

EXAMPLE 5

on p. 608
for Exs. 43–54

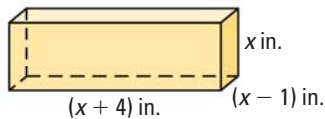
SOLVING EQUATIONS Solve the equation.

43. $x^3 + x^2 - 4x - 4 = 0$ 44. $a^3 - 11a^2 - 9a + 99 = 0$ 45. $4y^3 - 7y^2 - 16y + 28 = 0$
 46. $5n^3 - 30n^2 + 40n = 0$ 47. $3b^3 + 24b^2 + 45b = 0$ 48. $2t^5 + 2t^4 - 144t^3 = 0$
 49. $z^3 - 81z = 0$ 50. $c^4 - 100c^2 = 0$ 51. $12s - 3s^3 = 0$
 52. $2x^3 - 10x^2 + 40 = 8x$ 53. $3p + 1 = p^2 + 3p^3$ 54. $m^3 - 3m^2 = 4m - 12$

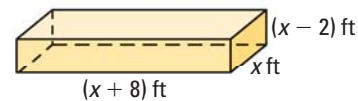
55. **WRITING** Is it possible to find three solutions of the equation $x^3 + 2x^2 + 3x + 6 = 0$? Explain why or why not.

 **GEOMETRY** Find the length, width, and height of the rectangular prism with the given volume.

56. Volume = 12 cubic inches



57. Volume = 96 cubic feet

**FACTORING COMPLETELY** Factor the polynomial completely.

58. $x^3 + 2x^2y - x - 2y$ 59. $8b^3 - 4b^2a - 18b + 9a$ 60. $4s^2 - s + 12st - 3t$

FACTOR BY GROUPING In Exercises 61–66, use the example below to factor the trinomial by grouping.**EXAMPLE** Factor a trinomial by grouping

Factor $8x^2 + 10x - 3$ by grouping.

Solution

Notice that the polynomial is in the form $ax^2 + bx + c$.

STEP 1 Write the product ac as the product of two factors that have a sum of b . In this case, the product ac is $8(-3) = -24$. Find two factors of -24 that have a sum of 10.

$$-24 = 12 \cdot (-2) \text{ and } 12 + (-2) = 10$$

STEP 2 Rewrite the middle term as two terms with coefficients 12 and -2 .

$$8x^2 + 10x - 3 = 8x^2 + 12x - 2x - 3$$

STEP 3 Factor by grouping.

$$\begin{aligned} 8x^2 + 12x - 2x - 3 &= (8x^2 + 12x) + (-2x - 3) && \text{Group terms.} \\ &= 4x(2x + 3) - (2x + 3) && \text{Factor each group.} \\ &= (2x + 3)(4x - 1) && \text{Distributive property} \end{aligned}$$

61. $6x^2 + 5x - 4$ 62. $10s^2 + 19s + 6$ 63. $12n^2 - 13n + 3$
 64. $16a^2 + 14a + 3$ 65. $21w^2 + 8w - 4$ 66. $15y^2 - 31y + 10$
 67. **CHALLENGE** Use factoring by grouping to show that a trinomial of the form $a^2 + 2ab + b^2$ can be factored as $(a + b)^2$. Justify your steps.