

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
1	Option A is correct	To determine how many more miles Mr. Maclane drove than Ms. Lopez, the student could have rounded each distance to the nearest 100 miles. When rounded to the nearest 100 miles, the numbers are as follows: 577.2 miles rounds to 600 miles, and 165.4 miles rounds to 200 miles. Then the student could have subtracted the rounded amounts, resulting in 400 miles ( $600 - 200 = 400$ ). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option B is incorrect	The student likely rounded 577.2 down to 500 instead of rounding up. The student then likely calculated the difference ( $500 - 200 = 300$ ). The student needs to focus on understanding reasonableness when estimating in problem situations.
	Option C is incorrect	The student likely added the rounded values instead of subtracting them ( $600 + 200 = 800$ ). The student needs to understand which operation to use.
	Option D is incorrect	The student likely rounded 577.2 down instead of up and added the rounded values instead of subtracting them ( $500 + 200 = 700$ ). The student needs to focus on understanding reasonableness when estimating in problem situations and understanding which operation to use.

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2	Option H is correct	To determine which graph best models $y = 9x$ (the relationship between the number of hours the employee works, $x$ , and the number of toys the employee builds, $y$ ), the student could have recognized that the domain, or the $x$ -values, are 1, 2, and 3. The student also could have recognized that the rule would generate a range, or $y$ -values, of 9, 18, and 27 respectively, which is shown on the graph (9 toys are built in one hour, 18 toys in 2 hours, and 27 toys in 3 hours). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely confused a multiplicative process with an additive one and identified a graph that represents $y = x + 9$ . The student needs to focus on applying an algebraic rule to generate a graph.
	Option G is incorrect	The student likely confused the domain and range, or the $x$ - and $y$ -axes and their meanings, and identified a graph that represents the rule $x = 9y$ . The student needs to focus on applying an algebraic rule to generate a graph.
	Option J is incorrect	The student likely confused the domain and range, or the $x$ - and $y$ -axes and their meanings; confused a multiplicative process with an additive one; and identified a graph that represents the rule $x = y + 9$ . The student needs to focus on applying an algebraic rule to generate a graph.

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3	Option D is correct	To determine which statement is true, the student could have compared the values, which are given to the thousandths place. Since both values have a 1 as a whole number and a 2 in the tenths place, the student could have compared the digits in the hundredths place. Since 8 is greater than 6, the weight of Car S, 1.281 tons, is greater than the weight of Car Q, 1.269 tons. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely compared only the values of the digits in the thousandths place because Car S weighs 1.281 tons and Car T weighs 1.238 tons, and 8 is greater than 1. The student needs to focus on comparing and ordering decimals to the thousandths place.
	Option B is incorrect	The student likely did not notice that the digits in the tenths place for Car Q and Car R—2 and 3, respectively—were not the same, because Car Q weighs 1.269 tons and Car R weighs 1.314 tons. The student needs to focus on comparing and ordering decimals to the thousandths place.
	Option C is incorrect	The student likely did not notice that the digits in the tenths place for Car R and Car T—3 and 2, respectively—were not the same, because Car R weighs 1.314 tons and Car T weighs 1.238 tons. The student needs to focus on comparing and ordering decimals to the thousandths place.

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Item #	Rationale	
4	Option G is correct	To determine the scatterplot that best represents the data in the table, the student should have identified the scatterplot with points located at (64, 105), (66, 115), (64.5, 112), (68.5, 124), (67, 116), (66, 110), (65, 120), and (64.5, 115). The student should have determined that, for each point on the graph, the $x$ -value (presented in the top row of the table) represents the horizontal distance to the right from zero, and the $y$ -value (presented in the bottom row of the table) represents the vertical distance up from the $x$ -value.
	Option F is incorrect	The student likely rounded weights up to the nearest even-numbered gridline (105 to 106, 115 to 116, etc.). The student needs to focus on representing discrete paired data on a scatterplot.
	Option H is incorrect	The student likely plotted only one point for each height (so did not plot 64.5 and 66 twice, since they repeated). The student needs to focus on representing discrete paired data on a scatterplot.
	Option J is incorrect	The student likely ordered each row from least to greatest ( $x$ -values: 64, 64.5, 64.5, 65, 66, 66, 67, 68.5; and $y$ -values: 105, 110, 112, 115, 115, 116, 120, 124) and then plotted the corresponding values [(64, 105), (64.5, 110), etc.]. The student needs to focus on representing discrete paired data on a scatterplot.

