

NOTES – SIMILAR TRIANGLES

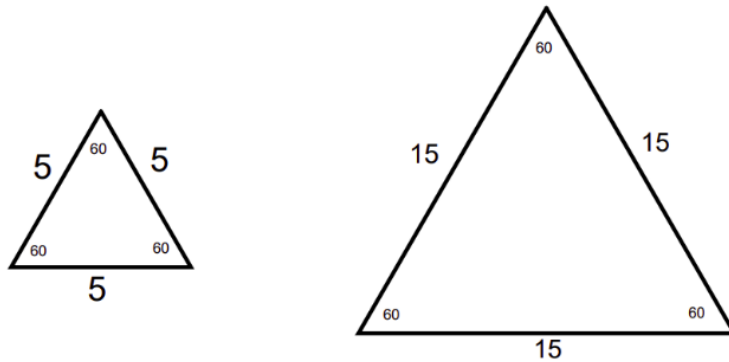
SIMILAR means “not exactly the same.”

In the case of a Triangle, SIMILAR triangles are only scaled BIGGER or SMALLER

- The ANGLES have to be the same
- The SCALE FACTORS have to be the same

EXAMPLE 1: ARE THESE TRAIANGLES SIMILAR?

NOTE: All the angles below are 60° = Good!



When I did car racing, the rule book said “Similar Fasteners of unrestricted origin are allowed.” I looked up the definition of “similar” and it said “not exactly the same.” I chose DIAMETER to be my dissimilar measurement. I then used 10mm suspension bolt in a 12mm hole, which gave me enough adjustment to GREATLY improve the cornering of my car.

The club later nominated me to re-write the rulebook to close “loopholes.”

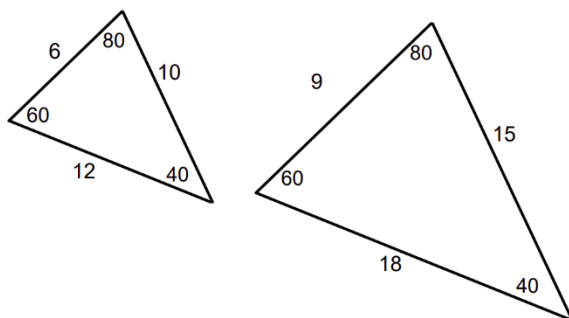
Let’s compare the SCALE FACTORS:

$$\text{SCALE FACTOR} = \frac{\text{BIG}}{\text{SMALL}} = \frac{15}{5} = \boxed{3} \quad (\text{for all sides})$$

(Can do SMALL/BIG instead, it will still work, just a different “scale factor”)

EXAMPLE 2: ARE THESE TRIANGLES SIMILAR?

NOTE: Both Triangles have the same angles: 60° , 80° , 40° = Good!



NOTICE: There is a **LONG** side, a **MEDIUM** side, and a **SHORT** side.

You **MUST MUST MUST** compare

- Long side with long side
- Medium side with medium side
- Short side with short side

YOU have to LOOK

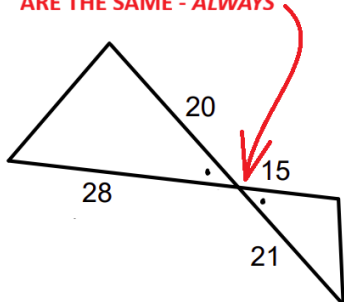
$$\begin{aligned}\text{SCALE FACTOR} &= \frac{\text{BIG}}{\text{SMALL}} = \frac{18}{12} = \boxed{1.5} \\ &= \frac{15}{10} = \boxed{1.5} \\ &= \frac{9}{6} = \boxed{1.5}\end{aligned}$$

YES! They are SIMILAR, because each SIDE SCALE FACTOR is the SAME.

Your answer will be: Yes! SSS ("SAME: SIDE SIDE SIDE")

EXAMPLE 3: ARE THESE TRAINGLES SIMILAR? HOW DO YOU KNOW?

NOTE: THE "CROSSED ANGLES"
ARE THE SAME - ALWAYS



We know that ONE angle is THE SAME. Are the SCALE FACTORS also the same?

$$\text{SCALE FACTOR} = \frac{\text{BIG}}{\text{SMALL}} = \frac{28}{21} = \boxed{1.333}$$

$$\frac{20}{15} = \boxed{1.333}$$

YES! They are SIMILAR, because ONE angle and ALL SCALE FACTORS are the SAME.

