

Chapter 7: Congruent Triangles

SECTION 7.1 INTRODUCTION TO CONGRUENT TRIANGLES

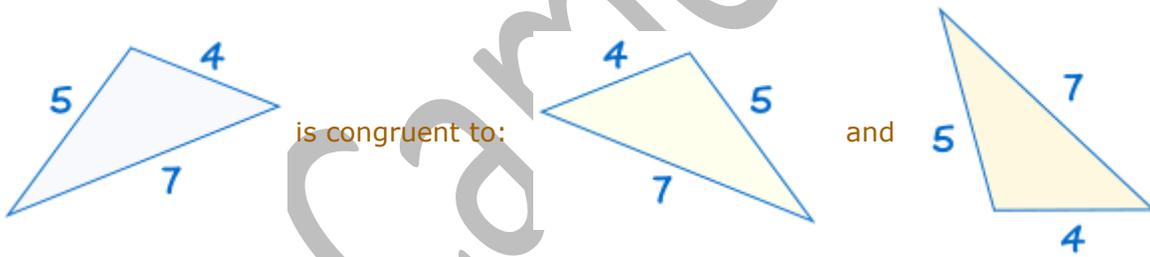
If two triangles are congruent they will have exactly **the same three sides** and exactly **the same three angles**.

The equal sides and angles may not be in the same position (if there is a turn or a flip), but they will be there.

Same sides

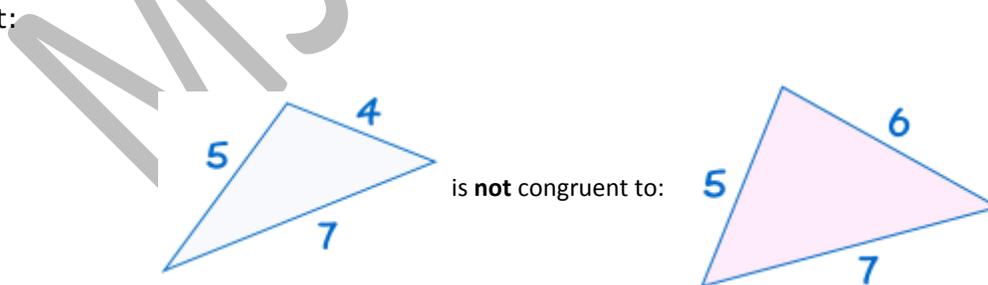
If the sides are the same then the triangles are congruent.

For example:



because they all have **exactly the same sides**.

But:



because the two triangles **do not have** exactly the same sides.

Same angles

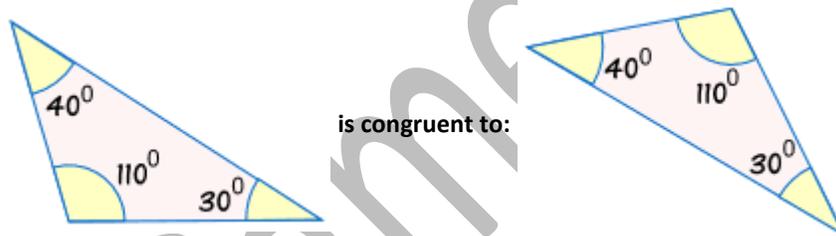
Does this also work with angles? Not always!

Two triangles can have the same angles but be **different sizes**:



because, even though all angles match, **one is larger than the other.**

But they could be congruent if they are the same size:

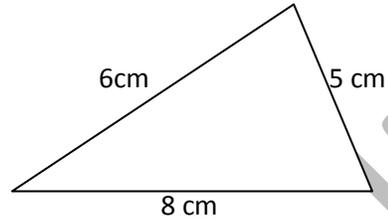
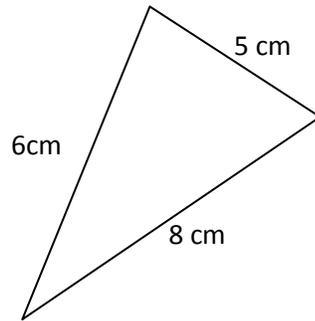
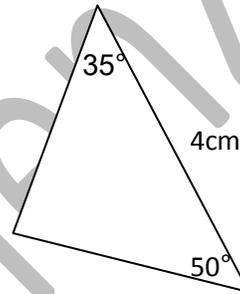
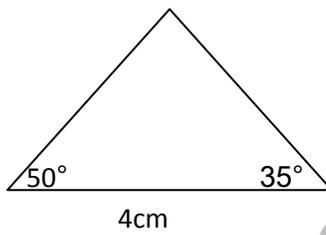
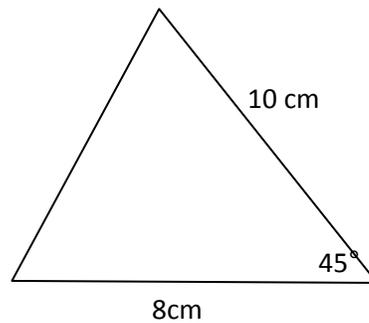
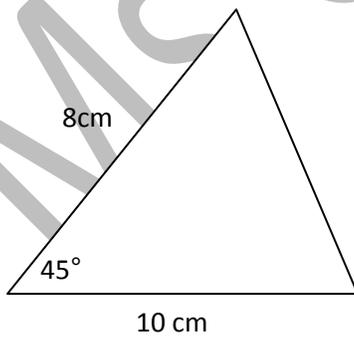


because they are (in this case) the **same size**

Therefore just having the same angles is no guarantee they are congruent.

