

1. Find the slope of the line passing through the points $(-1, -7)$ and $(5, 4)$.

- A. $-\frac{2}{11}$ B. $\frac{11}{6}$ C. $-\frac{3}{4}$ D. $\frac{6}{11}$

2. Factor completely: $8x^3y - 32xy^3$.

- A. $2xy(2x + 4y)(2x - 4y)$
B. $8xy(x + 2y)(x - 2y)$
C. $2x^2(4x^5y - 16x^3y^3)$
D. $xy(4x + 4y)(2x - 4y)$

3. Identify the x - and y -intercepts of the graph of the equation $3x - 3y = 7$.

- A. x -intercept: $\left(-\frac{3}{7}, 0\right)$ y -intercept: $\left(0, \frac{3}{7}\right)$
B. x -intercept: $\left(-\frac{7}{3}, 0\right)$ y -intercept: $\left(0, \frac{7}{3}\right)$
C. x -intercept: $\left(\frac{7}{3}, 0\right)$ y -intercept: $\left(0, -\frac{7}{3}\right)$
D. x -intercept: $\left(\frac{3}{7}, 0\right)$ y -intercept: $\left(0, -\frac{3}{7}\right)$

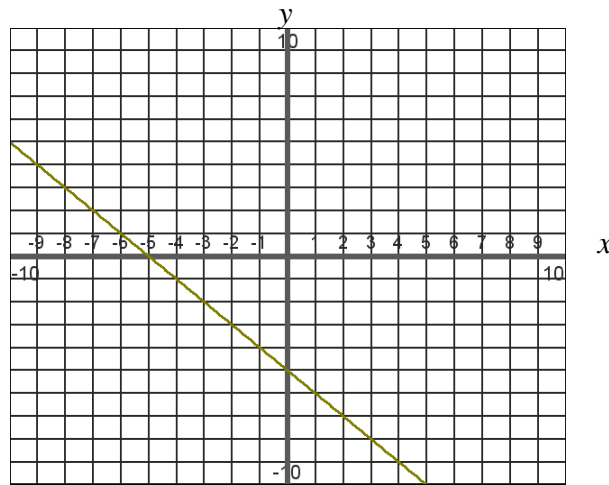
4. Solve: $5x - 2 = 3x - 8$.

- A. The equation has no solution.
B. $x = -3$
C. $x = \frac{5}{4}$
D. $x = -8$

5. Find a set of ordered pairs (x, y) that represents y as a function of x .

- A. $\{(5, -3), (-3, 5), (1, 1)\}$
B. $\{5, -3, -9, 1\}$
C. $\{(5, -3), (-3, -9), (5, 1)\}$
D. $\{(5, -3), (-9, 1), (-9, 5), (1, -9)\}$

6. Estimate the slope of the line. You may assume that each tick mark represents one unit.



- A. 1 B. -1 C. $-\frac{2}{7}$ D. $-\frac{7}{2}$

7. What is the vertex of $f(x) = x^2 + 2x$?

- A. (1,1) B. (1,-1) C. (-1,1) D. (-1,-1)

8. Solve: $4r^2 - 20r = -25$.

- A. $r = -25, r = -\frac{5}{4}$
 B. $r = -25, r = -\frac{45}{4}$
 C. $r = -\frac{5}{2}$
 D. $r = \frac{5}{2}$

