STAAR Spring 2025 Grade 4 Mathematics Rationales

| Item Position | Rationales | |
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| 1 | Option A is correct | To determine how much money Marta will have left in dollars and cents after buying dog food, the student could have first identified the values of a dime ($0.10) and a penny ($0.01) and then added the values listed to find the total value of the money in Marta's wallet. The student then should have subtracted the cost of the dog food from the amount of money in Marta's wallet. There are two $20 bills ($40), two $10 bills ($20), three dimes ($0.30), and six pennies ($0.06): 40.00 + 20.00 + 0.30 + 0.06 = 60.36. Marta spent $36.89 on dog food: 60.36 – 36.89 = 23.47. 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 incorrectly identified the value of a penny as $0.50 and multiplied the number of pennies (6) by $0.50. The student needs to focus on identifying the values of different types of U.S. currency. |
| | Option C is incorrect | The student likely added the value of only one $10 bill rather than two. The student needs to focus on attending to the details to accurately solve the problem. |
| | Option D is incorrect | The student likely identified the value of a penny as $0.10 and the value of a dime as $0.25. The student needs to focus on identifying the values of different types of U.S. currency. |

| Item Position | Rationales | |
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| 2 | 2, 4, 5 | To determine the values to complete the table using data from the dot plot (a graphical way of showing the frequency of an event by placing a dot or dots above a value on a number line), the student should have recognized that each dot represents 1 farmer and counted the numbers of dots shown above the labeled values in the dot plot for the missing values in the table. The dot plot shows 2 dots above 35, 4 dots above 40, and 5 dots above 47. Then the student should have completed the table by identifying the count for each value. |

| Item Position | Rationales | |
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| 3 | Option D is correct | To determine the total number of sheets in the packs of paper, the student should have recognized this as a multiplication problem. The number of packs of paper, 120, should be multiplied by the number of sheets of paper in each pack, 100. The student could have recalled that for each power of 10, (10, 100, 1,000, 10,000, . . .), an additional zero can be placed after the multiplicand (the number being multiplied) to find the product (the result of a multiplication expression). Therefore, the student could have placed two zeros to the right side of 120: 120 × 100 = 12,000. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely added three zeros, one for each digit in the number 100, to 120 to get the result 120,000. The student needs to focus on understanding how to use placeholders of zero when multiplying. |
| | Option B is incorrect | The student likely added 100 and 120. The student needs to focus on understanding the mathematical operations (+, −, ×, ÷) needed to represent the solution to a real-world problem. |
| | Option C is incorrect | The student likely omitted the zero in the multiplicand 120 when multiplying by 100. The student needs to focus on understanding how to use placeholders of zero when multiplying. |

| Item Position | Rationales | |
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| 4 | First option is correct | To determine which angles appear NOT to have a measure (amount of turn between two rays around their common point) of 70°, the student should have found the two measures on the same scale (the measurement values shown on the protractor) through which the two rays (→, part of a line with only one endpoint) of the angle pass. The student then could have subtracted the smaller measure from the larger measure. On the outside scale, the left ray passes through 0°, and the right ray passes through 110°, so the measure of the angle is 110° (110 – 0 = 110), which is not equal to 70°. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Third option is correct | To determine the other angle that does not have a measure of 70°, the student could have used the outside scale to find that the left ray passes through 70° and the right ray passes through 170°, so the measure of the angle is 100° (170 – 70 = 100). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Second option is incorrect | The student likely used different scales for the two rays when reading the protractor, creating a subtraction problem using the left ray passing through 110° on the outer scale and the right ray passing through 0° on the inner scale (110 – 0 = 110). The student needs to focus on understanding how to use a protractor to find measures of angles. |
| | Fourth option is incorrect | The student likely interpreted the right ray passing through 110° on the inner scale to mean that the measure of the angle is 110°, without considering the indication of the left ray. The student needs to focus on understanding how to use a protractor to find measures of angles. |
| | Fifth option is incorrect | The student likely used different scales for the two rays when reading the protractor, creating a subtraction problem using the left ray passing through 60° on the outer scale and the right ray passing through 50° on the inner scale (60 – 50 = 10). The student needs to focus on understanding how to use a protractor to find measures of angles. |

