

## Lesson 2-7

### Example 1 Find Square Roots

Find each square root.

a.  $\pm \sqrt{\frac{121}{400}}$

$\pm \sqrt{\frac{121}{400}}$  represents the positive and negative square roots of  $\frac{121}{400}$ .

$$\frac{121}{400} = \left(\frac{11}{20}\right)^2 \rightarrow \pm \sqrt{\frac{121}{400}} = \pm \frac{11}{20}$$

b.  $-\sqrt{4.41}$

$-\sqrt{4.41}$  represents the negative square root of 4.41.

$$4.41 = (-2.1)^2$$

$$-\sqrt{4.41} = -2.1$$

### Example 2 Classify Real Numbers

Name the set or sets of numbers to which each real number belongs.

a.  $-\sqrt{31}$

Because  $-\sqrt{31} = -5.56776436\dots$ , which is not a repeating or terminating decimal, this number is irrational.

b.  $\sqrt{81}$

Because  $\sqrt{81} = 9$ , this number is a natural number, a whole number, an integer, and a rational number.

c.  $-\sqrt{\frac{48}{3}}$

Because  $-\sqrt{\frac{48}{3}} = -\sqrt{16}$  which is equal to  $-4$ , this number is an integer and a rational number.

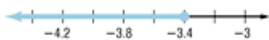
d.  $\frac{7}{8}$

Because  $\frac{7}{8} = 0.875$  is a terminating decimal, this number is a rational number.

### Example 3 Graph Real Numbers

Graph each solution set.

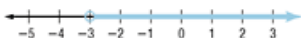
a.  $y \leq -3.4$



The heavy arrow indicates that all numbers to the left of  $-3.4$  are included in the graph. The dot at  $-3.4$  indicates that  $-3.4$  is included in the graph.

b.  $m > -\sqrt{9}$

$m > -3$                        $-\sqrt{9} = -3$



The heavy arrow indicates that all points to the right of  $-\sqrt{9}$  or  $-3$  are included in the graph. The circle indicates that  $-3$  is not included in the graph.

### Example 4 Compare Real Numbers

Replace  $\bullet$  with  $<$ ,  $>$ , or  $=$  to make each sentence true.

a.  $6.1 \bullet \sqrt{37}$

You can use a calculator to find an approximation for  $\sqrt{37}$ .

$\sqrt{37} = 6.082762530\dots$

Therefore,  $6.1 > \sqrt{37}$ .

b.  $-\sqrt{26} \bullet -4.6$

Find two perfect squares closest to  $-\sqrt{26}$  and write an inequality.

$-36 < -26 < -25$                        $-26$  is between  $-36$  and  $-25$ .

$-\sqrt{36} < -\sqrt{26} < -\sqrt{25}$                       Find the square root of each number.

$-6 < -\sqrt{26} < -5$                        $-\sqrt{26}$  is between  $-6$  and  $-5$ .

Since  $-\sqrt{26}$  is between  $-6$  and  $-5$ , it must be less than  $-4.6$ .

$-\sqrt{26} < -4.6$

### Example 5 Order Real Numbers

Write  $\sqrt{11}$ ,  $-3.\overline{31}$ ,  $-\frac{16}{5}$ ,  $\frac{31}{10}$  in order from least to greatest.

Write each number as a decimal.

$$\sqrt{11} = 3.31662479\dots \text{ or about } 3.317.$$

$$-3.\overline{31} = -3.3131313\dots \text{ or about } -3.313.$$

$$-\frac{16}{5} = -3.2$$

$$\frac{31}{10} = 3.1$$

$$-3.313 < -3.2 < 3.1 < 3.317$$

The numbers arranged in order from least to greatest are  $-3.\overline{31}$ ,  $-\frac{16}{5}$ ,  $\frac{31}{10}$ ,  $\sqrt{11}$ .

### Example 6 Rational Approximation

#### Multiple-Choice Test Item

For what value of  $b$  is  $\sqrt{\frac{b}{2}} > \frac{b}{2}$ ?

A. 4

B.  $\frac{5}{4}$

C. -2

D. 2.2

#### Read the Test Item

The expression  $\sqrt{\frac{b}{2}} > \frac{b}{2}$  is an open sentence, and the set of choices  $\left\{4, \frac{5}{4}, -2, 2.2\right\}$  is the replacement set.

#### Solve the Test Item

Replace  $b$  in  $\sqrt{\frac{b}{2}} > \frac{b}{2}$  with each given value.

A.  $b = 4$

$$\sqrt{\frac{4}{2}} \stackrel{?}{>} \frac{4}{2}$$

$$\sqrt{2} \stackrel{?}{>} 2$$

$$1.41 > 2 \quad \text{False}$$

B.  $b = \frac{5}{4}$

$$\sqrt{\frac{\frac{5}{4}}{2}} \stackrel{?}{>} \frac{\frac{5}{4}}{2}$$

$$\sqrt{\frac{5}{8}} \stackrel{?}{>} \frac{5}{8}$$

$$0.79 > 0.625 \quad \text{True}$$

C.  $b = -2$

$$\sqrt{\frac{-2}{2}} \stackrel{?}{>} \frac{-2}{2}$$

$$\sqrt{-1} \stackrel{?}{>} -1$$

False;  $\sqrt{-1}$  is not a real number.

D.  $b = 2.2$

$$\sqrt{\frac{2.2}{2}} \stackrel{?}{>} \frac{2.2}{2}$$

$$\sqrt{1.1} \stackrel{?}{>} 1.1$$

Use a calculator.

$$1.05 > 1.1 \quad \text{False}$$

The inequality is true for  $b = \frac{5}{4}$ , so the correct answer is **B**.