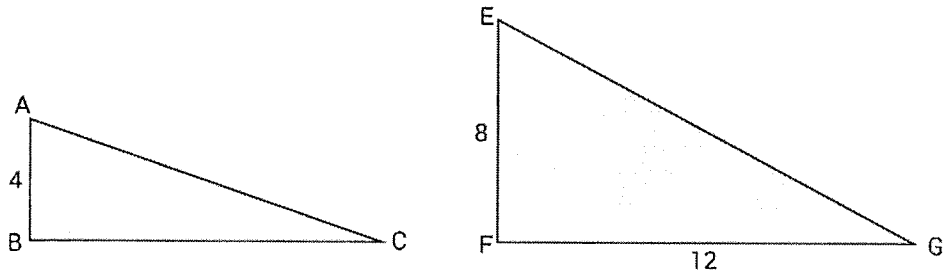# Mathematics—Module 2

1. In the figures below (not drawn to scale), right triangle $\triangle ABC$ is similar to $\triangle EFG$. What is the ratio of the area of $\triangle ABC$ to the area of $\triangle EFG$?

2. The function f is defined by a polynomial. The table below gives values for x and $f(x)$. Which of the following must be a factor of $f(x)$?

x	$f(x)$
0	4
1	2
2	0

A) x
B) $x - 1$
C) $x + 2$
D) $x - 2$

3. In the system of equations below, a is a constant and x and y are variables. For which of the following values of a will the system have no solution?
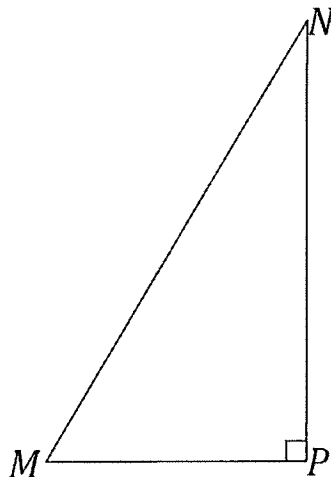
$$x + 3y = -7$$
$$ax - 2y = 6$$

A) $-\dfrac{2}{3}$
B) $-\dfrac{1}{3}$
C) 0
D) $\dfrac{7}{3}$

4. What is the sum of all values of x that satisfy the following equation?

$$5x^2 - 30x - 32 = 3$$

A) -1
B) 0
C) 6
D) 7

5. In right triangle MNP below, angle M measures $a°$ and $\cos a° = \frac{3}{5}$. What is $\cos(90 - a°)$?

6. If 52% of 25 people polled in a coffee survey preferred Brand A and 48% preferred Brand B, which of the following inferences is a logical conclusion?

 A) At least 52% of shoppers will prefer Brand A over Brand B.
 B) The majority of shoppers will prefer Brand A over Brand B.
 C) The majority of shoppers will prefer Brand B over Brand A.
 D) The number of shoppers who prefer Brand A may be similar to the number of shoppers who prefer Brand B.

7. Ben bought a bag of assorted rubber balls and measured each one. Each had a diameter between 1.2 and 1.5 inches. What is a possible volume, rounded to the nearest cubic inch, of one of the balls? Use 3.14 for π.

8. How many gallon jugs of water should Julia buy to completely fill a container in the shape of a rectangular prism if the length is 8 feet, the width is 4 feet, and the height is 3 feet (1 gallon = 231 cubic inches)?

 A) 5
 B) 718
 C) 719
 D) 165,888

9. Subtract the polynomials: $(2x^2 + 3x + 2) - (x^2 + 2x - 3)$

 A) $x^2 + x + 5$
 B) $x^2 + x - 1$
 C) $x^2 + 5x + 5$
 D) $x^2 + 5x - 1$

10. The table below shows the breakdown of orders at a frozen yogurt shop. There were two flavors of yogurt (strawberry and lemon) and two sizes (small and large). If a person among those who ordered frozen yogurt is chosen at random, what is the probability that this person ordered a small serving of lemon yogurt?

	Strawberry	Lemon	Total
Small	12	9	21
Large	20	16	36
Total	32	25	57

A) $\frac{9}{25}$

B) $\frac{3}{7}$

C) $\frac{7}{19}$

D) $\frac{3}{19}$

11. If (x, y) is the solution to the following system of equations, what is the value of $x + y$?

$$3x + y = -2$$
$$y = -x$$

A) -1

B) 0

C) 1

D) 2

Refer to the following for questions 12 - 13:

Elise, Max, and Rylie are each offering lawn care services. Their prices for each service are listed in the table below. Prices are per square foot.

