Item Position	Rationale	
1	Option A is correct	To determine which equation (a mathematic statement that demonstrates that two number expressions, or other objects, are equal) is true when $x = 5$, the student could have substituted 5 for x in each answer option, starting with the equation $2x = 10$ in option A. The student should have recognized that a number immediately next to a variable (letter that represents an unknown value) is multiplied by the variable. Therefore, $2x = 10$ becomes $2(5) = 10$, and $10 = 10$, so this equation is true when $x = 5$. Option A is the only answer option with an equation that is true when $x = 5$. 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 replaced the variable x with the digit 5, rather than multiplying, so that $3x = 35$ becomes $35 = 35$. The student should focus on understanding how to substitute a number for a variable when solving equations.
	Option C is incorrect	The student likely was confused about the steps needed solve an equation, believing $x = 5$ to be the answer to $x - 3 = 8$, and subtracted 3 from 8. The student should attend to the details of the question.
	Option D is incorrect	The student likely subtracted $-5 - 5$ instead of $5 - 5$, when substituting 5 for x in $x - 5 = -10$. The student should focus on adding and subtracting integers.

Item Position	Rationale	
2	Option D is correct	To determine which colors represent the mode (value that appears most frequently) of the data, the student should have interpreted each vertical mark in the tally chart as representing 1 and each set of four tally marks with a diagonal line as representing a set of 5. The student then should have determined that the frequency for blue is 5, the frequency for green is 7, the frequency for red is 6, and the frequency for silver is 7. The colors that occur most frequently in this set of data are green (7 skateboards) and silver (7 skateboards), so these are the two modes.
	Option A is incorrect	The student likely misunderstood mode as meaning the values that appear the least frequently instead of most frequently and chose red, which has a frequency of 6, and blue, which has a frequency of 5. The student should focus on understanding the definition of mode as well as other measures of central tendency.
	Option B is incorrect	The student chose the first two colors in the tally chart, thinking the colors were in order from greatest to least frequency. The student needs to attend to the details of the question and the tally chart.
	Option C is incorrect	The student chose the last two colors in the tally chart, thinking the colors were in order from least to greatest frequency. The student needs to attend to the details of the question and the tally chart.

Item Position	Rationale	
3	Option B is correct	To determine which ordered pair (pair of *x*- and *y*-coordinates) could represent point *R*, the student could have first determined the locations of the points already plotted on the coordinate grid. Point *P* is located at (–2, –1), and point *Q* is located at (1, –1). Then the student could have recognized that a right triangle has one right angle (90° angle), so one side of the triangle would need to be perpendicular to (form a 90° angle with) line segment *PQ*. The student then could have looked at the answer choices to determine which pair of coordinates could represent the third vertex of a right triangle with a height of 5 units. The ordered pair in option B, (1, 4), would be plotted 5 units above point *Q*. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely identified the ordered pair (–2, 4) as being 5 units above point *P* but confused the *x*- and *y*--coordinates and chose (4, –2). The student should focus on understanding the difference between the *x*- and *y*-coordinates.
	Option C is incorrect	The student likely did not understand that the third point needed to create a right triangle should be above or below line segment *PQ* and chose a point 5 units to the right of point *Q*. The student should focus on understanding the different types of triangles and attending to the details of the question.
	Option D is incorrect	The student likely counted the height of the triangle in units from the *x*-axis rather than starting at point *P*. The point (–2, **5**) is 6 units up from point *P* (–2, **–1**), since the difference between the *y* values is 6: 5 – (–1) = 6. The student should focus on understanding how to plot points on a coordinate grid.

Item Position	Rationale	
4	8, asymmetrical	To determine the correct answers needed to complete the statements, the student could have recognized that the mean of a set of data is found by adding the numbers in the set and dividing the sum (total) by how many numbers are in the set. The student then could have listed and added the values from the dot plot (2 + 4 + 6 + 6 + 7 + 8 + 8 + 9 + 9 + 9 + 10 + 10 + 10 + 11 + 11 = 120) and then divided by 15 (because there are 15 numbers in the set): 120 ÷ 15 = 8. Then the student could have observed the display of the data on the dot plot (a representation of data with an axis usually on either the bottom or left side and "dots" stacked above the value to represent the numbers of items) and found that the data presents an asymmetrical shape, meaning that the data set does not reflect over the midpoint. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationale	
5	Option C is correct	To determine the solution to the equation (a mathematical statement that demonstrates that two numbers, expressions, or other objects, are equal), the student could have first subtracted 2*x* from 8*x* to get 6*x* on the left side of the equation, making the equation 6*x* = 48. Then the student could have divided both sides of the equation by 6 to isolate the variable: 6*x* ÷ 6 = *x* and 48 ÷ 6 = 8. Therefore, *x* = 8. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely subtracted incorrectly and got –6*x* when subtracting 2*x* from 8*x*. Therefore, the student found that –6*x* = 48 and *x* = –8. The student should focus on solving one-variable, one-step equations.
	Option B is incorrect	The student likely divided both sides of the equation by 48 instead of by 6: $\frac{6}{48} = \frac{1}{8}$. The student should focus on solving for the given variable in an equation.
	Option D is incorrect	The student likely subtracted incorrectly and got –6*x* when subtracting 2*x* from 8*x*, and then divided both sides of the equation by 48 instead of by 6: $\frac{-6}{48} = -\frac{1}{8}$.The student should focus solving for the given variable in an equation.

