Item Position	Rationales	
1	Option C is correct	To determine which table contains only values that follow the rule $y = x + 4$, the student could have substituted (put a given number in for a variable) each given x-coordinate (value indicating left/right movement on the x-axis) and y-coordinate (value indicating up/down movement on the y-axis) from the table into the equation to verify the relationship. The first identified x-coordinate is 0, the first identified y-coordinate is 4, and the equation $4 = (0) + 4$ is true. The second identified x-coordinate is 6, the second identified y-coordinate is 10, and $10 = (6) + 4$ is true. The second identified x-coordinate is 6, the second identified y-coordinate is 10, and $10 = (6) + 4$ is true. The third identified x-coordinate is 19, the third identified y-coordinate is 23, and $23 = (19) + 4$ is true. The third identified x-coordinate is 19, the third identified y-coordinate is 23, and $23 = (19) + 4$- is true. 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 confused the x-values and the y-values, substituting the output (y-value) as the input (x-value) and the input as the output. The student needs to focus on understanding how to generate x- and y-coordinates when given a rule in the form $y = x + a$.
	Option B is incorrect	The student likely determined that the first two sets of x- and y-values given in the table follow the rule and did not consider the third x- and y-values. The student needs to focus on understanding that all coordinates given in a table must represent the same relationship when a rule is given.
	Option D is incorrect	The student likely chose a table in which the x-coordinate is multiplied by 4 to determine the y-coordinate, instead of being added to 4 as indicated in the rule. The student needs to focus on understanding how to generate x- and y-coordinates when given a rule in the form $y = x + a$.

Item Position	Rationales	
2	3 times, mugs OR 4 times, bottles	To determine the statement that correctly describes the data given in the frequency table, the student should have found the number of tally marks corresponding to cups in the frequency table. There are 12 tally marks next to cups. Next, the student should have found the numbers of tally marks corresponding to mugs and bottles, which are 4 and 3, respectively. The student then could have determined that there are 3 times as many cups in the cupboard as mugs, because $12 \div 3 = 4$, or that there are 4 times as many cups in the cupboard as bottles, because $12 \div 4 = 3$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
3	Option C is correct	To determine the difference between the two fractions represented in the models, the student should have identified the fraction for vanilla cookies as $\frac{2}{8}$, or $\frac{1}{4}$, and the fraction for chocolate cookies as $\frac{2}{3}$. Next, the student should have subtracted the two fractions: $\frac{2}{3}-\frac{1}{4}$. To subtract the two fractions, the student could have found the least common denominator (smallest multiple shared by the bottom numbers) for the two fractions represented. The least common multiple of the denominators 3 and 4 is 12. Next, the student could have multiplied both the numerator (top number) and the denominator (bottom number) of each fraction by the same factor to rewrite the fractions with a denominator of 12: $\frac{2}{3}\times\frac{4}{4}=\frac{8}{12}$, $\frac{1}{4}\times\frac{3}{3}=\frac{3}{12}$. The student then should have subtracted the two fractions, resulting in $\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$. 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 rewrote $\frac{2}{3}$ to have a denominator of 12 by multiplying the denominator by 4 but replacing the numerator with 4, resulting in $\frac{4}{12}$. The student then likely subtracted the two fractions, resulting in $\frac{4}{12}-\frac{3}{12}=\frac{1}{12}$. The student needs to focus on writing equivalent fractions.
	Option B is incorrect	The student likely rewrote $\frac{2}{3}$ to have a denominator of 12 by multiplying the denominator by 4 but replacing the numerator with 4, resulting in $\frac{4}{12}$. The student then likely added the fractions rather than subtracting, resulting in $\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$. The student needs to focus on writing equivalent fractions and understanding which operation (+, −, ÷, ×) to use when solving problems.
	Option D is incorrect	The student likely rewrote $\frac{2}{3}$ to have a denominator of 12 by multiplying the numerator and denominator by 4, resulting in $\frac{8}{12}$. The student likely rewrote $\frac{1}{4}$ to have a denominator of 12 by multiplying the numerator and denominator by 3, resulting in $\frac{3}{12}$. The student then likely added the fractions rather than subtracting, resulting in $\frac{8}{12}+\frac{3}{12}=\frac{11}{12}$. The student needs to focus on understanding which operation (+, −, ÷, ×) to use when solving problems.

