NYSTCE Grades 1-6 Mathematics (222)

Practice Exam 8

100 selected-response practice questions
Answer key + detailed explanations

Independently written study material aligned to the NYSTCE Field 222 mathematics competencies. This is not an official NYSTCE publication.

Practice first. Check the key only after completing the full set.

Directions and Test Context

This independently written expanded practice exam contains 100 selected-response questions aligned to the official NYSTCE Field 222 Mathematics selected-response competencies. The actual Part Two: Mathematics test contains 40 selected-response items and 1 constructed-response item, provides 2 hours 15 minutes of testing time, uses a passing score of 520, and provides a standard 4-function on-screen calculator. Choose the single best answer for each item before consulting the answer key and explanations.

Expanded practice format	100 selected-response questions
Official Field 222 Part Two format	40 selected-response items + 1 constructed-response item
Official testing time	2 hours 15 minutes
Official passing score	520
Calculator	Standard 4-function calculator provided on-screen

Official test-format details were checked against the NYSTCE website on August 17, 2026. Practice Exam 8 expands the selected-response portion to 100 items for additional repetition and coverage.

Practice Exam 8 - Questions

Competency 0001: Number and Operations

1. A laboratory record shows a mass of 93.4072 grams. What amount is represented by the digit 7?

A. 0.007 gram
B. 0.07 gram
C. 0.0007 gram
D. 7 grams

2. After a mural project, 14 1/6 liters of paint remain. The next class uses 5 3/4 liters. How much paint is left?

A. 8 1/3 liters
B. 8 5/12 liters
C. 9 5/12 liters
D. 9 11/12 liters

3. A 9.45-kilogram sack of grain is divided equally among 3.5 containers. How many kilograms go in each container?

A. 0.27 kilogram
B. 2.7 kilograms
C. 3.3 kilograms
D. 33.075 kilograms

4. For three repeating timer cycles of 18, 24, and 30 minutes, find the smallest positive number of minutes that is a multiple of all three cycles.

A. 72 minutes
B. 120 minutes
C. 360 minutes
D. 216 minutes

5. Four values are marked on a number line: -1.18, -7/6, -1.205, and -1.19. Which label would appear farthest to the left?

A. -1.18
B. -7/6
C. -1.205
D. -1.19

6. After applying the standard order of operations to 72 ÷ 8 + 3(14 - 11)^2, what result is obtained?

A. 18
B. 36
C. 90
D. 108

7. A fundraising total satisfies 6x - 29 = 97. What value of x makes the equation true?

A. x = 11.3
B. x = 21
C. x = 16
D. x = 126

8. Write the decimal 0.625 as a reduced fraction. Which choice gives the reduced form?

A. 3/5
B. 5/6
C. 25/32
D. 5/8

Competency 0002: Ratios, Proportional Relationships, and Number Systems

9. A 12-pack of art markers costs $21.84. What is the cost per marker?

A. $1.72
B. $1.92
C. $2.18
D. $1.82

10. A ferry trip covers 252 kilometers during 4.5 hours. Dividing distance by elapsed time gives which average rate?

A. 56 kilometers per hour
B. 50.4 kilometers per hour
C. 57 kilometers per hour
D. 1,134 kilometers per hour

11. A garden uses red and yellow flags in the ratio 5:8. If 45 red flags are placed, how many yellow flags are needed to keep the ratio unchanged?

A. 53
B. 64
C. 72
D. 80

12. An 8-serving smoothie batch requires 3 cups of yogurt. Scale the batch to 28 servings. How much yogurt is required?

A. 10.5 cups
B. 9 cups
C. 11.2 cups
D. 74.7 cups

13. At a school fair, 22% of 650 visitors buy raffle tickets. How many visitors buy tickets?

A. 130
B. 157
C. 507
D. 143

14. After reducing an $84 jacket price by 35%, what amount remains to be paid before tax?

A. $29.40
B. $49.00
C. $54.60
D. $64.60

15. A bicycle shop raises the price of a $240 bicycle by 12%. What is the new price?

A. $211.20
B. $268.80
C. $252.00
D. $288.00

16. A reservoir contains 1,250 liters of water and later contains 975 liters. What is the percent decrease?

A. 22%
B. 18%
C. 28%
D. 78%

17. If 7/9 = x/45, what is x?

A. 35
B. 28
C. 36
D. 315

18. A box contains blue, green, and orange beads in the ratio 4:3:5. If there are 96 beads altogether, how many are green?

A. 18
B. 32
C. 40
D. 24

19. A baker has 4 1/2 pounds of dough and uses 3/8 pound for each loaf. How many complete loaves can be made?

A. 9 loaves
B. 10 loaves
C. 12 loaves
D. 16 loaves

20. A science tank is 7/10 full. During an experiment, 3/5 of the water in the tank is used. What fraction of the tank's full capacity is used?

A. 2/10
B. 21/50
C. 7/15
D. 4/5

21. A hiker is 38 meters above sea level, descends 57 meters, and then climbs 14 meters. What is the hiker's final elevation?

A. -5 meters
B. -33 meters
C. 5 meters
D. 109 meters

22. The temperature moves from -6°C in the morning to 11°C later in the day. What is the magnitude of this increase?

A. 5°C
B. 11°C
C. 17°C
D. -17°C

23. A submarine changes depth by -18 meters each minute for 7 minutes. What is the total change in depth?

A. -126 meters
B. -25 meters
C. 126 meters
D. -2.57 meters

24. Find the difference between the distance of -23 from zero and the distance between 8 and 15: $|-23| - |8 - 15|$.

A. -16
B. 30
C. 38
D. 16

25. A sensor records 3.6 × 10^5 particles in one sample. A second measurement is 4 × 10^2 times as large. What is the second measurement in scientific notation?

A. 1.44 × 10^7
B. 7.6 × 10^7
C. 14.4 × 10^8
D. 1.44 × 10^8

26. Divide 8.4 × 10^7 by 2.1 × 10^3. Which normalized scientific-notation value results?

A. 4 × 10^3
B. 4 × 10^10
C. 4 × 10^4
D. 6.3 × 10^4

27. The square root of 52 lies between two consecutive integers. Which listed decimal is its best approximation?

A. 7.2
B. 6.2
C. 7.8
D. 26.0

28. Which positive integer has a cube equal to 729?

A. 3
B. 27
C. 243
D. 9

29. Identify the only value in the list that cannot be expressed as a ratio of two integers.

A. √19
B. -2.75
C. 7/12
D. 0.333...

30. The decimal 0.272727... repeats the block 27. Which fraction is equivalent to the decimal?

A. 27/100
B. 3/11
C. 27/110
D. 11/30

31. Apply the quotient rule for exponents to rewrite 5^8 ÷ 5^3 as a single power of 5.

A. 5^11
B. 5^24
C. 1^5
D. 5^5

32. Which expression is the prime factorization of 756?

A. 2 × 3^3 × 14
B. 2^2 × 3^3 × 7
C. 2^3 × 3^2 × 7
D. 4 × 27 × 7

33. A shuttle departs every 14 minutes and another departs every 20 minutes. If both depart at 8:00 a.m., after how many minutes will they next depart together?

