1. Which number has a 5 in the tenths place and a 2 in the hundreds place?

A. 5.02
B. 2.05
C. 500.2
D. 200.5

2. Jake needs to build a dock that will be $2\frac{3}{5}$ feet above the water at low tide. If the dock is 1 foot above the water at high tide, how high does the water rise from low tide to high tide?

A. $1\frac{2}{5}$ feet
B. $1\frac{3}{5}$ feet
C. $3\frac{2}{5}$ feet
D. $3\frac{3}{5}$ feet

3. Find the GCF of 16 and 36.

4. Which property is illustrated in the following equation?

$7 \times 3 + 7 \times 2 = 7 \times (3 + 2)$

A. Associative Property of Addition
B. Associative Property of Multiplication
C. Commutative Property of Multiplication
D. Distributive Property

5. Charice invested \$5,000 in a fund that returns 5% interest compounded yearly (at the end of the year) and makes no additional deposits or withdrawals. The total value of the fund, including accrued interest, at the end of n years is given by the equation $V = 5{,}000(1.05)^n$. How much accrued interest was earned during the second year?

6. What is the number 30,500,000, 000 expressed in scientific notation?

A. 3.05×10^9
B. 30.5×10^9
C. 3.05×10^{10}
D. 30.5×10^{10}

7. To the nearest tenth, what is the side length of a cube with a volume of 857 cubic millimeters?

8. A pet store sells two different sizes of a specialty dog food. The small bag is \$18 for 5 lbs and the large bag is \$61.60 for 28 lbs. How much more expensive is the small bag per pound?

A. \$1.20
B. \$1.40
C. \$2.20
D. \$3.60

9. An architectural firm is creating a scale model of a new building. The actual building will be 240 feet tall, and the model will have a scale of 1:300 inches. How tall should the model be?

____ inches

10. In a survey of 800 students, 60% of students reported being involved in an after school sport. How many of the surveyed students does this represent?

A. 160
B. 280
C. 424
D. 480

11. A car dealership finances simple interest car loans at a fixed rate of 5.3% per year for 5 years. How much interest will a buyer pay if she borrows \$17,999.00 for a new car?

A. \$953.95
B. \$4,769.74
C. \$9,539.47
D. \$23,301.84

12. How many possible ways can you choose a committee of 5 people out of a pool of 18 employees?

13. A number cube is rolled twice. Is this probability situation independent or dependent?

14. Which algebraic expression could be described in words as "2 times the difference of 7 minus a number"?

A. $2n - 7$
B. $\frac{2 \times 7}{n}$
C. $2(7 - n)$
D. $n - 2 \times 7$

15. Which inverse operation should you use to solve this one-step equation?

$81 + x = 108$

A. Addition
B. Subtraction
C. Multiplication
D. Division

16. The Gunsallus family is saving up to buy a new TV. The TV they would like to purchase costs \$1,080, and they plan to save \$135 per month. The equation $135m = 1{,}080$ represents this situation, where m is the number of months the family saves. Solve the equation to determine the number of months it will take for them to save up enough money for the TV.

____ months

17. Is the number -7 in the solution set for $x - 5 \leq -3$? Yes or no.

18. Solve the inequality $4(s - 3) > 3(s + 1)$.

$s >$ ____

19. Servers at a local café earn \$3.75 per hour plus tips. On average, a server will earn 15% of her total sales in tips. Last Friday, one of the servers worked 5 hours and had total sales of \$980. How much money did that server make last Friday?

A. \$147
B. \$149.81
C. \$155.75
D. \$165.75

20. Which of the following is a binomial of degree 3?

A. $x^3 + 3x - 2$
B. $x^2 - 3x$
C. $x^2 + 3x - 2$
D. $x^3 - 3$

21. What is the value of the polynomial expression below when $y = 2$?

$y^3 - 5y + 7y - y^2 + 9$

A. 9
B. 13
C. 17
D. 33

22. Which of the following is not a factor of the polynomial $2x^2 - 2x - 24$?

A. 2
B. $(x - 2)$
C. $(x + 3)$
D. $(x - 4)$

23. What is the leading coefficient of the polynomial $3x^2 + 5x + 2x^3 + 7$?

A. 2
B. 3
C. 5
D. 7

24. The distance d in feet that a dropped object falls in t seconds is given by the equation $d = 16t^2$. If an object is dropped from a height of 1,024 feet, how long will it take to reach the ground?