Item Position	Rationale	
6	Option A is correct	To determine which expression (the sum of products of numbers and variables) is **NOT** equivalent to $\frac{1}{2} \cdot (x - 6)$, the student could have used the distributive property [$a(b + c) = ab + ac$] and recognized that $\frac{1}{2}x - 6$ is not equivalent to $\frac{1}{2} \cdot (x - 6)$ because $\frac{1}{2}$ was not distributed to the 6. If $\frac{1}{2}$ were distributed correctly, the second term would be 3, not 6.
	Option B is incorrect	The student likely did not recognize that multiplying 6 by $\frac{1}{2}$ results in the term $\frac{6}{2}$. The student should focus on understanding how to multiply and divide with fractions.
	Option C is incorrect	The student likely did not recognize that multiplying $\frac{1}{2}$ by x results in the term $\frac{x}{2}$. The student should focus on understanding how to multiply and divide with fractions.
	Option D is incorrect	The student likely did not recognize that dividing the expression in the parentheses by 2 is the same as multiplying the expression by $\frac{1}{2}$. The student should focus on understanding how to multiply and divide with fractions.

Item Position	Rationale	
7	Option B is correct	To determine the height, h, of the prism (a three-dimensional figure containing two congruent and parallel faces that are polygons) in units, the student could have substituted the given values into the formula for the volume of (amount of three-dimensional space taken up by) a rectangular prism. This formula can be found in the Volume section of the STAAR Grade 6 Mathematics Reference Materials: $V = Bh$, where V represents the volume, B represents the area (measurement of the interior region of a 2-dimensional space, measured by the number of non-overlapping square units) of the base, and h represents the height (vertical distance from top to bottom). To determine B, the area of the base, the student could have multiplied 4 units by 4 units (because all four sides of a square are equal in length), resulting in 16 square units. Then the student could have substituted the values $V = 192$ and $B = 16$ into the formula $V = Bh$ to get $192 = 16h$ and solved the equation to find a height of 12 units ($192 \div 16 = 12$). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student used 4 as B, the area of the base, in the formula $V = Bh$ and solved the equation $192 = 4h$, which results in $h = 48$ because $192 \div 4 = 48$. The student should focus on understanding and applying the volume formula as well as understanding and applying the area formula.
	Option C is incorrect	The student added $4 + 4$ instead of multiplying 4×4 when finding the area of the base, making the equation $192 = 8h$, which results in $h = 24$ because $192 \div 8 = 24$. The student should focus on understanding and applying the area formula.
	Option D is incorrect	The student likely used the only number shown in the diagram, 4, for all the

		dimensions of the prism and used the volume formula length × width × height: 4 × 4 × 4 = 64, instead of finding the height of the prism. The student should focus on understanding and applying the volume formula as well as understanding and applying the area formula.

Item Position	Rationale	
8	Option A is correct	To determine which point on the number line represents the number with the greatest absolute value, the student should have recognized that a number's absolute value is its positive distance from zero. Therefore, the absolute values of the four labeled points are 25, 20, 0, and 20, and 25 is the greatest of those numbers. Point *P* represents –25, which has an absolute value of 25.
	Option B is incorrect	The student likely associated absolute value with negative and positive numbers and chose the only number that was represented by both a positive and a negative value. The student should focus on determining the absolute value of a number as its distance from zero.
	Option C is incorrect	The student likely identified zero, a number used to determine absolute value, as being the only number to have an absolute value. The student should focus on determining the absolute value of a number as its distance from zero.
	Option D is incorrect	The student likely misinterpreted the number with the greatest value as having the greatest absolute value. The student should focus on determining the absolute value of a number as its distance from zero.

Item Position	Rationale	
9	Option B is correct	To determine which list shows the side lengths of the triangle in order from greatest to least, the student should have recognized that angles *Q* and *T* together measure 115 degrees. Therefore, angle *R* must measure 65 degrees since all triangles have interior angles that add up to 180 degrees, and 180 – 115 = 65. Knowing that, the student should have recognized that the smallest angle of a triangle is opposite the shortest side of the triangle, the second-smallest angle is opposite the second-shortest side, and the largest angle is opposite the longest side. The angles in order from greatest to least are angle *Q*, angle *R*, angle *T*, so the side lengths of the triangle in order from greatest to least must be *RT*, *QT*, *QR*.
	Option A is incorrect	The student likely confused the lengths of the longest side of the triangle and the second-longest side of the triangle. The student needs to focus on extending previous knowledge of triangles and their properties, including the relationship between a triangle's angles and its sides.
	Option C is incorrect	The student likely misunderstood the method for determining the relative lengths of the sides of a triangle, identifying the side length *QT* as the longest because its adjacent angle (the angle next a given side), angle *Q*, measures 80°. The student then identified the side length *QR* as the second longest because its adjacent angle, angle *R*, measures 65°, and side length *RT* as the shortest side because its adjacent angle, angle *T*, measures 35°. The student needs to focus on extending previous knowledge of triangles and their properties, including the relationship between a triangle's angles and its sides.
	Option D is incorrect	The student likely misunderstood the method for determining the relative lengths of the sides of a triangle and also ordered the side

		lengths from least to greatest rather than from greatest to least. The student likely identified the side length *RT* as the shortest because its adjacent angle, angle *T*, measures 35°. The student then identified side length *QR* as the second longest because its adjacent angle, angle *R*, measures 65° and identified side length *QT* as the longest because its adjacent angle, angle *Q*, measures 80°. The student needs to focus on attending to the details of the question and on extending previous knowledge of triangles and their properties, including the relationship between a triangle's angles and its sides.

