STAAR Spring 2025 Grade 6 Math Rationales

Item Position	Rationales	
1	Option C is correct	To determine the decimal that represents 35%, the student could have written the percentage as a fraction. Since percentages are out of a whole of 100, 35% can be written as $\frac{35}{100}$. Then the student could have divided the numerator (top number in a fraction) by the denominator (bottom number in a fraction), resulting in an answer of 0.35. 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 wrote the percentage as a fraction with 35 as the numerator and 10 as a denominator. The student then likely divided 35 by 10, resulting in 3.5. The student needs to focus on writing percentages as fractions with 100 as the denominator.
	Option B is incorrect	The student likely wrote the percentage as a fraction with 35 as the numerator and 1,000 as a denominator. The student then likely divided 35 by 1,000, resulting in 0.035. The student needs to focus on writing percentages as fractions with 100 as the denominator.
	Option D is incorrect	The student likely did not write the percentage as a fraction and used the given percentage as the decimal representation. The student needs to focus on writing percentages as fractions with 100 as the denominator.

Item Position	Rationales	
2	Option A is correct	To determine the number that represents the total change in the number of fish in the tank, the student could have added the numbers listed for the daily changes in the number of fish from left to right. The student could have added the seven numbers in the list: 8 + (−6) + 2 + (−5) + (−1) + 3 + (−6), resulting in −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 likely added the first and the last numbers in the data set to determine the total change. The student likely added the first number (+8) and the last number (−6), resulting in 2. The student needs to focus on understanding how to add all the data points to determine the total change.
	Option C is incorrect	The student likely added the listed changes in the number of fish correctly, resulting in −5, but omitted the negative sign when selecting the final answer, resulting in 5. The student needs to focus on understanding how to add all the data points to determine the total change.
	Option D is incorrect	The student likely added the first number and the last number in the data set : 8 + (−6) = 2. The student then likely used the negative sign to represent a decrease from 8 to −6, resulting in an answer of −2. The student needs to focus on understanding how to add all the data points to determine the total change.

Item Position	Rationales	
3	Option C is correct	To determine the rate (a quantity measured against another quantity) that best represents the relationship between the number of students and the number of classrooms, the student could have divided 875 students by 35 classrooms, which results in a quotient (answer to a division problem) of 25 students per classroom. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely divided 875 by 35 to find the correct quotient 25 but reversed the units of the rate, resulting in 25 classrooms per student. The student needs to focus on understanding how to determine rates as quotients.
	Option B is incorrect	The student likely selected the number of classrooms as the rate and reversed the units of the rate, resulting in 35 classrooms per student. The student needs to focus on understanding how to determine rates as quotients.
	Option D is incorrect	The student likely selected the number of classrooms as the unit rate and correctly labeled the rate as students per classroom, resulting in 35 students per classroom. The student needs to focus on understanding how to determine rates as quotients.

Item Position	Rationales	
4	Option D is correct	To determine which inequality (a mathematical statement formed by placing one of the following signs: >, <, ≥, ≤, or ≠) is true when $n < -3$, the student could have substituted −4 for the variable (n) in each inequality, since −4 is less than −3. Substituting into the first inequality, $n + 5 < -6$, results in $(-4) + 5 < -6$, which simplifies to $1 < -6$. This inequality is not true. Substituting −4 into the second inequality, $n + 5 > 3$, results in $(-4) + 5 > 3$, which simplifies to $1 > 3$. his inequality is not true. Substituting −4 into the third inequality, $n + 5 < -1$, results in $(-4) + 5 < -1$, which simplifies to $1 < -1$. This inequality is not true. Substituting −4 into the fourth inequality, $n + 5 < 3$, results in $(-4) + 5 < 3$, which simplifies to $1 < 3$. This inequality is true because 1 is less than 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 replaced the variable (n) with −4 but multiplied −4 by 5 instead of adding, resulting in $(-4)(5) < -6$. This simplifies to the true inequality $-20 < -6$. The student needs to focus on understanding how to substitute a number into an inequality and perform the operations represented in the inequality.
	Option B is incorrect	The student likely correctly replaced the variable (n) with −4, resulting in $1 > 3$, but misinterpreted the inequality sign as meaning that 1 is less than 3. The student needs to focus on correctly interpreting inequality symbols.
	Option C is incorrect	The student likely replaced the variable (n) with −4 but subtracted 5 from −4 instead of adding, resulting in $(-4) - 5 < -1$. This simplifies to the true inequality $-9 < -1$. The student needs to focus on understanding how to substitute a number into an inequality and perform the operations represented in the inequality.

Item Position	Rationales	
5	Credit Card, Debit Card, Credit Card, Credit Card	To determine whether each statement is a characteristic of a debit card or a credit card, the student should have recalled the characteristics of both payment methods. A debit card automatically withdraws purchase amounts from a bank account. A credit card builds credit history, which can positively affect a person’s credit score; treats each purchase as a loan to be paid back in the future; and sometimes charges interest on purchases.

