

# 2.7

## Find Square Roots and Compare Real Numbers

**Goal** • Find square roots and compare real numbers.

### Your Notes

#### VOCABULARY

**Square root** If  $b^2 = a$ , then  $b$  is a square root of  $a$ .  
Square roots are written with the radical symbol  $\sqrt{\quad}$ .

**Radicand** The number or expression inside the radical symbol

**Perfect square** A number whose square roots are integers

**Irrational number** A number that cannot be written as the quotient of two integers

**Real number** The set of all rational and irrational numbers

#### SQUARE ROOT OF A NUMBER

##### Words

If  $b^2 = a$ , then  $\underline{b}$  is a square root of  $\underline{a}$ .

##### Numbers

$5^2 = 25$  and  $(-5)^2 = 25$ , so  $\underline{5}$  and  $\underline{-5}$  are square roots of 25.

## Your Notes

All positive real numbers have two square roots, a positive and a negative square root. The positive square root is called the *principal* square root.

### Example 1 Find square roots

Evaluate the expression.

#### Solution

a.  $-\sqrt{36} = \underline{-6}$

The negative square root of 36 is  $\underline{-6}$ .

b.  $\sqrt{16} = \underline{4}$

The positive square root of 16 is  $\underline{4}$ .

c.  $\pm\sqrt{64} = \underline{\pm 8}$

The positive and negative square roots of 64 are  $\underline{8}$  and  $\underline{-8}$ .

#### ✓ Checkpoint Evaluate the expression.

1.  $\sqrt{100}$

10

2.  $-\sqrt{1}$

-1

### Example 2 Classify numbers

Tell whether each of the following numbers is a real number, a rational number, an irrational number, an integer, or a whole number:  $\sqrt{144}$ ,  $-\sqrt{49}$ ,  $\sqrt{32}$ .

#### Solution

Number	Real Number?	Rational Number?	Irrational Number?	Integer?	Whole Number?
$\sqrt{144}$	Yes	Yes	No	Yes	Yes
$-\sqrt{49}$	Yes	Yes	No	Yes	No
$\sqrt{32}$	Yes	No	Yes	No	No

## Your Notes

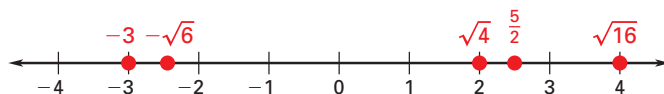
### Example 3 Graph and order real numbers

Order the numbers from least to greatest:

$$\sqrt{16}, \frac{5}{2}, \sqrt{4}, -3, -\sqrt{6}.$$

#### Solution

Graph the numbers on a number line.



Read the numbers from left to right:

$$-3, -\sqrt{6}, \sqrt{4}, \frac{5}{2}, \sqrt{16}$$

#### ✓ Checkpoint Complete the following exercises.

3. Tell whether each of the following numbers is a real number, rational number, irrational number, integer, or whole number:  $\sqrt{49}$ ,  $0$ ,  $-\frac{6}{4}$ ,  $-2$ ,  $\sqrt{17}$ .

$$\text{Real number: } \sqrt{49}, 0, -\frac{6}{4}, -2, \sqrt{17}$$

$$\text{Rational number: } \sqrt{49}, 0, -\frac{6}{4}, -2$$

$$\text{Irrational number: } \sqrt{17}$$

$$\text{Integer: } \sqrt{49}, 0, -2$$

$$\text{Whole number: } \sqrt{49}, 0$$

4. Order the numbers from Exercise 3 from least to greatest.



$$-2, -\frac{6}{4}, 0, \sqrt{17}, \sqrt{49}$$

## Homework