2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
1	Option C is correct	To determine which measurement is closest to the length of the ruler in millimeters, the student could have set up and solved a proportion (comparison of two ratios) comparing the number of millimeters in one inch with the number of millimeters in a ruler. There are 25.4 millimeters in 1 inch, and there are 12 inches in a ruler. The student could have used the proportion $\frac{x}{12} = \frac{25.4}{1}$ to find the value of x, the number of millimeters in the ruler, by multiplying 12 by 25.4, resulting in 304.8; the student could then have divided 304.8 by 1, resulting in $x = 304.8$ mm. 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 12 by 254 instead of multiplying 12 by 25.4 when solving the proportion $\frac{x}{12} = \frac{25.4}{1}$. The student needs to focus on determining correct place value when multiplying decimals.
	Option B is incorrect	The student likely multiplied 12 by 2.54 instead of multiplying 12 by 25.4 when solving the proportion $\frac{x}{12} = \frac{25.4}{1}$. The student needs to focus on determining correct place value when multiplying decimals.
	Option D is incorrect	The student likely multiplied 12 by 0.254 instead of multiplying 12 by 25.4 when solving the proportion $\frac{x}{12} = \frac{25.4}{1}$. The student needs to focus on determining correct place value when multiplying decimals.

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Item #		Rationale
2	Option J is correct	To determine which statement is best supported by the information in the table, the student should have compared the number of bags of cheese-flavored chips (20) with twice the number of bags of ranch-flavored chips (8) and compared the two numbers. Since 20 > 2(8), cheese-flavored chips are more than twice as likely as ranch-flavored chips to be chosen.
	Option F is incorrect	The student likely did not recognize that the number of bags of ranch-flavored chips, 8, is less than the number of bags of plain chips, 12. The student needs to focus on attending to the details of answer options in problems that require the student to interpret and compare information presented in a table.
	Option G is incorrect	The student likely interpreted "is twice as likely to" as "more than twice as likely to." The student needs to focus on attending to the details of answer options in problems that require the student to interpret and compare information presented in a table.
	Option H is incorrect	The student likely interpreted that having 4 flavors of potato chips to choose from meant that each flavor is equally likely to be chosen. The student needs to focus on attending to the details of answer options in problems that require the student to interpret and compare information presented in a table.

2022 STAAR Grade 7 Mathematics Rationales

Item #	Rationale	
3	Option A is correct	To determine which graph best represents the situation, the student should have understood that the statement "Nicole had a collection of 60 stuffed animals" means that the number of stuffed animals in her collection, 60, represents the y-value when no months have passed; this is represented by the point (0, 60) on the graph. The student should then have understood that the statement "she gave away 5 stuffed animals per month" means that the rate of change (ratio of the change in y-values to the change in x-values) for this situation is −5, since the number of stuffed animals decreases by 5 animals each month. The number of months is represented by the x-value. This graph shows the y-value decreasing by 5 each time the x-value increases by 1.
	Option B is incorrect	The student chose a graph that begins at 60 stuffed animals but has an increasing, not decreasing, rate of change, likely confusing the meaning of increasing and decreasing. The student needs to focus on how to represent a real-world situation with a graphical representation.
	Option C is incorrect	The student chose a graph that represents a situation with a rate of change of 60 animals per month, likely disregarding the rest of the information in the situation. The student needs to focus on how to represent a real-world situation with a graphical representation.
	Option D is incorrect	The student chose a graph that represents a situation with a rate of change of −60 stuffed animals per month, likely identifying the beginning number of stuffed animals in the collection as 600 instead of 60. The student needs to focus on how to represent a real-world situation with a graphical representation.

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Item #		Rationale
4	Option H is correct	To determine the area (amount of space covered) of the figure, the student should have calculated the area of each shape (parallelogram and trapezoid) and found the sum of the results. To find the area of the parallelogram ($A = bh$, where b represents the length of the base of the parallelogram and h represents the height), the length of the base should be multiplied by the height. The length of the base is shown as 26 centimeters. To determine the height of the parallelogram, subtract the height of the trapezoid (16 centimeters) from the height of the composite figure (32 centimeters); $32 - 16 = 16$. This gives the height of the parallelogram. Thus the area of the parallelogram is $26 \times 16 = 416$ square centimeters. Next, to find the area of the trapezoid $\left(A = \frac{1}{2}\left[b_1 + b_2\right]h\right.$, where b_1 and b_2 represent the lengths of the parallel sides of the trapezoid and h represents the height), substitute $b_1 = 26$, $b_2 = 40$, and $h = 16$ into the area formula: $A = \frac{1}{2}(26 + 40)(16) = \frac{1}{2}(66)(16) = 528$ square centimeters. The sum of the areas of the two shapes is $416 + 528 = 944$ square centimeters.
	Option F is incorrect	The student likely calculated the area of the parallelogram correctly but incorrectly calculated the area of the trapezoid. The student likely multiplied one base of the trapezoid, 40 centimeters, by the height of the trapezoid, 16 centimeters, to get an area of 640 square centimeters for the trapezoid. The resulting area of the figure is $416 + 640 = 1,056$ square centimeters. The student needs to focus on understanding how to determine the area of a composite figure.
	Option G is incorrect	The student likely calculated the area of the trapezoid correctly but incorrectly calculated the area of the parallelogram. The student likely used a height of 32 centimeters instead of 16 centimeters for the parallelogram to get an area of 832 square centimeters for the parallelogram. The resulting area of the figure is $832 + 528 = 1,360$ square centimeters. The student needs to focus on understanding how to determine the area of a composite figure.
	Option J is incorrect	The student likely calculated the area of the trapezoid and forgot to add the area of the parallelogram. The area of the trapezoid is 528 square centimeters. The student needs to focus on understanding how to determine the area of a composite figure.

