

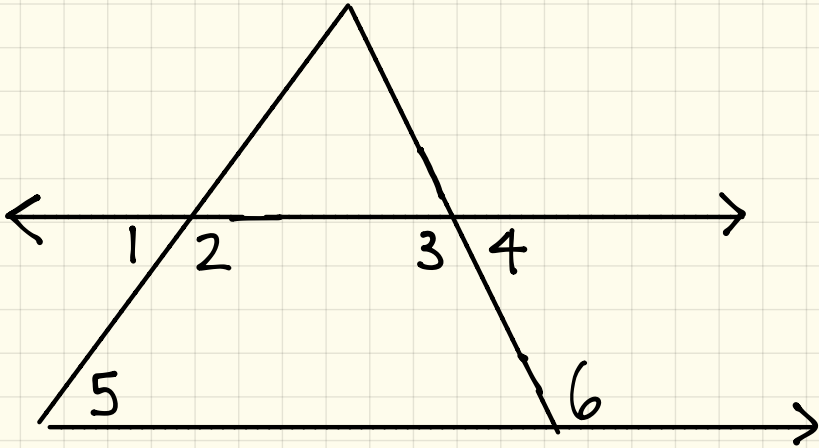
2.7 Similar Triangles

Part 1

Proving Similar Triangles

Old Parallel Lines Cut with Transversals

Find the missing angles.

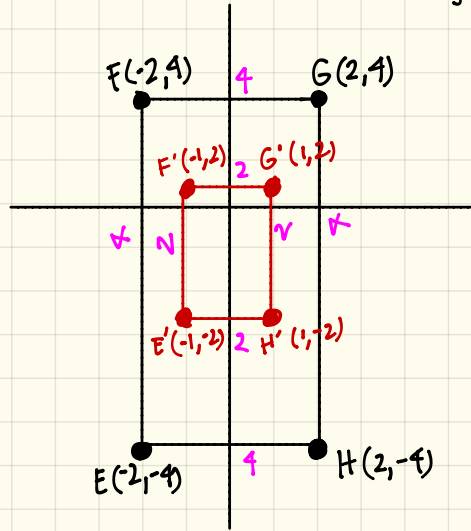


Given $\angle 1 = 47^\circ$
 $\angle 7 = 53^\circ$

- $\angle 1 = 47^\circ$ (given)
- $\angle 2 = 53^\circ \rightarrow$ supplementary (linear pair to $\angle 1$)
- $\angle 3 = 53^\circ \rightarrow$ congruent (alternate to $\angle 2$)
- $\angle 4 = 47^\circ \rightarrow$ supplementary (linear pair to $\angle 3$)
- $\angle 5 = 47^\circ \rightarrow$ congruent (alternate to $\angle 4$)
- $\angle 6 = 53^\circ$ (given)

more old... Dilations & Scale Factors

Let's consider a rectangle EFGH. Produce the image from $(x,y) \rightarrow (\frac{1}{2}x, \frac{1}{2}y)$.



Recall: Similar Triangles have proportional relationships.

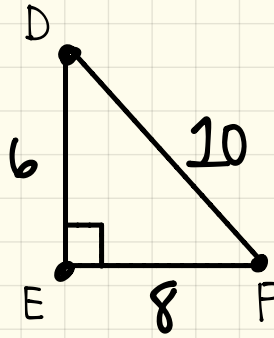
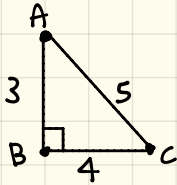
$$\frac{\text{Sides of Preimage}}{\text{Sides of Image}} = \frac{FE}{F'E'} = \frac{FG}{F'G'} = \frac{GH}{G'H'} = \frac{EH}{E'H'}$$

$$= \frac{2}{4} = \frac{2}{4} = \frac{2}{4} = \frac{2}{4}$$

$$= \frac{1}{2} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2}$$

New Similar Triangles (Part 1)

Let's consider 2 triangles of different sizes. Compare the 2 triangles.



Are the 2 triangles congruent? no, because corresponding sides are not equal.

Do they have the same shape? yes, because both are right triangles.

$$\triangle ABC \sim \triangle DEF$$

$$\frac{\overline{AB}}{\overline{DE}} = \frac{\overline{BC}}{\overline{EF}} = \frac{\overline{AC}}{\overline{DF}}$$

$$\frac{5}{10} = \frac{4}{8} = \frac{3}{6}$$

$$\frac{1}{2} = \frac{1}{2} = \frac{1}{2}$$

- $\triangle ABC$ & $\triangle DEF$ are similar because the shape is the same & the corresponding sides have the same ratio

Similar Triangles

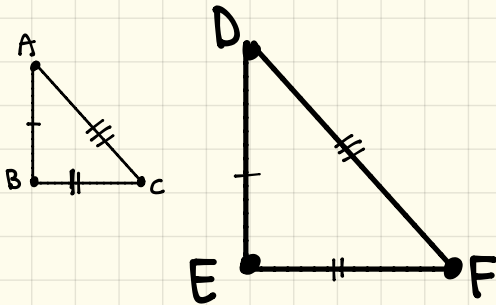
- Two triangles are similar if they have the same 3 angle measurements.
- Similar triangles have same shape but possibly different sizes.

