Name _____ Date _____ Class _____

LESSON 6-6

Practice B

Fundamental Theorem of Algebra

Write the simplest polynomial function with the given roots.

1. 1, 4, and –3

2. $\frac{1}{2}$, 5, and –2

3. $2i$, $\sqrt{3}$, and 4

4. $\sqrt{2}$, –5, and $-3i$

Solve each equation by finding all roots.

5. $x^4 - 2x^3 - 14x^2 - 2x - 15 = 0$

6. $x^4 - 16 = 0$

7. $x^4 + 4x^3 + 4x^2 + 64x - 192 = 0$

8. $x^3 + 3x^2 + 9x + 27 = 0$

Solve.

9. An electrical circuit is designed such that its output voltage, V, measured in volts, can be either positive or negative. The voltage of the circuit passes through zero at $t = 1$, 2, and 7 seconds. Write the simplest polynomial describing the voltage $V(t)$.

c. $P(x) = (x + 2i)(x - 2i)$

d. $P(x) = x^2 + 4$

8. $P(x) = x^3 + 2x^2 - 3x - 6$
9. $P(x) = x^3 - 7x^2 + 17x - 15$
10. $x = 6, \pm\sqrt{2}$

Practice B

1. $P(x) = x^3 - 2x^2 - 11x + 12$
2. $P(x) = x^3 - \frac{7}{2}x^2 - \frac{17}{2}x + 5$
3. $P(x) = x^5 - 4x^4 + x^3 - 4x^2 - 12x + 48$
4. $P(x) = x^5 + 5x^4 + 7x^3 + 35x^2 - 18x - 90$
5. $x = i, -i, -3$, and 5
6. $x = 2, -2, 2i$, and $-2i$
7. $x = -4i, 4i, 2$, and -6
8. $x = -3i, 3i$, and -3
9. $V(t) = t^3 - 10t^2 + 23t - 14$

Practice C

1. $P(x) = x^3 - \frac{17}{4}x^2 - \frac{39}{4}x - \frac{9}{2}$
2. $P(x) = x^4 - 9x^3 + 39x^2 - 225x + 350$
3. $P(x) = x^4 + 4x^3 + 4x^2 + 4x + 3$
4. $P(x) = x^5 - 4x^4 - 2x^3 + 8x^2 - 24x + 96$
5. $x = -\frac{3}{2}i, \frac{3}{2}i$, 3, and -1
6. $x = i\sqrt{3}$, $-i\sqrt{3}$, 1, and -4
7. $x = 1 + i, 1 - i, -3$, and 4
8. $x = 2i, -2i$, and -6 9. 3 inches

Reteach

1. $x^2 + 4x - 5$

   $x^3 + 4x^2 - 5x - 2x^2 - 8x + 10$

   $x^3 + 2x^2 + 13x + 10$
2. $(x^2 + 3x)(x + 1)$

   $x^3 + 3x^2 + x^2 + 3x$

   $x^3 + 4x^2 + 3x$
3. $(x - 1)(x - 4)(x - 5)$

   $(x^2 - 5x + 4)(x - 5)$

   $x^3 - 10x^2 + 29x - 20$
4. $(x + 2)(x - 3)(x - 6)$

   $(x^2 - x - 6)(x - 6)$

   $x^3 - 7x^2 + 36$
5. $(x - 2)(x - 4)(x - 6)$

   $(x^2 - 6x + 8)(x - 6)$

   $x^3 - 12x^2 + 44x - 48$
6. $(x + 5)(x)(x - 5)$

   $x(x^2 - 25)$

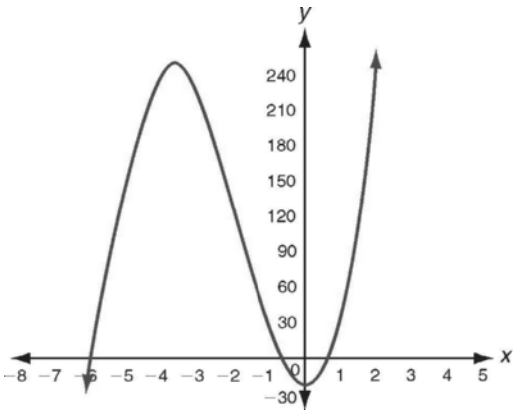
   $x^3 - 25x$
7. 1; 2; 1; 2; $x^2 + 4$; $2i$; $-2i$

Challenge

1. $-5 + 3 = -2$; $(-5)(3) = -15$
2. $-2 + 1 + 4 = -(-3) = 3$; $(-2)(1) + (-2)(4) + (1)(4) = -6$; $(-2)(1)(4) = -8$
3. $z_1z_2z_3 = -84 = (7)(-3)\ (z_3)$; $z_3 = 4$
4. $-2 + 5 + z_3 + z_4 = 1$; $(-2)(5) + (-2)(z_3) + (-2)(z_4) + (5)(z_3) + (5)(z_4) + (z_3)(z_4) = -19$; $z_3 = 1$; $z_4 = -3$
5. $(x - z_1)(x - z_2)(x - z_3) = x^3 - (z_1 + z_2 + z_3)x^2 + (z_1z_2 + z_1z_3 + z_2z_3)x - z_1z_2z_3$

Problem Solving

1. a. $V = 4\pi r^2$

   b. $V = \frac{1}{2}\left(\frac{4}{3}\pi r^3\right)$
2. $\frac{13}{12}\pi = 4\pi r^2 + \frac{2}{3}\pi r^3$
3. $8r^3 + 48r^2 - 13 = 0$
4. 

5. $\frac{1}{2}$
6. $x = \frac{-26 \pm 21.6}{8}$; both these roots are