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Item #		Rationale
5	Option B is correct	To determine which measurements represent the dimensions of a triangle that is similar (two figures with corresponding angle measures equal and corresponding side lengths proportional) to triangle *QRS*, the student could have set up and solved proportions (comparisons of two ratios) comparing corresponding (paired) side lengths of the triangles. Using the side length of 10 in the similar triangle, the student could have used the variable (symbol used to represent an unknown number) *x* to represent the unknown length of a second side of the triangle and set up the proportion $\frac{6}{12} = \frac{10}{x}$; to solve the proportion for *x*, multiply 12 by 10, resulting in 120, and then divide 120 by 6, resulting in *x* = 20. Using the side length of 10 in the similar triangle, the student could have used the variable *y* to represent the unknown length of the third side of the triangle and set up the proportion $\frac{6}{15} = \frac{10}{y}$. To solve the proportion for *y*, multiply 15 by 10, resulting in 150, and then divide 150 by 6, resulting in *y* = 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 chose side measurements that were calculated by adding 2 to each side of triangle *QRS*. The student needs to focus on understanding how to use proportions to solve problems involving similar triangles.
	Option C is incorrect	The student likely chose side measurements that were calculated by subtracting 2 from each side of triangle *QRS*. The student needs to focus on understanding how to use proportions to solve problems involving similar triangles.
	Option D is incorrect	The student likely chose side measurements in which two of the measurements are proportional to the corresponding (paired) sides of triangle *QRS* but the third measurement is not. The student needs to focus on understanding that the ratios of the corresponding side lengths of all three sides of similar triangles must be equal.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
6	Option G is correct	To determine which equation is true when $x = 4$, the student could have evaluated the equation using 4 for x to see if it makes a true statement. When 4 is substituted for x into $5x - 2 = 18$, the result is $5(4) - 2 = 20 - 2 = 18$, which is a true statement. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely substituted $x = 4$ into the equation, but then subtracted 4 instead of adding 4, resulting in $3(4) - 4 = 12 - 4 = 8$. The student needs to focus on understanding how to evaluate equations using the correct operation when substituting a given value for the variable.
	Option H is incorrect	The student likely substituted $x = 4$ into the equation, but then added 2 and 8 before multiplying by 4, resulting in $(2 + 8)(4) = (10)(4) = 40$. The student needs to focus on understanding how to determine whether a given value makes an equation true and following the order of operations.
	Option J is incorrect	The student likely substituted $x = 4$ into the equation, but then added all the values, resulting in $4 + 4 + 4 = 12$. The student needs to focus on understanding how to evaluate equations using the correct operation when substituting a given value for the variable.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
7	Option D is correct	To determine the volume (amount of three-dimensional space) of the rectangular pyramid in cubic millimeters, the student should have used the formula for the volume of a pyramid $(V = \frac{1}{3}Bh$, where V = the volume, B = the area [amount of space covered by a surface] of the base, and h = the height [vertical distance from top to bottom] of the pyramid). To determine B, the student should have found the area of the rectangular base by multiplying 4 mm by 5 mm, resulting in 20 mm². Then the student should have substituted the values B = 20 and h = 6 into the volume formula, $V = \frac{1}{3}(20)(6)$, resulting in a volume of 40 mm³.
	Option A is incorrect	The student likely did not use the formula for volume and added the given dimensions of 4 mm, 5 mm, and 6 mm (4 + 5 + 6), resulting in 15 mm³. The student needs to focus on understanding how to solve problems involving volumes of pyramids.
	Option B is incorrect	The student likely calculated $20(6)$ instead of $\frac{1}{3}(20)(6)$, resulting in 120 mm³. The student needs to focus on understanding how to solve problems involving volumes of pyramids.
	Option C is incorrect	The student likely used $\frac{1}{2}$ instead of $\frac{1}{3}$ when calculating the volume, resulting in $\frac{1}{2}(20)(6) = 60$ mm³. The student needs to focus on understanding how to solve problems involving volumes of pyramids.

Item #	Rationale	
8	Option G is correct	To determine which brand of sunscreen has the greatest cost per fluid ounce, the student should have divided the cost of the bottle by the number of fluid ounces per bottle for each brand and chosen the brand with the greatest cost. The costs per fluid ounce for the four brands are as follows: • Brand W: 12 ÷ 20 = $0.60 per fluid ounce • Brand X: 11.25 ÷ 15 = $0.75 per fluid ounce • Brand Y: 6.50 ÷ 10 = $0.65 per fluid ounce • Brand Z: 2.50 ÷ 5 = $0.50 per fluid ounce Brand X has the greatest cost per fluid ounce.
	Option F is incorrect	The student likely chose the item with the greatest cost in the table without calculating the cost per fluid ounce. The student needs to focus on understanding how to calculate a unit rate given a problem situation.
	Option H is incorrect	The student likely made an error when dividing the cost of each bottle by the number of fluid ounces per bottle that resulted in Brand Y having the greatest cost per fluid ounce. The student needs to focus on understanding how to calculate a unit rate given a problem situation.
	Option J is incorrect	The student likely divided the number of fluid ounces per bottle of Brand Z, 5, by the cost of the bottle, $2.50. This results in 5 ÷ 2.50 = 2, which is the greatest number of fluid ounces per dollar, not cost per fluid ounce. The student needs to focus on understanding how to calculate a unit rate given a problem situation.

Item #	Rationale	
9	Option C is correct	To determine the total area in square feet of the new carpet, the student should have found the area (amount of space covered by a surface) of the floor for each rectangular room and added the areas. The area of a rectangle ($A = bh$, where b represents the length of the base of the rectangle and h represents the height), is determined by multiplying the base of the rectangle by the height. The area of the floor of one room is $12\frac{1}{2} \times 10 = 125$ square feet. The area of the floor of the other room is $15\frac{3}{4} \times 10 = 157.5$ square feet. The total area of the new carpet is 125 + 157.5 = 282.5 square feet.
	Option A is incorrect	The student likely found the area of the floor for the room that is $12\frac{1}{2}$ feet by 10 feet instead of finding the total area of the floors of both rooms. The student needs to focus on understanding problem situations and the mathematical operations (+, −, ×, ÷) that are required to solve the problem.
	Option B is incorrect	The student likely found the area of the floor for the room that is $15\frac{3}{4}$ feet by 10 feet instead of finding the total area of the floors of both rooms. The student needs to focus on understanding problem situations and the mathematical operations (+, −, ×, ÷) that are required to solve the problem.
	Option D is incorrect	The student likely found the total perimeter (distance around the outside) of the floors of both rooms instead of finding the total area of the floors of both rooms. The total perimeter of the floors of both rooms is $12\frac{1}{2} + 12\frac{1}{2} + 10 + 10 + 15\frac{3}{4} + 15\frac{3}{4} + 10 + 10 = 96\frac{1}{2}$ feet. The student needs to focus on understanding problem situations and the mathematical operations (+, −, ×, ÷) that are required to solve the problem.

Item #	Rationale	
10	Option J is correct	To determine which statement is best supported by the information in the dot plots (graphs that use dots to display data), the student should have calculated the stated measures of center and spread for each plot. The range (difference between the greatest and least values in a set of data) for Population 1 is 18 − 12 = 6, and the range for Population 2 is 19 − 11 = 8. Therefore, the data for the two populations have different ranges.
	Option F is incorrect	The student likely misinterpreted the mode (most frequent value) of each data set to mean any number that repeats, instead of the number that repeats most frequently. The student needs to focus on understanding how to determine the mode of a set of data presented in a dot plot.
	Option G is incorrect	The student likely counted the number of dots in each dot plot, 23 dots for Population 1 and 25 dots for Population 2, and incorrectly concluded that data sets with different amounts of data must have different medians (middle number in a set of numbers when the set is ordered by value). The student needs to focus on understanding how to identify the median of a set of data presented on a dot plot.
	Option H is incorrect	The student likely misunderstood how to determine if a data set is skewed (where the data on the right of the middle are a different shape from the data on the left of the middle). Neither data set has a skew. The student needs to focus on understanding how to compare information presented in two dot plots.