Item Position	Rationales	
4	Rectangle (top, center) and trapezoid (bottom, right)	To determine which shapes belong in the shaded region of the Venn diagram, the student could have inspected each of the shapes in the answer choices and determined that the rectangle and the trapezoid each have at least one right angle and at least one pair of parallel sides. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
5	Option D is correct	To determine which weight should be third on the list when the weights are listed in order from least to greatest, the student could have first added zeros as placeholders in the hundredths and thousandths places as needed, so that the numbers would be written as 6.010, 8.600, 5.699, and 6.195. The student should have then ordered the four numbers from least to greatest by comparing the digits in each place value. Looking at the greatest place value (the ones place), the student should have ordered 5.699 as the least weight. Since 6.010 and 6.195 both have the digit 6 in the ones place (the digit to the left of the decimal point), the student should have compared the digits in the tenths place (the digit to the right of the decimal point). The number 6.010 is the next-smallest weight, followed by 6.195 . The greatest weight is 8.600 since it has the greatest digit in the ones place. The student could have then listed the weights in order from least to greatest (5.699, 6.010, 6.195, 8.600) to determine that the weight that should be third on the list is 6.195 lb. 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 ordered the numbers from greatest to least, which puts 6.01 lb in the third position. The student needs to focus on attending to the details of the problem.
	Option B is incorrect	The student likely chose 8.6 lb as the weight that should be third on the list by comparing the last digits of the four weights. The student needs to focus on ordering decimal numbers using place value.
	Option C is incorrect	The student likely chose 5.699 lb as the weight that should be third on the list by choosing the third weight in the table rather than ordering the values from least to greatest. The student needs to focus on attending to the details of the problem.

Item Position	Rationales	
6	×, +	To determine the equation that can be used to find how many booths Deidra rents, the student should have first recognized that each booth costs $32 to rent, which is represented by multiplying 32 by *b* booths, or 32 × *b*. The student should have then recognized that the additional $30 in fees is represented by + 30, resulting in the equation 94 = 32 × *b* + 30.

Item Position	Rationales	
7	Option C is correct	To determine the perimeter (distance around the outside of a figure) of the sign in feet, the student could have used the formula from the Perimeter section of the STAAR Grade 5 Mathematics Reference Materials: $P = 2l + 2w$, where P = perimeter, l = length, and w = width. The student should have substituted (put a given number in for a variable) the two given measurements, $l = 4.22$ and $w = 6.5$, in the formula: $P = 2(4.22) + 2(6.5) = 21.44$. The student should have then concluded that the perimeter of the sign is 21.44 feet. 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 added the two side lengths and multiplied by 2 but used 0.65 rather than 6.5, resulting in $(0.65 + 4.22) \times 2 = 9.74$. The student needs to focus on using the numbers given to solve problems related to perimeter.
	Option B is incorrect	The student likely confused perimeter with area (the space within the perimeter of a figure) and multiplied the two side lengths, resulting in $4.22 \times 6.5 = 27.43$. The student needs to focus on understanding how to solve problems related to perimeter.
	Option D is incorrect	The student likely added the two side lengths, resulting in $4.22 + 6.5 = 10.72$. The student needs to focus on understanding how to solve problems related to perimeter.

Item Position	Rationales	
8	$\frac{1}{162}$	To determine the missing quotient (answer to a division problem), the student should have divided $\frac{1}{9}$ by 18. To divide a fraction by a whole number, the student could have multiplied the dividend (a quantity or total to be divided) by the reciprocal (1 divided by that number) of the divisor (the number per group by which the dividend is to be divided), resulting in $\frac{1}{9} \times \frac{1}{18} = \frac{1}{162}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
9	Option D is correct	To determine which scatterplot best represents the data in the table, the student should have identified the scatterplot with points located at (83, 52), (87, 63), (95, 80), (81, 57), (73, 48), (68, 44), and (81, 72). 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 A is incorrect	The student likely switched the *x*- and *y*-values and misread the value of 95 as 55, thereby plotting (52, 83), (63, 87), (80, 55), (57, 81), (48, 73), (44, 68), and (72, 81). The student needs to focus on attending to the details of the problem and correctly identifying the *x*-coordinates and *y*-coordinates when plotting coordinates from a table.
	Option B is incorrect	The student likely switched the *x*- and *y*-values and plotted the points (52, 83), (63, 87), (80, 95), (57, 81), (48, 73), (44, 68), and (72, 81). The student needs to focus on correctly identifying the *x*-coordinates and *y*-coordinates when plotting coordinates from a table.
	Option C is incorrect	The student likely misread the value of 95 as 55 and plotted the points (83, 52), (87, 63), (55, 80), (81, 57), (73, 48), (68, 44), and (81, 72). The student needs to focus on attending to the details of the problem when plotting coordinates from a table.

