2019 STAAR Grade 4 Math Rationales

Item #	Rationale	
1	Option A is correct	To determine the value of the digit 1 in 129,600,000, the student should have recognized that since the digit 1 is the leftmost digit in a nine-digit number, it represents a value of 1 × 100,000,000, resulting in 100,000,000.
	Option B is incorrect	The student likely considered only the three digits to the left of the first comma and recognized that the place value for the digit 1 in a three-digit number is the hundreds place (129) and 1 × 100 = 100. The student needs to focus on understanding the place values of digits in a n9(student)6d,c□t8s 1251f 9.9

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Item #	Rationale	
3	Option B is correct	To determine the decimal equivalent to $\frac{79}{100}$, the student should have placed the 7 and the 9 to the right of the decimal point to represent $\frac{79}{100}$ as 0.79 (seventy-nine hundredths).
	Option A is incorrect	The student likely recognized that the denominator (bottom number) of the fraction $\frac{79}{100}$ had three digits and chose an answer that had three digits to the right of the decimal point representing seventy-nine thousandths instead of seventy-nine hundredths. The student needs to focus on understanding how to relate fractions to decimals that name hundredths.
	Option C is incorrect	The student likely identified that the digits from the numerator (top number) of the fraction $\frac{79}{100}$ should have been used in the decimal number but misplaced the decimal point. The student needs to focus on understanding how to relate fractions to decimals that name hundredths.
	Option D is incorrect	The student likely does not understand how to relate fractions to decimals and replaced the fraction

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Item #	Rationale	

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5	Option C is correct	To determine the strip diagram that shows a way to find the number of water bottles Alexa will drink during each of the next 6 days, the student should have first recognized that the total number of water bottles (36) is represented by the entire length of the strip in the diagram. Next, since 18 is half of 36, the student should have recognized that the number of bottles of water Alexa drank last week is represented by half the length of the strip. Finally, the student should have recognized that the remaining bottles of water should be divided into 6 equal groups which is represented by w in each group.
	Option A is incorrect	The student likely added 36 and 6 to find w, disregarding the details of the rest of the question. The strip diagram represents Alexa drinking a total of w or $36 + 6$ bottles of water. The student needs to focus on understanding how to use a strip diagram to represent a multi-step problem involving the four operations ($+$, $-$, $\times$, $\div$). The student also needs to focus on attending to the details of the question.
	Option B is incorrect	The student likely disregarded the "half" that Alexa already drank and then subtracted 6 from 36 to find w. The strip diagram represents Alexa drinking 6 of 36 bottles last week and drinking the rest of the bottles (w) during the next week. The student needs to focus on understanding how to use a strip diagram to represent a multi-step problem involving the four operations ($+$, $-$, $\times$, $\div$).
	Option D is incorrect	The student likely found half of 36 but did not divide the rest of the water bottles into 6 equal parts. The strip diagram represents Alexa drinking half of the bottles last week (18) and drinking the rest of the bottles during the next week. The student needs to focus on understanding how to use a strip diagram to represent a multi-step problem involving the four operations ($+$, $-$, $\times$, $\div$).

Item #	[redacted]	
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Item #	Rationale	
8	Option J is correct	To determine the drawing where line m appears to be perpendicular to line k, the student should have first understood that perpendicular lines are lines that intersect (cross each other) at a right angle (90° angle). Then the student should have recognized that lines m and k appear to intersect at a right angle in this drawing.
	Option F is incorrect	The student likely confused the definitions of the terms "parallel" and "perpendicular." Parallel lines are lines that do not cross each other and are always the same distance apart. The student needs to focus on understanding the difference between parallel and perpendicular lines.
	Option G is incorrect	The student likely confused the definitions of the terms "intersecting" and "perpendicular." Intersecting lines are lines that cross each other at any angle. Lines k and m in this drawing do not intersect at a 90° angle and therefore cannot be called perpendicular. The student needs to focus on understanding the difference between intersecting and perpendicular lines.
	Option H is incorrect	The student likely confused the definitions of the terms "intersecting" and "perpendicular." Intersecting lines are lines that cross each other at any angle. Lines k and m in this drawing do not intersect at a 90° angle and therefore cannot be called perpendicular. The student needs to focus on understanding the difference between intersecting and perpendicular lines.

