Completion Example Answers

2. $(4x)^2-(9)^2=16x^2-81$ **4.** $(3x)^2+2\cdot 10\cdot 3x+(10)^2=9x^2+60x+100$

Margin Exercise Answers

1. a. x^2-36 **b.** $16y^2-9$ **c.** x^8-9 **2.** $4x^4-36$ **3. a.** $9x^2+30x+25$ **b.** $16x^2-16x+4$
c. $4x^2-32x+64$ **d.** $4y^6-8y^3+4$ **4.** $25x^2-20x+4$

12.7 Exercises

Concept Check

Fill-in-the-Blank. Complete each sentence using information found in this section.

1. When two binomials are in the form of the sum and difference of the same term, the product is called the ___________ of two squares.
2. When the two binomials being multiplied together are the same, that product is called the _______ of a binomial.
3. The result of squaring a binomial is a/an _________.
4. Trinomials that are the result of squaring binomials are called _________ square trinomials.

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

5. When two binomials are in the form of the sum and difference of the same term, the product will be a trinomial.
6. When the two binomials being multiplied together are the same, the product will be a trinomial.
7. Perfect square trinomials result from squaring a binomial sum or a binomial difference.
8. When finding the product of two binomials that are in the form of the sum and difference of the same two terms, the FOIL method and the difference of two squares formula will produce different results.

Practice

Find each product and identify any that are either the difference of two squares or a perfect square trinomial. See Examples 1 through 4.

1. $(x-7)^2$
2. $(x-5)^2$
3. $(x+4)(x+4)$
4. $(x+8)(x+8)$
5. $(x+3)(x-3)$
6. $(x-6)(x+6)$
7. $(x+9)(x-9)$
8. $(x+12)(x-12)$
9. $(2x+3)(x-1)$
10. $(3x+1)(2x+5)$
11. $(3x-4)^2$
12. $(3x+1)^2$
13. $(5x+2)(5x-2)$
14. $(2x+1)(2x-1)$
15. $(3x-2)(3x-2)$

16. $(3+x)^2$

17. $(8-x)(8-x)$

18. $(5-x)(5-x)$

19. $(4x+5)(4x-5)$

20. $(11-x)(11+x)$

21. $(5x-9)(5x+9)$

22. $(9x+2)(9x-2)$

23. $(4-x)^2$

24. $(3x+7)^2$

25. $(2x+7)(2x-7)$

26. $(6x+5)(6x-5)$

27. $(5x^2+2)(2x^2-3)$

28. $(4x^2+7)(2x^2+1)$

29. $(1+7x)^2$

30. $(2-5x)^2$

Find each product.

31. $(5+x)(5+x)$

32. $(3-x)(3-x)$

33. $(x^2+1)(x^2-1)$

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

35. $(x^2+3)(x^2+3)$

36. $(x^3+8)(x^3+8)$

37. $(x^3-2)^2$

38. $(x^2-4)^2$

39. $(3x+2)(3x-2)$

40. $(3x-1)(3x+1)$

41. $(4x+3)(4x-3)$

42. $(8x+5)(8x-5)$

43. $(5x+3)(5x+3)$

44. $(3x+4)(3x+4)$

45. $(6x-5)^2$

46. $(7x-2)^2$

Use a calculator as an aid in multiplying the binomials.

47. $(x+1.4)(x-1.4)$

48. $(x-2.1)(x+2.1)$

49. $(x-2.5)^2$

50. $(x+1.7)^2$

51. $(x+2.15)(x-2.15)$

52. $(x+1.36)(x-1.36)$

53. $(x+1.24)^2$

54. $(x-1.45)^2$

55. $(1.42x+9.6)^2$

56. $(0.46x-0.71)^2$

57. $(11.4x+3.5)(11.4x-3.5)$

58. $(2.5x+11.4)(1.3x-16.9)$

59. $(12.6x-6.8)(7.4x+15.3)$

60. $(3.4x+6)(3.4x-6)$

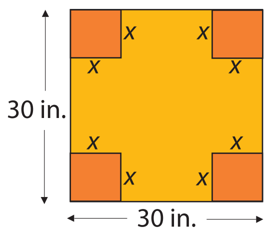
Applications

Solve.