Item Position	Rationales	
10	Option B is correct	To determine the word form of $(6 \times 10) + (2 \times 1) + (5 \times 0.1) + (9 \times 0.001)$, the student could have first evaluated the expression, resulting in $60 + 2 + 0.5 + 0.009 = 62.509$, which has 6 tens, 2 ones, 5 tenths, and 9 thousandths. The word form of this number is sixty-two and five hundred nine thousandths. 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 confused thousandths with hundredths and determined that $(5 \times 0.1) + (9 \times 0.001)$ is 59 hundredths. The student needs to focus on understanding place values of decimals in expanded notation.
	Option C is incorrect	The student likely read the expression as a whole number instead of a decimal to the thousandths. The student needs to focus on using place value to read expanded notation.
	Option D is incorrect	The student likely confused tenths with hundredths and determined that $(5 \times 0.1) + (9 \times 0.001)$ is 59 thousandths. The student needs to focus on understanding place values of decimals in expanded notation.

Item Position	Rationales	
11	3.2, 2, 1.6	To determine the division equation to represent the model, the student should have used the key (1 shaded 10-by-10 square represents 1 whole) to determine that the total value of the shaded part of the model is 3.2. The student should have recognized that the shaded model is separated into two equal groups, and this represents the expression 3.2 ÷ 2. The student should have then recognized the value of each shaded half as 1.6. Finally, the student should have recognized that the model represents the equation 3.2 ÷ 2 = 1.6. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
12	Option B is correct	To determine in which step of the simplification the error first appears, the student should have recognized that the operations inside the brackets are to be performed before the operations outside the brackets, according to the order of operations (represented by acronyms such as PEMDAS or BODMAS). The student should have determined that the error appears in Step 2, because the operation inside the brackets, 2 + 8, should be simplified before multiplying 2 by 6.
	Option A is incorrect	The student likely did not understand that operations in parentheses should be performed first. The student likely thought the addition between the 2 in the first set of the parentheses and the 4 in the second set of parentheses, 2 + 4, should be performed first, disregarding that the numbers are from different sets of parentheses. The student needs to focus on understanding the meaning of parentheses and brackets in a numeric expression.
	Option C is incorrect	The student likely determined that addition comes before division in the order of operations. The student needs to focus on correctly applying the order of operations to simplify expressions.
	Option D is incorrect	The student likely did not understand that operations inside the brackets should be performed before the operations outside the brackets. The student needs to focus on correctly applying the order of operations to simplify expressions.

Item Position	Rationales	
13	$\frac{55}{16}$ and any equivalent values are correct	To determine how many pounds of clay Maeve uses for the last vase, the student could have first calculated the total amount of clay in Vases 1 and 2 by adding $4\frac{3}{8}$ and $2\frac{3}{16}$. To add the two mixed numbers (numbers that combine a whole number and a fraction), the student could have found the least common denominator (smallest multiple shared by the bottom numbers of all the fractions) for the two fractions. The denominators are 8 and 16, and their least common multiple is 16. Next, the student should have multiplied the numerator (top number) and the denominator (bottom number) of the fraction $\frac{3}{8}$ by 2 to get a fraction with a denominator of 16: $\frac{3}{8} \times \frac{2}{2} = \frac{6}{16}$. Then, once the common denominator was obtained, the student should have added the two mixed numbers with the common denominator by adding the whole numbers and then the fractions, resulting in $4\frac{6}{16} + 2\frac{3}{16} = 6\frac{9}{16}$. Then the student should have found the difference between the total number of pounds of clay, 10, and the total number of pounds of clay used for Vases 1 and 2, by subtracting: $10 - 6\frac{9}{16}$. To subtract a mixed number from a whole number, the student should have rewritten 10 as a fraction with the common denominator, 16, by multiplying: $\frac{10}{1} \times \frac{16}{16} = \frac{160}{16}$. Then the student should have rewritten $6\frac{9}{16}$ as an improper fraction (a fraction with a numerator that is greater than the denominator) by multiplying 16 by 6 and adding 9, resulting in $6\frac{6}{16} = \frac{105}{16}$. Then the student could have subtracted the two fractions, resulting in $\frac{160}{16} - \frac{105}{16} = \frac{55}{16}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
14	Option A is correct	To determine the difference between the team's highest number of points scored and its second-lowest number of points scored, the student should have analyzed the stem and leaf plot, looking for the highest value and the second-lowest value. Using the key, "3|2 means 32 points," to interpret the meaning of the stems (which represent the tens place) and leaves (which represent the ones place), the student should have determined that the highest number of points scored was 46, and the second-lowest number of points scored was 28. Then the student should have subtracted the second-lowest number of points from the highest number of points: 46 – 28 = 18.
	Option B is incorrect	The student likely found the difference between the least number of points scored, 25, and the second-highest number of points scored, 45: 45 – 25 = 20. The student needs to focus on correctly analyzing data from a stem and leaf plot and attending to the details of the problem.
	Option C is incorrect	The student likely found the difference between the first value from the first stem and the first value from the last stem, 40 – 25 = 15. The student needs to focus on correctly analyzing data from a stem and leaf plot and attending to the details of the problem.
	Option D is incorrect	The student likely found the difference between the highest number of points and the lowest number of points, 46 – 25 = 21. The student needs to focus on correctly analyzing data from a stem and leaf plot and attending to the details of the problem.

