LESSON 2.1
Notes

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 *principle* 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
<u>Find square roots</u>

Evaluate the expression.

a. $\sqrt{400}$

b. $-\sqrt{16}$

c. $\pm\sqrt{81}$

Solution

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

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

$\pm\sqrt{81} = \pm 9$ 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 of 52 is closet to 49 then to 64, $\sqrt{52}$ is closer to 7 then to 8. So, $\sqrt{52}$ is about 7.

Exercises for Example 2

Approximate the square root to the nearest integer.

4. $\sqrt{75}$
5. $\sqrt{240}$
6. $-\sqrt{120}$

EXAMPLE 3
<u>Classify numbers</u>

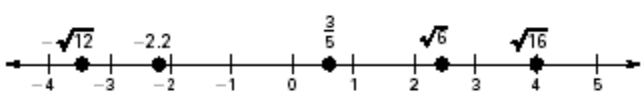
Tell whether each of the following numbers is a real number, a rational number, an irrational number, an integer, or a whole number: $\sqrt{64}$, $\sqrt{17}$, $-\sqrt{36}$

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
<u>Graph and order real numbers</u>

Order the numbers from least to greatest: $\sqrt{16}$, $\frac{3}{5}$, **–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, $\sqrt{6}$, $\sqrt{16}$, $\frac{3}{5}$

<u>Exercises for Examples 3 and 4</u>

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

Answer Key

Lesson 2.1

Study Guide

1. 17
2. – 10
3. ± 21
4. 9
5. 15
6. – 4
7. real number: $\sqrt{10}$, $-\frac{1}{2}$, $-\sqrt{8}$, – 2, 13; rational number: $-\frac{1}{2}$, – 2, 1.3; irrational number: $\sqrt{10}$, $-\sqrt{8}$; integer: – 2, whole number: none $-\sqrt{8}$, – 2, $-\frac{1}{2}$, 1.3, $\sqrt{10}$
8. real number: $-\sqrt{3}$, $-\frac{1}{3}$, $-\sqrt{11}$, – 2.5, 4; rational number: $-\frac{1}{3}$, – 2.5, 4; irrational number: $-\sqrt{3}$, $-\sqrt{11}$; integer; 4, whole number: 4; $-\sqrt{11}$, – 25, $\sqrt{3}$, $-\frac{1}{3}$, 4