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Item #	Rationale	
11	Option C is correct	To determine how many more residents have an occupation in industry than have an occupation in government, the student could have determined the number of residents who have each occupation. To determine the number of residents who have an occupation in industry, the student could have calculated 25% of 1,200. This is 0.25 × 1,200 = 300. To determine the number of residents who have an occupation in government, the student should have first calculated the percentage of residents who have an occupation in government. Since the total of the percentages represented in a circle graph is 100%, the percentage of residents who have an occupation in government is 100 − 25 − 25 − 30 − 15 = 5. To determine the number of residents who have an occupation in government, the student could have calculated 5% of 1,200. This is 0.05 × 1,200 = 60. The difference between the number of residents who have an occupation in industry and the number of residents who have an occupation in government is 300 − 60 = 240. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option A is incorrect	The student likely subtracted the percentages of residents who have the two occupations, 25 − 5 = 20, instead of subtracting the numbers of residents. The student needs to focus on understanding the data represented by circle graphs.
	Option B is incorrect	The student likely added the numbers of residents who have the two occupations, 300 + 60 = 360, instead of subtracting. The student needs to focus on understanding the operations indicated by key words in real-world problems.
	Option D is incorrect	The student likely chose the number of residents who have an occupation in industry, 0.25 × 1,200 = 300. The student needs to focus on carefully comparing the parts of data represented by circle graphs.

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Item #		Rationale
12	2,134.65 and any equivalent values are correct	To determine how many days on Earth, in decimal form, are equivalent to $9\frac{1}{2}$ years on Venus, the student could have multiplied 224.7 by $9\frac{1}{2}$. First, the student could have changed $9\frac{1}{2}$ to 9.5. Then the student could have calculated $224.7 \times 9.5 = 2{,}134.65$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

2022 STAAR Grade 7 Mathematics Rationales

Item #	Rationale	
13	Option C is correct	To determine which measurement is closest to the circumference (distance around the circle) in centimeters, the student should have used the ruler to measure the diameter (line segment going through the center of the circle connecting two points on the circle) to the nearest centimeter. The diameter of the circle is closest to 7 centimeters. The student should have then used the formula for the circumference of a circle ($C = \pi d$, where C = the circumference and d = the diameter) and the approximation of pi, $\pi \approx 3.14$). Substituting 7 for the value of the diameter and 3.14 for π into the formula for circumference results in $C \approx 3.14(7) \approx 21.98$ centimeters, which is approximately 22 centimeters.
	Option A is incorrect	The student likely used the diameter, 7 cm, as the radius (distance from the center of the circle to a point on the circle) in the formula for the area of a circle ($A = \pi r^2$, where A = the area, r = the radius, and $\pi \approx 3.14$), resulting in $A \approx 3.14(7^2) \approx 3.14(49) \approx 153.86$ square centimeters, which is approximately 154 square centimeters. The student needs to focus on understanding which formula to apply in calculations involving circles.
	Option B is incorrect	The student likely used the radius, 3.5 cm, as the diameter in the formula for the circumference of a circle ($C = \pi d$, where C = the circumference, d = the diameter, and $\pi \approx 3.14$), resulting in $C \approx 3.14(3.5) \approx 10.99$ centimeters, which is approximately 11 centimeters. The student needs to focus on understanding how to correctly apply the formula for the circumference of a circle.
	Option D is incorrect	The student likely used the formula for the area of a circle ($A = \pi r^2$, where A = the area, r = the radius, and $\pi \approx 3.14$), resulting in $A \approx 3.14(3.5^2) \approx 3.14(12.25) \approx 38.465$ square centimeters, which is approximately 38 square centimeters. The student needs to focus on understanding which formula to apply in calculations involving circles.

Item #	Rationale	
14	Option F is correct	To determine which prediction the shopper can make about buying mystery bags in the future, the student could have set up and solved a proportion (comparison of two ratios) equating ratios of numbers of mystery bags to numbers of spy novels. Since the given ratio of mystery bags to spy novels is 3 to 6, a proportion to find p, the number of spy novels, in 1 mystery bag is $\frac{3}{6} = \frac{1}{p}$. To find the value of p, the student could have multiplied 6 by 1, resulting in 6, and then divided 6 by 3, resulting in $p = 2$. Therefore, each mystery bag contains 2 spy novels. To determine the number of spy novels in 8 mystery bags, the student could have multiplied 8 by 2, resulting in 16. To determine the number of spy novels in 6 mystery bags, the student could have multiplied 6 by 2, resulting in 12. The student then could have subtracted the number of spy novels in 6 mystery bags from the number of spy novels in 8 mystery bags, resulting in $16 - 12 = 4$. There will be 4 more spy novels in 8 bags than in 6 bags. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option G is incorrect	The student likely determined the number of spy novels in one mystery bag, 2. The student needs to focus on solving problems involving proportional relationships using quantitative predictions from simple experiments.
	Option H is incorrect	The student likely used the difference between the numbers of mystery bags, resulting in $9 - 8 = 1$. The student needs to focus on solving problems involving proportional relationships using quantitative predictions from simple experiments.
	Option J is incorrect	The student likely divided the total number of mystery bags by the number of mystery bags the shopper initially bought. The sum of the numbers of mystery bags is $10 + 8 = 18$. Dividing this sum by the number of mystery bags the shopper bought results in $18 \div 3 = 6$. The student needs to focus on solving problems involving proportional relationships using quantitative predictions from simple experiments.

2022 STAAR Grade 7 Mathematics Rationales

Item #	Rationale	
15	Option C is correct	To determine the graph that best represents this relationship, the student should have recognized that the constant rate of change for this situation is 2.5 cups of food per day, since the dog eats 1.25 cups of food twice each day: $1.25(2) = 2.5$. The student should have recognized that the total number of cups of food is represented by y and the number of days is represented by x. The student then should have checked x- and y-values to find the graph in which each y-value is the result of multiplying the corresponding x-value by 2.5. The line contains the points (1, 2.5) and (2, 5).
	Option A is incorrect	The student likely used 1.25 cups of food each day instead of 2.5 cups of food each day. The student needs to focus on understanding how to represent real-world situations with a graph.
	Option B is incorrect	The student likely recognized that the dog eats 2.5 cups of food each day but reversed the meanings of the x- and y-axes. The student needs to focus on understanding how to represent real-world situations with a graph.
	Option D is incorrect	The student likely used 1.25 cups of food each day instead of 2.5 cups of food each day and reversed the meanings of the x- and y-axes. The student needs to focus on understanding how to represent real-world situations with a graph.