Item Position	Rationales	
15	Second option is correct	To determine which expressions are equivalent to the given expression, the student should have used the order of operations (represented by acronyms such as PEMDAS or BODMAS). According to the order of operations, operations in parentheses should be performed first. Therefore, the student should have first performed the subtraction step within the parentheses, $12 - 4 = 8$, which leads to the expression $28 + 7 \times 8$.
	Fourth option is correct	To determine the other expression that is equivalent to the given expression, the student should have used the order of operations (represented by acronyms such as PEMDAS or BODMAS). According to the order of operations, operations in parentheses should be performed first. Therefore, the student should have performed the subtraction step within the parentheses, $12 - 4 = 8$, which leads to the expression $28 + 7 \times 8$. Then the student should have multiplied 7 by 8, which results in $28 + 56$.
	First option is incorrect	The student likely performed the operations out of order, adding and subtracting before multiplying. The student needs to focus on understanding how to use the order of operations to simplify numerical expressions.
	Third option is incorrect	The student likely removed the parentheses and simplified from left to right, adding 28 and 7 first. The student needs to focus on understanding how to use the order of operations to simplify numerical expressions.
	Fifth option is incorrect	The student likely ignored the parentheses and multiplied 7 by 12 first. The student needs to focus on understanding how to use the order of operations to simplify numerical expressions.

Item Position	Rationales	
16	Option C is correct	To determine how many total cups of flour Charlie uses, the student could have multiplied the number of batches (10.5) by the number of cups of flour in each batch (1.5). This would result in $10.5 \times 1.5 = 15.75$ cups. 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 multiplied 10 by 1 and 5 by 5 and then placed a decimal point between the products. The student needs to focus on understanding how to correctly multiply decimal numbers.
	Option B is incorrect	The student likely confused a multiplicative situation with a situation that involves division and divided 10.5 by 1.5. The student needs to focus on attending to the details of a problem that involves multiplication.
	Option D is incorrect	The student likely confused a multiplicative situation with an additive one and added 10.5 + 1.5. The student needs to focus on attending to the details of a problem that involves multiplication.

Item Position	Rationales	
17	Option A is correct	To determine which graph best represents the total cost for the number of bags of popcorn sold, the student should have understood that the *x*-axis (horizontal number line) represents the number of bags, and the *y*-axis (vertical number line) represents the total cost in dollars. The student should have identified the graph where the *y*-coordinates are each 1.5 times the corresponding *x*-coordinate.
	Option B is incorrect	The student likely misunderstood the relationship between the cost and the number of bags and chose a graph where both of the *y*-coordinates are 1.5 (the cost of each bag of popcorn). The student needs to focus on understanding how to graph ordered pairs of numbers arising from real-world problems.
	Option C is incorrect	The student likely reversed the relationship and chose a graph where the *x*-coordinates are each 1.5 times the corresponding *y*-coordinate. The student needs to focus on understanding how to graph ordered pairs of numbers arising from real-world problems.
	Option D is incorrect	The student likely misunderstood the relationship between the cost and the number of bags and chose a graph where both of the *x*-coordinates are 1.5 (the cost of each bag of popcorn). The student needs to focus on understanding how to graph ordered pairs of numbers arising from real-world problems.

