rule using ordered pair notation to describe a series of transformations for any point (x, y).
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	***G.CO CONGRUENCE*** **Prove geometric theorems both formally and informally using a variety of methods.** ***G.CO.9*** Prove and apply theorems about lines and angles. *Theorems include but are not restricted to the following: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*
Content Limits	• Proving methods include, but are not restricted to, two-column proofs, flow chart proofs, paragraph/narrative proofs, indirect proofs, and transformational proofs. • The formal names of properties and theorems need to be recognized to justify statements (Note: The Addition Property of Equality and Multiplication Property of Equality can be used instead of the Subtraction Property of Equality and Division Property of Equality, respectively).
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	***G.CO CONGRUENCE*** **Prove geometric theorems both formally and informally using a variety of methods.** ***G.CO.10*** Prove and apply theorems about triangles. *Theorems include but are not restricted to the following: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*
Content Limits	• Proving methods include, but are not restricted to, two-column proofs, flow chart proofs, paragraph/narrative proofs, indirect proofs, and transformational proofs. • The formal names of properties and theorems need to be recognized to justify statements (Note: The Addition Property of Equality and Multiplication Property of Equality can be used instead of the Subtraction Property of Equality and Division Property of Equality, respectively).
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	***G.CO CONGRUENCE*** **Prove geometric theorems both formally and informally using a variety of methods.** ***G.CO.11*** Prove and apply theorems about parallelograms. *Theorems include but are not restricted to the following: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*
Content Limits	• Proving methods include, but are not restricted to, two-column proofs, flow chart proofs, paragraph/narrative proofs, indirect proofs, and transformational proofs. • The formal names of properties and theorems need to be recognized to justify statements (Note: The Addition Property of Equality and Multiplication Property of Equality can be used instead of the Subtraction Property of Equality and Division Property of Equality, respectively).
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	***G.CO CONGRUENCE*** **Make geometric constructions.** ***G.CO.12*** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*
Content Limits	• Items may require the student to justify steps and results.
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	***G.CO CONGRUENCE*** **Make geometric constructions.** ***G.CO.13*** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
Content Limits	• Items may require the student to justify steps and results.
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	***G.CO CONGRUENCE*** **Classify and analyze geometric figures.** ***G.CO.14*** Classify two-dimensional figures in a hierarchy based on properties.
Content Limits	• Possible two-dimensional figures include, but are not restricted to, triangles, quadrilaterals, and other polygons. • There are two definitions of a trapezoid – one that requires exactly one pair of parallel sides, and another that requires at least one pair of parallel sides. Items will not require the student to use one definition of a trapezoid over the other. • There are two definitions of an isosceles triangle – one that requires exactly two sides of the same length, and another that requires at least two sides of the same length. Items will not require the student to use one definition of an isosceles triangle over the other.
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	***G.GPE EXPRESSING GEOMETRIC PROPERTIES WITH EQUATIONS*** **Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements.** ***G.GPE.5*** Justify the slope criteria for parallel and perpendicular lines, and use them to solve geometric problems, e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point.
Content Limits	• All four quadrants • Proving methods include, but are not restricted to, two-column proofs, flow chart proofs, paragraph/narrative proofs, indirect proofs, coordinate proofs, and transformational proofs. • The formal names of properties and theorems need to be recognized to justify statements in some proofs (Note: The Addition Property of Equality and Multiplication Property of Equality can be used instead of the Subtraction Property of Equality and Division Property of Equality, respectively).
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	***G.GPE EXPRESSING GEOMETRIC PROPERTIES WITH EQUATIONS*** **Use coordinates to prove simple geometric theorems algebraically and to verify specific geometric statements.** ***G.GPE.7*** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★
Content Limits	• Items may involve polygons, triangles, rectangles, or use shapes composed of triangles and rectangles. • At least part of the computation must require the application of the distance formula.