Item #	Rationale	
16	Option G is correct	To determine which statement is true based on the information in the table, the student could have compared the number of purple pencils, 8, and the number of red pencils, 2. Since 8 = 4 × 2, the number of purple pencils is 4 times the number of red pencils, and the statement that the pencil is 4 times as likely to be purple as it is to be red is true. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely compared only the last three rows in the table. Among the last three rows, blue has the least number of pencils. The student needs to focus on understanding how to solve problems using quantitative data from a table.
	Option H is incorrect	The student likely recognized that the number of blue pencils, 4, is close to the number of green pencils, 5, and concluded that the similar numbers of pencils meant the colors are equally likely to be chosen. The student needs to focus on understanding how to solve problems using quantitative data from a table.
	Option J is incorrect	The student likely recognized that there are more purple pencils, 8, than other individual colors and concluded that the pencil chosen is more likely to be purple than the other three colors combined. The student needs to focus on understanding how to solve problems using quantitative data from a table.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
17	Option D is correct	To determine which number line represents the solution to the inequality $3x - 8 \geq 7$, the student could have solved the inequality by adding 8 to both sides, resulting in $3x \geq 15$, and then dividing both sides of the inequality by 3, resulting in $x \geq 5$. The correct number line shows a solid point at the value 5 with the shaded arrow pointing to the right since the solution is all values greater than or equal to 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 made a sign error when combining the 8 and the 7, resulting in $3x \geq -15$, and then divided both sides of the inequality by 3 but reversed the inequality sign, resulting in $x \leq -5$. The student then chose the graph with a solid point at the value -5 and the shaded arrow pointing to the left. The student needs to focus on understanding how to solve two-step inequalities.
	Option B is incorrect	The student likely made a sign error when combining the 8 and the 7, resulting in $3x \geq -15$, and then divided both sides of the inequality by 3, resulting in $x \geq -5$. The student then chose the graph with a solid point at the value -5 and the shaded arrow pointing to the right. The student needs to focus on understanding how to solve two-step inequalities.
	Option C is incorrect	The student likely followed the correct steps to solve the inequality but reversed the inequality sign and chose the number line representing $x \leq 5$. The student then chose the graph with a solid point at the value 5 with the shaded arrow pointing to the left. The student needs to focus on understanding how to solve two-step inequalities and represent the solutions on a number line.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
18	Option G is correct	To determine which equation can be used to find the value of x, the student should have recognized that the sum (total) of the angle measures of supplementary angles is 180°. The student should have written an equation showing that the sum of the measure of angle F, 77°, and the measure of angle H, $(5x + 18)$°, is equal to 180°, resulting in $77 + (5x + 18) = 180$.
	Option F is incorrect	The student likely confused supplementary angles (two angles that sum to 180°) with congruent angles (two angles that are equal in measure) and set the measure of angle F, 77°, equal to the measure of angle H, $(5x + 18)$°, resulting in the equation $77 = 5x + 18$. The student needs to focus on understanding how to write equations using geometric concepts including angle relationships.
	Option H is incorrect	The student likely confused supplementary angles (two angles that sum to 180°) with complementary angles (two angles that sum to 90°) and set the sum of the measure of angle F, 77°, and the measure of angle H, $(5x + 18)$°, equal to 90°, resulting in the equation $77 + (5x + 18) = 90$. The student needs to focus on understanding how to write equations using geometric concepts including angle relationships.
	Option J is incorrect	The student likely confused supplementary angles (two angles that sum to 180°) with the sum of the angle measures in a square (360°) and set the sum of the measure of angle F, 77°, and the measure of angle H, $(5x + 18)$°, equal to 360°, resulting in the equation $77 + (5x + 18) = 360$. The student needs to focus on understanding how to write equations using geometric concepts including angle relationships.

2022 STAAR Grade 7 Mathematics Rationales

Item #	Rationale	
19	Option D is correct	To determine the probability (how likely it is that an event will occur) of spinning a number greater than 4, the student should have recognized that two equal sections of the spinner, labeled "5" and "6," are each a number greater than 4 and that there are a total of six equal sections on the spinner. The student then should have determined the ratio of the number of sections with a number greater than 4 to the total number of sections (2 sections to 6 sections), resulting in $\frac{2}{6}$, which simplifies to $\frac{1}{3}$.
	Option A is incorrect	The student likely found the probability of spinning a 4 instead of the probability of spinning a number greater than 4. The student likely used the ratio of the number of sections with a 4 to the total number of sections (1 section to 6 sections), resulting in $\frac{1}{6}$. The student needs to focus on attending to the details of the question in problems that require the student to determine theoretical probability.
	Option B is incorrect	The student likely found the probability of spinning a number less than or equal to 4 instead of the probability of spinning a number greater than 4. The student likely used the ratio of the number of sections with a number less than or equal to 4 to the total number of sections (4 sections to 6 sections), resulting in $\frac{4}{6} = \frac{2}{3}$. The student needs to focus on attending to the details of the question in problems that require the student to determine theoretical probability.
	Option C is incorrect	The student likely found the probability of spinning a number greater than or equal to 4 instead of the probability of spinning a number greater than 4. The student likely used the ratio of the number of sections with a number greater than or equal to 4 to the total number of sections (3 sections to 6 sections), resulting in $\frac{3}{6} = \frac{1}{2}$. The student needs to focus on attending to the details of the question in problems that require the student to determine theoretical probability.

2022 STAAR Grade 7 Mathematics Rationales

Item #	Rationale	
20	Option H is correct	To determine which equation represents the linear relationship between the x-values and the y-values in the table, the student could have identified the rate of change (ratio of the change in y-values to the change in x-values) and the y-value when $x = 0$ and written the equation in the form $y = mx + b$, where m represents the rate of change and b represents the y-value when $x = 0$. To find the rate of change, the student could have used the ordered pairs (-1, -11) and (1, 1) from the table and calculated the change in y as $1 - (-11) = 12$, and the change in x as $1 - (-1) = 2$, resulting in the ratio $\frac{12}{2} = 6$. The student then could have calculated b, the y-value when $x = 0$, by recognizing that since the rate of change is 6, the value of y when $x = 0$ must be 6 units more than the value of y when $x = -1$: $-11 + 6 = -5$. Substituting 6 for m and -5 for b in the equation $y = mx + b$ results in the equation $y = 6x - 5$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely used the change in the x-values, $1 - (-1) = 2$, as the value of m and the change in the y-values, $1 - (-11) = 12$, as the value of b. The student then likely substituted $m = 2$ and $b = 12$ into the equation $y = mx + b$, resulting in $y = 2x + 12$. The student needs to focus on understanding how to represent linear equations in the form of $y = mx + b$ from a table.
	Option G is incorrect	The student likely reversed the meanings of m and b in the equation $y = mx + b$, using m to represent the y-value when $x = 0$ and b to represent the rate of change and switched the signs of the numbers, resulting in the equation $y = 5x - 6$. The student needs to focus on understanding how to represent linear equations in the form of $y = mx + b$ from a table.
	Option J is incorrect	The student likely used the x-value and y-value from the point (-1, -11) as the values of m and b, respectively, resulting in the equation $y = -1x - 11$, which is equivalent to $y = -x - 11$. The student needs to focus on understanding how to represent linear equations in the form of $y = mx + b$ from a table.