Item Position	Rationales	
6	Option A is correct	To determine how many of the floor tiles are blue, the student could have interpreted the ratio (comparison of one quantity to another) of the number of green tiles to the number of blue tiles to mean that for every 7 green tiles, there are 13 blue tiles on the floor. This also implies that the ratio of the number of blue tiles to the total number of tiles is 13:(13+7), which results in a ratio of 13:20. The student could have set up this ratio as a fraction: $\left(\frac{13 \text{ blue tiles}}{20 \text{ total tiles}}\right)$. To create an equivalent fraction with a denominator (bottom number) of 3,000 to represent the total number of tiles, the student could have multiplied the numerator (top number) and denominator by 150: $\left(\frac{13 \text{ blue tiles} \cdot 150}{20 \text{ total tiles} \cdot 150} = \frac{1{,}950 \text{ blue tiles}}{3{,}000 \text{ total tiles}}\right)$. The student then could have understood that out of the total of 3,000 tiles, 1,950 tiles were blue. 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 wrote the ratio of blue tiles to total tiles $\left(\frac{13 \text{ blue tiles}}{20 \text{ total tiles}}\right)$ and found the correct factor (a number that is multiplied by another number) of 150 to find the total of 3,000 tiles. Then the student likely selected 150 as the number of blue tiles instead of multiplying the factor by the number that represents the portion of blue tiles in the ratio. The student needs to focus on understanding how to determine equivalent ratios.
	Option C is incorrect	The student likely divided the total number of tiles (3,000) by the number that represents the portion of green tiles in the ratio, 7, and rounded to the nearest whole number, resulting in 429. The student needs to focus on understanding how to determine equivalent ratios.
	Option D is incorrect	The student likely multiplied the original ratio $\left(\frac{7 \text{ green tiles}}{13 \text{ blue tiles}}\right)$ by 3,000 (the total number of tiles). The student then likely rounded to the nearest whole number. The student needs to focus on understanding how to determine equivalent ratios.

Item Position	Rationales	
7	Option C is correct	To determine which value would NOT be in the shaded region (the integer classification), the student should have considered the classification system for 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 (comparison of one quantity to another) of two integers. 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 for a number NOT to be located in the shaded region, it must be a rational number that is not an integer, since all whole numbers are included in the integer classification. Of the choices listed, $\frac{11}{8}$ is the only fraction that cannot be written as an integer; therefore, it is the only listed option that is not an integer.
	Option A is incorrect	The student determined that negative fractions $\left(-\frac{8}{2}\right)$ are not integers. The student needs to focus on understanding the classification of numbers in the real number system.
	Option B is incorrect	The student determined that negative numbers (−33) are not integers. The student needs to focus on understanding the classification of numbers in the real number system.
	Option D is incorrect	The student did not consider a whole number (2) as an integer. The student needs to focus on understanding the classification of numbers in the real number system.

Item Position	Rationales	
8	$y = \frac{x}{4}$, $y = 2x$	To determine which equation represents the relationship between *x* and *y* in the table, the student could have identified *x* as the independent variable (symbol used to represent an unknown number) and *y* as the dependent variable (a value that is arrived at through some rule, function, or experiment). The student could have recognized that when each *x*-value is divided by 4, the result is the corresponding (paired) *y*-value. The student could have determined that the equation $y = \frac{x}{4}$ represents the relationship for all the values in the table. To determine which equation represents the relationship between *x* and *y* on the graph, the student could have identified the values on the -x-axis (horizontal number line) as the *x*-values and the values on the -y-axis (vertical number line) as the *y*-values. The student could have recognized that the *x*-value for each point is multiplied by a common factor (number multiplied to get another number) of 2 to obtain the corresponding *y*-value. The student could have determined that the equation $y = 2x$ represents the relationship for all the points on the graph. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
9	Option C is correct	To determine the statement that best supports the data in the percentage bar graph (a representation of data based on what percentage of the whole each category represents), the student could have used the percentage bar graph to determine the percentage of athletes who attended each session. Using the key, the student could have recognized that the light gray shade, which represents the 5:00 p.m. session, makes up 25% of the graph. Therefore, 25% of the athletes attended the 5:00 p.m. session. Then the student could have used the key to see that the white part of the graph, which represents the 6:00 p.m. session, makes up 20% of the graph. Therefore, 20% of the athletes attended the 6:00 p.m. session. This means that fewer students attended the 6:00 p.m. session (20%) than attended the 5:00 p.m. session (25%). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely used the key to see that the light gray shade represents the 5:00 p.m. session. The student likely determined that, because the light gray shaded region begins at 55%, more than half of the students attended the 5:00 p.m. session, since 55% is more than half (50%). The student needs to focus on reading percentage bar graphs.
	Option B is incorrect	The student likely used the key to determine that the morning sessions (5:00 a.m. and 6:00 a.m.) are represented by the black and dark gray shades, which are positioned on the left side of the percentage bar graph. Since the left side of a number line includes lesser numbers than the right side, the student could have determined that the morning sessions had fewer attendees than the afternoon sessions, which are represented farther to the right on the graph. The student needs to focus on reading percentage bar graphs.
	Option D is incorrect	The student likely used the key to determine that the dark gray shade represents the 6:00 a.m. session but determined that the section represented 55% since the section ends at 55%. The student then could have used the key to determine that the 5:00 p.m. session is indicated by the light gray shade, which represents 25%. Then the student likely determined 55% to be more than twice 25%. The student needs to focus on reading percentage bar graphs.

