MATH

MODULE 1

1. What value of x is the solution to the given equation?

   $7x - 6x + 130 = 260$

2. A company studied a random sample of 20 lawns in a small town. The company found that 4 of these lawns contain fertilizer. If there are 260 lawns in the town, which of the following is the best estimate of the number of lawns that contain fertilizer?

   A. 3
   B. 5
   C. 13
   D. 52

3. The function gives the total number of people on a school trip with x teachers. What is the total number of people on a school trip with 12 teachers?

   $f(x) = 12x + 6$

4. A total of 271 toothpicks of equal length were used to construct two types of figures: triangles and squares. The triangles and squares were constructed so that no two figures had a common side. The equation 3x+4y=271 represents this situation, where x is the number of triangles constructed and y is the number of squares constructed. What is the best interpretation of (x, y) = (13,58) in this context?

   A. If 13 triangles were constructed, then 58 squares were constructed.
   B. If 13 triangles were constructed, then 58 toothpicks were used.
   C. If 58 triangles were constructed, then 13 toothpicks were used.
   D. If 58 triangles were constructed, then 13 squares were constructed.

5. The function k is defined by $k(x) = 2^3 + 700$. What is the value of k(x) when x = 2?

   A. 700
   B. 705
   C. 706

D. 708

6. One of the two equations in a system of linear equations is given. The system has infinitely many solutions. If the second equation in the system is y = mx + b where m and b are constants, what is the value of b?

$$y = \frac{4}{7}x + 5$$

A. -5
B. - 1/5
C. 1/5
D. 5

7. Each side of square A has a length of 24 inches. Each side of square A is multiplied by a scale factor of 2 to create square B. What is the length, in inches, of each side of square B?

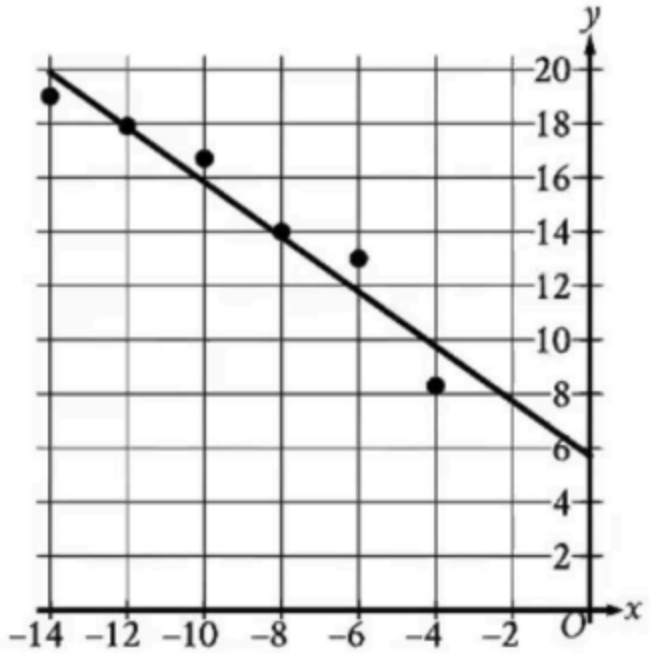
A. 22
B. 24
C. 26
D. 48

8. The function f models the depth below sea level, in meters, of a certain seal z minutes after the seal dives into the water. What is the best interpretation of f(2)= 170 in this context?

$$f(x) = -8x^2 + 101x$$

A. 2 minutes after the seal dives into the water, its estimated depth is 170 meters below sea level.
B. Approximately 2 minutes after diving into the water, the seal returns to sea level.
C. The seal reaches an estimated maximum depth of 170 meters below sea level.
D. 170 minutes after the seal dives into the water, its estimated depth is 2 meters below sea level.

9. The scatterplot shows the relationship between two variables, 2 and y. A line of best fit is also shown.



Which of the following equations best represents the line of best fit shown?

