

DRAFT

Grade 6 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.6.RP Ratios and Proportional Relationships</p> <p>MAFS.6.RP.1 Understand ratio concepts and use ratio reasoning to solve problems.</p> <p>MAFS.6.RP.1.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”</i></p>	
Assessment Limits	<p>Whole numbers.</p> <p>Ratios can be expressed as fractions ($\frac{1}{5}$), with a colon (1:5), or with words such as per, to, each, for each, for every, etc. (1 to 5); be sure to vary these representations across items at this standard.</p> <p>Quantities/units can be discrete or continuous and can be the same or different across the two quantities.</p> <p>Be precise in describing relationships such as “the ratio of the number of x to the number of y” or “the ratio of the length of x to the length of y,” or explicitly reference types of quantities.</p> <p>Limit use of percent to 6.RP.3c.</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Graphic Response — Drag and Drop</p> <p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Natural Language Response</p> <p>Table Response</p>	
Context	Allowable	
Example		
Context	<p>Give the student just the information needed to describe/create the ratio, but in a venue that requires the student to derive the numbers (art, etc.).</p> <p>Give the student the numbers needed to describe/create the ratio, but also more information than is needed.</p>	
Context easier	<p>Give the student just the information needed to describe/create the ratio.</p> <p>Give the student information in numerical form.</p>	
Context more difficult	<p>Give the student more information than is needed to describe/create the ratio.</p> <p>Give the student information in a venue that requires the student to derive the numbers needed to describe/create the ratio (art, etc.).</p>	
Sample Item Stem	Response Mechanism	Notes, Comments

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<p>Jordan has 3 blue marbles and 8 red marbles.</p> <p>What is the ratio of blue marbles to red marbles?</p> <p>A. 3:3 B. 3:5 C. 3:8 D. 3:11</p>	<p>Multiple Choice Response</p>	
<p>Jordan has blue and red marbles in a jar, as shown.</p> <p>Drag additional marbles to the jar so that the ratio of blue to total marbles is 8 to 11.</p>	<p>Graphic Response — Drag and Drop</p>	
<p>Jordan has a jar of blue, red, and yellow marbles, as shown.</p> <p>[jar of marbles, with student able to count each one]</p> <p>Complete the table to show the ratio of blue marbles to yellow marbles.</p> <p>[table has heading of “Ratio of Blue to Yellow”, with three cells, <box> to <box>]</p>	<p>Table Response</p>	
<p>A jar of marbles is shown.</p> <p>[jar of red, blue, green, and yellow marbles]</p> <p>Complete the table to show two ratios.</p> <ul style="list-style-type: none"> • The ratio of red marbles to green marbles • The ratio of blue marbles to total marbles 	<p>Table Response</p>	
<p>A jar of marbles is shown.</p> <p>[jar of red, blue, green, and yellow marbles]</p>	<p>Multiple Choice Response</p>	

<p>What does the ratio 3:5 represent?</p> <p>A. The ratio of blue marbles to green marbles. [other options dealing with both part-to-part and part-to-whole]</p>		
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Content Standard	<p>MAFS.6.RP Ratio and Proportions Relationships</p> <p>MAFS.6.RP.1 Understand ratio concepts and use ratio reasoning to solve problems.</p> <p>MAFS.6.RP.1.2 Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."</p>	
Assessment Limits	<p>Whole numbers will be used in the comparison of a ratio.</p> <p>Rates can be expressed as fractions, with ":" or with words.</p> <p>Units may be the same or different across the two quantities.</p> <p>Context itself does not determine the order.</p> <p>Name the amount of either quantity in terms of the other as long as one of the values is one unit.</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Table Response</p>	
Context	Required	
Example		
Context	Generally, one number in the given ratio is single-digit.	
Context easier	<p>Use numbers in the ratio that divide evenly (compatible).</p> <p>Generally, both numbers in the given ratio are single-digit.</p>	
Context more difficult	<p>Generally, both numbers in the given rate are double-digit.</p> <p>Present the quantities of the ratio in reverse order of the expected unit rate.</p> <p>Use numbers that require the student complete multistep problems.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>Which statement describes a unit rate?</p> <p>A. Sara ate 1 cookie.</p>	Multiple Choice Response	

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B. Sara is driving 16 miles. C. Sara is driving 30 miles per 1 hour. D. Sara ate 3 crackers and 1 apple.		
The double number line diagram shown represents a ratio. [diagram with 5, 10, 15, 20 on one line and corresponding 2, 4, 6, 8 on the other] What is a unit rate for this ratio?	Multiple Choice Response	
Dominic is buying candy by the pound. For every 10 pounds of candy he buys, he pays 12 dollars. How much does 1 pound of candy cost?	Equation Response	

Content Standard	<p>MAFS.6.RP Ratios and Proportional Relationships.</p> <p>MAFS.6.RP.1 Understand ratio concepts and use ratio reasoning to solve problems.</p> <p>MAFS.6.RP.1.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p> <p>MAFS.6.RP.1.3a Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.</p> <p>MAFS.6.RP.1.3b Solve unit rate problems including those involving unit pricing and constant speed. <i>For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</i></p> <p>MAFS.6.RP.1.3c Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.</p> <p>MAFS.6.RP.1.3d Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>MAFS.6.RP.1.3e Understand the concept of Pi as the ratio of the circumference of a circle to its diameter.</p>
Assessment Limits	<p>Rates can be expressed as fractions, with “:” or with words.</p> <p>Units may be the same or different across the two quantities.</p> <p>Percent found as a rate per 100.</p>
Calculator	No
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Graphic Response — Drawing, Drag and Drop</p> <p>Multiple Choice Response</p> <p>Table Response</p>
Context	Allowable
Example	
Context	<p>Generally, one number in the given ratio is single-digit.</p> <p>10% (percentages built on this).</p>
Context easier	<p>Use numbers in the ratio that divide evenly (compatible) or are multiples of 10.</p> <p>Generally, both numbers in the given ratio are single-digit.</p> <p>75%, 50%, 25%.</p>
Context more difficult	<p>Generally, both numbers in the given rate are double-digit.</p> <p>Use numbers that are not compatible.</p> <p>All whole number percentages.</p>

Sample Item Stem	Response Mechanism	Notes, Comments										
<p>A paint mixture uses a specific blue to green ratio.</p> <p>Complete the table using the ratio given.</p> <table border="1"> <thead> <tr> <th colspan="2">Paint Mixture</th> </tr> <tr> <th>Blue Paint</th> <th>Green Paint</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>5</td> </tr> <tr> <td>4</td> <td></td> </tr> <tr> <td>6</td> <td></td> </tr> </tbody> </table>	Paint Mixture		Blue Paint	Green Paint	2	5	4		6		Table Response	
Paint Mixture												
Blue Paint	Green Paint											
2	5											
4												
6												
<p>A table of equivalent ratios is shown.</p> <p>[table with (2, 20), (4, 40), (6, 60) and (8, 80)]</p> <p>Use the Add Point tool to plot these points on the coordinate grid.</p>	Graphic Response — Drawing											
<p>Tom knows that, in his school, 10 out of every 85 students are left-handed. There are 391 students in Tom’s school.</p> <p>How many students in Tom’s school are left-handed?</p>	Equation Response											
<p>The standard length of film on a film reel is 300 meters. On the first day of shooting a movie, a director uses 30% of the film in one reel. How long is the strip of film that was used?</p>	Equation Response											
<p>Sam is taking a trip to another town. He has traveled 33 miles and knows that 55% of his trip is complete.</p> <p>How many total miles is Sam’s trip?</p>	Equation Response											

