Name _____ Date _____ Class _____

LESSON 5-5

Practice C

Complex Numbers and Roots

Solve each equation.

1. $\frac{1}{2}x^2 = -28$

2. $3x^2 + 14 = -19$

Find the zeros of each function.

3. $f(x) = x^2 - 6x + 20$

4. $g(x) = -2x^2 + 8x - 16$

5. $h(x) = x^2 - 2x + 3$

Find the values of *x* and *y* that make each equation true.

6. $6x - 2i = (-2y)i + 10$

7. $-40i + 2x = (5y)i - 12$

8. $-8y + 14i = (7x)i - 2$

Find each complex conjugate.

9. $\sqrt{3i} - 25$

10. $-5i + \frac{12}{5}$

11. $-2 - 1.5i$

Solve.

12. Does the function $f(x) = (x - 1)^2 + 5$ have real or imaginary zeros? How can you determine that without any calculations or graphing?

13. Joel wrote the function $s(t) = t^2 + 6t + 34$ to approximate the speed of a model rocket that he built. The function models the speed of the rocket, *s*, at a given time, *t*.

    a. What does $s(t) = 0$ represent?

    b. Solve the equation to find the zeros of the function.

    c. Is Joel's function correct? Explain.

LESSON 5-5

Practice A

1. $3i$; $7i - 1$; $-2i$
2. i
3. -1
4. a
5. bi
6. $2i$
7. $9i$
8. $-9i$
9. $8i$
10. $5i$
11. $21i$
12. $1 - 2i$
13. $-5i$
14. $2 + 3i$
15. a. $x = \sqrt{-25}$, so $x = 5i$ and $-5i$.
    b. Possible answer: You could multiply $(x + 5i)(x - 5i)$ to get the original expression.
16. a. $x = \sqrt{-16}$, so $x = 4i$ and $-4i$.
    b. Possible answer: You could multiply $(x + 4i)(x - 4i)$ to get the original expression.

Practice B

1. $4i\sqrt{2}$
2. $6i\sqrt{2}$
3. $\frac{1}{3}i$
4. $x = \pm 3i\sqrt{3}$
5. $x = \pm i\sqrt{7}$
6. $x = \pm 4i\sqrt{3}$
7. $x = \pm i\sqrt{21}$
8. $x = 4, y = 5$
9. $x = -\frac{1}{3}, y = \frac{1}{2}$
10. $x = 1 \pm i\sqrt{3}$
11. $x = -3 \pm i\sqrt{5}$
12. $-3 - i$
13. $-4 - 3i$
14. $-11i$
15. $3 \pm i\sqrt{11}$

Practice C

1. $x = \pm 2i\sqrt{14}$
2. $x = \pm i\sqrt{11}$
3. $x = 3 \pm i\sqrt{11}$
4. $x = 2 \pm 2i$
5. $x = 1 \pm i\sqrt{2}$
6. $x = \frac{5}{3}, y = 1$
7. $x = -6, y = -8$
8. $x = 2, y = 0.25$
9. $-25 - i\sqrt{3}$
10. $\frac{12}{5} + 5i$
11. $-2 + 1.5i$
12. Imaginary; possible answer: since a is positive, the parabola opens upward and the vertex is at the minimum. Since the function is in vertex form, you can tell that the vertex is at $(1, 5)$. With a minimum at 5, the function never crosses the x-axis, so the zeros have to be imaginary.
13. a. The beginning and end of the flight when the speed of the rocket is 0
    b. $t = -3 \pm 5i$
    c. No; possible answer: the zeros are imaginary because the graph never crosses the x-axis so the function never equals 0. The speed of the rocket must be 0 before takeoff and after landing.

Reteach

1. $6i\sqrt{2}$
2. $12i\sqrt{2}$
3. $10i$
4. $15i\sqrt{6}$
5. $16i$
6. $-7i\sqrt{2}$
7. $9i$
8. $1 - 4i$
9. $12 + i$
10. $x = \pm 3i\sqrt{2}$
11. $x = \pm\sqrt{-4}$
    $x = \pm 2i$
12. $x^2 = -49$
    $x = \pm\sqrt{-49}$
    $x = \pm 7i$
13. $x^2 = -100$
    $x = \pm\sqrt{-100}$
    $x = \pm 10i$
14. $x^2 = -36$
    $x = \pm\sqrt{-36}$
    $x = \pm 6i$
15. $x^2 = -12$
    $x = \pm\sqrt{(4)(3)(-1)}$
    $x = \pm 2i\sqrt{3}$

Challenge

1. $2i$, $-7i$
2. $-6i$, -8i
3. $9i$, $-12i$
4. $5i$, $49i$