____ seconds

25. Which shows the rational expression $\frac{x-5}{x^2-4x-5}$ correctly simplified with its restricted values?

A. $\frac{1}{x-5}; x \neq -1$
B. $\frac{1}{x-5}; x \neq -1; x \neq 5$
C. $\frac{1}{x+1}; x \neq -1$
D. $\frac{1}{x+1}; x \neq -1; x \neq 5$

26. Which quadrant of the coordinate plane contains points of the form $(+x, -y)$?

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

27. A proportional relationship is modeled by $y = kx$. If $k = 6$, and (2, 12) is a point on the line, what is the slope of the line?

$m =$ ____

28. In what form is the equation $y = 5x + 2$?

A. Standard form of a linear equation
B. Slope-intercept form
C. Point-slope form
D. None of the above

29. The graph of a line passes through the points (3, −2) and (−1, 5). Graph the line and determine which of the following is true.

A. The line crosses the negative x-axis and the negative y-axis.
B. The line crosses the negative x-axis and the positive y-axis.
C. The line crosses the positive x-axis and the negative y-axis.
D. The line crosses the positive x-axis and the positive y-axis.

30. How many solutions does the system have?

$3x + 2y = 5$
$x + y = 2$

A. no solutions
B. one solution
C. two solutions
D. infinitely many solutions

31. Shawna is making trail mix for her hiking trip. She buys 20 total ounces of peanuts and raisins. She wants 3 times as many ounces of peanuts as raisins in her mix. How many ounces of raisins does she buy?

32. Which of the following is not a function?

A. A horizontal line
B. A vertical line
C. A line passing through the point (8, 2) and the origin
D. A line parallel to the x-axis

33. What is the value of $f(x)$ when x is 0 in the piecewise function below?

$$f(x) = \begin{cases} x - 1 \text{ when } x < -1 \\ 0 \text{ when } x = -1 \\ -x + 1 \text{ when } x > -1 \end{cases}$$

34. Make a table of values of the function $y = 3 - x^2$. Which of the following is true about the function?

A. 1st difference = −2, linear
B. 1st difference = −2, quadratic
C. 2nd difference = −2, linear
D. 2nd difference = −2, quadratic

35. The height of a ball above the ground is represented on a graph where y is the height, and x is the time that has passed. If the ball is thrown straight up in the air, what is true of the graph of the ball's motion?

A. There is one relative minimum
B. There is one relative maximum
C. The graph is symmetric across the x-axis
D. The graph is always increasing

36. Which of the following descriptions do not apply to the graph of a function that is a parabola?

A. The graph has a relative maximum or minimum.
B. The end behavior is the same for both ends of the parabola
C. The graph is periodic
D. There is a line of symmetry on the graph

37. The hourly sales at two local convenience stores are modeled below with y representing total dollars sold, and x representing the number of minutes the store has been open. Which of the stores is selling at a faster rate?

Store A: $4y - 3x = 16$

Store B:

x	12	15	21
y	8	10	14

38. A triangle has side lengths x, $x + a$, and $x + b$. The perimeter of the triangle will be a polynomial of what degree?

39. A trapezoid has an area of 42 square inches and a height of 12 inches. If one base has a length of 6 inches, what is the length of the other base?

A. 1
B. 2
C. 6
D. 7

40. A contractor is installing a circular fish pond in a park. The circumference of the fish pond must be less than 100 feet. What is the largest possible diameter of the pool, if it cannot be a fractional length?

A. 10
B. 11
C. 31
D. 32

41. If a cone and a cylinder have the same base area and the same height, which will have a greater volume?

42. A sphere has a diameter of 6 inches. What is the surface area of the sphere?

A. 36π
B. 48π
C. 108π
D. 144π

43. A farmer is buying a cylindrical silo that has a hemispherical roof. If the radius of his silo is 5 feet and the height is 20 feet, what is the approximate volume of his silo? Round your answer to the nearest whole number.

44. Which of the following measures of central tendency might not exist for a data set?

A. Mean
B. Median
C. Mode
D. Range

45. A restaurant records the average wait times during their peak hour every night for a week. What is the median value of this data?

11 min, 5 min, 9 min, 8 min, 11 min, 19 min, 7 min

A. 5 min
B. 8 min
C. 9 min
D. 11 min

46. If you would like to see what portion of your yearly salary goes to housing expenses, would a bar graph or a circle graph more clearly display the data?

47. If you are given a box-and-whisker plot but not the data values it was based on, what measure of central tendency would you not be able to calculate?

A. Mean
B. Median
C. Range
D. Outliers

48. What is the first quartile and median value of the data set below?

17, 8, 4, 7, 9, 3, 15

A. The first quartile is 4 and the median is 8.
B. The first quartile is 7 and the median is 4.
C. The first quartile is 8 and the median is 7.
D. The first quartile is 7 and the median is 8.