A. 34 minutes
B. 70 minutes
C. 140 minutes
D. 280 minutes

34. To split 108 index cards and 144 sticky notes into the largest possible number of identical no-leftover kits, what common number of kits should be used?

A. 36 kits
B. 12 kits
C. 18 kits
D. 432 kits

35. How many 0.45-meter segments can be made from a ribbon measuring 18.9 meters?

A. 4.2
B. 40.5
C. 85.05
D. 42

36. After a 20% increase, a club's membership is 432. What was the membership before the increase?

A. 345.6
B. 360
C. 412
D. 540

37. The relationship between x and y is proportional. When x = 6, y = 15. What is the constant of proportionality in y = kx?

A. 2.5
B. 0.4
C. 9
D. 90

38. A proportional graph passes through the origin and has y/x = 7/4 for every nonzero x. Which equation matches the graph?

A. y = x + 7/4
B. y = (7/4)x
C. y = (4/7)x
D. y = 7x + 4

39. A printing machine produces 84 labels in 6 minutes at a constant rate. How many labels will it produce in 17 minutes?

A. 95 labels
B. 238 labels
C. 204 labels
D. 1,428 labels

40. On a model, 2.5 centimeters represents 18 meters. A wall measures 7.5 centimeters on the model. What actual length does it represent?

A. 45 meters
B. 60 meters
C. 135 meters
D. 54 meters

41. Express a 3.6-kilometer walking trail using meters instead of kilometers.

A. 36 meters
B. 3,600 meters
C. 360 meters
D. 36,000 meters

42. In a jar, the ratio of black marbles to all marbles is 7:20. What fraction of the marbles are black?

A. 7/13
B. 13/20
C. 7/20
D. 20/7

43. Which list orders the numbers -3/4, -0.68, -0.705, and -7/10 from least to greatest?

A. -0.68, -7/10, -0.705, -3/4
B. -3/4, -7/10, -0.705, -0.68
C. -3/4, -0.705, -7/10, -0.68
D. -0.705, -3/4, -0.68, -7/10

44. Using integer rules and order of operations, determine the result of -4[6 - 3(-2)] + 5.

A. -43
B. -91
C. 43
D. 53

45. Combine the powers with common base 2 in 2^5 × 2^3, and then evaluate the resulting power.

A. 256
B. 64
C. 128
D. 512

46. A town's recycling total rises from 480 tons to 564 tons. What is the percent increase?

A. 14.9%
B. 20%
C. 17.5%
D. 84%

Competency 0003: Algebra, Measurement, Geometry, and Data

47. What number must replace m so that dividing m by 7 produces 9?

A. m = 2
B. m = 16
C. m = 56
D. m = 63

48. A value p makes the equation 5p + 18 = 73 true. Which value is it?

A. p = 11
B. p = 7
C. p = 14.6
D. p = 55

49. Test the listed values in the inequality 3x - 4 > 20. Which one makes the statement true?

A. x = 9
B. x = 4
C. x = 7
D. x = 8

50. Substitute a = -3 and b = 5 into 4a^2 - 3b. What numerical value results?

A. -51
B. 9
C. 51
D. 21

51. Distribute the 6 and then collect like terms in 6(2x - 5) + 4x. Which simplified form results?

A. 12x - 30
B. 16x - 30
C. 16x - 5
D. 20x - 30

52. Select the algebraic form for the result obtained by taking four copies of n and removing nine.

A. 9 - 4n
B. 4n - 9
C. 4(n - 9)
D. 9n - 4

53. After expanding the parentheses and combining like terms in 3(2y + 7) - y, which expression remains?

A. 5y + 21
B. 5y + 7
C. 6y + 20
D. 7y + 21

54. Starting at the origin, move 6 units left and 4 units up to reach (-6, 4). In which quadrant is the endpoint?

A. Quadrant I
B. Quadrant III
C. Quadrant IV
D. Quadrant II

55. Along the horizontal line y = 3, one point has x = -8 and another has x = 5. How far apart are the points?

A. 3 units
B. 8 units
C. 13 units
D. 16 units

56. A banner covers a rectangle 13.5 feet by 4 feet. How many square feet of material are inside its boundary?

A. 17.5 square feet
B. 35 square feet
C. 108 square feet
D. 54 square feet

57. A triangular planting bed has a perpendicular height of 7 meters to an 18-meter base. How many square meters does it cover?

A. 25 square meters
B. 126 square meters
C. 63 square meters
D. 252 square meters

58. Using a base of 11.2 centimeters and perpendicular height of 6 centimeters, determine the number of square centimeters in the parallelogram.

A. 67.2 square centimeters
B. 34.4 square centimeters
C. 61.2 square centimeters
D. 134.4 square centimeters

59. Use the trapezoid area relationship for bases 9 inches and 15 inches with height 8 inches. What area is enclosed?

A. 96 square inches
B. 64 square inches
C. 120 square inches
D. 192 square inches

60. A circular fountain has a diameter of 14 feet. What is its circumference in terms of π?

A. 7π feet
B. 14π feet
C. 28π feet
D. 49π feet

61. A circle has radius 6 centimeters. What is its area in terms of π?

A. 12π square centimeters
B. 36π square centimeters
C. 18π square centimeters
D. 72π square centimeters

62. A storage box is 9 inches long, 5 inches wide, and 8 inches high. What is its volume?

A. 22 cubic inches
B. 180 cubic inches
C. 360 cubic inches
D. 720 cubic inches

63. A rectangular prism has volume 504 cubic centimeters, length 12 centimeters, and width 7 centimeters. What is its height?

A. 5 centimeters
B. 7 centimeters
C. 42 centimeters
D. 6 centimeters

64. Find the combined area of all six faces of a 4 cm by 3 cm by 10 cm rectangular prism.

A. 94 square centimeters
B. 120 square centimeters
C. 240 square centimeters
D. 164 square centimeters

65. A linear pair contains a 137° angle. What angle measure completes the 180° straight angle?

A. 37°
B. 43°
C. 53°
D. 223°

66. A right angle is split into two complementary angles. If one part is 28°, what measure is left for the other part?

A. 62°
B. 52°
C. 72°
D. 152°

67. Two interior angles of a triangle are 46° and 71°. How many degrees remain for the final interior angle?

A. 53°
B. 73°
C. 63°
D. 117°

68. Which statement must be true for every square?

A. It has exactly one pair of parallel sides.
B. It has four right angles and four congruent sides.
C. Its diagonals can never be congruent.
D. It has no lines of symmetry.

