

## 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
1	Option B is correct	To determine the total amount of money Paul found (\$3.09), the student should have added 7 cents (\$0.07), 98 cents (\$0.98), and 2 dollars and 4 cents (\$2.04).
	Option A is incorrect	The student likely added $0.07 + 0.98 + 2.04$ , but did not carry the 1 when regrouping from the tenths place (digit to the right of the decimal point) to the ones place (digit to the left of the decimal point). The student needs to focus on understanding how to regroup when adding.
	Option C is incorrect	The student likely wrote 7 cents incorrectly as \$0.70 and then correctly added this amount to \$0.98 and \$2.04 ( $0.70 + 0.98 + 2.04 = 3.72$ ). The student needs to focus on understanding how to write decimal numbers.
	Option D is incorrect	The student likely wrote 2 dollars and 4 cents incorrectly as \$2.40 and 7 cents as \$0.70, and then correctly added these amounts to \$0.98. ( $2.40 + 0.70 + 0.98 = 4.08$ ) The student needs to focus on understanding how to write decimal numbers.

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2	Option H is correct	To determine that the comparison is NOT true (false) the student should have compared the digits of the two decimals. The two decimals have the same digit in the ones place (digit to the left of the decimal point) and in the tenths place (digit to the right of the decimal point) ( $2.6 = 2.6$ ). When comparing the digits in the hundredths place (second digit to the right of the decimal point), 5 is less than 7, so $2.6\bar{5}$ is less than $2.6\bar{7}5$ , not greater, as the $>$ symbol indicates.
	Option F is incorrect	The student likely identified a comparison that is true instead of NOT true (false) as directed. This comparison is true because the 3 in the tenths place (digit to the right of the decimal point) of $3.\bar{3}75$ is greater than the 2 in the tenths place of $3.\bar{2}75$ . The student needs to focus on understanding the values of digits to the right of the decimal point.
	Option G is incorrect	The student likely identified a comparison that is true instead of NOT true (false) as directed. This comparison is true because the 8 in the tenths place (digit to the right of the decimal point) of $6.\bar{8}75$ is less than the 9 in the tenths place of $6.\bar{9}$ , the comparison, $6.875 < 6.9$ , is true. The student needs to focus on understanding the values of digits to the right of the decimal point.
	Option J is incorrect	The student likely identified a comparison that is true instead of NOT true (false) as directed. This comparison is true because the 6 in the tenths place (digit to the right of the decimal point) of $7.\bar{6}75$ is less than the 7 in the tenths place of $7.\bar{7}5$ . The student needs to focus on understanding the values of digits to the right of the decimal point.

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Item#	Rationale	
3	Option D is correct	To determine each $y$ -value in the table, the student should have added 1.5 to each corresponding (paired) $x$ -value ( $0 + 1.5 = 1.5$ , $1 + 1.5 = 2.5$ , $2 + 1.5 = 3.5$ , $3 + 1.5 = 4.5$ , and $9 + 1.5 = 10.5$ ).
	Option A is incorrect	Instead of adding each $x$ -value and 1.5, the student likely multiplied each $x$ -value times 1.5 to get the corresponding (paired) $y$ -value ( $0 \times 1.5 = 0$ , $1 \times 1.5 = 1.5$ , $2 \times 1.5 = 3$ , $3 \times 1.5 = 4.5$ ) but reversed the numbers in the last pair ( $6 \times 1.5 = 9$ ). The student needs to focus on understanding how to use an addition rule given in an equation to generate a numerical pattern in a table.
	Option B is incorrect	Instead of adding each $x$ -value and 1.5, the student likely multiplied each $x$ -value times 1.5 to get the corresponding (paired) $y$ -value ( $0 \times 1.5 = 0$ , $1 \times 1.5 = 1.5$ , $2 \times 1.5 = 3$ , $3 \times 1.5 = 4.5$ , and $9 \times 1.5 = 13.5$ ). The student needs to focus on understanding how to use an addition rule given in an equation to generate a numerical pattern in a table.
	Option C is incorrect	Instead of adding each $x$ -value and 1.5 to get the corresponding (paired) $y$ -value, the student likely added 1.5 to each $y$ -value to get the next $y$ -value ( $1.5 + 1.5 = 3$ , $3 + 1.5 = 4.5$ , $4.5 + 1.5 = 6$ , and $6 + 1.5 = 7.5$ ). The student needs to focus on understanding how paired $x$ - and $y$ -values are arranged in a table to represent a numerical pattern.

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Item#	Rationale	
4	Option G is correct	To determine the area (amount of space covered by the base), the student should have multiplied the length of the base (9 inches) times the width of the base (40 inches). ( $40 \times 9 = 360$ )
	Option F is incorrect	The student likely added the length of the base plus the width of the base ( $9 + 40 = 49$ ), instead of multiplying 40 times 9. The student needs to focus on understanding the formula for determining the area of (amount of space covered by) a rectangle (Area = length times width).
	Option H is incorrect	The student likely calculated the perimeter (distance around the outside) of the base instead of the area of (amount of space covered by) the base. The perimeter of a rectangle (the base) is calculated by adding twice the length and twice the width ( $2 \times 9 + 2 \times 40 = 98$ ). The student needs to focus on understanding the difference between the formula for determining the area of a rectangle (Area = length times width) and the formula for determining the perimeter of a rectangle (Perimeter = (2 times length) + (2 times width)).
	Option J is incorrect	The correct answer (360 square inches) was presented in one of the other answer options.

