

Item Position	Rationales	
1	Option C is correct	To determine which graph contains only points where the value of the y -coordinate is three times the value of the x -coordinate, the student should have substituted (put a given number in for a variable) the x -coordinate (value indicating left/right movement parallel to the x -axis) and the y -coordinate (value indicating up/down movement parallel to the y -axis) of each point (x, y) from the graph into the equation $y = 3x$ to verify the relationship. The first identified x -coordinate is 1, the first identified y -coordinate is 3, and the equation using these values is true: $3 = 3 \times (1)$. The second identified x -coordinate is 2, the second identified y -coordinate is 6, and the equation using these values is true: $6 = 3 \times (2)$. The third identified x -coordinate is 3, the third identified y -coordinate is 9, and the equation using these values is true: $9 = 3 \times (3)$. 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 a graph in which 3 is subtracted from the x -coordinate to determine the y -coordinate, instead of the x -coordinate being multiplied by 3 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 of a verbal description.
	Option B is incorrect	The student likely confused the x -coordinates and the y -coordinates, substituting the y -coordinate as the x -value and the x -coordinate as the y -value in the equation. The student needs to focus on understanding how to generate x - and y -coordinates when given a rule in the form of a verbal description.
	Option D is incorrect	The student likely chose a graph in which the x -coordinate is added to 3 to determine the y -coordinate, instead of being multiplied by 3 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 of verbal description.

Item Position	Rationales	
2	Option B is correct	To determine what is 23 less than the product (the result of a multiplication expression) of 150 and 12, the student should have first calculated the product of 150 and 12 as $150 \times 12 = 1,800$. Then the student should have subtracted 23 from 1,800, resulting in 1,777. 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 add the regrouped number after each multiplication step, resulting in $150 \times 12 = 1,700$ and $1,700 - 23 = 1,677$. The student needs to focus on understanding how to use regrouped numbers when carrying out the steps in the multiplication algorithm (procedure).
	Option C is incorrect	The student likely left out a placeholder value of 0 in the partial products in both the first and the second step of multiplication, resulting in $(150 \times 1) + (150 \times 2) = 450$ and $450 - 23 = 427$. 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 included an extra placeholder value of 0 in the partial product in the first step of multiplication, resulting in $(150 \times 100) + (150 \times 2) = 15,300$ and $15,300 - 23 = 15,277$. The student needs to focus on understanding how to use placeholders of zero when carrying out the steps in the multiplication algorithm (procedure).

Item Position	Rationales	
3	Option B is correct	To determine which expression is equivalent to the expression shown, 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 multiplication within the parentheses, $1.1 \times 3 = 3.3$, and the addition step within the parentheses, $5 + 1.2 = 6.2$, which leads to the expression $[27 - 3.3] \times 6.2$.
	Option A is incorrect	The student likely ignored the parentheses within the brackets and simplified from left to right, subtracting 1.1 from 27 first. The student needs to focus on understanding how to use the order of operations to simplify numerical expressions.
	Option C is incorrect	The student likely ignored the parentheses within the brackets and subtracted 1.1 from 27 first. The student then likely multiplied 5 and 1.2 in the second set of parentheses instead of adding. The student needs to focus on understanding how to use the order of operations to simplify numerical expressions.
	Option D is incorrect	The student likely misread the operation and multiplied 5 and 1.2 in the second set of parentheses instead of adding. The student needs to focus on understanding how to use the order of operations to simplify numerical expressions.

Item Position	Rationales	
4	First option is correct	To determine which model represents the expression $2 \div \frac{1}{6}$, the student should have identified a number line from 0 to 2 in which each of the 2 wholes is divided into 6 parts. The student should have recognized that the total distance, 2, is divided into parts that each represent the fraction $\frac{1}{6}$.
	Fifth option is correct	To determine which model represents the expression $2 \div \frac{1}{6}$, the student should have identified a model that shows 2 wholes, each divided into 6 equal parts. The student should have recognized that the area, 2, is divided into parts that each represent the fraction $\frac{1}{6}$.
	Second option is incorrect	The student identified a model showing 6 wholes divided into 2 parts. The student likely used 6, the denominator (bottom number) of the fraction $\frac{1}{6}$, as the total number of wholes. The student needs to focus on understanding how to represent the division of a whole number by a unit fraction using a pictorial model.
	Third option is incorrect	The student identified a number line that shows 12 wholes divided into 2 equal parts. The student likely multiplied 6, the denominator (bottom number) of the fraction, by the whole number, 2, to determine the number of wholes, 12. The student then likely used 2, the whole number in the expression, to determine the number of parts. The student needs to focus on understanding how to represent the division of a whole number by a unit fraction using a pictorial model.
	Fourth option is incorrect	The student identified a number line that shows 6 wholes divided into 2 equal parts. The student likely used 6, the denominator (bottom number) of the fraction, as the total number of wholes. The student needs to focus on understanding how to represent the division of a whole number by a unit fraction using a pictorial model.