| Item Position | Rationales | |
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| 5 | Option C is correct | To determine the number in word form, the student could have translated each place value of the given number from expanded notation (the form of a number shown as a sum [total] of each digit multiplied by its place value) to numeric form and then written the sum of the values in word form. The student should have realized that $(1 \times 1{,}000) = 1{,}000$, $(8 \times 100) = 800$, $(4 \times 10) = 40$, $(2 \times 0.1) = 0.2$, and $(9 \times 0.01) = 0.09$. The sum is $1{,}000 + 800 + 40 + 0.2 + 0.09 = 1{,}840.29$, so the word form is "one thousand, eight hundred forty and twenty-nine hundredths." This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely did not understand the place values to the right of the decimal point and thought the 9 was in the tenths place rather than the hundredths place, resulting in twenty-nine tenths. The student needs to focus on understanding the place values of each number to correctly write the number in word form. |
| | Option B is incorrect | The student likely misinterpreted the $(4 \times 10)$ part of the number in expanded form as representing the ones place rather than the tens place. The student needs to focus on understanding the place values of each number to correctly write the number in word form. |
| | Option D is incorrect | The student likely misinterpreted the $(8 \times 100)$ and $(4 \times 10)$ parts of the number in expanded form as representing the tens and ones places rather than the hundreds and tens places. The student likely did not understand the place values to the right of the decimal point and thought the 9 was in the tenths place rather than the hundredths place, resulting in twenty-nine tenths. The student needs to focus on understanding the place values of each number to correctly write the number in word form. |

| Item Position | Rationales | |
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| 6 | 2 pairs, 1 pair | To complete the sentence to describe the polygons, the student should have identified the number of pairs of perpendicular sides (sides that intersect at a 90° angle) and parallel sides (sides that are always the same distance apart and will never intersect, no matter how far they are extended) for each polygon. The trapezoid (left) has 2 pairs of perpendicular sides (top and left, bottom and left) and 1 pair of parallel sides (top and bottom). The pentagon (right) also has 2 pairs of perpendicular sides (left and bottom, right and bottom) and 1 pair of parallel sides (left and right). |

| Item Position | Rationales | |
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| 7 | Option A is correct | To determine the greatest number of servings that can be made from the pizzas, the student could have first found the total number of slices by multiplying the number of pizzas (53) by the number of slices each pizza was cut into (8): 53 × 8 = 424 slices. The student then could have divided the total number of slices (424) by the number of slices in each serving (3): 424 ÷ 3 = 141 servings with 1 slice remaining. The student then should have realized the remainder represents a partial serving and that only 141 complete servings can be made from 53 pizzas. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option B is incorrect | The student likely added the number of slices each pizza was cut into (8) to the number of slices per serving (3) and then multiplied by the number of pizzas (53). The student needs to focus on attending to the details of the question being asked in a two-step problem. |
| | Option C is incorrect | The student likely found the total number of slices (53 × 8 = 424) rather than the number of servings. The student needs to focus on attending to the details of the question being asked in a two-step problem. |
| | Option D is incorrect | The student likely added the value of the remainder (1) to the value of the quotient (141). The student needs to focus on attending to the details of the question being asked in a two-step problem and understanding the meaning of the remainder in the context of the problem. |

| Item Position | Rationales | |
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| 8 | Second option is correct | To determine the shapes that appear to have all their lines of symmetry (imaginary lines that divide a figure into halves that are reflections of each other) drawn correctly, the student could have visualized the different ways to draw lines through each figure to create two shapes that are mirror images of each other. The student should have realized that the equilateral triangle has 3 lines of symmetry that each divide it into halves that are reflections of each other, and they are all drawn correctly on the figure. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Fifth option is correct | To determine the other shape that appears to have all its lines of symmetry drawn correctly, the student should have realized that the heart shape has only 1 line of symmetry that divides it into halves that are reflections of each other, and it is drawn correctly on the figure. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | First option is incorrect | The student likely determined that the vertical line in the middle of the trapezoid creates two equal parts. The student needs to focus on identifying lines of symmetry, if they exist, for all two-dimensional figures. |
| | Third option is incorrect | The student likely determined that an isosceles triangle has 3 lines of symmetry because it has 3 sides and 3 angles. The student needs to focus on identifying lines of symmetry, if they exist, for all two-dimensional figures. |
| | Fourth option is incorrect | The student likely determined that the rectangle has 4 lines of symmetry because it has 4 sides and 4 angles. The student needs to focus on identifying lines of symmetry, if they exist, for all two-dimensional figures. |

