NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

LEARNING OBJECTIVE: We will simplify square roots. (G8M7L4)

ACTIVATING PRIOR KNOWLEDGE:

How do we know that $\sqrt{36} = 6$?	How do we know that $\sqrt{16} = 4$?
Because $6^2 = 36$ 36 is a perfect square	Because $4^2 = 16$ 16 is a perfect square.

TAKING THE SQRT OF A PERFECT SQUARE RESULTS IN AN INTEGER

CONCEPT DEVELOPMENT:

Multiplication Property of Square Roots:

$\sqrt{100} = 10$

$\sqrt{100} = \sqrt{10}\cdot\sqrt{10} = \sqrt{2}\cdot\sqrt{5}\cdot\sqrt{2}\cdot\sqrt{5}$

$= \sqrt{5}\cdot\sqrt{2}\cdot\sqrt{10}$

$\sqrt{4}\cdot\sqrt{25}$

$2\cdot 5 = 10$

$\sqrt{ab} = \sqrt{a}\cdot\sqrt{b}$ $\sqrt{5}\cdot\sqrt{6} = \sqrt{30}$

Examples:

$\sqrt{56} = \sqrt{8\cdot 7} = \sqrt{8}\cdot\sqrt{7}$

$\sqrt{72} = \sqrt{9}\cdot\sqrt{8}$

$= \sqrt{3}\cdot\sqrt{24}$

$= \sqrt{2}\cdot\sqrt{36}$

$= \sqrt{3}\cdot\sqrt{3}\cdot\sqrt{2}\cdot\sqrt{2}\cdot\sqrt{2}$

$\sqrt{124} = \sqrt{4}\cdot\sqrt{31}$

Remember this important item:

$\sqrt{x^2} = x$

Example: $\sqrt{144} = \sqrt{12^2} = 12$

$\sqrt{156^2} = 156$

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Guided Practice:

Steps for Simplifying Square Roots

1. Look at the number in the radical sign. Is it a perfect square?
2. If not a perfect square, can we rewrite the number as a factor of other numbers, looking for perfect squares (i.e. 4, 9, 16, 25, etc.)
3. Rewrite the square root as a product of its factors.
4. Simplify the perfect squares.

$\sqrt{48}$ $\sqrt{4}\cdot\sqrt{12}$ $(\sqrt{4}\cdot\sqrt{4})\cdot\sqrt{3}$ $\sqrt{16}\ \sqrt{3}$ $4\sqrt{3}$	$\sqrt{216}$ $\sqrt{36}\cdot\sqrt{6}$ $6\sqrt{6}$ $\sqrt{4}\cdot\sqrt{54}$ $\sqrt{4}\cdot\sqrt{9}\cdot\sqrt{6}$ $2\cdot 3\cdot\sqrt{6}$ $6\sqrt{6}$ $\sqrt{6^3} = \sqrt{6\cdot 6\cdot 6}$ $\sqrt{2^3}\cdot\sqrt{3^3} = 6\sqrt{6}$
$\sqrt{108}$ $\sqrt{4}\cdot\sqrt{27}$ $\sqrt{4}\cdot\sqrt{9}\cdot\sqrt{3}$ $2\cdot 3\cdot\sqrt{3}$ $6\sqrt{3}$ $\sqrt{36}\cdot\sqrt{3}$ $6\sqrt{3}$	$\sqrt{2000}$ $\sqrt{100}\cdot\sqrt{20}$ $\sqrt{100}\cdot\sqrt{4}\cdot\sqrt{5}$ $10\cdot 2\cdot\sqrt{5}$ $20\sqrt{5}$
$\sqrt{475}$ $\sqrt{25}\cdot\sqrt{19}$ $5\sqrt{19}$	$\sqrt{1250}$ $\sqrt{25}\cdot\sqrt{25}\cdot\sqrt{2}$ $25\sqrt{2}$ $\sqrt{125}\cdot\sqrt{10}$ $\sqrt{5}\cdot\sqrt{5}\cdot\sqrt{5}\cdot\sqrt{5}\cdot\sqrt{2}$ $5\cdot 5\sqrt{2}$ $25\sqrt{2}$