Item Position	Rationales	
5	Option C is correct	To determine the volume (measurement of space or capacity) of the cube in cubic feet, the student should have used the formula for the volume of a cube from the Volume section of the STAAR Grade 5 Mathematics Reference Materials: $V = s \times s \times s$, where V = volume and s = side length. The student should have calculated $8 \times 8 \times 8 = 512$.
	Option A is incorrect	The student likely multiplied two dimensions of the cube instead of all three dimensions, resulting in $8 \times 8 = 64$. The student needs to focus on understanding how to solve problems related to volume.
	Option B is incorrect	The student likely added the three dimensions of the cube ($8 + 8 + 8 = 24$) instead of multiplying. The student needs to focus on understanding how to solve problems related to volume.
	Option D is incorrect	The student likely did not correctly add the regrouped number when multiplying $8 \times 8 \times 8$, resulting in $64 \times 8 = 60 \times 8 + 2 = 482$. The student needs to focus on understanding how to regroup when carrying out the steps in the multiplication algorithm (procedure).

Item Position	Rationales	
6	Option D is correct	To determine the total distance Juan ran, the student should have multiplied the number of kilometers he ran (5.6) by the number of days he ran (12). This would result in $5.6 \times 12 = 67.2$ kilometers. 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 used addition instead of multiplication and included a placeholder value of 1 when adding, resulting in $5.6 + 11.2 = 16.8$ kilometers. The student needs to focus on attending to the details of a problem that involves multiplication.
	Option B is incorrect	The student likely confused a multiplicative situation with an additive situation and added $5.6 + 12$, resulting in 17.6 kilometers. The student needs to focus on attending to the details of a problem that involves multiplication.
	Option C is incorrect	The student likely did not add the regrouped number in the first step after multiplying 12 by 0.6, resulting in $12 \times 5.6 = 66.2$ kilometers. The student needs to focus on understanding how to regroup when carrying out the steps in the multiplication algorithm (procedure).

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Item Position	Rationales	
7	4 sides and angles, 2 acute angles, 2 obtuse angles	To determine the attributes that the parallelogram, the rhombus, and the isosceles trapezoid all have, the student could have used the graphic organizer to understand how the shapes were related. Then the student could have visualized or recalled the definition of each shape. The student should have determined that a parallelogram, a rhombus, and an isosceles trapezoid all have 4 sides and angles, 2 acute angles, and 2 obtuse angles. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
8	Option A is correct	The student should have recognized this as a division situation. To determine the number of ounces each golf ball weighs, the student could have used the long division algorithm (procedure) to divide the total number of ounces (38.88) by the number of golf balls (24), resulting in $38.88 \div 24 = 1.62$ ounces. 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 split the dividend (the quantity or total to be divided), 38.88, and the divisor (the number by which the dividend is being divided), 24, into 20 and 4 and divided the whole number and decimal parts of 38.88 separately, resulting in $(38 \div 20) + (0.88 \div 4) = 1.9 + 0.22 = 2.12$. 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 C is incorrect	The student likely split the divisor (24) into 20 and 4, divided the dividend (38.88) by each of those numbers, and then added the two quotients, resulting in $(38.88 \div 20) + (38.88 \div 4) = 1.944 + 9.72 = 11.664$. 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 correctly but did not include the decimal point. The student needs to focus on understanding division of decimals and how to correctly write the quotients.