	Elise	Max	Rylie
Mowing	$0.0025	$0.002	$0.003
Edging	$0.0015	$0.0015	$0.002
Weeding	$0.055	$0.065	$0.05

12. Rylie was asked to mow and edge a lawn as well as weed a 1,000 square foot garden. If she will spend $12 on gas and other overhead costs, how large of a lawn does she need to be able to make a $75 profit?

A) 2,600 ft²

B) 5,000 ft²

C) 6,875 ft²

D) 7,400 ft²

13. Ms. Lin wants to have her 7,500 square foot lawn mowed and edged. She also has a flower bed of x square feet to be weeded. Which of the following inequalities represents x if Elise's services are a better deal than Max's?

A) $x < 250$

B) $x < 375$

C) $x > 250$

D) $x > 375$

14. A number of cash prizes were awarded for the top salespeople at ABC Communications, each in the amount of $100, $200, or $400. If the prizes totaled $1,600 and there were 7 total prizes awarded, what is the greatest possible number of $100 prizes awarded?

15. The graph of the system of inequalities $y \leq \frac{2}{3}x - \frac{3}{2}$ and $y \geq -2x - \frac{5}{2}$ has solutions in which quadrants on the xy-plane below?
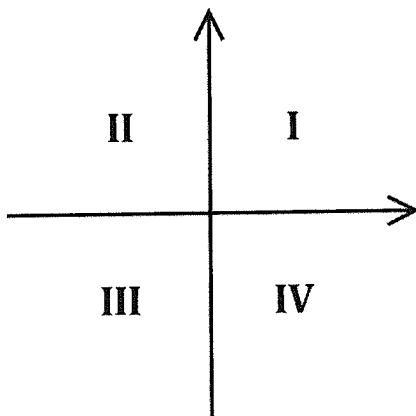
A) Quadrants I and IV
B) Quadrants II and III
C) Quadrants I, II, and IV
D) Quadrants I, III, and IV

16. The equation below is used to solve for the distance, d (meters), that an object travels in a certain amount of time, t (seconds), with an initial velocity of v meters per second. Which of the following equations gives a in terms of d, v, and t?

$$d = vt + \frac{1}{2}at^2$$

A) $\frac{2d-2vt}{t}$
B) $\frac{2dvt}{t^2}$
C) $\frac{2d}{t^2} - \frac{2v}{t}$
D) $\frac{2d}{t^2} - 2vt$

17. The function f is defined by a polynomial. The table below gives values for x and $f(x)$. Which of the following must be a factor of $f(x)$?

x	$f(x)$
-5	14
-3	0
-1	-6

A) $x + 3$
B) $x - 3$
C) $x + 5$
D) $x - 5$

18. Simplify the following expression.

$$(3x + 5)(4x - 6)$$

A) $12x^2 - 38x - 30$
B) $12x^2 + 2x - 30$
C) $12x^2 - 2x - 1$
D) $12x^2 + 2x + 30$

19. If (x, y) is the solution to the following system of equations, what is the value of $x - y$?

$$4x - y = 11$$
$$x = 3y$$

A) 0
B) 1
C) 2
D) 3

20. The equation below is used to calculate the period of a pendulum (i.e., the time it takes a pendulum to make one full oscillation). If T refers to the time in seconds, L is the length of the pendulum in meters, and g is the acceleration due to gravity in meters per second squared, which of the following equations gives L in terms of T, g, and π?

$$T = 2\pi \sqrt{\frac{L}{g}}$$

A) $(T - 2\pi)^2 g$
B) $g\sqrt{\frac{T}{2\pi}}$
C) $\frac{T^2 g}{4\pi^2}$
D) $\frac{4\pi^2}{T^2 g}$

21. If $x > 0$ and $x^2 - 4x = 12$, what is the value of x?

22. In the function below, b is a constant. If $f(2) = 0$, what is the value of $f(-1)$?

$$f(x) = \frac{3}{2}x + b$$

A) $-\frac{9}{2}$
B) -3
C) $-\frac{3}{2}$
D) $\frac{3}{2}$