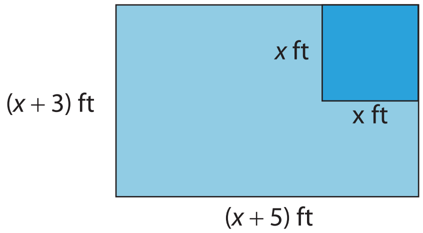
61. A square is 30 inches on each side. A square that is x inches on each side is cut from each corner of the 30-inch square.

a. Represent the area of the remaining portion of the square in the form of a polynomial function $A(x)$.

b. Represent the perimeter of the remaining portion of the square in the form of a polynomial function $P(x)$.



62. A rectangle has sides $(x+3)$ feet and $(x+5)$ feet. If a square that is x feet on each side is cut from the rectangle, represent the remaining area in the form of a polynomial function $A(x)$.



63. In the case of binomial probabilities, if x is the probability of success in one trial of an event, then the expression $f(x)=15x^4(1-x)^2$ is the probability of 4 successes in 6 trials where $0 \le x \le 1$.

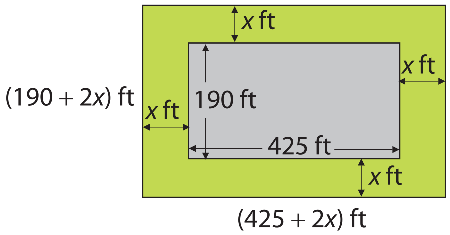
a. Represent the expression $f(x)$ as a single polynomial by multiplying the polynomials.

b. If a fair coin is tossed, the probability of heads occurring is $\frac{1}{2}$. That is, $x = \frac{1}{2}$. Find the probability of 4 heads occurring in 6 tosses.

64. The Americans with Disabilities Act requires sidewalks to be x feet wide in order for wheelchairs to fit on them. At the bottom, the Empire State Building is 425 feet long and 190 feet wide and a regulation sidewalk surrounds the building.

a. Represent the area covered by the building and the sidewalk in the form of a polynomial function.

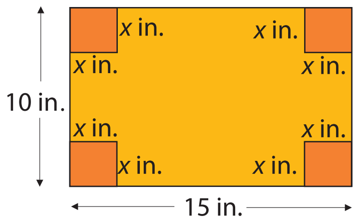
b. Represent the area covered by just the sidewalk in the form of a polynomial function.



65. A rectangular piece of cardboard that is 10 inches by 15 inches has squares of length x inches on a side cut from each corner. (Assume that $0 < x < 5$.)

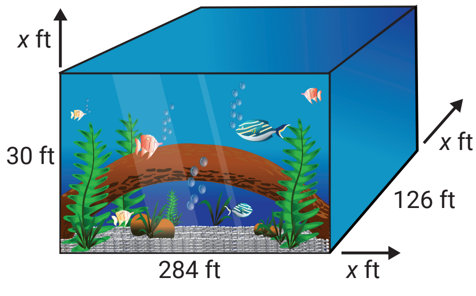
a. Represent the remaining area in the form of a polynomial function $A(x)$.

b. Represent the perimeter of the remaining figure in the form of a polynomial function $P(x)$.

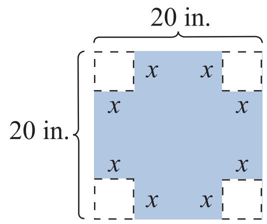


c. If the flaps of the cardboard are folded up, an open box is formed. Represent the volume of this box in the form of a polynomial function $V(x)$. (**Note:** Volume = length × width × height.)

66. The world's largest single aquarium habitat, located at the Georgia Aquarium, is 284 feet long, 126 feet wide, and 30 feet deep. Another aquarium is attempting to make a tank that is x feet longer, wider, and deeper. Represent the volume of the new tank as a polynomial function $V(x)$. (**Note:** The volume of the aquarium is the product of its length, width, and height, $V = lwh$.)



67. Lee is making a box. He starts with a piece of cardboard that is 20 inches by 20 inches. He cuts a square with side length x from each corner of the box.



a. Write a polynomial function $A(x)$ to represent the area of the cardboard that remains after the corners are cut out.

b. When the sides of the box are folded up, what will be the side lengths of the base of the box?

c. Write a polynomial function $B(x)$ to represent the area of the base of the box when the sides are folded up.

d. The height of the box will be x inches. Write a polynomial function $V(x)$ to determine the volume of the box.

Writing & Thinking

68. A square with sides of length $(x+5)$ can be broken up as shown in the diagram. The sums of the areas of the interior rectangles and squares is equal to the total area of the square: $(x+5)^2$. Show how this fits with the formula for the square of a sum.