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Item#	Rationale	
5	Option C is correct	To determine the quotient (answer) the student should have divided 4.68 by 78. ( $4.68 \div 78 = 0.06$ )
	Option A is incorrect	The student likely divided 78 by 46 instead of 46 by 78 in the first step, subtracted $78 - 46$ to get 32, and then brought down the digit 8 from 468. The student likely carried out the remaining division algorithm (procedure) correctly, resulting in 0.14 as the quotient (answer) and disregarded the remainder. The student needs to focus on understanding how to carry out all the steps in the division algorithm.
	Option B is incorrect	The student likely determined that 46 could not be divided by 78, but did not place a zero in the quotient (answer) to reflect that step. In doing so, the student's quotient was 0.6 instead of 0.06. The student needs to focus on understanding when zeros are needed to keep digits in their correct places in the division algorithm (procedure).
	Option D is incorrect	The student likely determined that 78 could be divided into 468 five times instead of six times (so recorded the digit 5 in the quotient). The student likely multiplied 5 times 78 correctly to arrive at 390, subtracted 390 from 468 to get 78, and lastly determined that 78 could be divided by 78 one time (so recorded the digit 1 in the quotient (answer)). The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure).
6	103.00 and any equivalent values are correct	The student should have determined that the sum of the dollar amounts Wanda spent on rent, utilities, food, transportation, and savings is \$2,335 and that, in order for the budget to be balanced, all expenses must add up to Wanda's net income for the month (\$2,438). The student then should have determined that the amount spent on "Other" is \$103.00 because $2,438 - 2,335 = 103$ .

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Item#	Rationale	
7	Option D is correct	To determine the mass of the 20 buckets of gravel, the student should have multiplied 7.05 by 20. The student should have determined that the product (answer) when 705 (without the decimal point) is multiplied by 20 is 14,100. To determine the placement of the decimal point, the student should have counted the number of digits to the right of the decimal point in 7.05 (two) and then counted two digits from right to left to place the decimal point in the answer (141.00). Because zeros after a decimal point have no value, 141.00 is equivalent to the correct answer of 141.
	Option A is incorrect	The student correctly multiplied the numbers ( $705 \times 20 = 14,100$ ), but likely miscounted digits when placing the decimal point. The student needs to focus on understanding where to place the decimal point when multiplying with decimals.
	Option B is incorrect	When multiplying 705 by the digit 2 in 20, the student likely multiplied $2 \times 5$ to get 10, correctly wrote the 0, but then incorrectly regrouped the digit 1 from the ones place to the hundreds place (7) instead of regrouping it to the tens place (0). The student needs to focus on understanding how to regroup when carrying out the steps in the multiplication algorithm (procedure).
	Option C is incorrect	The student likely added 7.05 and 20 instead of multiplying. The student needs to focus on understanding problem situations that require multiplication to solve.

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Item#	Rationale	
8	Option H is correct	To determine the fraction of the students in the class who made 5 or more words, the student should have first counted the six dots associated with values of 5 or more and then represented those six dots as a fraction of the entire class (20 students in all). Lastly, the student should have reduced the fraction $\frac{6}{20}$ to simplest terms $\left(\frac{3}{10}\right)$ by dividing both the numerator (top number) of 6 and the denominator (bottom number) of 20 by 2.
	Option F is incorrect	The student likely only counted the one dot seen above the 5 on the dot plot instead of counting the dots at "5 or more" as directed, and then correctly counted the total number of students in the class (20). The student needs to focus on understanding the question being asked in problems that have data represented in a dot plot.
	Option G is incorrect	The student likely interpreted "5 or more" as "more than 5" and only counted the five dots associated with the values of 6 and 7. The fraction $\frac{5}{20}$ was reduced to simplest terms $\left(\frac{1}{4}\right)$ by dividing both the numerator (top number) of 5 and the denominator (bottom number) of 20 by 5. The student needs to focus on understanding the question being asked in problems that have data represented in a dot plot.
	Option J is incorrect	The student likely interpreted "5 or more" as "no more than 5" and counted only the dots associated with the values of 1, 2, 3, 4, and 5. The fraction $\frac{15}{20}$ was reduced to simplest terms $\left(\frac{3}{4}\right)$ by dividing both the numerator (top number) of 15 and the denominator (bottom number) of 20 by 5. The student needs to focus on understanding the question being asked in problems that have data represented in a dot plot.

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Item#	Rationale	
9	Option D is correct	The student should have determined that the triangle is classified as acute because all of its angles have measures that are less than 90 degrees, the triangle is classified as isosceles because at least two of its sides are the same length, and that the triangle is classified as equilateral because all three of its sides are the same length.
	Option A is incorrect	The student likely focused only on the angle measures. The student needs to focus on understanding that triangles are classified by angle measures and by side lengths.
	Option B is incorrect	The student likely focused only on the lengths of the sides and chose equilateral only because all three sides of the triangle are the same length. The student likely disregarded the classification of isosceles, not considering that all equilateral triangles can also be classified as isosceles. The student needs to focus on understanding that triangles are classified by angle measures and by side lengths. The student also needs to focus on the relationship between isosceles triangles and equilateral triangles.
	Option C is incorrect	The student correctly identified the two correct classifications of acute and isosceles. The student likely disregarded the classification of equilateral, not considering that all the sides of the triangle are of equal length. The student needs to focus on the relationship between isosceles triangles and equilateral triangles.



# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
10	Option H is correct	The student should have determined that each strip of squares in the model represents 10 cents and every 10 strips represents 1 dollar. The student should have determined that the cost of the three peppers is found by multiplying the number of groups (3) times the cost of each pepper (40 cents in each group) and that the 12 strips are equal to one dollar (10 strips) and 20 cents (remaining 2 strips).
	Option F is incorrect	The student likely counted the number of groups (3), the number of strips in each group (4), and then multiplied 3 times 4 to determine the total number of strips (12). The student should have multiplied 3 times 0.40 instead of 4. The student needs to focus on understanding the placement of decimal points when multiplying decimals.
	Option G is incorrect	The student likely counted the number of groups (3), the 40 cents ( $4 \times 10$ ) within each group, and then multiplied 3 times 40 to determine the total number of cents (120). The student should have reported the answer in dollars and cents (1.20) as indicated in the question, instead of in cents (120.00). The student needs to focus on understanding the placement of decimal points when multiplying decimals.
	Option J is incorrect	The student likely multiplied the number of groups (3) times the number of strips per group (4), and then divided that product (answer) of 12 by 100 (the number of units in the 1 dollar model) to determine the updated answer of 0.12. The student should have multiplied 3 times 0.40 instead of 4 and should not have divided by 100. The student needs to focus on understanding the placement of decimal points when multiplying decimals.

