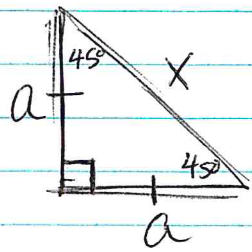
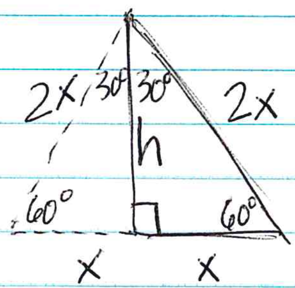
Notes 10.2 - ~~Simp~~ 30-60-90, 45-45-90 + Simplifying radicals



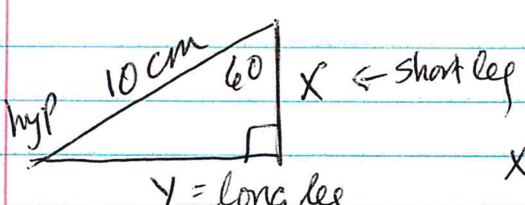
$$a^2 + a^2 = x^2$$
$$\sqrt{2a^2} = \sqrt{x^2}$$
$$\sqrt{2} \cdot a = x$$
$$a\sqrt{2} = x$$

Proved: In an isosceles right triangle, if one leg = a, then the hypotenuse = $a\sqrt{2}$.



$$x^2 + h^2 = (2x)^2$$
$$x^2 + h^2 = 4x^2$$
$$-x^2 \qquad -x^2$$
$$\sqrt{h^2} = \sqrt{3x^2}$$
$$h = \sqrt{3} \cdot x$$
$$h = x\sqrt{3}$$

x = short leg
2x = hypotenuse
h = long leg
$= x\sqrt{3}$



$x = \frac{10}{2} = 5$ cm $\quad y = 5\sqrt{3}$ cm

Simplifying radicals:

$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

$\sqrt{a^2} = a$

has
1. no perfect square factors under radical.
2. no fractions under the radical
3. no radical in denominator

$(3\sqrt{5})^2$
$3^2 \cdot \sqrt{5}^2$
$9 \cdot 5$
45

$\sqrt{50}$
$\sqrt{25 \cdot 2}$
$\sqrt{25} \cdot \sqrt{2}$
$5\sqrt{2}$

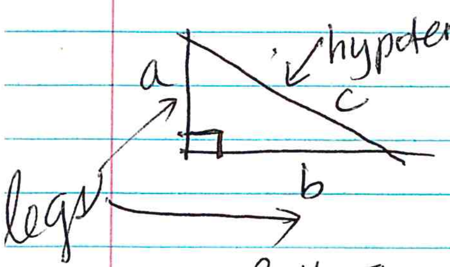
$\sqrt{72}$
$\sqrt{36} \cdot \sqrt{2}$
$6\sqrt{2}$

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

$3\sqrt{40}$
$3\sqrt{4} \cdot \sqrt{10}$
$3 \cdot 2\sqrt{10}$
$6\sqrt{10}$

$(2\sqrt{3})(4\sqrt{6})$
$8\sqrt{18}$
$8\sqrt{9} \cdot \sqrt{2}$
$8 \cdot 3\sqrt{2} = 24\sqrt{2}$

Notes 10.1-2



Right Triangle has one right angle

hypotenuse - long side, opp. 90° angle

the other two sides are called legs.

Pyth Th: $a^2+b^2=c^2$

Converse: if $a^2+b^2=c^2$ then the Δ is a right triangle.

If $c^2>a^2+b^2$, the Δ is obtuse

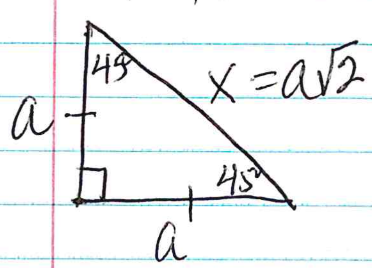
" $c^2<a^2+b^2$, the Δ is acute

3 whole numbers that can be sides of a right Δ are called Pyth. Triples.