Item Position	Rationales	
18	Top left option is correct	To determine which hundredths model is shaded to represent the equation 0.3 × 0.6 = 0.18, the student should have interpreted the 3 shaded columns of squares as representing a value of 0.3 (three -tenths) and the 6 shaded rows of squares as representing a value of 0.6 (six-tenths). Then the student should have concluded that the 18 squares with the darker shading represent a value of 0.18, the product (the result of a multiplication problem) of 0.3 × 0.6. The model represents the equation 0.3 × 0.6 = 0.18.
	Bottom right option is correct	To determine which hundredths model is shaded to represent the equation 0.3 × 0.6 = 0.18, the student should have interpreted the 6 shaded columns of squares as representing a value of 0.6 (six -tenths) and the 3 shaded rows of squares as representing a value of 0.3 (three-tenths). Then the student should have concluded that the 18 squares with the darker shading represent a value of 0.18, the product (the result of a multiplication problem) of 0.3 × 0.6. The model represents the equation 0.3 × 0.6 = 0.18.
	Top middle option is incorrect	The student likely chose the model with 5 shaded columns of squares, representing the value of 0.5 rather than 0.6, and 3 shaded rows of squares, representing the value of 0.3. The student needs to focus on attending to the details of the problem when representing products of decimals.
	Top right option is incorrect	The student likely chose the model with 3 shaded columns of squares, representing the value of 0.3, and 5 shaded rows of squares, representing the value of 0.5 rather than 0.6. The student needs to focus on attending to the details of the problem when representing products of decimals.
	Bottom left option is incorrect	The student likely chose the model with 6 shaded columns of squares, representing the value of 0.6, and 4 shaded rows of squares, representing the value of 0.4 rather than 0.3. The student needs to focus on attending to the details of the problem when representing products of decimals.

Item Position	Rationales	
19	Option D is correct	To determine which graphic organizer correctly classifies the shapes, the student should have understood the definition of each shape in the graphic organizer. Polygons are closed plane figures with at least three straight sides and angles. Since a triangle is a closed plane figure with three straight sides and angles, triangles are a subset of polygons. Since a quadrilateral is a closed plane figure with four straight sides and angles, quadrilaterals are a subset of polygons. 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 confused a parallelogram with a quadrilateral. The student needs to focus on understanding the attributes and properties of two-dimensional figures to accurately classify them in a hierarchy of sets and subsets.
	Option B is incorrect	The student likely confused a parallelogram with a polygon. The student needs to focus on understanding the attributes and properties of two-dimensional figures to accurately classify them in a hierarchy of sets and subsets.
	Option C is incorrect	The student likely determined that all closed plane figures are polygons. Since a circle has curved lines, it does not meet the definition of a polygon. The student needs to focus on understanding the attributes and properties of two-dimensional figures to accurately classify them in a hierarchy of sets and subsets.

Item Position	Rationales	
20	Option D is correct	To determine which equation can be used to find *m*, the amount of money in dollars that Lucas spends on the video game, the student should have identified the equation where the total Lucas spent ($127) is equal to the sum (the result when two or more quantities are added) of the money he spent on a remote-control car ($55) and the money spent on a pair of headphones ($31), plus the unknown amount of money spent on a video game, *m.* The result is $127 = 55 + 31 + m$.
	Option A is incorrect	The student likely realized that 55 and 31 must both be subtracted to find *m* but subtracted them from *m* instead of from the total. The student needs to focus on correctly representing situations using an equation.
	Option B is incorrect	The student likely realized that 55 and 31 can be added to find part of the total but subtracted the sum from *m* and misrepresented this subtraction by omitting the parentheses. The student needs to focus on correctly representing situations using an equation.
	Option C is incorrect	The student likely realized that 55 and 31 can be added to find part of the total but subtracted *m* to find the remaining amount, instead of adding. The student needs to focus on correctly representing situations using an equation.

Item Position	Rationales	
21	300 or any equivalent value	To determine what Tasha's budget should be for the entertainment category each month in dollars, the student should have understood that a balanced budget requires the amount of expenses to equal the amount of income. The student should have then calculated the total of all the given expenses by adding all the values in the table: 2,600 + 1,950 + 550 + 100 = 5,200. Since the total monthly income is $5,500, the student could have found the amount of the entertainment category by calculating the difference between the total monthly income and the expenses: 5,500 – 5,200 = 300. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
22	Option B is correct	To determine the number of lessons in the 3-hour dance class, the student should have interpreted "split" to mean division into equal parts. The number 3 can be written as a fraction with a denominator (bottom number) of 1: $\frac{3}{1}$. The student could have used the standard algorithm (procedure) for dividing fractions, multiplying $\frac{3}{1}$ by the reciprocal (the fraction with the positions of the numerator and denominator switched) of $\frac{1}{6}$: $\frac{3}{1} \div \frac{1}{6} = \frac{3}{1} \times \frac{6}{1} = 18$. 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 misunderstood the process used to write a fraction as a whole number and rewrote $\frac{1}{6}$ as 7 by adding its numerator and denominator: 1 + 6 = 7. The student likely then multiplied by 3: 7 × 3 = 21. The student needs to focus on understanding how to correctly divide a whole number by a fraction.
	Option C is incorrect	The student likely found the reciprocal of $\frac{1}{6}$ and added instead of multiplying: $\frac{3}{1} + \frac{6}{1} = 9$. The student needs to focus on attending to the details of problems that involve dividing a whole number by a fraction.
	Option D is incorrect	The student likely multiplied the denominator and the numerator of $\frac{1}{6}$: 6 × 1 = 6. The student needs to focus on understanding how to correctly divide a whole number by a fraction.