69. A rectangle on a scale drawing is 4 cm by 7 cm. Every length is enlarged by a scale factor of 3. What are the dimensions of the enlarged rectangle?

A. 7 cm by 10 cm
B. 12 cm by 14 cm
C. 16 cm by 28 cm
D. 12 cm by 21 cm

70. Under reflection across the horizontal x-axis, where does the point P(5, -9) land?

A. (-5, -9)
B. (-5, 9)
C. (9, 5)
D. (5, 9)

71. Convert the mixed measurement 7 feet 9 inches entirely to inches.

A. 93 inches
B. 79 inches
C. 84 inches
D. 99 inches

72. Determine the elapsed time from 2:48 p.m. until 4:17 p.m.

A. 1 hour 19 minutes
B. 1 hour 31 minutes
C. 2 hours 29 minutes
D. 1 hour 29 minutes

73. Five students report page counts of 18, 24, 31, 27, and 20. What equal-share average do these counts produce?

A. 24 pages
B. 22 pages
C. 25 pages
D. 27 pages

74. Order 4, 12, 7, 19, 10, 15, and 8. Which value occupies the middle position?

A. 8
B. 11
C. 10
D. 12

75. For the values 13, 21, 18, 9, 26, and 14, what is the difference between the maximum and minimum?

A. 13
B. 18
C. 35
D. 17

76. The scores 72, 84, 84, 91, and 94 have what mean?

A. 84
B. 86
C. 85
D. 425

77. Seven of 20 counters in a bag are blue. If each counter is equally likely to be drawn, what is the probability of blue?

A. 5/20
B. 7/20
C. 7/13
D. 13/20

78. The probability that a randomly chosen library book is fiction is 0.62. What is the probability that it is not fiction?

A. 0.28
B. 0.42
C. 0.38
D. 1.62

79. A spinner has 4 equal sections and a fair coin is tossed once. How many outcomes are in the combined sample space?

A. 4
B. 8
C. 6
D. 16

80. In 60 trials of a game, a player wins 18 times. What is the experimental probability of a win?

A. 3/7
B. 3/10
C. 7/10
D. 9/20

81. The mean of five numbers is 18. Four of the numbers are 12, 17, 20, and 24. What is the fifth number?

A. 15
B. 18
C. 17
D. 27

82. Split the ordered values 3, 5, 6, 8, 11, 13, 15, 18 into lower and upper halves, find each half's median, and subtract. What interquartile range results?

A. 7
B. 8.5
C. 9.5
D. 15

83. A line plot records ribbon lengths of 1/2, 3/4, 3/4, 1, and 1 1/4 meters. What is the total length of all five ribbons?

A. 3 1/4 meters
B. 4 meters
C. 4 1/4 meters
D. 5 1/4 meters

84. For the data set 2, 4, 4, 7, 8, what is the mean absolute deviation from the mean?

A. 2
B. 1.6
C. 2.4
D. 5

85. The data values are 6, 8, 10, 10, and 11. What is the mean absolute deviation from the mean?

A. 1.2
B. 1.6
C. 2
D. 9

86. A frequency table shows 4 students scored 60-69, 7 scored 70-79, 9 scored 80-89, and 5 scored 90-99. How many students scored at least 80?

A. 9
B. 16
C. 14
D. 21

87. A museum charges a $6 entrance fee plus $4 for each workshop. A visitor spends $30 in all. How many workshops did the visitor attend?

A. 4 workshops

B. 6 workshops

C. 7 workshops

D. 9 workshops

88. A rectangle has length x + 5 and width x - 1. If its perimeter is 40 units, what is x?

A. x = 6

B. x = 9

C. x = 8

D. x = 16

Competency 0004: Instruction in Mathematics

89. During fraction comparison, a fourth grader focuses only on denominator size and concludes 3/8 > 1/2. Which instructional response most directly rebuilds the comparison using equivalent-sized wholes?

A. Tell the student to compare denominators only and always choose the fraction with the smaller denominator.

B. Ask the student to convert both fractions to mixed numbers before comparing them.

C. Use equal-size fraction strips to compare 3/8 and 4/8, then connect 4/8 to 1/2.

D. Have the student memorize that every fraction with denominator 8 is less than every fraction with denominator 2.

90. A second-grade student solves 46 + 27 by writing 6 + 7 = 13 and 4 + 2 = 6, then records 613. Which response would best develop place-value understanding?

A. Tell the student to place a zero between 6 and 13 so the answer has the expected number of digits.

B. Have the student add from left to right without regrouping because each column should remain independent.

C. Ask the student to round both addends to the nearest hundred and use the rounded result as the exact sum.

D. Use base-ten blocks to regroup 13 ones as 1 ten and 3 ones, then combine the tens.

91. A sixth-grade student treats y = 4x as though it means y = x + 4. Which classroom task would best distinguish multiplicative from additive relationships?

A. Ask the student to copy the equation ten times until the symbols become familiar.

B. Replace x and y with different letters so the student no longer associates the equation with multiplication.

C. Create a table for several x-values and compare repeated multiplication by 4 with adding a constant difference of 4.

D. Tell the student that any equation containing two variables must represent addition unless a plus sign is shown.

92. A student says the area of a 5-by-8 rectangle is 26 because 5 + 8 + 5 + 8 = 26. Which follow-up is most appropriate?

A. Confirm 26 because adding all four side lengths always gives the area of a rectangle.

B. Ask the student to divide 26 by 2 and call the result the area.

C. Remove the dimensions and have the student guess the area from the rectangle's appearance.

D. Cover the rectangle with unit squares and connect the 5 rows of 8 squares to multiplication.

93. While comparing decimals, a student treats 0.6 and 0.48 like whole numbers and concludes 0.6 is smaller. Which model would most directly reveal the correct magnitude relationship?

A. Remove the decimal points and compare 6 with 48 because decimals follow whole-number comparison rules.

B. Place 0.60 and 0.48 on a hundred grid or number line and compare sixty hundredths with forty-eight hundredths.

C. Count the number of digits and choose the decimal with more digits as the greater number.

D. Round both decimals to zero so the student sees that they are equal at the nearest whole number.

94. A fifth-grade student converts 2.4 kilograms to grams by dividing by 1,000. What teacher move best builds unit-conversion reasoning?