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Item #	Rationale	
5	Option A is correct	To determine which shape is not sorted correctly in the organizer, the student could have determined that polygons, a subset of two-dimensional figures (which may contain arcs), are defined as closed figures with only segments as sides. Only the circle does not fit this definition. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option B is incorrect	The student likely assumed that triangles, quadrilaterals, and circles, and not pentagons, are polygons. The student needs to focus on classifying two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.
	Option C is incorrect	The student likely assumed that triangles, pentagons, and circles, and not quadrilaterals, are polygons. The student needs to focus on classifying two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.
	Option D is incorrect	The student likely assumed that pentagons, quadrilaterals, and circles, and not triangles, are polygons. The student needs to focus on classifying two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.

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Item #	Rationale	
6	14.28 and any equivalent values are correct	To determine how much money in dollars and cents each person paid, the student could have divided \$99.96 by 7. The resulting quotient is 14.28. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

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Item #	Rationale	
7	Option D is correct	<p>To determine how much money Kassidy earned walking and bathing dogs last weekend (the value of the expression), the student could have used the order of operations (represented by acronyms such as BODMAS and PEMDAS). The student should have completed the operations in this order: (1) Operations contained in Parentheses or brackets, (2) Exponents (numbers raised to a power), (3) Multiplication/Division from left to right, and (4) Addition/Subtraction from left to right. First, the student could have performed the addition and multiplication steps within the parentheses (<math>6 + 5 = 11</math> and <math>2 \times 4 = 8</math>). Second, the student could have performed the multiplication steps [<math>5.75(11) = 63.25</math>, and <math>8.50(8) = 68</math>]. Finally, the student could have added 63.25 to 68, resulting in 131.25. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.</p>
	Option A is incorrect	<p>The student likely disregarded the 2 in the second addend, <math>8.50(2 \times 4)</math>. In looking at the bulleted list of jobs completed by Kassidy, the student likely (1) multiplied 5.75 times 6 for the dogs walked on Saturday, (2) multiplied 5.75 times 5 for the dogs walked on Sunday, and (3) multiplied 8.50 times 4 for the dogs walked and bathed on Saturday or Sunday, instead of multiplying 8.50 times 4 times 2 to account for the dogs walked and bathed on both Saturday and Sunday. The student needs to focus on understanding the relationship between the information provided in the problem and the given numerical expression.</p>
	Option B is incorrect	<p>The student likely solved from left to right and made other errors in attempting to apply the order of operations. First, the student likely multiplied 5.75 by 6 and then added 5, resulting in 39.5; (<math>5.75 \times 6 + 5 = 39.5</math>). Then, again misunderstanding the order of operations, the student likely added 2 to get 41.5; (<math>39.5 + 2 = 41.5</math>). Finally, the student likely multiplied 41.5 by 8.5 and 4 to result in 1,411; (<math>41.5 \times 8.5 \times 4 = 1,411</math>). The student needs to focus on simplifying numerical expressions that include grouping.</p>
	Option C is incorrect	<p>The student likely multiplied the expression <math>5.75(6 + 5)</math> by 2. In determining the charge for walking and bathing 4 dogs on Saturday and Sunday, the student multiplied 8.50 times 4 twice to account for Saturday and Sunday (cost <math>\times</math> 4 dogs + cost <math>\times</math> 4 dogs OR cost <math>\times</math> 4 dogs <math>\times</math> 2 days). The student likely mistakenly multiplied by 2 days when determining the charge for walking only (cost <math>\times</math> 6 dogs + cost <math>\times</math> 5 dogs) <math>\times</math> 2 days. The student needs to focus on understanding the relationship between the information provided in the problem and the given numerical expression.</p>

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8	Option F is correct	To determine how many cups of flour were left in the container, the student could have first subtracted $11\frac{1}{4}$ from 48. That difference is $36\frac{3}{4}$ . Then the student could have subtracted $14\frac{1}{2}$ from $36\frac{3}{4}$ resulting in $22\frac{1}{4}$ cups of flour left. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option G is incorrect	The student likely added the two fractions, $11\frac{1}{4} + 14\frac{1}{2}$ , before subtracting from 48. When subtracting, the student did not regroup in order to subtract $\frac{3}{4}$ , subtracting only the whole numbers $48 - 25$ and adding $\frac{3}{4}$ to the difference. The student needs to focus on adding and subtracting positive rational numbers fluently.
	Option H is incorrect	The student likely calculated only the amount of flour used, adding $11\frac{1}{4}$ and $14\frac{1}{2}$ to result in $25\frac{3}{4}$ cups, and did not subtract that sum from 48. The student needs to focus on adding and subtracting positive rational numbers fluently.
	Option J is incorrect	The student likely did not borrow from the whole number when subtracting $11\frac{1}{4}$ from 48, incorrectly resulting in $37\frac{3}{4}$ . Then the student likely subtracted $14\frac{1}{2}$ from $37\frac{3}{4}$ , resulting in $23\frac{1}{4}$ cups of flour left. The student needs to focus on adding and subtracting positive rational numbers fluently.