Item Position	Rationales	
10	Option B is correct	To determine which ordered pair (pair of x- and y-coordinates) could represent the location of point V, the student could have recognized that in the ordered pair (2, −4), 2 represents the x-value (value on the horizontal number line) and −4 represents the y-value (value on the vertical number line). The student could have added 4 (distance to the right) or −4 (distance to the left) to the x--value and left the y-value the same, resulting in (6, −4) or (−2, −4). The student also could have added 4 (distance up) or −4 (distance down) to the y-value and left the x--value the same, resulting in (2, 0) or (2, −8). All these points are 4 units away from point Q, so the student could have compared these ordered pairs with the given options, and found the ordered pair (−2, −4). 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 split the distance (4 units) in half, adding −2 (distance to the left) to the x-value and adding 2 (distance up) to the y-value, resulting in the ordered pair (0, −2). The student needs to focus on identifying locations of ordered pairs relative to other ordered pairs.
	Option C is incorrect	The student likely began at the origin (the point of intersection of the axes in a coordinate system, which is represented by the ordered pair (0, 0)), and added −4 (distance to the left) to the x-value and added −4 (distance down) to the y-value, resulting in the ordered pair (−4, −4). The student needs to focus on identifying locations of ordered pairs relative to other ordered pairs.
	Option D is incorrect	The student likely added−4 (distance to the left) to the x-value and 4 (distance up) to the y-value, resulting in the ordered pair (−2, 0). The student needs to focus on identifying locations of ordered pairs relative to other ordered pairs.

Item Position	Rationales	
11	0.025, $\frac{1}{8}$	To determine which number makes each inequality true, the student could have converted all the fractions to decimals by dividing the numerator (top number in a fraction) by the denominator (bottom number in a fraction): $\frac{1}{8} = 0.125$, $-\frac{9}{2} = -4.5$, $\frac{1}{10} = 0.1$, and $\frac{12}{7} \approx 1.714$. To satisfy the first inequality, the student could have found the number that is greater than −2.6 and less than 0.1, which is 0.025. Then, to satisfy the second inequality, the student could have found the number that is greater than 0.1 and less than approximately 1.714, which is 0.125, or $\frac{1}{8}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
12	Option A is correct	To determine the total value of Josette's coins in dollars and cents, the student should have multiplied 178 by $0.05, which results in the product (answer to a multiplication problem) of $8.90.
	Option B is incorrect	The student divided 178 by $0.05 and misplaced the decimal point one place value to the left, resulting in $356.00. The student needs to focus on representing and solving a real-world multiplication problem.
	Option C is incorrect	The student divided 178 by $0.05 and misplaced the decimal point two place values to the left, resulting in $35.60. The student needs to focus on representing and solving a real-world multiplication problem.
	Option D is incorrect	The student multiplied 178 by $0.05 and misplaced the decimal point two place values to the right, resulting in $890.00. The student needs to focus on solving a real-world multiplication problem.

Item Position	Rationales	
13	14.4, 14.7	To determine the mean (average of a set of numbers) sprint time from the given data set, the student could have added the numbers in the set and divided the sum (the result when two or more quantities are added together) by the number of data points in the set (6): 15.1 + 13.8 + 12.9 + 14.3 + 15.2 + 15.1 = 86.4, and 86.4 ÷ 6 = 14.4. To determine the median (middle value in an ordered set with an odd number of data or the mean of the two middle values in an ordered set with an even number of data) sprint time, the student could have first ordered the numbers from least to greatest: 12.9, 13.8, 14.3, 15.1, 15.1, 15.2. The student then could have found the two numbers in the center of the data (14.3 and 15.1) and found the mean of these two numbers: 14.3 + 15.1 = 29.4, and 29.4 ÷ 2 = 14.7. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
14	Option C is correct	To determine the amount of the employee's salary increase after the training, the student could have found 3% of the starting salary ($36,000). To find 3%, the student could have first converted 3% to a decimal by dividing 3 by 100, which moves the decimal point two places to the left, resulting in 0.03. The student then could have multiplied the decimal by the original salary, resulting in $36{,}000 \cdot 0.03 = 1{,}080$. 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 moved the decimal point one place to the left when converting the percentage to a decimal (0.3). The student then likely multiplied 0.3 by the initial salary, resulting in $36{,}000 \cdot 0.3 = 10{,}800$. The student needs to focus on converting percentages to decimals.
	Option B is incorrect	The student likely divided the original salary by the given percentage (3), resulting in $36{,}000 \div 3 = 12{,}000$. The student needs to focus on solving problems when given a whole number and a percentage.
	Option D is incorrect	The student likely changed 3% to 30 and divided the original salary by 30, resulting in $36{,}000 \div 30 = 1{,}200$. The student needs to focus on solving problems when given a whole number and a percentage.

Item Position	Rationales	
15	$\frac{33}{b}$ and any equivalent expressions are correct	To determine the height of the parallelogram in inches, the student should have used the area (measurement of the interior region of a -two-dimensional space, measured in square units) formula for a parallelogram, which is $A = bh$, where A represents the area, b represents the length of the base, and h represents the height. The student could have substituted 33 square inches for A, resulting in $33 = bh$. The student then could have solved for h by dividing both sides of the equation by b: $\frac{33}{b} = \frac{bh}{b}$. This results in the equation $\frac{33}{b} = h$, or $h = \frac{33}{b}$.

