

DRAFT

Grade 8 Mathematics Item Specifications



The draft Florida Standards Assessment (FSA) *Test Item Specifications (Specifications)* are based upon the Florida Standards and the Florida Course Descriptions as provided in [CPALMs](#). The *Specifications* are a resource that defines the content and format of the test and test items for item writers and reviewers. Each grade-level and course *Specifications* document indicates the alignment of items with the Florida Standards. It also serves to provide all stakeholders with information about the scope and function of the FSA.

Item Specifications Definitions

Also assesses refers to standard(s) closely related to the primary standard statement.

Clarification statements explain what students are expected to do when responding to the question.

Assessment limits define the range of content knowledge and degree of difficulty that should be assessed in the assessment items for the standard.

Acceptable response mechanisms describe the characteristics from which a student must answer a question.

Context defines types of stimulus materials that can be used in the assessment items.

Content Standard	<p>MAFS.8.NS <i>The Number System</i></p> <p>MAFS.8.NS.1 <i>Know that there are numbers that are not rational, and approximate them by rational numbers.</i></p> <p>MAFS.8.NS.1.1 <i>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.</i></p>	
Assessment Limits	<p>All irrational numbers excluding e</p> <p>Only rational numbers with repeating decimal expansions</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Matching Item</p> <p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Natural Language Response</p>	
Context	No Context	
Example		
Context	<p>Determine whether each number is rational or irrational $\{\sqrt{81}, \sqrt{89}, \sqrt{121}, \sqrt{131}\}$. Use positive and negative numbers. Use square roots of prime numbers and perfect squares $1^2 - 12^2$. Use repeating decimal expansions with a 2-digit sequence (e.g., $\frac{8}{11} = 0.\overline{72}$).</p>	
Context easier	<p>Use only positive numbers. Use irrational numbers $\sqrt{2}, \sqrt{3}$, and π. Use repeating decimal expansions with a single-digit sequence (e.g., $\frac{2}{9} = 0.\overline{2}$).</p>	
Context more difficult	<p>Use square roots of composite numbers and perfect squares $13^2 - 20^2$. Use repeating decimal expansions with a 3-digit sequence or have digits before the repeating sequence (e.g., $\frac{7}{12} = 0.58\overline{33}$) Give fractions where the numerator or denominator is an irrational number.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>Select all numbers that are irrational.</p> <ul style="list-style-type: none"> • $\frac{1}{3}$ • $\sqrt{2}$ • π • $\frac{2}{9}$ • $\sqrt{3}$ 	Multi-Select Response	

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<p>Select rational or irrational for each number shown.</p> <table border="1"> <thead> <tr> <th><i>Number</i></th> <th><i>Rational</i></th> <th><i>Irrational</i></th> </tr> </thead> <tbody> <tr> <td>$\sqrt{81}$</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>$\sqrt{89}$</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>$\sqrt{121}$</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>$\sqrt{131}$</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table>	<i>Number</i>	<i>Rational</i>	<i>Irrational</i>	$\sqrt{81}$	<input type="checkbox"/>	<input type="checkbox"/>	$\sqrt{89}$	<input type="checkbox"/>	<input type="checkbox"/>	$\sqrt{121}$	<input type="checkbox"/>	<input type="checkbox"/>	$\sqrt{131}$	<input type="checkbox"/>	<input type="checkbox"/>	<p>Matching Item Response</p>	
<i>Number</i>	<i>Rational</i>	<i>Irrational</i>															
$\sqrt{81}$	<input type="checkbox"/>	<input type="checkbox"/>															
$\sqrt{89}$	<input type="checkbox"/>	<input type="checkbox"/>															
$\sqrt{121}$	<input type="checkbox"/>	<input type="checkbox"/>															
$\sqrt{131}$	<input type="checkbox"/>	<input type="checkbox"/>															
<p>Which number is irrational?</p> <p>A. $\sqrt{64}$</p> <p>B. $\frac{1}{2}$</p> <p>C. $\frac{\sqrt{16}}{4}$</p> <p>D. $\frac{\sqrt{20}}{5}$</p>	<p>Equation Response</p>																
<p>What is $0.\overline{36}$ written as a rational number?</p>	<p>Equation Response</p>																
<p>Why is the square root of a perfect square always rational?</p> <p>[Response: Perfect squares have two identical whole number factors.]</p>	<p>Natural Language Response</p>																

Content Standard	<p>MAFS.8.NS. Number Systems</p> <p>MAFS.8.NS.1 Know that there are numbers that are not rational, and approximate them by rational numbers.</p> <p>MAFS.8.NS.1.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</p>	
Assessment Limits	All real numbers excluding e Irrational expressions should only use one operation.	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Graphic Response—Drag and Drop, Hot Spot Multiple Choice Response Multi-Select Response Natural Language Response	
Context	No context	
Example		
Context	What is the approximate value of $\sqrt{64}$, to the nearest whole number? Use positive and negative numbers. Use integer intervals. Use square roots of prime numbers and perfect squares $1^2 - 12^2$.	
Context easier	Use only positive numbers. Use irrational numbers $\sqrt{2}$, $\sqrt{3}$ and π .	
Context more difficult	Use fractional intervals. Use square roots of composite numbers and perfect squares $13^2 - 20^2$.	
Sample Item Stem	Response Mechanism	Notes, Comments
What is the approximate value of $\sqrt{3}$, to the nearest whole number?	Equation Response	
What is the approximate value of $\sqrt{12}$?	Multiple Choice Response	
A number line is shown. Place the following numbers in the proper location on the number line. [integer only number line from 0 to 3] <ul style="list-style-type: none"> • $\sqrt{2}$ • $\sqrt{3}$ 	Graphic Response	