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Item #	Rationale	
9	Option C is correct	The student should have determined that the graph with points located at (0.5, 2.0), (1.0, 2.5), (1.5, 3.0), and (2.5, 4.0) best represents the ordered pairs given. The student should have determined that the $x$ -value (presented in the left-hand column of the graphic) represents the horizontal distance to the right from zero, and the $y$ -value (presented in the right-hand column of the table) represents the vertical distance up from the $x$ -value.
	Option A is incorrect	The student likely reversed the $x$ - and $y$ -coordinates. The student needs to focus on graphing ordered pairs of numbers in the first quadrant of the coordinate plane.
	Option B is incorrect	The student likely thought the $x$ -values increased by a constant amount and were 0.5, 1.0, 1.5, and 2.0 instead of 0.5, 1.0, 1.5, and 2.5. The student needs to focus on graphing ordered pairs of numbers in the first quadrant of the coordinate plane.
	Option D is incorrect	The student likely reversed the $x$ - and $y$ -coordinates and thought the $x$ -values were increased by a constant amount and were 0.5, 1, 1.5, and 2.0. The student needs to focus on graphing ordered pairs of numbers in the first quadrant of the coordinate plane.

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Item #	Rationale	
10	Option G is correct	To determine the total amount of money the man spent on 6 cans of tuna, the student could have multiplied the number of cans, 6, by the cost of each can, \$0.93. This results in a product of \$5.58. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely used 48, instead of 54, as the product of 9 and 6 in multiplying using the standard algorithm. The student needs to focus on understanding the relationship between multiplication and repeated addition when carrying out the steps in the multiplication algorithm.
	Option H is incorrect	The student likely added 6 and 0.93 instead of multiplying. The student needs to focus on attending to the details of problems that involve multiplication and understanding how to carry out all the steps in the multiplication algorithm.
	Option J is incorrect	The student likely did not regroup in any of the multiplication steps, using only the 8 from the 18 in the first product. The student needs to focus on understanding how to regroup when carrying out the steps in the multiplication algorithm.

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11	Option C is correct	To determine which model is represented by the equation, the student should have interpreted the 60 shaded squares as representing a value of 0.6, the 2 outlined sections as representing dividing 0.6 into 2 equal groups, and the 30 shaded squares in each group as representing a value of 0.30. The model represents the equation $0.6 \div 2 = 0.30$ .
	Option A is incorrect	The student likely chose the model with 2 groups of 6 hundredths. The student needs to focus on representing quotients of decimals to the hundredths using pictorial models, including area models.
	Option B is incorrect	The student likely chose the model that represents 0.6 times 0.2. The student needs to focus on representing quotients of decimals to the hundredths using pictorial models, including area models.
	Option D is incorrect	The student likely chose the model that represents 0.6 times 2. The student needs to focus on representing quotients of decimals to the hundredths using pictorial models, including area models.

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Item #	Rationale	
12	Option F is correct	To determine which movement Carmella should do first, the student should have recognized that starting at the origin (point where the horizontal $x$ -axis and the vertical $y$ -axis on a coordinate grid intersect) meant starting at the ordered pair $(0, 0)$ . Then the student should have recognized that the first movement required to find the location of $(1, 3)$ is to find the $x$ -coordinate (first number in an ordered pair). An $x$ -coordinate of 1 indicates moving right along the $x$ -axis 1 unit. Then the student should have recognized that the second movement required to find the location of $(1, 3)$ is to find the $y$ -coordinate (second number in an ordered pair). A $y$ -coordinate of 3 indicates moving up along the $y$ -axis 3 units.
	Option G is incorrect	The student likely did not pay attention to the units on the $y$ -coordinate. The $y$ -coordinate was also graphed incorrectly, as it should have been up 3, not 1. The student needs to focus on the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane.
	Option H is incorrect	The student likely did not pay attention to the units on the $x$ -coordinate. The $x$ -coordinate was also graphed incorrectly, as it should have been right 1 unit, not left 3 units. The student needs to focus on the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane.
	Option J is incorrect	The student likely confused the $x$ -coordinate with the $y$ -coordinate. The student needs to focus on the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane.

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Item #	Rationale	
13	Option A is correct	To determine the value of the expression, the student should have divided $\frac{1}{5}$ by 30. Using the standard algorithm (procedure), the number 30 would be considered a fraction with a denominator (bottom number) of 1; $\frac{30}{1}$ . Then the student could have determined that $\frac{1}{5}$ divided by $\frac{30}{1}$ is equal to $\frac{1}{5}$ multiplied by $\frac{1}{30}$ . The resulting product is $\frac{1}{150}$ . This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option B is incorrect	The student likely divided 30 by 5 and used 6 as the new denominator. The student needs to focus on dividing unit fractions by whole numbers.
	Option C is incorrect	The student likely did not invert the 30 and multiplied instead of dividing. The student needs to focus on dividing unit fractions by whole numbers.
	Option D is incorrect	The student likely inverted $\frac{1}{5}$ and multiplied by 30. The student needs to focus on dividing unit fractions by whole numbers.

