

# Properties of Similar Triangles

## Lesson objectives

- I know the difference between similar and congruent
- I know how to identify corresponding sides of similar triangles
- I know how to express corresponding sides as a proportion
- I know how to calculate a scale factor

1.1

Lesson objectives

Teachers' notes

Lesson notes

MHR Page 333 #s 4, 5, 6, 8, 9 & 17

## Similarity vs. Congruence

### Similar Triangles

- Triangles in which corresponding sides are proportional and corresponding angles are equal.

### Congruent

- Equal in all respects; for example, in two congruent triangles, the three corresponding pairs of sides and the three corresponding pairs of angles are equal.

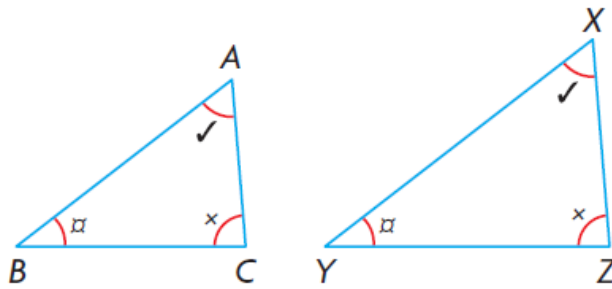
Congruent triangles are also similar triangles.

Symbols:  $\sim$  means similar to       $\cong$  means congruent to

# Proving Similarity

To prove that two triangles are similar we need to have two pairs of matching angles in each triangle (AA~).

Case 1



We often use different symbols to indicate equal angles.

$$\begin{aligned} \angle A &\cong \angle X \\ \angle B &\cong \angle Y \\ \angle C &\cong \angle Z \end{aligned}$$

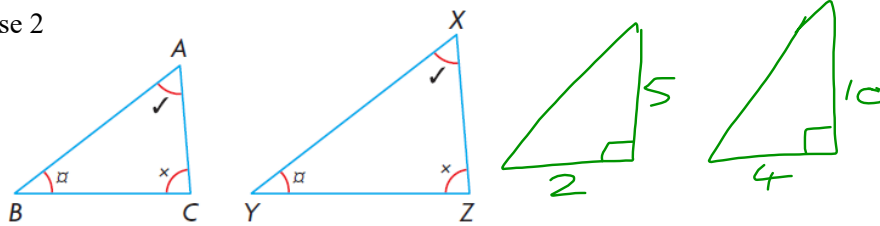
If we have 2 matching pairs, we must have a 3<sup>RD</sup> pair too.

# Proving Similarity

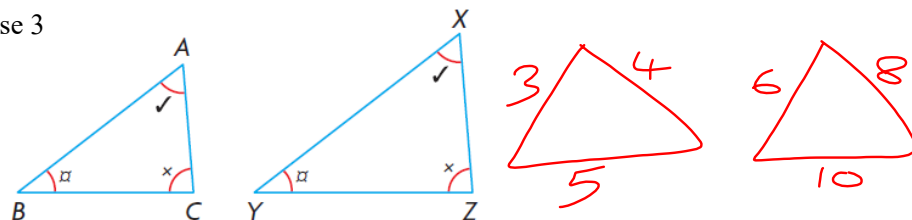
We can also prove two triangles are similar if

- Two pairs of corresponding sides are proportional and their contained angles are equal (SAS ~);
- All three pairs of corresponding sides are proportional (SSS~).

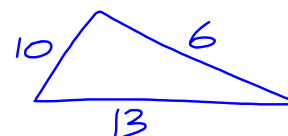
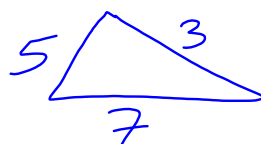
Case 2



