

9.2: Converse of the Pythagorean Thm

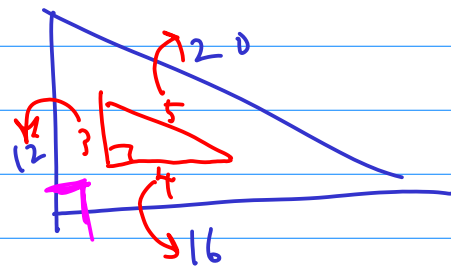
Pyth. Thm: $\left[\begin{array}{c} \text{rt} \\ \Delta \end{array} \right] \xrightarrow{\text{Converse}} a^2 + b^2 = c^2$

* Converse of Pyth. Thm: If the eqn $a^2 + b^2 = c^2$ hold true for a Δ , then the Δ is a rt Δ .

Ex: Is a Δ w/sides $12-16-20$ a rt Δ ?

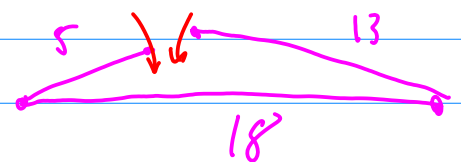
$$\begin{aligned} a^2 + b^2 &= c^2 \\ 12^2 + 16^2 &\stackrel{?}{=} 20^2 \\ 144 + 256 &\stackrel{?}{=} 400 \\ 400 &\stackrel{!}{=} 400 \end{aligned}$$

\therefore the Δ is a rt Δ .



Ex: Is a Δ w/sides $5-13-18$ a rt Δ ?

$$\begin{aligned} a^2 + b^2 &\stackrel{?}{=} c^2 \quad \therefore \text{not a} \\ 5^2 + 13^2 &\stackrel{?}{=} 18^2 \quad \text{rt } \Delta \\ 25 + 169 &\stackrel{?}{=} 324 \\ 194 &\neq 324 \end{aligned}$$



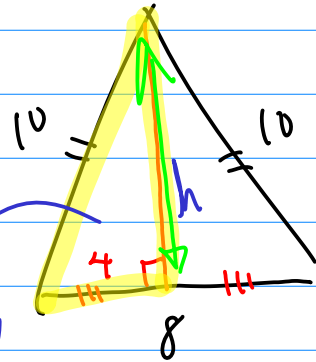
Ex: ... $15-36-39$?

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 15^2 + 36^2 &\stackrel{?}{=} 39^2 \end{aligned}$$

$$\begin{aligned} (3 \cdot 5)^2 + (3 \cdot 12)^2 &\stackrel{?}{=} (3 \cdot 13)^2 \\ 3^2 \cdot 5^2 + 3^2 \cdot 12^2 &\stackrel{?}{=} 3^2 \cdot 13^2 \\ \cancel{9} \cdot 25 + \cancel{9} \cdot 144 &\stackrel{?}{=} \cancel{9} \cdot 169 \\ 25 + 144 &\stackrel{?}{=} 169 \\ &\stackrel{!}{=} 169 \end{aligned}$$

$\therefore \Delta$ is a rt Δ

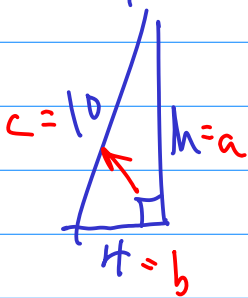
Ex: The \cong sides of an isos. Δ are 10 & the base is 8. find A_{Δ} .



$$A_{\Delta} = \frac{1}{2} b h$$

$$= \frac{1}{2} (8) (\sqrt{84})$$

$$= \boxed{4\sqrt{84} \text{ u}^2}$$



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

$$h^2 + 4^2 = 10^2$$

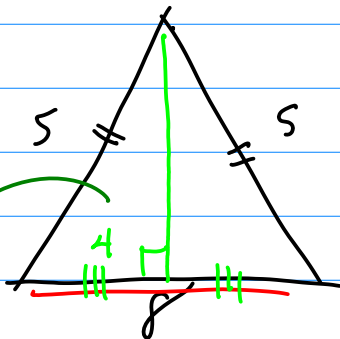
$$h^2 + 16 = 100$$

$$\sqrt{h^2} = \sqrt{84}$$

$$h = \sqrt{84}$$

∴

Ex: Isos. Δ w/ \cong sides 5 & base 8. $A_{\Delta} = ?$



$$A_{\Delta} = \frac{1}{2} b h$$

$$= \frac{1}{2} (8) (3)$$

$$= \boxed{12 \text{ u}^2} \checkmark$$

