

GUIDED PRACTICE

Vocabulary Check ✓
 Concept Check ✓

- Give an example of a polynomial in quadratic form that contains an x^3 -term.
- State which factoring method you would use to factor each of the following.
 - $6x^3 - 2x^2 + 9x - 3$
 - $8x^3 - 125$
 - $16x^4 - 9$

3. **ERROR ANALYSIS** What is wrong with the solution at the right?

$$\begin{array}{l}
 \cancel{2x^4 - 18x^2 = 0} \\
 \cancel{2x^2(x^2 - 9) = 0} \\
 \cancel{x^2 - 9 = 0} \\
 \cancel{(x + 3)(x - 3) = 0} \\
 \cancel{x = -3 \text{ or } x = 3}
 \end{array}$$

Ex. 3

- Factor the polynomial $x^3 + 1$ into the product of a linear binomial and a quadratic trinomial.
- Show that you can't factor the quadratic trinomial from part (a).

Skill Check ✓

Factor the polynomial using any method.

- $x^6 + 125$
- $4x^3 + 16x^2 + x + 4$
- $x^4 - 1$
- $2x^3 - 3x^2 - 10x + 15$
- $5x^3 - 320$
- $x^4 + 7x^2 + 10$

Find the real-number solutions of the equation.

- $x^3 - 27 = 0$
- $3x^3 + 7x^2 - 12x = 28$
- $x^3 + 2x^2 - 9x = 18$
- $54x^3 = -2$
- $9x^4 - 12x^2 + 4 = 0$
- $16x^8 = 81$

17. **BUSINESS** The revenue R (in thousands of dollars) for a small business can be modeled by

$$R = t^3 - 8t^2 + t + 82$$

where t is the number of years since 1990. In what year did the revenue reach \$90,000?

PRACTICE AND APPLICATIONS

STUDENT HELP

Extra Practice to help you master skills is on p. 948.

MONOMIAL FACTORS Find the greatest common factor of the terms in the polynomial.

- $14x^2 + 8x + 72$
- $3x^4 - 12x^3$
- $7x + 28x^2 - 35x^3$
- $24x^4 - 6x$
- $39x^5 + 13x^3 - 78x^2$
- $145x^9 - 17$
- $6x^6 - 3x^4 - 9x^2$
- $72x^9 + 15x^6 + 9x^3$
- $6x^4 - 18x^3 + 15x^2$

MATCHING Match the polynomial with its factorization.

- $3x^2 + 11x + 6$
- $x^3 - 4x^2 + 4x - 16$
- $125x^3 - 216$
- $2x^7 - 32x^3$
- $2x^5 + 4x^4 - 4x^3 - 8x^2$
- $2x^3 - 32x$
- $2x^3(x + 2)(x - 2)(x^2 + 4)$
- $2x(x + 4)(x - 4)$
- $(3x + 2)(x + 3)$
- $(x^2 + 4)(x - 4)$
- $2x^2(x^2 - 2)(x + 2)$
- $(5x - 6)(25x^2 + 30x + 36)$

STUDENT HELP

HOMEWORK HELP

Example 1: Exs. 18–40, 59–67

Example 2: Exs. 18–32, 41–49, 59–67

Example 3: Exs. 18–32, 50–67

Example 4: Exs. 68–85

Example 5: Exs. 87–92

SUM OR DIFFERENCE OF CUBES Factor the polynomial.

33. $x^3 - 8$ 34. $x^3 + 64$ 35. $216x^3 + 1$ 36. $125x^3 - 8$
 37. $1000x^3 + 27$ 38. $27x^3 + 216$ 39. $32x^3 - 4$ 40. $2x^3 + 54$

GROUPING Factor the polynomial by grouping.

41. $x^3 + x^2 + x + 1$ 42. $10x^3 + 20x^2 + x + 2$ 43. $x^3 + 3x^2 + 10x + 30$
 44. $x^3 - 2x^2 + 4x - 8$ 45. $2x^3 - 5x^2 + 18x - 45$ 46. $-2x^3 - 4x^2 - 3x - 6$
 47. $3x^3 - 6x^2 + x - 2$ 48. $2x^3 - x^2 + 2x - 1$ 49. $3x^3 - 2x^2 - 9x + 6$

QUADRATIC FORM Factor the polynomial.

50. $16x^4 - 1$ 51. $x^4 + 3x^2 + 2$ 52. $x^4 - 81$
 53. $81x^4 - 256$ 54. $4x^4 - 5x^2 - 9$ 55. $x^4 + 10x^2 + 16$
 56. $81 - 16x^4$ 57. $32x^6 - 2x^2$ 58. $6x^5 - 51x^3 - 27x$

CHOOSING A METHOD Factor using any method.

59. $18x^3 - 2x^2 + 27x - 3$ 60. $6x^3 + 21x^2 + 15x$ 61. $4x^4 + 39x^2 - 10$
 62. $8x^3 - 12x^2 - 2x + 3$ 63. $8x^3 - 64$ 64. $3x^4 - 300x^2$
 65. $3x^4 - 24x$ 66. $5x^4 + 31x^2 + 6$ 67. $3x^4 + 9x^3 + x^2 + 3x$

SOLVING EQUATIONS Find the real-number solutions of the equation.

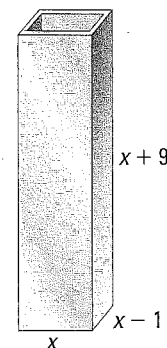
68. $x^3 - 3x^2 = 0$ 69. $2x^3 - 6x^2 = 0$ 70. $3x^4 + 15x^2 - 72 = 0$
 71. $x^3 + 27 = 0$ 72. $x^3 + 2x^2 - x = 2$ 73. $x^4 + 7x^3 - 8x - 56 = 0$
 74. $2x^4 - 26x^2 + 72 = 0$ 75. $3x^7 - 243x^3 = 0$ 76. $x^3 + 3x^2 - 2x - 6 = 0$
 77. $8x^3 - 1 = 0$ 78. $x^3 + 8x^2 = -16x$ 79. $x^3 - 5x^2 + 5x - 25 = 0$
 80. $3x^4 + 3x^3 = 6x^2 + 6x$ 81. $x^4 + x^3 - x = 1$ 82. $4x^4 + 20x^2 = -25$
 83. $-2x^6 = 16$ 84. $3x^7 = 81x^4$ 85. $2x^5 - 12x^3 = -16x$

86. **Writing** You have now factored several different types of polynomials. Explain which factoring techniques or patterns are useful for factoring binomials, trinomials, and polynomials with more than three terms.

87. **PACKAGING** A candy factory needs a box that has a volume of 30 cubic inches. The width should be 2 inches less than the height and the length should be 5 inches greater than the height. What should the dimensions of the box be?

88. **MANUFACTURING** A manufacturer wants to build a rectangular stainless steel tank with a holding capacity of 500 gallons, or about 66.85 cubic feet. If steel that is one half inch thick is used for the walls of the tank, then about 5.15 cubic feet of steel is needed. The manufacturer wants the outside dimensions of the tank to be related as follows:

- The width should be one foot less than the length.
- The height should be nine feet more than the length.



What should the outside dimensions of the tank be?

STUDENT HELP

INTERNET HOMEWORK HELP

Visit our Web site
www.mcdougallittell.com
 for help with problem
 solving in Ex. 88.