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Item #	Rationale	
14	Option H is correct	<p>To determine which equation is represented by the model, the student could have determined that the number line is divided into eighths, and then that the arrow from 0 moves to the right <math>\frac{7}{8}</math>. Then the student could have identified the arrow moving back toward 0 as indicating subtraction and written the equation <math>\frac{7}{8} - \frac{2}{8} = \frac{5}{8}</math>. The student could have seen the subtrahend (the part being taken away) is <math>\frac{2}{8}</math> and then simplified to the equivalent fraction <math>\frac{1}{4}</math>. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.</p>
	Option F is incorrect	<p>The student likely identified the correct fractions and the correct operation but subtracted the numerators and kept the greater denominator. The student needs to focus on representing and solving addition and subtraction of fractions with unequal denominators referring to the same whole using objects, pictorial models, and properties of operations.</p>
	Option G is incorrect	<p>The student likely identified the correct fractions with a correct sum but did not realize the operation in the equation was incorrect. The student needs to focus on representing and solving addition and subtraction of fractions with unequal denominators referring to the same whole using objects, pictorial models, and properties of operations.</p>
	Option J is incorrect	<p>The student likely identified the correct fractions but did not realize that the operation in the equation was incorrect and thought the sum would be the sum of the numerators over the sum of the denominators. The student needs to focus on representing and solving addition and subtraction of fractions with unequal denominators referring to the same whole using objects, pictorial models, and properties of operations.</p>

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Item #	Rationale	
15	Option D is correct	To determine the difference between the number of visitors who were younger than 20 and the number of visitors who were 20 and older, the student could have added the number of visitors in the four age ranges younger than 20 years and then subtracted that sum from the sum of the numbers of visitors in the four age ranges 20 and older: $(15 + 28 + 21 + 11) - (7 + 10 + 12 + 23) = 75 - 52 = 23$ . This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely calculated only the number of visitors who were younger than 20. The student needs to focus on solving two-step problems using data from a frequency table.
	Option B is incorrect	The student likely calculated only the number of visitors who were 20 and older. The student needs to focus on solving two-step problems using data from a frequency table.
	Option C is incorrect	The student likely misread the frequency table and did not include a tally of 5. The student needs to focus on solving two-step problems using data from a frequency table.

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Item #	Rationale	
16	Option F is correct	To determine the total number of points the basketball team scored during the game, the student could have used the order of operations (represented by acronyms such as BODMAS or PEMDAS). The student could have completed the operations in this order: (1) Operations contained in Parentheses or brackets, (2) Exponents (numbers raised to a power), (3) Multiplication/Division from left to right, and (4) Addition/Subtraction from left to right. The student could have first performed the multiplication steps $6(3)$ and $21(2)$ , resulting in 18 and 42. Second, the student could have added $18 + 42 + 16$ , resulting in 76. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option G is incorrect	The student likely added all the numbers; $6 + 3 + 21 + 2 + 16 = 48$ . The student needs to focus on representing and solving multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.
	Option H is incorrect	The student likely completed the operations in order from left to right: $6(3) = 18$ ; $18 + 21 = 39$ ; $39(2) = 78$ ; and $78 + 16 = 94$ . The student needs to focus on representing and solving multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.
	Option J is incorrect	The student likely calculated the two products and added them but did not add the 16. The student needs to focus on representing and solving multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.



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Item #	Rationale	
17	Option A is correct	To determine which statement is true about the number pattern shown in the table, the student could have analyzed the relationship between each $x$ -value and the corresponding (paired) $y$ -value in the table. The student could have noticed that each $y$ -value is 5 more than the corresponding $x$ -value ( $8 = 3 + 5$ , $7 = 2 + 5$ , $13 = 8 + 5$ , and $10 = 5 + 5$ ). The pattern is additive because 5 is added to each $x$ -value to get the corresponding $y$ -value. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option B is incorrect	The student likely recognized that the $y$ -values are generally greater than their corresponding $x$ -values but confused an additive relationship with a multiplicative relationship. The student needs to focus on recognizing the difference between additive and multiplicative numerical patterns given in a table.
	Option C is incorrect	The student likely recognized an additive relationship but confused $x$ -values with $y$ -values and did not find the common difference. The student needs to focus on identifying characteristics of an additive relationship given in a table.
	Option D is incorrect	The student likely confused an additive relationship with a multiplicative relationship and confused a common difference with a common factor. The student needs to focus on recognizing the difference between additive and multiplicative numerical patterns given in a table.