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Item #	Rationale	
10	Option J is correct	To

Item #	Rationale	
13	Option C is correct	To determine the area of (amount of space covered by) the top of Kathleen's desk, the student should have used the formula for the area of a rectangle from the Area section of the STAAR Grade 4 Mathematics Reference Materials page within the student's test booklet ($A = l \times w$, where A = area, l = length, and w = width). Using the formula, the student should have calculated that the area is 24×17 resulting in 408 square inches.
	Option A is incorrect	The student likely multiplied 24 by 7 correctly but did not use a zero placeholder for the ones place in the second multiplication step when multiplying 24 by 10, resulting in 192 ($24 \times 7 = 168$; $24 \times 1 = 24$; $168 + 24 = 192$). The student needs to focus on understanding how to use placeholders of zero when carrying out the steps in the multiplication algorithm (procedure).
	Option B is incorrect	The student likely added the side lengths ($24 + 17 + 24 + 17 = 82$) to find the perimeter (distance around the outside) of the top of the desk instead of multiplying the length and width to find the area. The student needs to focus on understanding the difference between area and perimeter calculations and when to use each to solve problems.
	Option D is incorrect	The student likely added ($24 + 17 = 41$) instead of multiplying to find the area. The student needs to focus on understanding that the area is determined by multiplying the length and the width of a rectangle.

Item #		Rationale
14	Option G is correct	To determine the expression (combination of numbers and operational symbols ($+$, $-$, $\times$, $\div$) grouped together to show the value) that CANNOT be used to represent the number represented by the shaded parts in Model Y, the student should have calculated that the number represented by the shaded parts in Model Y is $\frac{12}{4}$. Each rectangle has 3 out of 4 parts shaded, and $\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}=\frac{12}{4}$. Since $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{4}{4}$ and $\frac{4}{4}$ is NOT equal to $\frac{12}{4}$, the student should have recognized that this expression CANNOT be used to represent $\frac{12}{4}$.
	Option F is incorrect	The student likely found that Model Y is shaded to represent $\frac{12}{4}$ but added the fractions in the expression $\frac{4}{4}+\frac{4}{4}+\frac{4}{4}$ incorrectly, resulting in $\frac{12}{12}$ which is not equal to $\frac{12}{4}$. The correct sum of $\frac{4}{4}+\frac{4}{4}+\frac{4}{4}$ is $\frac{12}{4}$. The student needs to focus on adding fractions correctly in problems that require finding expressions that are equal to fractions.
	Option H is incorrect	The student likely found that Model Y is shaded to represent $\frac{12}{4}$, but added the fractions in the expression $\frac{4}{4}+\frac{4}{4}+\frac{3}{4}+\frac{1}{4}$ incorrectly, resulting in $\frac{12}{16}$ which is not equal to $\frac{12}{4}$. The correct sum of $\frac{4}{4}+\frac{4}{4}+\frac{3}{4}+\frac{1}{4}$ is $\frac{12}{4}$. The student needs to focus on adding fractions correctly in problems that require finding expressions that are equal to fractions.

Item #	Rationale	
	Option J is incorrect	The student likely found that Model Y is shaded to represent $\frac{12}{4}$, but added the fractions in the expression $\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}$ incorrectly, resulting in $\frac{12}{16}$ which is not equal to $\frac{12}{4}$. The correct sum of $\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}$ is $\frac{12}{4}$. The student needs to focus on adding fractions correctly in problems that require finding expressions that are equal to fractions.
15	37 and any equivalent values are correct	To determine the measure of angle YXZ in degrees, the student should have subtracted 53° from 90° since 90° is the combined measure of angle YXZ and angle YXW (90 53 = 37).

