Completion Example Answers

3. $(y+8)(y+2)$ **5.** $5(a^2+5a-36)=5(a+9)(a-4)$

Margin Exercise Answers

1. $(x+3)(x+7)$ **2.** $(x-5)(x+4)$ **3.** $(x-3)(x-2)$ **4. a.** $7y(y-1)(y+6)$
b. $11xy(x+3)(x-1)$ **5.** $6(x+4)(x-2)$

7.2 Exercises

Concept Check

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

1. To factor a trinomial that has 1 as its leading coefficient, find two factors of the ________ term whose sum is the coefficient of the ________ term.
2. When listing all the pairs of factors for a particular term, the _______-_______-_______ method is being used.
3. When factoring trinomials with leading coefficient 1, if the constant is __________, then both factors have the same sign.
4. If the leading coefficient of a trinomial is not one, the first step in factoring is to look for a/an ______ monomial factor to factor out.
5. When factoring trinomials with leading coefficient 1, if the constant term is negative, then the factors of that constant have __________ sign(s).

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.)

6. In a trinomial such as $x^2 - 5x + 4$, one would need to find two factors of 4 whose sum is negative 5.
7. In factoring a trinomial with leading coefficient 1, if the constant term is negative, then both factors must be negative.
8. The first step in factoring a trinomial is to look for a common monomial factor.
9. For a trinomial with leading coefficient 1, if no pair exists whose product is the constant and whose sum is the middle term's coefficient, then the trinomial is not factorable.

Practice

List all pairs of integer factors for each given integer. Remember to include negative integers as well as positive integers.

1. 15
2. 12
3. 20
4. 30

5. -6

6. -7

7. 16

8. 18

9. -10

10. -25

Find the pair of integers whose product is the first integer and whose sum is the second integer.

11. 12, 7

12. 25, 26

13. -14, -5

14. -30, -1

15. -8, 7

16. -40, 6

17. 36, -12

18. 16, -10

19. 20, -9

20. 4, -5

Complete each factorization as indicated.

21. $x^2+6x+5=(x+5)(\quad)$

22. $y^2-7y+6=(y-1)(\quad)$

23. $p^2-9p-10=(p+1)(\quad)$

24. $m^2+4m-45=(m-5)(\quad)$

25. $a^2+12a+36=(a+6)(\quad)$

26. $n^2-2n-3=(n-3)(\quad)$

Completely factor each trinomial. If a trinomial cannot be factored, write "not factorable." See Examples 1 through 5.

27. $x^2 - x - 12$

28. $x^2 - 6x - 27$

29. $y^2 + y - 30$

30. $x^2 + 6x - 36$

31. $m^2 + 3m - 1$

32. $x^2 + 3x - 18$

33. $x^2 - 8x + 16$

34. $a^2 + 10a + 25$

35. $x^2 + 7x + 12$

36. $a^2 + a + 2$

37. $y^2 - 3y + 2$

38. $y^2 - 14y + 24$

39. $x^2 + 3x + 5$

40. $y^2 + 12y + 35$

41. $x^2 - x - 72$

42. $y^2 + 8y + 7$

43. $z^2 - 15z + 54$

44. $a^2 + 4a - 21$

45. $x^3 + 10x^2 + 21x$

46. $x^3 + 8x^2 + 15x$

47. $5x^2 - 5x - 60$

48. $6x^2 + 24x + 18$

49. $10y^3 - 10y^2 - 60y$

50. $7y^3 - 70y^2 + 168y$

51. $4p^4 + 36p^3 + 32p^2$

52. $15m^5 - 30m^4 + 15m^3$

53. $2x^4 - 14x^3 - 36x^2$

54. $3y^6 + 33y^5 + 90y^4$

55. $2x^2 - 2x - 72$

56. $3x^2 - 18x + 30$

57. $2a^4 - 8a^3 - 120a^2$

58. $2a^4 + 24a^3 + 54a^2$

59. $3y^5 - 21y^4 - 24y^3$

60. $4y^5 + 28y^4 + 24y^3$

61. $x^3 - 10x^2 + 16x$

62. $x^3 - 2x^2 - 3x$

63. $5a^2 + 10a - 30$

64. $6a^2 + 24a + 12$

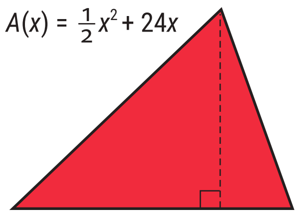
65. $20a^4 + 40a^3 + 20a^2$

66. $6x^4 - 12x^3 + 6x^2$

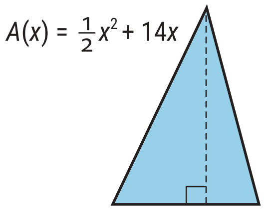
Applications

Solve.

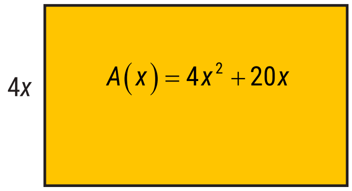
67. The area of a triangle is $\frac{1}{2}$ the product of its base and its height. If the area of the triangle shown is given by the function $A(x) = \frac{1}{2}x^2 + 24x$, find representations for the lengths of its base and its height (where the base is longer than the height).



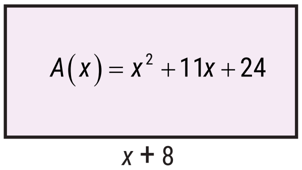
68. The area of a triangle is $\frac{1}{2}$ the product of its base and its height. If the area of the triangle shown is given by the function $A(x) = \frac{1}{2}x^2 + 14x$, find representations for the lengths of its base and its height (where the height is longer than the base).



69. The area of the rectangle shown is given by the polynomial function $A(x) = 4x^2 + 20x$. If the width of the rectangle is $4x$, what is the length?



70. The area of the rectangle shown is given by the polynomial function $A(x) = x^2 + 11x + 24$. If the length of the rectangle is $(x + 8)$, what is the width?



71. A ball is thrown upward from an initial height of 96 feet with an initial velocity of 16 feet per second. After t seconds, the height of the ball can be described by the polynomial $-16t^2 + 16t + 96$.

a. What is the height of the ball after 3 seconds?

b. Completely factor the polynomial $-16t^2 + 16t + 96$.

c. Use the factored form of the polynomial from part b. to find the height of the ball after 3 seconds.

d. Are the answers from parts a. and c. the same? Why do you think this is?

72. A large call center determines that the average number of calls they receive per hour of the day can be modeled by the polynomial $-x^2 + 25x - 100$, where x is the hour of the day, 1 through 24.

a. Factor the polynomial completely.

b. If the average number of calls at a certain time of day equals 26, write an equation using the polynomial given to demonstrate this fact.

c. Rewrite the equation in part b. so that all terms are on the left side of the equation and zero is on the right.

d. Factor the expression on the left side of the equation from part c.

Writing & Thinking

73. Discuss, in your own words, how the sign of the constant term determines what signs will be used in the factors when factoring trinomials.