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Item #	Rationale	
18	Option J is correct	To determine the volume of the rectangular prism that Sophie built, the student could have understood that each of the 10 layers contains 30 blocks ( $15 \times 2$ ) and multiplied $10 \times 30$ , resulting in 300 cubic units. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely did not include the depth of 2 units and only multiplied 10 by 15 to yield 150. The student needs to focus on determining the volume of a rectangular prism with whole number side lengths in problems related to the number of layers times the number of unit cubes in the area of the base.
	Option G is incorrect	The student likely correctly determined the volume of the base but added the height instead of multiplying; $30 + 10 = 40$ . The student needs to focus on determining the volume of a rectangular prism with whole number side lengths in problems related to the number of layers times the number of unit cubes in the area of the base.
	Option H is incorrect	The student likely multiplied 15 (the length of the prism) by the sum of 10 and 2 (the number of layers and the depth of the prism); $15 \times 12 = 180$ . The student needs to focus on determining the volume of a rectangular prism with whole number side lengths in problems related to the number of layers times the number of unit cubes in the area of the base.

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Item #	Rationale	
19	Option C is correct	<p>To determine in what position Nellie’s time would be, the student could have ordered the times from least to greatest number of minutes, by comparing first at the tens place, then the ones place, followed by the tenths, hundredths, and thousandths. All five numbers have a 1 in the tens place; therefore, this comparison does not distinguish any number as less than the others. Two numbers have a 1 in the ones place (11.450, 11.50), whereas the remaining three (greater) numbers have a 2 in the tens place (12.068, 12.495, 12.085). Looking at the tenths place, the student should order 11.450 first and 11.50 second because 4 is less than 5. Again, looking at the tenths place, the student could have determined that 12.495 is greater than 12.068 and 12.085 because 4 is greater than 0. Finally, looking at the hundredths place, the student could have ordered 12.068 before 12.085 because 6 is less than 8. Following these comparisons, the student should have ordered the times as follows: 11.450, 11.50, 12.068, 12.085 (Nellie’s time), 12.495, and realized that Nellie’s time is fourth. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.</p>
	Option A is incorrect	<p>The student likely ordered the times from greatest to least. The student needs to focus on comparing and ordering decimals to the thousandths.</p>
	Option B is incorrect	<p>The student likely did not order correctly and used the digits in the thousandths place to order the three decimals greater than 12. The student needs to focus on comparing and ordering decimals to the thousandths.</p>
	Option D is incorrect	<p>The student likely used the order given in the table, which has Nellie in the fifth row from the top. The student needs to focus on comparing and ordering decimals to the thousandths.</p>

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Item #	Rationale	
20	Option G is correct	To determine which answer choice best describes the $x$ -coordinate in an ordered pair, the student should have understood that the $x$ -coordinate is the first number in an ordered pair, which determines movement left or right from the origin on a coordinate grid.
	Option F is incorrect	The student likely confused the $x$ -coordinate with the $x$ -axis. The student needs to focus on understanding how to graph a point on a coordinate grid using $x$ - and $y$ -coordinates.
	Option H is incorrect	The student likely confused the $x$ - and $y$ -coordinates. The student needs to focus on understanding how to graph a point on a coordinate grid using $x$ - and $y$ -coordinates.
	Option J is incorrect	The student likely confused the origin with the $x$ -coordinate. The student needs to focus on understanding how to graph a point on a coordinate grid using $x$ - and $y$ -coordinates.

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Item #	Rationale	
21	Option A is correct	To determine how many tickets were sold for the event, the student could have divided the total amount collected by the cost for each ticket ( $4,554 \div 18 = 253$ ). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option B is incorrect	The student likely thought $18 \times 4$ was 54. The student needs to focus on understanding how to carry out all the steps in the division algorithm with accuracy.
	Option C is incorrect	The student likely subtracted the smaller digit from the larger digit for each step while dividing, resulting in 267 with a remainder of 12, and then rounded up to 268. The student needs to focus on understanding how to carry out all the steps in the division algorithm with accuracy.
	Option D is incorrect	The student likely rounded 4,554 to 4,600 and 18 to 20 and then divided. The student needs to focus on understanding when a problem situation requires an exact solution instead of an estimated solution.

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22	59.7 and any equivalent values are correct	To determine the perimeter of the triangle in miles, the student should have calculated the sum of the three side lengths. They could have used the standard algorithm, $10.1 + 21.5 + 28.1 = 59.7$ .

