Item Position	Rationale	
1	Option A is correct	To determine how many visitors were at the park on Wednesday, the student should have first used the bar graph (a graph that uses either vertical or horizontal bars to display categories of data) to identify the number of visitors on Friday (400) and then divided that number by 2 (taking half of a number is equivalent to dividing by 2): 400 ÷ 2 = 200.
	Option B is incorrect	The student likely used the bar graph and found the halfway point between Tuesday's total (125) and Thursday's total (225): (125 + 225) ÷ 2 = 175. The student needs to focus on attending to the details of problems that involve data.
	Option C is incorrect	The student likely multiplied by 2 instead of dividing by 2. The student needs to focus on attending to the details of problems that involve data.
	Option D is incorrect	The student likely misinterpreted Wednesday's number of visitors as being the same as Friday's. The student needs to focus on attending to the details of problems that involve data.

Item Position		Rationale
2	Option D is correct	To determine the number of complete rows the farmer can plant, the student should have divided the total number of seeds (1,850) by the number of seeds in each row (40): 1,850 ÷ 40 = 46.25. The student then needed to identify that there are enough seeds for 46 *complete* rows (and one-fourth of an additional row of seeds). 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 misinterpreted the remainder and rounded up to the next greater whole number. The student needs to focus on attending to the details of problems that involve division.
	Option B is incorrect	The student likely divided 1,850 by 40 but did not complete the calculation after subtracting 185 – 160. At this step in the long division algorithm (procedure), the student should have brought the zero from 1,850 down, resulting in 250. Instead, the student placed a zero in the ones place of the quotient (the answer to a division problem), showing that 25 could not be divided by 40. The student needs to focus on understanding how to carry out all the steps in the division algorithm with accuracy.
	Option C is incorrect	The student likely divided 1,850 by 40 but did not subtract 185 – 160 correctly, subtracting only the ones place and then bringing down the zero to make the new dividend (number being divided), 50. The divisor (the number by which the dividend is being divided), 40, goes into 50 only once. The student likely did not account for the remainder of 10 and determined the number of complete rows to be 41. The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy.

Item Position		Rationale
3	Option A is correct	To determine the rectangular prisms that have a volume (amount of space occupied by a three-dimensional object) of 24 cubic centimeters, the student should have used the formula for the volume of a rectangular prism from the Volume section of the STAAR Grade 5 Mathematics Reference Materials: $V = l \times w \times h$, where V = volume, l = length, w = width, and h = height. The student should have calculated $4 \times 2 \times 3 = 24$.
	Option B is correct	To determine the rectangular prisms that have a volume of 24 cubic centimeters, the student should have used the formula for the volume of a rectangular prism from the Volume section of the STAAR Grade 5 Mathematics Reference Materials: $V = l \times w \times h$, where V = volume, l = length, w = width, and h = height. The student should have calculated $6 \times 2 \times 2 = 24$.
	Option C is incorrect	The student likely added the side lengths $(8 + 8 + 8 = 24)$ instead of multiplying. The student needs to focus on representing and solving problems related to volume.
	Option D is incorrect	The student likely added the side lengths $(9 + 5 + 10 = 24)$ instead of multiplying. The student needs to focus on representing and solving problems related to volume.
	Option E is incorrect	The student likely added the side lengths $(8 + 10 + 6 = 24)$ instead of multiplying. The student needs to focus on representing and solving problems related to volume.

Item Position	Rationale	
4	Option A is correct	To determine which expression is equivalent to the given 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 multiplication step within the parentheses (1.7 × 2.3) = 3.91, which leads to the expression 6[2 + 3.91] + 39.
	Option B is incorrect	The student likely solved from left to right, multiplying 6 × 2 first. The student needs to focus on understanding how to use the order of operations and how to simplify numerical expressions.
	Option C is incorrect	The student likely solved from right to left, adding 2.3 + 39 first. The student needs to focus on understanding how to use the order of operations and how to simplify numerical expressions.
	Option D is incorrect	The student likely performed the operations within the brackets from left to right without considering the parentheses, adding 2 + 1.7 first. The student needs to focus on understanding how to use the order of operations and how to simplify numerical expressions.