Item Position	Rationales	
9	Option C is correct	To determine how many flowers the three friends sell altogether, the student should have used the bar graph (a graph that uses either vertical or horizontal bars to display categories of data) to identify the number of flowers each friend sold. Julio sold 40 flowers, Andy sold 15 flowers, and Riley sold 25 flowers. Then the student should have added the numbers of flowers together, resulting in $40 + 15 + 25 = 80$.
	Option A is incorrect	The student likely misinterpreted the numbers of flowers Andy and Riley sold and read the number of flowers below each bar to the nearest ten, resulting in $40 + 10 + 20 = 70$. The student needs to focus on reading the axis of a bar graph.
	Option B is incorrect	The student likely misinterpreted the numbers of flowers Andy and Riley sold and read the number of flowers above each bar to the nearest ten, resulting in $40 + 20 + 30 = 90$. The student needs to focus on reading the axis of a bar graph.
	Option D is incorrect	The student likely identified the number of flowers sold by the friend who sold the most flowers. The student needs to focus on attending to the details of problems that involve data.

Item Position	Rationales	
10	$\frac{1}{2}$, 5, $\frac{1}{10}$	To complete the equation to find how much of a roll of wrapping paper Pete uses for each gift, the student should have recognized that the total number of rolls Pete used is the dividend (the quantity or total to be divided) and that it needs to be divided by the number of gifts Pete wrapped, the divisor (the number by which the dividend is being divided), resulting in the expression $\frac{1}{2} \div 5$. Then the student could have determined the quotient (the answer to a division problem) using the standard algorithm (procedure). The student could have determined that the number 5 can be written as a fraction with a denominator (bottom number) of 1, $\frac{5}{1}$. Then the student could have determined that $\frac{1}{2}$ divided by 5 is equal to $\frac{1}{2}$ multiplied by the reciprocal (fraction with the positions of the numerator and denominator switched) of $\frac{5}{1}$: $\frac{1}{2} \times \frac{5}{1} = \frac{5}{2}$. Last, the student should have created a division equation with the dividend, the divisor, and the quotient (answer to a division problem): $\frac{1}{2} \div 5 = \frac{1}{10}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
11	Option D is correct	To determine which change Matthew can make to balance his budget for this month, the student should have understood that "greater than" indicates a budget that is over the planned amount. The student should have identified an option that would decrease Matthew's total expenses by \$38. The student should have determined that decreasing Matthew's budget for spending by \$38 would best balance his budget.
	Option A is incorrect	The student likely did not realize that increasing the budgeted amount by \$38 would increase the amount spent. The student needs to focus on understanding actions that might be taken to balance a budget when expenses exceed income.
	Option B is incorrect	The student likely did not realize that decreasing this month's budget for spending to \$0 would not balance the budget. The spending needs to be decreased by only \$38. The student needs to focus on understanding actions that might be taken to balance a budget when expenses exceed income.
	Option C is incorrect	The student likely did not realize that keeping the budget for spending the same would cause Matthew's expenses to again be \$38 greater than his income and would not balance the budget. The student needs to focus on understanding actions that might be taken to balance a budget when expenses exceed income.

Item Position	Rationales	
12	First option is correct	To determine which numbers are less than six tenths, the student could have written the numbers as decimals. The student should have determined that six tenths is written as 0.6. The student then should have determined that one hundred thirty-six thousandths is written as 0.136. The student next could have compared the digits in each place value. The student could have compared the digits in the tenths place (the first digit to the right of the decimal point) in 0.6 and 0.136. The student could have determined that, because 1 is less than 6, the value 0.136 is less than 0.6. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Second option is correct	To determine which numbers are less than six tenths, the student could have written the numbers as decimals. The student should have determined that six tenths is written as 0.6. The student then should have determined that four hundred nine thousandths is written as 0.409. The student next could have compared the digits in each place value. The student should have compared the digits in the tenths place (the first digit to the right of the decimal point) in 0.6 and 0.409. The student could have determined that, because 4 is less than 6, the value 0.409 is less than 0.6. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Third option is incorrect	The student likely disregarded the place values when comparing the numbers. The student likely determined that, because 5 is less than 6, five and two hundredths (5.02) is less than six tenths (0.6). The student needs to focus on understanding how to compare decimals.
	Fourth option is incorrect	The student likely misunderstood place values. The student likely understood that thousandths are smaller than tenths but assumed any number of thousandths was less than any number of tenths. The student needs to focus on understanding how to compare decimals.
	Fifth option is incorrect	The student likely misunderstood place values. The student confused the hundreds place with the hundredths place. The student needs to focus on understanding how to compare decimals.