Item Position	Rationale	
10	Option A is correct	To determine which situation about the school bus most likely yields data without variability, the student should have recognized that variability of data means the ability of the data to vary, or change, because of a likely lack of consistency. A situation whose data has variability has the potential to have different data from day to day. Since the number of seats on a school bus does not change, this is the situation that likely yields data without variability.
	Option B is incorrect	The student likely misunderstood "without variability" to mean having the potential for change and recognized that a school bus could change speeds in traffic. The student should focus on understanding data with variability as data that can vary, or change, because of a lack of consistency.
	Option C is incorrect	The student likely misunderstood "without variability" to mean having the potential for change and recognized that the temperature on a school bus could change because of windows being open or closed or because of the weather. The student should focus on understanding data with variability as data that can vary, or change, because of a lack of consistency.
	Option D is incorrect	The student likely confused "without variability" to mean having the potential for change and recognized that the amount of fuel a school bus has will decrease as the school bus travels and increase as the fuel tank is replenished. The student should focus on understanding data with variability as data that can vary, or change, because of a lack of consistency.

Item Position	Rationale	
11	7, 28	To determine which answers complete the statement about the books Kara owns, the student could have found 20% of 35 by first converting 20% to a decimal number, 0.20, by moving the decimal point two places to the left. Multiplying 0.20 by 35 results in a product of 7, which means 7 of Kara's books have fewer than 100 pages. The student could have used the same procedure to find 80% of 35: $35 \times 0.8 = 28$, so Kara has 28 books that have 100 pages or more. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationale	
12	Option B is correct	To determine the number of cups in 1.5 gallons, the student should have converted the units of measurement from the larger given unit (gallons) to the smaller given unit (cups) using the Volume and Capacity section in the STAAR Grade 6 Mathematics Reference Materials. Since there are 4 quarts in a gallon, 1.5 gallons are equivalent to 6 quarts: $1.5 \times 4 = 6$. Next, there are 2 pints in a quart, so 6 quarts are equivalent to 12 pints: $2 \times 6 = 12$. Last, there are 2 cups in a pint, so 12 pints are equivalent to 24 cups: $2 \times 12 = 24$.
	Option A is incorrect	The student likely confused pints with cups. Since there are 4 quarts in a gallon, 1.5 gallons are equivalent to 6 quarts: $1.5 \times 4 = 6$. Next, there are 2 pints in a quart, so 6 quarts are equivalent to 12 pints: $2 \times 6 = 12$. The student should focus on attending to details of the question.
	Option C is incorrect	The student likely found the number of fluid ounces in a cup, 1 cup = 8 fluid ounces, instead of finding the number of cups in 1.5 gallons. The student should focus on attending to details of the question.
	Option D is incorrect	The student likely converted only 1 gallon to cups, ignoring the extra 0.5 gallon. Since there are 4 quarts in a gallon, 1 gallon is equivalent to 4 quarts: $1 \times 4 = 4$. Next, there are 2 pints in a quart, so 4 quarts are equivalent to 8 pints ($2 \times 4 = 8$). Last, there are 2 cups in a pint, so 8 pints are equivalent to 16 cups ($2 \times 8 = 16$). The student should focus on attending to details of the question.

Item Position	Rationale	
13	$-1\frac{7}{10}$, –0.209, $-\frac{1}{8}$, $\frac{35}{52}$, $\frac{46}{24}$	To determine how to arrange the numbers from least to greatest, the student could have converted all the fractions to decimal numbers by dividing the numerator by the denominator: $\frac{46}{24}$ = 1.916, $-\frac{1}{8}$ = –0.125, $\frac{35}{52}$ = 0.673, and $-1\frac{7}{10}$ = –1.7. Since –0.209 is already in decimal form, it can stay as it is. The student then could have recognized that numbers with a negative sign are less than zero, and numbers without a negative sign (positive numbers) are greater than zero. The number with the least value (the negative number farthest from zero) is –1.7 $\left(-1\frac{7}{10}\right)$. Moving toward zero, the next number is –0.209, and the closest negative number to zero is –0.125 $\left(-\frac{1}{8}\right)$. The positive number closest to zero is 0.673 $\left(\frac{35}{52}\right)$, and the positive number farthest from zero is 1.916 $\left(\frac{46}{24}\right)$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