| Item Position | Rationales | |
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| 9 | Option A is correct | To determine the total number of minutes for the two days Briana practices the longest, the student should have first determined the two greatest values shown in the stem and leaf plot (a plot that displays data with each number split into a stem [the first digit or digits of the number, in this case the tens place] and a leaf [the last digit of the number, in this case the ones place]). The student should have read the key and recognized that 7\|0 represents the greatest value, 70 minutes. Since 7\|0 is listed twice, the student then should have added the two values, resulting in 70 + 70 = 140 minutes. |
| | Option B is incorrect | The student likely identified the two least values in the stem and leaf plot, 2\|5 and 2\|7. The sum of these values is 25 + 27 = 52. The student needs to focus on understanding how to read data represented in a stem and leaf plot. |
| | Option C is incorrect | The student likely added the two greatest leaf values in the stem and leaf plot without consideration of the stem values. The two greatest leaf values are 7 and 8, resulting in 7 + 8 = 15. The student needs to focus on understanding how to read data represented in a stem and leaf plot. |
| | Option D is incorrect | The student likely did not consider that 7\|0 is listed twice and therefore identified 6\|8 as the second-greatest value in the stem and leaf plot. The sum of these values is 68 + 70 = 138. The student needs to focus on understanding how to read data represented in a stem and leaf plot. |

| Item Position | Rationales | |
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| 10 | First option is correct | To determine which fraction is equivalent to $\frac{4}{6}$, the student could have determined that equivalent fractions can be formed by multiplying or dividing the numerator (the top number of a fraction) and denominator (the bottom number of a fraction) by the same value. The student then could have recognized that multiplying the numerator (4) and the denominator (6) by 2 results in the equivalent fraction $\frac{8}{12}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Fourth option is correct | To determine the other fraction that is equivalent to $\frac{4}{6}$, the student could have recognized that dividing the numerator (4) and the denominator (6) by 2 results in the equivalent fraction $\frac{2}{3}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Second option is incorrect | The student likely subtracted 1 from both the numerator and the denominator, resulting in $\frac{4-1}{6-1}=\frac{3}{5}$. The student needs to focus on understanding how to determine an equivalent fraction. |
| | Third option is incorrect | The student likely added 1 to both the numerator and the denominator, resulting in $\frac{4+1}{6+1}=\frac{5}{7}$. The student needs to focus on understanding how to determine an equivalent fraction. |
| | Fifth option is incorrect | The student likely added 2 to both the numerator and the denominator, resulting in $\frac{4+2}{6+2}=\frac{6}{8}$. The student needs to focus on understanding how to determine an equivalent fraction. |

| Item Position | Rationales | |
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| 11 | Option D is correct | To determine which strip diagram best represents *c*, the number of cupcakes Kenji has left, the student should have first recognized that the total number of cupcakes, 24, is represented by the entire length of the strip in the diagram. Next, since Kenji ate 3 cupcakes, the student should have realized that a small portion of the longer bar should represent the 3 cupcakes eaten. Then, since Kenji gave away 12 cupcakes to his friends, the student should have realized that half of the longer bar should represent the 12 cupcakes given away. Finally, the student should have determined that the remaining portion of the bar should represent *c*, the number of cupcakes Kenji has left. |
| | Option A is incorrect | The student likely determined that the sum of the three given quantities (3, 12, and 24) is equal to *c*, the number of cupcakes Kenji has left. The student needs to focus on understanding how to use a strip diagram to represent a multistep problem involving the four operations (+, −, ×, ÷). The student also needs to focus on attending to the details of the question. |
| | Option B is incorrect | The student likely determined that Kenji ate 12 cupcakes and shared the remaining cupcakes among 3 friends. The student needs to focus on understanding how to use a strip diagram to represent a multistep problem involving the four operations (+, −, ×, ÷). The student also needs to focus on attending to the details of the question. |
| | Option C is incorrect | The student likely added the number of cupcakes Kenji gave to his friends to the total (12 + 24). The student needs to focus on understanding how to use a strip diagram to represent a multistep problem involving the four operations (+, −, ×, ÷). The student also needs to focus on attending to the details of the question. |

| Item Position | Rationales | |
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| 12 | Option B is correct | To determine which equality statement is true, the student could have determined that the number 3.04 is equal to 3 + 0.04. The decimal 0.04 (4 hundredths) is equal to the fraction $\frac{4}{100}$. Then the student could have realized that 3 is equal to $\frac{3}{1}$ and that $\frac{3}{1} \times \frac{100}{100} = \frac{300}{100}$. Finally, the student could have added $\frac{4}{100} + \frac{300}{100}$ to find $\frac{304}{100}$, the fraction equivalent to 3.04. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely determined that the zero in the hundredths place indicates that the equivalent fraction would have 10 as the denominator, but used the digits from the decimal as the numerator. The student needs to focus on understanding the value of each digit in a decimal and how to convert decimals to fractions. |
| | Option C is incorrect | The student likely concluded that the decimal part 0.04 represents 4 tenths rather than 4 hundredths. The student needs to focus on understanding the value of each digit in a decimal and how to convert decimals to fractions. |
| | Option D is incorrect | The student likely determined that the two digits after the decimal point indicate that the equivalent fraction would have 100 as the denominator, but used only the first two digits in the decimal as the numerator. The student needs to focus on understanding the value of each digit in a decimal and how to convert decimals to fractions. |

