

# The Real Numbers

(Pages 600–605)

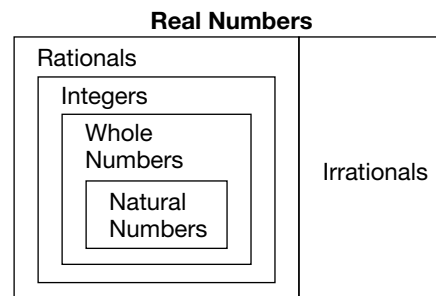
The set of rational numbers and the set of irrational numbers together form the set of **real numbers**.

Natural Numbers:  $\{1, 2, 3, 4, \dots\}$

Whole Numbers:  $\{0, 1, 2, 3, \dots\}$

Integers:  $\{\dots, -2, -1, 0, 1, 2, \dots\}$

Rational Numbers: {all numbers that can be expressed in the form  $\frac{a}{b}$ , where  $a$  and  $b$  are integers and  $b \neq 0$ }



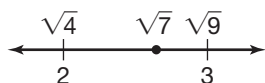
Examples of irrational numbers are  $\pi$ , 4.690415759..., and  $\sqrt{17}$ .

## EXAMPLES

**A** Find  $\sqrt{7}$  to the nearest tenth. Then graph the square root on a number line.

Use a calculator.

$$\sqrt{7} \approx 2.6$$



**B** Determine if  $\sqrt{10}$  is rational or irrational. If irrational, find two consecutive integers between which its graph lies on the number line.

$$\sqrt{9} < \sqrt{10} < \sqrt{16} \rightarrow 3 < \sqrt{10} < 4$$

Since 10 is not a perfect square, its square root is irrational. The graph of  $\sqrt{10}$  lies between 3 and 4.

## PRACTICE

Name the set or sets of numbers to which each real number belongs. Let  $N$  = natural numbers,  $W$  = whole numbers,  $Z$  = integers,  $Q$  = rational numbers, and  $I$  = irrational numbers.

1.  $\sqrt{64}$

2.  $\frac{-20}{2}$

3.  $\sqrt{5}$

4.  $-\sqrt{100}$

5.  $0.\bar{4}$

Find an approximation, to the nearest tenth, for each square root. Then graph the square root on a number line.

6.  $\sqrt{14}$

7.  $\sqrt{27}$

8.  $-\sqrt{41}$

9.  $\sqrt{53}$

10.  $\sqrt{70}$

Determine whether each number is rational or irrational. If it is irrational, find two consecutive integers between which its graph lies on the number line.

11.  $\sqrt{122}$

12.  $\sqrt{25}$

13.  $\sqrt{92}$

14.  $-\sqrt{19}$

15.  $\sqrt{169}$



**16. Standardized Test Practice** Which number is an irrational number?

**A**  $\frac{2}{3}$

**B**  $-\sqrt{225}$

**C**  $-\sqrt{20}$

**D**  $0.\bar{6}$

**Answers:** 1. N, W, Z, Q 2. Z, Q 3. I 4. Z, Q 5. Q 6–10. See Answer Key for graphs. 6. 3, 7 7. 5, 2 8. –6, 4 9. 7, 3 10. 8, 4 11. irrational; 11 and 12 12. rational 13. irrational; 9 and 10 14. irrational; –5 and –4 15. rational 16. C