Item #		Rationale
21	Option D is correct	To determine the area (amount of space covered by a surface) of the sidewalk in square feet, the student should have calculated the sum of the areas of the shapes that make up the sidewalk. The sidewalk is made up of two congruent triangles, a rectangle, and a square. The student should have calculated the area of each triangle by substituting $b = 6$ and $h = 6$ into the formula for the area of a triangle ($A = \frac{1}{2}bh$, where A represents the area of the triangle, b represents the base of the triangle, and h represents the height), resulting in $A = \frac{1}{2}(6)(6) = 18$ square feet. The student should have also calculated the area of the rectangle by substituting $b = 18$ and $h = 6$ into the formula for the area of a rectangle ($A = bh$, where A represents the area of the rectangle, b represents the base of the rectangle, and h represents the height), resulting in $A = 18(6) = 108$ square feet. Lastly, since a square is also a rectangle, the student should have calculated the area of the square by using the same formula for area of a rectangle ($A = bh$), substituting the value 6 for b and h into the formula resulting in $A = 6(6) = 36$ square feet. The student should then have found the sum of the areas to find the total area of the sidewalk, resulting in $A = 18 + 18 + 108 + 36 = 180$ square feet.
	Option A is incorrect	The student likely found only the area of the rectangle by multiplying the base and height, resulting in $18(6) = 108$ square feet. The student needs to focus on understanding how to determine the area of composite figures.
	Option B is incorrect	The student likely added the area for only one of the triangles instead of the area for both triangles when calculating the total area of the sidewalk, resulting in $A = 18 + 108 + 36 = 162$ square feet. The student needs to focus on understanding how to determine the area of composite figures.
	Option C is incorrect	The student likely added the areas of the triangles and rectangle but ignored the area of the square, resulting in $A = 18 + 18 + 108 = 144$ square feet. The student needs to focus on understanding how to determine the area of composite figures.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
22	62.93 and any equivalent values are correct	To determine the sales tax on the computer, the student should have converted 7% to a decimal by moving the decimal point two places to the left, resulting in 0.07, and multiplied the price of the computer, $899, by 0.07, resulting in $62.93. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item #	Rationale	
23	Option D is correct	To determine the graph that best represents the relationship between y and x, the student should have recognized that the total number of users is represented by y and that the number of days is represented by x. The student should have also recognized that the rate at which the number of users increases is 500 users each day. The student then should have checked pairs of x- and y-values, such as (2, 1,000), (4, 2,000), (6, 3,000), and (8, 4,000), to find the graph in which each y-value was the result of multiplying the corresponding x-value by 500.
	Option A is incorrect	The student likely recognized that the number of users increases by 500 users each day but reversed the meanings of the x- and y-axes. The student needs to focus on how to represent a real-world situation with a graphical representation.
	Option B is incorrect	The student likely recognized that the number of users increases by 500 users each day and chose a point with a y-value of 500, but did not recognize that the corresponding x-value is 10 instead of 1. The student needs to focus on how to represent a real-world situation with a graphical representation.
	Option C is incorrect	The student likely recognized that 500 users is an important part of the situation and chose a graph containing the point (4, 500). The student needs to focus on how to represent a real-world situation with a graphical representation.

Item #	Rationale	
24	Option F is correct	To determine which measurement is closest to the area (amount of space covered by a surface) of circle *S* in square millimeters, the student should have used the formula for the area of a circle ($A = \pi r^2$, where A = the area of the circle and r = the radius [distance from the center of the circle to a point on the circle]). The student should have recognized that the radius of circle *L* is 8 millimeters, and the radius of circle *S* is half of the radius of circle *L*, resulting in $r = \frac{1}{2} \times 8 = 4$ millimeters. The student then should have substituted r = 4 and $\pi \approx 3.14$ into the formula for the area of a circle, resulting in $A \approx 3.14 \times 4^2 \approx 3.14 \times 16 \approx 50.24$ square millimeters.
	Option G is incorrect	The student likely used the formula for the circumference (distance around the circle) ($C = 2\pi r$, where C = the circumference and r = the radius) instead of the formula for the area of a circle, resulting in $2 \times 3.14 \times 4 = 25.12$. The student needs to focus on understanding how to apply the correct formula for the area of a circle.
	Option H is incorrect	The student likely used 8 millimeters for the radius of circle *S* instead of 4 millimeters, resulting in $A \approx 3.14 \times 8^2 \approx 3.14 \times 64 \approx 200.96$ square millimeters. The student needs to focus on understanding how to correctly apply the formula for the area of a circle.
	Option J is incorrect	The student likely did not square the value of the radius in the formula for the area of a circle, resulting in $A \approx 3.14 \times 4 \approx 12.56$ square millimeters. The student needs to focus on understanding how to correctly apply the formula for the area of a circle.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
25	Option B is correct	To determine which situation is represented by the equation $68.50x + 127.95 = 675.95$, the student should have reviewed the equation for key characteristics. The equation $68.50x + 127.95 = 675.95$ is in the form $y = mx + b$, where $m = 68.50$ represents a rate of change, $b = 127.95$ represents a fixed initial amount, and 675.95 represents the total amount. The statement in the option shows that the total amount the office manager paid is $675.95 and the fixed amount the office manager has already paid is $127.95. The situation shows that the cost of each hard drive, $68.50, is the rate of change. This situation is represented by the key characteristics of the equation $68.50x + 127.95 = 675.95$.
	Option A is incorrect	The student correctly identified the total amount but likely reversed the fixed initial amount and the rate of change of the situation, identifying the fixed initial amount as $68.50 and the rate of change as $127.95 per hour. This situation would be represented by the equation $68.50 + 127.95x = 675.95$. The student needs to focus on understanding how to write real-world problems based on equations.
	Option C is incorrect	The student correctly identified the total amount but likely reversed the fixed initial amount and the rate of change of the situation, identifying the fixed initial amount as a $68.50 discount and the rate as $127.95 per hour. This situation would be represented by the equation $127.95x - 68.50 = 675.95$. The student needs to focus on understanding how to write real-world problems based on equations.
	Option D is incorrect	The student correctly identified the total amount but likely reversed the fixed initial amount and the rate of change of the situation, identifying the fixed initial amount as $68.50 and the rate as $127.95 per day. This situation would be represented by the equation $68.50 + 127.95x = 675.95$. The student needs to focus on understanding how to write real-world problems based on equations.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
26	Option J is correct	To determine the theoretical probability (how likely it is that some event will occur) that all three number cubes will land on an odd number, the student should have recognized that the probability of one of the number cubes landing on an odd number is $\frac{3}{6} = \frac{1}{2}$ since 3 of the 6 numbers on the number cube are odd. Next, the student should have recognized that because three number cubes are being rolled, the probability that all three number cubes will land on an odd number is $\left(\frac{3}{6}\right)\left(\frac{3}{6}\right)\left(\frac{3}{6}\right) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{8}$.
	Option F is incorrect	The student likely determined the probability that only one of the number cubes will land on an odd number. The student needs to focus on understanding how to determine the probability of a compound event.
	Option G is incorrect	The student likely added the probabilities instead of multiplying the probabilities and added the denominators (number on the bottom of a fraction) instead of adding the numerators (number on the top of a fraction). The student needs to focus on understanding how to determine the probability of a compound event.
	Option H is incorrect	The student likely determined that the probability is $\frac{1}{3}$ since three number cubes were rolled. The student needs to focus on understanding how to determine the probability of a compound event.