| Item Position | Rationales | |
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| 13 | Option D is correct | To determine the fraction that is less than the value represented by the model, the student should have identified that the model shows 6 shaded rectangles out of a total of 12 rectangles, which is represented by the fraction $\frac{6}{12}$. The student then could have compared the fractions $\frac{6}{12}$ and $\frac{1}{3}$ by finding a common denominator (a multiple of both bottom numbers). Since the fractions have denominators of 12 and 3, the student could have recognized that a common denominator for the fractions could be 12, since 12 × 1 = 12 and 3 × 4 = 12. The student then could have written $\frac{1}{3}$ in its equivalent form using the common denominator: $\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$. The student then could have compared the numerators (top numbers) of the two fractions. Since 4 is less than 6, $\frac{4}{12} < \frac{6}{12}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely reversed the comparison of the two values and chose a fraction greater than $\frac{6}{12}$ instead of less. The student needs to focus on attending to the meaning of words used when comparing fractions with different numerators and denominators. |
| | Option B is incorrect | The student likely identified a fraction that is equal to $\frac{6}{12}$ instead of less. The student needs to focus on attending to the meaning of words used when comparing fractions with different numerators and denominators. |
| | Option C is incorrect | The student likely determined that a fraction with the same numerator but a lesser denominator has a lesser value. The student needs to focus on understanding how to compare fractions with different denominators. |

| Item Position | Rationales | |
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| 14 | +, 20 | To determine the rule that can be used to find the output number when the input number is given, the student should have considered the relationship between each input value and the corresponding output value listed in the table. Since each output value is 20 greater than its input value, the relationship involves adding 20 to the input value (5 + 20 = 25; 10 + 20 = 30; 15 + 20 = 35; 20 + 20 = 40). The rule that represents this relationship is "+ 20." |

| Item Position | Rationales | |
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| 15 | Option C is correct | To determine which number line shows a point that represents a distance of 0.4 unit from zero, the student should have first recognized that 0.4 is the same as four-tenths. The student should have counted the number of sections on the number line between 0 and 1 and determined that since there are 10 sections between 0 and 1, each section represents one-tenth. The student should then have counted the number of sections between 0 and the point, which is 4. Therefore, the distance from 0 to the point is a distance of four-tenths, or 0.4. |
| | Option A is incorrect | The student likely determined a point that is 0.4 unit from 1 rather than from 0. The student needs to focus on understanding how to represent a decimal distance on a number line. |
| | Option B is incorrect | The student likely counted the tick marks, including the tick mark at 0, rather than the sections, when counting four-tenths from 0. The student needs to focus on understanding how to represent a decimal distance on a number line. |
| | Option D is incorrect | The student likely determined a point that is 0.4 unit from 1 rather than from 0 and counted the tick marks, including the tick mark at 1, rather than the sections, when counting four-tenths from 1. The student needs to focus on understanding how to represent a decimal distance on a number line. |

| Item Position | Rationales | |
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| 16 | Option D is correct | To determine the area (amount of space covered by a two-dimensional figure) of the rectangle in square feet, the student should have first determined the width of the rectangle. The student could have used the formula for perimeter (distance around the outside of a figure) of a rectangle ($P = l + w + l + w$, where $P$ = perimeter, $l$ = length, and $w$ = width) to determine the width. Because the length of the rectangle is 23 feet, and the perimeter is 80 feet, the student could have found the sum (total) of the two lengths, 46 (23 + 23), and subtracted that from 80 to get 34 (80 – 46 = 34), which is equal to the sum of the two widths. Then the student should have divided 34 by 2 to get 17, the width in feet of the rectangle. Next, the student should have used the formula for the area of a rectangle ($A = l \times w$, where $A$ = area, $l$ = length, and $w$ = width). Since the length of the rectangle is 23 feet and the width is 17 feet, the student should have multiplied 23 by 17 to determine that the area is 391 square feet. 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 23 by 23. The student needs to focus on understanding how to solve problems related to perimeter and area of rectangles. |
| | Option B is incorrect | The student likely added the given numbers (80 and 23). The student needs to focus on understanding how to solve problems related to perimeter and area of rectangles. |
| | Option C is incorrect | The student likely multiplied the given numbers (80 and 23) but did not use a zero placeholder in the partial product when multiplying 80 by 20. The student needs to focus on understanding how to solve problems related to perimeter and area of rectangles. |