Item Position	Rationales	
23	Option B is correct	To determine how many hours Santiago drives each week, the student could have used the long-division algorithm (procedure) to divide the total number of hours Santiago drives (24.2) by the number of weeks (4), resulting in 24.2 ÷ 4 = 6.05 hours. 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 the digits in the tens place and ones place by the divisor (the number by which the dividend is being divided) and divided the digit in the tenths place by the divisor, resulting in 24 ÷ 4 = 6 and 2 ÷ 4 = 0.5. The student then likely added the results: 6 + 0.5 = 6.5 hours. The student needs to focus on attending to the details of problems that involve division and understanding how to solve for quotient of decimals to the hundredths place.
	Option C is incorrect	The student likely divided only the whole numbers and ignored the decimal part of the dividend: 24 ÷ 4 = 6 hours. The student needs to focus on attending to the details of problems that involve division and understanding how to solve for quotients of decimals to the hundredths place.
	Option D is incorrect	The student likely divided the whole numbers correctly but did not continue dividing the decimal portion (0.2) and instead added it to the whole number, 6. The student needs to focus on understanding how to solve for quotients of decimals to the hundredths place.

Item Position	Rationales	
24	Option D is correct	To determine the area (the space within the perimeter of a figure) of the square in square inches, the student should have recognized that the perimeter (the sum of all the side lengths) of a square is found by adding all four side lengths. Second, the student should have found the side length by dividing the perimeter by 4, since a square has four equal sides: 36 ÷ 4 = 9. Last, the student should have found the area by multiplying the side length by itself: 9 × 9 = 81. 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 identified the side length of the square by dividing the perimeter by 4: 36 ÷ 4 = 9. The student needs to focus on understanding how to find the area of a square after finding the side length.
	Option B is incorrect	The student likely multiplied the perimeter by 2: 36 × 2= 72. The student needs to focus on understanding how to find the area of a square when given the perimeter.
	Option C is incorrect	The student likely added the side length to itself rather than multiplying it by itself: 9 + 9 = 18. The student needs to focus on understanding how to find the area of a square when given the perimeter.

Item Position	Rationales	
25	11, 13	To determine which missing values complete the table to represent the rule $y = x + 7$, the student should have understood that the x-values should be added to 7 to obtain the y-values, and 7 should be subtracted from the y-values to obtain the x-values. The student could have substituted (put a given number in for a variable) the x-value corresponding to the missing y-value into the rule and determined that $y = 4 + 7 = 11$. The student could have substituted the y-value corresponding to the missing x-value into the rule and determined that $20 = x + 7$. Then the student could have determined $20 - 7 = x$, and thus that $13 = x$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
26	Option D is correct	To determine how many milliliters of iced tea are in all 6 glasses combined, the student could have first determined the number of liters of tea in all the glasses by multiplying the number of glasses of tea, 6, by the number of liters of iced tea in each glass, 0.3. This results in 1.8 liters of iced tea. The student should have then referred to the units shown in the Volume and Capacity section of the STAAR Grade 5 Mathematics Reference Materials to find that 1 liter (L) = 1,000 milliliters (mL). The student could have then multiplied the number of liters (1.8) by the liters-to-milliliters conversion factor (1,000), resulting in 1,800 milliliters. 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 found the total number of liters of iced tea and used a conversion factor of 10,000 instead of 1,000, resulting in $1.8 \times 10{,}000 = 18{,}000$ milliliters. The student needs to focus on understanding problem situations and attending to the details of problems that involve measurements and conversions.
	Option B is incorrect	The student likely found the total number of liters of iced tea by multiplying 0.3 by 6 to get 1.8 but did not complete the conversion to milliliters. The student needs to focus on understanding problem situations and attending to the details of problems that involve measurements and conversions
	Option C is incorrect	The student likely found the total number of liters of iced tea and used a conversion factor of 100 instead of 1,000, resulting in $1.8 \times 100 = 180$ milliliters. The student needs to focus on understanding problem situations and attending to the details of problems that involve measurements and conversions.

