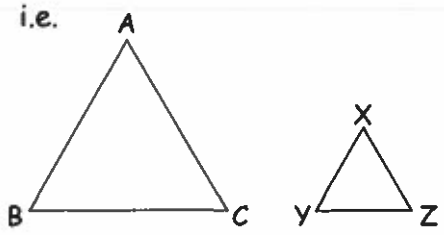
Similar Triangles

- Similar triangles **are pairs or groups of triangles that** have the same shape but are not the same size.

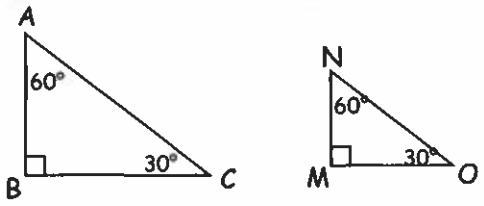
i.e.



$\Delta ABC \sim \Delta XYZ$

- Pairs of triangles are considered similar if:
  1) All the angles are the same.

i.e.

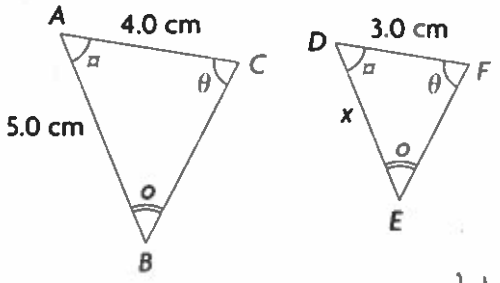


angles go in the same order!

$\Delta ABC \sim \Delta NMO$

Ex/ Are the following pairs of triangles similar?

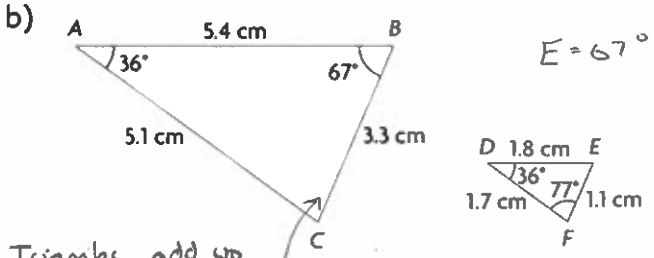
a)



Yes, all angles have matching symbols (don't need values)

$\Delta ABC \sim \Delta DEF$

b)



$E = 67°$

Triangles add up to 180°

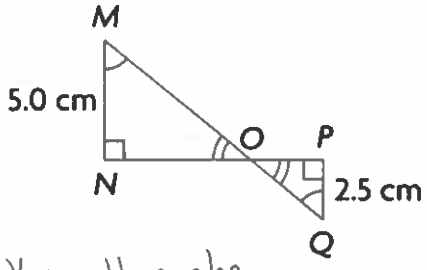
$C = 180 - 36 - 67$

$= 77°$

Yes, all angles the same

$\Delta ABC \sim \Delta DEF$

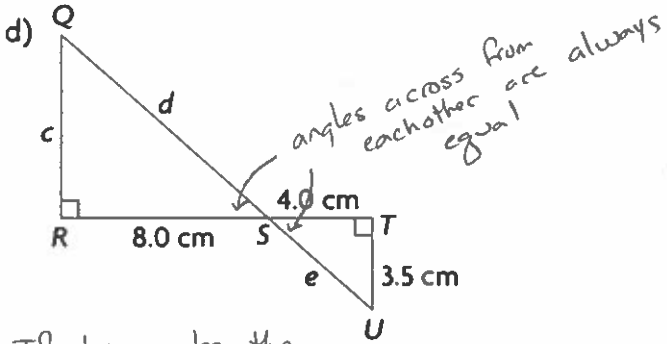
c)



Yes, all angles the same

$\Delta MNO \sim \Delta QPO$

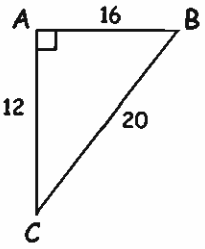
d)

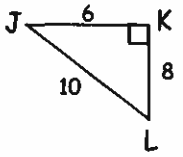


- If two angles the same, so is the 3rd to add up to 180°

$\Delta QRS \sim \Delta UTS$

2) The side lengths are proportional. That is, there is a constant multiple between pairs of matching sides. This is called the *scale factor*.