Item Position	Rationale	
5	Option C is correct	To determine which equation can be used to find z, the length of the leftover string in inches, the student should have identified the equation where the total length of the string (84) is equal to the length in inches (18) of each piece Jeremy cuts times the number of pieces (4), plus the unknown leftover amount, z. The result is $84 = (18 \times 4) + z$.
	Option A is incorrect	The student likely misunderstood the "leftover string" as indicating subtraction rather than addition and subtracted z instead of adding. The student needs to focus on understanding how a number in a problem situation is related to the other numbers in the problem situation and the mathematical operations ($+$, $-$, $\times$, $\div$) that are required to solve the problem.
	Option B is incorrect	The student likely confused the addition and multiplication symbols. The student needs to focus on understanding how a number in a problem situation is related to the other numbers in the problem situation and the mathematical operations ($+$, $-$, $\times$, $\div$) that are required to solve the problem.
	Option D is incorrect	The student likely misunderstood the operation needed to find the remaining string to be dividing by z rather than adding z. The student needs to focus on understanding how a number in a problem situation is related to the other numbers in the problem situation and the mathematical operations ($+$, $-$, $\times$, $\div$) that are required to solve the problem.

Item Position		Rationale
6	Option B is correct	To determine which number should be listed third, 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 4.760, 4.800, 4.753, and 4.801. The student should have then ordered the four numbers from least to greatest by comparing the digits in each place value starting with the greatest place value (ones). Since all four numbers have the digit 4 in the ones place (the digit to the left of the decimal point), the student should have compared the digits in the tenths place next. The numbers 4.760 and 4.753 both have a 7 in the tenths place, so they are less than 4.800 and 4.801. Looking next at the hundredths place, 5 is less than 6, so 4.753 is the least number. The second least number is 4.760. Finally, the student needs to compare the two greater numbers, 4.800 and 4.801. Both numbers have a 4 in the ones place, an 8 in the tenths place, and a zero in the hundredths place, but 4.800 has a zero in the thousandths place, making it less than 4.801, which has a 1 in the thousandths place. Therefore, 4.8 (4.800) is the third number in the list when the four numbers are listed from least to greatest. 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 listed the numbers from greatest to least. The student needs to focus on attending to the details of problems that involve comparing decimal numbers.
	Option C is incorrect	The student likely listed the four numbers from least to greatest using only the digits to the right of the decimal points, without considering the place value of each digit. Instead, the student treated the digits to the right of the decimal points as though they were whole numbers and listed them from least to greatest: 8, 76, 753, 801. Since 753 is the third number in this list, the student selected 4.753 as the third number when all four numbers are listed from least to greatest. The student needs to focus on understanding how to compare decimal numbers.
	Option D is incorrect	The student likely reversed the order of 4.8 (4.800) and 4.801 in the list from least to greatest. The student needs to focus on understanding how to compare decimal numbers.

Item Position	Rationale	
7	Option C is correct	To determine how to classify the triangle shown, the student should have understood the characteristics of each type of triangle in the graphic organizer. An acute triangle has three angles that measure less than 90°. An equiangular triangle has three angles that all measure 60° (typically indicated with an arc on each angle). An obtuse triangle has one angle that measures more than 90°. A right triangle has one angle that measures 90° (typically indicated with a right-angle symbol). There are no right angles in triangle *XYZ*, not all angles appear to measure less than 90°, and all angles do not appear to be equal. One angle (angle *ZXY*) appears to measure more than 90° which makes the triangle obtuse.
	Option A is incorrect	The student likely saw two acute angles (angles *XYZ* and *XZY*) and thought that the triangle was an acute triangle. The student needs to focus on understanding the attributes of triangles and how they can be classified.
	Option B is incorrect	The student likely knew that the sum of the angle measures in a triangle equals 180° and incorrectly divided 180° by 3 angles. The student needs to focus on understanding the attributes of triangles and how they can be classified.
	Option D is incorrect	The student likely misidentified angle *X* as a right angle instead of an obtuse angle. The student needs to focus on understanding the attributes of triangles and how they can be classified.

Item Position		Rationale
8	$\frac{1}{5}$, 2, $\frac{1}{10}$	To determine the equation that can be used to represent Sarah's sharing $\frac{1}{5}$ of a cake equally with her friend, the student could have realized that the vertical lines divide the model into 5 equal pieces and that the total of the shaded sections represents the fraction of the cake Sarah started with $\left(\frac{1}{5}\right)$. Next, the student could have identified the dashed horizontal line as dividing each of the 5 pieces of cake in half ($\div$ 2). Finally, the student could have noticed that, when each of the 5 pieces is divided in half, there are a total of 10 pieces, 1 of which Sarah will keep and 1 of which $\left(\frac{1}{10}\right)$ she will give to her friend: $\frac{1}{5} \div 2 = \frac{1}{10}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationale	
9	Option B is correct	To determine which graph best represents the total cost for each customer, the student should have understood that the *x*-axis (horizontal number line) represents the cost before using the coupon, and the *y*-axis (vertical number line) represents the cost after using the coupon (as shown in the axes' titles). The student should have identified the graph whose *y*-coordinates are each 5 less than the corresponding *x*-coordinates.
	Option A is incorrect	The student likely did not subtract the $5 discount and found the graph with points where the *x*-coordinates and *y*-coordinates were the same. 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 graphed only the $5 discount as every *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 outcome of using a coupon and added $5 to the initial cost instead of subtracting. The student needs to focus on understanding how to graph ordered pairs of numbers arising from real-world problems.