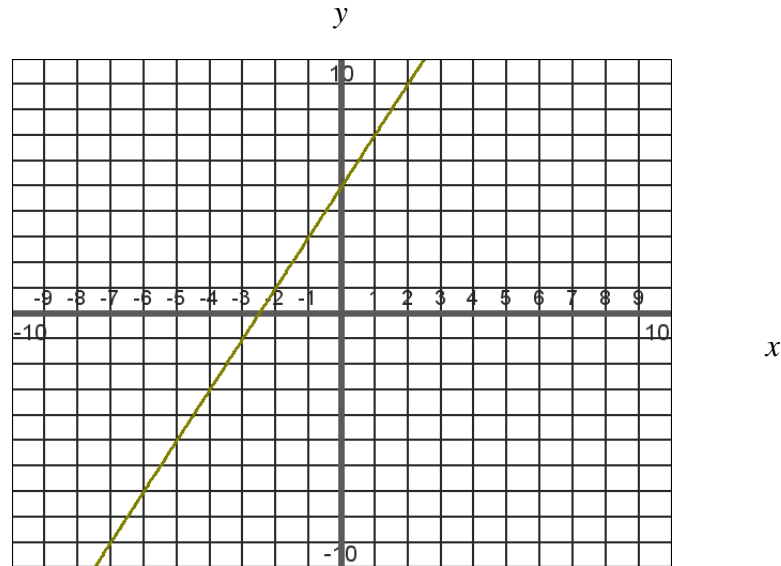
9. Simplify: $\sqrt[3]{81a^5b^9}$.

- A. $3ab^3\sqrt{3a^2}$ B. $3a^3b^9\sqrt[3]{3a^2}$ C. $3ab^3\sqrt[3]{3ab}$ D. $3ab^3\sqrt[3]{3a^2}$

10. Simplify: $\left(\frac{2x^{-2}}{5x^2}\right)^{-3}$.

- A. $\frac{125x^{12}}{8}$ B. $\frac{8x^{12}}{125}$ C. $125x^{12}$ D. $8x$

11. What is true of the graph below? You may assume that each tick mark represents one unit.



- A. The y-intercept is at $(-2, 0)$.
- B. The graph has a negative slope.
- C. $f(0) = 5$.
- D. The graph passes through the point $(-1, -3)$.

12. Find the solution to the equation $\frac{x+6}{3} + \frac{x-6}{5} = 4$.

- A. $x = 24$
- B. $x = 6$
- C. $x = -22$
- D. $x = -4$

13. Solve: $2x^2 - 4x + 1 = 0$.

- A. $x = \frac{2 \pm \sqrt{2}}{2}$
- B. $x = \frac{-2 \pm \sqrt{2}}{2}$
- C. $x = -1 \pm \sqrt{2}$
- D. $x = 1 \pm \sqrt{2}$

14. Which of the following is the graph of $f(x) = x^2$ shifted two units to the left and three units down?

- A. $f(x) = (x-2)^2 - 3$
- B. $f(x) = (x-3)^2 - 2$
- C. $f(x) = (x+2)^2 - 3$
- D. $f(x) = (x+3)^2 - 2$

15. Find the slope-intercept form of the equation of the line through the point $(2, 7)$ parallel to the line $9x - 4y = 1$.