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<p>A number line is shown.</p> <p>Place the following numbers in the proper location on the number line.</p> <p>[integer only number line from 0 to 6]</p> <ul style="list-style-type: none">• $\sqrt{4}$• $\sqrt{9}$• $\sqrt{25}$	<p>Graphic Response</p>	
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Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.1 Work with radicals and integer exponents</p> <p>MAFS.8.EE.1.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. <i>For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.</i></p>	
Assessment Limits	<p>Integer exponents Whole numbers for bases No variables</p>	
Calculator	<p>No</p>	
Acceptable Response Mechanisms	<p>Equation Response Matching Item Response Multiple Choice Response Multi-Select Response Graphic Response—Drag and Drop</p>	
Context	<p>No context</p>	
Example		
Context	<p>Two properties are used. Whole numbers or positive rational numbers for the base.</p>	
Context easier	<p>Only one property of exponents is required to compare. Whole numbers are used for the base.</p>	
Context more difficult	<p>Multiple properties of exponents are used. May use negative rational bases.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>Which expression is equivalent to $\frac{1}{27}$?</p> <p>[each option uses one exponent property to write the numerical expression without exponents]</p>	Multiple Choice Response	
<p>Which expression is equivalent to $(4^3)^2 \cdot 4^2$?</p> <p>[All choices are written with exponents.]</p>	Multiple Choice Response	
<p>Which expression is equivalent to $5^4 \cdot (5^{-3})^2$?</p> <p>[All choices are written with positive exponents.]</p>	Multiple Choice Response	
<p>Drag a number to each box to create a true equation.</p> <p>$3^{[]} * 3^{[]} = 3^{-2}$</p> <p>[integers -5 to 5 are given in the palette]</p>	Graphic Response—Drag and Drop	

Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.1 Work with radicals and integer exponents</p> <p>MAFS.8.EE.1.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.</p>	
Assessment Limits	<p>Square roots and cube roots</p> <p>Rational and irrational numbers</p> <p>No variables under radical sign</p>	
Calculator	Yes	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Multi-Select Response</p> <p>Multiple Choice Response</p>	
Context	Allowable	
Example		
Context	Solving two-step equations with square roots and cube roots.	
Context easier	<p>The dimensions of a side of a cube are compared.</p> <p>Solving one-step equations with square roots and cube roots. Must be perfect square/cube.</p>	
Context more difficult	Solving multi-step equations that involve using inverse operations. Use rational numbers that require number sense (i.e., decimal numbers).	
Sample Item Stem	Response Mechanism	Notes, Comments
Solve for p when $p^3 = 0.064$	Equation Response	
<p>A cube with side length s has a volume of 64 units.</p> <p>What is the length of the side of the cube?</p>	Equation Response	
<p>A square is cut in half at the diagonal, creating 2 equal triangles. Each triangle has an area of 0.32 units.</p> <p>What is the length of the side of the square?</p>	Equation Response	

Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.1 Work with radicals and integer exponents</p> <p>MAFS.8.EE.1.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. <i>For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger.</i></p>	
Assessment Limits	N/A	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Multiple Choice Response	
Context	Allowable	
Example		
Context	Comparing a very small quantity with a very large quantity. Same units, one number is less than 1, the other number greater than 1. More about the magnitude than the units. For example, 1,000 is a million times more than 0.0001, etc.	
Context easier	Comparing quantities of similar magnitude. For example, 2×10^9 and 4×10^{10} .	
Context more difficult	Comparing a very small quantity with a very large quantity involving unit conversion. How many dimes would need to be stacked to reach the moon (inches to miles)? The average person blinks 1,000 times an hour. Using scientific notation, estimate the number of times the average person blinks in one year.	
Sample Item Stem	Response Mechanism	Notes, Comments
The average mass of a giraffe is approximately 1×10^3 kilograms. The average mass of a blue whale is approximately 2×10^6 kilograms. About how many times as much mass does a blue whale have than a giraffe?	Equation Response	
The average mass of an ant is approximately 3×10^{-3} grams. The average mass of a giraffe is approximately 2×10^3 kilograms. About how many times as much mass does a giraffe have than an ant?	Equation Response	

Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.1 Work with radicals and integer exponents</p> <p>MAFS.8.EE.1.4 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.</p>	
Assessment Limits	N/A	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Matching Response Multiple Choice Response	
Context	Allowable	
Example		
Context	2 operations $(3 \times 10^3)(2 \times 10^5 + 2 \times 10^5)$	
Context easier	Single operation $2 \times 10^5 + 2 \times 10^5$	
Context more difficult	Multiple operations $\frac{(3 \times 10^3)(2 \times 10^5 + 2 \times 10^5)}{(6 \times 10^7)}$	
Sample Item Stem	Response Mechanism	Notes, Comments
What is the sum of 4×10^{-5} and 3×10^{-5} ?	Equation Response	
Write the expression shown as one scientific number. $\frac{(4 \times 10^{-5} + 2 \times 10^{-5})}{(3 \times 10^7)}$	Equation Response	

Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.2 Understand the connections between proportional relationships, lines, and linear equations.</p> <p>MAFS.8.EE.2.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</p>	
Assessment Limits	Rational numbers	
Calculator	Yes	
Acceptable Response Mechanisms	Graphic Response—Drawing, Hot Spot Matching Item Response Multiple Choice Response Multi-Select Response Natural Language Response	
Context	Allowable	
Example		
Context	Verbal description without simplifying. Can use some rational numbers. Don't use "per" or "rate." John travelled 30 miles in 1 hour.	
Context easier	The rate is given. Solving for the solution is limited to substitution or a single-step process. John travelled at a rate of 30 miles per hour.	
Context more difficult	Calculating the rate requires a multi-step process that is less apparent than in the regular context. Rational numbers can be used heavily. John travelled 60 miles in 2 hours.	
Sample Item Stem	Response Mechanism	Notes, Comments
The graph of a proportional relationship is shown. [the graph of a proportional relationship with appropriate labels] What is the unit rate? [Equation uses integers.]	Equation Response	

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<p>The graph of a proportional relationship is shown.</p> <p>[the graph of a proportional relationship with appropriate labels]</p> <p>What is the unit rate?</p> <p>[x-tick labels are decimals. Unit rate is a non-integer.]</p>	<p>Equation Response</p>	
<p>A sink fills with 2 liters of water every 2.5 minutes. What is the rate at which the sink is being filled?</p> <p>Construct a graph to represent the situation.</p>	<p>Graphic Response— Drawing</p>	

Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.2 Understand the connections between proportional relationships, lines, and linear equations.</p> <p>MAFS.8.EE.2.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.</p>	
Assessment Limits	<p>Triangles are limited to right triangles. Functions are limited to linear functions. Rational numbers are allowed. Triangles should be on a grid.</p>	
Calculator	Yes	
Acceptable Response Mechanisms	<p>Equation Response Graphic Response Multiple Choice Response Natural Language Response</p>	
Context	Allowable	
Example		
Context	Triangles should overlap some, although their legs should not be shared. Use a scale with x - and y -axis ratio something other than 1:1 OR have some non-integer triangle leg lengths/coordinates.	
Context easier	Triangles should not overlap. Use whole numbers for x - and y -values. Use a scale with x - and y -axis ratio 1:1.	
Context more difficult	The smaller triangle should be inside of the larger triangle and they should share a leg. Use rational numbers for x - and y -values. Use scales that vary in x - and y -axis ratio.	
Sample Item Stem	Response Mechanism	Notes, Comments
Select all pairs of triangles that can be used to show the slope of a line is the same anywhere along the line. [No choices where the triangles overlap]	Multi-Select Response	
Select all pairs of triangles that can be used to show the slope of a line is the same anywhere along the line. [Choices with the triangles being separate and with some overlap (although no legs should be shared)]	Multi-Select Response	

Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.3 Analyze and solve linear equations and pairs of simultaneous linear equations.</p> <p>MAFS.8.EE.3.7 Solve linear equations in one variable.</p> <p>MAFS.8.EE.3.7a Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).</p> <p>MAFS.8.EE.3.7b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.</p>		
Assessment Limits	Rational numbers		
Calculator	Yes		
Acceptable Response Mechanisms	Equation Response Multiple Choice Response Multi-Select Response Matching Item Response Natural Language Response		
Context	Allowable		
Example			
Context	Variables on both sides of the equation, requires the distributive property with a positive integer outside factor on one side or combining of like terms		
Context easier	Variables on both sides of the equation, but no distributive property or combining of like terms		
Context more difficult	Requires the distributive property with a negative or non-integer as the outside factor or requires the distributive property on both sides of the equation		
Sample Item Stem	Response Mechanism	Notes, Comments	
Select whether each equation has no solution, one solution, or infinitely many solutions. <ul style="list-style-type: none"> • $3x = 3x + 4$ • $3x + 4 = 3x + 4$ • $3x + 4 = 4x + 3$ 	Matching Item Response		
An equation is shown. $\frac{1}{4}(x - 3) = 3x - \frac{11}{4}x - 3$ How many solutions does the equation have?	Multiple Choice Response		

<p>A linear equation is shown.</p> $3x = ax + b$ <p>What values of a and b will result in an equation with infinitely many solutions?</p>	<p>Equation Response</p>	
<p>A linear equation is shown.</p> $\frac{-3}{5}(x - 5) + 4x = ax + b$ <p>What values of a and b will result in an equation whose only solution is $x = 3$?</p>	<p>Equation Response</p>	
<p>Solve the equation shown for x.</p> $2(x - 4) = 4x + 3x + 6$	<p>Equation Response</p>	
<p>Explain why $3(x + 4) = 3(x - 5)$ has no solution. Choose the best response below.</p> <ul style="list-style-type: none"> • The x-terms are the same, but the constant terms are different. • The x-terms are different, but the constant terms are the same. • The x-terms are the same, and the constant terms are same. • The x-terms are different, and the constant terms are different. 	<p>Multiple Choice Response</p>	
<p>An equation is shown.</p> $ax + 4 = 5x + b$ <p>Enter values of a and b for which $x = 4$ is a solution of the equation.</p> <p>$a = []$ $b = []$</p>	<p>Equation Response</p>	

Content Standard	<p>MAFS.8.EE Expressions and Equations</p> <p>MAFS.8.EE.3 Analyze and solve linear equations and pairs of simultaneous linear equations.</p> <p>MAFS.8.EE.3.8 Analyze and solve pairs of simultaneous linear equations.</p> <p>MAFS.8.EE.3.8a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.</p> <p>MAFS.8.EE.3.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</i></p> <p>MAFS.8.EE.3.8c Solve real-world and mathematical problems leading to two linear equations in two variables. <i>For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</i></p>
Assessment Limits	Rational numbers Equations must be given Should involve a graph
Calculator	Yes
Acceptable Response Mechanisms	Equation Response Graphic Response—Drawing Matching Item Response Multiple Choice Response
Context	Allowable
Example	
Context	<p>Ask for the coordinates of the solution from a graph, which is a grid point on the graph.</p> <p>The equations are given in different forms, and the distributive property and/or combining of like terms are needed in one equation in order to compare and solve the equations.</p> <p>There is a real-world context involved, but the equations arising from this context are simple (both in the form $y = ax + b$ or $ax + by = c$) and provided.</p> <p>Part of the system is given in a form that requires either the distributive property or combining of like terms to write it in a simpler form along with a solution or number of solutions.</p>

Context easier	<p>Ask for the number of solutions from a graph.</p> <p>Both equations are given in the same form (either $ax + by = c$ or $y = ax + b$). Plot the solution on a graph.</p> <p>At least one equation has a coefficient of 1 and both equations are given in the same form (either $ax + by = c$ or $y = ax + b$).</p> <p>Ask only for a system with particular solution with no other constraints.</p> <p>One simple equation of a system is given in the form $ax + by = c$ or $y = ax + b$ along with a solution or number of solutions.</p>	
Context more difficult	<p>Ask an approximate solution of a system which is not a grid point on the graph.</p> <p>The equations are given in different forms, and the distributive property and/or combining of like terms is needed in both equations to compare the equations.</p> <p>Both equations require the distributive property and/or combining of like terms to be solved.</p> <p>The equations that arise from the context are more complicated and may need the distributive property or combining of like terms to be solved.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
A graph of a system of two equations is shown. Use the Add Point tool to plot the solution of the system.	Graphic Response—Drawing	
<p>A system of two linear equations is shown.</p> <p>$y = 3(x + 4)$ $y = 3(x - 4)$</p> <p>How many solutions does the system have?</p>	Multiple Choice Response	
<p>A graph of a system of two equations is shown.</p> <p>[graph of two lines with intersection point at a grid point]</p> <p>What is the solution of the system?</p> <p>$x =$ [response box] $y =$ [response box]</p>	Equation Response	