Item Position	Rationales	
27	multiplicative, product, 14	To determine whether the pattern is additive or multiplicative, the student should have understood that an additive pattern involves adding a common difference to the input to get the output, and a multiplicative pattern involves multiplying each input by a common factor to get a product (the result of a multiplication expression), which in this case is the output. The student could have subtracted each input from the output in order to find that there is no common difference: 168 – 12 = 156, 126 – 9 = 117, 84 – 6 = 78, and 42 – 3 = 39. Then the student could have divided each output by the input to determine the common factor: 168 ÷ 12 = 14, 126 ÷ 9 = 14, 84 ÷ 6 = 14, and 42 ÷ 3 = 14. The common factor of 14 indicates the pattern is multiplicative. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
28	Option A is correct	To determine the list that shows the numbers in order from least to greatest, the student should have compared the digits in each place value. The student could have started with the greatest place value (tens). Since all numbers have 2 in the tens place and 5 in the ones place (the two places to the left of the decimal point), the student should have compared the digits in the tenths place (first place to the right of the decimal point) next. The numbers 25.024 and 25.04 both have a 0 in the tenths place, so they are less than 25.125 and 25.25. Looking next at the hundredths place (second place to the right of the decimal point), 2 is less than 4, so 25.024 is the least number, and 25.04 is the next least. When listing the final two numbers, 25.125 and 25.25, the student should have compared the digits in the tenths place and determined that 1 is less than 2, so 25.25 is the greatest number. Finally, the student could have determined that the numbers in order from least to greatest are 25.024, 25.04, 25.125, and 25.25. 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 ordered the numbers from least to greatest using the digits to the right of the decimal point as whole numbers. The student needs to focus on understanding the value of each place to the right of a decimal to compare and order numbers.
	Option C is incorrect	The student likely reversed the order of the two least numbers in the list. The student needs to focus on understanding how to compare decimals.
	Option D is incorrect	The student likely reversed the order of the two greatest numbers in the list. The student needs to focus on understanding how to compare decimals.

Item Position	Rationales	
29	*x*-coordinate, horizontal	To create a true statement to describe the point (0, 3), the student should have understood how ordered pairs are written and the structure of the coordinate grid. The student should have recognized that an ordered pair is written to describe first the *x*-coordinate and then the *y*-coordinate. Therefore, the *x*-coordinate is 0. The student should have also understood that the *x*-axis is the horizontal number line on the coordinate grid, and therefore the *x*-coordinate shows the horizontal distance from the origin. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
30	Option A is correct	To determine the distance in miles that the third student ran, the student could have first found the total distance the first and second students ran. The student could have added $\frac{3}{4} + 0.65$ by converting $\frac{3}{4}$ to a decimal, $\frac{3}{4} = 0.75$, and then adding 0.75 + 0.65 = 1.4. To find the distance the third student ran, the student could have then subtracted the sum of the first and second students' distances from the total length of the race: $2\frac{1}{4} - 1.4$. To subtract, the student could have converted $2\frac{1}{4}$ to a decimal, $2\frac{1}{4} = 2.25$, and then subtracted 2.25 – 1.4 = 0.85. 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 incorrectly converted $2\frac{1}{4}$ to 2.14 and $\frac{3}{4}$ to 0.34 and then added 0.34 + 0.65 = 0.99. Then, the student likely subtracted 0.99 from the total of 2.14 to get 1.15. The student needs to focus on understanding how to convert fractions to decimals to solve problems.
	Option C is incorrect	The student likely added all three given numbers by first converting the mixed number and fraction to decimals: $2\frac{1}{4} = 2.25$ and $\frac{3}{4} = 0.75$. The student then likely added the decimals: 2.25 + 0.75 + 0.65 = 3.65. The student needs to focus on understanding which mathematical operation(s) (+, −, ×, ÷) to use when solving word problems.
	Option D is incorrect	The student likely incorrectly converted $2\frac{1}{4}$ to 2.14 and $\frac{3}{4}$ to 0.34 and then added 0.34 + 0.65 = 0.99. Then the student likely subtracted 0.99 from the total of 2.14 incorrectly. The student likely subtracted the smaller digit from the larger digit in each place value to get 2.85. The student needs to focus on understanding how to convert fractions to decimals and how to subtract two numbers to solve problems.