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Item Position	Rationale	
14	Option A is correct	To determine which proportion (comparison of two ratios) could be used to find *x*, the length of the model in inches, the student could have first recognized that the scale (a comparison of two values) the model of the classroom uses is a ratio of 2 inches to 3 feet, meaning that every 2 inches in the model represents 3 feet in the actual classroom. The length of the actual classroom is 30 feet. Using that measurement and *x*, the student could have set up and equivalent ratio that could be used in a proportion. Since a ratio can be written as a fraction, 2:3 becomes $\frac{2}{3}$. To create a ratio equivalent to $\frac{2}{3}$, the student should have matched the length of the classroom and the variable *x* to their corresponding measurements. The length of the model is *x* inches, which corresponds to the 2 inches in the ratio for the scale. The actual length of the classroom, 30 feet, corresponds to the 3 feet in the ratio for the scale. So the proportion is written as $\frac{2}{3} = \frac{x}{30}$ or $\frac{x}{30} = \frac{2}{3}$. 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 created incorrect ratios by confusing the scale measurements and the actual measurements, placing the given scale in inches (2) over the length of the actual classroom in feet (30) and putting the variable *x* (the length of the model) over the given scale in feet (3). The student should focus on setting up proportions so that the ratios correspond.
	Option C is incorrect	The student likely created incorrect ratios by confusing the scale measurements and the actual measurements, placing the given scale in feet (3) over the variable *x* (the length of the model classroom) and the given scale in inches (2) over the length of the actual classroom in feet (30). The student should

		focus on setting up proportions so that the ratios correspond.
	Option D is incorrect	The student likely created incorrect ratios by using the given scale in inches (2) as the numerator for both fractions, disregarding the given scale in feet (3). The student should focus on setting up proportions so that the ratios correspond.

Item Position	Rationale	
15	$\left(\frac{1}{2}p \cdot 5\right) - (7 \cdot 2)$ and $\left(5 \cdot \frac{1}{2}p\right) - (7 \cdot 2)$	To determine which two expressions are equivalent, the student could have applied the commutative property of multiplication, $a \cdot b = b \cdot a$, to $\left(5 \cdot \frac{1}{2}p\right) - (2 \cdot 7)$ and selected as equivalent. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationale	
16	Option D is correct	To determine which equation represents y, the length of Mr. Guzman's camping trailer in feet, the student should have recognized that 6 feet would need to be subtracted from x, the length of Ms. Palmer's camping trailer: $y = x - 6$.
	Option A is incorrect	The student likely misunderstood the mathematical language indicating subtraction as meaning multiplication and multiplied –6 by x, the length of Ms. Palmer's trailer. The student needs to focus on understanding how to write one-step equations to represent conditions in real-world problems.
	Option B is incorrect	The student likely misunderstood how to indicate which number is being subtracted, and subtracted the length of Ms. Palmer's trailer from 6 instead of subtracting 6 from the length of Ms. Palmer's trailer. The student needs to focus on understanding how to write one-step equations to represent conditions in real-world problems.
	Option C is incorrect	The student likely misunderstood the mathematical language indicating subtraction as meaning addition and added 6 to x, the length of Ms. Palmer's trailer. The student needs to focus on understanding how to write one-step equations to represent conditions in real-world problems.

Item Position	Rationale	
17	12, 6, 30, 12	To determine the number of students who created each type of project, the student should have first used the percentage bar graph (a representation of data based on what percentage of the whole each piece of data equals) to calculate the percentage for each type of project. Using the key, Model represents 20% because its bar goes from 0% to 20%. Paper represents 10% because its bar goes from 20% to 30%, and 30% – 20% = 10%. Presentation represents 50% because its bar goes from 30% to 80%, and 80% – 30% = 50%. Video represents 20% because its bar goes from 80% to 100%, and 100% – 80% = 20%. Next, the student should have recognized that the total number of students that were assigned to the project is 60. Therefore, each percentage is out of 60 and should be written as a decimal and multiplied by 60. For Model, 20% of 60 is 12: $60 \times 0.2 = 12$. For Paper, 10% of 60 is 6: $60 \times 0.1 = 6$. For Presentation, 50% of 60 is 30: $60 \times 0.5 = 30$. For Video, 20% of 60 is 12: $60 \times 0.2 = 12$.

Item Position	Rationale	
18	Option C is correct	To determine which statement describes the relationship between x and y in the two equations, the student should have determined the type of relationship shown in each equation. The first equation, $y = 3x$, shows a multiplicative relationship where the y -value is 3 times the x -value, and the second equation, $y = 3 + x$, shows an additive relationship where the y -value is 3 more than the x -value.
	Option A is incorrect	The student likely misunderstood "3 more than" as indicating both a multiplicative and an additive relationship between the x -value and the y -value. The student needs to focus on understanding the difference between additive and multiplicative relationships.
	Option B is incorrect	The student likely misunderstood "3 times" as indicating both a multiplicative and an additive relationship between the x -value and the y -value. The student needs to focus on understanding the difference between additive and multiplicative relationships.
	Option D is incorrect	The student likely confused the meanings of additive (+) and multiplicative (×) relationships. The student needs to focus on understanding the difference between additive and multiplicative relationships.