A. $y = \frac{9}{4}x - \frac{2}{5}$

C. $y = \frac{9}{4}x + \frac{5}{2}$

B. $y = \frac{4}{9}x - \frac{2}{5}$

D. $y = -\frac{9}{4}x + \frac{5}{2}$

16. Perform the indicated operation: $(-3 + 2i)(-3 - 7i)$.

A. $-5 + 27i$

B. $23 + 15i$

C. $-5 + 15i$

D. $23 - 15i$

17. Write an equation of the line passing through the point $(6, -10)$ with an undefined slope.

A. $x = 6$

B. $x = -10$

C. $y = 6$

D. $y = -10$

18. If $f(x) = 2x^2 + 3x$ and $g(x) = 1 + 5x$, for what values are $f(x) = g(x)$?

A. $x = 1 \pm \sqrt{3}$

B. $x = -1 \pm \sqrt{3}$

C. $x = \frac{1 \pm \sqrt{3}}{2}$

D. $x = -\frac{1 \pm \sqrt{3}}{2}$

19. Which of the following graphs is symmetric about the y-axis?

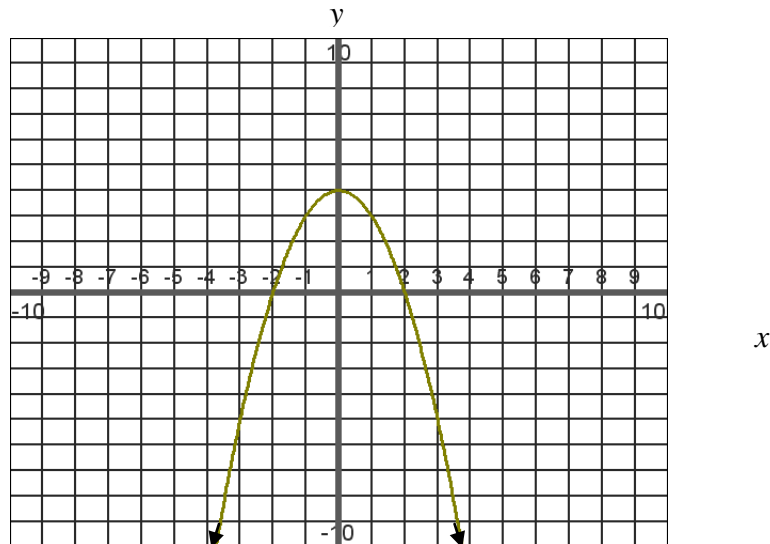
A. $f(x) = x + 2$

C. $f(x) = x^2 - 3x - 1$

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

D. $f(x) = |x - 4|$

20. What is the range of the function shown below? You may assume that each tick mark represents one unit.



A. $(-\infty, \infty)$

B. $[4, \infty)$

C. $(-\infty, 4]$

D. $[-2, 2]$

21. Factor completely $14a^5 - 28a^4b - 35a^3b^2$.

- A. $a^3(14a^2 - 28ab - 35b^2)$
 B. $7a(2a^4 - 4a^3b - 5a^2b^2)$
 C. $7a(2a^5 - 4a^2b - 5a^4b^2)$
 D. $7a^3(2a^2 - 4ab - 5b^2)$

22. If $f(x) = \frac{6x}{x+2} + x$, for what values of x is $f(x) = 8$?

- A. $x = 0$ B. $x = -4, x = 4$ C. $x = 16$ D. $x = -8, x = 2$

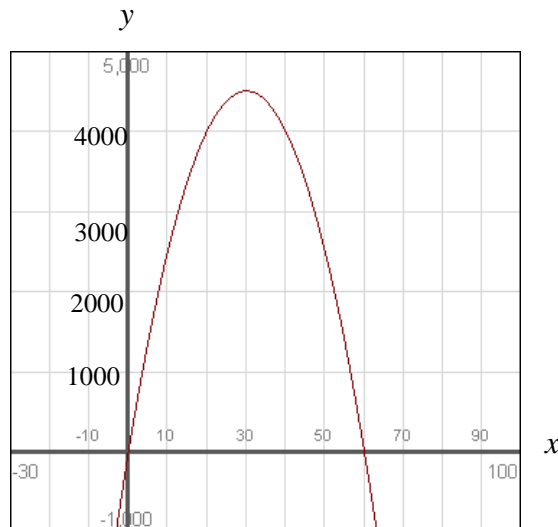
23. A salesperson earns \$30,000 a year plus 8% commission on his total sales. Write an equation that expresses this relationship between his earnings (E) and total sales (S).

- A. $E = 30,000 + 8S$
 B. $E = 30,000 - 8S$
 C. $E = 8S - 30,000$
 D. $E = 30,000 + 0.08S$

24. Solve: $|6x - 3| > 9$.

- A. $(-1, 2)$ B. $[-1, 2]$ C. $(-\infty, -1) \cup (2, \infty)$ D. $(-\infty, -1] \cup [2, \infty)$

25. The graph below represents a company's profit from selling tickets for a weekend trip. The x -axis represents the number of tickets sold and the y -axis represents the profit made. What is the least number of tickets that must be sold to make a profit of \$4,000.00? Please note the scale on the axes.



- A. 10 B. 20 C. 30 D. 40

26. Solve $A = mx + bx$ for x .

- A. $x = \frac{A}{mb}$
 B. $x = A - m - b$
 C. $x = \frac{A}{m+b}$
 D. $x = \frac{A}{m-b}$

27. If $f(x) = 4x^3 - 6x^2 - x + 28$, evaluate $f(-2)$.

- A. -38 B. -36 C. -26 D. -8

28. What is the domain of $r(x) = \frac{6x}{x(x^2 - 1)}$?

- A. All real numbers $x \neq 0, x \neq \pm 1$.
 B. All real numbers $x \neq \pm 1$.
 C. All real numbers $x \neq 0$.
 D. All real numbers.

