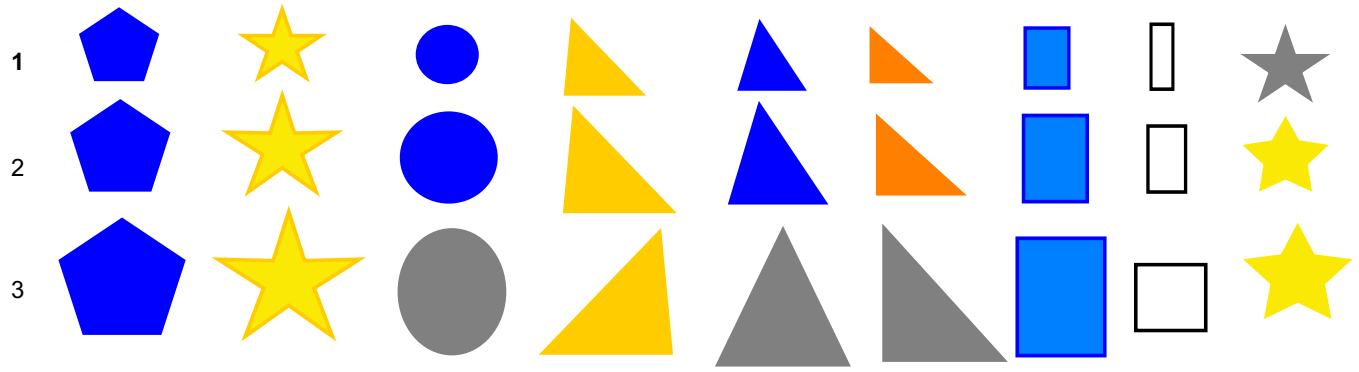
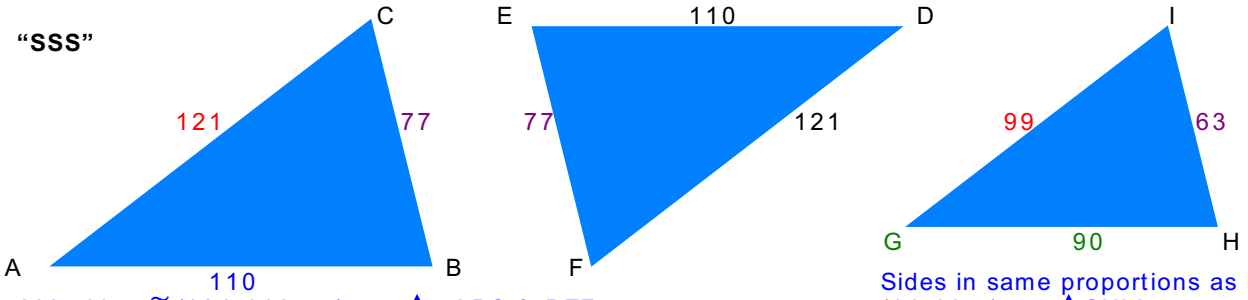
1.



SIMILAR → 123 123 1&2 123 1&2 1&2 123 none 2&3

2. **"SSS"**



ALL sides ≅ (121-110-77), so △s ABC & DEF are CONGRUENT.

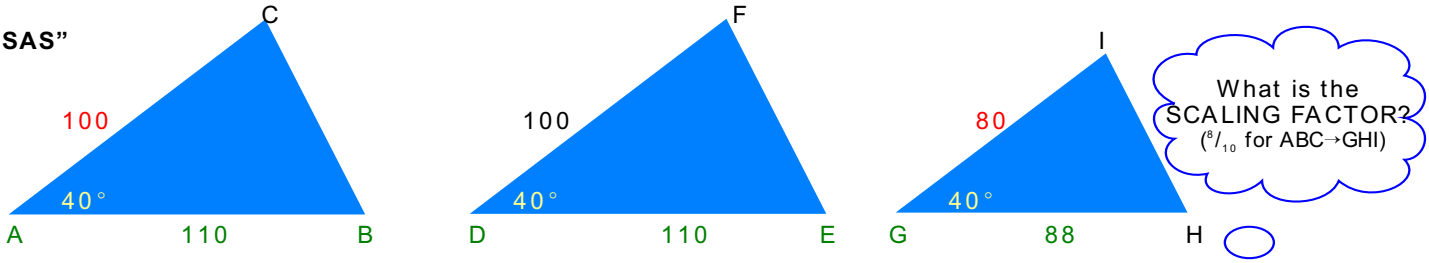
Sides in same proportions as in ABC (11:10:7), so △GHI is SIMILAR to △ABC.