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Item #	Rationale	
23	Option B is correct	To determine the value of the expression, the student could have used the order of operations (represented by acronyms such as BODMAS and PEMDAS). The student should have completed the operations in this order: (1) Operations contained in Parentheses or brackets, (2) Exponents (numbers raised to a power), (3) Multiplication/Division from left to right, and (4) Addition/Subtraction from left to right. First, the student should have performed the addition step within the parentheses ( $25 + 19 = 44$ ). Second, the student should have performed the multiplication step on the left [ $3(44) = 132$ ]. Then the student should have performed the multiplication step on the right [ $4(3) = 12$ ]. Finally, the student should have added the two products, resulting in 144; ( $132 + 12 = 144$ ). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely performed the operations in order from left to right without regard for the parentheses ( $3 \times 25 = 75$ ; $75 + 19 = 94$ ; $94 + 4 = 98$ ; $98 \times 3 = 294$ ). The student needs to focus on understanding how to perform the order of operations and on how to simplify numerical expressions that do not involve exponents, including up to two levels of grouping.
	Option C is incorrect	The student likely performed the first two steps correctly and then added 4 and multiplied the sum by 3; ( $132 + 4 = 136$ ; $136 \times 3 = 408$ ). The student needs to focus on understanding how to perform the order of operations and on how to simplify numerical expressions that do not involve exponents, including up to two levels of grouping.
	Option D is incorrect	The student likely performed the multiplication step on the right side first [ $4(3) = 12$ ] and then added ( $25 + 19 + 12 = 56$ ) and multiplied the sum by 3; ( $56 \times 3 = 168$ ). The student needs to focus on understanding how to perform the order of operations and on how to simplify numerical expressions that do not involve exponents, including up to two levels of grouping.

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Item #	Rationale	
24	Option H is correct	To determine which triangle can be classified as scalene, the student should understand the characteristics of each type of triangle in the graphic organizer. Isosceles triangles have at least two sides that are congruent. Since equilateral triangles have three congruent sides, they are a subset of isosceles triangles, as shown in the graphic organizer. Scalene triangles have no congruent sides and are shown as being separate from scalene and equilateral triangles. Sides of a triangle that are marked with the same number of hash marks are sides of equal length. The student should have used the hash marks on the sides of each triangle to determine that the triangle with three different hash marks (I, II, III) is the only triangle with no congruent sides.
	Option F is incorrect	The student likely confused scalene with isosceles. The student needs to focus on classifying two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.
	Option G is incorrect	The student likely thought all right triangles are scalene. The student needs to focus on classifying two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.
	Option J is incorrect	The student likely confused equilateral with scalene. The student needs to focus on classifying two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.



## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
25	Option B is correct	To determine how much ground beef was used for each hamburger, the student could have divided the total amount of ground beef (2.24 pounds) by the total number of hamburgers (8), resulting in 0.28 pounds of ground beef used for each hamburger $2.24 \div 8 = 0.28$ . This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely divided 2.24 by 8 but miscalculated the first digit of the quotient (answer) to be 3 instead of 2. The student then likely subtracted 22 from 24, resulting in 2. The student likely performed the rest of the division algorithm (procedure) correctly, resulting in 0.33. The student needs to focus on understanding how to carry out all the steps in the division algorithm with accuracy and focus on solving for quotients of decimals to the hundredths.
	Option C is incorrect	The student likely disregarded the number to the left of the decimal point and divided 0.24 by 8, resulting in 0.3. The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy and focus on solving for quotients of decimals to the hundredths.
	Option D is incorrect	The student likely divided correctly but placed the decimal point in the wrong place in the quotient (answer), resulting in 2.8. The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy and focus on solving for quotients of decimals to the hundredths.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
26	Option G is correct	To determine which change Penelope can make to balance her budget for the month of May, the student could have first calculated the total expenses by adding $50 + 100 + 150 + 120 + 50 = 470$ . Since the expenses are \$20 more than the income ( $470 - 450 = 20$ ), the student could have identified an option that would decrease Penelope's total expenses by \$20. The student could have determined that decreasing Penelope's budgeted amount for entertainment by \$20 would balance her budget. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely assumed that an increase in savings would not mean greater expenses. The student needs to focus on describing actions that might be taken to balance a budget when expenses exceed income.
	Option H is incorrect	The student likely did not realize that increasing the budgeted amount for food would increase expenses, or the student made a calculation error in finding total expenses. The student needs to focus on describing actions that might be taken to balance a budget when expenses exceed income.
	Option J is incorrect	The student likely did not realize that a \$10 decrease in expenses would not be enough to balance the budget. The student needs to focus on describing actions that might be taken to balance a budget when expenses exceed income.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
27	Option D is correct	To determine length in centimeters of the remaining part of the large piece of paper from top to bottom, the student could have first added the lengths of the two strips of paper Patricia cut from the large piece of paper ( $25.4 + 15.24 = 40.64$ ). Then the student could have subtracted that sum from the length of the paper ( $91.44 - 40.64 = 50.8$ ). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely right-aligned all numbers when adding and subtracting without considering the decimal points and placed the decimal point in the answer so that there were two digits after the decimal point. The student needs to focus on adding and subtracting positive rational numbers, specifically decimals, fluently.
	Option B is incorrect	The student likely did not regroup when adding and subtracted the smaller digit from the larger digit in each place value. The student needs to focus on adding and subtracting positive rational numbers, specifically decimals, fluently.
	Option C is incorrect	The student likely added the two given widths without subtracting the total from 91.44. The student needs to focus on adding and subtracting positive rational numbers, specifically decimals, fluently.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
28	2.94 and any equivalent values are correct	To determine what 2.938 is when rounded to the nearest hundredth, the student should have determined that the digit in the hundredths place (second digit to the right of the decimal point) is 3 (2.9 <u>3</u> 8). The student then should have looked at the digit to the right of the 3 (2.93 <u>8</u> ) and compared it with 5. Because 8 is greater than 5, the digit 3 is rounded up to 4, and the answer is 2.94.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
29	Option B is correct	<p>To determine how many days it took Lee Ann to eat all the yogurt in the 2 cartons, the student could have interpreted “<math>\frac{1}{8}</math> of a carton of yogurt each day” to mean division into equal parts. The student could have determined that 2 divided by <math>\frac{1}{8}</math> is equal to 2 multiplied by the reciprocal of <math>\frac{1}{8}</math>, or <math>2 \div \frac{1}{8} = 2 \times \frac{8}{1} = 16</math>. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.</p>
	Option A is incorrect	<p>The student likely added the denominator, 8, to 2. The student needs to focus on dividing whole numbers by unit fractions.</p>
	Option C is incorrect	<p>The student likely divided the denominator, 8, by 2. The student needs to focus on dividing whole numbers by unit fractions.</p>
	Option D is incorrect	<p>The student likely subtracted 2 from the denominator, 8. The student needs to focus on dividing whole numbers by unit fractions.</p>