Content Standard	<p>MAFS.6.NS <i>The Number System</i></p> <p>MAFS.6.NS.1 <i>Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</i></p> <p>MAFS.6.NS.1.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. <i>For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$-cup servings are in $2/3$ of a cup of yogurt? How wide is a rectangular strip of land with length $3/4$ mi. and area $1/2$ square mi.?</i></p>	
Assessment Limits	<p>At least the divisor or dividend needs to be a non-unit fraction.</p> <p>Dividing a unit fraction by a whole number or vice versa (e.g., $\frac{1}{a} \div q$ or $q \div \frac{1}{a}$) is below grade level.</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Multiple Choice Response</p> <p>Natural Language Response</p>	
Context	Allowable	
Example		
Context	<p>How wide is a rectangular plot of land that has an area of $\frac{3}{2}$ km² and a length of $\frac{3}{4}$ km?</p> <p>Dividing a fraction and improper fraction is medium difficult.</p>	
Context easier	Dividing a proper fraction by another proper fraction or a fraction and whole number is easier.	
Context more difficult	Dividing a fraction and a mixed number or dividing two mixed numbers is more difficult.	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>An expression is shown.</p> <p>$\frac{2}{3} \div 8$</p> <p>What is the value of the expression?</p>	Equation Response	
<p>An expression is shown.</p>	Equation Response	

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$\frac{4}{5} \div \frac{8}{7}$ <p>What is the value of the expression?</p>		
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<p>An expression is shown.</p> $2\frac{1}{4} \div 1\frac{2}{5}$ <p>What is the value of the expression?</p>	Equation Response	
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<p>A rectangular plot of land has an area of $\frac{3}{2}$ square kilometers and a length of $\frac{3}{4}$ kilometer.</p> <p>What is the width of the plot of land?</p>	Equation Response	
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<p>An expression is shown.</p> $\frac{2}{3} \div \frac{3}{4}$ <p>Which problem can be solved using the expression?</p> <p>A. Eric ate $\frac{2}{3}$ of a container that holds $\frac{3}{4}$ cup of yogurt. How much yogurt did Eric eat?</p> <p>B. Eric ate $\frac{3}{4}$ of a container that holds $\frac{2}{3}$ cup of yogurt. How much yogurt did Eric eat?</p> <p>C. How many $\frac{3}{4}$ cup servings are in $\frac{2}{3}$ of a cup of yogurt?</p> <p>D. How many $\frac{2}{3}$ cup servings are in $\frac{3}{4}$ cup of yogurt?</p>	Multiple Choice Response	
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Content Standard	<p>MAFS.6.NS <i>The Number System</i></p> <p>MAFS.6.NS.2 <i>Compute fluently with multi-digit numbers and find common factors and multiples.</i></p> <p>MAFS.6.NS.2.2 <i>Fluently divide multi-digit numbers using the standard algorithm.</i></p>	
Assessment Limits	5-digit dividend by 2-digit divisor and 4-digit dividend by 2- or 3-digit divisor	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Multiple Choice Response	
Context	No context	
Example		
Context	$1602 \div 178 = 9$ 4-digit dividend by 3-digit divisor	
Context easier	2-digit divisor and 5-digit dividend and only the dividend or divisor is rational.	
Context more difficult	Quotient requires the student to look at the dividend or part of the dividend as a whole. Quotient includes a zero in the middle of nonzero values.	
Sample Item Stem	Response Mechanism	Notes, Comments
An expression is shown. $2925 \div 15$ What is the value of the expression?	Equation Response	
An expression is shown. $1608 \div 268$ What is the value of the expression?	Equation Response	

Content Standard	MAFS.6.NS <i>The Number System</i>	
	MAFS.6.NS.2 <i>Compute fluently with multi-digit numbers and find common factors and multiples.</i>	
	MAFS.6.NS.2.3 <i>Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</i>	
Assessment Limits	Rational numbers only.	
Calculator	No	
Acceptable Response Mechanisms	Equation Response	
Context	No context	
Example		
Context	Permit value up to the hundredths place. Included limited carrying and/or borrowing.	
Context easier	Restrict the operations to addition and subtraction. Restrict decimals to tenths. Include values that do not require carrying or borrowing.	
Context more difficult	Include values up to thousandths place. Use multiple operations in a single problem. Increase the amount of carrying and/or borrowing required.	
Sample Item Stem	Response Mechanism	Notes, Comments
An expression is shown. 2312.2 + 3.4 What is the value of the expression?	Equation Response	

An expression is shown. 590.92 – 219.38 What is the value of the expression?	Equation Response	
An expression is shown. 462.06 ÷ 5.1 + 100.384 What is the value of the expression?	Equation Response	

Content Standard	MAFS.6.NS <i>The Number System</i> MAFS.6.NS.2 <i>Compute fluently with multi-digit numbers and find common factors and multiples.</i> MAFS.6.NS.2.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. <i>For example, express 36 + 8 as 4 (9 + 2).</i>	
Assessment Limits	Whole numbers less than or equal to 100. Least common multiple of two whole numbers less than or equal to 12.	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Multiple Choice Response Matching Item Response	
Context	No context	
Example		
Context	What is an equivalent expression to $81 + 27$? Expressions using the factors 3, 4, 6, and 9.	
Context easier	Expressions using the factors 2, 5, 10, and 11 only.	
Context more difficult	Expressions using the factors 7, 8, and 12.	
Sample Item Stem	Response Mechanism	Notes, Comments

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What is the greatest common factor of 15 and 20?	Equation Response	
What is the least common multiple of 7 and 12?	Equation Response	
Which expression is equivalent to $8 + 20$? A. $4(4 + 20)$ B. $4(2 + 5)$ C. $2(2 + 10)$ D. $2(6 + 18)$	Multiple Choice Response	

An equation is shown. $30 + 12 = \square(5 + 2)$ What factor is missing from the equation?	Equation Response																	
Match the equivalent expression in the table. <table border="1"> <tr> <td></td> <td>$4(10+9)$</td> <td>$9(5+2)$</td> <td>$3(12+7)$</td> </tr> <tr> <td>$36+21$</td> <td></td> <td></td> <td></td> </tr> <tr> <td>$45+18$</td> <td></td> <td></td> <td></td> </tr> <tr> <td>$40+36$</td> <td></td> <td></td> <td></td> </tr> </table>		$4(10+9)$	$9(5+2)$	$3(12+7)$	$36+21$				$45+18$				$40+36$				Matching Item Response	
	$4(10+9)$	$9(5+2)$	$3(12+7)$															
$36+21$																		
$45+18$																		
$40+36$																		

Content Standard	<p>MAFS.6.NS <i>The Number System</i></p> <p>MAFS.6.NS.3 <i>Apply and extend previous understandings of numbers to the system of rational numbers.</i></p> <p>MAFS.6.NS.3.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p>
Assessment Limits	<p>Rational numbers. Items should not require the student to perform an operation.</p>
Calculator	No
Acceptable Response Mechanisms	<p>Equation Response Multiple Choice Response Multi-Select Response Natural Language Response</p>
Context	Required
Example	
Context	<p>Seeley, California is located below sea level. What does zero represent in the context of this situation? Include positive and negative non-integer rational numbers. Include interpretation of zero.</p>
Context	Limit to positive and negative integers

