Name ______________________ Date ______________ Class ______________

LESSON 13-1

Practice B

Complex Numbers and Roots

Express each number in terms of *i*.

1. $\sqrt{-32}$

2. $2\sqrt{-18}$

3. $\sqrt{-\frac{1}{9}}$

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Solve each equation.

4. $3x^2 + 81 = 0$

5. $4x^2 = -28$

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6. $\frac{1}{4}x^2 + 12 = 0$

7. $6x^2 = -126$

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

8. $2x - 20i = 8 - (4y)i$

9. $5i - 6x = (10y)i + 2$

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Find the zeros of each function.

10. $f(x) = x^2 - 2x + 4$

11. $g(x) = x^2 + 6x + 14$

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Find each complex conjugate.

12. $i - 3$

13. $3i - 4$

14. $11i$

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Solve.

15. The impedance of an electrical circuit is a way of measuring how much the circuit impedes the flow of electricity. The impedance can be a complex number. A circuit is being designed that must have an impedance that satisfies the function $f(x) = 2x^2 - 12x + 40$, where x is a measure of the impedance. Find the zeros of the function.

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7. 132°; 90°; 48°; 90°
8. 101°; 86°; 79°; 94°

Challenge

1. chord; inscribed
2. a. 45°
   b. 67.5°
   c. |180 − 11.25n|
   d. 0 < |n − 16| < 16
   e. $\left|180 - \frac{360n}{p}\right|$, or $\left[180\left(1 - \frac{2n}{p}\right)\right]$, where $0 < n - \left|n - \frac{p}{2}\right| < \frac{p}{2}$
   f. Answers will vary. Students may choose any values of *n* and *p* for which $\frac{n}{p} = \frac{5}{12}$. Sample answer: $n = 15$, $p = 36$

Problem Solving

1. 160°
2. 112°; 52°; 68°; 128°
3. C
4. G
5. B
6. G

Reading Strategies

1. half
2. $m\angle A + m\angle C = 180$; $m\angle B + m\angle D = 180$
3. 31°
4. 60°
5. 124°
6. 60°
7. 56°
8. 120°

Answers for Unit 4

13-1 COMPLEX NUMBERS AND ROOTS

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.