<p>(8b) Select the number of solutions for each system of two linear equations.</p> <table border="1"> <thead> <tr> <th></th> <th>0</th> <th>1</th> <th>Infinitely many solutions</th> </tr> </thead> <tbody> <tr> <td>$7x + 5y = 6$ $7(x - 2) = 8 - 5y$</td> <td></td> <td></td> <td></td> </tr> <tr> <td>$7x + 5y = 6$ $5x + 7y = 6$</td> <td></td> <td></td> <td></td> </tr> <tr> <td>$7x + 5y = 6$ $8x + 4y - 3 = x - y$</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		0	1	Infinitely many solutions	$7x + 5y = 6$ $7(x - 2) = 8 - 5y$				$7x + 5y = 6$ $5x + 7y = 6$				$7x + 5y = 6$ $8x + 4y - 3 = x - y$				<p>Matching Item Response</p>	
	0	1	Infinitely many solutions															
$7x + 5y = 6$ $7(x - 2) = 8 - 5y$																		
$7x + 5y = 6$ $5x + 7y = 6$																		
$7x + 5y = 6$ $8x + 4y - 3 = x - y$																		
<p>A graph of a system of two equations is shown.</p> <p>[graph of two lines with intersection point not at a grid point]</p> <p>What is the approximate solution of the system?</p> <p>x = [response box] y = [response box]</p>	<p>Equation Response</p>																	
<p>A system of two equations is shown.</p> <p>$y = 5x + 3$ $y = 4x - 5$</p> <p>A. Use the Add Arrow tool to graph the two lines. B. Use the Add Point tool to plot the solution of the system.</p>	<p>Graphic Response— Drawing</p>																	
<p>A system of two equations is shown.</p> <p>$5x + 4y = 12$ $3x + 6y = 8$</p> <p>What is the solution of the system?</p> <p>x = [response box] y = [response box]</p>	<p>Equation Response</p>																	

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<p>Radha is trying to choose between two bike rental companies, Company A and Company B.</p> <p>Company A charges a \$25 initial fee and an additional \$5 for each hour rented. Company B charges an initial \$18 fee and an additional \$6 for each hour rented.</p> <p>The total cost to rent a bike from Company A can be represented by the equation $y = 5x + 25$.</p> <p>The total cost to rent a bike from Company B can be represented by the equation $y = 6x + 18$.</p> <p>For how many hours of rental is the amount charged by the two companies the same? What is the cost, in dollars, of renting the bike for this many hours?</p> <p>Hours = [response box] Cost = [response box]</p>	<p>Equation Response</p>	
<p>An equation is shown.</p> <p>$y = 3x + 4$ $y = ax + b$</p> <p>Enter values of a and b so that the system has one solution.</p> <p>a = b =</p>	<p>Equation Response</p>	

Content Standard	MAFS.8.F Functions											
	MAFS.8.F.1 Define, evaluate, and compare functions.											
	MAFS.8.F.1.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.											
Assessment Limits	Function notation is not allowed. Nonlinear functions may be included for identifying a function.											
Calculator	Yes											
Acceptable Response Mechanisms	Equation Response Graphic Response Multiple Choice Response Natural Language Response Table Response											
Context	Allowable											
Example												
Context	An input/output table of values for x and y is shown for a relation with x values given. The x values can increase by any number. Use of a graph to find a rule.											
Context easier	The values given are integers. The x values in the table increase by 1 only. Use of a table to find a rule.											
Context more difficult	The values in the table do not follow chronological order. Use of equation to find a rule.											
Sample Item Stem	Response Mechanism	Notes, Comments										
A table of values for x and y is shown. <table border="1" style="margin-left: 20px;"><tr><td>x</td><td>y</td></tr><tr><td>1</td><td>5</td></tr><tr><td>2</td><td>7</td></tr><tr><td>3</td><td>9</td></tr><tr><td>4</td><td>11</td></tr></table> Select the correct rule for y in terms of x.	x	y	1	5	2	7	3	9	4	11	Multiple Choice Response	
x	y											
1	5											
2	7											
3	9											
4	11											
A graph is shown. [(2, 7), (-2, 9), (-4, 17), (3, -11)] How do you determine if this is a function or not?	Natural Language Response											

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<p>A graph of a function is shown.</p> <p>[Graph of: $y = -2x - 7$]</p> <p>Create a table to show the relationship of the values of x to the values of y.</p>	<p>Table Response</p>	
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Content Standard	<p>MAFS.8.F Functions</p> <p>MAFS.8.F.1 Define, evaluate, and compare functions.</p> <p>MAFS.8.F.1.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i></p>										
Assessment Limits	Function notation is not allowed. Only linear										
Calculator	Yes										
Acceptable Response Mechanisms	Equation Response Graphing Response—Drag and Drop, Hot Spot Matching Item Response Multiple Choice Response Multi-Select Response Natural Language Response Table Response										
Context	Allowable										
	Example										
Context	Two linear functions are presented in different forms.										
Context easier	A verbal description is not given for one of the functions. Algebraic function expressed in slope intercept form. Compare two linear functions presented in same form, e.g., Function 1—algebraic expression; Function 2—algebraic expression—Compare their slope.										
Context more difficult	A verbal description is given for one of the functions. Allow functions expressed in standard form.										
Sample Item Stem	Response Mechanism	Notes, Comments									
Compare the following functions to determine which has a greater rate of change. Function 1: $y = 5x + 4$ Function 2 : <table border="1" style="margin-left: 20px;"> <tr> <td>X</td> <td>Y</td> </tr> <tr> <td>-1</td> <td>-6</td> </tr> <tr> <td>0</td> <td>-3</td> </tr> <tr> <td>2</td> <td>3</td> </tr> </table>	X	Y	-1	-6	0	-3	2	3	Multiple Choice Response		
X	Y										
-1	-6										
0	-3										
2	3										

<p>The graph of one function is shown. A table of values is given for a second function.</p> <p>What is another function that has a greater rate of change than one function but a smaller rate of change than the other function? ($y = 2x - 1$ and $y = -2.5x + 0.5$ are the actual equations of the given graph and table).</p>	<p>Equation Response</p>	
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Content Standard	<p>MAFS.8.F Functions</p> <p>MAFS.8.F.1 Define, evaluate, and compare functions.</p> <p>MAFS.8.F.1.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. <i>For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1, 1), (2, 4) and (3, 9), which are not on a straight line.</i></p>	
Assessment Limits	Function notation is not allowed.	
Acceptable Response Mechanisms	Drag and Drop Response Equation Response Graphing Response Multiple Choice Response Multi-Select Response Natural Language Response Table Input Response	
Calculator	Yes	
Context	Allowable	
Example		
Context	A linear function shown in table form.	
Context easier	The relationship is shown in the form of a graph.	
Context more difficult	The relationship is shown as an equation or as a word problem.	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>The function $y = 3.50x + 2$, as shown in the graph, represents the account balance, y, in a savings account for each week, x.</p> <p>Identify the function as linear or nonlinear.</p>	Multiple Choice Response	
<p>Several functions represent different savings account plans.</p> <p>Which functions are nonlinear?</p> <p>$y = 5.50x + 7$ $y = 5.50(1.02)^x$ $y = 0.5(x)^2$ $y = 7.25x$</p>	Multi-Select Response	