Item Position	Rationale	
19	Option D is correct	To determine which statement is true about the data set, the student could have put the data in order from least to greatest (1, 2, 3, 4, 5, 9) and determined the mean (average of a set of numbers, found by adding the numbers in the set and dividing the sum [total] by how many numbers are in the set), the median (middle number in an ordered set with an odd number of data or the mean of the two middle numbers in an ordered set with an even number of data), the mode (value in a set of data that repeats most often), and the range (least [lowest] value in a set of numbers subtracted from the greatest [highest] value in the set) of the data. The mean is 4 $\left(\frac{1+2+3+4+5+9}{6}\right)$, and the median is 3.5. 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 the greater of the two numbers in the middle of the ordered set (3 and 4) when identifying the median, rather than adding the two numbers and dividing the sum by 2. The student needs to focus on understanding the difference between finding the median of a data set with an even number of values and finding the median of a data set with an odd number of values.
	Option B is incorrect	The student likely did not list the numbers in the set from least to greatest when finding the range and instead subtracted the first number in the given list (5) from the last number (9). Additionally, the student likely chose the lesser of the two numbers in the middle of the ordered set when identifying the median. The student needs to focus on summarizing numerical data with numerical summaries, including the median and the range.
	Option C is incorrect	The student likely did not list the numbers in the set from least to greatest when finding the range and instead subtracted the first number

		in the list (5) from the last number (9). The student should focus on understanding the process steps used when summarizing numerical data with numerical summaries such as the range.

Item Position	Rationale	
20	The solution set is graphed with an open circle at 6 and an arrow pointing to the right.	To determine the solution to the inequality $3p > 18$, the student could have first divided both sides of the given inequality by 3, which results in $p > 6$. Next, the student could have interpreted the ">" symbol as "greater than" and realized that only numbers larger than but not equal to 6 represent a solution to the inequality. The open circle indicates that the number 6 is not included as a solution. Last, the student should have realized that ward the right side of the number line. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationale	
21	Option A is correct	To determine which measurement is equivalent to 0.05 inch, the student should have converted 0.05 to a fraction. Since the digit 5 is in the hundredths place, the fraction would be written as $\frac{5}{100}$. That is not an answer choice, so the student should have found a fraction equivalent to $\frac{5}{100}$. To find an equivalent fraction, the student should have multiplied or divided the numerator and denominator by the same number. Since 5 can be divided by 5 and 100 can be divided by 5, the equivalent fraction would be
	Option B is incorrect	The student likely converted 0.05 to a fraction incorrectly by reading the decimal as 50 hundredths and reducing $\frac{50}{100}$ $\frac{1}{2}$.to OBJ The student should focus on converting decimals to fractions.
	Option C is incorrect	The student likely converted 0.05 to a fraction incorrectly by using the 5 as the denominator and 1 as the numerator. The student should focus on converting decimals to fractions.
	Option D is incorrect	The student likely converted 0.05 to a fraction incorrectly by using 50 as the denominator and 1 as the numerator. The student should focus on converting decimals to fractions.

Item Position	Rationale	
22	Option D is correct	To determine the integer that represents the total change in the value of the gift card in dollars, the student should have found the value of the given expression. The student should have used the order of operations to first multiply 2 and –7. The student should have understood that the product (answer to a multiplication problem) of a positive integer and negative integer is a negative integer; therefore, 2(–7) = –14. Next, the student should have found the sum (answer to an addition problem) of –30 and –14, which is –44.
	Option A is incorrect	The student likely added 2 and –7 instead of multiplying. The student should focus on understanding how to add and multiply integers fluently.
	Option B is incorrect	The student likely was confused about the sign when multiplying 2 and –7 incorrectly determining the product to be positive, and then found the sum of –30 and 14, which is –16. The student should focus on understanding how to multiply integers fluently.
	Option C is incorrect	The student likely solved the expression from left to right, disregarding the order of operations, by first adding –30 + 2 = –28 and then multiplying –28(–7). The student likely also was confused about the sign of the product and identified the answer as negative instead of recognizing that the product of two negative integers is a positive integer. The student should focus on applying the order of operations and on understanding how to multiply integers fluently.

Item Position	Rationale	
23	Option A is correct	To determine which statement correctly compares the fees that Bank Q and Bank R will charge the customer, the student could have multiplied the monthly maintenance fee (a fee customers pay to a bank each month to use its service) by the number of months the customer has an account, which is 5. Bank Q charges the customer $6 per month, so for 5 months the total maintenance fee will be $30: 6 × 5 = 30. Bank R charges the customer $5 per month, so for 5 months, the total maintenance fee will be $25: 5 × 5 = 25. The student then could have multiplied the overdraft fee (a fee customers pay to the bank for writing a check for more money than they have in their account) by 3, the number of checks written for amounts greater than the checking account balance. Bank Q charges the customer $10 per check, so the total overdraft fee for 3 checks will be $30: 10 × 3 = 30. Bank R charges the customer $15 per check, so the total overdraft fee for 3 checks will be $45: 15 × 3 = 15. Then the student could have found the sums of the monthly maintenance fee and overdraft fee for Bank Q and for Bank R and subtracted to find the difference. The total the customer will be charged at Bank Q is $60: 30 + 30 = 60. The total the customer will be charged at Bank R is $70: 25 + 45 = 70. The total fees at Bank Q will be $10 less than the total fees at Bank R: 70 – 60 = 10. 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 confused the two types of fees, multiplying the overdraft fee by the number of months the customer has the account (Bank Q: 10 × 5 = 50, Bank R: 15 × 5 = 75) and multiplying the monthly maintenance fee by the number of checks written for an amount greater than the checking account balance (Bank Q: 6 × 3 =