Case 3



Example of NOT similar =

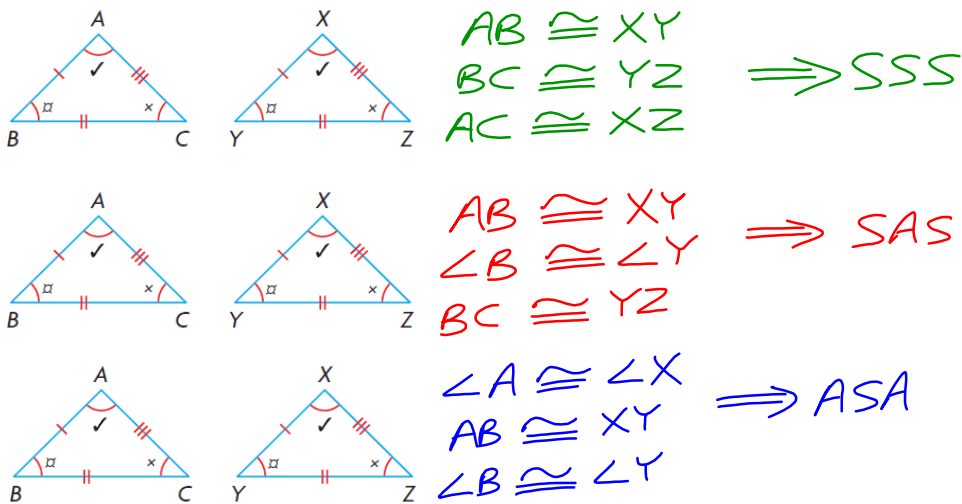


$$(13 \neq 2(7))$$

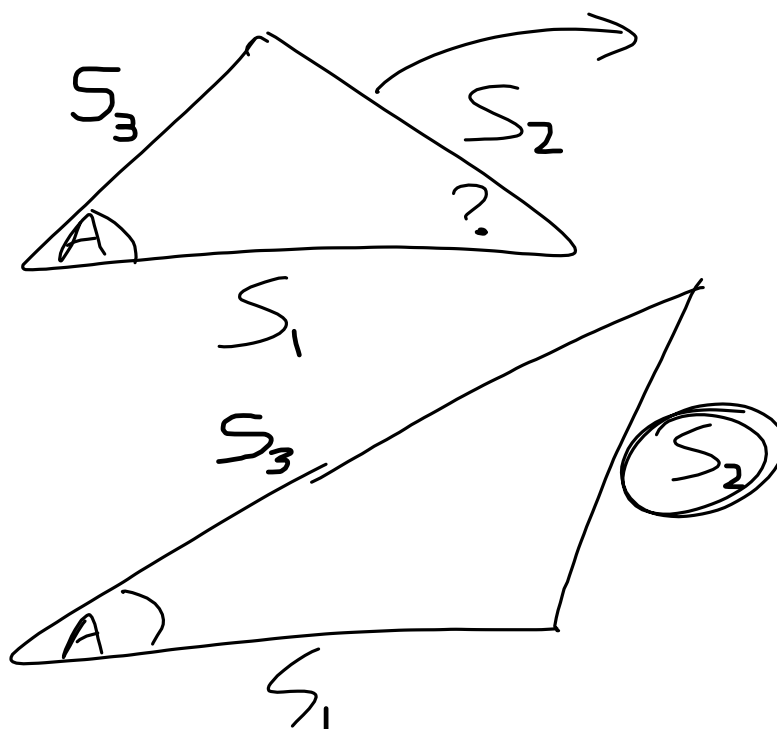
### Congruence

We have three different ways to prove two triangles are congruent:

- Three equal pairs of corresponding sides (S-S-S  $\cong$ )
- Two pairs of corresponding sides and the contained angle are equal (S-A-S  $\cong$ )
- Two pairs of corresponding angles and the contained sides are equal (A-S-A  $\cong$ )

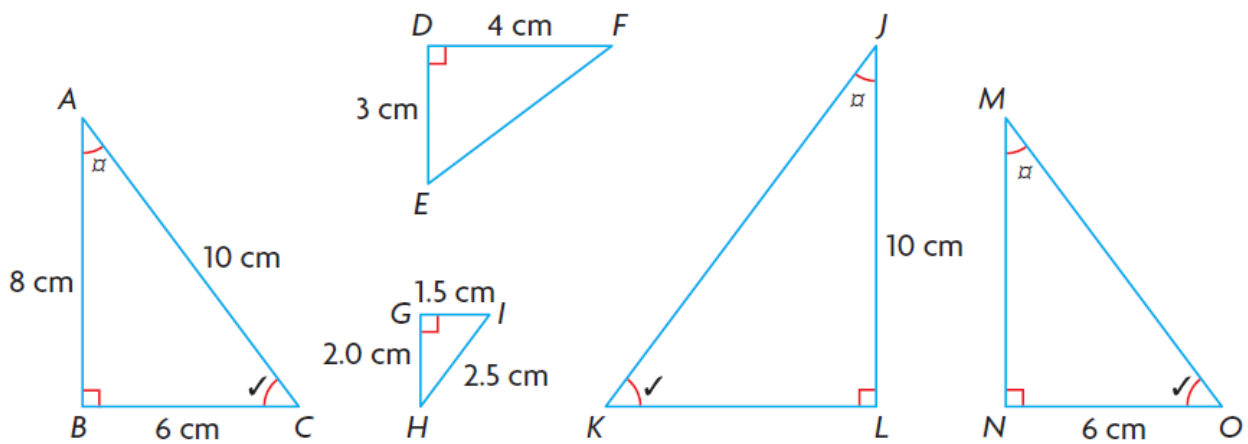


Can't have A-S-S as a reason for similar triangles. Side  $S_2$  could be in a different position because we don't know the base angle. This would make the sides  $S_3$  different lengths.



**Example:** 2. a) Which triangle is congruent to  $\triangle ABC$ ?

b) Which triangles are similar to, but not congruent to,  $\triangle ABC$ ?



a)  $\triangle MNO \cong \triangle ABC$  (ASA)

b)  $\triangle JLK \sim \triangle ABC$  (AAA)

$\triangle HGI \sim \triangle ABC$  (SSS)

$\triangle FDE \sim \triangle ABC$  (SAS)