For two triangles to be congruent we must prove one of the following 4 conditions:

- *two sides and the included angle are equal (SAS)*
- *two angles and a corresponding side are equal (AAS)*
- *three sides are equal (SSS)*
- *a right angle, the hypotenuse and one other side are equal (RHS)*

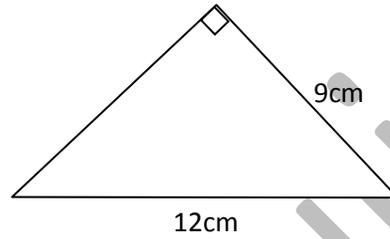
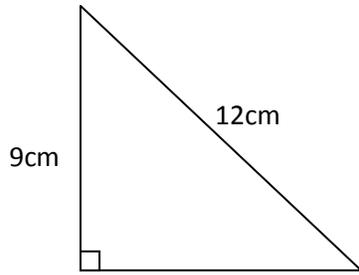
Proving by SSS**Proving by AAS****Proving by SAS**

Proving by RHS

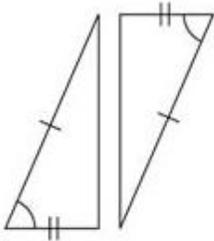
R = Right Angle

H = Hypotenuse

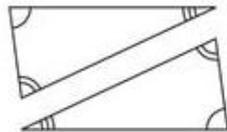
S = Side



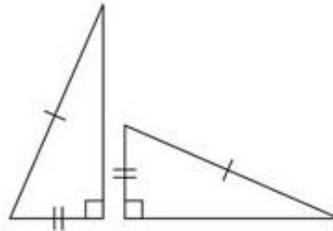
Consolidation



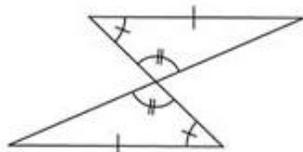
(a)



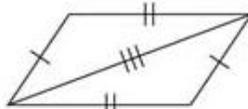
(b)



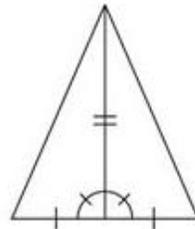
(c)



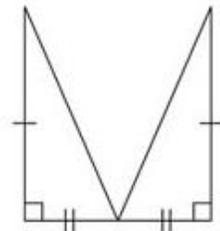
(d)



(e)



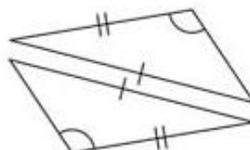
(f)



(g)



(h)



(i)

For each of the above, state whether they can be proved congruent and if Yes state why.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____
- f) _____
- g) _____
- h) _____
- i) _____

Support Exercise Handout

SECTION 7.2 PROOFING CONGRUENT TRIANGLES

These facts about angles can be assumed to be true:

- Vertically Opposite Angles are equal
- Corresponding angles (made with parallel lines) are equal
- Alternate angles (made with parallel lines) are equal

These facts about a circle can be assumed to be true:

- All radii are equal. (This comes from the definition of a circle)
- A tangent is perpendicular to the radius at the point of contact.

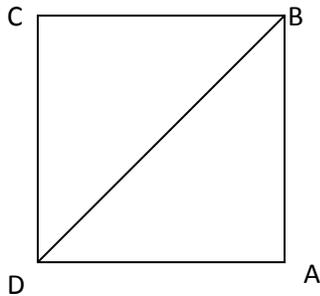
To prove that two triangles are congruent, you have to use one of the following four reasons:

SSS

SAS

AAS

RHS

Example 1

ABCD is a square. Prove that triangles ADB and CDB are congruent.

Line BD is common, therefore equal (Side)

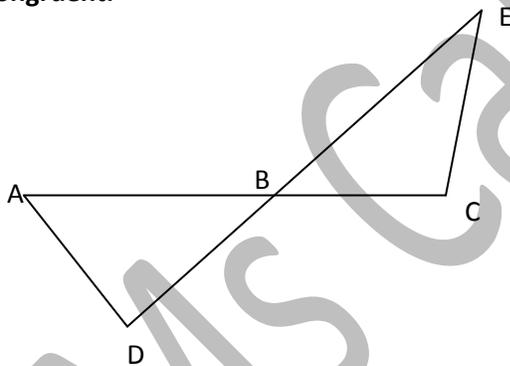
AB = CD Sides of a square (Side)

CB = AD Sides of a square (Side)

Therefore triangles ADB and CDB are congruent by **SSS**.

Example 2

ABC is a straight line and so is DBE. AB=BE and DB=BC. Prove that triangles ABD and EBC are congruent.



AB = EB Given (Side)

DB = CB Given (Side)

Angle ABD = EBC Vertically Opposite Angles (Angle)

Therefore triangle ABD and BCE are congruent by **SAS**

Consolidation

Class Handout

Support Exercise Handout