		18, Bank R: 5 × 3 = 15). The student then added the two fees at each bank and found the difference: Bank Q: 50 + 18 = 68, Bank R: 75 + 15 = 90, 90 – 68 = 22). The student should focus on understanding the costs of a checking account and attending to the details of the problem.
	Option C is incorrect	The student likely accounted for the fees charged if the customer has an account for 1 month and writes 1 check for an amount greater than the checking account balance. For Bank Q, the student likely added 6 + 10 = 16, and for Bank R, the student likely added 5 + 15 = 20. Then the student subtracted 20 – 16 = 4. The student should focus on understanding the costs of a checking account and attending to the details of the problem.
	Option D is incorrect	The student likely determined the total monthly maintenance fees for Bank Q (6 × 5 = 30) and Bank R (5 × 5 = 25) correctly but accounted for only 1 check written for an amount greater than the checking account balance, instead of 3.The student should focus on understanding the costs of a checking account and attending to the details of the problem.

Item Position	Rationale	
24	Option B is correct	To determine which Venn diagram shows the correct relationship among the numbers in the list, the student should have first considered the classification system for the sets of numbers. The largest classification in the Venn diagram is Rational numbers. Rational numbers are all numbers that can be represented as the ratio of two integers. There are many special types of rational numbers, such as fractions, decimals, integers, and whole numbers. Two of the special types of rational numbers (integers and whole numbers) are shown in the Venn diagram. Integers make up the second largest classification in the Venn diagram. Integers are all the positive and negative numbers with no decimal or fraction parts, and zero. Whole numbers make up the smallest classification in the Venn diagram. Whole numbers are all the positive integers and zero. The student should have determined that $-\frac{3}{8}$ is a rational number because it can be written as the ratio of two integers, but it is not an integer or a whole number, because it has a decimal part (–0.375). Therefore, $-\frac{3}{8}$ should be placed in the rational numbers section of the Venn diagram. The student should have determined that 25 is a rational number because it can be written as the ratio of two integers $\left(\frac{25}{1}\right)$, an integer because it does not have a decimal part (25.0), and a whole number because it is positive. Therefore, 25 can be placed within the whole numbers section of the Venn diagram. The student should have determined that –10 is a rational number because it can be written as the ratio of two integers $\left(-\frac{10}{1}\right)$, and an integer because it does not have a decimal part (–10.0). However, –10 is not a whole number, because it is negative; therefore, –10 should be placed within the integer section of the Venn diagram. Finally, the student should have

		determined that 0.163 is a rational number because it can be written as the ratio of two integers$\left(\frac{163}{1{,}000}\right)$, but it is not an integer or a whole number because it has a decimal part (0.163); therefore, it should be placed within the rational numbers section of the Venn diagram.
	Option A is incorrect	The student likely confused the definitions of integers and whole numbers, as well as the relationship between the two (all whole numbers are integers, so the whole number section should be drawn within the integer section). The student needs to focus on understanding the difference between integers and whole numbers.
	Option C is incorrect	The student likely confused the relationship between integers and whole numbers. The student needs to focus on understanding the relationship between integers and whole numbers.
	Option D is incorrect	The student likely misunderstood the definition of integers, identifying all negative numbers, even those with decimal parts, as integers. The student needs to focus on understanding the characteristics of integers.

Item Position	Rationale	
25	Option C is correct	To determine which statement is true based on the stem and leaf plot, the student could have identified that there are a total of 25 people volunteering at the food drive and that the maximum age (69) minus the minimum age (20) gives a range of 49 years. Finally, the student could have identified the duplicate ages (22, 22, 31, 31, 38, 38, 65, 65, 65) and determined that 65 is the mode (the number that appears most often) of the data because it has a higher frequency than any other age. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely identified the first number in the last row (61), instead of the last number in the last row (69), as the maximum age. The student needs to focus on interpreting numerical data summarized in stem and leaf plots.
	Option B is incorrect	The student likely subtracted the least age that did not have a zero in the ones place (22) from the greatest age (69). The student needs to focus on interpreting numerical data summarized in stem and leaf plots.
	Option D is incorrect	The student likely counted only each unique age, excluding any duplicate ages. The student needs to focus on interpreting numerical data summarized in stem and leaf plots.

