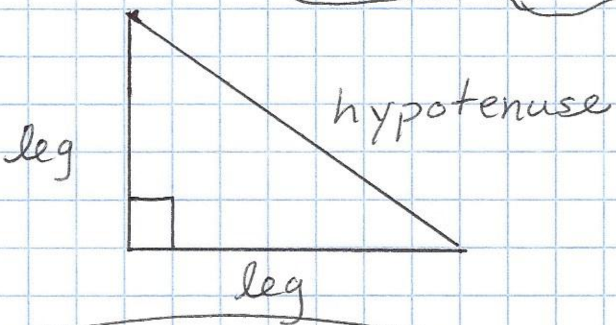
Right Triangles



* the legs are the 2 shorter sides — the ones that form the $90°$ angle.
* The hypotenuse is the longest side — opposite the $90°$ angle
* The 2 acute angles always add to $90°$
* Right triangles may be scalene (no equal sides) or isosceles (2 equal sides)

Pythagorean Thm.

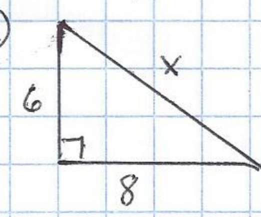
If "a" + "b" are the legs and "c" is the hypotenuse, <u>then</u>

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

Applies <u>only</u> to right triangles; is used to find 3rd side when 2 are Known.

Examples:

1.



$x^2 = 6^2 + 8^2$

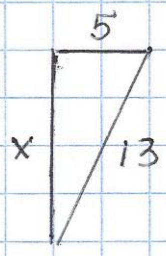
$x^2 = 36 + 64$

$x^2 = 100$

$x = \sqrt{100}$

$\boxed{x = 10}$

2.



$x^2 + 5^2 = 13^2$

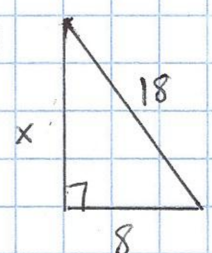
$x^2 + 25 = 169$

$x^2 = 144$

$x = \sqrt{144}$

$x = 12$

3.



$x^2 + 8^2 = 18^2$

$x^2 + 64 = 324$

$x^2 = 260$

$x = \sqrt{260}$

$x = \sqrt{4 \cdot 65}$

$x = 2\sqrt{65}$

or

$x \approx 16.1$

<u>Quick review of simplifying radicals</u>

Example

$\sqrt{8} =$

$\sqrt{4 \cdot 2} =$

$2\sqrt{2}$

Ask yourself "what is the biggest perfect square that goes evenly into 8 — in this case 4
Then rewrite 8 as $4 \cdot 2$
Take the square root of the 4 + leave the 2 under the square root sign

Other examples:

$\sqrt{300} = \sqrt{100 \cdot 3} = 10\sqrt{3}$

$\sqrt{75} = \sqrt{25 \cdot 3} = 5\sqrt{3}$

<u>Perfect squares</u>

1, 4, 9, 16, 25, 36

49, 64, 81, 100, 121,

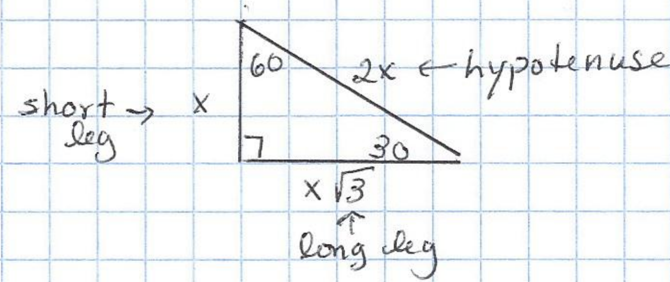
144, 169, 196, 225,

256, 289, 324 . . .

Special Triangles

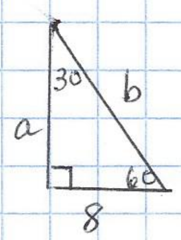
In these triangles, you can find 2 missing sides if one side is Known.

$30°-60°-90°$



Examples:

(1.)

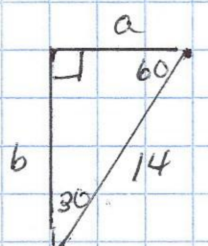


Since "8" is the short leg;

$\boxed{b = 2\cdot 8 = 16}$ (hypotenuse)

$\boxed{a = 8\sqrt{3}}$ (long leg)

(2.)

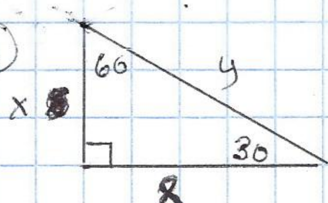


Since "14" is the hypotenuse,

$\boxed{a = \frac{14}{2} = 7}$ (short leg)

$\boxed{b = 7\sqrt{3}}$ (long leg)

(3.)



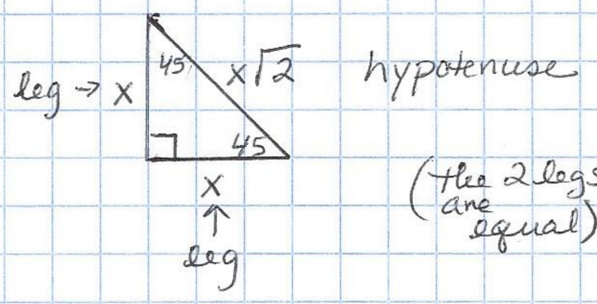
In this case, "8" is the longer leg. To find the short leg, we divide by $\sqrt{3}$

$\therefore\ x = \frac{8}{\sqrt{3}}$ To simplify, take top + bottom of fraction times $\sqrt{3}$

$\frac{8}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{8\sqrt{3}}{3}}$ $\boxed{\text{or}}$ $\frac{8}{\sqrt{3}} \approx \boxed{4.6}$

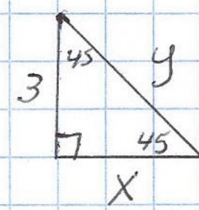
$y = 2\cdot X$ or $2\cdot 8\sqrt{3} = 16\sqrt{3} \approx \boxed{9.2}$

$45°-45°-90°$



(the 2 legs are equal)

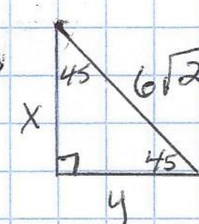
(1.)



Since the legs are equal,

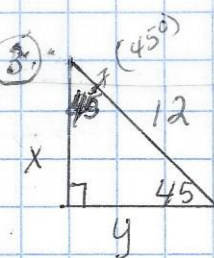
$\boxed{x = 3 \quad y = 3\sqrt{2}}$

(2.)



Since x + y are =, they both $= \frac{6\sqrt{2}}{\sqrt{2}}$ or $\boxed{6}$

(3.)



$X = y = \frac{12}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2} = 6\sqrt{2}$

or

$\boxed{X = y \approx 8.4}$