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easier		
Context more difficult	N/A	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>Seeley, California is located at an elevation that is below sea level.</p> <p>What is a possible elevation of Seeley, California?</p> <p>A. 600 feet B. 500 feet C. -200 feet D. 0 feet</p>	Equation Response	

<p>Chicago, Illinois has an elevation of 600 feet above sea level. The elevation of Seeley, California is -200 feet.</p> <p>Select all the true statements.</p> <p>A. Seeley is above sea level. B. Seeley is at sea level. C. Seeley is below sea level. D. The difference in elevations is less than 600 feet. E. The difference in the elevations is 600 feet. F. The difference in the elevations is more than 600 feet.</p>	Multi-Select Response	
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<p>Chicago, Illinois has an elevation of 600 feet above sea level. The elevation of Seeley, California is -200 feet.</p> <p>What does 0 represent in the context of this situation?</p>	<p>Natural Language Response</p>	
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Content Standard	<p>MAFS.6.NS <i>The Number System</i></p> <p>MAFS.6.NS.3 <i>Apply and extend previous understandings of numbers to the system of rational numbers.</i></p> <p>MAFS.6.NS.3.6a Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.</p> <p>MAFS.6.NS.3.6b Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</p> <p>MAFS.6.NS.3.6c Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.</p>	
Assessment Limits	<p>Rational numbers.</p> <p>Plotting of points in the coordinate plane should include some negative values (not just first quadrant).</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Graphic Response — Drawing, Drag and Drop</p>	
Context	No context	
Example		
Context	<p>Include graphing rational numbers on a number line.</p> <p>Limit rational numbers to same representation.</p> <p>Include graphing integer points in quadrants II and/or IV.</p> <p>Involve two abstract values.</p>	
Context easier	<p>Limit to integer values on the number line.</p> <p>Include graphing integer points in quadrants I and III.</p> <p>Involve one abstract value.</p>	
Context more difficult	<p>Include placing multiple rational numbers on the number line represented in different forms (fractions, decimals, etc.).</p> <p>Graph coordinates with non-integer values on the coordinate plane.</p> <p>Include three abstract values.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
What is the opposite of -5?	Equation Response	

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<p>Use the Add Point tool to plot (-2, -3) on the coordinate plane.</p>	<p>Graphic Response</p>	
<p>Use the Add Point tool to plot a point on the number line that is the opposite of 2.5.</p>	<p>Graphic Response</p>	
<p>Use the Add Point tool to graph (-2.5, 0.5) on the coordinate plane.</p>	<p>Graphic Response</p>	
<p>Four values are shown.</p> <p>$[-\frac{2}{4}, 1.6, -2.25, 3\frac{3}{4}]$</p> <p>Drag each value to its correct location on the number line.</p>	<p>Graphic Response</p>	
<p>A value x is shown on the number line.</p> <p>Drag the point to the number line to show the location of $-x$.</p> <p>[number line with x labeled, and preplaced palette image of a point labeled "$-x$"; no numbers except 0 on the number line]</p>	<p>Graphic Response</p>	
<p>A value x is shown on the number line.</p> <p>Drag the two points to the number line to show the locations of $-x$ and $-(-x)$.</p>	<p>Graphic Response</p>	
<p>A point (a, b) is shown on the coordinate grid.</p> <p>Drag the three points to their correct locations on the coordinate grid.</p> <p>[three points labeled $(a, -b)$, $(-a, b)$, and $(-a, -b)$; no scale on the coordinate grid]</p>	<p>Graphic Response</p>	

Content Standard	<p>MAFS.6.NS <i>The Number System</i></p> <p>MAFS.6.NS.3 <i>Apply and extend previous understandings of numbers to the system of rational numbers.</i></p> <p>MAFS.6.NS.3.7a <i>Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret $-3 > -7$ as a statement that -3 is located to the right of -7 on a number line oriented from left to right.</i></p> <p>MAFS.6.NS.3.7b <i>Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write $-3^{\circ}\text{C} > -7^{\circ}\text{C}$ to express the fact that -3°C is warmer than -7°C.</i></p> <p>MAFS.6.NS.3.7c <i>Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of -30 dollars, write $-30 = 30$ to describe the size of the debt in dollars.</i></p> <p>MAFS.6.NS.3.7d <i>Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.</i></p>
Assessment Limits	Positive and negative rational numbers
Calculator	No
Acceptable Response Mechanisms	Equation Response Graphic Response — Drag and Drop Multiple Choice Response Matching Item Response Multi-Select Response Natural Language Response
Context	Allowable
Example	
Context	Compare more than two numbers. Involve two abstract values.
Context easier	Limit to integer values. Numbers to be compared are generally not close or alike/opposites (e.g., 9, -3, 20, -47). Compare two numbers. Involve one abstract value.
Context more difficult	Exclusively non-integer values. Numbers to be compared are generally close or alike/opposites (e.g., -7, -8, 7, -17). Include comparisons of non-integer values where leading digits have the same value (-2.25 and -2.5). Involve three or more abstract values.

Sample Item Stem	Response Mechanism	Notes, Comments
<p>Cityville has a temperature of -10°F. Townville has a temperature colder than Cityville.</p> <p>Select all values that could represent the temperature of Townville.</p> <p><input type="checkbox"/> 12°F <input type="checkbox"/> 8°F <input type="checkbox"/> -8°F <input type="checkbox"/> -12°F <input type="checkbox"/> -20°F</p>	Multi-Select Response	
<p>Enter a value that would be located to the left of -24 on the number line.</p> <p>[Include a graphic of a portion of a number line, not including the number -24.]</p>	Equation Response	
<p>Which value is furthest from 0 on the number line?</p> <p>A. 20 B. -21 C. 20.5 D. -21.5</p>	Multiple Choice Response	
<p>Order the numbers from least to greatest.</p> <p>-2.25 3 2.5 -3 0</p>	Graphic Response	
<p>The elevations of several cities are shown.</p> <p>Select which city has the greatest elevation and which city is furthest from sea level.</p> <p>[matching table with city names and elevations in the row headings, and “Highest Elevation” and “Furthest from Sea Level” in the column headings; numbers are such that the answers are</p>	Matching Item Response	

different]		
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Molly wrote down a positive integer x . What is a number that is different than x but is the same distance from 0 on the number line? A. $ x $ B. $ -x $ C. $-x$ D. $-(-x)$	Multiple Choice Response	
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Content Standard		<p>MAFS.6.NS <i>The Number System</i></p> <p>MAFS.6.NS.3 <i>Apply and extend previous understandings of numbers to the system of rational numbers.</i></p> <p>MAFS.6.NS.3.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.</p>	
Assessment Limits		<p>Positive and negative whole numbers.</p> <p>Do not use polygons/vertices for this standard.</p> <p>Do not exceed 10 x 10 coordinate grid, though scales can vary.</p>	
Calculator		No	
Acceptable Response Mechanisms		<p>Equation Response</p> <p>Graphic Response — Graphing</p>	
Context		Allowable	
Example			
Context	<p>The city of Glendale wants to build a new library that is 5 blocks away from the bank.</p> <p>The coordinate plane is given for plotting points or calculating distance.</p>		
Context easier	Work with coordinates in the same quadrant.		
Context more difficult	<p>Work with coordinates on opposite sides of the x- or y-axis.</p> <p>No coordinate plane is given.</p>		
Sample Item Stem		Response Mechanism	Notes, Comments
<p>Two points are shown.</p> <p>(4, -6) (9, -6)</p> <p>What is the distance between the two points?</p>		Equation Response	
<p>Point A is shown on the coordinate grid.</p> <p>Use the Add Point tool to plot four points that are all 7 units away from point A.</p>		Graphic Response	
<p>What is the value of the x-coordinate that is 9 units to the left of (5, -8)?</p>		Equation Response	