Item Position	Rationale	
26	Option B is correct	To determine how many trees in the park will change color in the fall, the student could have multiplied 500 trees by 40% (0.40), resulting in 200. 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 incorrectly identified 40% as equivalent to $\frac{1}{4}$ divided 500 by 4 to get 125. The student needs to focus on understanding how to find a percentage of a whole.
	Option C is incorrect	The student likely subtracted 40% from 100% (100 – 40 = 60) and then multiplied the two percentages and misinterpreted the result: .40 ×. 60 = .240. The student should focus on attending to the details of the question and on how to find a percentage of a whole.
	Option D is incorrect	The student likely misunderstood the question and subtracted 500 – 40 = 460. The student should focus on attending to the details of the question and on how to find a percentage of a whole.

Item Position	Rationale	
27	Option A is correct	To determine which groups could represent the numbers of student volunteers and adult volunteers at the event, the student could have recognized that an equivalent ratio can be found by multiplying each given number (5 student volunteers for every 2 adult volunteers) by the same factor (number is multiplied by another number). To determine which answer choices include the products (answer to a multiplication problem) of 5 and 2 being multiplied by the same factor, the student could have divided the two numbers in each answer choice by 5 and 2, respectively, to determine whether the same the factor is used: 120 ÷ 5 = 24, and 48 ÷ 2 = 24. Therefore, the following proportion can be written using 24 as a factor of change: $\frac{5}{2} \times \frac{24}{24} = \frac{120}{48}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option C is correct	To determine which groups could represent the numbers of student volunteers and adult volunteers at the event, the student could have recognized that an equivalent ratio can be found by multiplying each given number (5 student volunteers for every 2 adult volunteers) by the same factor (number that is multiplied by another number). To determine which answer choices include the products (answer to a multiplication problem) of 5 and 2 being multiplied by the same factor, the student could have divided the two numbers in each answer choice by 5 and 2, respectively, to determine whether the same the factor is used: 85 ÷ 5 = 17, and 34 ÷ 2 = 17. Therefore, the following proportion can be written using 17 as a factor of change: $\frac{5}{2} \times \frac{17}{17} = \frac{85}{34}$. 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 confused the numbers given in the initial ratio, multiplying 2 students (instead of 5) and 5 adults (instead of 2) by 10. The student needs to focus on attending to the details of the question and on understanding how to determine equivalent ratios.
	Option D is incorrect	The student likely used the quotient (answer to a division problem) from dividing $70 \div 5 = 14$ as the number of adult volunteers instead of multiplying 2 adult volunteers by 14 to get 28 adult volunteers (if there are 70 student volunteers). The student needs to focus on understanding how to determine equivalent ratios.
	Option E is incorrect	The student likely used the quotient from dividing $65 \div 5 = 13$ as the number of adult volunteers instead of multiplying 2 adult volunteers by 13 to get 26 adult volunteers (if there are 65 student volunteers). The student needs to focus on understanding how to determine equivalent ratios.

Item Position	Rationale	
28	Option C is correct	To determine which equation represents the relationship between p, the number of pears, and f, the number of figs, the student should have identified p as the independent variable (symbol used to represent an unknown number). The student should have also recognized that each value of f is 2 times the corresponding value of p. . The student then should have determined that the equation $f = 2p$ represents the relationship between each pair of values in the table: $2 = 1 \times 2$, $6 = 3 \times 2$, and $8 = 4 \times 2$.
	Option A is incorrect	The student likely noticed that, in the first row of the table, the value of f, the number of figs is 1 more than the value of p, the number of pears, and interpreted that relationship as representing the whole table. The student needs to focus on writing an equation that represents the relationship between all independent and dependent quantities from a table.
	Option B is incorrect	The student likely reversed the p and the f in the relationship and interpreted the value of p, the number of pears, in the last row of the table as being 4 less than the value of f, the number of figs. The student needs to focus on writing an equation that represents the relationship between all independent and dependent quantities from a table.
	Option D is incorrect	The student likely reversed p and f in the relationship and determined the equation to be $p = 2f$. The student needs to focus on understanding which variable is the independent variable when writing an equation from given values in a table

Item Position	Rationale	
29	A line segment with endpoints at (–4, 3) and (–4, 7)	To determine where to plot the points on the coordinate grid, the student should have recognized that an ordered pair is written as (x, y). So, to find (–4, –3), the student should have first found –4 on the x-axis (4 units to the left of the origin [the point of intersection of the axes in a coordinate system, or (0, 0)]). Then the student should have moved 3 units down, parallel to the y-axis and plotted the point (–4, –3). Last, the student should have counted 10 units up from (–4, –3) and plotted the point (–4, 7).

Item Position	Rationale	
30	Option C is correct	To determine which equation can be used to find x, the total number of people on the bus before 4 people got off, the student should have recognized that the number of people who got off the bus (4) is subtracted from the original number of people on the bus (x) to get the result of 31, and that the correct equation is $x - 4 = 31$.
	Option A is incorrect	The student divided the original number of people by 4 instead of subtracting 4. The student needs to focus on understanding how to write one-step equations to represent conditions in problems.
	Option B is incorrect	The student multiplied the original number of people by 4 instead of subtracting 4. The student needs to focus on understanding how to write one-step equations to represent conditions in problems.
	Option D is incorrect	The student added 4 to the original number of people instead of subtracting 4. The student needs to focus on understanding how to write one-step equations to represent conditions in problems.