2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
30	Option J is correct	To determine what fraction of the teams raised the extra money (walked more than 50 laps), the student could have analyzed the stem and leaf plot, looking for values greater than 50. Using the key “3 0 means 30” to interpret the meaning of the stems and leaves, the student should have determined that there are 4 teams that walked more than 50 laps. They walked 53, 63, 63, and 65 laps. The stem and leaf plot contains a total of 12 teams, and $\frac{4}{12} = \frac{1}{3}$ . This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely did not include any teams with a stem of 5, because the stem and leaf plot was misread or “more than 50 laps” was misinterpreted to mean any number that has a 5 in the tens place did not need to be included. Therefore, the student only included numbers that had a stem of 6. There are 3 values that have a stem of 6. They represent teams that walked 63, 63, and 65 laps, and $\frac{3}{12} = \frac{1}{4}$ . The student needs to focus on solving one- and two-step problems using data from a stem and leaf plot.
	Option G is incorrect	The student likely included the team that walked 50 laps in the comparison $\left( \frac{\text{teams that walked more than 50 laps}}{\text{total teams}} \right)$ , not understanding that they needed to walk “more than” 50 laps; $\frac{(4+1)}{12} = \frac{5}{12}$ . The student needs to focus on solving one- and two-step problems using data from a stem and leaf plot.
	Option H is incorrect	The student likely misunderstood the “more than 50 laps” needed and compared the number of teams that walked 50 or more laps with the number of teams that walked fewer than 50 laps. There are 5 teams that walked more than 50 laps. They walked 50, 53, 63, 63, and 65 laps. There are 7 teams that walked fewer than 50 laps. They walked 31, 32, 32, 32, 33, 41, and 46 laps. This comparison results in $\frac{5}{7}$ . The student needs to focus on solving one- and two-step problems using data from a stem and leaf plot.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
31	Option B is correct	To determine which graph includes only points that follow the rule $y = x + 3$ , the student should have understood that the $x$ -coordinates 1, 2, and 3 have corresponding $y$ -coordinates of 4, 5, and 6, noting that each $y$ -coordinate is 3 more than its corresponding $x$ -coordinate.
	Option A is incorrect	The student likely identified a graph that represents the rule $y = 3x$ . The student needs to focus on generating a numerical pattern when graphing a given rule in the form $y = x + a$ .
	Option C is incorrect	The student likely identified a graph that represents the rule $x = 3y$ . The student needs to focus on generating a numerical pattern when graphing a given rule in the form $y = x + a$ .
	Option D is incorrect	The student likely identified a graph that represents the rule $x = y + 3$ . The student needs to focus on generating a numerical pattern when graphing a given rule in the form $y = x + a$ .