<p>A map of a town is shown.</p> <p>[A map is shown on the coordinate plane with the following landmarks: School (8, 5); Bank (-4, -1); and Park (3, -1). Include a key to show a representation of a block.]</p> <p>The town wants to build a new library that is 5 blocks away from the park and 6 blocks away from the school.</p> <p>Use the Add Point tool to plot the location where the library should be built.</p>	<p>Graphic Response</p>	
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Content Standard	<p>MAFS.6.EE Expressions and Equations</p> <p>MAFS.6.EE.1 Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>MAFS.6.EE.1.1 Write and evaluate numerical expressions involving whole-number exponents.</p>	
Assessment Limits	<p>Whole number bases.</p> <p>Whole number exponents.</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Multi-Select Response</p>	
Context	No Context	
Example		
Context	No context.	
Context easier	Simple evaluation of expressions involving whole number exponents.	
Context more difficult	<p>Evaluate expressions with whole number exponents and positive rational numbers.</p> <p>Create or write expressions involving whole number exponents.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
Which value is equivalent to the expression 4^5 ?	Equation Response	
What is the value of $(5)^3$?	Multi-Select Response	
Select the expressions equivalent to $8 \times 8 \times 8 \times 8$.	Multi-Select Response	

Content Standard		<p>MAFS.6.EE Expressions and Equations</p> <p>MAFS.6.EE.1 Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>MAFS.6.EE.1.2 Write, read, and evaluate expressions in which letters stand for numbers.</p> <p>MAFS.6.EE.1.2a Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation “Subtract y from 5” as $5 - y$.</p> <p>MAFS.6.EE.1.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms.</p> <p>MAFS.6.EE.1.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.</p>	
Assessment Limits		Rational numbers.	
Calculator		No	
Acceptable Response Mechanisms		Equation Response Multi-Select Response	
Context		Allowable	
Example			
Context	Ages of two different boys. Expression contains rational numbers and/or exponents.		
Context easier	Information is explicit in context. Expressions use only whole numbers.		
Context more difficult	Multiple expressions are considered. Expressions involve rational numbers and exponents.		
Sample Item Stem		Response Mechanism	Notes, Comments
What statements describe the expression $5 + 2x$?		Multi-Select Response	

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Jeffrey is 6 years old. He has an older brother whose age is represented by the expression $2x + 5$, where x represents Jeffrey's age. How old is his brother?	Equation Response	
Jeffrey is 10 years old. He has a brother named Max. Max is 5 years older than twice Jeffrey's age. Write an expression that represents the relationship of Max's age in terms of Jeffrey's age, n .	Equation Response	
Find the surface area of a cube with sides of length $s = \frac{1}{3}$.	Equation Response	

Content Standard	<p>MAFS.6.EE Expressions and Equations</p> <p>MAFS.6.EE.1 Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>MAFS.6.EE.1.3 Apply the properties of operations to generate equivalent expressions. <i>For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$.</i></p>		
Assessment Limits	<p>Positive rational numbers, values may include exponents.</p> <p>Variables must be included in the expression.</p>		
Calculator	No		
Acceptable Response Mechanisms	Equation Response		
Context	Allowable		
Example			
Context	Create an expression that is equivalent to $2(x + 3)$.		
Context easier	Create an expression that is equivalent to $2x + 6 + 3x$.		
Context more difficult	Create an expression that is equivalent to $2(x + 3) + 3x$.		
Sample Item Stem	Response Mechanism	Notes, Comments	
Create an expression that is equivalent to $3x + 2x - x$.	Equation Response		
Create an expression that is equivalent to $4(6x - x)$.	Equation Response		

Content Standard	<p>MAFS.6.EE Expressions and Equations</p> <p>MAFS.6.EE.1 Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>MAFS.6.EE.1.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for.</p>		
Assessment Limits	<p>Positive rational numbers.</p> <p>Variables must be included in the expression.</p>		
Calculator	No		
Acceptable Response Mechanisms	<p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Matching Item Response</p>		
Context	No context		
Example			
Context	Identify which value for x would make the two expression equivalent: $3(2x + 4)$ and $4(3x - 4)$.		
Context easier	Identify which value for x would make the two expression equivalent: $3(x + 4)$ and $(x - 4)$.		
Context more difficult	Identify which value for x would make the two expression equivalent: $3(2x + 4) - 10$ and $4(3x - 4) + 3$.		
Sample Item Stem	Response Mechanism	Notes, Comments	
Which is a different way to express $3y$?	Multiple Choice Response		
Which expression is equivalent to $4(6x + 11) - 5x$?	Multiple Choice Response		

Content Standard	<p>MAFS.6.EE Expressions & Equations</p> <p>MAFS.6.EE.2 Reason about and solve one-variable equations and inequalities.</p> <p>MAFS.6.EE.2.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p>														
Assessment Limits	<p>Nonnegative rational numbers.</p> <p>One-variable linear equations and inequalities.</p> <p>An equation or inequality should be given if a context is included.</p>														
Calculator	No														
Acceptable Response Mechanisms	<p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Matching Item Response</p> <p>Equation Response</p>														
Context	Allowable														
Example															
Context	<p>Nick buys some books and one toy for \$19. The books cost \$3 each, and the toy costs \$4. The equation that models this situation is $3x + 4 = 19$, where x is the number of books. Which of the values can be substituted for x to make the equation true?</p>														
Context easier	<p>Use equations of the form $ax = c$ or $x + b = c$, where a, b, and c are whole numbers.</p> <ul style="list-style-type: none"> Nick buys a book and a toy for \$9. The toy costs \$4. The equation that models this is $x + 4 = 9$. Nick buys five books for \$20. The equation that models this situation is $5x = 20$. 														
Context more difficult	<p>Use fractions/decimals as coefficients and constants.</p> <ul style="list-style-type: none"> Nick buys some books and one toy for \$19.57. The books cost \$3.54 each, and the toy costs \$5.31. The equation that models this situation is $3.54x + 5.31 = 19.57$. Nick buys the same number of books and toys for \$35. The books cost \$3 each, and the toys cost \$4 each. The equation that models this situation is $3x + 4x = 35$. 														
Sample Item Stem	Response Mechanism	Notes, Comments													
<p>An equation is shown.</p> <p>$x + 5 = 14$</p> <p>Which of the values can be substituted for x to make the equation true?</p>	Multiple Choice Response														
<p>Select all of the equations for which $x = 3$ is a solution.</p>	Multi-Select Response														
<p>Select which values of x make each equation or inequality true.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="width: 15%; text-align: center;">$x = 1$</td> <td style="width: 15%; text-align: center;">$x = 2$</td> <td style="width: 15%; text-align: center;">$x = 3$</td> </tr> <tr> <td>$2x + 5 = 9$</td> <td></td> <td></td> <td></td> </tr> <tr> <td>$2x + 5 < 9$</td> <td></td> <td></td> <td></td> </tr> </table>		$x = 1$	$x = 2$	$x = 3$	$2x + 5 = 9$				$2x + 5 < 9$				Matching Item Response		
	$x = 1$	$x = 2$	$x = 3$												
$2x + 5 = 9$															
$2x + 5 < 9$															