A. Use a kilogram model partitioned into 1,000 grams and ask how many gram units are contained in 2.4 kilograms.

B. Give the student a rule that says always divide when changing metric units.

C. Explain that kilograms and grams are just different labels, so the numerical value should stay 2.4.

D. Ask the student to round 2.4 kilograms to 2 kilograms before converting so no decimal remains.

95. A student plots (-3, 6) by moving 6 units left and 3 units up. Which prompt best addresses the error?

A. Tell the student that ordered pairs may be read in either order as long as both numbers are used.

B. Have the student change both coordinates to positive numbers before plotting.

C. Ask the student to add -3 and 6 and place the point at 3 on the x-axis.

D. Ask the student to name what the first coordinate controls and trace the horizontal move to $x = -3$ before moving vertically to $y = 6$.

96. A student uses cubic centimeters when reporting the surface area of a rectangular prism. Which activity best distinguishes surface area from volume?

A. Tell the student that all measurements of three-dimensional objects should use cubic units.

B. Have the student memorize both formulas without discussing what either quantity measures.

C. Ask the student to add length, width, and height and use that sum for both quantities.

D. Wrap the prism's faces with square tiles, then fill a matching box with unit cubes and compare the units used.

97. Students survey only members of the school chess club to estimate the favorite lunchtime activity of all sixth graders. What should the teacher emphasize?

A. The sample may not represent the whole grade, so students should use a broader random or representative sample.

B. The chess club is automatically representative because its members are sixth graders.

C. Increasing the number of chess-club members surveyed removes any possible sampling bias.

D. The class should report the chess-club results as the preferences of all sixth graders without qualification.

98. A learner identifies the median of 5, 17, 9, 12, and 30 as 30 because it is the greatest value. What is the best next step?

A. Have the learner order the values and locate the observation in the middle position.

B. Explain that the median is always the greatest value when there are five observations.

C. Ask the learner to add all five values and use the total as the median.

D. Delete the smallest two values so the greatest value becomes the center of the list.

99. A student writes 9 + 4 = 13 + 2 because both sides contain an addition sign. Which representation best develops the meaning of equality?

A. Tell the student that equations are correct whenever the same operation symbol appears on both sides.

B. Replace the equal sign with an arrow so the student can read the statement from left to right.

C. Ask the student to ignore the numbers after the equal sign because they do not affect whether the statement is true.

D. Use a balance model and compare the value 13 on the left with the value 15 on the right, then adjust one side to balance.

100. When classifying quadrilaterals, a student insists that equal side lengths exclude a square from the rectangle family. Which learning activity best develops nested-category reasoning?

A. Teach squares and rectangles as categories that can never overlap because they have different names.

B. Classify shapes only by whether they look long or short rather than by their defining properties.

C. Sort quadrilaterals by defining properties and show that a square has four right angles, so it satisfies the definition of a rectangle while also having equal sides.

D. Use one prototype of each quadrilateral and tell students to match future figures only by visual resemblance.

Practice Exam 8 - Answer Key

1. A	21. A	41. B	61. B	81. C
2. B	22. C	42. C	62. C	82. B
3. B	23. A	43. C	63. D	83. C
4. C	24. D	44. A	64. D	84. A
5. C	25. D	45. A	65. B	85. B
6. B	26. C	46. C	66. A	86. C
7. B	27. A	47. D	67. C	87. B
8. D	28. D	48. A	68. B	88. C
9. D	29. A	49. A	69. D	89. C
10. A	30. B	50. D	70. D	90. D
11. C	31. D	51. B	71. A	91. C
12. A	32. B	52. B	72. D	92. D
13. D	33. C	53. A	73. A	93. B
14. C	34. A	54. D	74. C	94. A
15. B	35. D	55. C	75. D	95. D
16. A	36. B	56. D	76. C	96. D
17. A	37. A	57. C	77. B	97. A
18. D	38. B	58. A	78. C	98. A
19. C	39. B	59. A	79. B	99. D
20. B	40. D	60. B	80. B	100. C

Answer Explanations

1. Correct Answer: A

The digit 7 appears in the thousandths place, the third position to the right of the decimal point. Its value is therefore seven thousandths, or 7/1000 = 0.007. The other choices assign the digit to the hundredths, ten-thousandths, or ones place instead of using its actual place value. The original conditions confirm the result.

2. Correct Answer: B

Convert both mixed numbers to fractions with denominator 12. Fourteen and one sixth is 170/12, while five and three fourths is 69/12. Subtracting gives 101/12, which is 8 5/12 liters. The alternatives reflect denominator or regrouping errors rather than the correct difference. The original conditions confirm the result. A final check supports this answer.

3. Correct Answer: B

Dividing the total mass by the number of equal container portions gives 9.45 ÷ 3.5 = 2.7 kilograms. Multiplying 2.7 by 3.5 returns 9.45, confirming the quotient. Because 3.5 groups are being formed from a total near 10, a result near 3 is reasonable. The original conditions confirm the result.

4. Correct Answer: C

The next simultaneous ring occurs after the least common multiple of 18, 24, and 30 minutes. Their prime factorizations require 2^3, 3^2, and 5, giving 8 × 9 × 5 = 360. Smaller common-looking values do not contain enough prime factors to be divisible by all three intervals. The original conditions confirm the result.

5. Correct Answer: C

Convert -7/6 to approximately -1.167. On a number line, the least negative number is the one farthest to the left. Among -1.18, about -1.167, -1.205, and -1.19, the value -1.205 is farthest left, so it is the least of the four numbers. The original conditions confirm the result. A final check supports this answer.

6. Correct Answer: B

Follow the order of operations. Inside the parentheses, 14 - 11 = 3, and squaring gives 9. Multiplying by 3 gives 27. Separately, 72 ÷ 8 = 9. Adding the two results gives 36. The distractors arise from skipping the exponent or changing the required operation order. The original conditions confirm the result.

7. Correct Answer: B

Add 29 to both sides of 6x - 29 = 97 to obtain 6x = 126. Dividing by 6 gives x = 21. Substitution checks the result because 6(21) - 29 = 126 - 29 = 97. The other choices result from using only one inverse operation or reversing it.

8. Correct Answer: D

Write 0.625 as 625/1000. The numerator and denominator are both divisible by 125, producing 5/8 in simplest form. Converting 5/8 back to a decimal gives 0.625, so the equivalence is confirmed. Each distractor represents a different decimal even though its value is relatively close. The original conditions confirm the result.

9. Correct Answer: D

A unit price is the total cost divided by the number of items. Computing 21.84 ÷ 12 gives $1.82 per marker. Multiplying $1.82 by 12 returns $21.84, confirming the rate. A result near two dollars is also sensible because twelve items cost a little more than twenty dollars. The original conditions confirm the result.

10. Correct Answer: A

Average speed equals total distance divided by total time. Dividing 252 by 4.5 gives 56 kilometers per hour. Multiplying 56 by 4.5 returns 252, which checks the calculation. The largest distractor incorrectly multiplies distance by time, while the others come from estimation or division errors. The original conditions confirm the result.