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	***G.C CIRCLES*** **Understand and apply theorems about circles.** ***G.C.2*** Identify and describe relationships among angles, radii, chords, tangents, and arcs and use them to solve problems. *Include the relationship between central, inscribed, and circumscribed angles and their intercepted arcs; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
Content Limits	None
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	***G.C CIRCLES*** **Understand and apply theorems about circles.** ***G.C.3*** Construct the inscribed and circumscribed circles of a triangle; prove and apply the property that opposite angles are supplementary for a quadrilateral inscribed in a circle.
Content Limits	• Items may involve the notions of incenter and circumcenter when referring to the intersection of a triangle's angle bisectors or perpendicular segment bisectors.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**STATISTICS**
Content Standard	***S.ID INTERPRETING CATEGORICAL AND QUANTITATIVE DATA*** **Summarize, represent, and interpret data on a single count or measurement variable.** ***S.ID.1*** Represent data with plots on the real number line (dot plots, histograms, and box plots) in the context of real-world applications using the GAISE model.★
Content Limits	• Plots are limited to dot plots, histograms, and box plots. • The amount of data to be plotted or read is a reasonable amount to manipulate. • Items may touch on GAISE Levels A, B, and C, with a focus on Level B.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**STATISTICS**
Content Standard	***S.ID INTERPRETING CATEGORICAL AND QUANTITATIVE DATA*** **Summarize, represent, and interpret data on a single count or measurement variable.** ***S.ID.2*** In the context of real-world applications by using the GAISE model, use statistics appropriate to the shape of the data distribution to compare center (median and mean) and spread (mean absolute deviation, interquartile range, and standard deviation) of two or more different data sets. ★
Content Limits	• Visual data displays are limited to dot plots, histograms, and box plots. • Items may touch on GAISE Levels A, B, and C, with a focus on Level B.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**STATISTICS**
Content Standard	***S.ID INTERPRETING CATEGORICAL AND QUANTITATIVE DATA*** **Summarize, represent, and interpret data on a single count or measurement variable.** ***S.ID.3*** In the context of real-world applications by using the GAISE model, interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★
Content Limits	• Visual data displays are limited to dot plots, histograms, and box plots. • Items may touch on GAISE Levels A, B, and C, with a focus on Level B.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**STATISTICS**
Content Standard	***S.ID INTERPRETING CATEGORICAL AND QUANTITATIVE DATA*** **Summarize, represent, and interpret data on two categorical and quantitative variables.** ***S.ID.5*** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.★
Content Limits	• Items use multivariate data. • Items use positive rational numbers to represent frequencies and relative frequencies. • Items may touch on GAISE Levels A, B, and C, with a focus on Level B.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**STATISTICS**
Content Standard	***S.ID INTERPRETING CATEGORICAL AND QUANTITATIVE DATA*** **Summarize, represent, and interpret data on two categorical and quantitative variables.** ***S.ID.6*** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.★ ***S.ID.6c*** Fit a linear function for a scatterplot that suggests a linear association. (A1, M1)
Content Limits	• Items may require the student to use technology to generate the line of best fit for a scatter plot. • Items use multivariate data. • Items use positive rational numbers in the linear functions and in the labels of graphs. • Items may touch on GAISE Levels A and B, with a focus on Level B.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional

Reporting Category	**STATISTICS**
Content Standard	***S.ID INTERPRETING CATEGORICAL AND QUANTITATIVE DATA*** **Interpret linear models.** ***S.ID.7*** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.★
Content Limits	• A linear model should be provided. • To avoid overlap with A.SSE.1, items should include a scatterplot or set of data. • Items may touch on GAISE Levels A, B, and C, with a focus on Level B.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Required

Reporting Category	**STATISTICS**
Content Standard	***S.ID INTERPRETING CATEGORICAL AND QUANTITATIVE DATA*** **Interpret linear models.** ***S.ID.8*** Compute (using technology) and interpret the correlation coefficient of a linear fit.★
Content Limits	• Items may touch on GAISE Levels B and C, with a focus on Level C.
DOK	1, 2, and/or 3 are eligible. DOK levels are designated on an item-by-item basis.
Context	Context Optional