$2x + 5 \leq 9$		
<p>An equation is shown.</p> $\frac{2}{3}x + \frac{3}{4}x = \frac{4}{7}$ <p>Which of the following is the solution of the equation?</p>	<p>Multiple Choice Response</p>	
<p>An equation is shown.</p> $5x + 3x = 5x + \frac{15}{2}$ <p>What value of $3x$ makes the equation true?</p>	<p>Equation Response</p>	
<p>An inequality is shown.</p> $\frac{27}{7}n > \frac{4}{3}$ <p>Which choice contains only values of n that make the inequality true?</p>	<p>Multiple Choice Response</p>	

Content Standard	<p>MAFS.6.EE Expressions & Equations</p> <p>MAFS.6.EE.2 Reason about and solve one-variable equations and inequalities.</p> <p>MAFS.6.EE.2.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p>	
Assessment Limits	<p>Nonnegative rational numbers.</p> <p>Expressions must contain at least one variable.</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Multiple Choice Response</p> <p>Natural Language Response</p>	
Context	Allowable	
Example		
Context	Write an expression to represent the number of wheels on c cars and b bicycles.	
Context easier	<p>Use one variable and one operation or translation.</p> <ul style="list-style-type: none"> Write an expression to represent the number of wheels on b bicycles. There are 4 more cars in lot A than lot B. Write an expression to represent the number of cars in lot A, using b for the number of cars in lot B. 	
Context more difficult	<p>Use more than two operations or translations.</p> <ul style="list-style-type: none"> Margaret is decorating c cars and b bicycles for a parade. Margaret wants to put 4 stickers on each wheel. Write an expression to represent the number of stickers that Margaret needs. Write an expression to represent the number of wheels on c cars, b bicycles, and t tricycles. 	
Sample Item Stem	Response Mechanism	Notes, Comments
The perimeter of a garden with 7 sides of equal length is given by the expression $7n$. What does the variable n represent?	Multiple Choice Response or Natural Language Response	
Jason makes 30 dollars an hour. He spends 40 dollars a day on transportation and food. Write an expression to describe his spending and earnings for the day, where x is the number of hours that Jason works that day.	Equation Response	

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Translate the statement shown into a mathematical expression. 45 less than twice the sum of 5 and x	Equation Response	
Write an expression to represent the sum of three consecutive integers, the smallest of which is n .	Equation Response	
The expression $3n + 3$ can be used to find the sum of three consecutive integers. What does the variable n represent in this expression?	Multiple Choice Response or Natural Language Response	

Content Standard		MAFS.6.EE Expressions & Equations	
		MAFS.6.EE.2 Reason about and solve one-variable equations and inequalities.	
		MAFS.6.EE.2.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q , and x are all non-negative rational numbers.	
Assessment Limits		Nonnegative rational numbers. One-step linear equations of one variable.	
Calculator		No	
Acceptable Response Mechanisms		Equation Response	
Context		Allowable	
Example			
Context	One pound of cheese makes 8 sandwiches. Mr. Baxter wants to make each of his 12 students a sandwich. Write an equation to represent this situation, where x represents the number of pounds of cheese that Mr. Baxter needs. Then, solve the equation for x .		
Context easier	Whole number coefficients, constants, and solutions. <ul style="list-style-type: none"> One pound of cheese makes 6 sandwiches. Mr. Baxter wants to give each of his 12 students a sandwich. Mr. Baxter gave each of his 12 students a sandwich. He has 4 sandwiches left. Write an equation to represent this situation, where x represents the number of sandwiches that he had initially. Then, solve the equation for x. 		
Context more difficult	Rational number coefficients and constants <ul style="list-style-type: none"> A teacher has \$38.25 to spend on sandwiches. Each sandwich costs \$2.25. Write an equation to represent the number of sandwiches, x, that the teacher can buy. Then, solve the equation for x. 		
Sample Item Stem		Response Mechanism	Notes, Comments
An equation is shown. $8x = 32$ What is the value for x that makes the equation true?		Equation Response	
An equation is shown. $8x = 35$ What is the value for x that makes the equation true?		Equation Response	
An equation is shown. $\frac{8}{3x} = \frac{7}{16}$		Equation Response	

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What is the value for x that makes the equation true?		
Rebecca needs 4 cups of sugar for a recipe. She already has 2 cups of sugar. Write an equation for t , the amount of additional sugar that Rebecca needs to get. Then, solve the equation for t .	Equation Response	
Ron has 2,500 pounds of sod to transport. He wants to take an equal amount of sod in each of 3 trips. Write an equation for s , the amount of sod that Ron should transport in one trip. Then, solve the equation for s .	Equation Response	

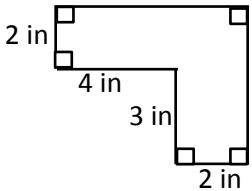
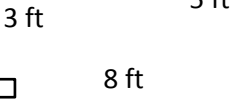
Content Standard	<p>MAFS.6.EE Expressions and Equations</p> <p>MAFS.6.EE.2 Reason about and solve one-variable equations and inequalities.</p> <p>MAFS.6.EE.2.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.</p>		
Assessment Limits	<p>Nonnegative rational numbers.</p> <p>Context in real-world items should be continuous or close to continuous.</p>		
Calculator	No		
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Graphic Response — Drag and Drop</p> <p>Graphic Response — Hot Spot</p> <p>Matching Item Response</p> <p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Natural Language Response</p>		
Context	Allowable		
Example			
Context	<p>Straightforward translation using easier words to translate such as less than, greater than, etc., with application context.</p> <p>An airport charges an extra fee for bags that weigh more than 50 lbs. Write an inequality that shows how much Michael’s suitcase can weigh, x, without Michael needing to pay the extra fee.</p>		
Context easier	<p>Have the student translate a graph into an inequality.</p> <p>The graph below shows the weights for bags in which an airport charges an extra fee. Write an inequality that shows how much Michael’s suitcase can weigh, x, without Michael needing to pay the extra fee.</p>		
Context more difficult	<p>Use words such as at least, a minimum, a maximum, etc., for the student to translate.</p> <p>An airport charges an extra fee for some bags. A bag can weigh a maximum of 50 lbs and not be charged a fee. Write an inequality that shows how much Michael’s suitcase can weigh, x, without Michael needing to pay the extra fee.</p>		
Sample Item Stem	Response Mechanism	Notes, Comments	
<p>Translate the following sentence into an inequality.</p> <p>b is less than 50.</p>	Equation Response		
<p>For the inequality $x < 50$, will the value of x be greater or less than 50? Explain.</p>	<p>Multiple Choice Response</p> <p>Or</p>		

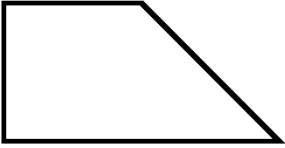
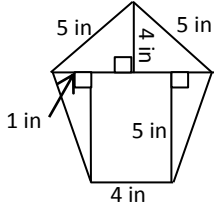
Grade 6 Mathematics Item Specifications
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	Proposition Response	
Graph the inequality $x < 50$.	Graphic Response	
An airport charges an additional fee for a piece of luggage that weighs more than 50 pounds. Write an inequality that shows the weight Michael's suitcase can be, x , without him having to pay the extra fee.	Equation Response	
The table shows the weight of luggage that belongs to passengers on an airplane and whether or not they were charged an additional fee by the airlines. Based on the table, graph the inequality that shows all luggage weights that require an additional fee.	Equation Response	