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Item#	Rationale	
11	Option D is correct	To describe the process for graphing ordered pairs, the student should have used this process: The origin (point where the $x$ -axis (horizontal) and the $y$ -axis (vertical) on a coordinate grid intersect and also the point represented by the ordered pair $(0, 0)$ ) is the starting point. When finding locations using ordered pairs, the first number in the ordered pair represents a horizontal first movement to the right or left on the $x$ -axis. The second number in the ordered pair represents a vertical second movement up or down from the stopping point of the horizontal movement. For the ordered pair $(5, 3)$ , the $x$ -value (5) represents the number of units to the right from zero, and the $y$ -value (3) represents the number of units up from there.
	Option A is incorrect	The student likely interpreted 5 and 3 as both representing distances to the right of $(0, 0)$ on the $x$ -axis. The student needs to focus on understanding that when finding locations using ordered pairs, the first number in the ordered pair represents a horizontal first movement to the right or left on the $x$ -axis and the second number in the ordered pair represents a vertical second movement up or down from the stopping point of the horizontal movement.
	Option B is incorrect	The student likely interpreted 5 and 3 as both representing distances up from $(0, 0)$ on the $y$ -axis. The student needs to focus on understanding that when finding locations using ordered pairs, the first number in the ordered pair represents a horizontal first movement to the right or left on the $x$ -axis and the second number in the ordered pair represents a vertical second movement up or down from the stopping point of the horizontal movement.
	Option C is incorrect	The student likely reversed the process for graphing the ordered pair, starting with the vertical movement of 5 and then a horizontal movement of 3. The student needs to focus on understanding that when finding locations using ordered pairs, the first number in the ordered pair represents a horizontal first movement to the right or left on the $x$ -axis and the second number in the ordered pair represents a vertical second movement up or down from the stopping point of the horizontal movement.

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Item#	Rationale	
12	Option : is correct	To determine the value of the expression, the student should have used the order of operations, or PEMDAS. Following the order of operations, the student should have done operations in this order: 1. Operations contained in <u>P</u> arentheses or brackets, 2. <u>E</u> xponents (numbers raised to a power), 3. <u>M</u> ultiplication/ <u>D</u> ivision from left to right, and 4. <u>A</u> ddition/ <u>S</u> ubtraction from left to right. First the student should have performed the multiplication step within the brackets, $2(1.2)$ or 2 times 1.2, resulting in 2.4. Second, the student should have subtracted 2.4 from 4.5, resulting in 2.1. Then, since the entire quantity in the brackets has been simplified, the student should have multiplied 4 times 2.1, resulting in 8.4.
	Option ; is incorrect	The student likely multiplied $4 \times 4.5$ , then multiplied $2 \times 1.2$ , and finally subtracted the two values ( $18 - 2.4 = 15.6$ ). The student needs to focus on understanding the order of operations.
	Option < is incorrect	The student likely subtracted first ( $4.5 - 2.0 = 2.5$ ), then multiplied by 1.2 ( $2.5 \times 1.2 = 3$ ), and finally multiplied by 4 ( $3 \times 4 = 12$ ). The student needs to focus on understanding the order of operations.
	Option > is incorrect	The student likely carried out the operations as they appear from left to right ( $4 \times 4.5 = 18$ , $18 - 2 = 16$ , $16 \times 1.2 = 19.2$ ). The student needs to focus on understanding the order of operations.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
13	Option C is correct	To determine the best estimate of how much more money is needed, the student should have first estimated that each shirt costs about \$17 and each belt costs about \$9. Then the student should have estimated the cost of the 3 shirts ( $3 \times \$17 = \$51$ ) and the 2 belts ( $2 \times \$9 = \$18$ ) is about \$69 ( $\$51 + \$18 = \$69$ ). The student should have finally determined that since Paula has \$45, she needs about \$24 more ( $\$69 - \$45 = \$24$ ).
	Option A is incorrect	The student likely estimated correctly that \$16.89 is about \$17 and that \$8.97 is about \$9, but found the cost of 2 shirts and 3 belts instead of 3 shirts and 2 belts. The student then likely calculated the total cost ( $2 \times \$17$ plus $3 \times \$9$ is \$61) and subtracted $\$61 - \$45 = \$16$ . The student needs to focus on attending to the details in a multi-step problem.
	Option B is incorrect	The student likely estimated incorrectly that \$16.89 is about \$15 and that \$8.97 is about \$5. The student then likely calculated the total cost ( $3 \times \$15$ plus $2 \times \$5$ is \$55) and subtracted $\$55 - \$45 = \$10$ . The student needs to focus on understanding reasonableness when estimating in problem situations.
	Option D is incorrect	The student likely estimated that both \$16.89 and \$8.97 are about \$10. The student then likely calculated the total cost ( $3 \times \$10$ plus $2 \times \$10$ is \$50) and subtracted $\$50 - \$45 = \$5$ . The student needs to focus on understanding reasonableness when estimating in problem situations.