| Item Position | Rationales | |
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| 17 | 9,507.41 or any equivalent decimal value | To determine the standard form of the number shown in expanded notation (the form of a number shown as a sum of each digit multiplied by its place value), the student could have evaluated the products in the given expression to find that (9 × 1,000) = 9,000, (5 × 100) = 500, (7 × 1) = 7, (4 × 0.1) = 0.4, and (1 × 0.01) = 0.01. The student then could have written the sum (total) of the values: 9,000 + 500 + 7 + 0.4 + 0.01 = 9,507.41. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |

| Item Position | Rationales | |
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| 18 | Option B is correct | To determine how much more sugar Dylan uses in the cookies than in the pie, the student should have recognized this as a subtraction problem that results in a smaller number than the two given numbers. The student could have subtracted 5.3 from 7, ensuring that the decimal point and each place value were aligned (the ones over the ones and the tenths over the tenths), to get the answer of 1.7 ounces. 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 only the whole numbers (7 – 5 = 2) and kept the 3 in the tenths place (0.3), resulting in 2.3. The student needs to focus on understanding how to accurately solve problems that involve whole numbers and decimals. |
| | Option C is incorrect | The student likely added the two values (7 + 5.3 = 12.3). The student needs to focus on attending to the details of the question. |
| | Option D is incorrect | The student likely wrote the two numbers vertically but aligned 7 with the tenths place, instead of the correct place value of the ones place, and then added 7 and 3. The 10 was likely regrouped as 1 in the ones place, resulting in 5 + 1 = 6 in the ones place and 0 in the tenths place (6.0). The student needs to focus on attending to the details of the question and understanding how to accurately solve problems that involve whole numbers and decimals. |

| Item Position | Rationales | |
|---|---|---|
| 19 | Option B is correct | To determine the true statement, the student could have compared the values of the digits in 0.03 and 0.3. The student could have found that the digit 3 in 0.03 is in the hundredths place, and the digit 3 in 0.3 is in the tenths place. The student then could have determined that 0.03 is one-tenth the value of 0.3 because the digit 3 in 0.03 is one place value to the right of the digit 3 in 0.3. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely determined that 300 is one-tenth the value of 30 because the digit 3 in 300 is one place value to the left of the digit 3 in 30. The student needs to focus on understanding that the value of each place-value position is 10 times the value of the position to the right and $\frac{1}{10}$ the value of the position to the left. |
| | Option C is incorrect | The student likely determined that 30 is one-tenth the value of 3 because the digit 3 in 30 is one place value to the left of the digit 3 in 3. The student needs to focus on understanding that the value of each place-value position is 10 times the value of the position to the right and $\frac{1}{10}$ the value of the position to the left. |
| | Option D is incorrect | The student likely determined that 3 is one-tenth the value of 0.3 because the digit 3 in 3 is one place value to the left of the digit 3 in 0.3. The student needs to focus on understanding that the value of each place-value position is 10 times the value of the position to the right and $\frac{1}{10}$ the value of the position to the left. |

| Item Position | Rationales | |
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| 20 | Option D is correct | To determine the number of feet Samuel rides, the student could have used the relationship shown in the table to determine the number of feet in 1 mile. The student could have divided 10,560 feet by 2 miles to determine that there are 5,280 feet in 1 mile. The student then could have multiplied the number of miles that Samuel rode, 7, by 5,280, resulting in 36,960 feet. 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 7 by the first number of feet listed in the table, 10,560, resulting in 73,920. The student needs to focus on understanding relationships in a measurement system and how to convert from one unit to another in the same measurement system. |
| | Option B is incorrect | The student likely added the first number of feet listed in the table, 10,560, to the last number of feet listed in the table, 31,680, resulting in 42,240. The student needs to focus on understanding relationships in a measurement system and how to convert from one unit to another in the same measurement system. |
| | Option C is incorrect | The student likely added all the numbers of feet listed in the table, resulting in 10,560 + 21,120 + 31,680 = 63,360. The student needs to focus on understanding relationships in a measurement system and how to convert from one unit to another in the same measurement system. |