Content Standard	<p>MAFS.6.EE Expressions and Equations</p> <p>MAFS.6.EE.3 Represent and analyze quantitative relationships between dependent and independent variables.</p> <p>MAFS.6.EE.3.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.</i></p>	
Assessment Limits	<p>Equation of the form $y = px$ or $y = x + p$.</p> <p>Positive rational numbers (zero can be used in graph and table).</p> <p>Variables need to be defined.</p> <p>Relationships are to be continuous.</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Graphic Response — Drawing</p> <p>Matching Item Response</p> <p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Table Response</p>	
Context	Required	
Example		
Context	<p>A translation item where the student needs to get values from a graph or table.</p> <p>Evan is saving money for a small trip with friends. The graph below models the amount of money he has saved after several weeks. Write an equation that can be used to calculate the amount of money in his savings account, s, after w weeks.</p>	
Context easier	<p>A straightforward translation item with the information given in paragraph form.</p> <p>Evan saves \$20 each week. Write an equation that can be used to find the total amount Evan has saved, s, after w weeks.</p>	
Context more difficult	<p>Give a partially filled in table and ask for an equation.</p> <p>Evan saves the same amount of money each week. The table below shows the amount of money Evan has saved for several weeks. Fill in the missing amounts in the table, and then write an equation that can be used to identify the amount of money Evan has saved, s, after w weeks.</p> <p>(The table for example can show weeks 0, 2, and 4. The student can fill in weeks 1 and 3.)</p>	

Sample Item Stem	Response Mechanism	Notes, Comments
<p>A graph of Evan’s bank account is shown. What are the dependent and independent variables?</p>	<p>Multiple Choice Response</p> <p>Matching Item Response</p>	
<p>Evan saves \$20 each week. Write an equation that Evan can use to determine the amount he has saved, s, after w weeks.</p>	<p>Equation Response</p>	
<p>The table shows the total amount of money Evan has saved for 5 consecutive weeks. Write an equation that can be used to determine his savings after any number of weeks.</p>	<p>Equation Response</p>	
<p>Evan saves the same amount of money each week. The table below shows the amount of money Evan has saved for several weeks.</p> <p>Fill in the missing amounts in the table.</p> <p>Then, write an equation that can be used to identify the amount of money Evan has saved, s, after w weeks.</p> <p>(The table for example can show weeks 0, 2, and 4. The student can fill in weeks 1 and 3.)</p>	<p>Table Response</p>	

Content Standard	MAFS.6.G Geometry	
	MAFS.6.G.1 Solve real-world and mathematical problems involving area, surface area, and volume.	
	MAFS.6.G.1.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	
Assessment Limits	Positive rational numbers. Limit shapes to those that can be decomposed or composed into rectangles and/or right triangles.	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Graphic Response — Drawing Multi-Select Response Natural Language Response	
Context	Allowable	
Example		
Context	A right trapezoid is shown. Find the area of the trapezoid. <ul style="list-style-type: none"> • Shape includes only one triangle and one rectangle. • Triangles with the height inside the triangle. • Include one non-integer value. 	
Context easier	Rectilinear shapes or a single right triangle. Area has a whole number value.	
Context more difficult	Shape composed of multiple triangles and rectangles. Includes triangles with the height outside the shape. Include multiple non-integer values.	
Sample Item Stem	Response Mechanism	Notes, Comments
A shape is shown.  What is the area, in square inches, of the shape?	Equation Response	
A right trapezoid is shown.  What is the area, in square feet, of the trapezoid?	Equation Response	

 <p>What is the area, in square feet, of the trapezoid?</p>		
<p>A pentagon is shown.</p>  <p>What is the area, in square inches, of the pentagon?</p>	<p>Equation Response</p>	

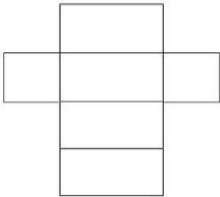
Content Standard		<p>MAFS.6.G Geometry</p> <p>MAFS.6.G.1 Solve real-world and mathematical problems involving area, surface area, and volume.</p> <p>MAFS.6.G.1.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.</p>	
Assessment Limits		<p>Right rectangular prisms.</p> <p>Unit fractional edge lengths (numerator is 1).</p>	
Calculator		No	
Acceptable Response Mechanisms		<p>Equation Response</p> <p>Graphic Response — Drawing</p>	
Context		Allowable	
Example			
Context	<p>Alex is packing square boxes in a large rectangular prism package.</p> <ul style="list-style-type: none"> For finding the volume, give 1 dimension as a whole number and 2 dimensions as unit fractions (i.e., $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, ...). For packing with unit cubes, use volume of the prism only with the fraction $\frac{1}{2}$. Fractional edge lengths of prism share same denominator as unit cube. 		
Context easier	<p>For finding the volume, give 2 dimensions with whole numbers and one dimension with the fractions $\frac{1}{2}$ or $\frac{1}{4}$.</p> <p>For packing with unit cubes, use rectangular prism with whole number edge lengths.</p>		
Context more difficult	<p>For finding the volume, give all dimensions of prism as fractions.</p> <p>For packing with unit cubes, use volume of the prism as a fraction.</p> <p>Fractional edge lengths of prism have a different denominator than the unit cube.</p>		
Sample Item Stem		Response Mechanism	Notes, Comments
<p>A right rectangular prism is shown.</p> <p>[a right rectangular prism with dimensions 3 in x $2\frac{1}{2}$ in x 8 in]</p> <p>What is the volume, in cubic inches, of the prism?</p>		Equation Response	

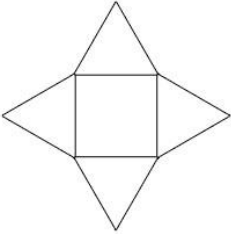
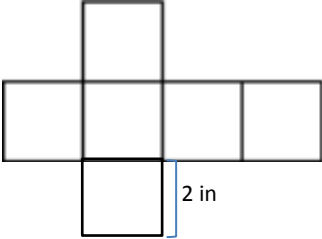
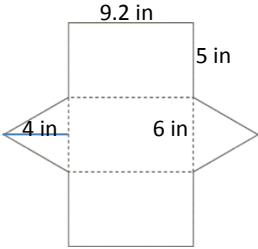
<p>A right rectangular prism is shown.</p> <p>[a right rectangular prism with dimensions, $3\frac{1}{4}$ in x $2\frac{1}{2}$ in x 8 in]</p> <p>What is the volume, in cubic inches, of the prism?</p>	<p>Equation Response</p>	
<p>Alex is packing square boxes as shown.</p> <p>[a square box with dimensions $\frac{1}{2}$ ft]</p> <p>He packs them in a large rectangular prism package so there are no gaps between them. There are 64 square boxes in the package.</p> <p>A. What is the volume, in cubic feet, of the large package?</p> <p>B. What are possible dimensions of the large package, in feet?</p>	<p>Equation Response</p>	
<p>Alex is packing square boxes as shown.</p> <p>[a square box with dimensions $\frac{1}{8}$ ft]</p> <p>He packs them in a large rectangular prism package so there are no gaps between them. There are 1,280 square boxes in the package.</p> <p>A. What is the volume, in cubic feet, of the large package?</p> <p>B. What are possible dimensions of the large package, in feet?</p>	<p>Equation Response</p>	