Item #		Rationale
27	Option A is correct	To determine the solution for the inequality $-5d + 5\frac{1}{2} \le 17$, the student could have first subtracted $5\frac{1}{2}$ from both sides of the inequality, resulting in $-5d \le 11\frac{1}{2}$. The student then could have divided both sides of the inequality by -5 and recognized that the inequality sign needs to be reversed since both sides of the inequality are being divided by a negative number, resulting in $d \ge 11\frac{1}{2} \div -5$. Lastly, the student simplified the result as $11\frac{1}{2} \div -5 = \frac{23}{2} \times \frac{1}{5} = -\frac{23}{10} = -2\frac{3}{10}$, and obtained the inequality $d \ge -2\frac{3}{10}$. 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 did not recognize that when an inequality is divided by a negative number, the inequality sign is reversed. The student needs to focus on how to represent the inequality symbol when solving an inequality.
	Option C is incorrect	The student likely added $5\frac{1}{2}$ to the right side of the inequality instead of subtracting and did not recognize that when an inequality is divided by a negative number, the inequality sign is reversed. The student needs to focus on how to isolate a variable (symbol used to represent an unknown number) when solving an inequality.
	Option D is incorrect	The student likely added $5\frac{1}{2}$ to the right side of the inequality instead of subtracting. The student needs to focus on how to isolate a variable (symbol used to represent an unknown number) when solving an inequality.

Item #	Rationale	
28	Option F is correct	To determine the total surface area (total amount of space covered by the surfaces) of the triangular prism in square inches, the student should have identified the pairs of congruent (same shape and size) triangles in the net (two-dimensional view of a three-dimensional figure) and recognized that the base of the triangle is 12 inches and the height is 10.4 inches. The student should have substituted $b = 12$ and $h = 10.4$ into the formula for the area of a triangle $(A = \frac{1}{2}bh$, where A represents the area of the triangle, b represents the base of the triangle, and h represents the height), resulting in $A = \frac{1}{2}(12)(10.4) = 62.4$ square inches for each triangle shown in the net. Since the triangles in the net are equilateral triangles (all side lengths of the triangle are equal), each rectangle in the net has a base of 4 inches and a height of 12 inches. The student should have substituted $b = 4$ and $h = 12$ into the formula for area of a rectangle ($A = bh$, where A represents the area of the rectangle, b represents the length of the base of the rectangle, and h represents the height), resulting in $A = 4(12) = 48$ square inches for each rectangle in the net. The combined area of the triangles and rectangles, $48 + 48 + 48 + 62.4 + 62.4 = 268.8$ square inches, is equal to the total surface area of the triangular prism.
	Option G is incorrect	The student likely calculated the area for each triangle in the net using 12 inches for the height of the triangle instead of 10.4 inches and used the formula for the area of a rectangle instead of the formula for the area of a triangle, resulting in $12(12) = 144$ square inches. The student then likely found the area for each rectangle in the net, resulting in $4(12) = 48$ square inches. Lastly, the student likely calculated the total surface area of the triangular prism by adding the areas of all the triangles and rectangles, resulting in $144 + 144 + 48 + 48 + 48 = 432$ square inches. The student needs to focus on understanding the steps and formulas needed to determine the total surface area of a prism from a net.
	Option H is incorrect	The student likely calculated the area of the triangles in the net using 12 inches for the height of the triangle instead of 10.4 inches, resulting in $\frac{1}{2}(12)(12) = 72$ square inches. The student then likely found the area for each rectangle in the net, resulting in $4(12) = 48$ square inches. Lastly, the student likely calculated the total surface area of the triangular prism by adding the areas of all the triangles and rectangles, resulting in $72 + 72 + 48 + 48 + 48 = 288$ square inches. The student needs to focus on understanding how to find the dimensions of a triangle from a net.

2022 STAAR Grade 7 Mathematics Rationales

Item #	Rationale
Option J is incorrect	The student likely used the formula for the area of a rectangle instead of the formula for the area of a triangle when calculating the area of each equilateral triangle, resulting in 10.4(12) = 124.8 square inches. The student then likely found the area for each rectangle, resulting in 4(12) = 48 square inches. Lastly, the student likely calculated the total surface area of the triangular prism by adding the areas of all triangular and rectangular faces, resulting in 124.8 + 124.8 + 48 + 48 + 48 = 393.6 square inches. The student needs to focus on understanding the steps and formulas needed to determine the total surface area of a prism from a net.