Item Position	Rationale	
31	Option D is correct	To determine which pair of expressions are equivalent, the student could have identified the like terms (terms that contain the same variables or that are constant terms) and combined them by adding. The student could have also recognized that $8a + (-8a) = 0$; therefore, $3a + 8a + (-8a) = 3a + 0 = 3a$. 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 $5a + (-5)$, not realizing that the terms $5a$ and -5 are not like terms and therefore cannot be combined through addition or subtraction. The student needs to focus on understanding how to generate equivalent expressions when the expression contains like terms.
	Option B is incorrect	The student likely multiplied $\frac{1}{5}(5a)$, excluding the variable in the product (answer to a multiplication problem): $\frac{1}{5}(5a) = \frac{1\times5}{5\times1}a = \frac{5}{5}a = a$. The student needs to focus on understanding how to generate equivalent expressions when the expression contains fractions.
	Option C is incorrect	The student likely did not use the correct sign for the product (answer to a multiplication problem) when the two factors multiplied are both negative (negative × negative = positive). The student needs to focus on understanding how to generate equivalent expressions when multiplying positive and negative rational numbers.

Item Position	Rationale	
32	16.5 and any equivalent values are correct	To determine the volume (the space occupied within a three-dimensional figure) of the rectangular prism in cubic meters, the student should have substituted the given values into the formula for the volume of a rectangular prism from the Volume section of the STAAR Grade 6 Mathematics Reference Materials: $V = Bh$, where V represents the volume, B represents the area (measurement of the interior region of a 2-dimensional space, measured by the number of non-overlapping square units) of the base, and h represents the height (vertical distance from top to bottom). To determine B, the area of the base, the student should have multiplied $5.5 \times 3 = 16.5$ to find that the area of the base is 16.5 square meters. Then the student should have substituted the values $B = 16.5$ and $h = 1$ in the volume formula ($V = 16.5 \times 1 = 16.5$), resulting in a volume of 16.5 cubic meters.

Item Position	Rationale	
33	Option C is correct	To determine how many math books are on the shelf, the student should have interpreted the ratio of the number of science books to the number of math books to mean that for every 4 science books, there are 3 math books on the shelf. The student could have set up the ratio as a fraction $\left(\frac{4}{3}\right)$. Then the student could have found an equivalent fraction based on the factor (number that is multiplied by another number) used when multiplying by 4 to get a product (answer to a multiplication problem) of 36: $4 \times 9 = 36$. Then the student should have multiplied 3 by 9 and determined that there are 27 math books on the shelf. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely misunderstood the given ratio, multiplying 3 by 12 to get 36 (the total number of science books, not math books, on the shelf). The student then used the factor 12 and multiplied 4 by 12 to get 48 as the number of math books on the shelf. The student needs to focus on correctly identifying the category that each quantity in a ratio represents.
	Option B is incorrect	The student likely misunderstood the ratio and that since 3 is 1 less than 4, that the number of math books would be 1 less than the number of science books. . The student needs to focus on understanding how to determine equivalent ratios.
	Option D is incorrect	The student likely determined the total number of books on the shelf, adding 4 science books and 3 math books (4 + 3 = 7) and multiplying by the factor 9. The student needs to focus on attending to the details of a problem.

Item Position	Rationale	
34	0.375, 37.5%	To determine which values are equivalent to $\frac{3}{8}$, the student could have converted $\frac{3}{8}$ to both a decimal number and a percentage. To find the decimal number equivalent to $\frac{3}{8}$, the student should have divided the numerator (top number in a fraction), 3, by the denominator (bottom number in a fraction), 8, to get 0.375. The find the percentage equivalent to $\frac{3}{8}$, the student should have used the decimal form, 0.375, and moved the decimal point two places to the right to represent multiplying by 100, resulting in 37.5%. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationale	
35	Option C is correct	To determine how many students are in the class if each student got 1.5 ounces of vinegar, the student could have divided 31.5 by 1.5. First, the student could have moved the decimal point one place to the right in both the divisor (1.5 --> 15) and the dividend (31.5 --> 315) and used the standard long division algorithm (procedure) to divide 315 ÷ 15 = 21. 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 31.5 to 32 and 1.5 to 2 and then divided 32 ÷ 2 = 16. The student needs to focus on understanding how to divide positive rational numbers fluently.
	Option B is incorrect	The student likely subtracted 1.5 from 31.5. The student needs to focus on understanding how to divide positive rational numbers fluently.
	Option D is incorrect	The student likely added 1.5 to 31.5. The student needs to focus on understanding how to divide positive rational numbers fluently.

Item Position	Rationale	
36	Option B is correct	To determine what type of funds Mia received from the government, the student should have recognized that a student loan is financial aid for college that accrues interest and must be repaid.
	Option A is incorrect	The student confused a student loan with work-study, which is working a part-time job to earn money for a college education. The student should focus on understanding the types of financial aid that can be used for college.
	Option C is incorrect	The student confused a student loan with savings, which is money a person sets aside for future use. The student should focus on understanding the types of financial aid that can be used for college.
	Option D is incorrect	The student confused a student loan with a grant, which is financial aid for college that usually does not need to be repaid. The student should focus on understanding the types of financial aid that can be used for college.