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Item #	Rationale	
17	Option D is correct	To determine the expanded notation (the form of a number shown as a sum of each digit multiplied by its place value) for the number of meters of pipe fixed (37,015.08), the student should have written the sum (total) of the values represented by the digits in 37,015.08. The 3 in the ten-thousands place should be written as $(3 \times 10{,}000)$, the 7 in the thousands place should be written as $(7 \times 1{,}000)$, the zero in the hundreds place has no value, the 1 in the tens place should be written as (1×10), the 5 in the ones place should be written as (5×1), the zero in the tenths place has no value, and the 8 in the 9 (tens.5 0 0 9.9375 281.9772 466.5795 Tm□□(()6.7 (1)□TJ□□T1
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Item #	Rationale	
18	Option G is correct	To

Item #	Rationale	
19	Option D is correct	To determine the difference between the lengths of the two pencils in centimeters, the student should have first used the centimeter side of the ruler provided on the STAAR Grade 4 Mathematics Reference Materials page within the student's test booklet to measure the length of each pencil. The student should have lined up the end of each line segment with the zero on the centimeter ruler to find the lengths of approximately 10 cm and approximately 13 cm. The student should have found the difference by subtracting $(13 \quad 10 = 3)$.
	Option A is incorrect	The student likely found the approximate length of each line in inches instead of centimeters and added to find the total length of both pencils $(4 + 5 = 9)$. The student needs to focus on understanding the meaning of the word "difference" and attending to the details of a problem involving measurement.
	Option B is incorrect	The student likely found the approximate length of each line in inches instead of centimeters and subtracted correctly to find the difference $(5 \quad 4 = 1)$. The student needs to focus on attending to the details of a problem involving measurement.
	Option C is incorrect	The student likely found the correct measurement of each pencil but added instead of subtracted $(10 + 13 = 23)$. The student needs to focus on understanding the meaning of the word "difference" in a problem involving measurement.

Item #	Rationale	
20	Option F is correct	To determine the number of square feet of space that is left, the student should have aligned the numbers using the decimal point and then subtracted the number of square feet the owners plan to use for the kitchen from the total amount of office space rented (4,506.23 − 281.6 = 4,224.63).
	Option G is incorrect	The student likely aligned the numbers correctly but found the difference by subtracting the smaller digit from the larger digit in each place value instead of regrouping (4,506.23 − 281.6 = 4,385.43). The student needs to focus on understanding how to regroup when subtracting.
	Option H is incorrect	The student likely disregarded the decimal points and right-aligned the numbers when subtracting instead of aligning the numbers by place value, resulting in 450623 − 2816 = 447807. Then the student likely placed the decimal point two places from the right (4,478.07). The student needs to focus on understanding how to align decimal numbers when subtracting.
	Option J is incorrect	The student likely represented 281.6 as 281.06 so that both numbers had 2 digits to the right of the decimal point and continued to subtract correctly (4,506.23 − 281.06 = 4,225.17). The student needs to focus on understanding how to align decimal numbers when subtracting.

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Item #	Rationale	
23	Option B is correct	To determine the frequency table (table that shows how often each value in a set of data occurs) that represents the number of students who chose each color, the student should have first determined the favorite colors of all 22 students (6 red; 2 yellow; 7 blue (5 more than yellow: $5 + 2 = 7$); 3 purple (3 fewer than red: $6 \quad 3 = 3$); 4 green (the rest: $6 + 2 + 7 + 3 = 18$; $22 \quad 18 = 4$

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Item #	Rationale	
24	Option J is correct	To determine the difference between the amount of flour and the combined amount of sugar Zeke used, the student could have first found the combined amount of sugar he used by adding $\frac{3}{4}$ and $\frac{3}{4}$ $\frac{3}{4} + \frac{3}{4} = \frac{6}{4}$ or $1\frac{2}{4}$. Then the student could have subtracted the total amount of sugar used from the total amount of flour used $2\frac{1}{4} \quad \frac{6}{4} = \frac{9}{4} \quad \frac{6}{4} = \frac{3}{4}$. 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 likel75 471.106oolve the