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<p>Jared puts 20 cents in a jar. The following week, he puts two times that original amount in the jar. For each of the following six weeks, Jared continues to double the amount of money he places in his savings jar each week.</p> <p>Determine if the relationship is linear or nonlinear. Explain your choice using examples with ordered pairs.</p>	<p>Natural Language Response</p>	
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Content Standard	<p>MAFS.8.F Functions</p> <p>MAFS.8.F.2 Use functions to model relationships between quantities.</p> <p>MAFS.8.F.2.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.</p>											
Assessment Limits	Function notation is not allowed. Limit to linear functions.											
Calculator	Yes											
Acceptable Response Mechanisms	Equation Response Graphic Response—Drag and Drop, Drawing Matching Item Response Multiple Choice Response Multi-Select Response Table Response											
Context	Allowable											
Example												
Context	A car rental company charges \$45 per day, d , and a one-time fee of \$15 for the car rental insurance. Create a graph or table that represents the function.											
Context easier	Use a proportional relationship. Fill in values of a table that correspond to the function represented as a graph.											
Context more difficult	Generate the algebraic (symbolic) form of a linear function from a table, a graph, or a written description. Find any specified feature or output of a linear function, given the equation representing the function.											
Sample Item Stem	Response Mechanism	Notes, Comments										
<p>The cost, C, to rent a car for d days is shown in the table.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Days (d)</th> <th>Cost (C)</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>\$105</td> </tr> <tr> <td>4</td> <td>\$195</td> </tr> <tr> <td>5</td> <td>\$240</td> </tr> <tr> <td>7</td> <td>\$285</td> </tr> </tbody> </table> <p>Write an equation that represents this function.</p>	Days (d)	Cost (C)	2	\$105	4	\$195	5	\$240	7	\$285	Equation Response	
Days (d)	Cost (C)											
2	\$105											
4	\$195											
5	\$240											
7	\$285											

<p>The cost, C, to rent a car for d days is shown in a table.</p> <table border="1"><thead><tr><th>Days (d)</th><th>Cost (C)</th></tr></thead><tbody><tr><td>2</td><td>\$105</td></tr><tr><td>4</td><td>\$195</td></tr><tr><td>5</td><td>\$240</td></tr><tr><td>7</td><td>\$285</td></tr></tbody></table> <p>At what rate does the value of C increase as the value of d increases by 1? Enter the rate in the first response box.</p> <p>What is the value of the function at $d = 0$? Enter the value in the second response box.</p> <p>What is an equation that represents this function? Enter the equation in the third response box.</p>	Days (d)	Cost (C)	2	\$105	4	\$195	5	\$240	7	\$285	Equation Response	
Days (d)	Cost (C)											
2	\$105											
4	\$195											
5	\$240											
7	\$285											

Content Standard	<p>MAFS.8.F Functions</p> <p>MAFS.8.F.2 Use functions to model relationships between quantities.</p> <p>MAFS.8.F.2.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.</p>		
Assessment Limits	<p>Linear or nonlinear relationships using all four quadrants Graph descriptions traditionally move from left to right Functional relationships should be continuous</p>		
Calculator	Neutral		
Acceptable Response Mechanisms	<p>Equation Response Graphic Response--Drawing, Graphing, Hot Spot Matching Item Response Multiple Choice Response Multi-Select Response Natural Language Response Table Response</p>		
Context	Allowable		
Example			
Context	<p>Mathematical or contextual situations involving changes in speed such as riding a bike.</p> <ul style="list-style-type: none"> • Linear functions and nonlinear functions with positive slope • Variable rates of change 		
Context easier	<ul style="list-style-type: none"> • Linear functions with positive slope • Constant rates of change 		
Context more difficult	<ul style="list-style-type: none"> • Linear or nonlinear functions with positive or negative slope 		
Sample Item Stem	Response Mechanism	Notes, Comments	
Which graph represents a linear function increasing at a constant rate?	Multiple Choice Response		

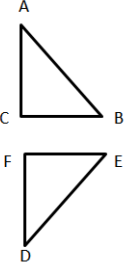
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<p>Mary and Kim ride their bikes to school each day. Graphs of the functions representing one of their rides are shown, where x is the time, in minutes, and y is the distance, in miles.</p> <p>[Have different sections of Mary’s or Kim’s graph labeled X, Y, Z and then have a table with rows of different statements and columns labeled X, Y, Z or columns labeled “Mary” and “Kim” with rows of different statements]</p> <p>Match each section of the graph with a statement that could be used to describe what is happening in this situation.</p>	<p>Matching Item Response</p>	
<p>Mary and Kim ride stationary bikes for exercise. Graphs of the functions representing one of their rides are shown, where x is the time, in minutes, and y is the distance, in miles.</p> <p>Select all of the descriptions that match the graph of Mary’s bike ride.</p> <p>E.g., Mary’s speed increased at a constant rate throughout her 15 minute bike ride.</p>	<p>Multi-Select Response</p>	
<p>Mary and Kim go bike riding on some trails. Graphs of the functions representing one of their rides are shown, where x is the time, in minutes, and y is the distance, in miles.</p> <p>Select all statements that are true based on the graphs shown.</p> <p>E.g., the function is increasing, but Kim’s speed decreases over time, Mary’s slows down between minutes 8 and 12 of her bike ride, etc.</p>	<p>Multi-Select Response</p>	

