Algebra I Notes
10.1 The Pythagorean Theorem

Objectives:	To solve problems using the Pythagorean Theorem To identify right triangles

Warm-Up

1. Solve for x using factoring.
   $2x^2 - 5x = 3$

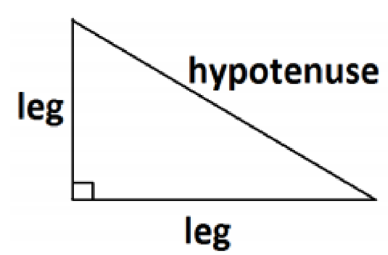
2. Solve using the quadratic formula.
   $x^2 + 8x = -11$

DEFINITIONS

In a **right triangle**,

legs - sides that form the right angle

hypotenuse - the side opposite the right angle

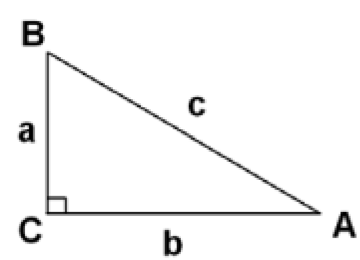


THE PYTHAGOREAN THEOREM

In a right triangle,

$(\boldsymbol{leg})^2 + (\boldsymbol{leg})^2 = (\boldsymbol{hypotenuse})^2$

$(\boldsymbol{a})^2 + (\boldsymbol{b})^2 = (\boldsymbol{c})^2$

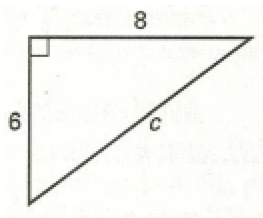


List the perfect squares from 1^2 to 12^2:

In each problem, solve for the missing side using the Pythagorean Theorem.

Example 1

a.



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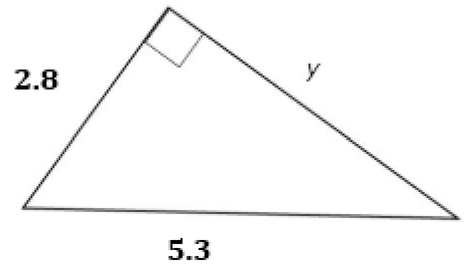
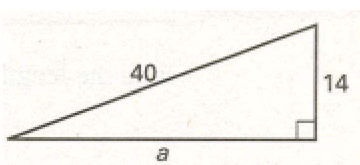


Example 2

a.



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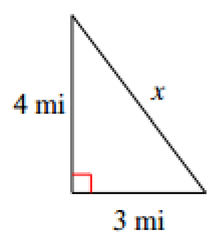


take note

Property **The Converse of the Pythagorean Theorem**

If a triangle has sides of lengths a, b, and c, and $a^2 + b^2 = c^2$, then the triangle is a right triangle with hypotenuse of length c.

Determine whether the given lengths can be side lengths of a right triangle.

Example 3

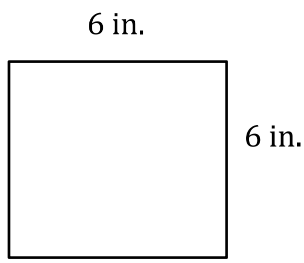
a. 6 in., 24 in., 25 in.

b. 11 m, 60 m, 61 m

Algebra I
10.2 Simplifying Radicals

Objectives:	To simplify radicals involving products and quotients.

Warm-Up:
Find the length diagonal of the below square. State the exact answer in reduced form.



List the perfect squares from 1^2 *to* 12^2.

Example 1 Simplify each radical.

a. $\sqrt{50}$

b. $\sqrt{\frac{49}{64}}$

c. $\sqrt{x^2 y}$

take note **Property** Multiplication Property of Square Roots

Algebra

For $a \geq 0$ and $b \geq 0$, $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$.

Example

$\sqrt{48} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}$

Example 2 Simplify each radical expression.

a. $2\sqrt{24}$

b. $3\sqrt{48x^3}$

c. $-5m\sqrt{20m^2n}$

Example 3 Simplify each product.

a. $\sqrt{6} \cdot \sqrt{8}$

b. $\frac{1}{2}\sqrt{12} \cdot \sqrt{15}$

c. $\sqrt{18p} \cdot \sqrt{32p^3}$

Example 4 Simplify each product.

a. $-3\sqrt{5m} \cdot 2\sqrt{8m^5}$

b. $12\sqrt{14a^3} \cdot \frac{1}{4}\sqrt{21a^4}$

Example 5 Simplify each radical expression.

a. $\sqrt{\frac{2}{3}}$

b. $\sqrt{\frac{4}{5n}}$

c. $2\sqrt{\frac{1}{7a^3}}$

d. $\frac{\sqrt{3}}{\sqrt{6m}}$

e. $\frac{-8}{\sqrt{x^5}}$

f. $3\sqrt{\frac{5}{32x}}$

Algebra I

10.3 Operations with Radical Expressions

Objectives:	To simplify sums and differences of radical expressions To simplify products and quotients of radical expressions

Warm-Up: Simplify each expression.

1. $-3\sqrt{200x^2}$

2. $15\sqrt{12m} \cdot \frac{1}{3}\sqrt{8m^2}$

3. $\sqrt{\frac{5}{6a}}$

Example 1 Simplify by combining like radicals.

a. $6\sqrt{11} + 9\sqrt{11}$

b. $\sqrt{3} - 5\sqrt{3}$

c. $4\sqrt{5} - 2\sqrt{5}$

Example 2 Simplify each radical expression and combine like radicals.

a. $5\sqrt{3} - \sqrt{12}$

b. $4\sqrt{7} + 2\sqrt{28}$

c. $-5\sqrt{32} - 4\sqrt{18}$

Example 3 Simplify each product.

a. $\sqrt{10}\,(\sqrt{6}+3)$ b. $(\sqrt{6}-2\sqrt{3})(\sqrt{6}+\sqrt{3})$ c. $(\sqrt{11}-2)^2$

RECALL: Simplify $\frac{2}{\sqrt{5}}$.

Consider the binomials $\sqrt{3}+5$ *and* $\sqrt{3}-5$. These are called ________________________

Example 4 Simplify each quotient using conjugates.

a. $\frac{3}{\sqrt{5}-2}$ b. $\frac{10}{\sqrt{3}+\sqrt{5}}$

c. $\frac{\sqrt{2}}{3+\sqrt{7}}$ d. $\frac{5}{\sqrt{2}-4}$