29. What number must be added to $t^2 - \frac{4}{3}t$ to complete the square?

- A. $\frac{16}{9}$ B. $\frac{4}{9}$ C. $\frac{2}{3}$ D. $\frac{8}{3}$

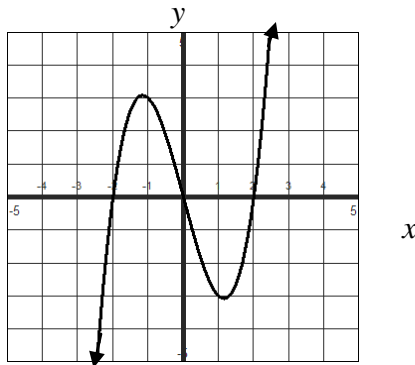
30. Simplify: $-16^{3/2}$.

- A. $-64i$ B. $-4\sqrt[3]{4}$ C. $64i$ D. -64

31. If $f(x) = \frac{7}{x^2 - 11x + 18}$, $g(x) = \frac{4}{x^2 - 3x - 54}$, find $f(x) + g(x)$.

- A. $\frac{11x^2 - 65x - 306}{(x-2)(x-9)(x+6)}$
 B. $\frac{11x^2 - 36}{(x-2)(x+9)(x-6)}$
 C. $\frac{11x + 34}{(x-2)(x-9)(x+6)}$
 D. $\frac{11x^2 - 65x - 18}{(x-2)(x+9)(x-6)}$

32. What is true of $f(x) = \frac{-5x^2 + 10x}{7}$?
- It is not a polynomial function.
 - It is a polynomial function of degree two.
 - It is not defined for all real numbers.
 - It has no real roots.
33. Factor $4x^3 + 33x^2 + 68x + 15$ given that $x + 3$ is a factor.
- $(x + 3)(x + 5)(4x + 1)$
 - $(x + 3)(x - 5)(4x - 1)$
 - $(x + 3)(x + 5)(4x - 1)$
 - $(x - 3)(x - 5)(4x + 1)$
34. If $f(x) = \frac{x+9}{x-1}$, find all values for which $f(x) = \frac{3}{2}$.
- $x = \frac{21}{5}$
 - $x = 21$
 - $x = 15$
 - $x = -2$
35. Solve the following system: $\begin{cases} 5x + 2y = 11 \\ 4x + 7y = -2 \end{cases}$.
- This system of equations has no solution.
 - $x = \frac{31}{15}, y = \frac{1}{3}$
 - This system of equations has an infinite number of solutions.
 - $x = 3, y = -2$
36. What is **not** true of the graph of $y = f(x)$ shown below?



- It has three distinct roots.
- $f(-4)$ is negative.
- It does not cross the x -axis at $x = 0$.
- The domain is $(-\infty, \infty)$.

37. Solve: $\left| \frac{6}{7}x + 6 \right| + 3 = 14$.

- A. $\left\{ \frac{161}{6}, \frac{119}{6} \right\}$ B. $\left\{ -\frac{102}{7}, \frac{119}{6} \right\}$ C. $\left\{ -\frac{161}{6}, \frac{30}{7} \right\}$ D. $\left\{ -\frac{119}{6}, \frac{35}{6} \right\}$

38. $(8y^2 - 10y^3 + y - 14) - (4y - 9y^3 + 7y^2 - 11) =$

- A. $-19y^3 + 15y^2 - 3y - 25$
B. $-19y^3 + 15y^2 + 3y - 3$
C. $-y^3 + y^2 - 3y - 3$
D. $-y^3 - y^2 - 3y - 3$

39. What is true of $f(x) = -2x^4 + 4x^2 + 4$?

- A. The graph is symmetric around the origin.
B. The graph has no symmetry.
C. This is an even function.
D. This is a parabola opening downward.