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<p>Mary and Kim ride their bikes to school each day. Graphs of the functions representing one of their rides are shown, where x is the time, in minutes, and y is the distance, in miles.</p> <p>Write a story about Mary's bike ride describing the relationship between time and distance. Include information about changes in the behavior of the function and rate of speed using terms such as increasing, constant, and decreasing.</p>	Natural Language Response	
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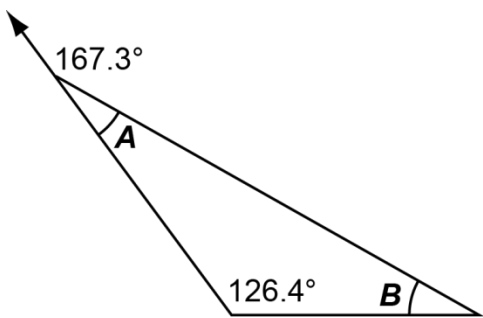
Content Standard	<p>MAFS.8.G Geometry</p> <p>MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software.</p> <p>MAFS.8.G.1.1 Verify experimentally the properties of rotations, reflections, and translations:</p> <p>MAFS.8.G.1.1a Lines are taken to lines, and line segments to line segments of the same length.</p> <p>MAFS.8.G.1.1b Angles are taken to angles of the same measure.</p> <p>MAFS.8.G.1.1c Parallel lines are taken to parallel lines.</p>	
Assessment Limits	<p>The coordinate plane should not be used until (8.G.3).</p> <p>A pre-image and image should not include apostrophe notation as this would give away the identification of similarity and congruence. No reference to the definition of congruence or symbols relating to the definition should be used (HS Geometry).</p>	
Calculator	Neutral	
Acceptable Response Mechanisms	<p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Graphic Response—Hot Spot</p>	
Context	Allowable	
Example		
Context	<p>Quadrilateral ABCD has been transformed to create quadrilateral DEFG.</p> <p>Include reflection or rotation.</p>	
Context easier	Include translation.	
Context more difficult	Includes more than one transformation.	

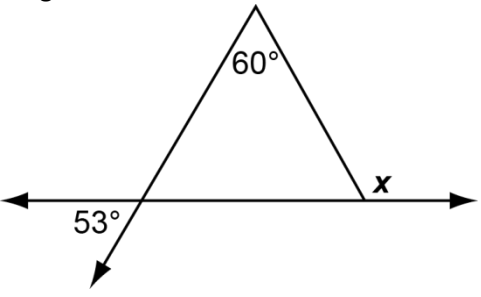
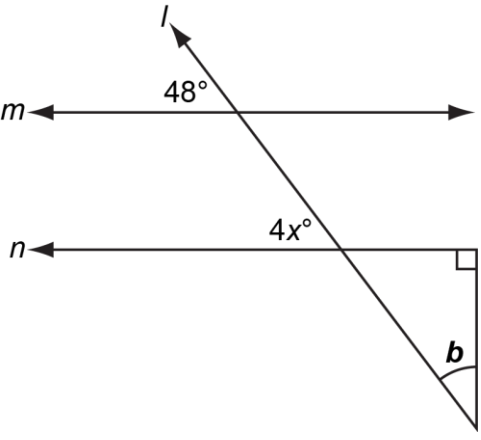
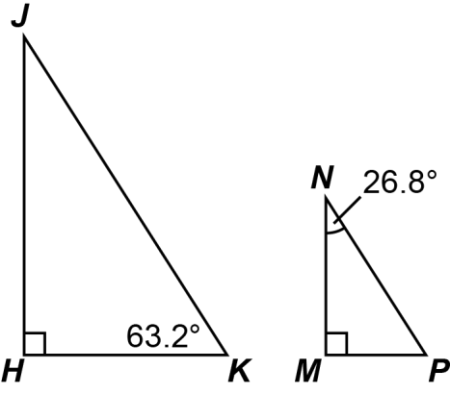
Content Standard	<p>MAFS.8.G Geometry</p> <p>MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software.</p> <p>MAFS.8.G.1.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.</p>		
Assessment Limits	<p>The coordinate plane should not be used until (8.G.3).</p> <p>Limit sequences to no more than two transformations.</p> <p>No reference to the definition of congruence or symbols relating to the definition should be used (HS Geometry).</p>		
Calculator	Neutral		
Acceptable Response Mechanisms	<p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Natural Language Response</p>		
Context	Allowable		
Example			
Context	<p>Include rotation or dilation.</p> <p>Graphic not provided.</p>		
Context easier	<p>Limit to translation or reflection.</p> <p>Include a graphic for a single transformation.</p>		
Context more difficult	<p>Include multiple transformations.</p>		
Sample Item Stem	Response Mechanism	Notes, Comments	
<p>Triangle ABC and its transformation DEF are shown.</p>  <p>What transformation of triangle ABC produced triangle DEF?</p>	Multiple Choice Response		

<p>Which sequence of transformations would maintain congruence?</p> <ul style="list-style-type: none">• A reflection and then a translation• A translation and then a rotation• A rotation and then a reflection• A dilation and a reflection• A rotation and then a dilation• A translation and then a dilation	<p>Multi-Select Response</p>	
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Content Standard	MAFS.8.G Geometry MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software. MAFS.8.G.1.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	
Assessment Limits	Limit coordinates to integer values of x and y. Limit transformations to no more than two. Limit rotations to about the origin and dilations about the center.	
Calculator	Neutral	
Acceptable Response Mechanisms	Equation Response Graphic Response—Drawing Multiple Choice Response Natural Language Response Table Response	
Context	Allowable	
Example		
Context	Include dilations and rotations. Include translations or reflections with directions given in coordinate notation.	
Context easier	Limit to translations and reflections with verbal descriptions.	
Context more difficult	Include two transformations.	
Sample Item Stem	Response Mechanism	Notes, Comments
Triangle ABC is transformed 5 units to the right to create triangle A'B'C'. Use the Connect Line tool to draw triangle A'B'C'.	Graphic Response	
Quadrilateral ABCD is rotated 90° clockwise about the origin to create quadrilateral A'B'C'D'. Use the Connect Line tool to draw quadrilateral A'B'C'D'.	Graphic Response	
A pentagon is shown. The pentagon is translated 5 units to the right and reflected over the x-axis.	Graphic Response	

