

Unit 1: Equations, Inequalities, Functions

1. Solve the system of equations.

a)
$$\begin{cases} 3x - y = 8 \\ y = 4 - x \end{cases}$$

b)
$$\begin{cases} 3x - 5y = 11 \\ x - 3y = 1 \end{cases}$$

c)
$$\begin{cases} 5x + 2y = 6 \\ 9x + 2y = 22 \end{cases}$$

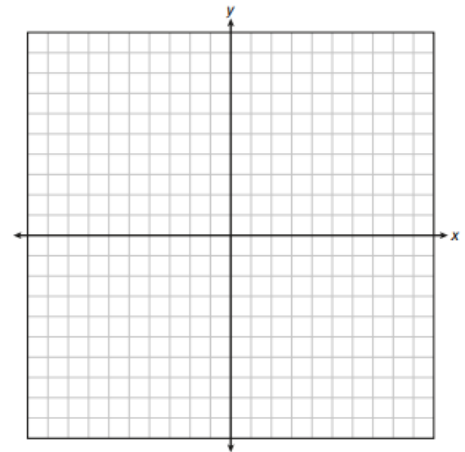
2. Aaron and Zelly want to rent a tandem bike so that they can ride together. The rental for a tandem bike is \$18.50 per hour plus \$3 per helmet. Write a function that gives the cost c as a function of the number of hours h that they can rent the bike.

3. Graph the following inequalities on the same grid and shade the solution region that is common to all the inequalities.

$$x < 2$$

$$y \leq 2x$$

$$y \geq -3x + 2$$



4. For parts a-f, use these three functions to evaluate each composite function.

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

$$g(x) = 3x$$

$$h(x) = 2x - 3$$

a) $(f \circ g)(2)$

b) $(g \circ f)(1)$

c) $(f \circ h)(4)$

d) $(g \circ h)(3)$

e) $(h \circ f)(-1)$

f) $(h \circ g)(-2)$

5. Find the inverse of each function.

a) $f(x) = 3x + 1$

b) $g(x) = \frac{1}{2}x - 3$

c) $h(x) = \frac{3}{4}x - 3$

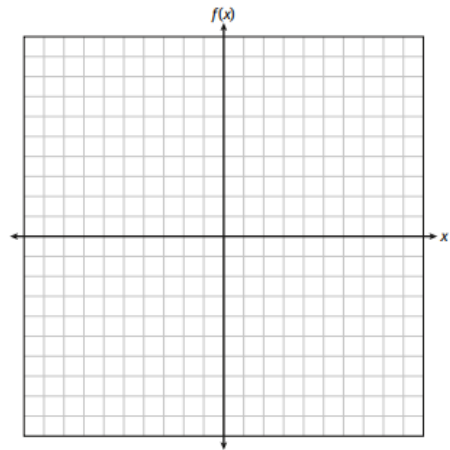
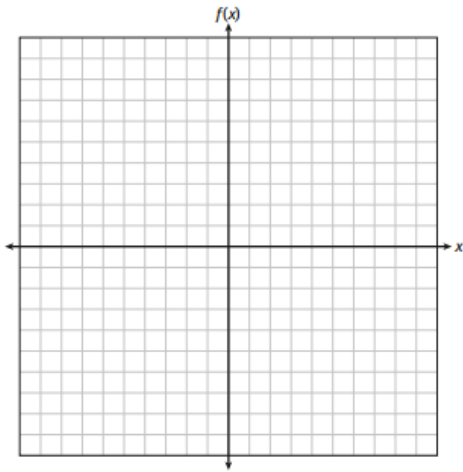
d) $j(x) = \frac{2x+3}{4}$

6. If $f(x) = 5x - 3$ and $g(x)$ is the inverse of $f(x)$, then what is $(f \circ g)(6) - (g \circ f)(6)$?

7. Graph the following piecewise functions.

$$\text{a) } f(x) = \begin{cases} 3x + 1 & \text{if } x < 1 \\ -x + 2 & \text{if } x > 1 \end{cases}$$

$$\text{b) } h(x) = \begin{cases} x - 8 & \text{if } x > 3 \\ x^2 - 5 & \text{if } x \leq 3 \end{cases}$$



8. A medical rescue helicopter is flying at an average speed of 172 miles per hour toward its base hospital. At 2:42 pm, the helicopter is 80 miles from the hospital. The equation $172 \left(\frac{m}{60}\right) = 80$, can be used to determine the number of minutes, m , it will take the helicopter to reach the hospital. What is the value of m ?

Unit 2: Quadratic Functions

Factor the following problems:

9. $x^2 - 8x - 20$

10. $4x^2 + 4x - 3$

11. $x^2 - 7x + 6$

12. $3x^2 + 9x$

13. $2x^2 + 4x + 2$

14. $4x^2 - 81$

Solve the quadratic equation.