40. Which point is on the line that passes through the point $(-5, 3)$ and has slope $m = -4$?

- A. $(1, -21)$ B. $(-4, 1)$ C. $(0, 7)$ D. $(-1, 19)$

41. $(x-3)^2 =$

- A. $x^2 - 9$
B. $x^2 + 9$
C. $x^2 - 6x + 9$
D. $x^2 - 6x - 9$

42. Simplify: $\frac{1}{4}\sqrt{800} - \sqrt{200} + \frac{1}{2}\sqrt{6^2}$.

- A. $-2\sqrt{2}$ B. $-5\sqrt{2} + 3$ C. $15\sqrt{2} + 3$ D. $5\sqrt{2} + 3$

43. What is the domain of $f(x) = \sqrt{-x-4}$?

- A. $(-\infty, -4]$ B. $(-\infty, 0]$ C. $[-4, \infty)$ D. $[0, \infty)$

44. If $f(x) = \frac{x}{x^2 - 16}$ and $g(x) = \frac{7}{x^2 + 5x + 4}$, find $f(x) - g(x)$.

- A. $\frac{x^2 - 6x + 28}{(x - 4)(x + 4)}$
 B. $\frac{x^2 - 6}{(x - 4)(x + 4)}$
 C. $\frac{x^2 - 6x + 28}{(x - 4)(x + 4)(x + 1)}$
 D. $\frac{x^2 + 6x + 28}{(x - 4)(x + 4)(x + 1)}$

45. Find the vertex of the graph of the function $f(x) = 3x^2 + 24x + 46$.

- A. (4, 2) B. (-4, -2) C. (-2, -4) D. (2, 4)

46. Solve: $\sqrt{x + 9} - 3 = x$.

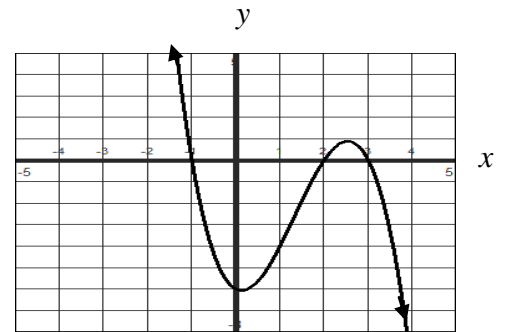
- A. $x = 0, x = -5$ B. $x = -5$ C. $x = 0$ D. \emptyset

47. What is the least common denominator for $\frac{3x}{x^2 - 16}$ and $\frac{4}{2x - 8}$?

- A. $2(x + 4)(x - 4)$
 B. $4(x^2 - 16) + 3x(2x - 8)$
 C. $2(x - 4)$
 D. $(x^2 - 16)(2x - 8)$

48. What is **not true** about the graph of $y = f(x)$ shown at the right?

- A. The y-intercept is at (0, -6).
 B. The zeros are at (-1, 0), (2, 0), (3, 0).
 C. The range of this function is $(-\infty, \infty)$.
 D. The graph is symmetric about the origin.



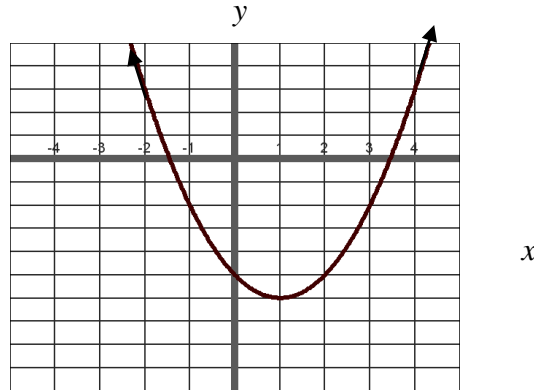
49. The discriminant of a quadratic equation with real coefficients is -9 . Which of the following statements is true?

- A. There is only one solution and this may be real or complex.
 B. There are two complex solutions.
 C. There are two real solutions.
 D. There may be 0, 1, or 2 real solutions.