Item Position	Rationale	
10	Option A is correct	To determine how much each gallon of gas costs, the student could have used the long division algorithm (procedure) to divide the total cost of the gas ($29.77) by the total number of gallons (13), resulting in $2.29 per gallon ($29.77 \div 13 = 2.29$). 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 used repeated subtraction to divide 29.77 by 13 and subtracted 13 from 29.77 as many times as possible until the difference was less than 13 ($29.77 - 13 - 13 = 3.77$). The student then confused the remainder with the quotient (answer to a division problem). The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy and focus on solving for quotients of decimals to the hundredths place.
	Option C is incorrect	The student likely did not subtract 26 from 29 in the first step of the long division algorithm and instead brought down the first 7 from 29.**7**7. Since 7 cannot be divided by 13, the student placed a zero to the right of the decimal point in the quotient and proceeded to bring down the 7 from 29.7**7**. Finally, the student likely determined that 6 groups of 13 can be made from 77 and determined the answer to be 2.06. The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy and focus on solving for quotients of decimals to the hundredths place.
	Option D is incorrect	The student likely misplaced the decimal point when dividing 29.77 by 13 (297.7 ÷ 13 = 22.90). The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy and focus attending to the details of problems that involve solving for quotients of decimals to the hundredths place.

Item Position		Rationale
11	Option B is correct	To determine which stem and leaf plot (a stem and leaf plot displays the data with each number split into a stem [the first digit or digits of the number] and a leaf [the last digit of the number]) represents the numbers of soccer games that the team won, the student could have started by listing the numbers of games won in order from least to greatest. Using the key "2|4 represents 24 wins" to interpret the meaning of the stems and leaves, the student should have recognized that the first stem, 0, has 7 and 9 as leaves. Option B identifies all the listed data points in the correct stem and leaf format. 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 where to place the 7 and the 9, since they are each only one digit, and chose to place them as stems, assigning each a leaf of zero. The student needs to focus on understanding how to set up a stem and leaf plot from the data given.
	Option C is incorrect	The student likely listed out each number with an individual leaf (ones digit) and an individual stem (tens digit). The student needs to focus on understanding how to set up a stem and leaf plot from the data given.
	Option D is incorrect	The student likely confused the place value that represents the stem with the place value that represents the leaf (as indicated by the key) for each piece of data. The student needs to focus on understanding how to set up a stem and leaf plot from the data given.

Item Position		Rationale
12	$1\frac{5}{8}$ and any equivalent values are correct	To determine the total number of miles Easton rode his bike last week, the student could have written the 0.75 shown for Wednesday as a fraction and added it to the fractions listed for Monday and Friday. To write 0.75 as a fraction, the student could have identified the number as seventy-five hundredths, or $\frac{75}{100}$. Both 75 and 100 are divisible by 25, so the fraction can be reduced to $\frac{3}{4}$. The student then could have added Monday's and Wednesday's distances, which share 4 as a denominator $\left(\frac{1}{4}+\frac{3}{4}=1\right)$. Finally, the student could have added 1 and $\frac{5}{8}$ to determine the sum of the miles for all three days, $1\frac{5}{8}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position		Rationale
13	Option A is correct	To determine how many numbers in the list are composite numbers (a positive integer that has at least one divisor other than 1 and itself), the student should have identified the numbers that have more than two factors (numbers multiplied together to arrive at a product, or answer: factor × factor = product). The student should have determined that 51 has four factors (1 × 51, 3 × 17); 52 has six factors (1 × 52, 2 × 26, 4 × 13); 53 has only two factors (1 × 53), which means it is a prime number; 54 has eight factors (1 × 54, 2 × 27, 3 × 18, 6 × 9); and 55 has four factors (1 × 55, 5 × 11). Therefore, 4 of the 5 numbers listed are composite numbers.
	Option B is incorrect	The student likely confused the definition of composite numbers with the definition of prime numbers. The student needs to focus on understanding the difference between composite numbers and prime numbers.
	Option C is incorrect	The student likely confused the definition of composite numbers with the definition of even numbers, selecting 52 and 54 as the 2 even numbers. The student needs to focus on understanding the difference between composite numbers and even numbers.
	Option D is incorrect	The student likely identified 51 as a prime number because its two factors other than 1 and itself, 3 × 17, are not as commonly known. The other 3 composite numbers have more identifiable factors. Both 52 and 54 are even, which means they (at least) have 2 as a factor, and 55 has a 5 in the ones place, which means it has 5 as a factor. The student needs to focus on understanding the steps to take when identifying factors of given numbers.

