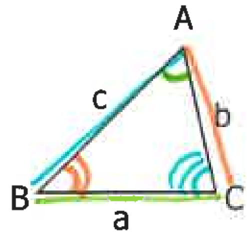
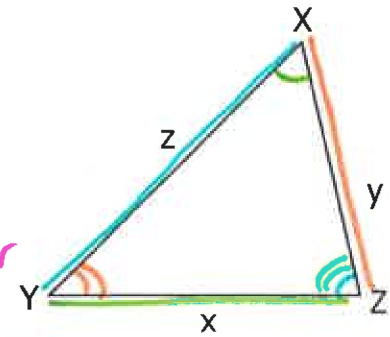
NOTES: Similar Triangles

Date: Nov. 28

The two triangles below are **similar**.



~ "is similar to"



$$\boxed{\Delta ABC \sim \Delta XYZ}$$

Similar means that they have the same <u>Shape</u>, but are a different <u>size</u> (ΔXYZ is an enlargement of ΔABC).

When two triangles are similar:

- their corresponding (matching) <u>angles</u> are equal
- their corresponding (matching) <u>side lengths</u> are proportional

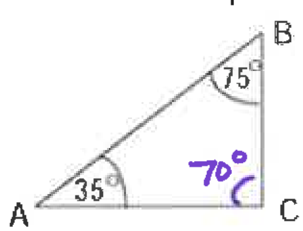
$\angle A = \angle X$
$\angle B = \angle Y$
$\angle C = \angle Z$

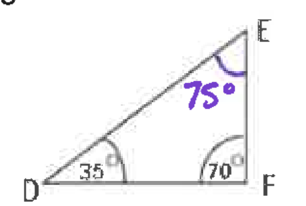
$$\frac{x}{a} = \frac{y}{b} = \frac{z}{c} \qquad \frac{a}{x} = \frac{b}{y} = \frac{c}{z}$$

To **prove** that two triangles are similar, you need to show that **<u>either</u>** of the above are true.

Example 1

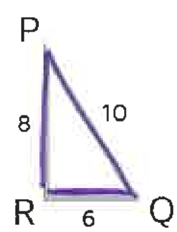
Prove that each pair of triangles is similar.

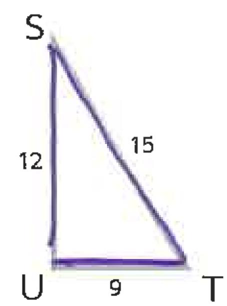




$180 - 35 - 75 = 70°$ $\qquad$ $180 - 35 - 70 = 75°$

$\left.\begin{array}{l}\angle A = \angle D \\ \angle B = \angle E \\ \angle C = \angle F\end{array}\right\}$ $\Delta ABC \sim \Delta DEF$ because corresponding angles are equal

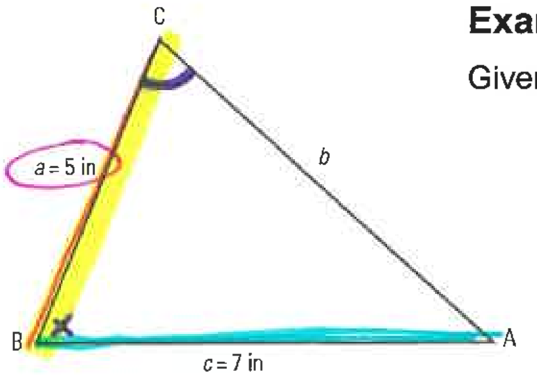


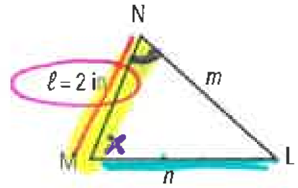


$\left.\begin{array}{l}\frac{9}{6} = 1.5 \\ \frac{12}{8} = 1.5 \\ \frac{15}{10} = 1.5\end{array}\right\}$ $\Delta PQR \sim \Delta STU$ because ratios of corresponding sides are equal

Example 2

Given the two triangles shown, find the length of n.





$\angle C = \angle N$
$\angle B = \angle M$
$\angle A$ must be equal to $\angle L$
$\triangle ABC \sim \triangle LMN$

big △ → $\dfrac{5}{2} = \dfrac{7}{n}$ ← small △

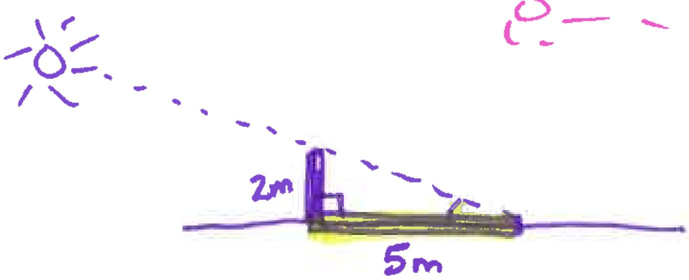
↑ left side ↑ bottom side

$n = \dfrac{2 \times 7}{5}$

$= \boxed{2.8 \text{ in}}$

Example 3

Ravi notices that a 2-m pole casts a shadow of 5 m, and a second pole casts a shadow of 9.4 m. How tall is the second pole?



$\dfrac{5}{9.4} = \dfrac{2}{h}$

$h = \dfrac{9.4 \times 2}{5}$

$= \boxed{3.8 \text{ m}}$