Item Position	Rationales	
16	Option B is correct	To determine the expression that does NOT represent the number of strawberries Liselle puts into each basket, the student could have first recognized that the total (60) needs to be split, or divided, among the 4 baskets. Therefore, an expression with division is needed. Since there are a total of 60 strawberries that need to be divided equally, the student could have recognized 60 as the dividend (a quantity or total to be divided) and the number of baskets (4) as the divisor (the number the answer choice $\frac{4}{60}$ has 4 as the dividend and 60 as the divisor and therefore does not represent the given situation. 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 determined that the use of the ÷ symbol did not represent the given situation. The student needs to focus on representing division problems from a verbal description.
	Option C is incorrect	The student likely determined that this answer choice had 4 as the dividend and 60 as the divisor and therefore did not represent the given situation. The student needs to focus on representing division problems from verbal descriptions.
	Option D is incorrect	The student likely misread the problem and selected an expression that did represent the given situation. The student needs to focus on representing division problems from verbal descriptions.

Item Position	Rationales	
17	+, ≤	To determine the inequality that represents all possible values of y, the amount in dollars Kevin can spend on popcorn and a drink, the student could have determined that the expression (the sum of products of numbers and variables) representing the total amount of money he spends at the theater is the sum (the result when two or more quantities are added together) of the amount he spends on a ticket and the amount he spends on popcorn and a drink. Since the amount he can spend on popcorn and a drink is unknown, this value is represented by the variable y. Since Kevin will spend $15 on a ticket and y dollars on popcorn and a drink, the student could have selected the plus sign to complete the expression $15 + y$, which represents the total amount he will spend at the theater. The student then could have determined that this value cannot exceed the amount of money Kevin has to spend at the theater ($28). The student could have used an inequality sign to represent that the total amount of money Kevin spends is less than or equal to the amount he can spend, resulting in the inequality $15 + y \leq 28$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
18	Option C is correct	To determine the value of the expression, the student should have recalled that the bars indicate absolute value, which is the positive distance from zero to the given number on a number line. The student could have determined that |6.28| indicates the distance from zero to 6.28 on the number line, which is 6.28.
	Option A is incorrect	The student likely first multiplied by 10, resulting in $6.28 \cdot 10 = 62.8$. Then the student likely associated absolute value with a negative value, resulting in –62.8. The student needs to focus on identifying the absolute value of a number.
	Option B is incorrect	The student likely found the opposite of the given value (–6.28). The student needs to focus on identifying the absolute value of a number.
	Option D is incorrect	The student likely multiplied the given value by 10, resulting in $6.28 \cdot 10 = 62.8$. The student needs to focus on identifying the absolute value of a number.

Item Position	Rationales	
19	Option B is correct	To determine the range of the listed ticket prices, The student should have recalled that range is difference between the greatest (highest) value in a data set and the least (lowest) value in the data set. The student should have determined that the greatest number in the data set is 42, and the least number in the data set is 10. The student then should have subtracted the least number from the greatest number: 42 – 10 = 32.
	Option A is incorrect	The student found the median (middle value in an ordered set with an odd number of data or the mean of the two middle values in an ordered set with an even number of data). The student ordered the numbers from least to greatest (10, 12, 14, 16, 20, 24, 26, 34, 42) and found the middle number of the data set (20). The student needs to focus on finding the range of a data set.
	Option C is incorrect	The student subtracted the first number in the list (16) from the last number in the list (34), resulting in 18. The student needs to focus on finding the range of a data set.
	Option D is incorrect	The student found the mean (average of a set of numbers) by adding the numbers in the set and dividing the sum (total) by the number of data points in the set: $\frac{16+10+26+14+12+20+42+24+34}{9}$ = 22. The student needs to focus on finding the range of a data set.

Item Position	Rationales	
20	Option D is correct	To determine the value of $\frac{8}{18} \div \frac{6}{12}$, the student could have recognized that fractions can be divided by multiplying the dividend (a quantity or total to be divided) by the reciprocal (the multiplicative inverse of the value of a number in which the numerator and denominator are switched) of the divisor (the number by which the dividend is to be divided). The student then could have found the reciprocal of $\frac{6}{12}$, which is $\frac{12}{6}$. The student then could have multiplied the dividend by the reciprocal of the divisor: $\frac{8}{18} \cdot \frac{12}{6} = \frac{96}{108}$. The student then could have simplified the fraction by dividing both the numerator (top number) and the denominator (bottom number) by the same value, 12: $\frac{96 \div 12}{108 \div 12} = \frac{8}{9}$. 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 changed the operation to multiplication but did not find the reciprocal of the divisor: $\frac{8}{18} \cdot \frac{6}{12} = \frac{48}{216}$. The student then likely simplified the fraction by dividing both the numerator and the denominator by 24, resulting in $\frac{48 \div 24}{216 \div 24} = \frac{2}{9}$. The student needs to focus on dividing rational numbers.
	Option B is incorrect	The student likely changed the operation to multiplication but found the reciprocal of the dividend instead of the divisor: $\frac{18}{8} \cdot \frac{6}{12} = \frac{108}{96}$. The student then likely simplified the fraction by dividing both the numerator and the denominator by 12, resulting in $\frac{108 \div 12}{96 \div 12} = \frac{9}{8}$. The student needs to focus on dividing rational numbers.
	Option C is incorrect	The student likely changed the operation to multiplication but found the reciprocals of both the dividend and the divisor: $\frac{18}{8} \cdot \frac{12}{6} = \frac{216}{48}$. The student then likely simplified the fraction by dividing both the numerator and the denominator by 24, resulting in $\frac{216 \div 24}{48 \div 24} = \frac{9}{2}$. The student needs to focus on dividing rational numbers.

