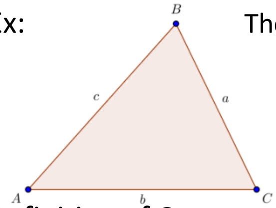
CH 5 – Congruent Triangles Short Cuts

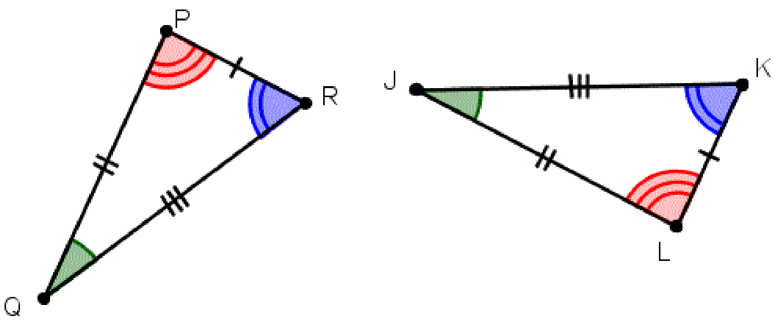
Parts of triangles: Triangles are made of 6 parts: 3 angles and 3 sides.

Ex: The parts of ΔABC are: $< A, < B, < C,\ \overline{AB}\ or\ c, \overline{BC}\ or\ a, and\ \overline{AC}\ or\ b$



Definition of Congruent Triangles: Two (or more) triangles are ≅ if all the corresponding parts are ≅.

EX.: $\Delta QPR \cong \Delta JLK$



Write the congruency statements for this ex. in 2 other ways.

____________________and____________________

Which corresponding parts are congruent?

1. $< Q \ \cong < J$
2.
3.
4.
5.
6.

CORRESPONDING PARTS OF CONGRUENT TRIANGLES ARE CONGRUENT, (CPCTC)

If you can prove that two triangles are congruent by any of the (5) methods below, then the corresponding parts not mentioned are automatically congruent.

Technically, to prove that two triangles are congruent, you would need to prove that **ALL SIX** corresponding parts are congruent.

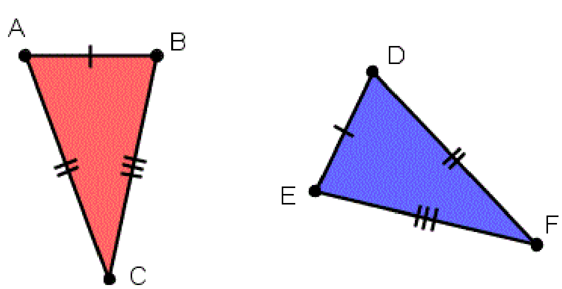
Good News!!! There are shortcuts. In fact, we have 5 shortcuts that work and 2 shortcuts that do not work.

Good Shortcuts:

1) **Side-Side-Side Congruency Theorem (SSS):** If three sides of a triangle are congruent to the corresponding three sides of another triangle, then the triangles are congruent.

This is our first shortcut. Whenever SSS is true, then the 3 pairs of corresponding angles will automatically be ≅, and thus saving us a lot of work. This is true for all shortcuts.

Ex. These two triangles are ≅ by the SSS Congruency Theorem.



Write the congruency statements for this ex. in 3 ways

____

Which are the corresponding parts given as congruent?

1)__________ 2)____________and 3)___________

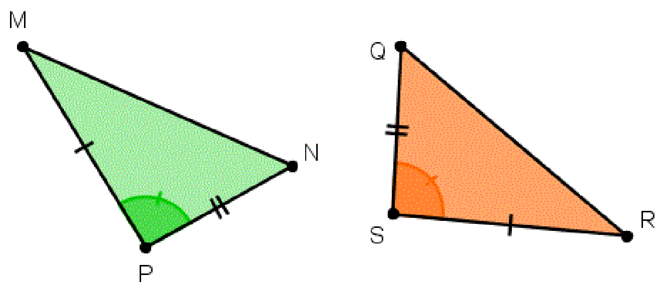
Therefore, if these 2 triangles are congruent, what other parts are congruent?

1)______________ 2)____________and 3)____________

Why?__________________________________

2) **<u>Side-Angle-Side Congruency Theorem (SAS):</u>** If two sides and the included angle of one triangle are congruent to the corresponding two sides and the included angle of another triangle, then the triangles are congruent. (Included means between).

Ex. These two triangles are ≅ by the SAS Congruency Theorem.



Write the congruency statements for this ex. in 3 ways

____

Which are the corresponding parts given as congruent?