15. $x^2 - 4x - 60 = 0$

16. $-2x^2 + 7x + 15 = 0$

17. $x^2 - 7x + 11 = 5$

18. $x^2 - 16 = 0$

19. $5x^2 + 100 = 0$

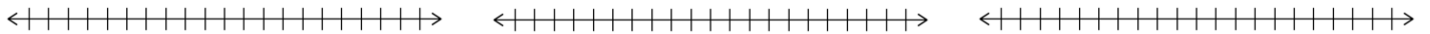
20. $x^2 - 3x - 11 = 1 + x$

Find the solutions to the inequality and graph them.

21. $x^2 - x < 12$

22. $2x^2 - 9x - 5 \geq 0$

23. $x^2 + 8x + 7 > 0$



Simplify.

24. $\sqrt{-81}$

25. $\sqrt{-150}$

26. $-\sqrt{-12}$

27. $5 + \sqrt{-15}$

Find the sum or difference.

28. $(8 - 3i) - (2 + 14i)$

29. $(8 + 6i) + (10 - i)$

30. $(6 + 3i) - (2 - 5i)$

Find the product or quotient.

31. $(3 - 2i)(5 + 2i)$

32. $(9 - 13i)(1 - 2i)$

33. $\frac{4-7i}{-2+3i}$

Solve using the quadratic formula.

34. $x^2 + 8x = -14$

35. $2x^2 + 10x - 3 = 0$

Find the discriminant and state the nature of the solutions.

36. $3x^2 + 7x = -12$

37. $3x^2 + x - 7 = 0$

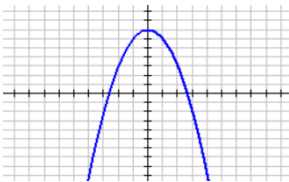
Describe the transformation of the parent function $f(x) = x^2$. Then state the vertex and match the function to its graph.

38. $g(x) = (x - 3)^2 - 6$

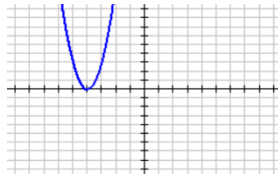
39. $g(x) = 3(x + 4)^2$

40. $g(x) = -x^2 + 7$

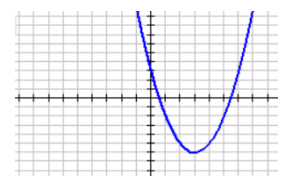
a.



b.



c.



Unit 3: Polynomials

Find the sum:

41. $(3x^2 - 5x^3 + 2) + (8x - 6x^2 + 7x^3)$

42. $(6x - 4 + 2x^3) + (4 - 2x^2 + 9x)$

Find the difference:

43. $(9x^4 - 2x^2 - 8x) - (12x^2 + 3x - 4x^4)$

44. $(x^3 + 2x^2 - 6) - (4x^5 - 6x^2 + 3)$

Find the product

45. $5x^2(2x^2 - x + 5)$

46. $(x - 3)(2x^2 - x + 3)$

Find the quotient:

47. $(x^4 - 3x^3 - 2x^2 + 3x + 2) \div (x + 4)$

48. $(x^3 + 2x^2 - 5x - 6) \div (x - 2)$

For numbers 49-53, determine if the function is even, odd, or neither.

49. $f(x) = 8x^3 - 5$

50. $f(x) = -5 + (x - 3)^2$

51. $f(x) = 13x^4 - 5x^2$

52. $f(x) = 5x^5 - 3x^3 - 4x$

53. $f(x) = 3(x^3 - 4x + 1)$

54. What is the degree of the product $3x^3(4x^2)$

55. What is the degree of a polynomial of degree 4 multiplied by a polynomial of degree 5?

Factor the following problems:

56. $2x^4 - x^3 - 18x^2 + 9x$

57. $8x^3 - 64x^2 + x - 8$

58. $x^2 - 9$

59. $x^2 - 4$

60. $x^2 - 25$

Unit 4: Sequences and Series

61. Consider the arithmetic sequence with $a_1 = 37$, and $d = 8$. Write the explicit formula with a_n in terms of n and a_8 ?

62. Consider the arithmetic sequence with $a_2 = -3$, and $d = 2$. Write the explicit formula with a_n in terms of n and a_{12} ?

63. Consider the arithmetic sequence 32, 42, 52, ...

Write a recursive formula for a_n , and what is the value of a_{17} ?

64. Consider the arithmetic sequence 11, 6, 1, ...

Write a recursive formula for a_n , and what is the value of a_{27} ?

65. Write a formula for the n th partial sum of the arithmetic series with $a_4 = 23$ and $d = 2$.

66. Write a formula for the n th partial sum of the arithmetic series with $a_8 = 83$ and $d = -3$.

67. Consider the geometric sequence with $4, -16, 64, \dots$

Write the explicit formula for a_n in terms of n , and a_9 .

68. Consider the geometric sequence with $8, 16, 32, \dots$

Write the explicit formula for a_n in terms of n , and a_{14} .

69. Consider the geometric sequence with $4, -12, 36, \dots$

Write the recursive formula for a_n in terms of a_{n-1} , and a_{14} .

70. Consider the geometric sequence with $-1, 6, -36, \dots$

Write the recursive formula for a_n in terms of a_{n-1} , and a_{11} .