Use the Connect Line tool to draw the pentagon after its transformation.			
Content Standard	<p>MAFS.8.G Geometry</p> <p>MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, and geometry software.</p> <p>MAFS.8.G.1.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.</p>		
Assessment Limits	<p>Items should not include the coordinate plane as the coordinate plane is needed in 8.G.3.</p> <p>Limit the sequence to no more than two transformations.</p> <p>Limited to polygons with up to 7 sides.</p>		
Calculator	Neutral		
Acceptable Response Mechanisms	<p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Natural Language Response</p>		
Context	Allowable		
Example			
Context	<p>Include dilations and rotations.</p> <p>Use shapes that have 2 sides of equal length (i.e., rectangle).</p>		
Context easier	<p>1 transformation only.</p> <p>Limit to translations and reflections.</p> <p>Use shapes with different side lengths (i.e., right trapezoid).</p>		
Context more difficult	<p>Multiple transformations.</p> <p>Use shapes with side lengths that are same size (i.e., square, rhombus).</p>		
Sample Item Stem		Response Mechanism	Notes, Comments
<p>Which sequence of transformations results in figures that are similar but not congruent?</p> <p>A. Rotated clockwise 90°, translated 5 units to the left</p> <p>B. Reflected across the x-axis, dilated by a factor of $\frac{1}{2}$</p> <p>C. Reflected across the x-axis, translated 7 units to the left</p> <p>D. Translated 3 units down, reflected across the y-axis</p>		Multiple Choice Response	

Content Standard	<p>MAFS.8.G Geometry</p> <p>MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, and geometry software.</p> <p>MAFS.8.G.1.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angle created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. <i>For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</i></p>	
Assessment Limits	Do not include shapes beyond triangles.	
Calculator	Yes	
Acceptable Response Mechanisms	Equation Response Graphic Response—Drag and Drop Multiple Choice Response Multi-Select Response Natural Language Response	
Context	No Context	
Example		
Context	May use monomials with variables to represent angle measures. Number of angle relationship is 2.	
Context easier	Use numbers to represent angle measures, no variables. Number of angle relationships is 1.	
Context more difficult	May use expressions to represent angle measures. Number of angle relationships is 3-4.	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>A figure is shown.</p>  <p>What is the measure of $\angle A$ in degrees?</p>	Equation Response	

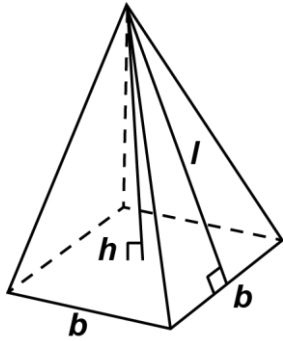
<p>A figure is shown.</p>  <p>What is the measure of $\angle x$ in degrees?</p>	<p>Equation Response</p>	
<p>A figure is shown.</p>  <p>What is the measure of $\angle b$ in degrees?</p>	<p>Equation Response</p>	
<p>Two similar triangles are shown.</p>  <p>What is the measure of $\angle P$?</p>	<p>Equation Response</p>	

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Content Standard	MAFS.8.G Geometry		
	MAFS.8.G.1 Understand congruence and similarity using physical models, transparencies, and geometry software.		
	MAFS.8.G.1.6 Explain a proof of the Pythagorean Theorem and its converse.		
Assessment Limits	For the converse, use only perfect roots.		
Calculator	Yes		
Acceptable Response Mechanisms	Graphic Response–Drag and Drop Multiple Choice Response Multi-Select Response Natural Language Response		
Context	Allowable		
Example			
Context	Determine whether sides a, b, and c form a right triangle. Use non-common Pythagorean triples.		
Context easier	Use common Pythagorean triples.		
Context more difficult	Use non-integer numbers.		
Sample Item Stem	Response Mechanism	Notes, Comments	
Select three side lengths that can form a right triangle. <input type="checkbox"/> 5 cm <input type="checkbox"/> 6 cm <input type="checkbox"/> 8 cm <input type="checkbox"/> 10 cm <input type="checkbox"/> 11 cm <input type="checkbox"/> 12 cm	Multi-Select Response		
Which set of numbers form a right triangle? A. 4.7, 3.6, 5.2 B. 6, 8, 10 C. 7, 3.2, 8 D. 1, 2, 3	Multiple Choice Response		

Content Standard	<p>MAFS.8.G Geometry</p> <p>MAFS.8.G.2 Understand and apply the Pythagorean Theorem</p> <p>MAFS.8.G.2.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</p>	
Assessment Limits	<p>If the triangle is part of a 3-dimensional figure, a graphic of the 3-dimensional figure must be included.</p> <p>No coordinate plane items should be included.</p>	
Calculator	Yes	
Acceptable Response Mechanisms	<p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Equation Response</p>	
Context	Allowable	
Example		
Context	<p>Triangle ABC is a right triangle. If the length of one leg is 10 inches and the hypotenuse is 12 inches, what is the length of the other leg?</p> <p>Find the length of a leg.</p>	
Context easier	Find the length of a hypotenuse.	
Context more difficult	Find measures from right triangles formed in 3D figures (i.e., height or slant height of a cone and diagonal of a cube).	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>Triangle ABC is a right triangle. The lengths of the legs are 60 cm and 80 cm.</p> <p>What is the length of the hypotenuse?</p>	Equation Response	
<p>Triangle ABC is a right triangle. The length of one leg is 80 cm and the hypotenuse is 120 cm.</p> <p>What is the length of the other leg?</p>	Equation Response	

A figure is shown.



The base of the shape is a square with side length $b = 30$ m. The height of the figure, h , is 10 m.

What is the length of l ?

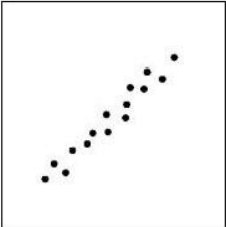
Equation
Response

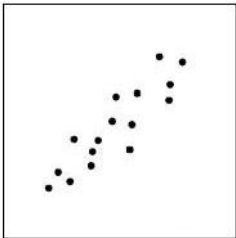
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Content Standard	MAFS.8.G Geometry	
	MAFS.8.G.2 Understand and apply the Pythagorean Theorem	
	MAFS.8.G.2.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	
Assessment Limits	Points on the coordinate grid should be where grid lines intersect.	
Calculator	Yes	
Acceptable Response Mechanisms	Multiple Choice Response Multi-Select Response Equation Response Graphic Response—Graphing	
Context	Allowable	
Example		
Context	A coordinate grid shows the location of three different buildings in a city. At most, one point is in quadrant 1. Leg lengths are whole numbers but hypotenuse can be represented as a radical.	
Context easier	All side lengths are whole numbers or perfect squares. All points are in the first quadrant only.	
Context more difficult	No points are in the first quadrant. All sides can be non-whole numbers.	
Sample Item Stem	Response Mechanism	Notes, Comments
What is the distance between A (-1, 3) and B (3, 5)? [Show the two points on the coordinate plane.]	Equation Response	
Three points are on the coordinate plane shown. A(-5, 3), B(-3, 5) What is the distance between A (-5, 3) and B (-3, 5)?	Equation Response	