| Item Position | Rationales | |
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| 21 | Option C is correct | To determine the measurement that best describes the weight of a basketball, the student could have used the reference materials to identify the units of weight and mass. Since kilograms is a unit of mass, the student should have focused on the units of weight, which are tons, ounces, and pounds. The student then should have recognized that a basketball is light enough to be easily thrown with one hand. Therefore, it can be concluded that 22 tons and 22 pounds would both be too heavy to describe the weight of a basketball. Since there are 16 ounces in a pound, 22 ounces is a little more than 1 pound and is a weight that could easily be thrown with one hand. Therefore, 22 ounces is the best description for the weight of a basketball. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely did not recognize that there are 2,000 pounds in one ton and therefore chose a weight that is much too great to describe the weight of a basketball. The student needs to focus on identifying relative sizes of measurement units within the customary system. |
| | Option B is incorrect | The student likely did not recognize that kilograms are a unit of mass, not weight. The student needs to focus on identifying relevant units for different measures. |
| | Option D is incorrect | The student likely did not recognize that 22 pounds is a weight too great to be easily thrown with one hand. The student needs to focus on identifying relative sizes of measurement units within the customary system. |

| Item Position | Rationale | |
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| 22 | Option D is correct | To determine the fraction that is greater than $\frac{5}{4}$, the student could have compared the fractions $\frac{5}{4}$ and $\frac{4}{3}$ by finding a common denominator (a multiple of both bottom numbers). Since the fractions have denominators of 4 and 3, the student could have recognized that a common denominator for the fractions could be 12, since 4 × 3 = 12 and 3 × 4 = 12. The student then could have written $\frac{5}{4}$ and $\frac{4}{3}$ in their equivalent forms using the common denominator: $\frac{5}{4} \times \frac{3}{3} = \frac{15}{12}$ and $\frac{4}{3} \times \frac{4}{4} = \frac{16}{12}$. The student then could have compared the numerators (top numbers) of the two fractions. Since 16 is greater than 15, $\frac{16}{12} > \frac{15}{12}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely determined that a fraction with a greater numerator and a greater denominator has a greater value. The student needs to focus on understanding how to compare fractions with different numerators and denominators. |
| | Option B is incorrect | The student likely determined that a fraction with a denominator of 2 is greater than a fraction with a denominator of 4 without considering that $\frac{5}{4}$ is an improper fraction that represents 1 whole plus a fractional value of $\frac{1}{4}$, whereas $\frac{2}{2}$ represents only 1 whole. The student needs to focus on understanding how to compare fractions with different numerators and denominators. |
| | Option C is incorrect | The student likely determined that a fraction with the same numerator but a greater denominator has a greater value. The student needs to focus on understanding how to compare fractions with different denominators. |

| Item Position | Rationales | |
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| 23 | Second option is correct | To determine which representation can be used to find the number of parents, $p$, on the school trip, the student should have concluded that the number of students (152) and the number of teachers (11) must be subtracted from the total number of people on the trip (187), resulting in $p = 187 - 152 - 11$. |
| | Fourth option is correct | To determine the other representation that can be used to find the number of parents, $p$, on the school trip, the student should have recognized that the total number of people (187) is represented by the entire length of the strip in a strip diagram. Then, since 152 of the people are students, the student should have realized that a large part of the strip should represent the 152 students. Next, since 11 of the people are teachers, the student should have realized that a small part of the strip should represent the 11 teachers. Finally, the student should have determined that the remaining part of the strip should represent $p$, the number of parents on the school trip. |
| | First option is incorrect | The student likely thought all numbers should be added and therefore chose the strip diagram that shows $p$ as a sum of the given numbers ($11 + 152 + 187$). The student needs to focus on attending to the details of a multistep problem and understanding how a strip diagram can be used to represent it. |
| | Third option is incorrect | The student likely thought all numbers should be added and therefore chose the equation that shows $p$ as a sum of the given numbers ($187 + 152 + 11$). The student needs to focus on attending to the details of a multistep problem and understanding how an equation can be used to represent it. |
| | Fifth option is incorrect | The student likely thought that the given number of adults (11 teachers) only needed to be subtracted from the number of students (152) to find the number of other adults (parents) on the school trip. The student needs to focus on attending to the details of a multistep problem and understanding how an equation can be used to represent it. |

| Item Position | Rationales | |
|---|---|---|
| 24 | Option D is correct | To determine which set of data the frequency table (a table that shows how often each value in a set of data occurs) could represent, the student could have identified the number of tally marks for each range in the table. The table shows that 2 students walked 1–4 laps, 6 students walked 5–8 laps, 5 students walked 9–12 laps, and 1 student walked 13–16 laps. Then the student could have matched the values in the list to each range in the table. The list has 2 values from 1 to 4 (3 and 4), 6 values from 5 to 8 (5, 5, 7, 7, 7, and 8), 5 values from 9 to 12 (10, 10, 11, 12, and 12), and 1 value from 13 to 16 (15). This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely identified the values from the parameters of the ranges given in the frequency table (1, 4, 5, 8, 9, 12, 13, and 16) and the totals in the frequency column (2, 6, 5, and 1) and omitted the repeated values. The student needs to focus on accurately reading data from frequency tables. |
| | Option B is incorrect | The student likely switched the frequencies for students who walked 5–8 laps and students who walked 9–12 laps. The student needs to focus on accurately reading data from frequency tables. |
| | Option C is incorrect | The student likely did not count the diagonal slashes in the tally marks showing the frequencies for students who walked 5–8 laps and 9–12 laps and concluded that there were 5 values from 5 to 8 and 4 values from 9 to 12. The student needs to focus on accurately reading data from frequency tables. |

