1. If $\frac{x-1}{3} = k$ and $k = 3$, what is the value of x ?

A) 2

B) 4

C) 9

D) 10

2. For $i = \sqrt{-1}$, what is the sum $(7 + 3i) + (-8 + 9i)$?

A) $-1 + 12i$

B) $-1 - 6i$

C) $15 + 12i$

D) $15 - 6i$

3. $(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$

Which of the following is equivalent to the expression above?

A) $4x^2y^2$

B) $8xy^2 - 6y^2$

C) $2x^2y + 2xy^2$

D) $2x^2y + 8xy^2 - 6y^2$

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

5.

If $y = kx$, where k is a constant, and $y = 24$ when $x = 6$, what is the value of y when $x = 5$?

A) 6
B) 15
C) 20
D) 23

6.

If $16 + 4x$ is 10 more than 14, what is the value of $8x$?

A) 2
B) 6
C) 16
D) 80

7.

For what value of n is $|n - 1| + 1$ equal to 0 ?

A) 0
B) 1
C) 2
D) There is no such value of n.

8.

$$a = 1{,}052 + 1.08t$$

The speed of a sound wave in air depends on the air temperature. The formula above shows the relationship between a, the speed of a sound wave, in feet per second, and t, the air temperature, in degrees Fahrenheit (°F).

Which of the following expresses the air temperature in terms of the speed of a sound wave?

A) $t = \frac{a - 1{,}052}{1.08}$

B) $t = \frac{a + 1{,}052}{1.08}$

C) $t = \frac{1{,}052 - a}{1.08}$

D) $t = \frac{1.08}{a + 1{,}052}$

9.

Based on Question 8:

At which of the following air temperatures will the speed of a sound wave be closest to 1,000 feet per second?

A) −46°F

B) −48°F

C) −49°F

D) −50°F

10.

If $5x + 6 = 10$, what is the value of $10x + 3$?

A) 4

B) 9

C) 11

D) 20

11.

$$x + y = 0$$
$$3x - 2y = 10$$

Which of the following ordered pairs (x, y) satisfies the system of equations above?

A) $(3, -2)$

B) $(2, -2)$

C) $(-2, 2)$

D) $(-2, -2)$

12.

$$9a^4 + 12a^2b^2 + 4b^4$$

Which of the following is equivalent to the expression shown above?

A) $(3a^2 + 2b^2)^2$

B) $(3a + 2b)^4$

C) $(9a^2 + 4b^2)^2$

D) $(9a + 4b)^4$

13.

$$\sqrt{2k^2 + 17} - x = 0$$

If $k > 0$ and $x = 7$ in the equation above, what is the value of k ?

A) 2
B) 3
C) 4
D) 5

14.

$$2x(3x + 5) + 3(3x + 5) = ax^2 + bx + c$$

In the equation above, a, b, and c are constants. If the equation is true for all values of x, what is the value of b ?

15.

A function f satisfies $f(2) = 3$ and $f(3) = 5$. A function g satisfies $g(3) = 2$ and $g(5) = 6$. What is the value of $f(g(3))$?

A) 2
B) 3
C) 5
D) 6

16.

If $3r = 18$, what is the value of $6r + 3$?

A) 6
B) 27
C) 36
D) 39

17.

Which of the following is equal to $a^{\frac{2}{3}}$, for all values of a ?

A) $\sqrt{a^{\frac{1}{3}}}$

B) $\sqrt{a^3}$

C) $\sqrt[3]{a^{\frac{1}{2}}}$

D) $\sqrt[3]{a^2}$

18.

If $\frac{5}{x} = \frac{15}{x+20}$, what is the value of $\frac{x}{5}$?

A) 10

B) 5

C) 2

D) $\frac{1}{2}$

19.

$$x^3(x^2 - 5) = -4x$$

If $x > 0$, what is one possible solution to the equation above?

20.

If $\frac{7}{9}x - \frac{4}{9}x = \frac{1}{4} + \frac{5}{12}$, what is the value of x ?

21.

n	1	2	3	4
$f(n)$	-2	1	4	7

The table above shows some values of the linear function f. Which of the following defines f ?

A) $f(n) = n - 3$

B) $f(n) = 2n - 4$

C) $f(n) = 3n - 5$

D) $f(n) = 4n - 6$

22.

$$3x^2 - 5x + 2$$
$$5x^2 - 2x - 6$$

Which of the following is the sum of the two polynomials shown above?

A) $8x^2 - 7x - 4$

B) $8x^2 + 7x - 4$

C) $8x^4 - 7x^2 - 4$

D) $8x^4 + 7x^2 - 4$

23.

If $\frac{3}{5}w = \frac{4}{3}$, what is the value of w ?

A) $\frac{9}{20}$

B) $\frac{4}{5}$

C) $\frac{5}{4}$

D) $\frac{20}{9}$

24.

$$(-3x^2 + 5x - 2) - 2(x^2 - 2x - 1)$$

If the expression above is rewritten in the form $ax^2 + bx + c$, where a, b, and c are constants, what is the value of b ?

25.

Which of the following expressions is equal to 0 for some value of x ?

A) $|x - 1| - 1$

B) $|x + 1| + 1$

C) $|1 - x| + 1$

D) $|x - 1| + 1$

26.

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

In the function above, b is a constant. If $f(6) = 7$, what is the value of $f(-2)$?

A) -5

B) -2

C) 1

D) 7

27.

$$\frac{x}{y} = 6$$
$$4(y + 1) = x$$

If (x, y) is the solution to the system of equations above, what is the value of y ?

A) 2

B) 4

C) 12

D) 24

28.

If $f(x) = -2x + 5$, what is $f(-3x)$ equal to?

A) $-6x - 5$

B) $6x + 5$

C) $6x - 5$

D) $6x^2 - 15x$

29.

$$3(2x + 1)(4x + 1)$$

Which of the following is equivalent to the expression above?

A) $45x$

B) $24x^2 + 3$

C) $24x^2 + 18x + 3$

D) $18x^2 + 6$