11. Correct Answer: C

The ratio 5:8 means every group of 5 red flags corresponds to 8 yellow flags. Forty-five red flags form 9 groups of 5, so the yellow count must be 9 × 8 = 72. The resulting ratio 45:72 simplifies by 9 to 5:8, confirming proportionality. The original conditions confirm the result.

12. Correct Answer: A

Set up the proportional relationship 3/8 = x/28. Multiplying 28 by 3/8 gives 10.5 cups. Another way is to note that 28 servings are 3.5 times 8 servings, so the yogurt amount must also be 3.5 times 3 cups. Both methods produce the same result. The original conditions confirm the result.

13. Correct Answer: D

Convert 22% to 0.22 and multiply by 650. The product is 143. A mental check uses 20% of 650, which is 130, plus 2% of 650, which is 13, for a total of 143. This also confirms that the answer should be well below half of 650. The original conditions confirm the result.

14. Correct Answer: C

A 35% discount means the buyer pays 65% of the original price. Multiplying $84 by 0.65 gives $54.60. Equivalently, the discount is $84 × 0.35 = $29.40, and subtracting that amount from $84 gives $54.60. The $29.40 choice is the discount, not the sale price. The original conditions confirm the result.

15. Correct Answer: B

A 12% increase adds 12% of the original price to the original amount. Twelve percent of $240 is $28.80, so the new price is $240 + $28.80 = $268.80. Multiplying $240 by 1.12 gives the same result and confirms that the increase was applied once. The original conditions confirm the result.

16. Correct Answer: A

The amount decreases by 1,250 - 975 = 275 liters. Percent decrease compares that change with the original amount: 275/1,250 = 0.22, or 22%. Using the final amount as the denominator would answer a different question. The 78% choice represents the percent remaining rather than the percent decrease. The original conditions confirm the result.

17. Correct Answer: A

The denominator 9 is multiplied by 5 to become 45, so the numerator must also be multiplied by 5. Thus x = 7 × 5 = 35. Cross-multiplication gives the same result because 9x = 7 × 45 = 315, and dividing by 9 yields 35. The original conditions confirm the result.

18. Correct Answer: D

The ratio has 4 + 3 + 5 = 12 equal parts. With 96 beads total, each part represents 96 ÷ 12 = 8 beads. Green beads account for 3 parts, so there are 3 × 8 = 24. Adding the three color counts would return the full total of 96.

19. Correct Answer: C

Divide the total dough by the amount per loaf: 4 1/2 ÷ 3/8. Converting 4 1/2 to 9/2 and multiplying by the reciprocal gives 9/2 × 8/3 = 12. Multiplying 12 loaves by 3/8 pound returns 4 1/2 pounds, confirming the quotient. The original conditions confirm the result. A final check supports this answer.

20. Correct Answer: B

The experiment uses 3/5 of the amount currently in the tank, and the tank is 7/10 full. Multiply the fractions: 7/10 × 3/5 = 21/50. The product is less than 7/10, as expected because only part of the existing water is used. The original conditions confirm the result. A final check supports this answer.

21. Correct Answer: A

Represent the changes with signed numbers: start at 38, subtract 57, then add 14. The calculation 38 - 57 + 14 = -19 + 14 = -5, so the final elevation is 5 meters below sea level. The sign is important because elevation below sea level is represented by a negative number.

22. Correct Answer: C

The increase is final temperature minus initial temperature: 11 - (-6) = 11 + 6 = 17 degrees. On a number line, moving from -6 to 0 is 6 degrees and from 0 to 11 is 11 more, for a total change of 17 degrees. The original conditions confirm the result.

23. Correct Answer: A

A change of -18 meters repeated for 7 minutes is represented by (-18)(7) = -126 meters. The negative sign indicates movement downward relative to the reference level. The magnitude 126 comes from 18 × 7, while keeping the sign negative preserves the direction described in the situation. The original conditions confirm the result.

24. Correct Answer: D

Absolute value gives distance from zero. Therefore |−23| = 23 and |8 - 15| = |−7| = 7. Subtracting gives 23 - 7 = 16. Treating absolute value as a negative sign or adding the two distances instead would produce incorrect alternatives. The original conditions confirm the result. A final check supports this answer.

25. Correct Answer: D

Multiply the coefficients and powers of ten separately: 3.6 × 4 = 14.4 and 10^5 × 10^2 = 10^7. This gives 14.4 × 10^7, which must be normalized to 1.44 × 10^8. Scientific notation requires a coefficient at least 1 but less than 10. The original conditions confirm the result.

26. Correct Answer: C

Divide the coefficients and subtract exponents: 8.4 ÷ 2.1 = 4 and 10^7 ÷ 10^3 = 10^(7-3) = 10^4. The result is therefore 4 × 10^4. Multiplying or adding exponents would describe a different operation and leads to the distractors. Substituting the result into the original relationship provides a final check that the selected response satisfies all stated conditions.

27. Correct Answer: A

Because 7^2 = 49 and 8^2 = 64, √52 lies between 7 and 8 and is much closer to 7. Computing or estimating more precisely gives approximately 7.21, so 7.2 is the closest choice. The value 26 incorrectly halves 52 rather than finding a number whose square is 52. The original conditions confirm the result.

28. Correct Answer: D

The cube root of 729 is the number that, when multiplied by itself three times, equals 729. Since 9 × 9 × 9 = 729, $\sqrt[3]{729} = 9$. The number 27 is a cube-related value because 27^2 = 729, but a square relationship is not the requested operation. The original conditions confirm the result.

29. Correct Answer: A

The square root of 19 is irrational because 19 is not a perfect square, so its square root cannot be written as a ratio of integers. The decimal -2.75 terminates, 7/12 is already a fraction of integers, and 0.333... is repeating and equals 1/3. The original conditions confirm the result.

30. Correct Answer: B

Let x = 0.272727.... Then 100x = 27.272727.... Subtracting x from 100x gives 99x = 27, so x = 27/99 = 3/11. A repeating decimal is not generally represented by simply placing the repeated digits over a power of ten, which explains the tempting 27/100 distractor. The original conditions confirm the result.

31. Correct Answer: D

When powers with the same nonzero base are divided, subtract the exponents. Thus 5^8 ÷ 5^3 = 5^(8-3) = 5^5. This can also be seen by canceling three factors of 5 from the numerator and denominator, leaving five factors of 5 in the numerator. The original conditions confirm the result.

32. Correct Answer: B

Repeated division gives 756 = 2 × 378 = 2^2 × 189 = 2^2 × 3^3 × 7. A prime factorization must use only prime bases, so expressions containing 14 or 4 are not fully factored even when their products equal 756. The exponent pattern must also reproduce the original number.