1)____________ 2)___________and 3____________

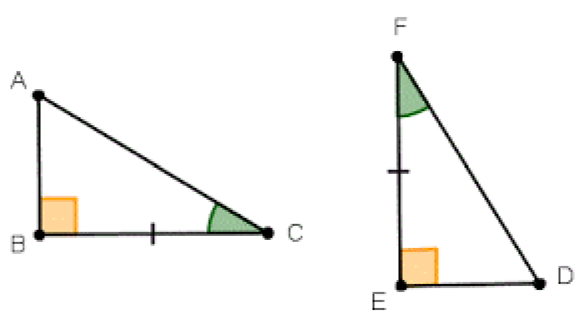
Therefore, if these 2 triangles are congruent, what other parts are congruent?

1)____________ 2)____________and 3)____________

Why?______________________________

3) **<u>Angle-Side-Angle Congruency Theorem (ASA):</u>** If two angles and the included side of one triangle are congruent to the corresponding two angles and the included side of another triangle, then the triangles are congruent.

Ex. These two triangles are ≅ by the ASA Congruency Theorem.



Write the congruency statements for this ex. in 3 ways

____

Which are the corresponding parts given as congruent?

1)____________ 2)____________and 3)___________

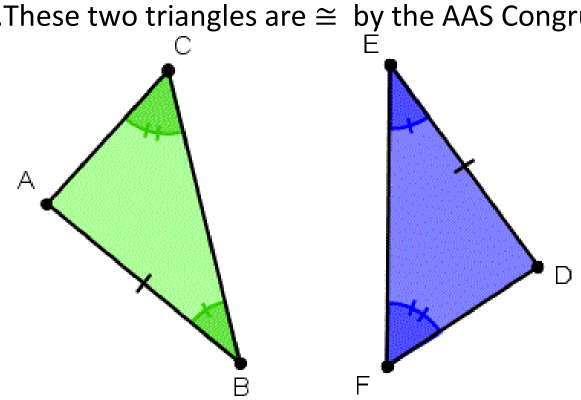
Therefore, if these 2 triangles are congruent, what other parts are congruent?

1)____________ 2)___________and 3)____________

Why?_______________________________

4) **<u>Angle-Angle-Side Congruency Theorem (AAS or SAA):</u>** If two angles and a non-included side of one triangle are congruent to the corresponding two angles and the non-included side of another triangle, then the triangles are congruent.

Ex.These two triangles are ≅ by the AAS Congruency Theorem



Write the congruency statements for this ex. in 3 ways

____

Which are the corresponding parts given as congruent?

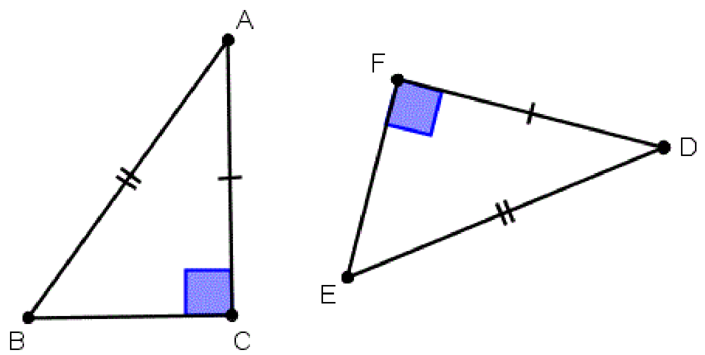
1)_____________ 2)____________and 3)___________

Therefore, if these 2 triangles are congruent, what other parts are congruent?

1)_____________ 2)____________and 3)___________

Why?______________________________________

5) **<u>Hypotenuse-Leg Congruency Theorem (HL):</u>** If the hypotenuse and a leg of a right triangle are congruent to the corresponding hypotenuse and leg of another right triangle, then the triangles are congruent.
Ex. These two triangles are ≅ by the HL Congruency Theorem



Write the congruency statements for this ex. in 3 ways

____

Which are the corresponding parts given as congruent?

1)_________________ 2)________________

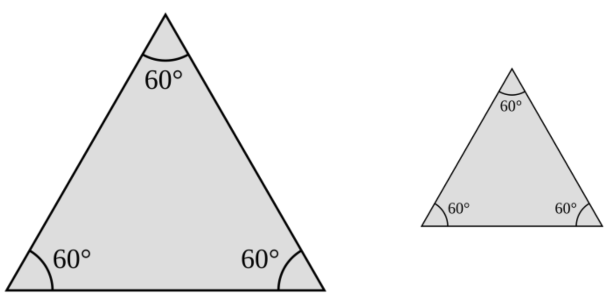
Therefore, if these 2 triangles are congruent, what other parts are congruent?

1)__________ 2)____________ 3)___________& 4)________

Why?__________________________________

<u>Bad Shortcuts: Do not work. Do not prove that triangles are ≅.</u>

1) **Angle-Angle-Angle (AAA).** Why not? The best way to understand why AAA does not work is to think of equilateral triangles where each angle = 60°. Therefore, all corresponding angles are congruent. However, equilateral triangles come in many sizes, and thus not necessarily ≅.



2) **Side-Side-Angle (SSA). Two sides and a non-included angle.** Does not prove that triangles are congruent.