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Item #	Rationale	
25	Option A is correct	To determine the measure of angle RST (the amount (degree) of turn between two lines around their common point), the student should have found the two measures on the same scale (inside or outside) through which the rays (o , a part of a line with a start point but no end point) of the angle pass. Then the student should have subtracted the smaller measure from the larger measure. On the inside scale (the measurement values shown on the protractor), one ray of this angle passes through 130° and the other ray passes through 90°, so the measure of angle RST is 40° (130° 90°). On the outside scale, one ray passes through 90° and the other ray passes through 50°, so the measure of the angle is 40° (90° 50°).
	Option B is incorrect	The student likely recognized that the leftmost ray on the protractor passes through 50° on the outside scale and interpreted 50° to be the measure of the angle. The student needs to focus on understanding that the measures through which rays pass must be subtracted to find the measure of an angle.
	Option C is incorrect	The student likely recognized that the leftmost ray on the protractor passes through 130° on the inside scale and interpreted 130° to be the measure of the angle. The student needs to focus on understanding that the measures through which rays pass must be subtracted to find the measure of an angle.
	Option D is incorrect	The student likely recognized that the leftmost ray on the protractor passes through 130° on the inside scale and 50° on the outside scale and subtracted 50 from 130. The student needs to focus on understanding that there are two scales that can be used on a protractor, but the same scale must be used when determining the measures through which the rays of an angle pass. The student also needs to focus on understanding that the measures through which rays pass must be subtracted to find the measure of an angle.
26	192 and any equivalent values are correct	To determine the total number of cups of flour the baker used in 2 days, the student could have first found the total number of cakes the baker made these two days by multiplying 24 by 2 ($24 \times 2 = 48$). Then the student could have multiplied the total number of cakes by the number of cups of flour in each cake ($48 \times 4 = 192$). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly.

Item #	Rationale	
27	Option B is correct	To determine which expenses were fixed expenses for Ms. McCulley, the student should have understood that fixed expenses are expenses that are the same amount each month. The student should have identified Rent and Car payment as the only expenses that were the same amount each month.
	Option A is incorrect	The student likely confused the definitions of variable expenses (changing from month to month) and fixed expenses. The student needs to focus on understanding that fixed expenses are expenses that are the same amount each month.
	Option C is incorrect	The student likely does not know what fixed expenses are. The student needs to focus on understanding that fixed expenses are expenses that are the same amount each month.
	Option D is incorrect	The student likely focused on the word "expenses" and did not distinguish between variable expenses (changing from month to month) and fixed expenses. The student needs to focus on understanding that fixed expenses are expenses that are the same amount each month.

Item #	Rationale	
28	Option H is correct	To determine which is closest to the fraction of the cereal Martha had left, the student should have calculated that since Martha ate $\frac{4}{9}$ of the cereal, she had $\frac{5}{9}$ of the cereal left ($\frac{9}{9} \quad \frac{4}{9} = \frac{5}{9}$). The student should have then compared $\frac{5}{9}$ to the benchmark (commonly known) fraction $\frac{1}{2}$. Since $\frac{5}{9}$ is just a little greater than $\frac{1}{2}$, about $\frac{1}{2}$ of the cereal was left.
	Option F is incorrect	The student likely determined that $\frac{5}{9}$ of the cereal was left but subtracted $\frac{5}{9} \quad \frac{4}{9}$ to get $\frac{1}{9}$ and then compared $\frac{1}{9}$ to the benchmark fraction $\frac{1}{4}$ instead of comparing $\frac{5}{9}$ to $\frac{1}{2}$. The student likely thought $\frac{1}{9}$ was a little less than $\frac{1}{4}$. The student needs to focus on attending to the details of problems involving the reasonableness of differences involving benchmark fractions such as $\frac{1}{4}$ or $\frac{1}{2}$.
	Option G is incorrect	The student likely compared $\frac{4}{9}$ (the amount of cereal Martha ate) to $\frac{1}{2}$ instead of comparing $\frac{5}{9}$ (the amount of cereal she had left) to $\frac{1}{2}$. The student needs to focus on attending to the details in problems involving the reasonableness of differences involving benchmark fractions.
	Option J is incorrect	The student likely determined that $\frac{5}{9}$ of the cereal was left but subtracted $\frac{5}{9} \quad \frac{4}{9}$ to get $\frac{}{9}$ to $\frac{}{2}$. The student likely thought