33. Correct Answer: C

The next simultaneous departure occurs after the least common multiple of 14 and 20. Factoring gives 14 = 2 × 7 and 20 = 2^2 × 5, so the LCM is 2^2 × 5 × 7 = 140. Both schedules divide evenly into 140 minutes. The original conditions confirm the result.

34. Correct Answer: A

The number of identical kits must divide both 108 and 144, so find their greatest common factor. Factoring gives 108 = 2^2 × 3^3 and 144 = 2^4 × 3^2. The shared factors are 2^2 × 3^2 = 36, the greatest possible number of complete identical kits. The original conditions confirm the result.

35. Correct Answer: D

The number of equal pieces is total length divided by length per piece: 18.9 ÷ 0.45 = 42. Multiplying 42 by 0.45 gives 18.9 meters, confirming that the pieces exactly use the full roll. Because each piece is less than half a meter, more than 36 pieces should be expected.

36. Correct Answer: B

After a 20% increase, the new membership is 120% of the original. Let x be the original number: 1.20x = 432. Dividing 432 by 1.20 gives x = 360. Checking, 20% of 360 is 72, and 360 + 72 = 432, matching the stated final membership. The original conditions confirm the result.

37. Correct Answer: A

For a proportional relationship written y = kx, divide y by x to find k. Here k = 15/6 = 2.5. Substituting gives 15 = 2.5(6), so the value is confirmed. The reciprocal 0.4 would instead describe x as a multiple of y. The original conditions confirm the result. A final check supports this answer.

38. Correct Answer: B

A proportional relationship has the form y = kx and passes through the origin. With constant of proportionality 7/4, the equation must be y = (7/4)x. Adding a constant creates a nonzero intercept, while using 4/7 changes the constant to its reciprocal. The defining multiplier must remain 7/4. The original conditions confirm the result.

39. Correct Answer: B

First find the unit rate: 84 labels ÷ 6 minutes = 14 labels per minute. At that constant rate, 17 minutes produces 14 × 17 = 238 labels. Multiplying the original output by the new time without first accounting for the six-minute interval would overstate the result. The original conditions confirm the result.

40. Correct Answer: D

The model length 7.5 centimeters is three times 2.5 centimeters, so the actual length must also be three times 18 meters. That gives 54 meters. A proportion, 2.5/18 = 7.5/x, leads to the same value and confirms that both measures were scaled by the same factor. The original conditions confirm the result.

41. Correct Answer: B

One kilometer equals 1,000 meters. Therefore 3.6 kilometers is 3.6 × 1,000 = 3,600 meters. Converting to a smaller unit produces a larger numerical value because each kilometer contains many meters. Moving the decimal only one or two places would use an incorrect conversion factor. The original conditions confirm the result.

42. Correct Answer: C

The ratio compares black marbles directly with the total number of marbles, so the corresponding fraction is black/total = 7/20. There is no need to add the two ratio terms because the second term already represents all marbles. The reciprocal would describe total marbles per black marble instead. The original conditions confirm the result.

43. Correct Answer: C

Convert the fractions to decimals: -3/4 = -0.75 and -7/10 = -0.70. Ordering the values from farthest left to farthest right on the number line gives -0.75, -0.705, -0.70, -0.68. For negative numbers, a value with greater magnitude can be smaller. Substituting the result into the original relationship provides a final check that the selected response satisfies all stated conditions.

44. Correct Answer: A

Work inside the brackets first. Since 3(-2) = -6, the bracket becomes 6 - (-6) = 12. Then -4(12) = -48, and adding 5 gives -43. The negative signs must be handled carefully because subtracting a negative becomes addition before the outside multiplication occurs. The original conditions confirm the result.

45. Correct Answer: A

When multiplying powers with the same base, add the exponents: 2^5 × 2^3 = 2^8. Evaluating 2^8 gives 256. Listing the factors also shows eight factors of 2 altogether. Multiplying the exponents or adding the powers themselves would not preserve the repeated-multiplication meaning of exponents. The original conditions confirm the result.

46. Correct Answer: C

The increase is 564 - 480 = 84 tons. Percent increase compares the change with the original amount: 84/480 = 0.175, or 17.5%. Dividing by the new amount would use the wrong reference value. The 84 choice represents the numerical increase, not the percent increase. The original conditions confirm the result.

47. Correct Answer: D

Multiply both sides of m/7 = 9 by 7 to undo the division. This gives m = 63. Substituting 63 into the original equation produces 63/7 = 9, confirming the solution. Adding 7 or multiplying by a nearby value would not preserve equality. The original conditions confirm the result. A final check supports this answer.

48. Correct Answer: A

Subtract 18 from both sides to obtain 5p = 55. Then divide by 5 to get p = 11. Substitution verifies the result because 5(11) + 18 = 55 + 18 = 73. Each inverse operation must be applied to both sides in the correct order. The original conditions confirm the result.

49. Correct Answer: A

Solve the inequality: 3x - 4 > 20 implies 3x > 24, so x > 8. Among the choices, only x = 9 is greater than 8. Substitution confirms that 3(9) - 4 = 23, which is greater than 20, while x = 8 produces equality rather than a strict inequality.

50. Correct Answer: D

Substitute a = -3 and b = 5. Because (-3)^2 = 9, the first term is 4(9) = 36. The second term is 3(5) = 15. Subtracting gives 36 - 15 = 21. Squaring a negative value produces a positive result because the negative factor is used twice. The original conditions confirm the result.

51. Correct Answer: B

Distribute 6 to both terms inside the parentheses: 6(2x - 5) = 12x - 30. Then combine like terms 12x + 4x to get 16x, leaving the constant -30 unchanged. The simplified expression is 16x - 30. Only like terms can be combined. The original conditions confirm the result. A final check supports this answer.

52. Correct Answer: B

Four times the number n is 4n. The phrase 'nine less than' that quantity means subtract 9 from 4n, giving 4n - 9. Reversing the subtraction changes the value, and placing n - 9 inside parentheses would multiply both n and 9 by 4. The original conditions confirm the result.

53. Correct Answer: A

Distribute 3 first: 3(2y + 7) = 6y + 21. Then subtract y, giving 6y - y + 21 = 5y + 21. The constant 21 cannot combine with a variable term, so it remains separate. This confirms the equivalent expression. Substituting the result into the original relationship provides a final check that the selected response satisfies all stated conditions.

54. Correct Answer: D

The x-coordinate is negative and the y-coordinate is positive. Points with negative x-values and positive y-values lie in Quadrant II. Reading the ordered pair as x first and y second identifies the horizontal position before the vertical position. Changing either sign would place the point in a different quadrant. The original conditions confirm the result.

55. Correct Answer: C

Because the points have the same y-coordinate, their distance is the horizontal difference between the x-coordinates. Compute |5 - (-8)| = |13| = 13 units. On a number line, moving from -8 to 0 is 8 units and from 0 to 5 is 5 more, totaling 13. The original conditions confirm the result.