Item Position	Rationales	
13	Option A is correct	To determine which part of the coordinate grid Jonathan describes, the student should have understood the structure of the coordinate plane. The student should have understood that the x -axis is the horizontal number line on the coordinate plane and that all points on that line have a y -coordinate of 0.
	Option B is incorrect	The student likely confused the x -axis with the y -axis and concluded that all points on the y -axis have a y -coordinate of 0. The student needs to focus on understanding the structure of a coordinate plane.
	Option C is incorrect	The student likely confused the x -axis with the x -coordinate. The student needs to focus on understanding the structure of a coordinate plane.
	Option D is incorrect	The student likely concluded that all points on the y -axis have a y -coordinate of 0 after confusing the horizontal line with the y -axis. The student needs to focus on understanding the attributes of a coordinate grid.

Item Position	Rationales	
14	(1, 7), (2, 8), (3, 9) or any three points that are on the line $y = x + 6$.	To determine three ordered pairs on the coordinate grid that follow the rule $y = x + 6$, the student could have substituted (put a given number in for a variable) an identified x -coordinate (value indicating left/right movement on the x -axis) on the coordinate plane into the equation and solved for the y -coordinate (value indicating up/down movement on the y -axis). The student could have identified an x -coordinate of 1, determined that the y -coordinate is $y = (1) + 6 = 7$, and graphed the point (1, 7) on the coordinate grid. The student then could have identified an x -coordinate of 2, resulting in $y = (2) + 6 = 8$, and graphed the point (2, 8). The student then could have identified an x -coordinate of 3, resulting in $y = (3) + 6 = 9$, and graphed the point (3, 9). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
15	Option C is correct	To determine how much farther in feet Marissa rode her bike than Evelyn, the student should have first converted the distance 3 miles to feet. The student could have found that 1 mile (mi) = 1,760 yards (yd) and 1 yard (yd) = 3 feet (ft). The student then could have multiplied the number of miles Marissa rode her bike (3) by the miles-to-yards conversion factor (1,760), resulting in $3 \times 1,760 = 5,280$ yards. The student could have then multiplied that result by the yards-to-feet conversion factor (3), resulting in $5,280 \times 3 = 15,840$ feet. Then the student should have found the difference between the number of feet Marissa rode her bike and the number of feet Evelyn rode her bike, resulting in $15,840 - 14,000 = 1,840$ feet.
	Option A is incorrect	The student likely subtracted the number of miles Marissa rode her bike from the number of feet Evelyn rode her bike, resulting in $14,000 - 3 = 13,997$ feet. 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 calculated the number of yards in 3 miles and subtracted that value from the number of feet Evelyn rode her bike, resulting in $3 \times 1,760 = 5,280$ and $14,000 - 5,280 = 8,720$ feet. The student needs to focus on understanding problem situations and attending to the details of problems that involve measurements and conversions.
	Option D is incorrect	The student likely calculated the number of feet in 3 miles, $3 \times 1,760 \times 3 = 15,840$ feet, but did not subtract 14,000, the number of feet Evelyn rode her bike. The student needs to focus on understanding problem situations and attending to the details of problems that involve measurements and conversions.

Item Position	Rationales	
16	Option B is correct	To determine the number of cups of fruit punch Nathan makes, the student could have added the amounts of the three ingredients together. The student could have first calculated the combined amount of orange juice and pineapple juice by adding $2\frac{3}{8} + 1 = 3\frac{3}{8}$. Then the student could have added the number of cups of grape juice to that total, resulting in $3\frac{3}{8} + 2\frac{2}{3}$. To add two mixed numbers (numbers that combine a whole number and a fraction), the student should have found the least common denominator (smallest multiple shared by the bottom numbers) for the two fractions. The denominators are 8 and 3, and their least common multiple is 24. Next, the student should have multiplied the numerator (top number) and the denominator (bottom number) of the fraction $\frac{3}{8}$ by 3 to get a fraction with a denominator of 24: $\frac{3}{8} \times \frac{3}{3} = \frac{9}{24}$. Then the student should have multiplied the numerator and the denominator of the fraction $\frac{2}{3}$ by 8 to get a fraction with a denominator of 24: $\frac{2}{3} \times \frac{8}{8} = \frac{16}{24}$. Then the student should have added the two mixed numbers with the common denominator by adding the whole numbers and then the fractions, resulting in $3\frac{9}{24} + 2\frac{16}{24} = 5\frac{25}{24}$. Then, since the mixed number in the sum includes an improper fraction (a fraction with a numerator that is greater than the denominator), the student could have rewritten the sum as $6\frac{1}{24}$ and determined that Nathan makes $6\frac{1}{24}$ cups of fruit punch. 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 whole numbers, numerators, and denominators separately, resulting in $2 + 1 + 2 + \frac{3+2}{8+3} = 5\frac{5}{11}$. The student needs to focus on understanding how to add fractions with different denominators.
	Option C is incorrect	The student likely added the number of cups of orange juice and the number of cups of grape juice and simplified the mixed number incorrectly, resulting in $2\frac{3}{8} + 2\frac{2}{3} = 2\frac{9}{24} + 2\frac{16}{24} = 4\frac{25}{24} : 4\frac{1}{24}$. The student needs to focus on understanding how to add fractions with different denominators.
	Option D is incorrect	The student likely added 5 to the numerator and denominator to try to generate a common denominator when adding the mixed numbers, resulting in $2\frac{3}{8} + 1 + 2\frac{2+5}{3+5} = 2\frac{3}{8} + 2\frac{7}{8} = 4\frac{10}{8} : 5\frac{10}{8}$. The student needs to focus on understanding how to add fractions with different denominators.

