Geometry CC – Unit 8
Lesson 1: Pythagorean Theorem
M2 L0

Do Now: Express each in simplest radical form (algebra review):

a) $\sqrt{300}$ → $\sqrt{100}\sqrt{3}$ → $10\sqrt{3}$

b) $\sqrt{45}$ → $\sqrt{9}\sqrt{5}$ → $3\sqrt{5}$

c) $\sqrt{x^2y^6}$ → $x \cdot x = x^2$, $y^3 \cdot y^3 = y^6$ → xy^3

d) $5\sqrt{72}$ → $5\sqrt{36}\sqrt{2}$ → $5 \cdot 6\sqrt{2}$ → $30\sqrt{2}$

e) $3\sqrt{168}$ → $3\sqrt{4}\sqrt{42}$ → $3(2)\sqrt{42}$ → $6\sqrt{42}$

f) $x^2\sqrt{108}$ → $x^2\sqrt{36}\sqrt{3}$ → $6x^2\sqrt{3}$

Perfect Squares

1^2 =	1
2^2 =	4
3^2 =	9
4^2 =	16
5^2 =	25
6^2 =	36
7^2 =	49
8^2 =	64
9^2 =	81
10^2 =	100
11^2 =	121
12^2 =	144
13^2 =	169
14^2 =	196
15^2 =	225

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The Pythagorean Theorem

The mathematical relationship stating that in any right triangle, the sum of the squares of the two legs is equal to the square of the hypotenuse.

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

The Pythagorean Theorem may also be used to prove that three sides of a triangle are the sides of a *right triangle*. If $a^2 + b^2 = c^2$ then the triangle is a right triangle

The Pythagorean Theorem ONLY works in Right Triangles!

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In each example below, *c* represents the length of the hypotenuse of a right triangle and *a* and *b* represent the length of the legs.

Find the length of each missing side: a) In simplest radical form;

1. legs 5, 12; hypotenuse c

$5^2 + 12^2 = c^2$
$25 + 144 = c^2$
$\sqrt{169} = \sqrt{c^2}$
$c = 13$

2. legs 8, b; hypotenuse 10

$b^2 + 8^2 = 10^2$
$b^2 + 64 = 100$
$b^2 = 36$
$b = 6$

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3. $b = \sqrt{3}$, $c = \sqrt{15}$

$a^2 + b^2 = c^2$
$a^2 + (\sqrt{3})^2 = (\sqrt{15})^2$
$a^2 + 3 = 15$
$\sqrt{a^2} = \sqrt{12}$
$a = \sqrt{4}\sqrt{3}$
$= 2\sqrt{3}$

4. $a = 4\sqrt{2}$, $c = 8$

$a^2 + b^2 = c^2$
$(4\sqrt{2})^2 + b^2 = 8^2$
$(4\sqrt{2})(4\sqrt{2}) + b^2 = 64$
$16(2) + b^2 = 64$
$32 + b^2 = 64$
$\sqrt{b^2} = \sqrt{32}$
$b = \sqrt{16}\sqrt{2}$
$b = 4\sqrt{2}$

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