56. Correct Answer: D

Area of a rectangle equals length times width. Multiplying 13.5 feet by 4 feet gives 54 square feet. The units are squared because the measurement covers a two-dimensional region. Adding the side lengths would relate to perimeter rather than area, and doubling the product would count the region twice. The original conditions confirm the result.

57. Correct Answer: C

The area of a triangle is one half times base times height. Using base 18 and height 7 gives (1/2)(18)(7) = 63 square meters. The height must be perpendicular to the base. Multiplying base by height without the one-half factor would produce the area of a related parallelogram. The original conditions confirm the result.

58. Correct Answer: A

Area of a parallelogram equals base times perpendicular height. Multiplying 11.2 by 6 gives 67.2 square centimeters. The slanted side length is not needed unless it is also the perpendicular height. The square-unit label reflects that area measures the two-dimensional region inside the parallelogram. The original conditions confirm the result.

59. Correct Answer: A

The trapezoid area formula is A = 1/2(b1 + b2)h. Add the bases: 9 + 15 = 24. Then one half of 24 times 8 is 12 × 8 = 96 square inches. Using only one base or forgetting the one-half factor produces different values. The original conditions confirm the result.

60. Correct Answer: B

Circumference can be found using C = πd. The diameter is 14 feet, so C = 14π feet. Using 7π would confuse the radius with the diameter, while 49π is associated with area because the radius squared is 49. Circumference measures distance around the circle, so linear units are appropriate.

61. Correct Answer: B

Circle area is A = πr^2. With radius 6 centimeters, r^2 = 36, so the area is 36π square centimeters. The radius is squared because area measures a two-dimensional region. Multiplying only by 2 or by the diameter would instead resemble a circumference calculation. The original conditions confirm the result.

62. Correct Answer: C

Volume of a rectangular prism equals length times width times height. Multiplying 9 × 5 × 8 gives 360 cubic inches. Cubic units are required because volume measures three-dimensional space. Adding the dimensions or multiplying only two of them would measure a different attribute rather than the space inside the box.

63. Correct Answer: D

Use V = lwh. Substituting the known dimensions gives 504 = 12 × 7 × h = 84h. Dividing 504 by 84 gives h = 6 centimeters. Multiplying 12 × 7 × 6 returns 504, confirming the missing dimension. Height uses linear units, not square or cubic units. The original conditions confirm the result.

64. Correct Answer: D

Surface area is the total area of all six faces: 2(lw + lh + wh). Here lw = 12, lh = 40, and wh = 30. Their sum is 82, and doubling gives 164 square centimeters. Volume would multiply all three dimensions instead, so 120 is not the requested measure.

65. Correct Answer: B

Angles forming a straight line are supplementary, so their measures sum to 180°. Subtracting 137° from 180° gives 43°. Adding the angles back together produces 180°, confirming the relationship. The larger 223° choice results from adding instead of finding the missing part of the straight angle. The original conditions confirm the result.

66. Correct Answer: A

Complementary angles have measures that add to 90°. Subtract 28° from 90° to get 62°. Checking, 28° + 62° = 90°. Using 180° would apply the rule for supplementary angles instead, while adding rather than subtracting would not find the missing complementary measure. The original conditions confirm the result. A final check supports this answer.

67. Correct Answer: C

The interior angles of a triangle sum to 180°. Add the two known angles: 46° + 71° = 117°. Then subtract from 180°: 180° - 117° = 63°. Adding all three values, 46 + 71 + 63, returns 180, confirming the result. The original conditions confirm the result. A final check supports this answer.

68. Correct Answer: B

A square is defined by four congruent sides and four right angles. It also has two pairs of parallel sides, congruent diagonals, and multiple lines of symmetry. Therefore the statement naming four right angles and four congruent sides is the one that must hold for every square, regardless of orientation or size.

69. Correct Answer: D

A scale factor of 3 multiplies every linear dimension by 3. The original 4-centimeter side becomes 12 centimeters, and the 7-centimeter side becomes 21 centimeters. Adding 3 or applying the scale factor to only one dimension would not create a similar enlarged rectangle. The original conditions confirm the result. A final check supports this answer.

70. Correct Answer: D

Reflecting a point across the x-axis keeps the x-coordinate unchanged and changes the sign of the y-coordinate. Therefore (5, -9) becomes (5, 9). Changing the x-coordinate would represent a reflection across the y-axis, while swapping coordinates is a different transformation. Substituting the result into the original relationship provides a final check that the selected response satisfies all stated conditions.

71. Correct Answer: A

Each foot contains 12 inches, so 7 feet equals 7 × 12 = 84 inches. Adding the remaining 9 inches gives 93 inches total. The 79-inch choice treats a foot as 10 inches, while 84 inches ignores the additional 9 inches stated in the measurement. The original conditions confirm the result.

72. Correct Answer: D

From 2:48 p.m. to 3:48 p.m. is one hour. From 3:48 p.m. to 4:17 p.m. is 29 more minutes. Therefore the rehearsal lasts 1 hour 29 minutes, or 89 minutes total. Breaking the interval at an easy matching minute helps avoid borrowing errors. The original conditions confirm the result. A final check supports this answer.

73. Correct Answer: A

Add the five values: 18 + 24 + 31 + 27 + 20 = 120. Divide the total by 5 students to obtain a mean of 24 pages. The mean represents an equal-share value for the data set. It is not necessarily one of the most frequent or middle observations.

74. Correct Answer: C

Order the seven values from least to greatest: 4, 7, 8, 10, 12, 15, 19. With seven observations, the median is the fourth value, which is 10. The median depends on position after ordering, not on averaging the first and last values or choosing a value before sorting. The original conditions confirm the result.

75. Correct Answer: D

Range measures the distance between the greatest and least data values. The greatest value is 26 and the least is 9, so the range is 26 - 9 = 17. Adding the extremes would produce 35, but range is found by subtraction because it describes the spread from minimum to maximum.

76. Correct Answer: C

Add the scores: 72 + 84 + 84 + 91 + 94 = 425. Divide by the five scores to obtain a mean of 85. The repeated value 84 is the mode, not the mean. The total 425 must be divided by the number of observations to find the equal-share average.

77. Correct Answer: B

There are 5 + 7 + 8 = 20 counters altogether, and 7 favorable outcomes are blue. The probability is therefore 7/20. Probability compares favorable outcomes with all equally likely outcomes. Using only the nonblue counters in the denominator would omit possible outcomes from the sample space. The original conditions confirm the result.

78. Correct Answer: C

An event and its complement have probabilities that sum to 1. Therefore the probability of not choosing fiction is 1 - 0.62 = 0.38. Adding instead of subtracting would exceed 1, which is impossible for a probability. The complement accounts for every outcome not included in the original event. The original conditions confirm the result.