Item Position	Rationales	
17	Option C is correct	To determine the product (the result of a multiplication problem) of 273.4 and 0.9, the student could have multiplied the two decimals using the standard algorithm (procedure). This would result in $273.4 \times 0.9 = 246.06$. 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 meaning of product (the result of multiplying two or more numbers) with sum (the result of adding two or more numbers) and added 273.4 and 0.9, instead of multiplying using the standard algorithm (procedure). The student needs to focus on attending to the details of problems that involve multiplication and understanding how to carry out all the steps in the multiplication algorithm.
	Option B is incorrect	The student likely ignored the decimal point in 0.9 and multiplied 273.4 and 9, resulting in 2,460.6. The student needs to focus on attending to the details of a problem that involves multiplication.
	Option D is incorrect	The student likely multiplied the values in the tenths place in the two numbers and added the whole number, resulting in $(0.4 \times 0.9) + 273 = 273.36$. The student needs to focus on understanding how to correctly multiply decimals.

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Item Position	Rationales	
18	5	To determine how many more skaters there are when the temperature is 25 °F than when the temperature is 10 °F, the student should have analyzed the scatterplot, looking for the number of skaters when the temperature was 25 °F (9) and the number of skaters when the temperature was 10 °F (4). Then the student could have found the difference by subtracting, resulting in $9 - 4 = 5$. Therefore, there are 5 more skaters when the temperature was 25 °F than when the temperature is 10 °F.

Item Position	Rationales	
19	Option C is correct	To determine which number is second when the numbers are listed in order from least to greatest, the student should have compared the digits in each place value to determine the order from least to greatest. The student should have started with the greatest place value (tens). Since all numbers have 4 in the tens place and 1 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 number 41.022 has a 0 in the tenths place, so that is the least number. The number 41.921 has 9 in the tenths place, so that is the greatest number. Finally, the student should have written the numbers in order from least to greatest as 41.022, 41.298, 41.599, and 41.921 to determine that the number that is second in Hailey's list is 41.298.
	Option A is incorrect	The student likely compared the digits in the thousandths place for the four numbers to determine the order from least to greatest, resulting in 41.921, 41.022, 41.298, and 41.599. This puts 41.022 in the second position. The student needs to focus on understanding how to order decimals using place value.
	Option B is incorrect	The student likely chose 41.921 as the number that is second in the list because it is the second number in the given list, rather than ordering the values from least to greatest. The student needs to focus on attending to the details of the problem.
	Option D is incorrect	The student likely ordered the numbers from greatest to least, resulting in 41.921, 41.599, 41.298, and 41.022. This puts 41.599 in the second position. The student needs to focus on attending to the details of the problem.