Item #		Rationale
29	Option C is correct	To determine the percentage of customers who put chocolate creamer in their coffee, the student should have used the data in the table to determine that the total number of customers in the coffee shop who used vanilla or chocolate creamer during the hour was 2 + 6 + 4 + 8 = 20. Next, the student should have determined that 14 of those customers (6 + 8 = 14) put chocolate creamer in their coffee. The student should have used this information to write a ratio of the number of customers who put chocolate creamer in their coffee (14) to the total number of customers who used either vanilla or chocolate creamer (20), resulting in $\frac{14}{20}$. The student then should have converted the ratio to a percentage by dividing 14 by 20 and then multiplying the result by 100, resulting in $\frac{14}{20} \cdot 100 = 0.7 \cdot 100 = 70\%$.
	Option A is incorrect	The student likely identified the percentage of customers who put vanilla creamer in their coffee instead of chocolate creamer, using $\frac{6}{20} = 0.3 = 30\%$. The student needs to focus on understanding how to solve problems involving percentages.
	Option B is incorrect	The student likely used the number of customers who put chocolate creamer in their coffee (14) as the percentage. The student needs to focus on understanding the part-to-whole relationship when calculating a percentage.
	Option D is incorrect	The student likely determined the percentage of customers in the age group 18–30 who put chocolate creamer in their coffee, using $\frac{6}{8} = 0.75 = 75\%$. The student needs to focus on understanding how to solve problems involving percentages.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
30	31.25 and any equivalent values are correct	To determine the length in inches of the building in the scale drawing, the student could have set up the proportion (comparison of two ratios) $\frac{0.25}{2} = \frac{x}{250}$, comparing the ratio of the scale where 0.25 inch represents 2 feet and the ratio of the length of the building in the scale drawing (x inches) to the length of the actual building (250 feet). To solve the proportion, the student could have multiplied by each denominator (the number on the bottom of a fraction) on both sides of the equation, resulting in $2x = 0.25(250)$ or $2x = 62.5$. Lastly, the student could have divided both sides of the equation by 2, resulting in $x = \frac{62.5}{2} = 31.25$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item #	Rationale	
31	Option C is correct	To determine which statement is best supported by the data in the box plots, the student should have calculated the interquartile range (difference between the third quartile and the first quartile). The student should have identified the first quartile (the value represented by the left side of the rectangle in a box plot) and the third quartile (the value represented by the right side of the rectangle in a box plot) for each set of data. The interquartile range for the fall semester at the university is 15 − 9 = 6, and the interquartile range for the fall semester at the community college is 15 − 6 = 9. The student then should have recognized that 9 > 6 and concluded that the interquartile range of the data for the community college is greater than the interquartile range of the data for the university.
	Option A is incorrect	The student likely confused the median (middle number in a set of numbers when the set is ordered by value) with the first quartile (the number represented by the left side of the rectangle in a box plot) and determined that the value of the first quartile of the data for the university (9) is greater than the value of the first quartile of the data for the community college (6). The student needs to focus on understanding how to find the medians of data presented in comparative box plots.
	Option B is incorrect	The student likely confused the minimum value with the range (difference between the maximum and minimum values in a data set) and determined that the value of the minimum of the data for the university (6) is greater than the value of the minimum of the data for the community college (3). The student needs to focus on understanding how to find the ranges of data presented in comparative box plots.
	Option D is incorrect	The student likely confused the value of the third quartile (the number represented by the right side of the rectangle in a box plot) with the maximum value and determined that the value of the maximum of the data for the community college (18) is greater than the value of the maximum of the data for the university (16). The student needs to focus on understanding how to find the values of the third quartiles of data presented in comparative box plots.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
32	Option F is correct	To determine the amount of simple interest Alice will pay on her loan at the end of one year, the student should have used the formula for simple interest ($I = Prt$, where I = amount of interest, P = the principal amount [initial amount] of the loan, r = the interest rate expressed as a decimal, and t = the time in years). The student should first have converted the interest rate (3.5%) to a decimal by moving the decimal point two places to the left, resulting in 0.035. Next, the student should have substituted the values P = 24,820, r = 0.035, and t = 1 into the simple interest formula, resulting in $I = (24,820)(0.035)(1) = 868.70$. Alice will pay \$868.70 in interest at the end of one year.
	Option G is incorrect	The student likely divided the interest rate by 12 before substituting into the simple interest formula, resulting in $r = \dfrac{3.5\%}{12} \approx 0.29167\%$. The student then likely substituted the values P = 24,820, r = 0.0029167, and t = 1 into the simple interest formula, resulting in $24,820(0.0029167)(1) \approx 72.39$. The student needs to focus on understanding annual interest rates and how to apply annual interest rates to the simple interest formula.
	Option H is incorrect	The student likely did not convert the interest rate from a percentage to a decimal correctly before applying it to the simple interest formula, resulting in $24,820(0.35)(1) = 8,687.00$. The student needs to focus on understanding how to correctly convert percentages to decimals in order to apply annual interest rates to the simple interest formula.
	Option J is incorrect	The student likely found the total amount that Alice would owe at the end of one year by adding the principal amount (initial amount) of the loan to the interest accrued, resulting in $24,820 + 24,820(0.035)(1) = 24,820 + 868.70 = 25,688.70$. The student needs to focus on understanding the details of the problem.

Item #	Rationale	
33	Option C is correct	To determine which statement is true regarding the probability of an event (how likely it is that some event will occur) and its complement (the probability of the event not occurring), the student could have determined that the probability of selecting a card with a picture of a circle is $\frac{8}{40} = \frac{1}{5}$. Next, the student could have recognized that the probability of the complement of this event (selecting a card that does not have a picture of a circle) is found by subtracting the probability of the event from 1, resulting in $1 - \frac{1}{5} = \frac{4}{5}$. 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 calculated the probability of selecting a card with a picture of a circle by using the ratio of the number of types of shapes (5) to the number of cards with a picture of a circle (8), resulting in $\frac{5}{8}$. The student likely then recognized that the probability of the complement of this event (selecting a card that does not have a picture of a circle) is found by subtracting the probability of the event from 1, resulting in $1 - \frac{5}{8} = \frac{3}{8}$. The student needs to focus on understanding how to calculate the probability of an event and its complement when given information in a table.
	Option B is incorrect	The student likely switched the incorrect probability of selecting a card with a picture of a circle on it, $\frac{5}{8}$, and the probability of the complement of that event (selecting a card that does not have a picture of a circle), $1 - \frac{5}{8} = \frac{3}{8}$. The student needs to focus on understanding how to calculate the probability of an event and its complement when given information in a table.
	Option D is incorrect	The student likely switched the probability of selecting a card with a picture of a circle and the probability of the complement of that event (selecting a card that does not have a picture of a circle), resulting in the probability of selecting a card with a picture of a circle being calculated as $\frac{4}{5}$ instead of $\frac{1}{5}$ and the probability of selecting a card that does not have a picture of a circle being calculated as $\frac{1}{5}$ instead of $\frac{4}{5}$. The student needs to focus on attending to the details of the question in problems that require determining the probability of an event and its complement.

Item #		Rationale
34	Option G is correct	To determine the solution to the equation represented by the model, the student could have translated the model into an equation. The student could have recognized that the left side of the model contains 5 squares, each representing x, and 4 triangles, each representing 1, which results in the expression $5x + 4$. The student then could have recognized that the right side of the model contains 10 triangles, each representing 1, which results in the expression 10. The student could have set up the equation by setting the expression on the left equal to the expression on the right ($5x + 4 = 10$). The student then could have solved the equation by first subtracting 4 from both sides of the equation, resulting in $5x + 4 - 4 = 10 - 4$ or $5x = 6$. Lastly, the student could have divided both sides of the equation by 5, resulting in $\frac{5x}{5} = \frac{6}{5}$ or $x = \frac{6}{5}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely set up the equation as $5x + 4 = 10$ based on the model but then added 4 to the right side of the equation instead of subtracting 4, resulting in $5x = 10 + 4$ or $5x = 14$. The student then likely divided both sides of the equation by 5, resulting in $\frac{5x}{5} = \frac{14}{5}$ or $x = \frac{14}{5}$. The student needs to focus on understanding how to solve a two-step linear equation.
	Option H is incorrect	The student likely switched the coefficient value (number in front of a variable) and the constant value (number without a variable) on the left side of the equation, resulting in $5 + 4x = 10$. The student then likely solved the equation by first subtracting 5 from both sides of the equation, resulting in $5 + 4x - 5 = 10 - 5$ or $4x = 5$. Lastly, the student likely divided both sides of the equation by 4, resulting in $\frac{4x}{4} = \frac{5}{4}$ or $x = \frac{5}{4}$. The student needs to focus on understanding how to write an equation when given a model.
	Option J is incorrect	The student likely switched the coefficient value (number in front of a variable) and the constant value (number without a variable) on the left side of the equation, resulting in $5 + 4x = 10$. The student then likely solved the equation by first adding 5 to the right side of the equation instead of subtracting, resulting in $5 + 4x = 10 + 5$ or $4x = 15$. Lastly, the student likely divided both sides of the equation by 4, resulting in $\frac{4x}{4} = \frac{15}{4}$ or $x = \frac{15}{4}$. The student needs to focus on understanding how to write and solve two-step equations when given a model.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
35	128 and any equivalent values are correct	To determine the number of homeowners in the neighborhood who could be expected to have cable television, the student could have set up the proportion (comparison of two ratios) $\frac{8}{20} = \frac{x}{320}$. The proportion compares the ratio of the number of homeowners in the survey who have cable television (8) to the number of homeowners in the neighborhood who were surveyed (20) with the ratio of the expected number of homeowners who have cable television (x) to the total number of homeowners in the neighborhood (320). To solve the proportion, the student then could have multiplied by each denominator (the number on the bottom of a fraction) on both sides of the equation, resulting in 20(x) = 8(320) or 20x = 2,560. Lastly, the student could have divided both sides of the equation by 20, resulting in $x = \frac{2,560}{20} = 128$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item #		Rationale
36	Option F is correct	To determine the percentage of students surveyed that selected "Bird" as their favorite type of animal, the student could have found the ratio of the number of students who selected "Bird" to the total number of students surveyed and then simplified the result, obtaining $\frac{6}{30} = \frac{1}{5} = 0.2$. Finally, the student could have converted the decimal to a percentage by moving the decimal point two places to the right, resulting in 0.2 = 20%. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option G is incorrect	The student likely inverted the ratio of the number of students who selected "Bird" to the total number of students surveyed and used the result as the percentage, resulting in $\frac{30}{6} = 5$. The student needs to focus on understanding the part-to-whole relationship when calculating a percentage.
	Option H is incorrect	The student likely used the number of students who selected "Bird" (6) as the percentage. The student needs to focus on understanding the part-to-whole relationship when calculating a percentage.
	Option J is incorrect	The student likely calculated the percentage of students who did not select "Bird," obtaining $\frac{24}{30} = \frac{4}{5} = 80\%$. The student needs to focus on understanding the details of the question in problems about calculating percentages.