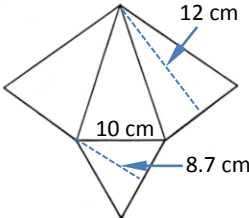
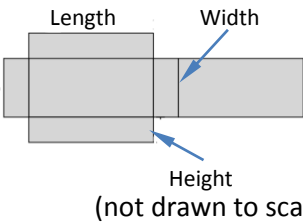
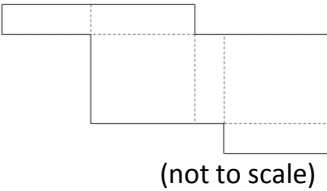
Content Standard	MAFS.6.G Geometry	
	MAFS.6.G.1 Solve real-world and mathematical problems involving area, surface area and volume	
	MAFS.6.G.1.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	
Assessment Limits	Can use rational numbers. Can use all four quadrants. When finding side length, limit polygons to traditional orientation (side lengths perpendicular to axes).	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Graphic Response — Drawing Multiple Choice Response	
Context	Allowable	
Example		
Context	Konrad draws a shape. <ul style="list-style-type: none"> • Points spread across 2 quadrants. • Include a decimal value for one coordinate (either x or y coordinate). • Use 4 points. 	
Context easier	Use only whole numbers. All points located in 1 quadrant. Use 3- 4 points. Limit to shapes with vertical and horizontal lines or triangles.	
Context more difficult	Use more than 4 points. Use a combination of whole numbers and decimals (more than one value is decimal). Points spread across 3-4 quadrants.	
Sample Item Stem	Response Mechanism	Notes, Comments
A set of points is shown. (-5, 1), (-2, 1), (-5, 4), (-2, 4) Use the Connect Line tool to draw the quadrilateral created by the points.	Graphic Response — Drawing	
A set of points is shown. (-1, 2.5), (-2, -2), (-6, -4), (-4, 0) Use the Connect Line tool to draw the polygon created by the points.	Graphic Response — Drawing	

<p>A set of points is shown.</p> <p>$(5, 1.5), (0, 2.5), (-1.5, -6), (4, -3), (-4.5, 1.5)$</p> <p>Use the Connect Line tool to draw the polygon created by the points.</p>	<p>Graphic Response — Drawing</p>	
<p>A set of points is shown.</p> <p>$(5, 1.3), (5, -4), (2, 1.3), (2, -4)$</p> <p>Conrad connects the points to a polygon. Which shape did he get?</p> <p>A. Rectangle B. Square C. Parallelogram D. Trapezoid</p>	<p>Multiple Choice Response</p>	
<p>Konrad draws a square. Two of its vertices are at $(2, 7)$ and $(6, 3)$. Use the Connect Line tool to draw Konrad's square on the coordinate grid.</p>	<p>Graphic Response — Drawing</p>	
<p>Konrad draws a parallelogram. Three of the vertices are located at $(-6, 4), (-3, 1)$, and $(5, 4)$. Use the Connect Line tool to draw the parallelogram.</p>	<p>Graphic Response- Drawing</p>	
<p>Konrad draws a quadrilateral with one pair of parallel sides. Two of the vertices are $(3, 1)$ and $(-5, -4)$. Use the Connect Line tool to draw Konrad's quadrilateral.</p>	<p>Graphic Response — Drawing</p>	
<p>Konrad draws a rectangle.</p> <ul style="list-style-type: none"> • Two of the vertices are $(2, 7)$ and $(7, 7)$. • The perimeter of the rectangle is 16 units. <p>Use the Connect Line tool to draw a possible rectangle that could be Konrad's.</p>	<p>Graphic Response — Drawing</p>	

<p>Konrad has drawn a triangle on a coordinate grid.</p> <ul style="list-style-type: none">• One of the vertices is located at (-1, -2).• A second vertex has x-coordinate of 7 and a positive y-coordinate.• The area of the triangle is 20 square units. <p>Use the Connect Line tool to draw a possible triangle that could be Konrad's.</p>	<p>Graphic Response — Drawing</p>	
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Content Standard	<p>MAFS.6.G Geometry</p> <p>MAFS.6.G.1 Solve real-world and mathematical problems involving area, surface area and volume</p> <p>MAFS.6.G.1.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.</p>	
Assessment Limits	<p>Positive rational numbers.</p> <p>3-dimensional figures are limited to rectangular prisms, triangular prisms, rectangular pyramids, and triangular pyramids.</p>	
Calculator	No	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Graphic Response — Drag and Drop</p> <p>Graphic Response — Hot Spot</p> <p>Matching Item Response</p> <p>Multiple Choice Response</p> <p>Multi-Select Response</p>	
Context	Allowable	
Example		
Context	<p>A net is shown.</p> <ul style="list-style-type: none"> • Include also triangles for net. • Dimensions given as a combination of whole numbers and decimals. 	
Context easier	<p>Limit to only rectangular prisms.</p> <p>Dimensions given as whole numbers.</p> <p>Net given has a common layout (base in the center).</p>	
Context more difficult	<p>Net given has uncommon layout.</p> <p>Change all of the dimensions to fractions or decimals.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>A net is shown.</p>  <p>Which 3-dimensional figure is represented by the net?</p> <p>[Each option will be an image of a 3-dimensional shape.]</p>	Multiple Choice Response	

<p>A net is shown.</p>  <p>Which 3-dimensional figure is represented by the net?</p> <p>[Each option will be an image of a 3-dimensional shape.]</p>	<p>Multiple Choice Response</p>	
<p>A net of a cube is shown.</p>  <p>What is the surface area, in square inches, of the cube?</p> <p>[Each option will be an image of a 3-dimensional shape.]</p>	<p>Equation Response</p>	
<p>A net of a triangular prism is shown. The bases are isosceles triangles.</p>  <p>What is the surface area, in square inches, of the prism?</p>	<p>Equation Response</p>	

<p>A net of a triangular pyramid is shown. The base of the pyramid is an equilateral triangle, and the other faces are isosceles triangles.</p>  <p>What is the surface area, in square centimeters, of the pyramid?</p>	<p>Equation Response</p>	
<p>The surface area of a rectangular prism is 92.5 square inches. The net of the prism is shown.</p>  <p>What could be the dimensions of the prism?</p> <p>[Each option specifies the length, height and width.]</p>	<p>Multiple Choice Response</p>	
<p>The surface area of a rectangular prism is 92.5 square in. The net of the prism is shown.</p>  <p>What could be the dimensions of the prism?</p> <p>[Each option specifies the length, height, and width.]</p>	<p>Multiple Choice Response</p>	

Content Standard	MAFS.6.SP Statistics and Probability	
	MAFS.6.SP.1 Develop understanding of statistical variability.	
	MAFS.6.SP.1.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.</i>	
Assessment Limits	N/A	
Calculator	No	
Acceptable Response Mechanisms	Multi-Select Response Multiple Choice Response	
Context	Required.	
Example		
Context	Several questions are shown. Which are statistical questions?	
Context easier	Limit to only one correct statistical question. Present data in graph and ask which is the question that could have been asked.	
Context more difficult	More than one set of data.	
Sample Item Stem	Response Mechanism	Notes, Comments
The bar graph is based on data collected from a sixth grade class. [bar graph showing favorite school subject] Which question could be asked to generate these data? A. What is your favorite subject? B. How many students are in sixth grade? C. How many subjects are there in sixth grade? D. What time do classes start?	Multiple Choice Response	
Select all of the statistical questions. A. How many days are in the year? B. How many houses are in your town? C. What percent of students like pizza? D. What is the average	Multi-Select Response	

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temperature in January? E. When does the bank open in the morning?		
Two sets of data are shown. [Graph showing last week’s high temperatures][Table with high schools from the football season] Select all of the statistical questions based on the data.	Multi-Select Response	

