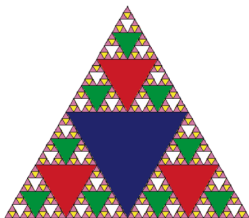


Similar & Congruent Triangles

J. Garvin

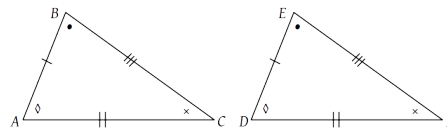


Slide 1/14

Congruent Triangles

Two triangles are *congruent* if they have the same shape, and the same size.

To meet both of these criteria, congruent triangles have equal corresponding angles and equal corresponding sides.



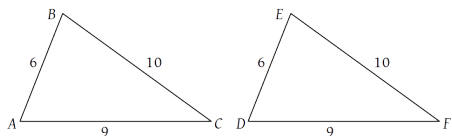
There are three distinct conditions that will result in congruent triangles.

J. Garvin — Similar & Congruent Triangles
Slide 2/14

Congruent Triangles

Side-Side-Side Congruency (SSS)

If $|AB| = |DE|$, $|AC| = |DF|$ and $|BC| = |EF|$, then $\triangle ABC \cong \triangle DEF$.



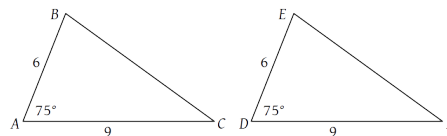
No matter how the sides are arranged, it will always be possible to find equal pairs of corresponding sides.

J. Garvin — Similar & Congruent Triangles
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Congruent Triangles

Side-Angle-Side Congruency (SAS)

If $|AB| = |DE|$, $|AC| = |DF|$, and $\angle A = \angle D$, then $\triangle ABC \cong \triangle DEF$.



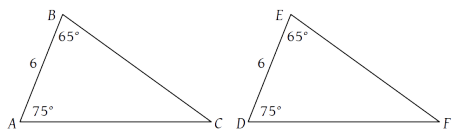
Two sides of a fixed length, containing a fixed angle, will always result in a third side of a specific length.

J. Garvin — Similar & Congruent Triangles
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Congruent Triangles

Angle-Side-Angle Congruency (ASA)

If $\angle A = \angle D$, $\angle B = \angle E$ and $|AB| = |DE|$, then $\triangle ABC \cong \triangle DEF$.



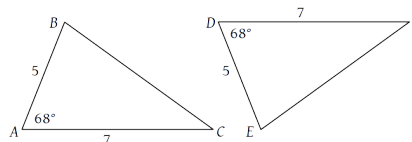
Like SAS, two fixed angles at each end of a side will result in two other sides of specific lengths.

J. Garvin — Similar & Congruent Triangles
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Congruent Triangles

Example

State why $\triangle ABC \cong \triangle DEF$.



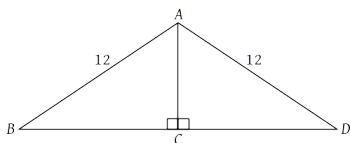
Since $|AB| = |DE| = 5$, $|AC| = |DF| = 7$ and $\angle A = \angle D$, $\triangle ABC \cong \triangle DEF$ due to SAS.

J. Garvin — Similar & Congruent Triangles
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Congruent Triangles

Example

State why $\triangle ABC \cong \triangle ADC$.



Since $|AB| = |AD| = 12$, $\triangle ABD$ is isosceles. This means that $\angle B = \angle D$.

Since $\angle ACB = \angle ACD = 90^\circ$, then $\angle BAC = \angle DAC$.

AC is common to both $\triangle ABC$ and $\triangle ADC$, so

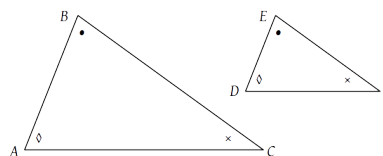
$\triangle ABC \cong \triangle ADC$ due to SAS.

J. Garvin — Similar & Congruent Triangles
Slide 7/14

Similar Triangles

Two triangles are *similar* if they have the same overall shape.

Triangles with equal corresponding angles will have the same shape, but may be different sizes.



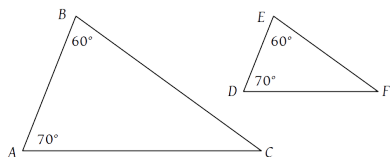
There are three distinct conditions that will result in similar triangles.

J. Garvin — Similar & Congruent Triangles
Slide 8/14

Similar Triangles

Angle-Angle Similarity (AA~)

If $\angle A = \angle D$ and $\angle B = \angle E$, then $\triangle ABC \sim \triangle DEF$.



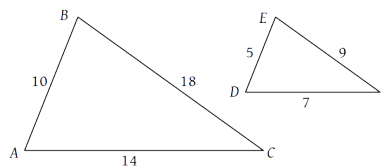
It is not necessary to specify that the remaining corresponding angles are equal, since it will always be true.

J. Garvin — Similar & Congruent Triangles
Slide 9/14

Similar Triangles

Side-Side-Side Similarity (SSS~)

If $|AB| = k|DE|$, $|AC| = k|DF|$, and $|BC| = k|EF|$, then $\triangle ABC \sim \triangle DEF$.



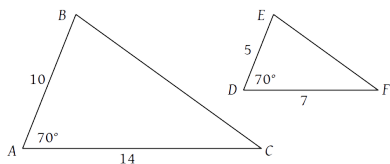
Since each side has been scaled by the same amount, the overall shape is preserved.

J. Garvin — Similar & Congruent Triangles
Slide 10/14

Similar Triangles

Side-Angle-Side Similarity (SAS~)

If $|AB| = k|DE|$, $|AC| = k|DF|$, and $\angle A = \angle D$, then $\triangle ABC \sim \triangle DEF$.



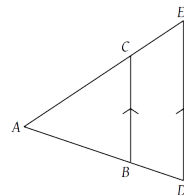
Since two sides containing the angle have been scaled by the same amount, the third side will also be scaled by the same amount as well.

J. Garvin — Similar & Congruent Triangles
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Similar Triangles

Example

State why $\triangle ABC \sim \triangle ADE$.



$\angle A$ is common to both triangles, and $\angle ACB = \angle AED$, since they are corresponding angles (F pattern).

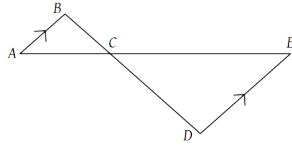
Therefore, $\triangle ABC \sim \triangle ADE$ due to AA~.

J. Garvin — Similar & Congruent Triangles
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Similar Triangles

Example

State why $\triangle ABC \sim \triangle EDC$.



$\angle ACB = \angle ECD$, since they are opposite angles.

$\angle B = \angle E$, since they are alternate angles (Z pattern).

Therefore, $\triangle ABC \sim \triangle EDC$ due to AA~.

Questions?