49. Which of the following is not true about a histogram?

A. The bars are all of equal width
B. Each bar represents an equal-sized interval
C. Each bar represents a different sized interval
D. Each bar can be a different height

50. A scatter plot is used to compare the price of gas and the outside temperature. If the data shows no correlation, which of the following would describe the line of best fit?

A. The line has a positive slope.
B. The line is horizontal.
C. The line is vertical.
D. There is no line of best fit.

1. **D** The tenths place is the number to the right of the decimal point, and the hundreds place is three places to the left of the decimal point. Incorrect answers switch the 2 and the 5, or mistake tenths place for tens, and hundreds place for hundredths.

2. **B** The difference between high tide and low tide is the absolute value of the difference between the distance from dock at high tide and low tide. $\left|1 - 2\frac{3}{5}\right| = 1\frac{3}{5}$. Incorrect answers may indicate errors in subtracting fractions, or adding the distances instead of subtracting.

3. **4** The factors of 16 are 1, 2, 4, 8, and 16. The factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, and 36. The greatest common factor is 4. Incorrect responses may choose other factors, or identify the least common multiple instead of the greatest common factor.

4. **D** The Distributive Property states that $a(b \times c) = a \times b + a \times c$. This property is illustrated in the equation. Incorrect responses may incorrectly choose the Associative Property based on the parentheses in the equation.

5. **$512.50** The total value of the fund after two years is $5{,}000(1.05)^2 = 5{,}512.50$. The accrued interest is the difference between the total value and the original investment: $5{,}512.50 - 5{,}000 = 512.50$. Incorrect responses may find the total value of the fund and not the accrued interest.

6. **C** The number is 240 feet tall. Multiply by 12 to translate to inches. $240 \times 12 = 2{,}880$. For every 300 inches, the model will be 1 inch high. The model is $2{,}880 \div 300 = 9.6$ inches high. Incorrect responses may not convert to inches before applying the scale factor.

7. **9.5** The cube root of 857 is about 9.498614, rounded to the nearest tenth is 9.5. Incorrect responses may calculate permutations instead of combinations or make an error calculating with factorials.

8. **B** The unit price for each size is the price divided by the number of pounds. The unit price of the small bag is $\$18 \div 5 = \$3.60$, the unit price of the large bag is $\$61.60 \div 28 = \$2.20$. The difference between the two is $\$3.60 - \$2.20 = \$1.40$. Incorrect answers may indicate errors in the difference.

9. **9.6 inches** The building is 240 feet tall. Multiply by 12 to translate to inches. $240 \times 12 = 2{,}880$. For every 300 inches, the model will be 1 inch high. The model is $2{,}880 \div 300 = 9.6$ inches high. Incorrect responses may not convert to inches before applying the scale factor.

10. **D** To calculate the number of students, convert the percentage to a decimal and multiply. The number of surveyed students who are involved in an after school sport is $800 \times 0.60 = 480$. Incorrect responses may convert the percentage to a decimal incorrectly or make an error when multiplying.

11. **B** Simple interest is calculated with the formula $I = P \times r \times t = 17{,}999 \times 0.053 \times 5 = \$4{,}769.74$. Incorrect responses may convert the percentage to a decimal incorrectly or make an error while multiplying.

12. The correct answer is 8,568. When choosing a group of 5 order doesn't matter, so it is calculated using combinations. $C(18, 5) = \frac{P(18, 5)}{5!} = \frac{18!}{(18-5)!5!} = \frac{18 \times 17 \times 16 \times 15 \times 14}{5 \times 4 \times 3 \times 2 \times 1} = 8{,}568$. Incorrect responses may calculate permutations instead of combinations or make an error calculating with factorials.

13. **independent** The number rolled the first time does not impact the result of the second number-cube roll, therefore the probability situation is independent. Incorrect responses may result from confusion over independent and dependent probability situations.

14. **C** Look for the key words "times" and "difference" to translate the words into an algebraic expression, $2(7 - n)$. The other answer options misinterpret the words that are translated into mathematical operations.

15. **B** The one-step equation involves addition, so the inverse operation needed to solve is subtraction. The other answer options may identify the operation in the equation, or mistakenly identify the inverse of addition.

16. **8 months** The equation $135m = 1{,}080$ is a one-step equation involving multiplication, so you can solve by using the inverse operation and dividing each side by 135. Incorrect responses may use the wrong inverse operation or make an arithmetic error when dividing.