IF the three SIDES of △ABC are CONGRUENT to the respective sides of △DEF then △ABC ≅ △DEF .

IF the lengths of the three sides of △ABC and the corresponding sides of △GHI all form the **SAME RATIO**, then the two triangles are **SIMILAR**.

$\frac{121}{99} = \frac{110}{90} = \frac{77}{63}$ = **11:9**

3. **"SAS"**

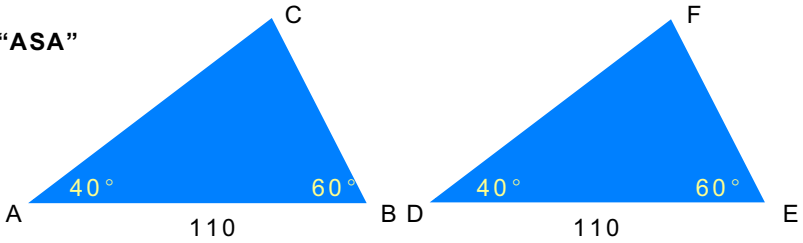


If two sides and the included angle of △ABC are congruent to the corresponding sides and included angle of △DEF then the two triangles are congruent.

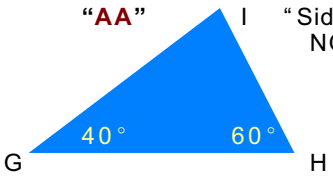
If two sides of △ABC and the corresponding sides of △GHI form the **same ratio**, and the **included angles are congruent**, then the two triangles are similar.

$\frac{100}{80} = \frac{110}{88}$

4. **"ASA"**



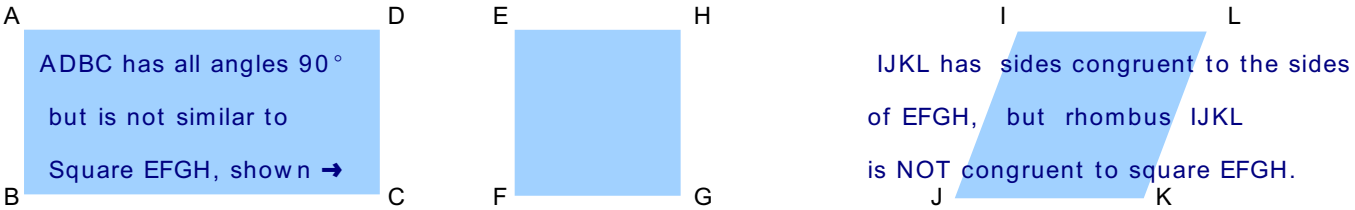
"AA"



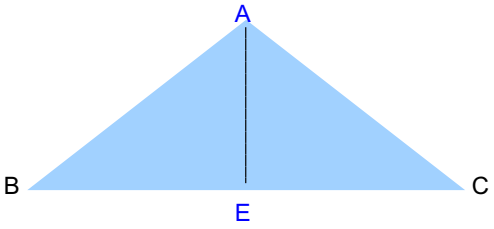
"Side information" NOT needed!

5. **AAA → similar triangles**
AAAA ↛ similar quadrilaterals example here:

Recall: **SSS → congruent triangles** *but* SSSS ↛ congruent quadrilaterals.



6. Triangle ABC has congruent sides AB & AC. The midpoint of BC is "E". Is AE.an altitude of △ABC?



What triangles are congruent, and how do we know?

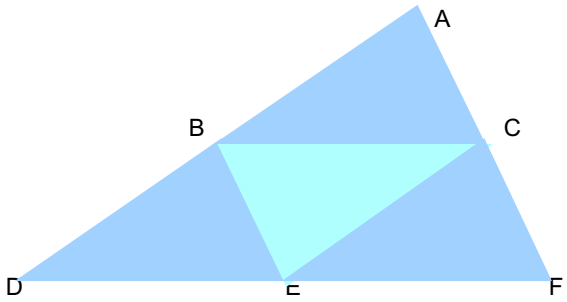
AB= AC, BE= CE are given. AE= AE (shared side) ...so
△ABE ≅ △ACE by the "SSS" congruence theorem.

What do we know about ∠ABE and ∠ACE?

Since △ABE ≅ △ACE, ∠ABE and ∠ACE must be congruent.