50. Solve:
$$\begin{cases} x - 2y = 7 \\ 2x + 5y = 5 \end{cases}$$

- A. $x = -5, y = -1$ B. $x = 4, y = 0$ C. $x = 4, y = 4$ D. $x = 5, y = -1$

51. What is the domain and range of the graph shown below? You may assume that each tick mark represents one unit.



- A. Domain $(-\infty, \infty)$, Range $[2, \infty)$
 B. Domain $(-\infty, \infty)$, Range $[-6, \infty)$
 C. Domain $(-\infty, \infty)$, Range $(-\infty, \infty)$
 D. Domain $(-\infty, \infty)$, Range $[0, \infty)$
52. Which of the following is the graph of $f(x) = |x|$ moved one unit to the right, two units up, and reflected across the x -axis?

- A. $f(x) = -|x + 1| + 2$
 B. $f(x) = -|x + 2| + 1$
 C. $f(x) = -|x - 1| + 2$
 D. $f(x) = -|x - 2| + 1$

53. Evaluate: $(2 - 5i) + (5 + 2i)$.

- A. $-3 + 7i$ B. $-7 + 3i$ C. $7 - 3i$ D. $7 + 3i$

54. What is true of the graph of $f(x) = x^3 - 3x^2$?

- A. The graph does not cross the x -axis at $(0, 0)$.
 B. The graph does not cross the x -axis at $(3, 0)$.
 C. The graph is symmetric around the y -axis.
 D. The graph is symmetric around the origin.

55. The following table shows the number of packages of paper purchased, P , and the cost, C , of purchasing that number of packages of paper:

P	C (\$)
2	8
6	24
8	32

Which of the following expresses C in terms of P ?

- A. $C = 4 + P$ C. $C = 4P$
 B. $C = \frac{P}{4}$ D. $C = P - 4$

56. Solve: $x + 1 < 4$ and $3 - x > 5$.

- A. $(-\infty, -2)$ B. $(-\infty, 3)$ C. $(-2, 3)$ D. $(-\infty, -2) \cup (3, \infty)$

57. Simplify: $\sqrt{225a^{12}b^6}$.

- A. $15a^6b^3$ B. $15a^{12}b^6$ C. $25a^6b^3$ D. $115a^9b^9$

58. Divide: $\frac{9 - 2i}{3 - 6i}$.

- A. $3 + \frac{1}{3}i$ B. $-2\frac{1}{3}i$ C. $\frac{13}{15} - \frac{16}{15}i$ D. $\frac{13}{15} + \frac{16}{15}i$

59. Perform the indicated operations and simplify: $\frac{x^2 - 4x - 21}{7x} \cdot \frac{x^2 - 7x}{x^2 - 14x + 49} \div \frac{x + 3}{x + 7}$.

- A. $\frac{x+7}{7}$ B. $\frac{x-7}{x}$ C. $\frac{x+7}{3}$ D. $\frac{x+3}{x}$

60. Solve $A = \frac{BC}{Bx + Y}$ for B.

A. $B = AY(Ax - C)$.

B. $B = \frac{AY}{Ax - C}$

C. $B = \frac{Y}{C - Ax}$

D. $B = \frac{AY}{C - Ax}$

61. Profit may be determined by calculating the revenue function minus the cost function. If the revenue a store receives is modeled by the function $R(x) = 55x - 2x^2$ and the store's costs are modeled by the function $C(x) = 23x + 98$, find the x -value that will make the store's profit a maximum.

- A. 9 B. 16 C. 8 D. 13.75

62. For which values is $\frac{x^2 + x - 6}{3x^2 - 20x - 7}$ undefined?

- A. $x = -3, x = 7$ C. $x = \frac{1}{3}, x = -7$
 B. $x = -3, x = 2$ D. $x = -\frac{1}{3}, x = 7$

63. Factor completely: $7x^8 + 8x^7 - 35x - 40$.

- A. $(x^7 - 5)(7x + 8)$ C. $(x^8 - 5)(7x + 8)$
 B. $(x^2 + 5)(7x - 8)$ D. $(x^7 - 5)(7x - 8)$

64. An arrow is shot into the air at a speed of 32 feet per second from a platform 12 feet high. The height of the arrow is given by the function $h(t) = -16t^2 + 32t + 12$, where t is time in seconds. What is the maximum height of the arrow?