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Item#	Rationale	
14	Option J is correct	The student should have determined that, since Miranda finished the race sooner, her time was less than Ella's time and should have calculated the difference in time by subtracting $9\frac{1}{10}$ minutes from 37.6 minutes. Because $\frac{1}{10}$ is equivalent to 0.10 (1 divided by 10 = 0.10), the student should have determined that $9\frac{1}{10}$ can be written as 9.10 and then subtracted from 37.6, resulting in 28.5 minutes. This time is not shown in any of the other answer options, so the student should have determined that the answer was "Not here."
	Option F is incorrect	The student likely wrote $9\frac{1}{10}$ as 9.10, but when subtracting $37.6 - 9.10$ , subtracted the lesser digit of 7 in the ones place of <u>3</u> 7.6 from the digit 9 in the ones place of <u>9</u> .10, resulting in 32.5. The student should have recognized that the digit 7 in the ones place was not enough to subtract 9 from, and regrouped from the tens place instead. The student needs to focus on understanding when regrouping is required in subtraction problems.
	Option G is incorrect	The student likely added 37.6 and 9.10 instead of subtracting, resulting in 46.7. The student needs to focus on understanding the difference between problems that require subtraction to solve and problems that require addition to solve.
	Option H is incorrect	The student likely wrote $9\frac{1}{10}$ as 9.01 instead of 9.10, and then subtracted correctly from 37.6, resulting in 28.59. The student needs to focus on understanding how to find an equivalent decimal when given a fraction.

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Item#	Rationale	
15	Option C is correct	The student should have determined that Maggie wrote the prime number 37 because the number 37 only has two numbers that it can be divided by (1 and itself, 37).
	Option A is incorrect	Elly wrote the number 35. The student likely chose 35 because each of its digits alone is a prime number or because it is an odd number (number that cannot be divided by 2 evenly). It is not a prime number because it is divisible by 1, 5, 7, and 35. The student needs to focus on understanding the definition of a prime number and the difference between prime numbers and odd numbers.
	Option B is incorrect	Ulysses wrote the number 39. The student likely chose 39 because it is an odd number (number that cannot be divided by 2 evenly). It is not a prime number because it is divisible by 1, 3, 13, and 39. The student needs to focus on understanding the difference between prime numbers and odd numbers.
	Option D is incorrect	Palmer wrote the number 33. The student likely chose 33 because each of its digits alone is a prime number or because it is an odd number (number that cannot be divided by 2 evenly). It is not a prime number because it is divisible by 1, 3, 11, and 33. The student needs to focus on understanding the definition of a prime number and the difference between prime numbers and odd numbers.

## 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
16	Option G is correct	<p>The student should have determined that to divide <math>\frac{1}{12}</math> by 36, the number 36 first has to be considered a fraction with a denominator (bottom number) of 1 <math>\left(\frac{36}{1}\right)</math>. Then the student should have determined that <math>\frac{1}{12}</math> divided by <math>\frac{36}{1}</math> is equal to <math>\frac{1}{12}</math> multiplied by <math>\frac{36}{1}</math> inverted (flipped upside down) <math>\left(\frac{1}{12} \div \frac{36}{1} = \frac{1}{12} \times \frac{1}{36} = \frac{1}{432}\right)</math>.</p>
	Option F is incorrect	<p>The student likely divided 36 by 12, instead of multiplying <math>\frac{1}{12}</math> by <math>\frac{1}{36}</math>. The student needs to focus on understanding how to divide unit fractions by whole numbers.</p>
	Option H is incorrect	<p>The student likely inverted (flipped upside down) the fraction <math>\frac{1}{12}</math>, instead of inverting <math>\frac{36}{1}</math>, and then correctly divided 12 by 36. The student needs to focus on understanding that the second number in a division expression needs to be inverted before multiplying to find the answer.</p>
	Option J is incorrect	<p>The student likely inverted (flipped upside down) the fraction <math>\frac{1}{12}</math>, instead of inverting <math>\frac{36}{1}</math>, and then correctly multiplied 12 times 36. The student needs to focus on understanding that the second number in a division expression needs to be inverted before multiplying to find the answer.</p>

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
17	Option C is correct	To determine the location of point $Y$ , the last vertex (corner) of the parallelogram (a four-sided figure with two pairs of parallel sides), the student should have found a point exactly three units away (or 6 grid squares that are each 0.5 units long) from point $X$ on the same horizontal grid line. The student should have found the ordered pair that represents this location (6.5, 1.5) by moving 6.5 units from 0 to the right along the $x$ -axis and then 1.5 units up from the stopping point of the horizontal movement.
	Option A is incorrect	The student likely identified the correct location of point $Y$ on the coordinate grid but reversed the order of the $x$ -coordinate and the $y$ -coordinate when writing the ordered pair. The student needs to focus on understanding that the $x$ -coordinate (horizontal position from 0) comes first in the ordered pair, and the $y$ -coordinate (vertical position from 0) comes second in the ordered pair.
	Option B is incorrect	The student likely identified the correct location of point $Y$ on the coordinate grid but miscounted 2 units instead of 1.5 when writing the $y$ -coordinate of the ordered pair. The student needs to focus on determining a location on the coordinate grid when the grid lines represent numbers that are fractions or decimals.
	Option D is incorrect	The student likely identified the correct location of point $Y$ on the coordinate grid but miscounted 2 units instead of 1.5 when determining the $y$ -coordinate of the ordered pair and then reversed the order of the $x$ -coordinate and the $y$ -coordinate when writing the ordered pair. The student needs to focus on determining a location on the coordinate grid when the grid lines represent numbers that are fractions or decimals. The student also needs to focus on understanding that the $x$ -coordinate (horizontal position from 0) comes first in the ordered pair, and the $y$ -coordinate (vertical position from 0) comes second in the ordered pair.



# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
18	Option J is correct	The student should have determined that, because the family spent a total of \$93, the sum (total) of all the amounts spent must equal \$93. Therefore, the amount spent on the games (represented by the letter $g$ ), plus the amount spent on food (\$36), plus the amount spent on the tickets (\$18), add up to \$93.
	Option F is incorrect	The student likely associated spending \$18 on tickets with subtraction and then chose the equation showing this amount subtracted. The student should have added \$18 to all the other amounts spent at the carnival, including $g$ , the unknown amount spent on games, to get the total of \$93. The student needs to focus on understanding how the position of a number or letter in an equation is related to the other numbers or letters in the equation and the operation ( $+$ , $-$ , $\times$ , $\div$ ) that is required.
	Option G is incorrect	The student likely added the two known amounts (\$18 and \$36) but then subtracted the unknown amount ( $g$ ) instead of adding it to the amounts spent. The student should have added $g$ to all the other amounts spent at the carnival to get the total of \$93. The student needs to focus on understanding how the position of a number or letter in an equation is related to the other numbers or letters in the equation and the operation ( $+$ , $-$ , $\times$ , $\div$ ) that is required.
	Option H is incorrect	The student likely determined that in order to find the value of $g$ , the amounts spent would need to be subtracted from \$93 and therefore chose subtraction instead of addition. To use subtraction to determine the correct value of $g$ , the equation would have to show the known amounts being subtracted from the total of \$93. The equation $g = 93 - 36 - 18$ could be used to determine $g$ , but this equation is not available in the options. The student needs to focus on understanding how the position of a number or letter in an equation is related to the other numbers or letters in the equation and the operation ( $+$ , $-$ , $\times$ , $\div$ ) that is required.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
19	Option B is correct	The student should have determined that the rectangular prism with a length of 3 cubes, a width of 2 cubes, and a height of 2 cubes has a volume (amount of three-dimensional space taken up) of 12 cubic inches because $3 \times 2 \times 2 = 12$ .
	Option A is incorrect	The student likely only counted the 12 unit cubes on the front face (side) of the rectangular prism. The front face of this rectangular prism shows 12 cubes, but the volume (amount of three-dimensional space taken up) of the rectangular prism (24 cubic units) is determined by multiplying $3 \times 2 \times 4$ . This volume does not match the volume indicated in the question. The student needs to focus on understanding that the volume of a rectangular prism can be found by multiplying the length times the width times the height of the prism or by counting the total number of unit cubes needed to make up the rectangular prism.
	Option C is incorrect	The student likely only counted the unit cubes on the front face (side) of the rectangular prism. The front face of this rectangular prism shows 12 cubes, but the volume (amount of three-dimensional space taken up) of the rectangular prism (24 cubic units) is determined by multiplying $6 \times 2 \times 2$ . This volume does not match the volume indicated in the question. The student needs to focus on understanding that the volume of a rectangular prism can be found by multiplying the length times the width times the height of the prism or by counting the total number of unit cubes needed to make up the rectangular prism.
	Option D is incorrect	The student likely only counted the 12 unit cubes along one edge of the rectangular prism's front face (side). The volume (amount of three-dimensional space taken up) of the rectangular prism (144 cubic units) is determined by multiplying $12 \times 12 \times 1$ . This volume does not match the volume indicated in the question. The student needs to focus on understanding that the volume of a rectangular prism can be found by multiplying the length times the width times the height of the prism or by counting the total number of unit cubes needed to make up the rectangular prism.

# 2018 STAAR Grade 5 Mathematics Rationales

Item#	Rationale	
20	Option < is correct	To determine the number of days it will take Shauna to read 528 pages, the student should have divided 528 by 22, resulting in a quotient (answer) of 24 days.
	Option : is incorrect	The student likely subtracted the two given numbers ( $528 - 22 = 506$ ). Though subtraction could be used to solve the given problem, the subtraction would have had to be repeated until there were 0 pages of the book left to read. The number of subtraction steps (24) would indicate the number of days Shauna needs to read the entire book. The student needs to focus on understanding when division is required to solve a problem.
	Option ; is incorrect	The student likely determined correctly that 52 (the first two digits of 528) divided by 22 is 2 and that $22 \times 2 = 44$ . When subtracting $52 - 44$ , the student likely made a subtraction error and determined that $52 - 44 = 12$ , instead of determining that $52 - 44 = 8$ . The student likely carried out the rest of the division steps correctly, resulting in an answer of 25 with a remainder of 18. The student then likely added 1 extra day to 25 to allow for Shauna reading the last 18 pages of the book. The student needs to focus on understanding how to perform all the steps of the division algorithm (procedure).
	Option > is incorrect	The student likely added the two given numbers ( $528 + 22 = 550$ ). Though addition could be used to solve the given problem, the addition of 22 would have to be repeated until the total number of pages read was 528. The number of times 22 was added would indicate the number of days Shauna needs to read the entire book (24). The student needs to focus on understanding when division is required to solve a problem.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
21	Option A is correct	To determine each $y$ -value in the table, the student should have multiplied 1.5 times each corresponding (paired) $x$ -value in the table ( $1.5 \times 9 = 13.5$ , $1.5 \times 11 = 16.5$ , $1.5 \times 13 = 19.5$ , $1.5 \times 15 = 22.5$ ). In the equation ( $y = 1.5x$ ), the side-by-side placement of 1.5 and $x$ indicates that multiplication of 1.5 and each $x$ -value is needed.
	Option B is incorrect	The student likely added each $x$ -value in the table to 1.5 instead of multiplying to determine each corresponding (paired) $y$ -value ( $1.5 + 10 = 11.5$ , $1.5 + 12 = 13.5$ , $1.5 + 14 = 15.5$ , $1.5 + 16 = 17.5$ ). The student should have identified that the side-by-side placement of 1.5 and $x$ in the given equation ( $y = 1.5x$ ) indicates multiplication is needed, not addition. The student needs to focus on understanding that the side-by-side placement of a number and a variable ( $x$ ) indicates multiplication.
	Option C is incorrect	The student likely selected the table in which each $y$ -value can be determined by adding 1.5 to the previous $y$ -value ( $19.5 + 1.5 = 21$ , $21 + 1.5 = 22.5$ , $22.5 + 1.5 = 24$ ). The student should have identified that the side-by-side placement of 1.5 and $x$ in the given equation ( $y = 1.5x$ ) indicates multiplication of 1.5 and each $x$ -value. The student also should have looked for the relationship between corresponding (paired) $x$ - and $y$ -values, instead of between the $y$ -values in the row. The student needs to focus on understanding how paired $x$ - and $y$ -values are arranged in a table to represent a numerical pattern. The student also needs to focus on understanding that the side-by-side placement of a number and a variable ( $x$ ) indicates multiplication.
	Option D is incorrect	The student likely multiplied each $x$ -value by 1 and then added 0.5 to determine each corresponding (paired) $y$ -value ( $14 \times 1 + 0.5 = 14.5$ , $16 \times 1 + 0.5 = 16.5$ , $18 \times 1 + 0.5 = 18.5$ , $20 \times 1 + 0.5 = 20.5$ ). The student should have only used a procedure of multiplying each $x$ -value by 1.5 to get each corresponding $y$ -value. The student needs to focus on understanding how to multiply with decimal numbers.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
22	90.4 and any equivalent values are correct	To write the temperature as a numeral, the student should have written 90.4. From left to right for this number, the place value order is tens place, ones place, decimal point, tenths place. The student should have used a 9 in the tens place for the $(9 \times 10)$ part of the expanded notation, a 0 in the ones place because the expanded notation had no indication of a value for the ones place $(\times 1)$ , and a 4 in the tenths place to the right of the decimal point for the $(4 \times 0.1)$ part of the expanded notation.
23	Option C is correct	To determine the cost of each sports drink, the student should have separated \$5.25 into three rows of quarters (5.25 divided by 3) with each row representing the cost of one sports drink (\$1.75).
	Option A is incorrect	The student likely multiplied the total cost (\$5.25) by the number of sports drinks (3) instead of dividing the total cost by the number of sports drinks. The procedure the student chose would be used if the money pictured (5.25) represented the cost of each sports drink and the student were asked to determine the total amount spent (15.75) on 3 sports drinks. The student needs to focus on understanding problem situations that require division.
	Option B is incorrect	The student likely divided the total cost (\$5.25) by the number of quarters in each row (7) instead of by the number of sports drinks (3). The procedure the student chose would be used if the student were asked to determine the amount of \$5.25 spent on each of 7 sports drinks instead of each of 3 sports drinks. The student needs to focus on recognizing the dividend, or number being divided by, in problem situations that require division.
	Option D is incorrect	The student likely multiplied the total cost (\$5.25) by the number of quarters in each row (7) instead of dividing by the number of sports drinks (3). The procedure the student chose would be used if the money pictured (5.25) represented the cost of each sports drink and the student was asked to determine the total amount spent (36.75) on 7 sports drinks. The student needs to focus on understanding problem situations that require division.