A. $y = x - 19.9$
B. $y = -x + 19.9$
C. $y = x - 5.7$
D. $y = -x + 5.7$

10. For the function h, the table gives three values of z and their corresponding values of h(x) Which equation could define h?

x	$h(x)$
0	30
1	31
2	33

A. $h(x) = 2^x$

B. $h(x) = 2^x + 2$

C. $h(x) = 2^x + 28$

D. $h(x) = 2^x + 29$

11. As part of a science experiment on evaporation, Ella measured the height of water in a glass over a period of time. The function $f(x)=36 - 0.16x$ gives the estimated height, in centimeters (cm), of the water in the glass 2 days after the start of the experiment. What is the best interpretation of 0.16 in this context?

    A. The estimated height, in cm, of the water at the start of the experiment
    B. The estimated height, in cm, of the water at the end of the experiment
    C. The estimated change in the height, in cm, of the water each day
    D. The estimated number of days for all the water in the glass to evaporate

12. For the linear function h, h(0) = 0 and h(7) = 4 Which equation defines h?

    A. $h(x) = \frac{7}{4}x$

    B. $h(x) = \frac{7}{4}x + 7$

    C. $h(x) = \frac{4}{7}x$

    D. $h(x) = \frac{4}{7}x + 4$

13. The product of a positive number x and the number that is 5 more than x is 104. What is the value of x?

    A. 4
    B. 8
    C. 13
    D. 26

14. The measure of angle C is 5π/4 radians. What is the value of cos(C) ?

    A. $\frac{-\sqrt{2}}{2}$

    B. $\frac{-1}{2}$

C. $\frac{\sqrt{2}}{2}$

D. $\frac{\sqrt{3}}{2}$

15. A model estimates that a gray whale travels 72 to 77 miles each day during its migration. Based on this model, which inequality represents the estimated total number of miles x, a gray whale could travel in 14 days of its migration?

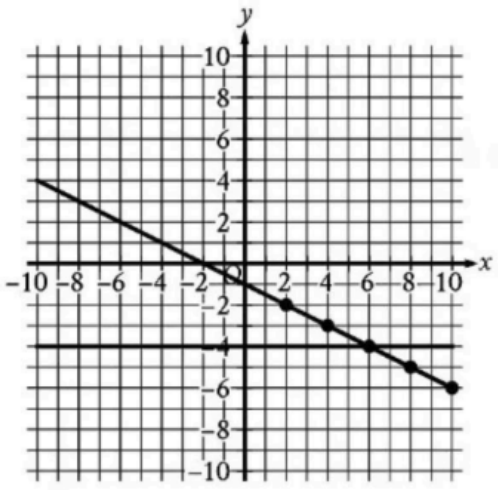
    A. $(72)(14) \leq x \leq (77)(14)$
    B. $72 + 14 \leq x \leq 77 + 14$
    C. $72 \leq 14x \leq 77$
    D. $72 \leq 14 + x \leq 77$

16. The table summarizes the number of objects in each group.

Group	Number of objects
A	325
B	68
C	572
D	102
Total	1,067

The number of objects in group C is p% of the number of objects in group A. What is the value of p?

17. The graph of a system of two linear equations is shown. If a third equation, $x + 2y = -8$, is added to this system, how many solutions will the resulting system of three equations have?



A. Zero
B. Exactly one
C. Exactly two
D. Infinitely many

18. Which expression is equivalent to 15(x + 10)?

A. 15x + 10
B. 15x + 150
C. 15x + 25
D. 15x + 5

19. Data set A and data set B each consist of 26 values. The table shows the frequencies of the values for each data set. Which of the following statements best compares the means of the two data sets?

Value	Data set A frequency	Data set B frequency
40	2	8
43	4	7
46	5	5
49	7	4
52	8	2

A. The mean of data set A is greater than the mean of data set B.
B. The mean of data set A is less than the mean of data set B.
C. The mean of data set A is equal to the mean of data set B.
D. There is not enough information to compare the means of the data sets.