match up corresponding sides

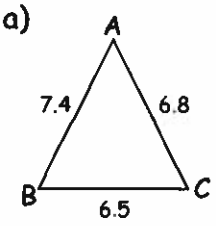
$\Delta ABC \sim \Delta KLJ$

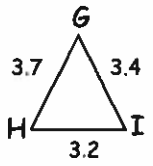
The scale factor is: 2

biggest sides $\frac{20}{10} = 2$ mid sides $\frac{16}{8} = 2$ small sides $\frac{12}{6} = 2$

Ex/ Determine if the following pairs of triangles are similar or not. Explain your reasoning.

a)

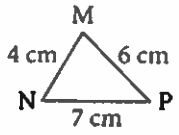


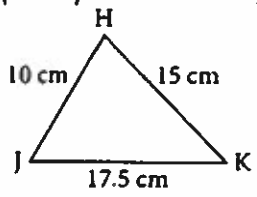


$\frac{7.4}{3.7} = 2$ $\frac{6.8}{3.4} = 2$ $\frac{6.5}{3.2} = 2.1$

∴ Not similar Not the same!

b)

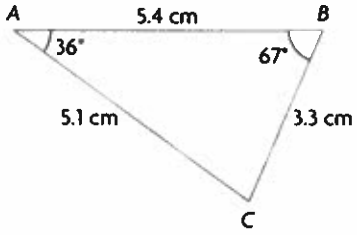




$\frac{17.5}{7} = 2.5$ $\frac{15}{6} = 2.5$ $\frac{10}{4} = 2.5$

Yes, similar $\Delta MNP \sim \Delta HJK$

- If triangles are similar, i.e. $\Delta ABC \sim \Delta JKL$ then we know:



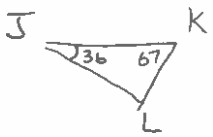
$\angle A = \angle J$

$\angle B = \angle K$

$\angle C = \angle L$

$$\frac{AB}{JK} = \frac{BC}{KL} = \frac{AC}{JL} = \text{Scale Factor}$$

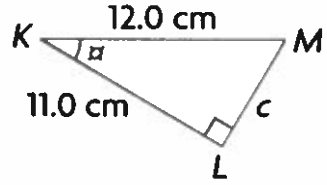
Ex/ Can you draw and label triangle JKL?

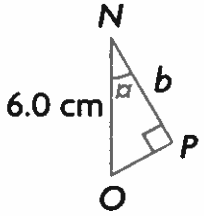


← Can be any size, but must be same shape

Ex/ Identify if the following pairs of triangles are similar. If so, make a list of the corresponding information.

a)





2 angles same, so all 3

$\Delta KLM \sim \Delta NPO$

$\angle K = \angle N$

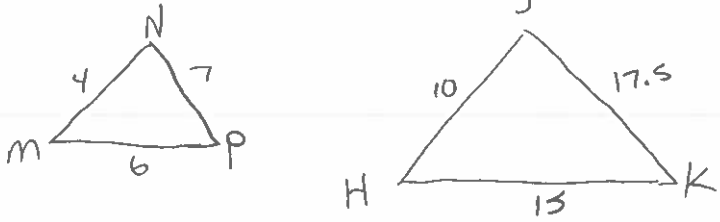
$\angle L = \angle P$

$\angle M = \angle O$

$\frac{KL}{NP} = \frac{LM}{PO} = \frac{KM}{NO}$

small letters are sides across from corresponding BIG letters

b) In ΔMNP, m = 7 cm, n = 6 cm, p = 4 cm and in ΔHJK, h = 17.5 cm, j = 15 cm, k = 10 cm



$\Delta MNP \sim \Delta HJK$

$\angle M = \angle H$
$\angle N = \angle J$
$\angle P = \angle K$

$\frac{MN}{HJ} = \frac{NP}{JK} = \frac{MP}{HK}$

$\frac{17.5}{7} = 2.5 \qquad \frac{15}{6} = 2.5 \qquad \frac{10}{4} = 2.5$

Practice: Handout - Similar Triangles