Item Position		Rationale
14	Option C is correct	To determine which graph includes only points that follow the rule $y = x + 4.5$, 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) identified on the coordinate plane into the equation and solved for the y-coordinate (value indicating up/down movement on the y-axis). In option C, the first identified x-coordinate is 1, so $y = (1) + 4.5$, $y = 5.5$, and (1, 5.5) is a point on the graph. The x-coordinate is 3, so $y = (3) + 4.5$, $y = 7.5$, and (3, 7.5) is a point on the graph. 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 the x-coordinate by 4.5 to determine the y-coordinate, instead of adding 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 $y = x + a$.
	Option B is incorrect	The student likely thought the y-value when $x = 1$ is found by starting with the y-value when $x = 0$ and adding 4.5. 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 D is incorrect	The student likely confused the x-values and the y-values, graphing the output (y-value) on the x-axis and the input (x-value) on the y-axis. 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		Rationale
15	Option B is correct	To determine which numbers Imogen could have rounded to the nearest tenth to get 124.6, the student should have first determined that the digit in the hundredths place (second place to the right of the decimal point) will determine 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 will not change; a digit of 5, 6, 7, 8, or 9 means that the digit to the left will be increased by 1) to identify that 124.5**5** has a 5 in the hundredths place and will therefore round to 124.6.
	Option E is correct	To determine which numbers Imogen could have rounded to the nearest tenth to get 124.6, the student should have first determined that the digit in the hundredths place will determine how the decimal will be rounded. Next, the student should have used the rules of rounding to identify that 124.6**1**5 has a 1 in the hundredths place and will therefore round to 124.6.
	Option A is incorrect	The student likely misunderstood the process of rounding a number to the tenths place, using the digit in the tenths place to round the digit in the hundredths place, 124.0<u>**6**</u> (rather than using the digit in the hundredths place to round the digit in the tenths place, 124.**0**<u>6</u>). Believing that the zero indicated that the 6 would remain the same, the student likely removed the zero in the tenths place, leaving 124.6. The student needs to focus on attending to the details of problems that compare decimal numbers rounded to the nearest tenth.
	Option C is incorrect	The student likely rounded to the nearest hundredth instead of the nearest tenth to get 124.06 and removed the 0 in the tenths place. The student needs to focus on attending to the details of problems that compare decimal numbers rounded to the nearest tenth.
	Option D is incorrect	The student likely confused the rules for rounding numbers and rounded up when the number, 124.5**1,** should have been rounded down (1 in the hundredths place means that the 5 in the tenths place would not change, and the number would

		round to 124.5). The student needs to focus on attending to the details of problems that compare decimal numbers rounded to the nearest tenth.

Item Position		Rationale
16	Option D is correct	To determine the value of the expression, the student could have found the least common denominator (smallest multiple shared by the bottom numbers of all the fractions) for the fractions given. The denominators are 12, 5, and 10, and the least common multiple they have is 60. Next, the student should have multiplied both the numerator (top number in a fraction) and the denominator of each fraction by a number to get a fraction with a denominator of 60: $\frac{1}{12} \times \frac{5}{5} = \frac{5}{60}$, $\frac{1}{5} \times \frac{12}{12} = \frac{12}{60}$, and $\frac{3}{10} \times \frac{6}{6} = \frac{18}{60}$. Then, once a common denominator was obtained, the student should have added the three fractions: $$\frac{5}{60} + \frac{12}{60} + \frac{18}{60} + \frac{35}{60}$$ 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 numerators and the denominators: $\frac{1+1+3}{12+5+10} = \frac{5}{27}$. The student needs to focus on understanding how to add fractions with different denominators.
	Option B is incorrect	The student likely added the numerators and used the greatest denominator listed, 12, rather than finding a common denominator: $\frac{1+1+3}{12} = \frac{5}{12}$. The student needs to focus on understanding how to add fractions with different denominators.
	Option C is incorrect	Change the first sentence to: The student likely added the numerators and used the least denominator listed, 5, rather than finding a common denominator: $\frac{1+1+3}{5} = \frac{5}{5}$. The student needs to focus on understanding how to add fractions with different denominators.

