Name ____________________ Date ____________

LESSON 2.7

Study Guide

For use with pages 109–118

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

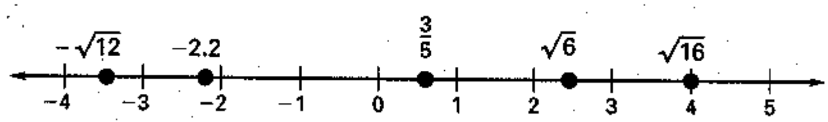
EXAMPLE 4

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

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Practice B

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Evaluate the expression.

1. $\pm\sqrt{81}$
2. $\pm\sqrt{25}$
3. $-\sqrt{400}$
4. $\sqrt{625}$
5. $\sqrt{4900}$
6. $\pm\sqrt{169}$

Approximate the square root to the nearest integer.

7. $-\sqrt{29}$
8. $\sqrt{108}$
9. $-\sqrt{53}$
10. $\sqrt{138}$
11. $-\sqrt{55}$
12. $\sqrt{640}$

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.

13. $-\sqrt{16}, 3.2, -\frac{3}{2}, \sqrt{9}$
14. $\sqrt{5}, -6, 2.5, -\frac{24}{5}$

Evaluate the expression for the given value of x.

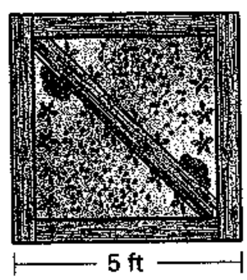
15. $14 + \sqrt{x}$ when $x = 16$
16. $\sqrt{x} - 5.5$ when $x = 4$
17. $-9 \cdot \sqrt{x}$ when $x = 25$
18. $2\sqrt{x} - 1$ when $x = 100$

19. **Park** A local park is in the shape of a square and covers an area of 3600 square feet. Find the side length of the park.

20. **Wall Poster** You are considering buying a square wall poster that has an area of 6.25 square feet. Find the side length of the wall poster.

21. **Road Sign** The U.S. Department of Transportation determines the sizes of the traffic control signs that you see along the roadways. The square Pennsylvania state route sign at the right has an area of 1296 square inches. Find the side length of the sign.

22. **Flower Bed** You are building the square flower bed shown using railroad ties. You want to place another railroad tie on the diagonal to form two triangular beds. Find the length of the diagonal by using the expression $\sqrt{2s^2}$ where s is the side length of the flower bed. Round your answer to the nearest tenth.



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