17. **yes** To check if the number -7 is in the solution set, substitute it into the inequality and check if it is valid. $-7 - 5 = -12 \leq -3$. Incorrectly answering no may result from an error in calculation or misinterpreting the inequality symbol.

18. **$s > 15$** To solve the inequality, multiply out each side and then get the variable to one side. Incorrect responses result from calculation errors or forgetting to move all of the variables to one side of the inequality.

19. **D** The server earned $3.75 for each of the 5 hours worked, $3.75 \times 5 = 18.75$. The server earned 15% of her total sales in tips. $0.15 \times 980 = 147$. Add the totals together and you get the total earnings of $166.75. Incorrect responses may find only the tip amount, or incorrectly take 15% of the server's hourly wages.

20. **D** A binomial is a polynomial with two terms, and degree 3 means the highest power of the variable is 3, so $x^3 - 3$ is the only polynomial that meets the description. Incorrect responses may confuse binomials and trinomials, or mistake the degree for the number of terms.

21. C The value of the polynomial expression can be found by substituting 2 and evaluating,
$2^3 - 5(2) + 7(2) - (2)^2 + 9$
$= 8 - 10 + 14 - 4 + 9 = 17$
Incorrect responses may make errors in calculating powers of 2 or evaluating the expression.

22. B Factor the polynomial completely to determine its factors, $2x^2 - 2x - 24 = 2(x + 3)(x - 4)$. The only choice that is not a factor is $(x - 2)$. Incorrect responses made an error while factoring the polynomial.

23. A The leading coefficient is the coefficient of the highest term of the polynomial, regardless of its position in the expression. In this polynomial the highest term is $2x^3$ so the leading coefficient is 2. Incorrect responses may result from choosing the coefficient of the first term.

24. 8 To solve this problem substitute 1024 for d and solve for t, $1{,}024 = 16t^2$; $64 = t^2$; $t = 8$. Incorrect responses may forget to divide by 16 first, or may find the negative square root, which does not make sense in this real world scenario.

25. D When the rational expression is simplified, you can divide $(x - 5)$ from the numerator and the denominator; however, that needs to be included in the restricted values. So the expression can be reduced to $\frac{1}{x+1}$ but both -1 and 5 are restricted values that would make the denominator of the expression 0. Incorrect responses make an error when reducing the expression or forget to include 5 as a restricted value.

26. D The quadrant that contains positive x-values and negative y-values is Quadrant IV. Incorrect responses may confuse the location of the quadrants or the x- and y-axes.

27. 6 The slope of a proportional relationship is the same as the value of k. Incorrect responses may use the x-value or y-value of the point on the line as the slope instead of the value of k.

28. B The equation is in slope intercept form, $y = mx + b$, where the slope is 5 and the y-intercept is 2. Incorrect responses may misidentify the form of the line.

29. D When you graph the line you clearly see that it crosses the positive x- axis and the positive y-axis. Incorrect responses may come from not graphing the line first, or incorrectly graphing the points.

30. B The system is not dependent, so there are not infinite solutions, and the system is not inconsistent so there is a solution. Two lines can only intersect at 0, 1, or infinitely many points, so the correct answer is B. Incorrect responses may incorrectly identify the system as inconsistent or dependent.

31. 5 ounces Set up the problem as a system of equations where x is the number of ounces of peanuts she buys, and y is the number of ounces of raisins. The system is $x + y = 20$, and $x = 3y$. The system can be solved using graphing, or substitution to find the answer (15, 5). Incorrect responses may set up the wrong system to solve, or switch the variables and solve for the wrong value.

32. B A graph must pass the vertical line test to be a function. All of the lines pass this test except for a vertical line. Incorrect responses may mistake the line parallel to the x-axis as a vertical line, or confuse the definition of a function.

33. 1 To evaluate a piecewise function, determine which criteria the value of x meets and then evaluate that piece of the function. When $x = 0$, it is > -1 so, $-x + 1 = 0 + 1 = 1$. Incorrect responses may evaluate the wrong piece of the function or misinterpret the criteria for x.

34. D The table of values for $y = 3 - x^2$ has no common first difference, and has a common second difference of -2. Therefore the function is quadratic. Incorrect responses may make an error when calculating, or misinterpret the meaning of the second difference.

35. B The graph of the ball's motion will increase, hit a relative maximum and then decrease until hitting the ground. The other descriptions are not possible for the graph. There can be no negative x-values for time so the graph can't be symmetric about the x-axis, and the graph can't keep increasing because gravity will bring the ball down.

