Constants in Equations

Multiple Choice (Calculator)

1. If $ax + 2a = 5$, where a is a constant, which of the following must be equal to $x + 2$?

A) a

B) 2

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

D) $\frac{2a}{5}$

2. In the xy-plane, the point (p, r) lies on the line with equation $y = x + b$, where b is a constant. The point with coordinates $(3p, 4r)$ lies on the line with equation $y = 2x + b$. If $p \neq 0$, what is the value of $\frac{r}{p}$?

A) $\frac{3}{5}$

B) $\frac{3}{4}$

C) $\frac{4}{3}$

D) $\frac{5}{3}$

3. In the equation $(ax - 5)^2 = 49$, a is a constant. If $x = -2$ is one solution to the equation, what is a possible value of a?

A) -6

B) -2

C) 0

D) 3

4. In the xy-plane, the graph of the polynomial function f crosses the x-axis at exactly two points, $(a, 0)$ and $(b, 0)$ and crosses the y-axis at exactly one point, $(0, c)$, where a, b, and c are all positive. Which of the following could define f?

A) $f(x) = cx(x - a)(x - b)$

B) $f(x) = \frac{c}{ab}(x - a)(x - b)$

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

D) $f(x) = \frac{c}{ab}(x + a)(x + b)$

5. The equation $9x^2 + bx + 16 = 0$ has exactly one solution, and b is a constant, what is a possible value of b?

A) -12
B) 6
C) 24
D) 36

6. $$f(x) = -(x + 2)^2 + a$$

In the function above, a is a constant. Which of the following is true about the graph of $f(x)$?

A) Its minimum occurs at $(-2, a)$.

B) Its minimum occurs at $(2, a)$.

C) Its maximum occurs at $(-2, a)$.

D) Its maximum occurs at $(2, a)$.

7. $3x(ax - 5) + 7(3x - a) + 14 = 3ax(x + 1)$

The equation above is true for all x, where a is a constant. What is the value of $a + 1$?

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

8.

$$kx - y = 1$$
$$y = -x^2 + 2k$$

In the system of equations above, k is a constant. When the equations are graphed in the xy-plane, the graphs intersect at exactly two points. Which of the following CANNOT be the value of k?

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

9. In the xy-plane, the graph of the exponential function $y = h(x)$, has a y-intercept of d, where d is a positive constant. Which of the following could define the function h?

A) $h(x) = -5(d)^x$

B) $h(x) = 5(x)d$

C) $h(x) = d(-x)^5$

D) $h(x) = d(5)^x$

10. In the xy-plane, line k has equation $bx + cy = d$, where $b, c,$ and d are positive constants. If the value of b is doubled while c and d remain unchanged, how will line k be affected?

A) The y-coordinate of the y-intercept will increase.

B) The y-coordinate of the y-intercept will decrease.

C) The slope will increase.

D) The slope will decrease.

Grid-In (Calculator)

11. If $4x^2 + 12x + 9 = 16$ and $2x + 3 = b$, what is b^2?

12. Line l can be written as $3x - 2y = 7$. Line n is parallel to line l and can be written as $y = mx$. Find m.

13. Line l is parallel to the line with equation $y = 2x - 3$ and contains the points $(-2, -2)$ and $(0, b)$. Find b.

14. Line l is perpendicular to the line with equation $y = 2x + 5$ and goes through the point $(6, -3)$. If line l crosses the y-axis at point $(0, b)$, find b.

15. The relationship between x and y can be written as $y = mx$, where m is a constant. If $y = 6$ when $x = 2a$, what is the value of y when $x = 3a$?

16. In the xy-plane, line l has a y-intercept of 11 and is perpendicular to the line with equation $y = -\frac{3}{5}x + 10$. If the point $(-6, b)$ is on line l, what is the value of b?

17. In the xy-plane, line l has a y-intercept of 7 and is parallel to the line with equation $y = -\frac{2}{3}x - 6$. If the point $(9, b)$ is on line l, what is the value of b?

18. In the xy-plane, a line that has the equation $y = c$ for some constant c intersects a parabola at exactly one point. If the parabola has the equation $y = -2x^2 + 12x - 16$, what is the value of c?

19.

$$y = a(x - 2)(x + 1)$$

$$y = ax - 1$$

In the system of equations above, a is a constant. If the system has a solution on the x-axis and a second solution on the y-axis, what is the value of a?

20. A set of 9 consecutive even integers has a mean value of a and median value of b. What is the value of $|a - b|$?

21.

$$|ax - 3| = 7$$

$$|3y + a| = 8$$

In the system of equations above, a is a constant. If $\left(5, -\frac{10}{3}\right)$ and $(-2,2)$ are two solutions to the system, what is the value of a?