Memorize 3, 4, 5 5, 12, 13 7, 24, 25 8, 15, 17

Shortcut (Pythagorean Theorem)

45, 45, 90 (Isos Right Δ) Shortcut



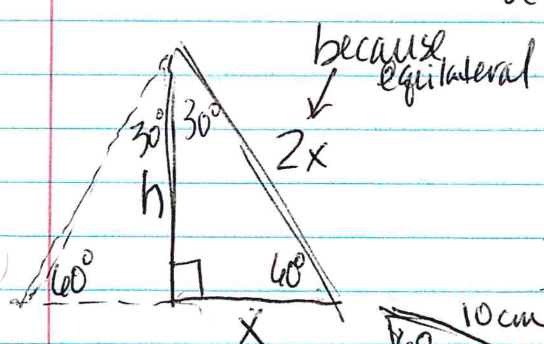
$a^2+a^2=x^2$ (P.T.)

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

$\sqrt{2}\cdot\sqrt{a^2}=x$

$a\sqrt{2}=x$

$\therefore$ In a 45-45-90 right Δ, if the legs have length a, the hypotenuse has length $a\sqrt{2}$.



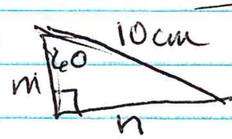
$x^2+h^2=(2x)^2$

$x^2+h^2=4x^2$

$-x^2 \qquad -x^2$

$\sqrt{h^2}=\sqrt{3x^2}$

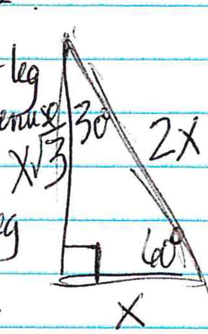
$h=\sqrt{3}\cdot x=x\sqrt{3}$



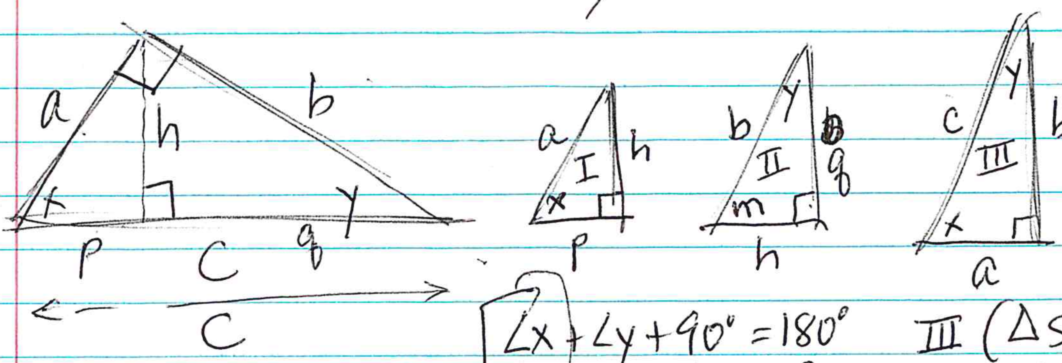
x: short leg

2x = hypotenuse

$x\sqrt{3}$ = long leg



Notes 10.1 – Prove Pyth. Th. (p 499)



$$\boxed{\begin{aligned}\angle x + \angle y + 90^\circ &= 180^\circ \\ \angle m + \angle y + 90^\circ &= 180\end{aligned}}\qquad \begin{aligned}&\text{III } (\Delta \text{ sum}) \\ &\text{II } (\text{"})\end{aligned}$$

$\angle m \cong \angle x$ (substitution)

I ~ II ~ III because AA (x, 90°)

By def of similarity $\dfrac{p}{a} = \dfrac{a}{c}$ $\qquad \dfrac{q}{b} = \dfrac{b}{c}$

$$a^2 = cp \quad + \quad b^2 = cq$$

$$a^2 + b^2 = cp + cq$$
$$= c(p+q)$$