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Solve 2 different ways

$\sqrt{256}$

$\sqrt{8}\cdot\sqrt{32}$

$\sqrt{2}\cdot\sqrt{4}\cdot\sqrt{4}\cdot\sqrt{4}\cdot\sqrt{2}$

$2\cdot2\cdot2\cdot2$

16

$\sqrt{16}\cdot\sqrt{16}$

16

$\sqrt{64}\cdot\sqrt{4}$

$8\cdot2$

16

Solve 2 different ways

$\sqrt{1024}$

1) $\sqrt{4}\cdot\sqrt{256}$

$2\cdot16$

32

2) $\sqrt{4}\cdot\sqrt{4}\cdot\sqrt{4}\cdot\sqrt{4}\cdot\sqrt{4}$

$2\cdot2\cdot2\cdot2\cdot2$

32

3) $\sqrt{16}\cdot\sqrt{64}$

Solve 2 different ways

$\sqrt{288}$

$\sqrt{2}\cdot\sqrt{144}$

$12\sqrt{2}$

$\sqrt{4}\cdot\sqrt{72}$

$\sqrt{4}\cdot\sqrt{36}\cdot\sqrt{2}$

$2\cdot6\cdot\sqrt{2}$

$12\sqrt{2}$

Solve 2 different ways

$\sqrt{1152}$

$\sqrt{4}\cdot\sqrt{288}$

$2\cdot12\sqrt{2}$

$24\sqrt{2}$

$\sqrt{36}\cdot\sqrt{32}$

$6\cdot\sqrt{16}\cdot\sqrt{2}$

$6\cdot4\sqrt{2}$

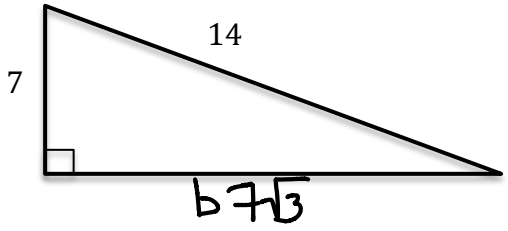
$24\sqrt{2}$

$\sqrt{16}\cdot\sqrt{72}$

$4\cdot\sqrt{36}\cdot\sqrt{2}$

$24\sqrt{2}$

Find the unknown side length. Simplify your answer!



$7^2+b^2=14^2$

$49+b^2=196$

$-49 \quad -49$

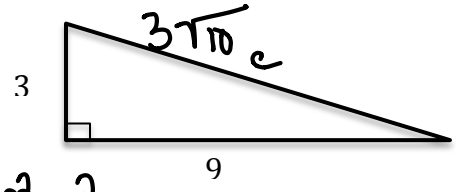
$b^2=147$

$b=\sqrt{147}=\sqrt{21}\cdot\sqrt{7}=\sqrt{3}\cdot\sqrt{7}\cdot\sqrt{7}$

$=\sqrt{49}\cdot\sqrt{3}$

$7\sqrt{3}$

Find the unknown side length. Simplify your answer!



$3^2+9^2=c^2$

$9+81=c^2$

$c^2=90$

$c=\sqrt{90}$

$c=\sqrt{9}\cdot\sqrt{10}$

$c=3\sqrt{10}$

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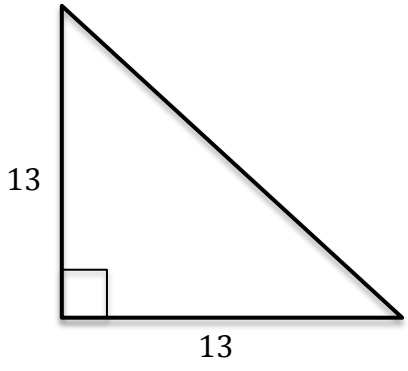
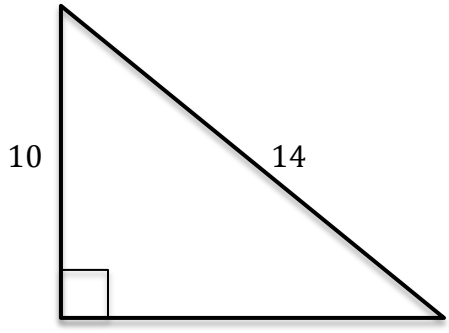
Independent Practice:

Simplify as much as possible: $\sqrt{1800}$	Simplify as much as possible: $\sqrt{660}$
Simplify as much as possible: $\sqrt{45} \cdot \sqrt{20}$	Simplify as much as possible: $\sqrt{24} \cdot \sqrt{3} \cdot \sqrt{2}$
Find the missing side length:  	Find the missing side length: 

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Closure:

Simplify $\sqrt{2420}$

$\sqrt{4} \cdot \sqrt{605}$

$\sqrt{4} \cdot \sqrt{5} \cdot \sqrt{121} = 22\sqrt{5}$

Notes:

This maps to Lesson 4, module 7, grade 8.
Homework is Pythagorean theorem on Khan Academy, and simplifying radicals 1 and 2 on Khan academy

Can be optional for math 8 students.