8.7 Similar Triangles, Part 1

Proving Similar Triangles

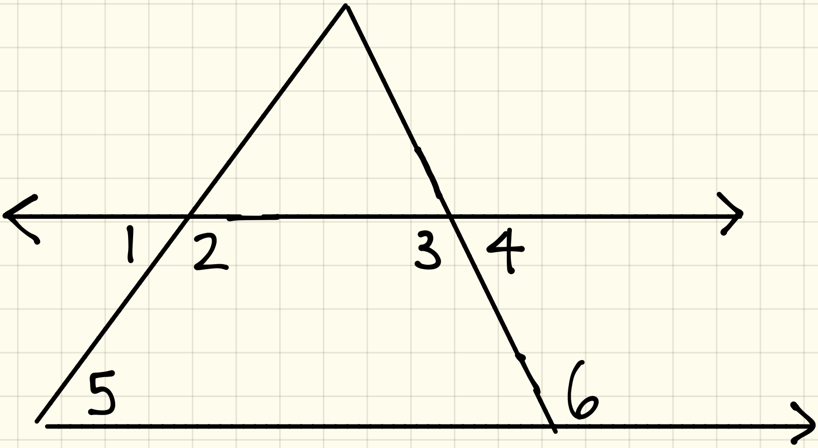
Standards:

G.SRT.2

G.SRT.3

01d Parallel Lines Cut with Transversals

Find the missing angles.

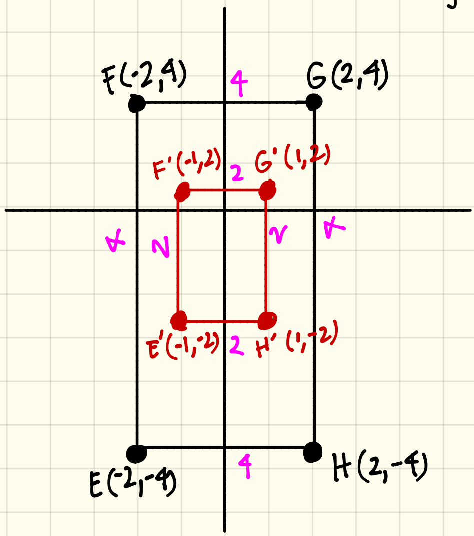


Given >1 = 47°
>7 = 53°

>1 = 47° (given)
>2 = 53 → supplementary (linear pair to <1)
>3 = 53° → congruent (alternate to < 6)
>4 = 47° → supplementary (linear pair to >3)
>5 = 47 → congruent (altornate to < 6)
>6 = 53° (given)

more old... Dilations & Scale Factors

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



<u>Recall:</u> Similar Triangles have proportional relationships.

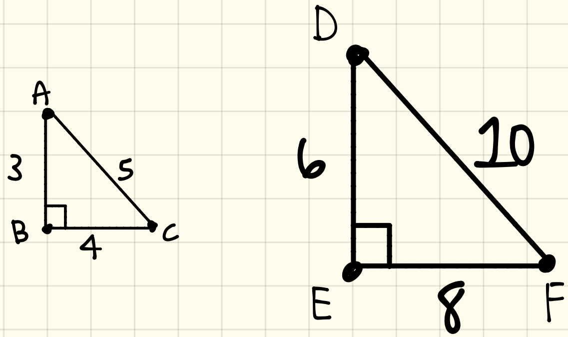
$$\frac{\text{Sides of Preimage}}{\text{Sides of Image}} = \frac{FE}{F'E'} = \frac{FG}{F'G'} = \frac{GH}{G'H'} = \frac{EH}{E'H'}$$

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

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

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 not equal.

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

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

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

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

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

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

Similar Triangles

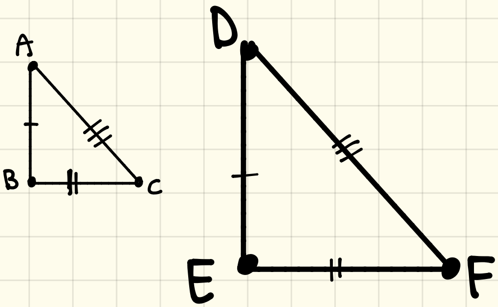
- Two triangles are similar if they have the same 3 angle measurements.
- Similar triangles have same shape but possibly different sizes.