Item Position	Rationales	
20	Any 8 circles selected	To create a model that represents the value of the expression $\frac{4}{7} \times 14$, the student could have first multiplied $\frac{4}{7}$ by 14. The student could have written 14 as a fraction with a denominator (bottom number) of 1 and multiplied by $\frac{4}{7}$: $\frac{4}{7} \times \frac{14}{1} = \frac{56}{7} = 8$. The student then could have selected 8 circles. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
21	Option D is correct	To determine which dot plot (graph that uses dots to represent the frequency of data points along a number line) represents the lengths of the pencils, the student should have started by determining which values are repeated in the list. Then the student could have listed the values, without repeating them, in order from least to greatest ($4\frac{1}{4}$, $4\frac{1}{2}$, 5 , $5\frac{1}{4}$, $5\frac{1}{2}$, $5\frac{3}{4}$, 6). Then the student should have determined how many pencils there are for each length, ($4\frac{1}{4}$ (1), $4\frac{1}{2}$ (2), 5 (1), $5\frac{1}{4}$ (2), $5\frac{1}{2}$ (1), $5\frac{3}{4}$ (1), 6 (2)), and selected the dot plot that represents the data set.
	Option A is incorrect	The student likely rounded each length to the nearest whole number and selected a dot plot that represents those numbers. The student needs to focus on understanding how to set up a dot plot from the data given.
	Option B is incorrect	The student likely switched the numbers of dots for the data values $5\frac{1}{4}$ and $5\frac{3}{4}$. The student needs to focus on understanding how to set up a dot plot from the data given.
	Option C is incorrect	The student likely switched the numbers of dots for the data values $5\frac{1}{4}$ and $5\frac{1}{2}$. The student needs to focus on understanding how to set up a dot plot from the data given.

Item Position	Rationales	
22	Option B is correct	To determine how many miles Samatha rides her bike, the student should have first found the distance Peyton rode her bike by interpreting "more than Julian" to mean addition. The student should have added 2.3 to the number of miles Julian rode his bike, resulting in $6 + 2.3 = 8.3$ miles. Then the student should have interpreted "less than Peyton" to mean subtraction and subtracted 1.2 from 8.3 to determine the number of miles Samantha rode her bike, resulting in $8.3 - 1.2 = 7.1$ miles.
	Option A is incorrect	The student likely added the three given numbers, resulting in $6 + 2.3 + 1.2 = 9.5$ miles. The student needs to focus on understanding how to solve problems involving decimals.
	Option C is incorrect	The student likely subtracted the sum of the two decimals from the whole number, resulting in $6 - (2.3 + 1.2) = 2.5$ miles. The student needs to focus on understanding how to solve problems involving decimals.
	Option D is incorrect	The student likely subtracted 2.3 from Julian's distance and then added 1.2, resulting in $6 - 2.3 + 1.2 = 4.9$ miles. The student needs to focus on understanding how to solve problems involving decimals.

Item Position	Rationales	
23	Option D is correct	To determine the number of pieces of wire George uses, the student should have interpreted "cuts all the wire into pieces that are each" to mean division of the total amount of wire into equal parts: $24 \div \frac{1}{3}$. The number 24 can be written as a fraction with a denominator (bottom number) of 1: $\frac{24}{1}$. The student could have used the standard algorithm (procedure) for dividing fractions, multiplying $\frac{24}{1}$ by the reciprocal (the fraction with the positions of the numerator and denominator switched) of $\frac{1}{3}$: $\frac{24}{1} \div \frac{1}{3} = \frac{24}{1} \times \frac{3}{1} = \frac{72}{1} = 72$. 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 reciprocal of the dividend (the quantity or total to be divided) by the divisor (the number by which the dividend is being divided), resulting in $\frac{1}{24} \times \frac{1}{3} = \frac{1}{72}$. The student needs to focus on attending to the details of problems that involve dividing a whole number by a fraction.
	Option B is incorrect	The student likely multiplied the reciprocal of the dividend (the quantity or total to be divided) by the reciprocal of the divisor (the number by which the dividend is being divided): $\frac{1}{24} \times \frac{3}{1} = \frac{3}{24}$. 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 multiplied 24 by $\frac{1}{3}$ instead of dividing: $\frac{24}{1} \times \frac{1}{3} = \frac{24}{3} = 8$. The student needs to focus on attending to the details of problems that involve dividing a whole number by a fraction.

Item Position	Rationales	
24	Option B is correct	To determine which factor pair of 184 contains only composite numbers (positive integers that have at least one divisor other than 1 and themselves), the student should have identified the pair with two numbers that have more than two factors (numbers that can be evenly divided into a number). Because 46 has the factors 1, 2, 23, and 46, it is composite. Because 4 has the factors 1, 2, and 4, it is composite.
	Option A is incorrect	The student likely misinterpreted 1 as a composite number. The student needs to focus on understanding that 1 is neither a prime number (a number greater than 1 that has only two factors, 1 and the number itself) nor a composite number.
	Option C is incorrect	The student likely confused the definition of composite numbers with the definition of even numbers (numbers that can be divided by 2 with no remainder) and selected 92 and 2 as the two composite numbers. The student needs to focus on understanding the difference between composite numbers and even numbers.
	Option D is incorrect	The student likely misinterpreted 23 as a composite number. The student needs to focus on understanding the difference between composite numbers and prime numbers.