Item Position		Rationale
17	Option A is correct	To determine how many slices of pie Miri has, the student should have interpreted "cut into equal slices" 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 B is incorrect	The student likely multiplied $\frac{3}{1}$ by $\frac{1}{6}$ instead of dividing: $\frac{3}{1} \times \frac{1}{6} = \frac{3}{6}$. The student needs to focus on attending to the details of problems that involve dividing a whole number by a fraction.
	Option C is incorrect	The student likely misunderstood the process used to write a whole number as a fraction and rewrote 3 as $\frac{3}{3}$. Next, the student likely multiplied by $\frac{1}{6}$ instead of dividing: $\frac{3}{3} \times \frac{1}{6} = \frac{3}{18}$. 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 found the reciprocal (the fraction with the positions of the numerator and denominator switched) 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.

Item Position		Rationale
18	Option D is correct	To determine the value of the expression shown, 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, the first operation to perform is the multiplication step within the parentheses: $5 \times 2 = 10$. Second, the student should have performed the division step: $20 \div 10 = 2$. Then the student should have performed the subtraction step within the brackets: 30 − 2 = 28. Finally, the student should have multiplied by 2, resulting in 56: $2 \times 28 = 56.$
	Option A is incorrect	The student likely performed the operations inside the outer brackets from left to right without considering the parentheses. 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 the operations from left to right. The student needs to focus on understanding how to simplify numerical expressions using the order of operations correctly.
	Option C is incorrect	The student likely performed the operations using the order of operations but without considering the parentheses, dividing 20 ÷ 5 = 4 first, multiplying 4 × 2 = 8 next, and finally subtracting 30 − 8 = 22 before multiplying by 2. The student needs to focus on understanding how to simplify numerical expressions using the order of operations correctly.

Item Position		Rationale
19	*y*-axis, *x*-coordinate, origin	To determine which term matches each given description, the student should have understood the structure of the coordinate plane. The student should have understood that the *y*-axis is the vertical number line on the coordinate plane. The student should also have recognized that ordered pairs are written to describe first the *x*-coordinate (indicating left/right movement on the *x*-axis) and then the *y*-coordinate (indicating up/down movement on the *y*-axis). Finally, the student should have recognized that the point where the horizontal axis intersects the vertical axis is called the origin.

Item Position		Rationale
20	Option B is correct	To determine which model represents the equation 1.20 ÷ 4 = 0.30, the student should have recognized that each 10-by-10 square represents hundredths, which can also represent 100 pennies. In addition, the student should have recognized that $1.20 is equivalent to 120 pennies and that $0.30 is equivalent to 30 pennies. Next, the student should have recognized that the shaded squares separated into 4 groups represent the 120 pennies divided equally into 4 stacks, with each stack containing 30 pennies.
	Option A is incorrect	The student likely recognized that 4 groups of pennies were needed but failed to recognize that not all 120 shaded squares were used. The student needs to focus on understanding how to interpret hundredths models.
	Option C is incorrect	The student likely chose the model that has 30 squares in each group from the first (completely shaded) hundredths block but failed to recognize that not all 120 shaded squares were used and that each group also contained 6 squares from the second hundredths block. The student needs to focus on understanding how to interpret hundredths models.
	Option D is incorrect	The student chose a model that represents 1.20 ÷ 3 = 0.40, likely misunderstanding the value of the divisor (number dividing the dividend) and the quotient (answer to a division problem). The student needs to focus on understanding how to interpret hundredths models.

Item Position		Rationale
21	net income, subtracted from her gross income.	To complete the statement about Rosa's take-home pay, the student should have recognized that Rosa's take-home pay is equal to her weekly salary minus any income taxes and deductions. The student should have recognized that $450 represents Rosa's gross income and that her take-home pay is the same as her net income. The student should have recognized that taxes and deductions are subtracted from Rosa's gross income ($450) to determine her take-home pay.

Item Position		Rationale
22	Option C is correct	To determine approximately how many more milliliters of water Jar Y has than Jar X, the student should have recognized that the number of milliliters of water that Jar X contains needs to be subtracted from the number of milliliters of water that Jar Y contains. In addition, the student could have recognized that since the answer is an approximation, the numbers should be rounded. The student could have rounded 705.2 mL to 700 mL and 192.6 mL to 200 mL and then subtracted: 700 − 200 = 500. 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 rounded 192.6 to 200 and 705.2 to 700 and then added the rounded numbers instead of subtracting. The student needs to focus on understanding the vocabulary in a problem situation that indicates subtraction.
	Option B is incorrect	The student likely rounded 192.6 to 100 and 705.2 to 700 and then added the rounded numbers instead of subtracting. The student needs to focus on understanding the vocabulary in a problem situation that indicates subtraction and find a reasonable estimate (an approximate value close enough to the exact value).
	Option D is incorrect	The student likely rounded 192.6 to 100 and 705.2 to 700 and then subtracted the rounded numbers. The student needs to focus on understanding how to find a reasonable estimate (an approximate value close enough to the exact value).