Content Standard	<p>MAFS.6.SP Statistics and Probability</p> <p>MAFS.6.SP.1 Develop understanding of statistical variability.</p> <p>MAFS.6.SP.1.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p>	
Assessment Limits	<p>Rational numbers.</p> <p>Dot plot, histogram, box plot.</p>	
Calculator	<p>No</p>	
Acceptable Response Mechanisms	<p>Multiple Choice Response</p> <p>Multi-Select Response</p> <p>Graphic Response — Hot Spot</p>	
Context	<p>Allowable</p>	
<p>Example</p>		
Context	<p>A school is surveyed on the ages of students in each class. The data is displayed on a histogram.</p>	
Context easier	<p>The data are displayed on a dot plot.</p> <p>About 10 data points.</p>	
Context more difficult	<p>More than 20 data points.</p> <p>The data are displayed on a box plot.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>The dot plot shows the ages of students in the sixth grade.</p> <p>[dot plot with ages 11, 12, 13. 12 has the most points]</p> <p>Click on the graph to show where most of the ages are displayed.</p>	<p>Graphic Response — Hot Spot</p>	
<p>The box plot shows the ages of all the students in the middle school and high school.</p> <p>[box plot with a minimum of 11, max of 18, Q1 13, Q3 16, mean 14]</p> <p>Click on the part that represents the mean of the data.</p>	<p>Graphic Response — Hot Spot</p>	

Content Standard	<p>MAFS.6.SP Statistics & Probability</p> <p>MAFS.6.SP.1 Develop understanding of statistical variability.</p> <p>MAFS.6.SP.1.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p>	
Assessment Limits	Rational numbers, only numerical data sets.	
Calculator	No	
Acceptable Response Mechanisms	Equation Response Multiple Choice Response Multi-Select Response	
Context	Allowable	
Example		
Context	Tim collects data for a set number of weeks on the number of people who ride the bus. (The student must distinguish and apply the concepts of mean and median.)	
Context easier	<p>Provide the values of the data in a table.</p> <p>Reduce the number of data points in a set.</p> <p>Use a set of numbers with an odd number of data points.</p> <p>Include range as a type of variation.</p>	
Context more difficult	<p>Provide a partial set of data and a measure or measures of center for the entire data set.</p> <p>Increase the number of data points in a set.</p> <p>Use a set of numbers with an even number of data points.</p> <p>Extend to include mean absolute deviation or interquartile range as a type of variation.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>Tim drives the Grand Avenue bus route. He counts the total number of people who ride the bus each week for 5 weeks.</p> <p>How many more people need to ride the bus on week 6 to increase the mean number of riders per week by 10?</p>	Equation Response	
<p>The mean and mean absolute deviation is shown.</p> <p>Tim drives the Grand Avenue bus route. He counts the total number of people who ride the bus each week for 4</p>	Multi-Select Response	

weeks.		
What is a possible number of riders for week 5?		

Content Standard	MAFS.6.SP Statistics and Probability MAFS.6.SP.2 Summarize and describe distributions. MAFS.6.SP.2.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	
Assessment Limits	Rational numbers. Dot/line plots, box plots, and histograms.	
Calculator	No	
Acceptable Response Mechanisms	Graphic Response — Hot Spot Multiple Choice Response Multi-Select Response	
Context	Allowable	
Example		
Context	Collect data for each family member’s age. Create a histogram.	
Context easier	Fewer than around 10 data values or one graph. Create a dot plot.	
Context more difficult	More than around 20 data values or multiple graphs. Create a box plot.	
Sample Item Stem	Response Mechanism	Notes, Comments
A class is surveyed with data as shown. [data set with less than 10 values, range of 10 and modes at 5 and 7] Which dot plot represents the class?	Multiple Choice Response	
A class is surveyed with data as shown. [data set with 15 values, range of 10 and modes at 5 and 7] Which dot plot represents the class?	Multiple Choice Response	
A class is surveyed with data as shown. [data set with more than 20 values, range of 10 and modes at 5 and 7]	Multiple Choice Response	

Which dot plot represents the class?		
Robert asked each family member his or her age and recorded the data as shown. Click above the number line to create a dot plot that displays this data.	Graphic Response — Hot Spot	

Robert asked each family member his or her age and recorded the data as shown. Click on the graph to create a histogram that displays these data.	Graphic Response — Hot Spot	
Robert asked each family member his or her age and wants to display the data in a box plot. [Provide 25 pieces of data.] Create a box plot to represent Robert's data.	Graphic Response — Hot Spot	

Content Standard	<p>MAFS.6.SP.2 Summarize and describe distributions</p> <p>MAFS.6.SP.2.5 Summarize numerical data sets in relation to their context, such as by:</p> <p>MAFS.6.SP.2.5a Reporting the number of observations.</p> <p>MAFS.6.SP.2.5b Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.</p> <p>MAFS.6.SP.2.5c Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.</p> <p>MAFS.6.SP.2.5d Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.</p>	
Assessment Limits	<p>Histograms, dot/line plots or box plots.</p> <p>Rational numbers.</p>	
Calculator	<p>No</p>	
Acceptable Response Mechanisms	<p>Equation Response</p> <p>Graphic Response — Hot Spot</p> <p>Multiple Choice Response</p> <p>Multi-Select Response</p>	
Context	<p>Required</p>	
<p>Example</p>		
Context	<p>Data is recorded at a school while collecting donations for a food drive.</p> <p>Data analyzed using median and/or mean.</p>	
Context easier	<p>One data set.</p> <p>Less data values (fewer than around 10 points).</p> <p>Problems involving range.</p>	
Context more difficult	<p>More than one data set.</p> <p>More data values (more than around 20 points).</p> <p>Problems involving interquartile and mean absolute deviation.</p>	
Sample Item Stem	Response Mechanism	Notes, Comments
<p>A table of data is shown.</p> <p>Tim drives the Grand Avenue bus route. He counts the total number of people who ride the bus each week for 5 weeks. What is the range of the data?</p>	<p>Equation Response</p>	

<p>A set of data is shown (an even set of numbers).</p> <p>Tim drives the Grand Avenue bus route. He counts the total number of people who ride the bus each week for 5 weeks.</p> <p>What is the median for the set of data?</p>	<p>Equation Response</p>	
<p>A set of data is shown.</p> <p>Tim drives the Grand Avenue bus route. He counts the total number of people who ride the bus each week for 5 weeks.</p> <p>What is the interquartile range of the data?</p>	<p>Equation Response</p>	
<p>A line plot shows the number of cans students at Epping Middle School collected for a canned food drive. How many students donated cans of food?</p>	<p>Equation Response</p>	
<p>Alex found the mean number of food cans that were donated by students for the canned food drive at Epping Middle School. Alex's work is shown.</p> <p>[Graphic showing Alex's work]</p> <p>How many students donated food cans?</p>	<p>Equation Response</p>	
<p>Given the shape of the box plot showing the number of cans students at Epping Middle School collected for a canned food drive, which measure of center is the most appropriate to describe the data set?</p> <p>(Data set contains less than 10 points.)</p>	<p>Multiple Choice Response</p>	
<p>A histogram shows the number of cans students at Epping Middle School collected for a canned food drive. Select all of the statements that describe the best measure of center to represent the data set.</p>	<p>Multi-Select Response</p>	

<p>A box plot is shown that shows the spread of the numbers of cans brought by students for a food drive. Create a possible line plot, given that 25 students donated cans, using the values from the box plot.</p>	<p>Graphic Response — Hot Spot</p>	
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