Item Position	Rationales	
25	Option D is correct	To determine the quotient (the answer to a division problem), the student could have used the long-division algorithm (procedure) to divide 12.6 by 12, resulting in $12.6 \div 12 = 1.05$. 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 placed a decimal point in the divisor (the number by which the dividend is being divided) to match the decimal point in the dividend (the quantity or total being divided) and divided, resulting in $12.6 \div 1.2 = 10.5$. 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 B is incorrect	The student likely did not use a placeholder of zero in the tenths place of the quotient when dividing. 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 C is incorrect	The student likely placed a decimal point in the divisor to match the decimal point in the dividend and did not use a placeholder of zero in the quotient when dividing. 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.

Item Position	Rationales	
26	38, 84	To determine the perimeter (distance around the outside of a figure) of the rectangle in inches, 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, $l = 12$ and $w = 7$, in the formula: $P = 2(12) + 2(7) = 38$. The student should have concluded that the perimeter of the rectangle is 38 inches. Then the student should have calculated the area (the space within the perimeter of a figure). To determine the area of the rectangle in square inches, the student could have used the formula from the Area section of the STAAR Grade 5 Mathematics Reference Materials: $A = l \times w$, where A = area, l = length, and w = width. The student should have substituted the two given measurements, $l = 12$ and $w = 7$, in the formula: $A = 12 \times 7 = 84$. The student should have concluded that the area of the rectangle is 84 square inches. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
27	Option C is correct	To determine the number of kilograms the estimated mass of an adult African elephant can be, the student could have rounded the mass of an elephant calf to the nearest hundred: 90.6 rounds to 100 kilograms. Then the student should have multiplied the rounded number by 50, resulting in $100 \times 50 = 5,000$ kilograms. 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 90.6 to the nearest ten and added 90 to 50 instead of multiplying, resulting in $90 + 50 = 140$ kilograms. The student needs to focus on understanding which operation to use when solving problems.
	Option B is incorrect	The student likely rounded 90.6 to 900 and multiplied by 50, resulting in $900 \times 50 = 45,000$ kilograms. The student needs to focus on understanding reasonableness when estimating in problem situations.
	Option D is incorrect	The student likely rounded 90.6 to 100 and divided by 50 instead of multiplying, resulting in $100 \div 50 = 2$ kilograms. The student needs to focus on understanding which operation to use when solving problems.

Item Position	Rationales	
28	9 or any equivalent value	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 operation inside the parentheses within the brackets. The student should have performed the subtraction in the parentheses as $14.6 - 2.1 = 12.5$, resulting in the expression $[127 - 8 \times 12.5] \div 3$. The student then should have performed the multiplication step in the brackets, $8 \times 12.5 = 100$, resulting in the expression $[127 - 100] \div 3$. The student then should have performed the subtraction operation in the brackets, resulting in $[127 - 100] \div 3 = 27 \div 3$. Finally, the student should have performed the division, $27 \div 3 = 9$.

Item Position	Rationales	
29	Option C is correct	To determine the volume of the rectangular prism that Christine built, the student should have recognized that the volume of the prism equals the length times the width times the height. The student should have then understood that the volume of the prism described is the product of the number of layers and the volume of each layer. Each of the 7 layers contains 35 cubes (5×7). The student could have multiplied the number of layers by the volume of each layer, 7×35 , resulting in 245 cubic centimeters.
	Option A is incorrect	The student likely determined the volume of the base layer correctly by multiplying 5 by 7 but added the number of layers, 7, instead of multiplying, resulting in $(5 \times 7) + 7 = 35 + 7 = 42$ cubic centimeters. The student needs to focus on understanding how to determine the volume of a rectangular prism with whole number side lengths when the number of layers and the dimensions of the base layer are given.
	Option B is incorrect	The student likely determined the volume of the base layer by adding the width (5) and length (7), instead of multiplying, and then added the number of layers, 7, instead of multiplying, resulting in $(5 + 7) + 7 = 19$. The student needs to focus on understanding how to determine the volume of a rectangular prism with whole number side lengths when the number of layers and the dimensions of the base layer are given.
	Option D is incorrect	The student likely multiplied the length (7) and width (5) of the base layer and then multiplied by the number of layers (7) but did not regroup when multiplying, resulting in 215. The student needs to focus on multiplying correctly when determining the volume of a rectangular prism with whole number side lengths when the number of layers and the dimensions of the base layer are given.