| Item Position | Rationales | |
|---|---|---|
| 25 | Option A is correct | To determine the true statement about the fraction of cookies Shan has left, the student should have used benchmark (commonly known) fractions to determine the value of $\frac{3}{12}$ as $\frac{1}{4}$ and estimated the value of $\frac{5}{12}$ as a little less than $\frac{1}{2}$. Since the sum (total) of $\frac{1}{4}$ and $\frac{1}{2}$ is $\frac{3}{4}$, the student could have estimated that the total portion of the cookies Shan gave away is a little less than $\frac{3}{4}$. Since $1 - \frac{3}{4} = \frac{1}{4}$, the fraction of the cookies Shan has left is a little greater than $\frac{1}{4}$ but less than $\frac{1}{2}$. 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 approximated the fraction of cookies that Shan gave away, $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$, rather than the fraction of cookies he has left, and estimated $\frac{5}{12}$ as a little greater than $\frac{1}{2}$ instead of a little less. The student needs to focus on attending to the details of problems involving the reasonableness of sums and differences involving benchmark fractions such as $\frac{1}{4}$ and $\frac{1}{2}$. |
| | Option C is incorrect | The student likely approximated the fraction of cookies that Shan gave away, $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$, rather than the fraction of cookies he has left, resulting in a little less than $\frac{3}{4}$ of the cookies since $\frac{5}{12}$ is a little less than $\frac{1}{2}$. The student needs to focus on attending to the details of problems involving the reasonableness of sums and differences involving benchmark fractions such as $\frac{1}{4}$ and $\frac{1}{2}$. |
| | Option D is incorrect | The student likely estimated $\frac{5}{12}$ as a little greater than $\frac{1}{2}$ instead of a little less, resulting in Shan having a little less than $\frac{1}{4}$ of the cookies left. The student needs to focus on attending to the details of problems involving the reasonableness of sums and differences involving benchmark fractions such as $\frac{1}{4}$ and $\frac{1}{2}$. |

| Item Position | Rationales | |
|---|---|---|
| 26 | 17, 46 | To determine the length and perimeter (distance around the outside of a figure) of the rectangle, the student could have first found the length by using the formula for area (amount of space covered by a two-dimensional figure) of a rectangle ($A = l \times w$, where $A$ = area, $l$ = length, and $w$ = width). In this case the area is 102 and the width is 6, so $102 = l \times 6$. Using the relationship between multiplication and division, the student could have divided 102 by 6 to get 17 units ($102 \div 6 = 17$), which is the length of the rectangle.<br><br>Next, the student could have used the formula for the perimeter of a rectangle ($P = l + w + l + w$, where $P$ = perimeter, $l$ = length, and $w$ = width). Since the length of the rectangle is 17 units and the width is 6 units, the student should have calculated the perimeter as $17 + 6 + 17 + 6 = 46$ units. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |

| Item Position | Rationales | |
|---|---|---|
| 27 | Option C is correct | To determine which expression can be used to find the fraction of the classrooms that are used by teachers, the student should have recognized that the total number of squares, 30, represents all the classrooms. This total, 30, represents the denominator (bottom number) of each fraction. The student should have recognized that the shaded squares represent the classrooms that are used by teachers. The student could have counted the numbers of shaded squares as three separate groups and recognized that the numbers of squares in the groups (5, 6, and 5) represent the numerators (top numbers) of the fractions. The student then should have determined that the sum of the three fractions $\left(\frac{5}{30}+\frac{6}{30}+\frac{5}{30}\right)$ represents the fraction of classrooms that are used by teachers. 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 counted the number of shaded squares and the number of white squares in each two-column section of the model and created fractions by placing the numbers of shaded squares over the numbers of white squares. The first two-column section has 5 shaded squares and 5 white squares, resulting in the fraction $\frac{5}{5}$. The second two-column section has 6 shaded squares and 4 white squares, resulting in the fraction $\frac{6}{4}$. The third two-column section has 5 shaded squares and 5 white squares, resulting in the fraction $\frac{5}{5}$. The student needs to focus on understanding how to determine denominators in problems involving fractions. |
| | Option B is incorrect | The student likely counted the number of white squares in each three-column section and created fractions of the number of white squares over the total number of squares in the model. Both the first and second three-column sections have 7 white squares, resulting in the sum of the fractions $\frac{7}{30}+\frac{7}{30}$ . The student needs to focus on attending to the details of the question being asked in a problem. |
| | Option D is incorrect | The student likely determined the sum of the fraction represented by the shaded squares $\left(\frac{16}{30}\right)$ and the fraction represented by the white squares $\left(\frac{14}{30}\right)$. The student needs to focus on attending to the details of the question being asked in a problem. |