Item Position	Rationales	
21	Figure L, Figure N	To determine which two figures have the same area, the student should have first recognized that there are three parallelograms (including one rectangle and one square), one trapezoid, and one triangle. To determine the area (measurement of the interior region of a two-dimensional space, measured in square units) of each shape, the student could have substituted the given values into the area formulas for parallelograms, trapezoids, and triangles. Figure J (trapezoid): The formula for the area of a trapezoid is $A = \frac{1}{2}(b_1 + b_2)h$, where *A* represents the area, b_1 represents one of the parallel sides of the trapezoid, b_2 represents the other parallel side of the trapezoid, and *h* represents the height. The student could have substituted 12 for b_1, 4 for b_2, and 7 for *h,* resulting in $A = \frac{1}{2}(12 + 4)7$, which is equal to 56 cm². Figure K (rectangle): The formula for the area of a parallelogram is $A = bh$, where *A* represents the area, *b* represents the base, and *h* represents the height (vertical distance from top to bottom). The student could have substituted 13 for *b* and 4 for *h*, resulting in $A = (13)(4)$, which is equal to 52 cm². Figure L (triangle): The formula for area of a triangle is $A = \frac{1}{2}bh$, where *A* represents the area, *b* represents the base, and *h* represents the height. The student could have substituted 7 for *b* and 12 for *h*, resulting in $A = \frac{1}{2}(7)(12)$, which is equal to 42 cm². Figure M (square): Using the formula for the area of a parallelogram, $A = bh$, the student could have substituted 21 for *b* and 21 for *h*, resulting in $A = (21)(21)$, which is equal to 441 cm². Figure N (parallelogram): Using the formula for the area of a parallelogram, $A = bh$, the student could have substituted 6 for *b* and 7 for *h*, resulting in $A = (6)(7)$, which is equal to 42 cm². The student could have then compared the areas and determined that the areas of Figure L and Figure N are both 42 cm². This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
22	Option C is correct	To determine which inequality (a mathematical statement formed by placing numbers or expressions on either side of the following signs: $>$, $<$, $\geq$, $\leq$, $\neq$) represents the number of avocados, n, a customer can buy with \$10.00, the student could have recognized that the amount the customer spends can be represented by multiplying the number of avocados bought by the price of each avocado, \$0.65, resulting in $0.65n$. The student should have recognized that this product (answer to a multiplication problem) cannot exceed the total amount of \$10.00. The student could have determined that the inequality $0.65n \leq 10$ represents the situation. 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 0.65 by n but reversed the inequality sign, resulting in $0.65n \geq 10$. The student needs to focus on modeling one-variable, one-step inequalities that represent verbal scenarios.
	Option B is incorrect	The student likely switched the total cost and the price of each avocado, resulting in the inequality $10n \leq 0.65$. The student needs to focus on modeling one-variable, one-step inequalities that represent verbal scenarios.
	Option D is incorrect	The student likely switched the total cost and the price of each avocado and reversed the inequality sign, resulting in the inequality $10n \geq 0.65$. The student needs to focus on modeling one-variable, one-step inequalities that represent verbal scenarios.

Item Position	Rationales	
23	Second option is correct	To determine a measurement that is equivalent to 6 yards, the student could have first converted the measurement in yards to feet by multiplying 6 by 3, since 1 yard = 3 feet, resulting in 18 feet. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Fifth option is correct	To determine a measurement that is equivalent to 6 yards, the student could have first converted the measurement in yards to feet by multiplying 6 by 3, since 1 yard = 3 feet, resulting in 18 feet. Then, to convert the measurement in feet to inches, the student could have multiplied 18 by 12, since 1 foot = 12 inches, resulting in 216 inches.
	First option is incorrect	The student likely used the conversion 1 yard = 3 feet but divided 6 by 3, resulting in 2 feet. The student needs to focus on converting units within a measurement system.
	Third option is incorrect	The student likely used the conversion 1 yard = 3 feet but added 3 to 6, resulting in 9 feet. The student needs to focus on converting units within a measurement system.
	Fourth option is incorrect	The student likely used the conversion 1 yard = 3 feet but added 3 to 6, resulting in 9 feet. The student then likely used the conversion 1 foot = 12 inches and multiplied 9 by 12, resulting in 108 inches. The student needs to focus on converting units within a measurement system.
	Sixth option is incorrect	The student likely recognized that 1 foot = 12 inches and multiplied 6 by 12 without converting yards to feet first. The student needs to focus on converting units within a measurement system.

Item Position	Rationales	
24	Option B is correct	To determine the value of the expression −8(2 − 5) + 3(−4), the student should have recalled the order of operations (the order expressions should be solved in, beginning with parentheses, then exponents, followed by multiplication and division from left to right, and then addition and subtraction left to right). The student should have first solved 2 − 5 within the parentheses, resulting in −3. The student then should have multiplied −8 by the result (−3), resulting in 24, and then multiplied 3 by −4, resulting in −12. The student then should have added 24 and −12, resulting in 12.
	Option A is incorrect	The student likely multiplied −8 and 2, resulting in −16, and then multiplied 3 and −4, resulting in −12. The student then likely solved from left to right: −16 − 5 + −12 = −33. The student needs to focus on adding, subtracting, multiplying, and dividing integers in the correct order.
	Option C is incorrect	The student likely multiplied −8 and 2, resulting in −16, and then multiplied 3 and −4, resulting in −12. The student then likely solved from left to right (−16 − 5 + −12 = −33) but applied the multiplication rule for two negative values to the sum of negative values and made the answer positive (33). The student needs to focus on adding, subtracting, multiplying, and dividing integers in the correct order.
	Option D is incorrect	The student likely solved 2 − 5 within the parentheses, resulting in −3. The student then likely added −3 and 3, resulting in 0. The student then likely solved from left to right: −8 + 0 + (−4) = −12. The student needs to focus on adding, subtracting, multiplying, and dividing integers in the correct order.