- A. 28 feet B. 16 feet C. 12 feet D. 11 feet

65. Factor: $4x^2 - 25y^2$.

- A. $(2x + 5y)(2x + 5y)$ C. $(2x + 5y)(2x - 5y)$
 B. $(2x - 5y)(2x - 5y)$ D. $(4x + 5y)(x - 5y)$

66. What is true of the line passing through the point $(5, -3)$ and $(2, 6)$?

- A. $m = 3$ and the y-intercept is $(0, 0)$.
 B. $m = -3$ and the y-intercept is $(0, 12)$.
 C. $m = \frac{1}{3}$ and the y-intercept is $(0, 9)$.
 D. $m = -\frac{1}{3}$ and the y-intercept is $(0, -9)$.

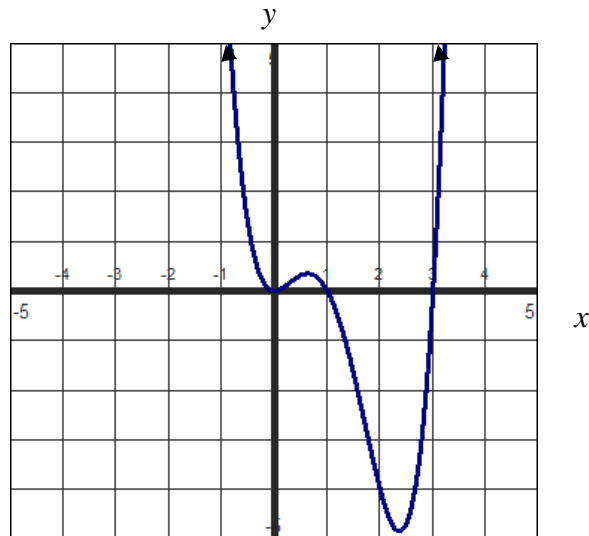
67. $\frac{8x}{3x+6} \cdot \frac{2x+4}{x^2-4} =$

- A. $\frac{4x}{3x^2-3}$ B. $\frac{16}{(3x+6)}$ C. $\frac{4x^2}{3x+3}$ D. $\frac{16x}{3x^2-12}$

68. 1,000 people were surveyed. Let $f(x)$ equal the number of people who are fans of the Philadelphia Phillies baseball team. Let $g(x)$ equal the number of people who are fans of the New York Yankees Baseball team. Everyone else picked some other team. Which of the statements below represents the number of people who picked another team?

- A. $1,000 + (f(x) + g(x))$
- B. $1,000 - (f(x) - g(x))$
- C. $1000 - (f(x) + g(x))$
- D. $(f(x) - g(x)) - 1000$

Use the graph of $y = f(x)$ below to answer questions 69 and 70.



69. The graph has a repeated root at $x = 0$.

- A. True
- B. False
- C. Cannot be determined from the graph.

70. This is the graph of a polynomial function.

- A. True
- B. False
- C. Cannot be determined from the graph.

Key

- | | |
|-------|-------|
| 1. B | 36. C |
| 2. B | 37. D |
| 3. C | 38. C |
| 4. B | 39. C |
| 5. A | 40. A |
| 6. B | 41. C |
| 7. D | 42. B |
| 8. D | 43. A |
| 9. D | 44. C |
| 10. A | 45. B |
| 11. C | 46. C |
| 12. B | 47. A |
| 13. A | 48. D |
| 14. C | 49. B |
| 15. C | 50. D |
| 16. B | 51. B |
| 17. A | 52. C |
| 18. C | 53. C |
| 19. B | 54. A |
| 20. C | 55. C |
| 21. D | 56. A |
| 22. B | 57. A |
| 23. D | 58. D |
| 24. C | 59. A |
| 25. B | 60. D |
| 26. C | 61. C |
| 27. C | 62. D |
| 28. A | 63. A |
| 29. B | 64. A |
| 30. D | 65. C |
| 31. C | 66. B |
| 32. B | 67. D |
| 33. A | 68. C |
| 34. B | 69. A |
| 35. D | 70. A |