| Item Position | Rationales | |
|---|---|---|
| 28 | movies, groceries, changed OR groceries, movies, changed | To determine which expenses are variable, the student should have first decided whether each expense was a fixed expense (the same amount each month) or a variable expense (changing from month to month). The student should have determined that the grocery and movie expenses were variable, because the amounts Tara paid changed each month. |

| Item Position | Rationales | |
|---|---|---|
| 29 | Option B is correct | To determine the equation that CANNOT be used to find the number of gallons of each of the 4 types of ice cream the store has, the student could have determined that, to find the number of gallons of each type of ice cream the store has, the total number of gallons of ice cream (720) should be divided by the number of types of ice cream (4), resulting in $720 \div 4 = 180$. The quotient (the result of the division of one quantity by another) represents the number of gallons of each type of ice cream. The student then could have recognized that the number of types of ice cream (4) times the number of gallons of each type (180) would be equal to the total number of gallons. Thus, $4 \times 180 = 720$ could be used. Finally, the student could have realized that the total number of gallons (720) divided by the number of gallons of each type (180) would be equal to the number of types. Thus, $720 \div 180 = 4$ could be used. The equation $180 \div 4 = 45$ reflects dividing the number of gallons of each type, rather than the total number of gallons, by the number of types. Therefore, that equation cannot be used. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |
| | Option A is incorrect | The student likely chose a division equation that could be used to find the number of gallons of each of the 4 types of ice cream, rather than one that could not be used. The student needs to focus on attending to the details of the question being asked in a problem. |
| | Option C is incorrect | The student likely determined a division equation that could be used ($720 \div 4 = 180$) but did not recognize the relationship between values used in a related multiplication equation. The student needs to focus on representing quotients with a variety of equations. |
| | Option D is incorrect | The student likely determined a division equation that could be used ($720 \div 4 = 180$) but did not recognize the relationship between the quotient and the divisor (the number by which another number is to be divided) in the division equation. The student needs to focus on representing quotients with a variety of equations. |

| Item Position | Rationales | |
|---|---|---|
| 30 | 84, 9, 10 OR 84, 90, 100 OR 849, 10 | To determine a mixed number that represents 84.9, the student should have kept the whole number, 84, and then used place value to write 0.9 as a fraction. Because the 9 is in the tenths place, the student could have rewritten 0.9 as $\frac{9}{10}$ and combined it with 84 to make $84\frac{9}{10}$. Alternatively, the student could have written 0.9 as the equivalent fraction $\frac{90}{100}$ to create the mixed number $84\frac{90}{100}$. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |

| Item Position | Rationales | |
|---|---|---|
| 31 | Option A is correct | To determine the amount of money the team earns from selling tickets, the student should have recognized that the number of tickets (2,158) should be multiplied by the amount earned per ticket ($7). The student should have chosen a method familiar to them to multiply 2,158 and 7, which results in 15,106 (2,158 × 7 = 15,106). |
| | Option B is incorrect | The student likely multiplied the given numbers (2,158 × 7) but did not add the regrouped 5 tens and 3 hundreds. Thus, the student likely determined 2,158 × 7 to be equal to 14,000 + 700 + 50 + 6 = 14,756. The student needs to focus on accurately multiplying one-digit by four-digit numbers. |
| | Option C is incorrect | The student likely divided the given numbers (2,158 ÷ 7) and rounded down to the nearest whole number. The student needs to focus on attending to the details of the question being asked in a problem. |
| | Option D is incorrect | The student likely added the given numbers (2,158 + 7). The student needs to focus on attending to the details of the question being asked in a problem. |

| Item Position | Rationales | |
|---|---|---|
| 32 | 3, 20 | To determine how far Keira walks during the three days in kilometers and meters, the student could have first added the distances in meters for the three days (862 + 1,235 + 923 = 3,020). Then the student could have recognized that there are 1,000 meters in a kilometer and regrouped 3,020 meters to 3 kilometers 20 meters. This is an efficient way to solve the problem; however, other methods could be used to solve the problem correctly. |