## UNDERSTAND

14. Mathematical Connections How is factoring a common factor out of a trinomial like factoring common factors out of the numerator and denominator of a fraction? How is it different?

15. Make Sense and Persevere What are all possible values of b for which $7x^2 + bx + 3$ is factorable, if the factors have integer coefficients and constants?

16. Look for Relationships In the trinomial $ax^2 + bx + c$, $b = m + n$. What is mn in terms of a, b, and c?

17. Error Analysis Describe and correct the error a student made in factoring $2x^2 + 11x + 15$.

$ac = 2 \times 15 = 30;\ b = 11$

Factors of 30	Sum of Factors
1×30	$1 + 30 = 31$
2×15	$2 + 15 = 17$
3×10	$3 + 10 = 13$
5×6	$5 + 6 = 11$

$2x^2 + 11x + 15 = (x + 5)(x + 6)$ ✗

18. Higher Order Thinking Can you factor the trinomial $6x^2 + 7x - 6$ as $(px + q)(sx + t)$, where p, q, s, and t are integers? Explain why or why not.

19. Reason Use factoring to arrange the following algebra tiles first into one rectangle and then into two rectangles of equal size.
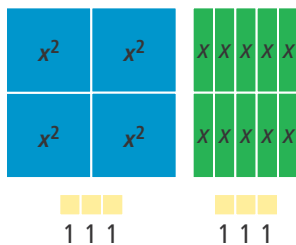
20. Use Structure What is the factored form of $pqx^2 + (mp + qn)x + mn$?

PRACTICE

Factor the trinomial represented by the algebra tiles.

21.

22.
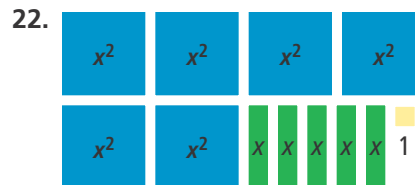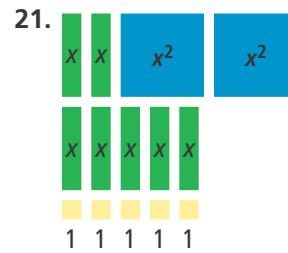
Factor each trinomial. SEE EXAMPLE 1

23. $4x^2 + 16x + 12$

24. $2x^2 - 16x + 30$

25. $3x^2 + 12x - 63$

26. $6x^2 + 12x - 48$

Identify the factor pairs of ac you could use to rewrite b to factor each trinomial by grouping.
SEE EXAMPLE 2

27. $7x^2 + 9x + 2$

28. $6x^2 + 11x - 2$

29. $8x^2 - 2x - 1$

30. $10x^2 + 19x + 6$

31. $15x^2 - 16x - 7$

32. $12x^2 + 11x + 2$

Factor each trinomial completely.
SEE EXAMPLES 1, 2, AND 3

33. $4x^2 + 13x + 3$

34. $6x^2 - 25x - 14$

35. $2x^2 + 7x - 4$

36. $12x^2 + 13x + 3$

37. $6x^3 + 9x^2 + 3x$

38. $8x^2 - 10x - 3$

39. $12x^2 + 16x + 5$

40. $16x^3 + 32x^2 + 12x$

41. $21x^2 - 35x - 14$

42. $16x^2 + 22x - 3$

43. $9x^2 + 46x + 5$

44. $24x^3 - 10x^2 - 4x$

Factor each trinomial completely.

45. $3x^2 + xy - 2y^2$

46. $2x^2 + 9xy + 10y^2$

47. $5x^2 - 4xy - y^2$

48. $2x^2 + 10xy + 12y^2$

APPLY

49. Reason A rectangular patio has an area of $2x^2 + 13x - 24$ ft^2. Use factoring to find possible dimensions of the patio. The patio is to be enlarged so that each dimension is 2 ft greater than it was originally. What are the new dimensions of the patio? What is the new area of the patio?

50. Make Sense and Persevere Use factoring to find possible dimensions of the container shown. The container is a rectangular prism. What are the dimensions of the container if $x = 3$? What is the volume of the container if $x = 4$?

$V = 4x^3 + 10x^2 + 4x$ ft^3

51. Model With Mathematics A photographer is placing photos in a mat for a gallery show. Each mat she uses is x in. wide on each side. The total area of each photo and mat is shown.

x

x x

x
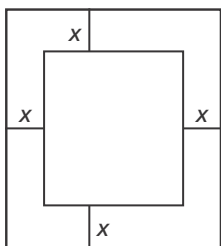
Area $= 4x^2 + 36x + 80$

a. Factor the total area to find possible dimensions of a photo and mat.

b. What are the dimensions of the photos in terms of x?

c. Explain why the photographer might use x to represent the width of the mat.

ASSESSMENT PRACTICE

52. The trinomial $ax^2 + bx + c$ is factorable when factors of _?_ have a sum of _?_.

53. SAT/ACT What is the factored form of $3x^2 - 5x - 12$?

Ⓐ $(x - 4)(3x + 1)$

Ⓑ $(x - 3)(3x + 4)$

Ⓒ $(x + 4)(3x - 9)$

Ⓓ $3(x + 2)(x - 3)$

Ⓔ $3(x - 4)(x + 1)$

54. Performance Task A paint tray has an area of $42x^2 + 135x + 108$ in.^{2}. The square paint compartments that are all the same size and spaced evenly, though the space along the edge of the tray is twice as wide as the space between squares.

x $2x$

$2x$ $2x$

$2x$

$7x + 12$ in.
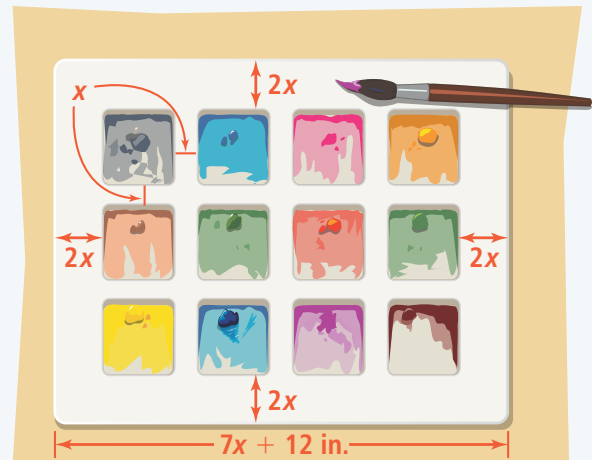
Part A What is the width of the paint tray?

Part B What is the area of each of the paint compartments in the tray?

Part C How wide are the edges of the tray if the width of the paint tray is 45 in.?