Item Position	Rationales	
25	Option B is correct	To determine the value of x, the amount Lianna would charge for a computer repair that takes 9 hours, the student could have used the data in the table to find the ratio (comparison of one quantity to another) of the amount charged in dollars to the number of hours worked: $\frac{67.50}{3}$. Then the student could have multiplied the numerator (top number of a fraction) and the denominator (bottom number of a fraction) by 3 to find the equivalent ratio for 9 hours, resulting in $\frac{67.50 \cdot 3}{3 \cdot 3} = \frac{202.50}{9}$. The student could have recognized that for 9 hours of work, Lianna would have charged $202.50. 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 calculated the difference (the amount that remains when one quantity is subtracted from another) between the amounts charged in the second and third rows of the table (112.50 – 101.25 = 11.25) and added the result to 112.50 (112.50 + 11.25 = 123.75). The student needs to focus on applying quantitative reasoning to solve prediction problems involving ratios.
	Option C is incorrect	The student likely calculated the difference between the amounts charged in the first and second rows of the table (101.25 – 67.50 = 33.75) and added the result to 112.50 (112.50 + 33.75 = 146.25). The student needs to focus on applying quantitative reasoning to solve prediction problems involving ratios.
	Option D is incorrect	The student likely added the amounts charged in the second and third rows of the table (101.25 + 112.50 = 213.75). The student needs to focus on applying quantitative reasoning to solve prediction problems involving ratios.

Item Position	Rationales	
26	Option D is correct	To determine how much more money a sound engineering technician will earn than a journalist over a period of 5 years, the student could have subtracted the yearly salary for a journalist ($62,400) from the yearly salary of a sound engineering technician ($67,090) to find the difference (the amount that remains when one quantity is subtracted from another) in annual salary each year: 67,090 – 62,400 = 4,690. The student then could have multiplied this difference by 5 years, resulting in 4,690 · 5 = 23,450. 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 calculated the difference between the annual salaries of a sound engineering technician and a journalist (67,090 – 62,400 = 4,690) but did not multiply by the number of years (5). The student needs to focus on understanding how to calculate and compare annual salaries over a given period.
	Option B is incorrect	The student likely added the annual salaries of a journalist ($62,400) and a sound engineering technician ($67,090), resulting in $129,490. The student needs to focus on understanding how to calculate and compare annual salaries over a given period.
	Option C is incorrect	The student likely used the annual salary for a technical writer ($76,860) instead of a journalist. The student likely subtracted the sound engineering technician's annual salary from the technical writer's annual salary (76,860 – 67,090 = 9,770) and multiplied by the given number of years (5), resulting in 9,770 · 5 = 48,850. The student needs to focus on understanding how to calculate and compare annual salaries over a given period.

Item Position	Rationales	
27	Second option is correct	To determine a statement that describes the relationships between x and y in the two equations, the student could have determined the type of relationship shown in each equation. The first equation, $y = 7x$, shows a multiplicative relationship where the y-value is 7 times the x-value, and the second equation, $y = x + 7$, shows an additive relationship where the y-value is 7 more than the x-value. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Fifth option is correct	To determine a statement that describes the relationships between x and y in the two equations, the student could have determined that when the x-value is positive in the first equation, $y = 7x$, the y-value will also be because the x-value is multiplied by a positive number, 7. The student could have also determined that when the x-value is positive in the second equation, $y = x + 7$, the y-value will be positive because 7 is being added to the x-value. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	First option is incorrect	The student likely did not consider that when the x-value is between −7 and 0, the y-value for the second equation ($y = x + 7$) will be positive. The student needs to focus on comparing two rules in the forms $y = ax$ and $y = x + a$ to differentiate between multiplicative and additive relationships.
	Third option is incorrect	The student likely determined that since the number 7 is in both equations, both relationships have a multiplicative relationship where the y-value is 7 times the x-value. The student needs to focus on comparing two rules in the forms $y = ax$ and $y = x + a$ to differentiate between multiplicative and additive relationships.
	Fourth option is incorrect	The student likely determined that the first equation, $y = 7x$, is an additive relationship where the y-value is 7 more than the x-value. The student also likely determined that the second equation, $y = x + 7$, is a multiplicative relationship where the y-value is 7 times the x-value. The student needs to focus on comparing two rules in the forms $y = ax$ and $y = x + a$ to differentiate between multiplicative and additive relationships.