Item Position		Rationale
23	Option A is correct	To determine the value of 1.5 × 1.12, the student could have used the distributive property to evaluate (1 × 1.12) + (0.5 × 1.12), resulting in 1.12 + 0.56 = 1.68. 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 multiplied the digits in the ones place together and the digits after the decimal point together and then added: (1 × 1) + (0.5 × 0.12) = 1 + 0.06 = 1.06. The student needs to focus on attending to the details of problems that involve multiplication and understanding how to solve for products of decimals to the hundredths place.
	Option C is incorrect	The student likely multiplied the digits in the ones place together and the digits after the decimal point together and then added: (1 × 1) + (0.5 × 0.12) = 1 + 0.06 = 1.06. The student then moved the decimal point one place to the right to get 10.6, confusing the steps for multiplying decimals using the distributive property with the steps of the standard algorithm (procedure). The student needs to focus on attending to the details of problems that involve multiplication and understanding how to solve for products of decimals to the hundredths place.
	Option D is incorrect	The student likely multiplied the decimals correctly using the standard algorithm (procedure), but then placed the decimal point incorrectly. The student needs to focus on understanding place value when multiplying decimals.

Item Position		Rationale
24	Option C is correct	To determine the length of the tablecloth in inches, the student should have used the formula from the Perimeter section of the STAAR Grade 5 Mathematics Reference Materials: $P = 2l + 2w$, where P = perimeter (distance around the outside of a figure), l = length, and w = width. The student could have substituted (put a given number in for a variable) the two given measurements, $P = 320$ and $w = 70$, in the formula: $320 = 2l + 2(70)$, or $320 = 2l + 140$. Then the student could have solved the equation for l by subtracting 140 from both sides to obtain $180 = 2l$ and then dividing both sides by 2 to obtain $l = 90$ inches. 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 subtracted the given width (70) from the perimeter one time. The student needs to focus on understanding how to solve problems related to perimeter.
	Option B is incorrect	The student likely found the sum of the two lengths of the tablecloth but neglected to divide the result by 2. The student needs to focus on understanding how to solve problems related to perimeter.
	Option D is incorrect	The student likely subtracted the given width (70) from the perimeter one time and then divided the result by 2. The student needs to focus on understanding how to solve problems related to perimeter.

Item Position		Rationale
25	÷, 12	To determine the equation that can be used to show the number of laps Trisha runs, the student should have recognized that the total number of miles Trisha ran needs to be divided by the length in miles of one lap: $3 \div \frac{1}{4}$. The number 3 can be written as a fraction with a denominator (bottom number) of 1, $\frac{3}{1}$. Then the student could have used the standard algorithm (procedure) to determine that $\frac{3}{1}$ divided by $\frac{1}{4}$ is equal to $\frac{3}{1}$ multiplied by the reciprocal (fraction with the positions of the numerator and denominator switched) of $\frac{1}{4}$: $\frac{3}{1} \times \frac{4}{1} = 12$. Last, the student should have created an equation with the division sign and the quotient (answer to a division problem): $3 \div \frac{1}{4} = 12.$

Item Position		Rationale
26	Option D is correct	The student should have recognized that the number of unit cubes needed to fill the prism is the volume of the prism in cubic inches. The student should have used the formula from the Volume section of the STAAR Grade 5 Mathematics Reference Materials: $V = l \times w \times h$, where V = volume, l = length, w = width, and h = height. The student should have recognized that the length is 2 in., the width is 4 in., and the height is 2 in., and then multiplied to find the volume, or the number of unit cubes needed: $2 \times 4 \times 2 = 16$.
	Option A is incorrect	The student likely added the three dimensions shown in the diagram: $2 + 2 + 4 = 8$. The student needs to focus on solving problems related to the volume of a rectangular prism.
	Option B is incorrect	The student likely correctly calculated the number of unit cubes needed to fill the prism but then multiplied by 3 because of the word "cubic." The student needs to focus on solving problems related to the volume of a rectangular prism.
	Option C is incorrect	The student likely added the three dimensions shown in the diagram and then multiplied the result by 3 because of the word "cubic." The student needs to focus on solving problems related to the volume of a rectangular prism.