Item Position	Rationales	
31	257.7, 257.68	To determine the value of 257.684 when rounded to the nearest tenth and the nearest hundredth, the student should have first understood that when a number is rounded to the tenths place (first place to the right of the decimal point), the digit in the hundredths place (second place to the right of the decimal point) determines how the decimal will be rounded. Next, the student should have used the rules of rounding (a digit of 0, 1, 2, 3, or 4 means that the digit to the left does not change; a digit of 5, 6, 7, 8 or 9 means that the digit to the left is increased by 1) to identify that 257.6**8**4 has an 8 in the hundredths place and will therefore round to 257.7 when it is rounded to the nearest tenth. Then the student should have understood that when a number is rounded to the hundredths place, the digit in the thousandths place (third place to the right of the decimal point) determines how the decimal will be rounded. Next, the student should have used the rules of rounding to identify that 257.68**4** has a 4 in the thousandths place and therefore rounds to 257.68 when it is rounded to the nearest hundredth. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
32	Option A is correct	To determine the product (the result of a multiplication expression) of 538 and the sum (the result when two or more quantities are added) of 42 and 6, the student should have first calculated the sum of 42 and 6 as 42 + 6 = 48. The student then should have multiplied 538 by 48, resulting in the product 25,824.
	Option B is incorrect	The student likely included a placeholder value of 0 on the partial products in both the first and the second step of multiplication, resulting in 43,040 + 21,520 = 64,560. The student needs to focus on understanding how to use placeholders of zero when carrying out the steps in the multiplication algorithm (procedure).
	Option C is incorrect	The student likely did not add the regrouped number after each multiplication step, resulting in 4,044 + 20,220 = 24,264. The student needs to focus on understanding how to use placeholders of zero when carrying out the steps in the multiplication algorithm (procedure).
	Option D is incorrect	The student likely calculated the product of 538 and 42, resulting in 22,596. The student then likely found the sum of 22,596 and 6, resulting in 22,602. The student needs to focus on understanding the order of mathematical operations (+, −, ×, ÷) to use when solving multistep problems.

Item Position	Rationales	
33	Option C is correct	To determine the value of the expression, the student should have used the order of operations (represented by acronyms such as PEMDAS or BODMAS). The student should have completed the operations in this order: (1) operations contained in Parentheses or brackets, (2) Exponents (the number of times a number is multiplied by itself), (3) Multiplication/Division from left to right, and (4) Addition/Subtraction from left to right. First, the student should have performed the operations inside the brackets. Within the brackets are two sets of parentheses, so the student should have evaluated them individually. The student should have calculated the subtraction in the first set of parentheses as $9 - 5 = 4$. The student should have calculated the addition in the second set of parentheses as $3 + 7 = 10$. The student then should have performed the multiplication step in the brackets, $4 \times 10 = 40$, resulting in the expression $8 + 40 - 2$. The student then should have performed the addition and subtraction operations from left to right, resulting in $8 + 40 - 2 = 48 - 2 = 46$.
	Option A is incorrect	The student likely performed the operations from left to right without considering the grouping symbols, resulting in $8 + 9 - 5 \times 3 + 7 - 2$ $= 17 - 5 \times 3 + 7 - 2$ $= 12 \times 3 + 7 - 2$ $= 36 + 7 - 2$ $= 43 - 2$ $= 41$. The student needs to focus on understanding how to simplify numerical expressions using the order of operations correctly.
	Option B is incorrect	The student likely performed all the operations inside the brackets from left to right without considering the parentheses. The student likely evaluated the expression in the brackets by subtracting $9 - 5 = 4$ first, multiplying $4 \times 3 = 12$ next, and finally adding $12 + 7 = 19$. Last, the student likely calculated $8 + 19 - 2 = 21$. The student needs to focus on understanding how to simplify numerical expressions using the order of operations correctly.
	Option D is incorrect	The student likely performed addition and subtraction before multiplication and disregarded the brackets. The student likely calculated the operations in the parentheses as $9 - 5 = 4$ and $3 + 7 = 10$. The student then likely added $8 + 4 = 12$ and $10 - 2 = 8$ and finally multiplied $12 \times 8 = 96$. The student needs to focus on understanding how to simplify numerical expressions using the order of operations correctly.

Item Position	Rationales	
34	13, left over	To determine the number of complete gift bags Brenda can make, the student should have recognized this as a division scenario. The student could have used the standard algorithm (procedure) to divide the total number of pieces of candy, 165, by the number of pieces of candy in each gift bag, 12, resulting in 165 ÷ 12 = 13, with a remainder of 9. The student then should have identified that there are enough pieces of candy for 13 complete gift bags. The student then should have identified that the remainder, 9, represents the number of pieces of candy left over after the 13 gift bags are filled. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.