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Item Position	Rationales	
30	subtracted from, less than	To complete the statements about Ada’s gross income the student should have recognized that Ada’s gross income is her monthly salary before any taxes and deductions are subtracted. The student should have recognized that taxes and deductions are subtracted from Ada’s gross income (\$3,750), resulting in a net income (take-home pay after taxes and deductions) that is less than the gross income.

Item Position	Rationales	
31	Option D is correct	To determine which equation can be used to find p , the price in dollars of each shirt that Michela buys, the student should have identified the equation where the total Michela spent (\$47) is equal to the difference (the result when one quantity is subtracted from another) between the cost of 3 shirts at the original price ($3 \times p$) and the \$10 coupon amount. The result is $3 \times p - 10 = 47$.
	Option A is incorrect	The student likely realized that the coupon amount must be subtracted from the price of the shirts but subtracted the coupon amount (\$10) from the price of each shirt (p) and multiplied by the number of shirts (3), resulting in $3(p - 10) = 47$. The student needs to focus on correctly representing situations using an equation.
	Option B is incorrect	The student likely added the coupon amount to the price of each shirt and then multiplied by the number of shirts (3), resulting in $3(p + 10) = 47$. The student needs to focus on correctly representing situations using an equation.
	Option C is incorrect	The student likely added the coupon amount to the cost of the 3 shirts at the original price instead of subtracting, resulting in $3 \times p + 10 = 47$. The student needs to focus on correctly representing situations using an equation.

Item Position	Rationales	
32	Points graphed at (1, 3.5) and (4.5, 2)	To plot the two points on the coordinate grid to represent the ordered pairs (1, 3.5) and (4.5, 2), the student could have first located the x -coordinate (value that indicates the horizontal position of a point) on the x -axis (horizontal number line) for each ordered pair. Then the student could have counted up to locate the y -coordinate (value that indicates the vertical position of a point) on the y -axis (vertical number line) to plot each point. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
33	Option A is correct	To determine which measurement could NOT be the exact length that when rounded to the nearest tenth equals 6.5 centimeters, 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 6.4 4 9 has a 4 in the hundredths place and will therefore round to 6.4 instead of 6.5 when it is rounded to the nearest tenth.
	Option B is incorrect	The student likely misunderstood the process of rounding a number to the tenths place and used the digit in the thousandths place, 9 in 6.54 9 , (rather than the 4 in the hundredths place) to round to the nearest tenth. The student likely believed that the 9 indicated that the 5 would round up to 6, resulting in 6.6 instead of 6.5. The student needs to focus on understanding how to apply rounding rules to decimals.
	Option C is incorrect	The student likely was confused about the rules for rounding numbers and rounded the number, 6.4 9 1, down to 6.4 instead of rounding up to 6.5 (the 9 in the hundredths place means that the 4 in the tenths place would change). The student needs to focus on understanding how to apply rounding rules to decimals.
	Option D is incorrect	The student likely was confused about the rules for rounding numbers and rounded the number, 6.54 6 , up to 6.6 instead of rounding down to 6.5 (the 4 in the hundredths place means that the 5 in the tenths place would not change). The student needs to focus on understanding how to apply rounding rules to decimals.

Item Position	Rationales	
34	10, 80, 18	To determine the values that complete the table to represent a multiplicative pattern between the values of x and y, the student should have understood that a multiplicative pattern involves multiplying each x-value (input) by a common factor to get the corresponding y-value (output). The student could have divided each given y-value by the corresponding given x-value to determine the common factor: $20 \div 4 = 5$ and $40 \div 8 = 5$. The common factor of 5 indicates the pattern for the values. Then the student could have divided the given y-value 50 by 5 to determine the missing x-value, resulting in $50 \div 5 = 10$. Then the student could have multiplied the given x-value 16 by 5 to determine the missing y-value, resulting in $16 \times 5 = 80$. Last, the student could have divided the given y-value 90 by 5 to determine the missing x-value, resulting in $90 \div 5 = 18$. The x- and y-values that complete the table are 10, 80, and 18. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.