# 2018 STAAR Grade 5 Mathematics Rationales

Item#	Rationale	
24	Option : is correct	To determine the length of the wall in inches, the student should have first determined that there are 12 inches in 1 foot, and then multiplied 12 by 29. ( $12 \times 29 = 348$ )
	Option ; is incorrect	The student likely divided 29 by 12 and disregarded the decimal point in the answer, instead of multiplying 29 times 12. The student needs to focus on understanding how to calculate conversions from a larger unit to a smaller unit by multiplying.
	Option < is incorrect	The student likely multiplied 29 times 12, but when multiplying $29 \times 2$ , made a regrouping error resulting in $29 \times 2 = 48$ instead of 58. The student likely carried out the remaining steps correctly, resulting in 338. The student needs to focus on understanding how to do all the steps in the multiplication algorithm (procedure).
	Option > is incorrect	The student likely multiplied 29 times 12 using two smaller steps ( $29 \times 2$ ) and ( $29 \times 1$ ) to get the partial products (answers). When adding in the last step, the student likely did not regroup from the tens place (second digit from the right) to the hundreds place (third digit from the right), resulting in 248. The student needs to focus on understanding how to do all the steps in the multiplication algorithm (procedure).

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
25	Option D is correct	To determine the file size of 16 electronic books, the student should have multiplied the file size of one electronic book times the number of electronic books ( $2.4 \times 16 = 38.4$ ).
	Option A is incorrect	The student likely multiplied 2 times 16 and then added 0.4. The student needs to focus on understanding the algorithm (procedure) for multiplying decimals.
	Option B is incorrect	The student likely set up the multiplication as $16 \times 2.4$ and made a regrouping error in each regrouping step. The student likely determined $16 \times 0.4 = 12.4$ instead of 6.4, $16 \times 2 = 42$ instead of 32, and then added 12.4 and 42, resulting in 54.4. The student needs to focus on understanding how regrouping needs to be done in the multiplication algorithm (procedure).
	Option C is incorrect	The student likely multiplied 16 times 2, multiplied 16 times 4, and combined the two partial products (answers) as one decimal number ( $16 \times 2 = 32$ , $16 \times 4 = 64$ , and 32 combined with 64 is 32.64). The student should have maintained the correct place values when adding the partial products ( $16 \times 0.4 = 6.4$ , $16 \times 2 = 32.0$ , $6.4 + 32.0 = 38.4$ ). The student needs to focus on understanding the place values of the numbers at each step of the multiplication algorithm (procedure).

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
26	Option H is correct	To determine the type of figure that will always belong in the shaded section of the Venn diagram, the student should have recognized that a square can be classified as a rectangle (figures within the left group in the graphic organizer) because it has four right angles and each pair of its opposite sides are the same length. The student also should have recognized that a square can also be classified as a rhombus (figures within the right group in the graphic organizer) because all four of its sides are the same length and each pair of its opposite sides are parallel.
	Option F is incorrect	The student likely identified the name of the figures within the left group in the graphic organizer. A rectangle cannot always be classified as a rhombus (figures within the right group in the graphic organizer) because all of its sides do not have to be the same length. To fit into the right group in the graphic organizer, a rectangle would always have to have all side lengths equal. The student needs to focus on understanding the relationship between rectangles, squares, and rhombuses.
	Option G is incorrect	The student likely identified the name of the figures within the right group in the graphic organizer. A rhombus cannot always be classified as a rectangle (figures within the left group in the graphic organizer) because its angles do not have to be right angles. To fit in the left group in the graphic organizer, a rhombus would always have to have right angles. The student needs to focus on understanding the relationship between rectangles, squares, and rhombuses.
	Option J is incorrect	The student likely only focused on one attribute of a trapezoid (four sides) and found this attribute in common with both the rectangles and rhombuses given in the graphic organizer. The student should have recognized that a trapezoid cannot fit into the right group, because it does not have four sides of equal length and does not have each pair of opposite sides parallel. The student should have recognized that a trapezoid cannot fit into the left group, because it does not have four right angles and each pair of its opposite sides are not the same length. The student needs to focus on the attributes of trapezoids, rectangles, and rhombuses.



# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
27	Option A is correct	To find the number of cups of milk used, the student should have simplified the expression, using the order of operations, or PEMDAS. Following the order of operations, the student should have done operations in this order: 1. Operations contained in <u>P</u> arentheses or brackets, 2. <u>E</u> xponents (numbers raised to a power), 3. <u>M</u> ultiplication/ <u>D</u> ivision from left to right, and 4. <u>A</u> ddition/ <u>S</u> ubtraction from left to right. First, the student should have multiplied the numbers within the parentheses, $2 \times 5$ , resulting in 10. Then the student should have added this number (10) to $\frac{1}{4}$ , resulting in $10\frac{1}{4}$ .
	Option B is incorrect	The student likely added $\frac{1}{4}$ and 2 and then multiplied the result $\left(\frac{9}{4}\right)$ times 5. The resulting product (answer) from the second operation is $\frac{45}{4}$ or $11\frac{1}{4}$ . The student needs to focus on understanding that, based on the order of operations, operations contained within parentheses are done first.
	Option C is incorrect	The student likely multiplied $2 \times 5$ , resulting in 10, added the numerator (top number) of 1 in $\frac{1}{4}$ to the result to get 11, and then kept 4 as the denominator (bottom number) in $\frac{11}{4}$ . The student needs to focus on understanding how to add fractions to whole numbers.
	Option D is incorrect	The student likely added 1 to 2, multiplied the result (3) by 5 to get 15, and then kept 4 as the denominator (bottom number). The student needs to focus on understanding the order of operations and how to add fractions to whole numbers.
28	20.2 and any equivalent values are correct	To determine the perimeter (distance around the outside) of the hexagon, the student should have added all of the side lengths ( $4.5 + 2.8 + 2.8 + 4.5 + 2.8 + 2.8 = 20.2$ ).

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
29	Option D is correct	To determine the total number of pieces of pie, the student should have divided 16 pies by $\frac{1}{8}$ . The result of this, 128, is the same as multiplying 16 pies by 8 pieces $\left(16 \div \frac{1}{8} = 16 \times 8 = 128\right).$
	Option A is incorrect	The student likely multiplied 16 times $\frac{1}{8}$ , resulting in 2. The student should have divided 16 by $\frac{1}{8}$ instead of multiplying by $\frac{1}{8}$ . The student needs to focus on understanding problem situations that require dividing whole numbers by fractions.
	Option B is incorrect	The student likely determined correctly that each pie was cut into 8 pieces. When multiplying 16 times 8, the student likely made a regrouping error, resulting in 88. The student needs to focus on understanding how to regroup when completing the multiplication algorithm (procedure).
	Option C is incorrect	The student likely determined that each pie was cut into 8 pieces and then added the number of pies (16) and the number of pieces per pie (8), resulting in 24. The student should have multiplied 16 times 8 instead of adding 16 to 8. The student needs to focus on understanding problem situations that require dividing whole numbers by fractions.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
30	Option G is correct	To order the numbers from least (smallest) to greatest (largest), the student should have recognized that the decimal with the greatest whole number is <u>1</u> .42, making it the greatest decimal (and last in the list). The student should also have determined that 0. <u>5</u> 02 has a lesser value in the tenths place (digit to the right of the decimal point) than 0. <u>9</u> 46 has ( $5 < 9$ ), making 0.502 the least value (and first in the list), and leaving 0.946 as the middle decimal in the list. The student should have ordered the decimals from least to greatest as 0.502 (Container Y), followed by 0.946 (Container X), followed by 1.42 (Container Z).
	Option F is incorrect	The student likely attempted to order the numbers from greatest (largest) to least (smallest), instead of from least to greatest, but only considered the first non-zero digit in each number when ordering the numbers ( $9 > 5 > 1$ ). The student needs to focus on understanding whether a question is asking for values to be ordered from least to greatest or from greatest to least and that digits in different places of a number have different values.
	Option H is incorrect	The student likely only considered the first non-zero digit in each number when ordering the numbers from least (smallest) to greatest (largest) ( $1 < 5 < 9$ ). The student should have considered the place values of these digits when ordering the numbers. The student needs to focus on understanding that digits in different places of a number have different values.
	Option J is incorrect	The student likely ordered the numbers from greatest (largest) to least (smallest) instead of from least to greatest. The student needs to focus on understanding whether a question is asking for values to be ordered from least to greatest or from greatest to least.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
31	Option A is correct	To find the number of apples in the boxes, the student should have simplified the expression, using the order of operations, or PEMDAS. Following the order of operations, the student should have done operations in this order: 1. Operations contained in <u>P</u> arentheses or brackets, 2. <u>E</u> xponents (numbers raised to a power), 3. <u>M</u> ultiplication/ <u>D</u> ivision from left to right, and 4. <u>A</u> ddition/ <u>S</u> ubtraction from left to right. The student should have first added within the parentheses, $31 + 41$ , resulting in 72 and then multiplied this sum (72) times 8, resulting in 576.
	Option B is incorrect	The student likely made an error when adding 31 and 41, resulting in 71, and then correctly multiplied 8 by the sum ( $71 \times 8 = 568$ ). The student needs to focus on understanding how to complete the addition algorithm (procedure) without error.
	Option C is incorrect	The student likely added all the numbers ( $31 + 41 + 8 = 80$ ). The student needs to focus on understanding that the placement of a number just outside of parentheses indicates that multiplication is required.
	Option D is incorrect	The student likely multiplied all the numbers ( $31 \times 41 \times 8 = 10,168$ ). The student needs to focus on understanding that a plus sign indicates that addition is required.