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
32	Option G is correct	To determine which graph best represents the data shown in the table, the student should have determined that the graph with points located at (1, 2.5), (2, 5), (3, 7.5), and (5, 12.5) best represents the ordered pairs in the table. The student should have determined that the $x$ -value (presented in the first column of the table) represents the horizontal distance to the right from zero, and the $y$ -value (presented in the second column of the table) represents the vertical distance up from the $x$ -value.
	Option F is incorrect	The student likely rounded up to the nearest whole dollar amount. The student needs to focus on attending to the details of the question in problems that involve graphing points.
	Option H is incorrect	The student likely misplaced the data point for 5 tickets at 11.50 rather than 12.50. The student needs to focus on attending to the details of the question in problems that involve graphing points.
	Option J is incorrect	The student likely used only the whole numbers in the costs and ignored the decimals. The student needs to focus on attending to the details of the question in problems that involve graphing points.



## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
33	Option D is correct	To determine in which equation $c$ represents the number of cars the business had at the end of the day on Monday, the student should have first identified an equation where the numbers of cars rented and numbers of hours are multiplied ( $5 \times 3$ and $3 \times 2$ ). Then those products should be subtracted from the initial 45 cars. Lastly, the number of cars that were returned (17) is added.
	Option A is incorrect	The student likely thought that addition, not multiplication, should be used in representing the information in the first two bullets. The student needs to focus on representing multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.
	Option B is incorrect	The student likely thought that the 17 cars that were returned would be represented by subtraction instead of addition. The student needs to focus on representing multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.
	Option C is incorrect	The student likely thought that addition should be used in representing the information in the first two bullets and thought that the cars that were returned would be represented by subtraction instead of addition. The student needs to focus on representing multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
34	Option F is correct	To determine which measurement is closest to the area of the base of the carton in square inches, the student should have used the ruler provided to measure the length and width. Then the two measurements could be multiplied together to find the area (length $\times$ width). The length is about 4 inches, and the width is about 3 inches. The area is therefore about 12 square inches ( $4 \times 3 = 12$ ). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option G is incorrect	The student likely found the length and width correctly but then found the perimeter ( $4 + 3 + 4 + 3 = 14$ ). The student needs to focus on how to represent and solve problems related to area.
	Option H is incorrect	The student likely mismeasured and used 5 and 4 as the length and width, respectively ( $5 \times 4 = 20$ ). The student needs to focus on measuring and reading instruments used to measure, such as rulers.
	Option J is incorrect	The student likely mismeasured and used 6 and 3 as the length and width, respectively ( $6 \times 3 = 18$ ). The student needs to focus on measuring and reading instruments used to measure, such as rulers.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
35	Option B is correct	To determine which operation should be performed first when simplifying the expression, the student should have known the order of operations and recognized that operations inside parentheses are to be performed first. This would indicate that $(5 + 3)$ is to be performed first.
	Option A is incorrect	The student likely did not understand that operations in parentheses should be performed first and thought expressions should be simplified left to right. Under this assumption, the student selected $40 \div 5$ as the first step. The student needs to focus on describing the meaning of parentheses and brackets in a numeric expression.
	Option C is incorrect	The student likely thought of PEMDAS, ignored the P (for parentheses), and thought that multiplication should be performed as the first step. The student needs to focus on describing the meaning of parentheses and brackets in a numeric expression.
	Option D is incorrect	The student likely thought of the multiplication algorithm in which one starts on the right and works to the left. The student needs to focus on describing the meaning of parentheses and brackets in a numeric expression.

## 2022 STAAR Grade 5 Mathematics Rationales

Item #	Rationale	
36	Option J is correct	To determine which expression can be used to determine the number of days Jacqueline works each week, the student should have realized that the model represents repeated addition and is a multiplicative situation. The number of days (5) should be multiplied by the fraction of each day spent at work $\left(\frac{1}{3}\right)$ . This would result in the expression $5 \times \frac{1}{3}$ .
	Option F is incorrect	The student likely confused a multiplicative situation with an additive one and misrepresented the fraction as the number of shaded parts divided by the number of unshaded parts. The student needs to focus on representing and solving multiplication of a whole number and a fraction (that refers to the same whole) using objects and pictorial models, including area models.
	Option G is incorrect	The student likely confused a multiplicative situation with an additive one. The student needs to focus on representing and solving multiplication of a whole number and a fraction (that refers to the same whole) using objects and pictorial models, including area models.
	Option H is incorrect	The student likely misrepresented the fraction part of the product as the number of shaded parts over the number of unshaded parts. The student needs to focus on representing and solving multiplication of a whole number and a fraction (that refers to the same whole) using objects and pictorial models, including area models.