Name: **Date:**

Assessment

Extending the Number System

Unit Assessment

Circle the letter of the best answer.

1. Which sum is irrational?

   a. $\frac{2}{5}+\sqrt[3]{27}$

   b. $4^{6}+49^{\frac{1}{2}}$

   c. $\sqrt[3]{1000}+2.1$

   d. $12^{\frac{2}{3}}+35$

2. Let $\sqrt[5]{x^{2}}=3$. What is the approximate value of x?

   a. 1.55

   b. 7.50

   c. 15.59

   d. 243.00

3. What is the result of $(-6x+7)+(19x-1)$?

   a. $25x+8$

   b. $13x+6$

   c. $19x$

   d. $25x+6$

4. What is the result of $\left(x^{5}+x\right)-\left(4x+12\right)$?

   a. $-2x-12$

   b. $x^{5}-3x-12$

   c. $x^{5}+5x+12$

   d. $x^{5}-3x+12$

5. What is the result of $(-x^{2}+7)(2x^{2}+3x)$?

   a. $-x^{4}+11x^{2}+21x$

   b. $2x^{4}+3x^{3}+14x^{2}+21x$

   c. $-2x^{4}-3x^{3}+14x^{2}+21x$

   d. $-2x^{2}+11x+21$

6. What is the real part of the complex number $-31+15i$?

   a. 15

   b. –31

   c. i

   d. $15i$

continued

7. Which value is equal to i^{29}?

   a. i
   c. 1
   b. $-i$
   d. -1

8. What is the result of $(18 - i) + (29 + 4i)$?

   a. 47
   c. $-11 - 5i$
   b. $47 + 3i$
   d. $-11 + 3i$

9. What is the value of $125^{\frac{2}{3}}$?

   a. 5
   c. 25
   b. $\sqrt{125}$
   d. 15,625

10. What is the result of $(7 + 3i) - (2 - 4i)$?

    a. $9 - i$
    c. $5 - i$
    b. $9 + 7i$
    d. $5 + 7i$

11. What is the result of $(3 + 5i)(6 - 4i)$?

    a. $38 + 18i$
    c. $18 + 18i$
    b. $-2 + 18i$
    d. $-2 - 20i$

12. What is the result of $(-8 + 2i)(1 - 3i)$?

    a. $-2 + 26i$
    c. $-14 + 26i$
    b. $-7 - i$
    d. $-8 - 6i$

continued

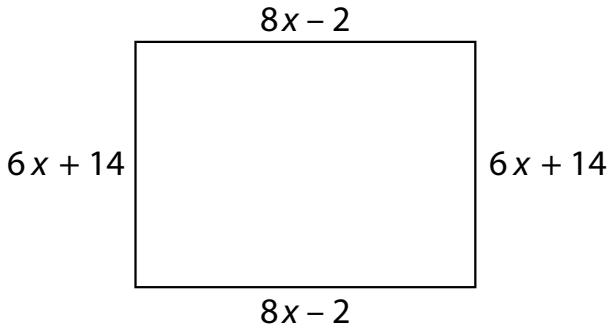
Use your knowledge of polynomials, rational numbers, and complex numbers to answer the following questions.

13. A town conducts a census of its population biannually, or every 2 years. The equation $y = 31{,}000(1.04)^{\frac{t}{2}}$ can be used to estimate the town's population, where t is the number of years after the year 2000.

    a. What was the town's approximate population in 2006?

    b. What will be the town's estimated population in 2025?

14. The perimeter of a rectangle is the sum of the lengths of its sides. The area of a rectangle is the product of the rectangle's length and width. If l is the length of a rectangle and w is the width, then its perimeter is equal to $2l + 2w$ and its area is equal to lw. Use the rectangle shown to answer the questions that follow.



    a. What is the rectangle's perimeter, expressed as a polynomial in terms of x?

    b. What is the rectangle's area, expressed as a polynomial in terms of x?

continued

15. The impedance of element 1 is $Z_1 = 5 + 2i$ and the impedance of element 2 is $Z_2 = 10 + i$. The elements are in a circuit in parallel, and the sum of $\frac{1}{Z_1} + \frac{1}{Z_2}$ is the total impedance of the circuit.

    a. What is a common denominator for finding the total impedance?

    b. What is the total impedance? Leave your answer as a fraction.