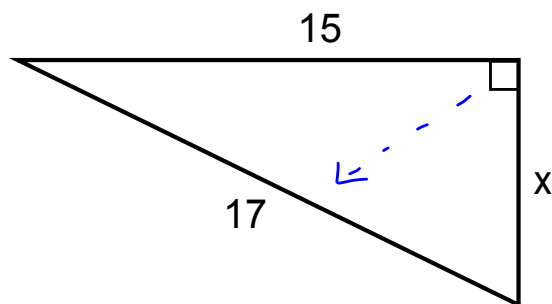## DO NOW
Find the value of x

15

17

x

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

$$15^2 + x^2 = 17^2$$

$$225 + x^2 = 289$$

$$\sqrt{x^2} = \sqrt{64}$$

$$\boxed{X = 8}$$

Mar 7-10:24 AM

The Pythagorean Theorem

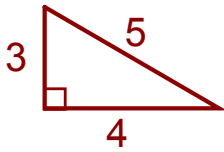If a triangle is a right triangle, then $a^2 + b^2 = c^2$

Converse of the Pythagorean Theorem

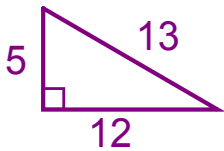If the sides of a triangle "work" in $a^2 + b^2 = c^2$, then the triangle is a right triangle

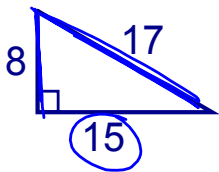Mar 7-10:26 AM

Pythagorean Triples

Common side lengths of right triangles to remember:

Multiples: 6, 8, 10
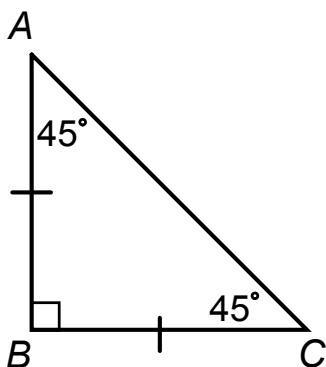9, 12, 15
12, 16, 20

Multiples: 10, 24, 26
15, 36, 39

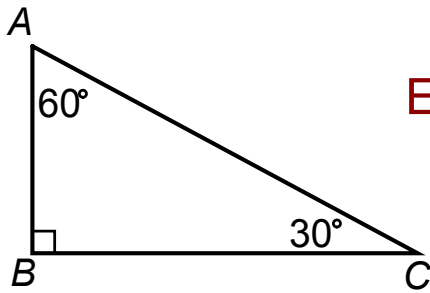Multiples: 16, 30, 34

Mar 7-10:29 AM

Special Right Triangles

45°- 45°- 90° is an Isosceles Right Triangle

EX: If $AB = 1$, find AC.

Mar 7-10:37 AM

30°- 60°- 90° Triangle

A

$60°$

B $\square$ $30°$ C
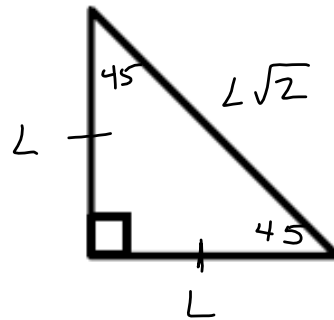
EX: If $AB = 1$ and $AC = 2$, find BC.

Mar 7-10:44 AM

45°-45°-90°
Triangle Theorem

If one leg is known, then the hypotenuse = leg$\sqrt{2}$

$L,$ $L,$ $L\sqrt{2}$

leg   leg   hypotenuse

45 $L\sqrt{2}$

L

$\square$ 45

L

Jan 14-12:54 PM

Find the value of each variable. Write your answer as a simplified radical.

$x = 5, y = 5$

Example 1:

$\angle\sqrt{2}$
$5\sqrt{2}$

x, y

$\angle$ $\angle$

Example 2:

$x = 9,$
$y = 9\sqrt{2}$

x, y, 9

Example 3:

$\angle$ $\angle$
x, y

$2\sqrt{6}$
$\angle\sqrt{2}$

$\dfrac{L\cdot\sqrt{2}}{\sqrt{2}} = \dfrac{2\sqrt{6}}{\sqrt{2}}$

$L = 2\sqrt{3}$

Example 4:

$45°$
$\angle$ x y $\angle\sqrt{2}$
$45°$
$7\sqrt{2}$
$\angle$

$x = 7\sqrt{2}$

$y = 7\sqrt{2}\cdot\sqrt{2}$

$7\cdot 2$

$y = 14$

Jan 14-12:53 PM

30°-60°-90°
Triangle Theorem

Short leg (opposite 30° angle)
$\dfrac{1}{2}$ (hyp)

Long leg (opposite 60° angle)
$\dfrac{1}{2}$ (hyp)$\sqrt{3}$

60°   2·SL
SL Γ- - -
30°
SL$\sqrt{3}$

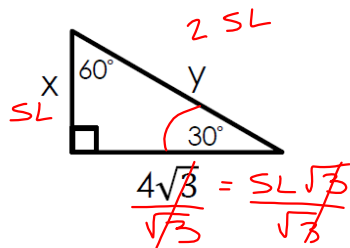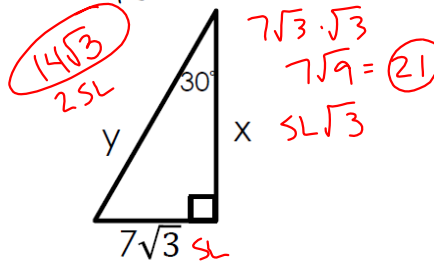$SL, \quad SL\sqrt{3}, \quad 2(SL)$

short leg   long leg   hypotenuse

Jan 14-12:55 PM

4

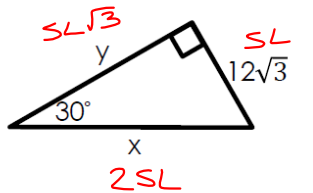Find the value of each variable. Write your answer as a simplified radical.
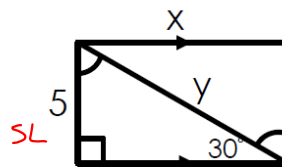
Example 5: $x = 4, y = 8$

2 SL

$$\frac{4\sqrt{3}}{\sqrt{3}} = \frac{SL\sqrt{3}}{\sqrt{3}}$$

x — SL   60°   y   30°

Example 6: $14\sqrt{3}$ 2SL

$7\sqrt{3} \cdot \sqrt{3}$
$7\sqrt{9} = 21$

30°   x   SL$\sqrt{3}$ y $7\sqrt{3}$ SL

Example 7:

SL$\sqrt{3}$ y   SL $12\sqrt{3}$ 30°   x

2SL

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

$$y = 12\sqrt{3} \cdot \sqrt{3}$$

$$12 \cdot 3$$

$$y = 36$$

Example 8:

x   y   5   SL   30°

$$y = 10$$

$$x = 5\sqrt{3}$$

Use the special right triangle patterns to find the missing sides.

SL   y $4\sqrt{3}$
SL$\sqrt{3}$ 12   60°
$8\sqrt{3}$
30°   x   2·SL

$$\frac{SL\sqrt{3}}{\sqrt{3}} = \frac{12}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$SL = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$$