20. The function g is defined as $g(x) = \frac{2x-4}{(2x+11)(x-6)}$ .If g(a + 5) = 0, where a is a constant, what is the value of a?

21. What is the sum of the solutions to the given equation?

$$|x - 8| = - |x - 8| + 20$$

22. The floor of a library has an area of 9,375 square feet. An architect creates a scale model of the floor of the library, where the length of each side of the model is $\frac{1}{25}$ times the length of the corresponding side of the floor of the actual library. What is the area, in square feet, of the scale model?

MODULE 2

1. The water depth in a certain river is 78.7 feet (ft). During a 30-day period, the water depth in this river is predicted to increase by a minimum of 1 ft and a maximum of 3 ft. What is the predicted maximum water depth, in feet, during this time?

A. 75.7
B. 77.7
C. 79.7
D. 81.7

2. What value of y is the solution to the given equation?

$$5(y - 15) + 10 = 4(y - 15)+10$$

A. 0
B. 1
C. 10
D. 15

3. If f(x) = x + 3 and g(x) = 3x what is the value of 5f(2) - g(2)?

4. The given expression is equivalent to by + c, where b and c are constants. What is the value of b?

   (9y + 9) - (5y + 7)

5. What is the slope of the graph of y = $\frac{1}{2}$(11x + 16) + 4x in the zy-plane?

   A. $\frac{11}{2}$
   B. $\frac{19}{2}$
   C. 11
   D. 15

6. A clothing store buys shirts at a wholesale price of 4.00 dollars each and resells them each at a retail price that is 280% of the wholesale price. At the end of the season, any remaining shirts are marked at a discounted price that is 80% off the retail price. What is the discounted price of each remaining shirt, in dollars?

7. Which expression is equivalent to $\sqrt[12]{x^5 y^5}$ where x and y are positive?

   A. $(xy)^{\frac{12}{5}}$
   B. $(xy)^{\frac{5}{12}}$
   C. $(xy)^{17}$
   D. $(xy)^{60}$

8. In 6 days, a polar bear ate 25.8 pounds of fat. Which equation describes the amount of fat y, in pounds, the polar bear ate in these 6 days?

   A. y = 25.8 + 6
   B. y = 25.8
   C. y = $\frac{25.8}{6}$
   D. y = 6

9. If $(x + 3)^2 = 33$ what is the value of $x^2 + 6x$?

10. In the xy-plane, line s passes through the point (0,0) and is parallel to the line represented by the equation y = 25x + 5. If line s also passes through the point (2, d), what is the value of d?

    A. 5
    B. 25
    C. 50
    D. 55

11. In triangle FGH and triangle KLM, the measures of angles G and L are each 60º. The lengths of GH and LM are each 34 centimeters, and $\frac{GH}{GF} = \frac{LM}{LK}$. Which additional piece of information would be necessary to prove that triangle FGH is congruent to triangle KLM?

    A. The lengths of FG and KM are each 17 centimeters.
    B. The measures of angles H and M are each 30º
    C. The measures of angles F and K are each 90º
    D. No additional information is necessary.

12. A machine launches a baseball from ground level. The baseball reaches a maximum height of 92.16 meters above the ground at 2.4 seconds and hits the ground at 4.8 seconds. Which equation represents the height above ground h, in meters, of the baseball t seconds after it is launched?