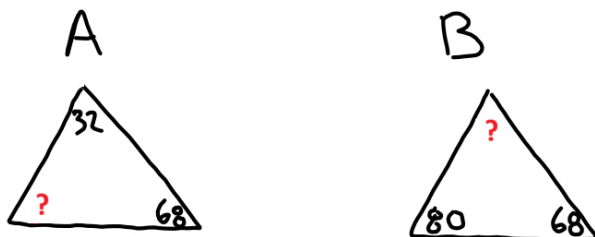
Your answer will be: **Yes! SAS** ("SAME: SIDE ANGLE SIDE")

EXAMPLE 4: (WORD PROBLEM):

Triangle A has angles of 32° and 68°. Triangle B has angles of 68° and 80°. Are they similar? How do you know?

Step 1: DRAW two triangles. Making a word problem a VISUAL PICTURE is SMART. "A picture is worth a thousand words"

I'm going to put the SAME angle in MATCHING corners – it helps me SEE things

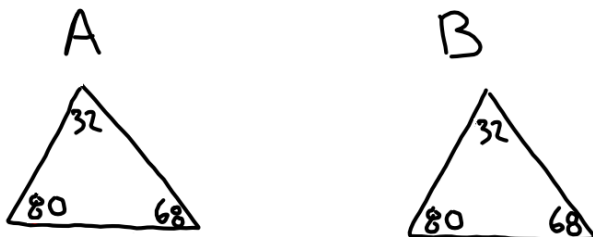


NEED TO KNOW: ALL ANGLES IN A TRIANGLE ADD UP TO 180° - ALWAYS

Triangle A: $180 - 68 - 32 = 80$

Triangle B: $180 - 68 - 80 = 32$

Write those numbers into your triangle:



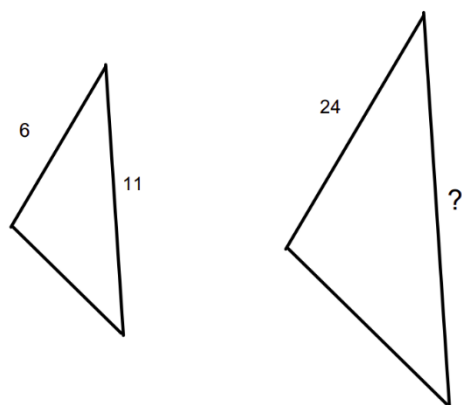
OMG THEY ARE SIMILAR!

Your answer will be:

YES! AAA

("SAME: ANGLE ANGLE ANGLE")

EXAMPLE 5: The two triangles ARE similar. Determine the missing side.



SINCE they are SIMILAR, they HAVE the same scale factor.

Let's Solve this using **Ratios** (you did this in Chapter 1)

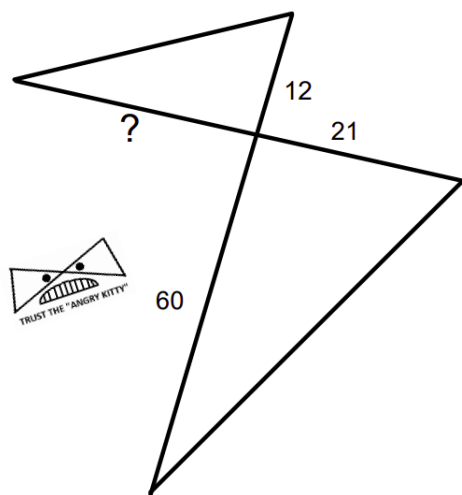
FIRST: Make sure you are comparing the SAME LENGTH SIDES (Small, Medium, or LARGE):

$$\begin{array}{r} \text{BIG} \\ \hline \text{SMALL} \end{array} \quad \frac{24}{6} = \frac{?}{11}$$

$$\frac{24 \times 11}{6} = \frac{? \times 11}{11}$$

MISSING SIDE: 44 = ?

EXAMPLE 6: The two triangles ARE similar. Determine the missing side.



SINCE they are SIMILAR, they HAVE the same scale factor.

Let's Solve this using **Ratios**

FIRST: Make sure you are comparing the SAME LENGTH SIDES

SECOND: Put the UNKNOWN on the top

$$\begin{array}{r} \text{SMALL} \\ \hline \text{BIG} \end{array} \quad \frac{12}{21} = \frac{?}{60}$$

$$\frac{12 \times 60}{21} = \frac{? \times 60}{60}$$

MISSING SIDE: 34.29 = ?