36. C A parabola will always have a relative maximum or minimum, and then end behavior will either increase or decrease indefinitely but it will be the same for both ends of the parabola and there will always be a line of symmetry. Incorrect responses might confuse the key features of the graph.

37. Store A To find the rate at which the stores are selling, find the slope of each line. Store A's slope can be found by converting the equation into point-slope form to find $m = 0.75$. Store B's slope can be found by using the slope formula and two points to find $m = \frac{2}{3}$. Incorrect responses may make errors in calculating the slope, or not recognize slope as being the same as the rate.

38. 1 The perimeter of a triangle is found by adding the sides together, and all of the sides are of degree 1, so the sum will also be of degree 1. Incorrect responses may confuse perimeter and area, or add the degrees of the sides.

39. A The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Substitute all the known values and solve for the length of the other base, $42 = \frac{1}{2}(12)(6 + b_2)$ and so $b_2 = 1$. Incorrect responses may forget the $\frac{1}{2}$ or divide the area by the length instead of using the trapezoid formula.

40. C The circumference of a circle is calculated by multiplying the diameter by π. To find the largest diameter divide 100 by π and find the next smallest whole number, 31. Incorrect responses may find the square root of 100 or incorrectly round their answer.

41. cylinder The volume of the cylinder is base area time height, and the volume of the cone is $\frac{1}{3}$ base area times height, so the cone will be $\frac{1}{3}$ the volume of the cylinder. Incorrect responses may confuse the volume formulas of cones and cylinders.

42. A The formula for the surface area of a sphere is SA $= 4\pi r^2$, and the diameter of the sphere is 6, so the radius is 3 and the sur face area is 36π. Incorrect responses may use the diameter instead of the radius, or cube the radius instead of square it.

43. 1833 ft^3 The volume of his silo is the volume of the cylinder, $V = \pi r^2 h = \pi(5)^2(20) = 1{,}571$, plus the volume of the hemisphere section, $V = \frac{2}{3}\pi r^3 = \frac{2}{3}\pi(5)^3 \approx 262$. Add the two totals, 1,571 + 262, to find the total volume is approximately 1,833 ft^3. Incorrect responses may use the volume of a sphere instead of a hemisphere, or make a calculation er ror.

44. C A data set may not have a mode if there are no repeated values. All of the other measures of central tendency can be calculated on any data set. Incorrect responses may confuse the measures of central tendency.

45. C The median value is the middle value when all of the data set is ar ranged in order. The incorrect answers may find the middle value before the data is ar ranged, or may find the mode or mean instead of the median.

46. circle graph A circle graph shows the data as parts of a whole so would be more usef ul in this scenario. A bar graph would be more usef ul to show year-over- year housing expenses.

47. A The box plot will show the median as a line in the box, and the outliers will be indicated by an asterisk. The range can be calculated by subtracting the least value from the greatest value. However you will not be able to determine the mean just from the box plot.

48. A In order to find the values, ar range the data set from least to greatest and then find the middle value, 7, and then the middle value of the lower half of the data, 4. Incor rect responses may include forgetting to ar range the data before finding the values.

49. C A histogram's bars need to all represent equal-sized intervals and should be the same width; however, the height can var y depending on the number of data points in that inter val. Incorrect responses may confuse bar graphs and histograms.

50. D If there is no cor relation of the data in the scatter plot, then there is no line that can be drawn that fits the data points. Incor rect answers may interpret a horizontal or v ertical line as indicating no cor relation.

Check Your Understanding

On the following chart, circle any items you missed. This helps you determine which areas you need to study the most. If you missed many of the questions that correspond to a certain skill, you should pay special attention to that skill as you work through this book.

Lesson	Item Number(s)			Review Page(s)
	Procedural	Conceptual	Problem Solving	
Chapter 1: Number Sense and Operations	3, 6, 7	1, 4	2, 5	44–45
Chapter 2: Ratio, Proportion, and Probability	10, 12	13	8, 9, 11	78–79
Chapter 3: Linear Equations and Inequalities	17, 18	14, 15	16, 19	114–115
Chapter 4: Polynomials and Rational Expressions	21, 22, 25	20, 23	24	146–147
Chapter 5: Linear Equations in the Coordinate Plane	27, 29	26, 28	30, 31	180–181
Chapter 6: Functions	33, 34	32,36	35, 37	216–217
Chapter 7: Geometry and Measurement	39, 42	41	38, 40, 43	250–251
Chapter 8: Data Analysis	46, 48	44, 47, 49, 50	45	286–287