Item Position		Rationale
27	Option C is correct	To determine the difference between the greatest and least numbers of hours practiced, the student should have first analyzed the dot plot (a graphical way of showing the frequency of an event by placing a dot or dots above a value on a number line), looking for the maximum and minimum values. The maximum number of hours that a player practiced, as shown in the dot plot, is $4\frac{1}{2}$. The minimum number of hours that a player practiced is 1. To find the difference, the student should have subtracted the minimum value from the maximum value: $4\frac{1}{2} - 1 = 3\frac{1}{2}$.
	Option A is incorrect	The student likely subtracted the minimum value shown on the number line, $\frac{1}{2}$, from the maximum value shown on the number line, $4\frac{1}{2}$. The student needs to focus on interpreting and understanding data shown on a dot plot.
	Option B is incorrect	The student likely added the maximum number of hours practiced to the minimum number of hours practiced: $4\frac{1}{2} + 1 = 5\frac{1}{2}$. The student needs to focus on understanding the vocabulary in a real-life situation that indicates subtraction and on understanding which operation to use.
	Option D is incorrect	The student likely subtracted the number of hours practiced by the least number of players from the number of hours practiced by the greatest number of players. Since 4 players practiced for $1\frac{1}{2}$ hours, and no players practiced for $\frac{1}{2}$ hour, the student likely calculated $1\frac{1}{2} - \frac{1}{2} = 1$. The student needs to focus on interpreting and understanding data shown on a dot plot.

Item Position		Rationale
28	5, 2, 10	To determine the equation that represents the expression and its product, the student should have recognized that each rectangle in the model has 5 of the 8 smaller rectangles shaded, so each rectangle represents the fraction $\frac{5}{8}$. Next, since the model has 2 identical rectangles, the student should have determined that, in the equation that represents the model, $\frac{5}{8}$ should be multiplied by 2: $\frac{5}{8} \times 2 = \frac{10}{8}$.

Item Position		Rationale
29	Option B is correct	To determine the shape that belongs in Group 1 of the Venn diagram but not in Group 2, the student should have identified the shape that contains at least one pair of congruent (same size) sides but that does not contain at least one pair of parallel sides (two line segments that are always an equal distance apart and never meet). The student should have recognized that an isosceles triangle contains two congruent sides but no parallel sides. Option B is the only shape that has the characteristic described for Group 1 but not the characteristic described for Group 2.
	Option A is incorrect	The student likely identified a shape that satisfies the characteristics of both groups. A square contains at least one pair of congruent sides and at least one pair of parallel sides. The student needs to focus on attending to the details of problems that involve identifying the characteristics of polygons.
	Option C is incorrect	The student likely identified a shape that satisfies the characteristic for Group 2 but not the characteristic for Group 1. A trapezoid does not necessarily contain two congruent sides, but it does contain one pair of parallel sides. The student needs to focus on attending to the details of problems that involve identifying the characteristics of polygons.
	Option D is incorrect	The student likely identified a shape that does not belong in either group. A scalene triangle does not contain at least one pair of congruent sides, nor does it contain at least one pair of parallel sides. The student needs to focus on attending to the details of problems that involve identifying the characteristics of polygons.

Item Position		Rationale
30	Option B is correct	To determine the number of ounces of food that Laila feeds her dog each day, the student could have used the long division algorithm (procedure) to divide the total number of ounces of food used (97.5) by the number of days (30), resulting in 3.25 ounces of food per day: 97.5 ÷ 30 = 3.25. 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 did not complete the division algorithm (procedure) and stopped after dividing to the tenths place. The student needs to focus on understanding how to carry out all the steps in the division algorithm with accuracy and focus on solving for quotients of decimals to the hundredths place.
	Option C is incorrect	The student likely divided 97.5 by 30 but misplaced the decimal point in the quotient (answer to a division problem). The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy and focus on solving for quotients of decimals to the hundredths place.
	Option D is incorrect	The student likely did not use the division algorithm correctly. The student likely divided 97 by 30, placing a 3 in the quotient. Then, after subtracting 90 from 97 in the procedure, the student likely divided 7 by 30 before bringing down the 5 from 97.5, therefore placing a zero as the second digit in the quotient. The student completed the division algorithm and then rounded 3.025 to the nearest hundredth. The student needs to focus on understanding how to carry out all the steps in the division algorithm (procedure) with accuracy and focus on solving for quotients of decimals to the hundredths place.