What do we know about ∠AEB and ∠AEC?
Since △ABE ≅ △ACE, ∠ABE and ∠ACE must be ≅. (CPCTC)
Since they are supplementary, each must be 90°.

7.



Given that:
B is the midpoint of segment $\overline{AD}$. C is the midpoint of $\overline{AF}$.
E is the midpoint of segment $\overline{DF}$.

What segments are parallel?
BC ∥ DF BE ∥ AF CE ∥ AD

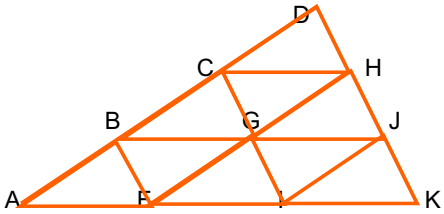
What triangles are congruent, and why?

△ACB, △BED, △CFE and △EBC. (As discussed in class.)

What triangles are similar, but not congruent?

The four triangles named above are similar to △AFD.

8.



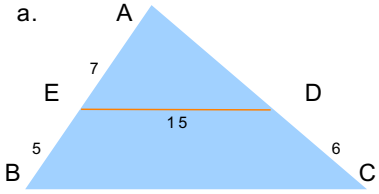
Points B & C "cut" segment $\overline{AD}$ into thirds.
Similarly F& I and H&J cut segments $\overline{AK}$ and $\overline{DK}$ into thirds.

What can be said about segments $\overline{BJ}$ and $\overline{AK}$? They are PARALLEL !

What can be said about triangles BJD and AKD? They are SIMILAR.

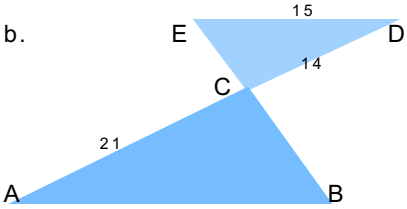
If AB is 5u, then, since B & C cut $\overline{AD}$ in thirds, BD must be 2·5u, i.e. 10u, and AD must be 15u.
If BJ is 12 u, then AK must be 1.5·12u = 18u .

9. a.



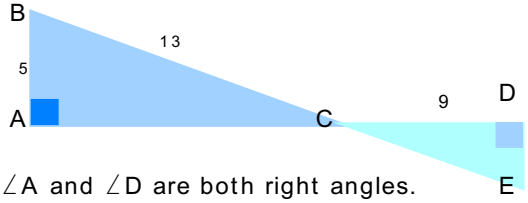
$\overline{BC}$ || $\overline{ED}$

b.



$\overline{AB}$ || $\overline{DE}$

c.*



∠A and ∠D are both right angles.

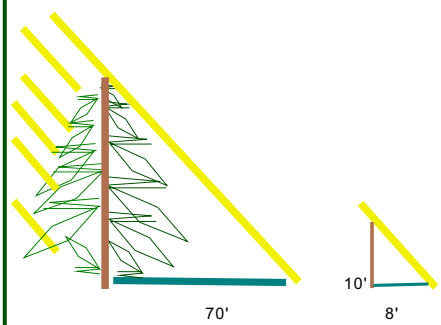
All segments that appear straight are straight (including ACD and BCE in 2nd and 3rd sketches).
What triangles are similar and why? Can you find the missing segment lengths?

△AE ~△ABC AD = 8.4
BC = 180/7

△DEC ~ △ABC
AB = 15(3/2) = 45/2
SCALE FACTOR is 3/2 or 1.5
There is not enough information
to find lengths of BC and EC – neither is known.

△DEC ~ △ABC AC= 12
DE = 9(5/12) CE = 9(12/13)

10.



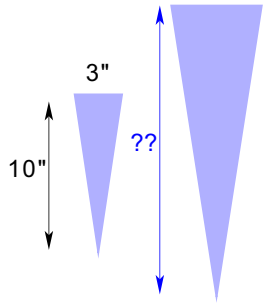
A redwood tree casts a shadow 70' long at the same time a 10' tall street sign casts an 8' shadow.
How tall must the tree be?

The sunlight streaming down, interrupted by the vertical tree and sign, forms the shadows on the horizontal ground.
These right triangles have congruent base angles, since the sunlight hits the ground at the same angle in each triangle!

