Name _____ Date _____

LESSON 2.1

Study Guide

For use with the lesson "Find Square Roots and Compare Real Numbers"

GOAL **Find square roots and compare real numbers.**

Vocabulary

If $b^2 = a$ then b is a **square root** of a. All positive real numbers have two **square roots,** a positive square root (or *principal* square root) and a negative square root.

A square root is written with the radical symbol $\sqrt{\ }$. The number or expression inside the radical symbol is the **radicand.**

The square of an integer is called a **perfect square.**

An **irrational number** is a number that cannot be written as a quotient of two integers.

The set of **real numbers** is the set of all rational and irrational numbers.

EXAMPLE 1 Find square roots

Evaluate the expression.

a. $\sqrt{400}$ **b.** $-\sqrt{16}$ **c.** $\pm\sqrt{81}$

Solution

a. $\sqrt{400} = 20$ The positive square root of 400 is 20.

b. $-\sqrt{16} = -4$ The negative square root of 16 is -4.

c. $\pm\sqrt{81} = \pm 9$ The positive and negative square roots of 81 are 9 and -9.

Exercises for Example 1

Evaluate the expression.

1. $\sqrt{289}$ **2.** $-\sqrt{100}$ **3.** $\pm\sqrt{441}$

EXAMPLE 2 Approximate a square root

Approximate $\sqrt{52}$ to the nearest integer.

Solution

The greatest perfect square less than 52 is 49. The least perfect square greater than 52 is 64.

$49 < 52 < 64$	Write a compound inequality that compares 52 to both 49 and 64.
$\sqrt{49} < \sqrt{52} < \sqrt{64}$	Take positive square root of each number.
$7 < \sqrt{52} < 8$	Find square root of each perfect square.

Because 52 is closer to 49 than to 64, $\sqrt{52}$ is closer to 7 than to 8. So, $\sqrt{52}$ is about 7.

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Exercises for Example 2

Approximate the square root to the nearest integer.

4. $\sqrt{75}$ **5.** $\sqrt{240}$ **6.** $-\sqrt{20}$

EXAMPLE 3

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: $\sqrt{64}$, $\sqrt{17}$, $-\sqrt{36}$.

Number	Real number?	Rational number?	Irrational number?	Integer?	Whole number?
$\sqrt{64}$	Yes	Yes	No	Yes	Yes
$\sqrt{17}$	Yes	No	Yes	No	No
$-\sqrt{36}$	Yes	Yes	No	Yes	No

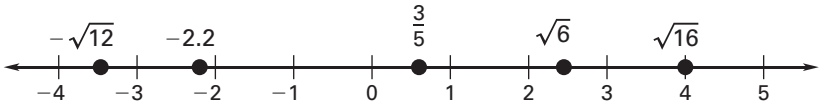
EXAMPLE 4

Graph and order real numbers

Order the numbers from least to greatest: $\frac{3}{5}$, $\sqrt{16}$, -2.2, $-\sqrt{12}$, $\sqrt{6}$.

Solution

Begin by graphing the numbers on a number line.



Read the numbers from left to right: $-\sqrt{12}$, -2.2, $\frac{3}{5}$, $\sqrt{6}$, $\sqrt{16}$.

Exercises for Examples 3 and 4

Tell whether each number in the list is a real number, a rational number, an irrational number, an integer, or a whole number. Then order the numbers from least to greatest.

7. $\sqrt{10}, -\frac{1}{2}, -\sqrt{8}, -2, 1.3$ **8.** $-\sqrt{3}, -\frac{1}{3}, -\sqrt{11}, -2.5, 4$