Think about → Similar Triangles as being a magnification of the other.

⇒ To prove 2 triangles are similar, you must show that sides are proportional & angles are congruent.

There are three ways to prove similarity:

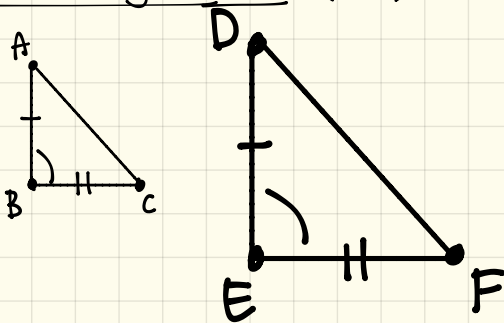
1. Side-Side-Side (SSS)



Measures of all corresponding sides of the 2 triangles are proportional.

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

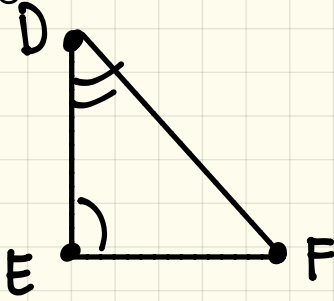
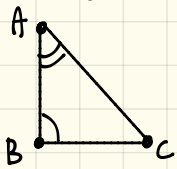
2. Side-Angle-Side (SAS)



Measures of the 2 sides of one triangle is proportional to the corresponding 2 sides of the other triangle & the the corresponding INCLUDED angles are congruent.

$$\frac{AB}{DE} = \frac{BC}{EF} \text{ and } \angle B = \angle E.$$

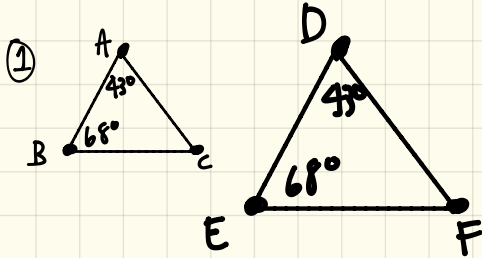
3. Angle-Angle (AA)



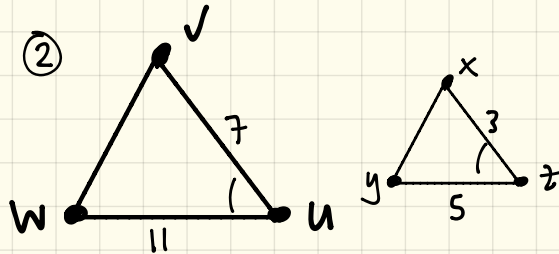
Measure of the 2 angles in one triangle must be congruent to the corresponding 2 angles in the other triangle.

$$\begin{aligned}\angle A &= \angle D \\ \angle B &= \angle E\end{aligned}$$

[Examples] Determine whether the triangles are similar. Explain your answer by either using similarity test or showing why it's not similar.



Yes because
 $\angle A = \angle D$, $\angle B = \angle E$.
So, $\triangle ABC \sim \triangle DEF$
because of AA.

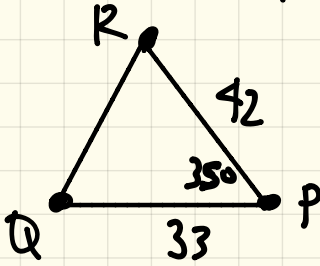
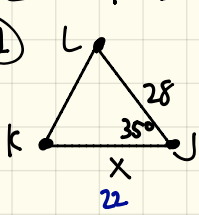


$$\begin{aligned}\frac{xz}{wv} &= \frac{yz}{wu} \\ \frac{3}{7} &\neq \frac{5}{11}\end{aligned}$$

No. $\triangle WUV \not\sim \triangle XYZ$ because the sides are not proportional.

[Examples] Find the unknown of the following similar triangles.

①



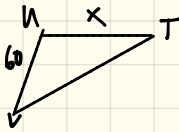
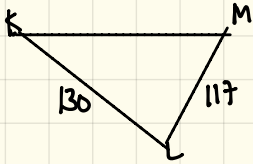
$$\frac{LR}{RP} = \frac{KJ}{PQ}$$

$$\frac{28}{42} = \frac{x}{33}$$

$$42x = 924$$

$$x = 22$$

②



$$\frac{UN}{LK} = \frac{UT}{LM}$$

$$\frac{60}{130} = \frac{x}{117}$$

$$130x = 7020$$

$$x = 54$$