By the "AA" theorem of △ similarity, the two triangles must be similar.

$$\frac{H}{70'} = \frac{10}{8} \rightarrow H = \frac{10'(70)}{8} = 87.5'$$

11. If held 10" from the wall, a spray gun paints a disc 3" in diameter.
How far from the wall should the gun be held to spray a toy that is 6" wide?
TOUGHER QUESTION: If at 10" we spray for 1 second, at the new distance, how long should we spray to get the same thickness of paint?

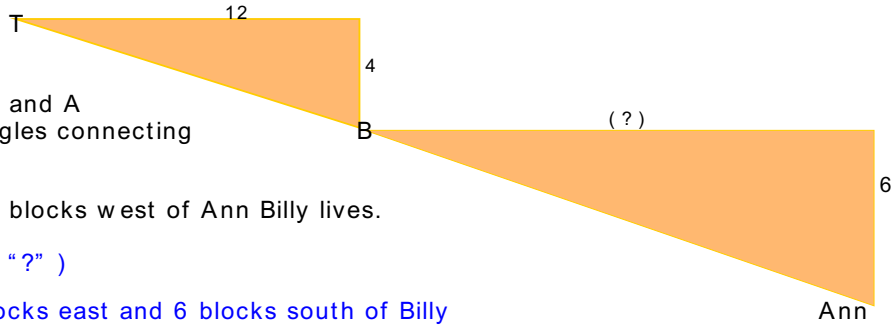


If the width of the spray is 3" wide at 10" distance,
then it should be 6" wide when the spray gun is 20" away.

So hold the spray gun 20 inches away.

When the **width** is doubled, the height is also doubled, and so
the **area** is quadrupled, so the paint ends up thinner, by a factor of 4.
So the spray must be continued four times as long— 4seconds.

12. Tom, Billy and Ann live in a straight line. Tom lives four blocks north and twelve blocks west of Billy. Billy lives six blocks north of Ann. Explain exactly where Ann lives relative to Billy.



Once you view the information
in an appropriate way (as in a map view),
The relationship becomes clear.... with T, B and A
in a straight line, there must be similar triangles connecting
them on the map.

The only thing we don't know is how many blocks west of Ann Billy lives.

$\frac{(?)}{6 \text{ bl.}} = \frac{12 \text{ blocks}}{4 \text{ bl.}}$ (Solve this for "?")

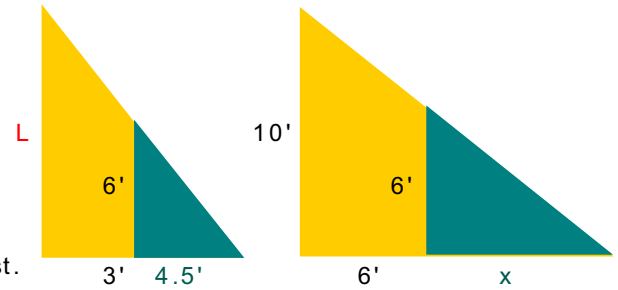
Ann is 18 blocks east and 6 blocks south of Billy

13. * A 6' tall man standing 3' from a lamppost casts a shadow 4.5' long.
How long would his shadow be if he stood 6' away from the lamp?

First set up the proportion for the initial situation given.
Find the height of the lamppost.

$\frac{L}{6'} = \frac{(3+4.5)'}{4.5'} = \frac{7.5}{4.5}$

$L = (5/3)\,6' = 10'$

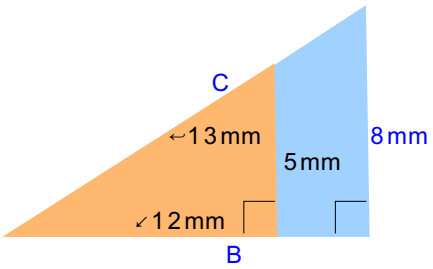


Then redraw the sketch and set up a new proportion to
answer the second question, when he is 6' from the lamppost.

$\frac{10'}{6'} = \frac{x+6'}{x}$ multiply both sides by x and by 6′ to get: $10x = 6x + 36'$ ...and solve easily for $x = 9'$

Notice that the ratio of distance between lamppost and man to length of shadow remained the same!
That is because the ratio of the height of the lamppost to the height of the man remained the same.

14. Find the dimensions of the outer triangle:



We know the height, so we just need the base and hypotenuse.

C : 13mm = 8 : 5

C = 8·13mm / 5 = 104/5 mm = 20.8 mm

B : 12 mm = 8 : 5

B = 8· 12 mm / 5 = 96/5 = 19.2 mm