Item Position		Rationale
31	Option D is correct	To determine which comparison is true, the student could have first added zeros as placeholders in the tenths, hundredths, and thousandths places as needed, so that the numbers would have been written as 42.500, 42.000, 42.630, and 41.172. The student should have compared the values of the digits, starting with the tens place (the digit two places to the left of the decimal point). Since all four numbers have the digit 4 in the tens place, the student should have compared the digits in the ones place next. The number 41.172 is the only number with a 1 in the ones place, and therefore is the least number in the comparison. Looking next at the tenths place (the digit to the right of the decimal point), 42.000 has a 0 in the tenths place, making it the second least number, 42.500 has a 5 in the tenths place, making it the second greatest number, and 42.630 has a 6 in the tenths place, making it the greatest number. The correct comparison is 42.63 > 42.5 > 42 > 41.172. 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 chose 41.172 to be the greatest number since it has the greatest number of digits. The student needs to focus on comparing and ordering decimals to the thousandths place.
	Option B is incorrect	The student likely compared the values of only the rightmost digit in each number (42.**5**, 42.6**3**, 41.17**2**, 42.**0**): 5 > 3 > 2 > 0. The student needs to focus on comparing and ordering decimals to the thousandths place.
	Option C is incorrect	The student likely read the "greater than" symbols to mean "less than." The student needs to focus on correctly interpreting mathematical symbols.

Item Position		Rationale
32	36, 10, 12, 120	To determine which values complete the table to represent the relationship $y = 6x$, the student should have understood that the x-values should be multiplied by 6 to obtain the y-values and that the y-values should be divided by 6 to obtain the x-values. The student could have substituted (put a given number in for a variable) the two given x-values into the equation to solve for the two missing y-values: $y = 6(6) = 36$, and $y = 6(20) = 120$. The student could have divided the two given y-values by 6 to obtain the two missing x-values: $x = 60 \div 6 = 10$, and $x = 72 \div 6 = 12$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position		Rationale
33	Option C is correct	To determine which graph represents the values in the table, the student should have recognized that the values in the table can be represented by the ordered pairs (7, 2), (5, 9), and (8, 4). The *x*-coordinate of each ordered pair indicates left/right movement on the *x*-axis, and the *y*-coordinate indicates up/down movement on the *y*-axis. The point (7, 2) is located 7 units to the right of and 2 units up from the origin, the point (5, 9) is located 5 units to the right of and 9 units up from the origin, and the point (8, 4) is located 8 units to the right of and 4 units up from the origin. Option C correctly represents the values in the table.
	Option A is incorrect	The student likely mixed up the meanings of the *x*-coordinate and the *y*-coordinate. The student needs to focus on graphing ordered pairs of numbers in the first quadrant of the coordinate plane.
	Option B is incorrect	The student likely correctly determined the placement when the *x*-coordinate is 7 and the *y*-coordinate is 2 but mixed up the meanings of the *x*-coordinate and the *y*-coordinate for the other two ordered pairs. The student needs to focus on graphing ordered pairs of numbers in the first quadrant of the coordinate plane.
	Option D is incorrect	The student likely correctly determined the placement when the *x*-coordinate is 8 and the *y*-coordinate is 4 but mixed up the meanings of the *x*-coordinate and the *y*-coordinate for the other two ordered pairs. The student needs to focus on graphing ordered pairs of numbers in the first quadrant of the coordinate plane.

Item Position		Rationale
34	Option C is correct	To determine which hundredths model is shaded to represent the equation 0.7 × 0.7 = 0.49, the student should have interpreted the 7 shaded columns of squares and the 7 shaded rows of squares as each representing a value of 0.7 (seven-tenths). Then the student should have concluded that the 49 squares with the darker shading represent a value of 0.49, the product (the result of a multiplication problem) of 0.7 × 0.7. The model represents the equation 0.7 × 0.7 = 0.49.
	Option A is incorrect	The student likely chose the model with 7 shaded columns of squares representing the value 0.7 and 7 unshaded rows of squares as representing the value 0.7, instead of using two groups of shaded squares. The student needs to focus on representing products of decimals to the hundredths place using pictorial models, including area models.
	Option B is incorrect	The student likely chose the model with 6 shaded rows of squares representing the value 0.6 and 8 shaded columns of squares representing the value 0.8, instead of using two groups of shaded squares each representing 0.7. The student needs to focus on representing products of decimals to the hundredths place using pictorial models, including area models.
	Option D is incorrect	The student likely chose the model that has 7 unshaded squares, incorrectly interpreting it as representing 0.7. The student needs to focus on representing products of decimals to the hundredths place using pictorial models, including area models.