Item Position	Rationales	
28	Option C is correct	To determine which value is equivalent to the expression (the sum of products of numbers and variables) $5 - 2(3)^2 + 4$, the student should have applied the order of operations (the order expressions should be solved in, beginning with parentheses, then exponents, followed by multiplication and division from left to right, and then addition and subtraction from left to right). Since there are no operations in parentheses, the student should have begun by evaluating the exponent $(3)^2$, which equals 9, resulting in the expression $5 - 2(9) + 4$. Then the student should have multiplied 2 by 9, which equals 18, resulting in the expression $5 - 18 + 4$. Then the student should have evaluated the expression from left to right by first calculating $5 - 18 = -13$ and then calculating $-13 + 4 = -9$.
	Option A is incorrect	The student likely evaluated 2(3) before applying the exponent, resulting in $(6)^2 = 36$, which creates the expression $5 - 36 + 4$. The student likely simplified this expression from left to right, resulting in −27. The student needs to focus on evaluating numerical expressions using the order of operations, including whole number exponents.
	Option B is incorrect	The student likely first multiplied 2 and 3, which is equal to 6, resulting in the expression $5 - (6)^2 + 4$. The student then likely subtracted $5 - 6 = -1$, resulting in the expression $(-1)^2 + 4$. Then the student likely evaluated the exponent, $(-1)^2$, resulting in 1, and finished by simplifying: $1 + 4 = 5$. The student needs to focus on evaluating numerical expressions using the order of operations, including whole number exponents.
	Option D is incorrect	The student likely first calculated $5 - 2 = 3$, resulting in the expression $3(3)^2 + 4$. The student then likely calculated $(3)^2 = 9$, resulting in the expression $3(9) + 4$. The student then likely multiplied $3 \cdot 9 = 27$ and added 4, resulting in 31. The student needs to focus on generating equivalent numerical expressions using the order of operations, including whole number exponents.

Item Position	Rationales	
29	Option A is correct	To determine which statement is true based on the histogram, the student could have identified that the bar for customers who drove 150–199 miles has a height of 50, meaning that 50 customers drove 150–199 miles. The student could have then identified that the bar representing customers who drove at least 200 miles has a height of 30. Therefore, the number of customers who drove 150 miles or more is 50 + 30, which equals 80. The student then could have identified that the bar representing the number of customers who drove 0–49 miles has a height of 15, the bar representing the number of customers who drove 50–99 miles has a height of 30, and the bar representing the number of customers who drove 100–149 miles has a height of 35. This means that the number of customers who drove less than 150 miles is 15 + 30 + 35, which also equals 80. The student could have recognized that the number of customers who drove 150 miles or more is the same as the number of customers who drove less than 150 miles. 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 identified the interval with the tallest bar and determined that the height of the bar (50) equaled the number of miles driven instead of the number of customers. The student needs to focus on interpreting numeric data summarized in histograms.
	Option C is incorrect	The student likely misinterpreted the range 50–99 as representing the number of customers instead of the number of miles and determined that the range 50–99 was less than the range 200 or more. The student needs to focus on interpreting numeric data summarized in histograms.
	Option D is incorrect	The student likely misinterpreted the height of the bars as representing the number of miles driven and noticed that two bars have a height of 30. Therefore, the student likely identified that more customers drove 30 miles than drove any other distance. The student needs to focus on interpreting numeric data summarized in histograms.

Item Position	Rationales	
30	$7 \div x + 1, \ \frac{7}{x} + 1$	To determine which two expressions (the sum of products of numbers and variables) are equivalent, the student could have simplified each of the given expressions. For the expression $7(x \cdot 1)$, the student could have applied the associative property (a property that enables the different combinations of the same operation to be performed in different orders), resulting in $(7x) \cdot 1$, which simplifies to 7x because of the multiplicative identity property (a property that states any number multiplied by 1 will result in the original number). The student then could have recognized that in the expression $7 \div x + 1$, 7 is the dividend (a quantity or total to be divided), x is the divisor (the number by which the dividend is to be divided), and 1 is added to the quotient (answer to a division problem). The student then could have applied the distributive property (a property that allows for numbers to be combined using one operation, usually addition or subtraction, before combining the value with another operation, usually multiplication or division) to the expression $x(7 + 1)$, resulting in $x(7) + x(1) = 7x + x = 8x$. The student could have recognized that in the expression $\frac{x}{7} + 1$, x is the dividend, 7 is the divisor, and 1 is added to the quotient. The student then could have recognized that in the expression $\frac{7}{x} + 1$, 7 is the dividend, x is the divisor, and 1 is added to the quotient. The student then could have determined that the expressions $7 \div x + 1$ and $\frac{7}{x} + 1$ are equivalent because both expressions have 7 as the dividend, x as the divisor, and 1 added to the quotient. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item Position	Rationales	
31	Option D is correct	To determine which set of measures could be the angle measures of a triangle, the student should have recalled that the angle measures of a triangle must have a sum (the result when two or more quantities are added together) of 180°. The student should have determined that the only group of three angle measures listed that add to 180° are 30°, 50°, and 100° because 30 + 50 + 100 = 180.
	Option A is incorrect	The student likely determined that the sum of the three angle measures of a triangle must be less than 180°. The student likely added the set of measures to find a value less than 180: 25 + 25 + 25 = 140. The student needs to focus on extending previous knowledge of triangles and their properties, including the sum of the angle measures of a triangle.
	Option B is incorrect	The student likely determined that the sum of the three angle measures of a triangle must be 360°. The student likely added the set of measures, resulting in 90 + 90 + 180 = 360. The student needs to focus on extending previous knowledge of triangles and their properties, including the sum of the angle measures of a triangle.
	Option C is incorrect	The student likely determined that three equivalent angle measures create an equilateral triangle but did not consider the sum of the given angle measures. The student needs to focus on extending previous knowledge of triangles and their properties, including the sum of the angle measures of a triangle.

