Section Overview

SECTION 4B

Squares and Square Roots
Lessons 4-6, 4-7

Why? Squares and square roots are important and necessary concepts in algebra, geometry, and higher levels of mathematics.

Squares

The **square** of both 6 and −6 is 36.

$6^2 = 36 \qquad (-6)^2 = 36$

A **perfect square** has an integer square root.

Examples: 0, 1, 4, 9, 16, 25, . . .

Square Roots

The positive square root of 36 is 6: $\sqrt{36} = 6$.

The negative square root of 36 is −6: $-\sqrt{36} = -6$.

The **principal square root** is the positive square root.

Estimate $\sqrt{27}$ to the nearest tenth.

Step 1:

$$\sqrt{25} = 5 \text{ and } \sqrt{36} = 6$$

So $\sqrt{27}$ is between 5 and 6, closer to 5.

Step 2:

$$5.1^2 = 26.01 \text{ (too low) and}$$
$$5.2^2 = 27.04 \text{ (too high)}$$

To the nearest tenth, $\sqrt{27} \approx 5.2$.

The Real Numbers
Lesson 4-8

Why? The set of real numbers includes rational and irrational numbers.

A **rational number** can be written as a quotient of two integers. Every rational number can be written as a decimal that either terminates or repeats.

$3\frac{4}{5} = 3.8 \qquad -3 = -3.0 \qquad \frac{2}{3} = 0.\overline{6}$

$\sqrt{1.44} = 1.2 \qquad \sqrt{\frac{4}{25}} = \frac{2}{5} = 0.4 \qquad \frac{0}{2} = 0$

An **irrational number** cannot be written as a quotient of two integers. There is no exact decimal representation for an irrational number.

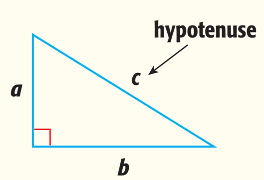
$\sqrt{7} \approx 2.646 \qquad \sqrt{2.8} \approx 1.673$

$\sqrt{\frac{3}{8}} \approx 0.612 \qquad \pi \approx 3.14159 \approx \frac{22}{7}$

The Pythagorean Theorem
Lesson 4-9

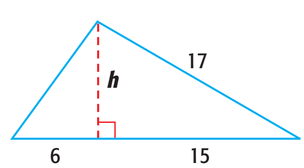
Why? You can use the Pythagorean Theorem to find information about triangles, such as the area of a triangle whose height is unknown.

Pythagorean Theorem



$a^2 + b^2 = c^2$

Find the area of the triangle.



First, use the right triangle to find h.

$$h^2 + 15^2 = 17^2$$
$$h^2 + 225 = 289$$
$$h^2 = 64$$
$$h = 8$$

Then, use the area formula to find the area of the large triangle.

$$A = \frac{1}{2}bh$$
$$A = \frac{1}{2}(21)(8)$$
$$A = 84 \text{ units}^2$$