## 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
32	Option H is correct	The student should have determined that the tax paid on the value of a piece of furniture is sales tax, not property tax.
	Option F is incorrect	The student likely does not recognize that a farm is a piece of property. The student should have selected the option with "Tax paid on the value of a piece of furniture a person owns" as that is the only option that is not an example of property tax. The student needs to focus on understanding examples and non-examples of property tax.
	Option G is incorrect	The student likely does not recognize that a piece of land is a piece of property. The student should have selected the option with "Tax paid on the value of a piece of furniture a person owns" as that is the only option that is not an example of property tax. The student needs to focus on understanding examples and non-examples of property tax.
	Option J is incorrect	The student likely does not recognize that a home is a piece of property. The student should have selected the option with "Tax paid on the value of a piece of furniture a person owns" as that is the only option that is not an example of property tax. The student needs to focus on understanding examples and non-examples of property tax.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
33	Option B is correct	The student should have determined that the pattern in the given table is additive because each $y$ -value can be found by adding 17 to each corresponding (paired) $x$ -value ( $5 + 17 = 22$ , $10 + 17 = 27$ , $15 + 17 = 32$ , and $20 + 17 = 37$ ).
	Option A is incorrect	The student likely identified the relationship between consecutive $x$ -values (values in the first column) in the table. The student needs to focus on understanding the relationship between corresponding (paired) $x$ - and $y$ -values within a table.
	Option C is incorrect	The student likely identified the difference of 17 between each $y$ -value and each corresponding (paired) $x$ -value, but related the difference to multiplication instead of addition. The student needs to focus on understanding the difference between additive and multiplicative relationships within a table.
	Option D is incorrect	The student likely identified a common characteristic of the given $x$ -values, since all of the $x$ -values are multiples of 5 (numbers that can be divided by 5 evenly). The student needs to focus on understanding the relationship between corresponding (paired) $x$ - and $y$ -values within a table. The student needs to also focus on understanding the difference between additive and multiplicative relationships within a table.
34	Option H is correct	Using the key 9 1 means 91, the student should have determined that Ryan's math scores are 79, 82, 82, 83, 86, 90, 91, 93, 94, and 97 and that the sum of his greatest (highest) score (97) and his least (lowest) score (79) is 176 because $97 + 79 = 176$ .
	Option F is incorrect	The student likely added the first score in the top row (79) and the first score in the bottom row (90), resulting in a sum of 169. The student needs to focus on understanding how stem and leaf plots display data.
	Option G is incorrect	The student likely added the greatest (highest) score in the bottom row (97) to the least (lowest) score in the bottom row (90), resulting in a sum of 187. The student needs to focus on understanding how stem and leaf plots display data.
	Option J is incorrect	The correct answer (176) was presented in one of the other answer options.

# 2018 STAAR Grade 5 Math Rationales

Item#	Rationale	
35	Option D is correct	To determine the weight of the sand in each small bag, the student should have divided the amount of sand in the large bag (63.4) by the number of small bags (20) resulting in 3.17, because $63.4 \div 20 = 3.17$ .
	Option A is incorrect	The student likely divided 63.4 by 20 correctly to get the first part of the quotient (answer) of 3.1. Then the student likely added the remainder of 14 to the end of 3.1, resulting in 3.114 instead of adding a 0 and continuing the division algorithm (procedure) to get the correct answer of 3.17. The student needs to focus on understanding what to do with a remainder when dividing with decimals.
	Option B is incorrect	The student likely divided 63.4 by 20 correctly to get the first part of the quotient (answer) of 3.1, but then incorrectly added 0 to the quotient. This resulted in the incorrect answer of 3.107 after completing the division algorithm (procedure). The student needs to focus on understanding how to complete all of the steps in the division algorithm.
	Option C is incorrect	The student likely divided the two numbers correctly, but made an error in placing the decimal point in the quotient (answer). The student should have placed the decimal point between the digit 3 and the digit 1, instead of between the digit 1 and the digit 7. The student needs to focus on understanding where to place the decimal point in the quotient when dividing with decimals.

# 2018 STAAR Grade 5 Mathematics Rationales

Item#	Rationale	
36	Option ; is correct	The student should have determined that the graph with points located at (4, 2), (6, 3), (8, 4), and (10, 5) best represents the ordered pairs in the number machine. The student should have determined for each point on the graph that the $x$ -value (presented on the left side of number machine) represents the horizontal distance to the right from zero, and the $y$ -value (presented on the right side of the number machine) represents the vertical distance up from there.
	Option : is incorrect	The student likely miscounted the vertical distance when graphing (10, 5) and graphed (10, 6) instead. The student needs to focus on understanding how to graph points on the coordinate plane with accuracy.
	Option < is incorrect	The student likely used the $x$ -value to determine the vertical distance from zero and the $y$ -value to determine the horizontal distance from zero when graphing the four ordered pairs. The student should have used the $x$ -value to determine the horizontal distance to the right from zero and the $y$ -value to determine the vertical distance up from there. The student needs to focus on understanding that the $x$ -value (horizontal distance) comes first in an ordered pair, and the $y$ -value (vertical distance) comes second in an ordered pair.
	Option > is incorrect	The student likely reversed the $x$ - and $y$ -values in the first two ordered pairs and graphed (2, 4) and (3, 6) instead of (4, 2) and (6, 3). The student needs to focus on understanding how to graph points on the coordinate plane with accuracy.