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:

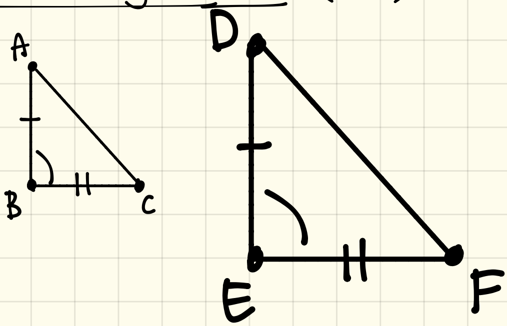
1. Side-Side-Side (SSS)



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

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

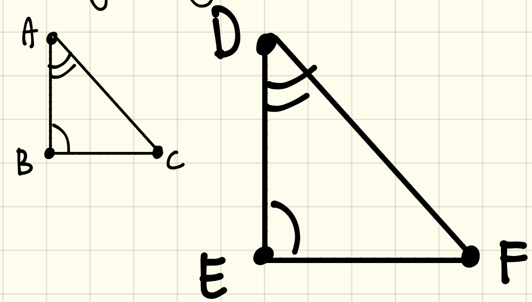
2. Side-Angle-Side (SAS)



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.

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

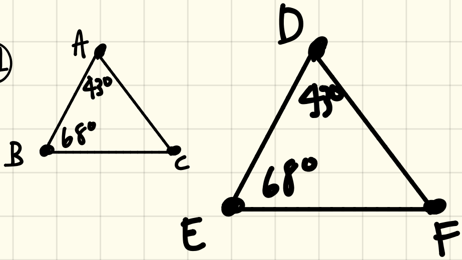
3. Angle-Angle (AA)



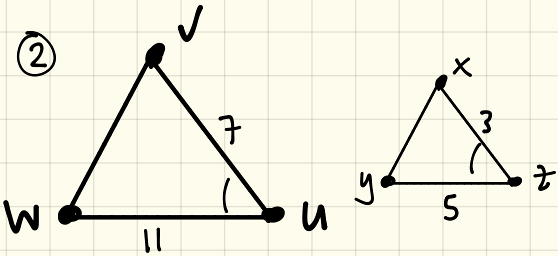
Measure of the 2 angles in one triangle must be congruent to the corresponding 2 angles in the other triangle.

$\angle A = \angle D$
$\angle B = \angle E$

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

① 

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

② 

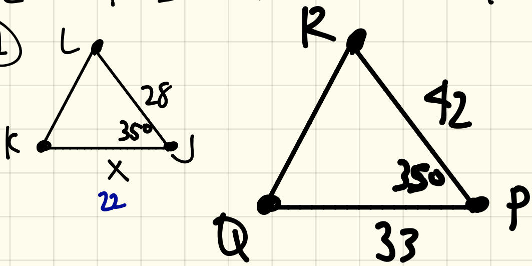
$$\frac{XZ}{VW} = \frac{YZ}{WU}$$

$$\frac{3}{7} \neq \frac{5}{11}$$

No. $\Delta WVU \nsim \Delta XYZ$ because the sides are not proportional.

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

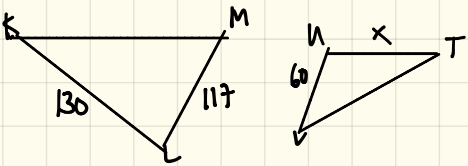
1.



$$\frac{LR}{RP} = \frac{KJ}{PQ} \qquad \frac{28}{42} = \frac{x}{33}$$

$$42x = 924$$
$$x = 22$$

2.



$$\frac{UV}{LK} = \frac{UT}{LM} \qquad \frac{60}{130} = \frac{x}{117}$$

$$130x = 7020$$
$$x = 54$$