4.5 Exercises

Concept Check

Fill-in-the-Blank. Complete the sentences using information found in this chapter.

1. The distributive property can be used to find the _____ of a monomial and a polynomial.
2. When multiplying two polynomials together, the distributive property is applied by multiplying each _____ of one polynomial by each _____ of the other.
3. In the case of the product of two _____, the FOIL method is used.
4. The O in the FOIL method stands for multiplying the _____ terms together.
5. When binomials are in the form of the sum and difference of the same terms, their product is called the _____ of two squares.
6. The result of squaring a binomial is a _____.

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.)

7. The distributive property can only be used to multiply a monomial and a polynomial.
8. The FOIL method is a way to remember one specific order that the distributive property can be applied.
9. When two binomials are in the form of the sum and difference of the same term, the product will be a trinomial.
10. When the two binomials being multiplied together are the same, the product will be a trinomial.

Find the indicated products and simplify, if possible.

1. $5x\left(x^2-2x+3\right)$
2. $2x^2\left(3x^2+5x-1\right)$
3. $xy^2\left(x^2+4y\right)$
4. $x^2z(x-4y+z)$
5. $(x+3)(x-6)$
6. $(x-2)(x-5)$
7. $(x-8)(x-1)$
8. $(x+2)(x+4)$
9. $(2y+1)(y-6)$
10. $(y+5)(3y+2)$
11. $(3x-4)(x-5)$
12. $(2x-1)(x-2)$
13. $(2y+3)(3y+2)$
14. $(5y-2)(3y+1)$

15. $(8x+3)(x-5)$

16. $(7x+6)(2x-3)$

17. $(9x+1)(3x-2)$

18. $(5x-11)(3x+4)$

19. $(3x+1)^2$

20. $(4x-3)^2$

21. $(5x-2y)^2$

22. $(7x+4y)^2$

23. $(4x+7)(4x-7)$

24. $(3x+5)(3x-5)$

25. $(2x-3y)(2x+3y)$

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

27. $x(3x^2-4)(3x^2+4)$

28. $3x(7x^2+8)(7x^2-8)$

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

30. $(y+4)(y^2-4y+16)$

31. $(x+3)(x^2+6x+9)$

32. $(y-5)(y^2+3y+2)$

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

34. $(2x^3-3)^2$

35. $(2x^3-7)(2x^3+7)$

36. $(x+2y)(x^2-2xy+4y^2)$

37. $(x-3y)(x^2+3xy+9y^2)$

38. $(8y^2-7)(3y^2+2)$

39. $(x^2+6y^2)(x^2-6y^2)$

40. $(x^2-6y^2)(x^2+3y^2)$

41. $(5x^2+y^2)(2x^2-3y^2)$

42. $(x-2y)(x^2+2xy+4y^2)$

43. $[(x+y)+2][(x+y)-2]$

44. $[(x+1)+y][(x+1)-y]$

45. $[(5x-y)+3]^2$

46. $[(2x+1)-y]^2$

47. $[(x+4)-2y]^2$

48. $[(x-3y)+5]^2$

49. $x^2(x^k+3)$

50. $x^3(x^{2k}+x)$

51. $(x^k+3)(x^k-5)$

52. $(x^k+6)(x^k-6)$

53. $(x^k+1)(x^k+4)$

54. $(2x^k-3)(x^k+2)$

55. $(3x^k+2)(x^k+5)$

56. $\left(x+\frac{1}{4}\right)\left(x-\frac{1}{4}\right)$

57. $\left(x+\frac{5}{8}\right)\left(x-\frac{5}{8}\right)$

58. $\left(x+\frac{2}{3}\right)^2$

59. $\left(y-\frac{1}{5}\right)^2$

60. $\left(y+\frac{1}{4}\right)\left(y-\frac{3}{4}\right)$

61. $(x+2.5)(x-2.5)$

62. $(x+2.1)^2$

63.
$$\begin{array}{r} 2x^2 - 5x - 6 \\ \underline{\qquad\quad 3x + 1} \end{array}$$

64.
$$\begin{array}{r} x^2 + 2x + 1 \\ \underline{x^2 + 2x + 1} \end{array}$$

65.
$$\begin{array}{r} x^3 - 3x + 4 \\ \underline{\qquad\quad 2x - 3} \end{array}$$

66. $2x^3 + 6x^2 + 5$
$\underline{\qquad\qquad x^2 + 5}$

67. $x^3 - 7x - 4$
$\underline{\qquad\qquad 4x - 6}$

68. $x^3 - 5x + 14$
$\underline{\qquad\qquad 2x - 3}$

Applications

Solve.

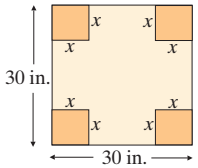
69. In the case of binomial probabilities, if x is the probability of success in one trial of an event, then the expression $P(x) = 10x^3(1-x)^2$ is the probability of 3 successes in 5 trials where $0 \le x \le 1$.

a. Represent the expression $P(x)$ as a single polynomial function.

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 exactly 3 heads occurring in 5 tosses.

c. A basketball player is known to make 80% of his free throws. What is the probability that he will make exactly 3 of his next 5 attempts?

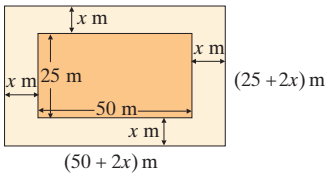
70. A square is 30 inches on each side. A small square, x inches on each side, is cut from each corner of the original square.



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 $P(x)$.

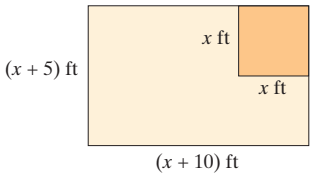
71. A swimming pool, 25 meters by 50 meters, is surrounded by a concrete deck that is x meters wide.



a. Represent the area covered by the deck and the pool in the form of a polynomial function.

b. Represent the area covered by the deck only in the form of a polynomial function.

72. A rectangle has sides $(x + 5)$ ft and $(x + 10)$ ft. A square x feet on each side is cut from one corner of the rectangle.



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

b. Represent the perimeter of the remaining figure (after the square in the corner has been removed) in the form of a polynomial function $P(x)$.

Writing & Thinking

73. 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.