

**Practice 6-4****Solving Polynomial Equations**

Factor the expression on the left side of each equation.

1.  $8x^3 - 27 = 0$

$$(2x-3)(4x^2+6x+9)$$

$$x = \frac{-6 \pm \sqrt{36 - 4(4)(9)}}{2(4)}$$

$$\frac{-6 \pm i\sqrt{108}}{8}$$

3.  $2x^3 + 54 = 0$

$$2(x^3 + 27) = 0$$

$$2(x+3)(x^2 - 3x + 9)$$

$$x = \frac{3 \pm \sqrt{9 - 4(1)(9)}}{2(1)}$$

$$\frac{3 \pm i\sqrt{07}}{2}$$

5.  $4x^3 - 32 = 0$

$$4(x^3 - 8) = 0$$

$$4(x-2)(x^2 + 2x + 4)$$

$$x = \frac{-2 \pm \sqrt{4 - 4(1)(4)}}{2(1)}$$

$$\frac{3 \pm 3i\sqrt{3}}{2}$$

7.  $64x^3 - 1 = 0$

$$(4x-1)(16x^2+4x+1)$$

$$x = \frac{-4 \pm \sqrt{16 - 4(16)(1)}}{2(16)}$$

$$\frac{-4 \pm i\sqrt{48}}{32}$$

9.  $x^4 - 5x^2 + 4 = 0$

$$(x^2-1)(x^2-4)$$

$$(x-1)(x+1)(x-2)(x+2)$$

$$x = 1, -1, 2, -2$$

11.  $x^4 - 10x^2 + 16 = 0$

$$(x^2-8)(x^2-2)$$

$$x = \pm\sqrt{8} = 2\sqrt{2}$$

$$x = \pm\sqrt{2}$$

13.  $x^4 - 9x^2 + 14 = 0$

$$(x^2-7)(x^2-2)$$

$$x = \pm\sqrt{7} \quad x = \pm\sqrt{2}$$

15.  $x^4 - 10x^2 + 9 = 0$

$$(x^2-1)(x^2-9)$$

$$(x-1)(x+1)(x-3)(x+3)$$

$$x = 1$$

$$x = -1$$

$$x = 3$$

$$x = -3$$

2.  $x^3 + 64 = 0$

$$(x+4)(x^2-4x+16)$$

$$x = -4$$

$$x = \frac{4 \pm \sqrt{16 - 4(1)(16)}}{2(1)}$$

$$x = \frac{4 \pm 4i\sqrt{3}}{2}$$

4.  $2x^3 - 250 = 0$

$$2(x^3 - 125) = 0$$

$$2(x-5)(x^2 + 5x + 25)$$

$$x = 5$$

$$x = \frac{-5 \pm \sqrt{25 - 4(1)(25)}}{2(1)} = \frac{-5 \pm 5i\sqrt{3}}{2}$$

$$x = 2 \pm 2i\sqrt{3}$$

6.  $27x^3 + 1 = 0$

$$(3x+1)(9x^2-3x+1)$$

$$x = -\frac{1}{3}$$

$$x = \frac{3 \pm i\sqrt{27}}{18}$$

$$\frac{3 \pm 3i\sqrt{3}}{18} = \frac{1 \pm i\sqrt{3}}{6}$$

8.  $x^3 - 27 = 0$

$$(x-3)(x^2+3x+9)$$

$$x = 3$$

$$x = \frac{-3 \pm \sqrt{9 - 4(1)(9)}}{2(1)} = \frac{-3 \pm i\sqrt{27}}{2}$$

10.  $x^4 - 12x^2 + 11 = 0$

$$(x^2-1)(x^2-11)$$

$$(x-1)(x+1)(x^2-11)$$

$$x = 1, -1, \pm\sqrt{11}$$

12.  $x^4 - 8x^2 + 16 = 0$

$$(x^2-4)(x^2-4)$$

$$(x-2)(x+2)(x-2)(x+2)$$

$$x = 2, 2, -2, -2$$

14.  $x^4 + 13x^2 + 36 = 0$

$$(x^2+9)(x^2+4)$$

$$x = \pm 3i$$

$$x = \pm 2i$$

16.  $x^4 + 3x^2 - 4 = 0$

$$(x^2+4)(x^2-1)$$

$$(x^2+4)(x-1)(x+1)$$

$$x = \pm 2i$$

$$x = 1$$

$$x = -1$$