2022 STAAR Grade 7 Mathematics Rationales

Item #	Rationale	
37	Option B is correct	To determine the inequality that can be used to determine the number of pies the class must sell to earn enough money for the field trip, the student should have recognized that $75 is a fixed amount and will represent a constant term in the equation. Next, the student should have recognized that the selling price of each pie, $5, is a rate of change and would represent the coefficient of the variable. The student then should have recognized that the students in the class need at least (greater than or equal to the number) $386 to pay for the field trip. Finally, the student should have used all this information to create the inequality $5p + 75 \geq 386$.
	Option A is incorrect	The student likely determined the correct expression, $5p + 75$, to represent the amount of money the students will collect but interpreted "at least" as less than or equal to instead of greater than or equal to. The student needs to focus on understanding the meaning of the inequality symbol.
	Option C is incorrect	The student likely reversed the values of the constant (fixed amount, $75) and the coefficient (rate of change, $5) on the left side of the inequality but used the correct inequality symbol when interpreting "at least" ($\geq$). The student needs to focus on understanding the difference between constant values and coefficient values when writing a two-step inequality.
	Option D is incorrect	The student likely switched the values of the constant (fixed amount, $75) and the coefficient (rate of change, $5) on the left side of the inequality, and the student interpreted "at least" as less than or equal to instead of greater than or equal to. The student needs to focus on understanding the meaning of the inequality symbol. The student also needs to focus on understanding the difference between constant values and coefficient values when writing a two-step inequality.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
38	Option J is correct	To determine the volume (amount of three-dimensional space) of the rectangular prism in cubic feet, the student could have used the formula for the volume of a prism ($V = Bh$, where V = the volume, B = the area [amount of space covered by a surface] of the base, and h = the height [vertical distance from top to bottom] of the prism). Since the base of the rectangular prism is a rectangle, the student could have calculated the area of the rectangular base as $B = bh$ (where b represents the base of the rectangle and h represents the height of the rectangle), using $b = 1.5$ and $h = 3.5$, obtaining $B = (1.5)(3.5) = 5.25$ square feet. Next, the student could have substituted $B = 5.25$ and $h = 2$ into the volume formula: $V = (5.25)(2) = 10.5$ cubic feet. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.
	Option F is incorrect	The student likely added the given dimensions, resulting in $1.5 + 3.5 + 2 = 7$. The student needs to focus on understanding how to apply the formula for the volume of a rectangular prism when given the dimensions.
	Option G is incorrect	The student likely found the area of the base, B, by multiplying 1.5 by 3.5, but then added 2 to the result instead of multiplying, resulting in $(1.5)(3.5) + 2 = 5.25 + 2 = 7.25$. The student needs to focus on understanding how to apply the formula for the volume of a rectangular prism when given the dimensions.
	Option H is incorrect	The student likely used 3.5 and 2 as the dimensions of the base and then added 1.5 to the result, obtaining $(3.5)(2) + 1.5 = 7 + 1.5 = 8.5$. The student needs to focus on understanding how to apply the formula for the volume of a rectangular prism when given the dimensions.

2022 STAAR Grade 7 Mathematics Rationales

Item #		Rationale
39	Option A is correct	To determine which expression represents the value of π, the student should have understood that π is the ratio of the circumference (distance around a circle) to the diameter (length of the line segment going through the center of the circle connecting two points on the circle). The circumference is C inches, and the diameter is 19 inches; therefore, the ratio is $\frac{C}{19}$.
	Option B is incorrect	The student likely reversed the values in the ratio, finding the ratio of the diameter of the circle (19 inches) to the circumference (C inches). The student needs to focus on understanding that π is the ratio of the circumference of a circle to its diameter.
	Option C is incorrect	The student likely used the radius (distance from the center to a point on the circle) (9.5 inches) instead of the diameter when writing the ratio. The student needs to focus on understanding that π is the ratio of the circumference of a circle to its diameter.
	Option D is incorrect	The student likely used the radius (distance from the center to a point of the circle) (9.5 inches) instead of the diameter when writing the ratio and reversed the values in the ratio. The student needs to focus on understanding that π is the ratio of the circumference of a circle to its diameter.

Item #	Rationale	
40	Option F is correct	To determine the equation used to find the minimum amount of money the family must earn annually given their monthly budget, the student should have first recognized that the table represents a monthly budget and that there are 12 months in a year. Next, the student should have found the total of the family's monthly budget by adding all the items, obtaining 800 + 600 + 360 + 540 + 750 + 580 = 3,630. Since b represents the minimum annual income the family must earn, multiplying the monthly budget by 12 will determine the value of b: $b = \$3,630 \times 12$.
	Option G is incorrect	The student likely misinterpreted the table as representing a weekly budget instead of a monthly budget and multiplied the sum of the items by 52 instead of 12. The student needs to focus on understanding the amount of time represented by a monthly budget and the amount of money earned annually.
	Option H is incorrect	The student likely determined the minimum amount of money that the family must earn annually by multiplying $3,630 \times 12 = 43,560$ but then chose an equation where this amount would be divided by 52 to result in the amount of money the family would need to earn weekly instead of monthly. The student needs to focus on understanding how to determine the minimum annual income needed to meet a household budget when given data in a table.
	Option J is incorrect	The student likely determined the minimum amount of money that the family must earn annually by multiplying $3,630 \times 12 = 43,560$ but then chose an equation where this amount would be divided by 365 to result in the amount of money the family would need to earn daily instead of monthly. The student needs to focus on understanding how to determine the minimum annual income needed to meet a household budget when given data in a table.