    A. h = $-t^2 + 4.8$
    B. B h = $-t^2 + 92.16$
    C. C h = $-16(t - 2.4)^2 - 4.8$
    D. D h = $-16(t - 2.4)^2 + 92.16$

13. The function f is defined by the given equation. If g(x) = f(x - 3) which of the following equations defines the function g?

    f(x) = $240(2)^x$

    A. g(x) = $30(2)^x$

B. $g(x) = 80(2)^x$

C. $g(x) = 240(8)^x$

D. $g(x) = 240(6)^x$

14. In the given equation, r is a constant. The equation has no solution. What is the value of r?

$-3x + 6rx = 42$

A. $\frac{1}{7}$

B. $\frac{1}{2}$

C. 2

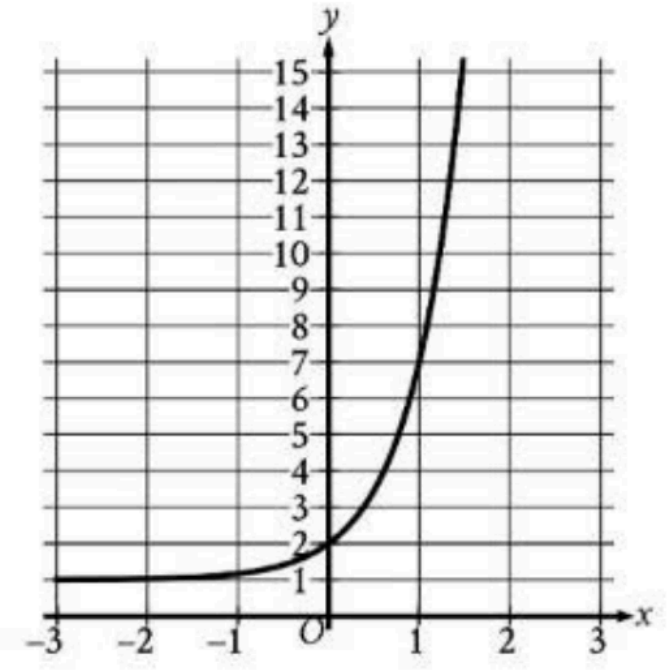
D. 7

15. The solution to the given system of equations is (x, y). What is the value of x – y?

$$\frac{x-18}{6} + \frac{y+25}{3} = -5$$

$$\frac{x-18}{3} - \frac{y+25}{6} = 5$$

16. The graph of y = f(x) + 1 is shown. Which equation defines the function f?



A. $f(x) = 6^x$

B. $f(x) = 2^x$

C. $f(x) = 6^x + 2$

D. $f(x) = 2^x + 1$

17. A raised garden is in the shape of a right rectangular prism. Its base has a width of 3 feet and a length of 27 feet, and it will be filled 24 inches high with topsoil. The total cost of the topsoil needed to fill the garden to this height is 234 dollars. What is the unit cost, in dollars per cubic yard, for the topsoil? (1 yard 3 feet; 1 foot = 12 inches)

18. The result of increasing the quantity z by 600% is 126. What is the value of z?

A. 18

B. 21

C. 474

D. 756

19. The given equation relates the positive variables p, q, r, and s. Which of the following is equivalent to q?

$$\frac{20}{p} = \frac{20}{q} - \frac{20}{r} - \frac{20}{s}$$

A. $p + r + s$
B. $20(p + r + s)$
C. $\frac{prs}{pr+ps+rs}$
D. $\frac{prs}{20p+20r+20s}$

20. The perimeter of an equilateral triangle is 642 centimeters. The three vertices of the triangle lie on a circle. The radius of the circle is $w\sqrt{3}$ centimeters. What is the value of w?

21. The function f is defined by the given equation, where a, b, and c are distinct constants. When $a < x < b$ the value of f(x) is positive. The graph of $y = f(x)$ in the xy-plane contains the point (r, s), where r and s are constants. If $s = 8$ which of the following could be true?

$f(x) = 3(x - a)(x - b)(x - c)$

I. $r < a$
II. $b < r < c$
III. $r > c$

A. I only
B. III only
C. I and III only
D. II and III only

22. A right square pyramid has a total surface area of 36,864 square inches, and the combined surface area of the four lateral faces of this pyramid is 20,480 square inches. What is the height, in inches, of this pyramid?

A. 48
B. 64
C. 80
D. 128