Item Position	Rationales	
32	513.18, 7.89	To determine the two amounts that are missing from Ms. Kar's check register, the student should have used the given information. To determine the missing balance on 8/22, the student could have subtracted the phone bill withdrawal, $50.00, from the starting balance, $563.18: 563.18 – 50 = 513.18. To determine the missing cash deposit on 8/24, the student could have identified the balance before the deposit, $538.47, and the balance after the deposit, $546.36, and found the difference (the amount that remains when one quantity is subtracted from another): 546.36 – 538.47 = 7.89.

Item Position	Rationales	
33	Option A is correct	To determine the list that shows the data in order from least (smallest) to greatest (largest) value, the student could have converted the values in the list to the same form, resulting in a list of all decimals. The student could have expressed the fraction $-\frac{1}{4}$ as the decimal –0.25. Then the student could have ordered the decimals from least to greatest: –0.86, –0.25, 0.18, 0.3, 1.02. The student could have then converted –0.25 back to fraction form, $-\frac{1}{4}$, resulting in the list of rational numbers –0.86, $-\frac{1}{4}$, 0.18, 0.3, 1.02. 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 determined that $-\frac{1}{4}$ was less than –0.86, since the absolute value (the magnitude of a number) of $-\frac{1}{4}$, 0.25, is less than 0.86, the absolute value of –0.86. The student needs to focus on ordering sets of rational numbers.
	Option C is incorrect	The student likely ordered the data from least to greatest value without considering the negative signs in $-\frac{1}{4}$ and –0.86, resulting in the list 0.18, $-\frac{1}{4}$, 0.3, –0.86, 1.02. The student needs to focus on ordering sets of rational numbers.
	Option D is incorrect	The student likely considered 0.3 to be less than all the other values because it has only one digit after the decimal point. The student needs to focus on ordering sets of rational numbers.

Item Position	Rationales	
34	Option C is correct	To determine which point on the coordinate grid is best represented by the ordered pair (−3, −4), the student should have determined that the first value in the ordered pair represents the *x*-coordinate (horizontal position from zero) and the second value in the ordered pair represents the *y*-coordinate (vertical distance from zero). The student should have determined that the point is 3 units to the left of the origin (the point of intersection of the axes in a coordinate system) and 4 units down, resulting in point *R*.
	Option A is incorrect	The student likely reversed the *x*- and *y*-coordinates and determined that the point was 4 units to the left of the origin and 3 units down, resulting in point *P*. The student needs to focus on graphing points in all four quadrants using ordered pairs of rational numbers.
	Option B is incorrect	The student likely determined that the point was 3 units to the right of the origin and 4 units down, resulting in point *Q*. The student needs to focus on graphing points in all four quadrants using ordered pairs of rational numbers.
	Option D is incorrect	The student likely reversed the *x*- and *y*-coordinates and determined that the point was 4 units to the left of the origin and 3 units up, resulting in point *T*. The student needs to focus on graphing points in all four quadrants using ordered pairs of rational numbers.

Item Position	Rationales	
35	Option A is correct	To determine which value is equivalent to $\frac{5}{4}$, the student could have converted $\frac{5}{4}$ to a decimal by dividing the numerator (top number in a fraction), 5, by the denominator (bottom number in a fraction), 4, resulting in 1.25. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option B is incorrect	The student likely determined that $\frac{5}{4}$ was greater than 100% and added 1% because the numerator (5) is 1 more than the denominator (4). The student needs to focus on generating equivalent forms of fractions, decimals, and percentages.
	Option C is incorrect	The student likely divided the denominator, 4, by the numerator, 5, resulting in 0.8. The student needs to focus on generating equivalent forms of fractions, decimals, and percentages.
	Option D is incorrect	The student likely converted the fraction $\frac{5}{4}$ to a mixed number but used the incorrect value as the denominator, resulting in $1\frac{1}{5}$. The student then likely converted $1\frac{1}{5}$ to decimal form, resulting in 1.2. The student then likely converted 1.2 to a percentage by moving the decimal point two places to the right, resulting in 120%. The student needs to focus on generating equivalent forms of fractions, decimals, and percentages.

Item Position	Rationales	
36	Option B is correct	To determine which ratio (comparison of one quantity to another) represents the number of red beads to the number of black beads, the student could have recognized that the ratio can be represented in fraction form by using the number representing the red beads as the numerator (top number) and the number representing the black beads as the denominator (bottom number). The student could have determined that the fraction $\frac{6 \text{ red beads}}{10 \text{ black beads}}$ represents the ratio and then simplified the fraction by dividing the numerator and the denominator by 2, resulting in $\frac{6 \div 2}{10 \div 2} = \frac{3}{5}$. 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 inverted the ratio of red beads to black beads, resulting in a ratio of $\frac{10}{6}$, which simplifies to $\frac{5}{3}$. The student needs to focus on representing real-world problems involving ratios.
	Option C is incorrect	The student likely found the total number of beads by adding: 6 + 10 = 16. The student then likely found the ratio of red beads to total beads, resulting in $\frac{6}{16}$, which simplifies to $\frac{3}{8}$. The student needs to focus on representing real-world problems involving ratios.
	Option D is incorrect	The student likely found the total number of beads by adding: 6 + 10 = 16. The student then likely inverted the ratio of red beads to total beads, resulting in $\frac{16}{6}$, which simplifies to $\frac{8}{3}$. The student needs to focus on representing real-world problems involving ratios.