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Content Standard	MAFS.8.G Geometry MAFS.8.G.3 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. MAFS.8.G.3.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.		
Assessment Limits	Graphics of three-dimensional figures will be included in most items. Dimensions are rational numbers.		
Calculator	Yes		
Acceptable Response Mechanisms	Multi-Select Response Equation Response Multiple Choice Response		
Context	Allowable		
Example			
Context	A cone has a height of 9.75 centimeters and a diameter of 5.5 centimeters. Include one non-integer value.		
Context easier	Limit given measures to whole numbers.		
Context more difficult	Include multiple non-integer values.		
Sample Item Stem	Response Mechanism	Notes, Comments	
A cylinder with a height of 6 inches and a diameter of 5 inches is shown. What is the volume of the cylinder, in cubic inches? (Use 3.14 for π)	Equation Response		
A cone with a height of 6 inches and a diameter of 6 inches is shown. What is the volume of the cone, in cubic inches? (Use 3.14 for π)	Equation Response		
The diameter of a sphere is 4 inches. What is the volume of the sphere, in cubic inches? (Use 3.14 for π)	Equation Response		

Content Standard	<p>MAFS.8.SP Statistics and Probability</p> <p>MAFS.8.SP.1 Investigate patterns of association in bivariate data.</p> <p>MAFS.8.SP.1.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.</p>		
Assessment Limits	Rational numbers		
Calculator	Neutral		
Acceptable Response Mechanisms	Graphic Response—Hot Spot Multiple Choice Response Multi-Select Response		
Context	Allowable		
Example			
Context	A convenience store keeps track of bottled water sales as the temperature changes. Scatter plots have a clearly strong or clearly weak correlation with some moderate outliers.		
Context easier	Scatter plots have a very strong or very weak correlation. No outliers		
Context more difficult	Only give the data.		
Sample Item Stem	Response Mechanism	Notes, Comments	
<p>A scatter plot is shown for bottled water sales and temperature.</p>  <p>Which statement is true of the graph? (Options that show different patterns of association.)</p>	Multiple Choice Response		

<p>A scatter plot is shown for bottled water sales and temperature.</p>  <p>Select all statements that correctly interpret the graph.</p> <p>(Options that show different patterns of association.)</p>	<p>Multi-Select Response</p>	
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Content Standard	<p>MAFS.8.SP Statistics and Probability</p> <p>MAFS.8.SP.1 Investigate patterns of association in bivariate data.</p> <p>MAFS.8.SP.1.2 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.</p>	
Assessment Limits	Rational numbers, trend/association— not based on numbers, only based on visual strength, linear association only	
Calculator	Neutral	
Acceptable Response Mechanisms	Multiple Choice Response Multi-Select Response Graphic Response—Graphing, Hot Spot Natural Language Response	
Context	Allowable	
Example		
Context	<p>Bottled water sales vs. temperature.</p> <p>A convenience store keeps track of bottled water sales as the temperature changes.</p>	
Context easier	Stronger trend	
Context more difficult	Weaker trend	
Sample Item Stem	Response Mechanisms	Notes, Comments
<p>A scatter plot is shown.</p> <p>Which graph represents the line of best fit for the scatter plot shown?</p> <p>Options have the same data points but the line of best fit is in different locations for each graph.</p>	Multiple Choice Response	

Content Standard	<p>MAFS.8.SP Statistics and Probability</p> <p>MAFS.8.SP.1 Investigate patterns of association in bivariate data.</p> <p>MAFS.8.SP.1.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. <i>For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.</i></p>	
Assessment Limits	<p>Rational numbers Data is required for all items Limit to linear equations (Note: In all items requiring a line of best fit, the equation of that line should be given.)</p>	
Calculator	Neutral	
Acceptable Response Mechanisms	<p>Equation Response Multiple Choice Response Multi-Select Response Natural Language Response</p>	
Context	Required	
Example		
Context	A scatter plot and line of best fit are shown for the amount of time people spent in a mall compared to how much money they spent. Questions involve only slope.	
Context easier	Questions involve only intercept.	
Context more difficult	Questions involve both slope and y-intercept.	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>The slope of the line of best fit for the data shown is $\frac{3}{2}$.</p> <p>What is the meaning of $\frac{3}{2}$ in terms of the context?</p>	Multi-Select Response	
<p>The equation of the line of best fit for the data shown is $t = \frac{3}{2}n$.</p> <p>Explain why this line of best fit can be used to represent the data.</p>	Natural Language Response	

Content Standard	<p>MAFS.8.SP Statistics and Probability</p> <p>MAFS.8.SP.1 Investigate patterns of association in bivariate data.</p> <p>MAFS.8.SP.1.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. <i>For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?</i></p>	
Assessment Limits	<p>Rational numbers Relate questions to grand total of survey Categorical variables Two columns (plus category and total) and two rows (plus category and total)</p>	
Calculator	Yes	
Acceptable Response Mechanisms	<p>Equation Response Multiple Choice Response Multi-Select Response Table Response</p>	
Context	Required	
	Example	
Context	<p>The 200 students in eighth grade were surveyed on whether they prefer apple juice or orange juice (sample size between around 100 and 300). Finding missing number from inner cells.</p>	
Context easier	<p>A smaller sample size (less than around 100 students). Only consider a single inner cell of the table. Finding totals.</p>	
Context more difficult	<p>A larger sample size (greater than around 300 students). Consider both inner cells and totals of the table. Parameters given using relative frequencies. Totals not at 10s or 100s.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>Two hundred students were asked whether they prefer apple juice or orange juice.</p> <p>[two-way table displaying data: boy/girl vs. apple/orange]</p> <p>How many more girls were surveyed than boys?</p>	Equation Response	

Seventh grade students were surveyed on whether they prefer apple juice or orange juice. It is found that there were 100 boys who preferred orange juice.				Table Response	
	Apple juice	Orange juice	Total		
Boys		100			
Girls			370		
Total	240	260			
Complete the table to show the results.					