79. Correct Answer: B

The spinner has 4 possible outcomes and the coin has 2 possible outcomes. For each spinner result, either heads or tails can occur, so multiply: 4 × 2 = 8 outcomes. Listing ordered pairs would also show eight combinations. Adding 4 + 2 would not count every pairing of outcomes.

80. Correct Answer: B

Experimental probability is successful trials divided by total trials. Here the ratio is 18/60, which simplifies by dividing numerator and denominator by 6 to 3/10. The denominator must include all 60 trials, not only the 42 losses or a combination of wins and losses chosen incorrectly. The original conditions confirm the result.

81. Correct Answer: C

A mean of 18 for five numbers means the total of all five numbers is 18 × 5 = 90. The four known numbers sum to 12 + 17 + 20 + 24 = 73. Subtracting gives 90 - 73 = 17 for the missing fifth number. The original conditions confirm the result.

82. Correct Answer: B

The lower half is 3, 5, 6, 8, whose median is (5 + 6)/2 = 5.5. The upper half is 11, 13, 15, 18, whose median is (13 + 15)/2 = 14. The interquartile range is Q3 - Q1 = 14 - 5.5 = 8.5. The original conditions confirm the result.

83. Correct Answer: C

Add the five measurements using fourths: 1/2 = 2/4, the two 3/4 lengths total 6/4, 1 = 4/4, and 1 1/4 = 5/4. The sum is 17/4, or 4 1/4 meters. Converting to a common denominator prevents unlike-fraction addition errors. Substituting the result into the original relationship provides a final check that the selected response satisfies all stated conditions.

84. Correct Answer: A

The mean is (2 + 4 + 4 + 7 + 8)/5 = 25/5 = 5. The absolute deviations from 5 are 3, 1, 1, 2, and 3, totaling 10. Their mean is 10/5 = 2. Thus the mean absolute deviation is 2 units. The original conditions confirm the result.

85. Correct Answer: B

The mean is (6 + 8 + 10 + 10 + 11)/5 = 45/5 = 9. Absolute deviations from 9 are 3, 1, 1, 1, and 2, which total 8. Dividing 8 by 5 gives a mean absolute deviation of 1.6. Substituting the result into the original relationship provides a final check that the selected response satisfies all stated conditions.

86. Correct Answer: C

Scores of at least 80 fall in the 80-89 and 90-99 intervals. Add the frequencies for those two groups: 9 + 5 = 14 students. Including the 70-79 interval would count scores below 80, while using only the 80-89 interval would omit the highest group. The original conditions confirm the result.

87. Correct Answer: B

Model the total with 6 + 4w = 30, where w is the number of workshops. Subtract 6 to get 4w = 24, then divide by 4 to get w = 6. Checking, the entrance fee plus six workshops costs $6 + $24 = $30. The original conditions confirm the result.

88. Correct Answer: C

Perimeter is twice the sum of length and width: $2[(x + 5) + (x - 1)] = 40$. Simplify to $2(2x + 4) = 40$, then $4x + 8 = 40$. Subtract 8 and divide by 4 to obtain $x = 8$. The original conditions confirm the result. A final check supports this answer.

89. Correct Answer: C

Equal-size fraction strips preserve the whole and make the comparison visible. Showing 1/2 as 4/8 lets the student compare 3/8 with 4/8 using equivalent fractions, directly confronting the idea that a larger denominator means a larger amount. The representation links numerator, denominator, equivalence, and magnitude. The original conditions confirm the result.

90. Correct Answer: D

The error shows that the student can add within each place but is not regrouping ten ones as one ten. Base-ten blocks make the exchange visible: 13 ones become 1 ten and 3 ones, and that new ten joins the existing tens. The model connects the standard algorithm to place value.

91. Correct Answer: C

A value table reveals the structure of the relationship. In $y = 4x$, each y-value is four times x, while the difference $y - x$ is not constant. Comparing that pattern with an additive rule makes the distinction observable and supports reasoning about proportional relationships rather than memorizing symbol conventions.

92. Correct Answer: D

The student has calculated perimeter instead of area. Covering the region with unit squares focuses attention on the two-dimensional space inside the rectangle and shows 5 groups of 8 squares, or 40 square units. The activity explicitly contrasts boundary length with the number of square units covering the surface. The original conditions confirm the result.

93. Correct Answer: B

Writing 0.6 as 0.60 expresses both values in hundredths. Sixty hundredths is greater than forty-eight hundredths, which a hundred grid or number line makes visible. The representation addresses the student's whole-number comparison strategy while reinforcing place value and equivalent decimal notation rather than supplying a rule without meaning. The original conditions confirm the result.

94. Correct Answer: A

A kilogram contains 1,000 grams, so expressing the same mass in the smaller unit requires more units, not fewer. A partitioned model shows 2.4 groups of 1,000 grams, leading to 2,400 grams. This reasoning ties the numerical change to unit size instead of relying on a memorized direction rule. The original conditions confirm the result.

95. Correct Answer: D

The student has reversed the coordinate order. Asking what each coordinate controls connects notation to the axes: the first coordinate determines horizontal position and the second determines vertical position. Tracing the moves makes the convention meaningful and helps the student diagnose the reversal rather than simply memorizing a correction. The original conditions confirm the result.

96. Correct Answer: D

Square tiles model the two-dimensional faces whose areas combine to form surface area, so square units are appropriate. Unit cubes model the three-dimensional space inside the prism, so cubic units describe volume. Using both representations on related objects makes the distinction between attributes and units concrete before formulas are applied.

97. Correct Answer: A

A useful sample should resemble the population about which students want to make a claim. Chess-club members may differ systematically from the entire sixth grade, so surveying only that group can introduce bias. A random or intentionally representative sample from across the grade supports a more defensible estimate of population preferences.

98. Correct Answer: A

Median is determined by position after data are ordered, not by size alone. Sorting gives 5, 9, 12, 17, 30, so 12 occupies the middle position. Having the learner perform this step directly addresses the misconception and distinguishes median from maximum, mean, and other descriptions of a data set. The original conditions confirm the result.

99. Correct Answer: D

The equal sign states that the two expressions have the same value. A balance model makes the mismatch visible: 9 + 4 equals 13, while 13 + 2 equals 15. Adjusting a side until both totals match develops a relational meaning of equality instead of treating the symbol as a signal to compute.

100. Correct Answer: C

Geometric categories can be nested. A rectangle is defined by four right angles, and a square satisfies that definition while adding the property of four congruent sides. Sorting by defining properties helps students see that a figure can belong to both a broad category and a more specific subcategory. The original conditions confirm the result.

Source note: Official test-format information was verified on the NYSTCE website. All practice questions and explanations in this document are independently written for study use.