Item #	Rationale	
29	Option A is correct	To determine the number represented by point W, the student should have first counted the number of sections on the number line between 11 and 12. The student should have determined that since there are 10 sections between 11 and 12, each section represents one-tenth. Then the student should have counted the number of sections between 11 and point W. The student should have determined that since there are 6 sections between 11 and point W, point W represents 11.6 (eleven and six-tenths).
	Option B is incorrect	The student likely counted the number of tick marks from 11 to point W instead of counting sections. The student also likely confused the tenths and hundredths places, writing eleven and seven-tenths as 11.07 instead of 11.7. The student needs to focus on understanding how to determine the decimal number represented by a point on a number line. The student also needs to focus on understanding the difference between tenths and hundredths when writing decimal numbers.
	Option C is incorrect	The student likely counted the number of tick marks from 11 to point W instead of counting sections. The student needs to focus on understanding how to determine the decimal number represented by a point on a number line.
	Option D is incorrect	The student likely confused the tenths and hundredths places, writing eleven and six tenths as 11.06 instead of 11.6. The student needs to focus on understanding the difference between tenths and hundredths when writing decimal numbers.

Item #	Rationale	
30	Option H is correct	To determine the statement that best describes the polygons (closed shapes with at least three sides) in the group, the student should have concluded each polygon has at least one right angle (90° angle).
	Option F is incorrect	The student likely confused the definition of parallel (opposite sides that are always the same distance apart) with the definition of perpendicular (intersect at a right angle). The student needs to focus on recognizing the difference between parallel and perpendicular sides in polygons.
	Option G is incorrect	The student likely confused the definition of obtuse angles (angles that are greater than 90°) with the definition of right angles. The student needs to focus on recognizing the difference between obtuse and right angles in polygons.
	Option J is incorrect	The student likely confused the definition of acute angles (angles that are less than 90°) with the definition of right angles. The student needs to focus on recognizing the difference between acute and right angles in polygons.

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Item #	Rationale	
31	Option D is correct	To determine the rule that shows how to find the value when given the position, the student should have considered the relationship in the table. Since each value is 32 more than each paired position, the relationship is $+32$ ($1 + 32 = 33$; $2 + 32 = 34$; $3 + 32 = 35$; $4 + 32 = 36$).
	Option A is incorrect	The student likely focused only on the first row of numbers in the table ($1 \times 33 = 33$) and did not test the relationship on any other pairs of numbers in the table. The student needs to focus on understanding that the relationship in a table must be true between the numbers in each set of paired numbers in the table.
	Option B is incorrect	

Item #	Rationale	
33	Option B is correct	To determine which model could represent the bulletin board with a perimeter (distance around the outside of a shape) of 22 feet, the student could have used one of the rectangle formulas from the Perimeter section of the STAAR Grade 4 Mathematics Reference Materials page within the student's test booklet ($P = l + w + l + w$ or $P = 2l + 2w$, where P = perimeter, l = length, and w = width). Because this rectangle has two sides that are 3 feet long and two sides that are 8 feet long, the perimeter is 22 feet ($8 + 3 + 8 + 3 = 22$).
	Option A is incorrect	The student likely confused the formula for perimeter and multiplied 11 feet by 1 foot and then multiplied the result by 2 ($11 \times 1 = 11$; $11 \times 2 = 22$). The student needs to focus on understanding that perimeter is determined by adding all of the side lengths of a shape.
	Option C is incorrect	The student likely added only the given dimensions of 16 feet and 6 feet to get an answer of 22 feet. The two sides of the rectangle that are not labeled also need to be added to find the perimeter. The student needs to focus on understanding that perimeter is determined by adding all of the side lengths of a shape.
	Option D is incorrect	The student likely multiplied the given dimensions of 11 feet and 2 feet. This procedure gives the area of (amount of space covered by) the rectangle (22 square feet) rather than the perimeter. The student needs to focus on understanding the difference between perimeter and area.
