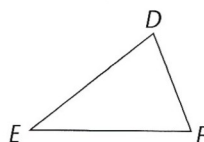
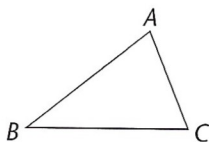


Congruent

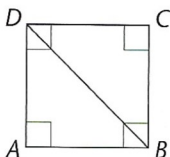
Figures that have the same size and shape

Figures that have exactly the same size and shape are **congruent**. The symbol for *congruent* is \cong . $\triangle ABC \cong \triangle DEF$ is read "Triangle ABC is congruent to triangle DEF ."



A diagonal divides each of these quadrilaterals into two triangles. Two triangles are congruent if their corresponding sides and angles are equal.

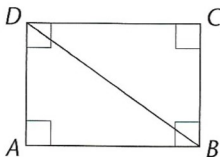
square



$$\triangle ABD \cong \triangle CBD.$$

If you fold the square along the diagonal, the triangles would match exactly.

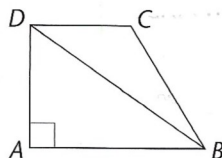
rectangle



$$\triangle ABD \cong \triangle CDB.$$

If you cut along the diagonal and make two triangles, one triangle could be moved and placed exactly on top of the other.

right trapezoid



$\triangle ABD$ and $\triangle CBD$ are not congruent.

$$\triangle ABD \not\cong \triangle CBD.$$

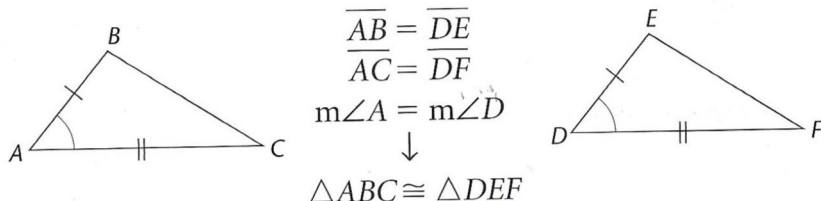
$\triangle ABD$ is a right triangle.

$\triangle CBD$ is not a right triangle.

Three theorems can help you determine whether two triangles are congruent.

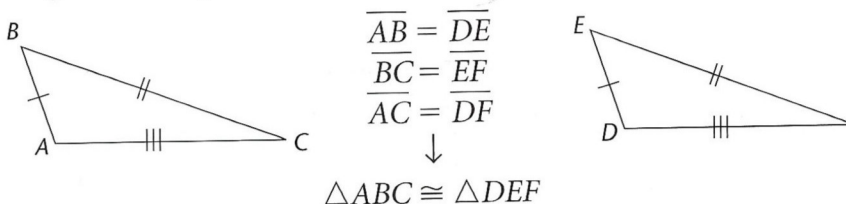
The Side-Angle-Side Theorem (SAS)

If two sides and the included angle of two triangles are equal, then the triangles are congruent.



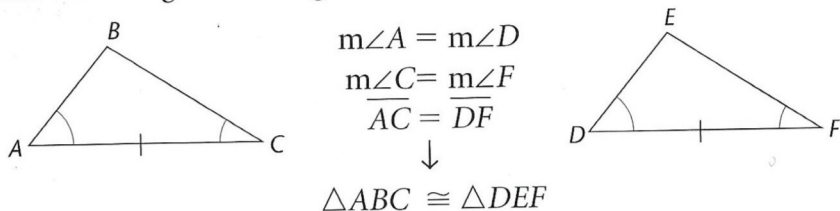
The Side-Side-Side Theorem (SSS)

If the corresponding sides of two triangles are equal, then the triangles are congruent.



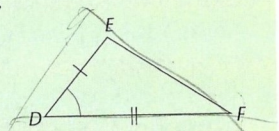
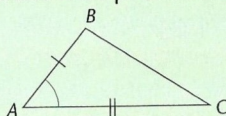
The Angle-Side-Angle Theorem (ASA)

If two angles and the included side of two triangles are equal, then the triangles are congruent.



EXAMPLE 1

Given $\triangle ABC$ and $\triangle DEF$ with $m\angle A = m\angle D$, $AB = DE$, and $AC = DF$, determine whether the triangles are congruent. If the triangles are congruent, name the theorem that proves congruence.



Solution Make a sketch and label the given. Then determine which theorem—SAS, SSS, or ASA—proves congruence. Answer: $\triangle ABC \cong \triangle DEF$ by SAS.

EXAMPLE 2

Given $\triangle ABC$ and $\triangle DEF$ with $m\angle B = m\angle E$, $m\angle C = m\angle F$, and $\overline{BC} = \overline{EF}$, determine whether the triangles are congruent. If the triangles are congruent, name the theorem that proves congruence.

Solution Make a sketch and label the given. Then determine which theorem—SAS, SSS, or ASA—proves congruence. Answer: $\triangle ABC \cong \triangle DEF$ by ASA.

EXAMPLE 3

Given $\triangle ABC$ and $\triangle DEF$ with $m\angle A = m\angle D$, $\overline{BC} = \overline{EF}$, and $\overline{AB} = \overline{DE}$, determine whether the triangles are congruent. If the triangles are congruent, name the theorem that proves congruence.

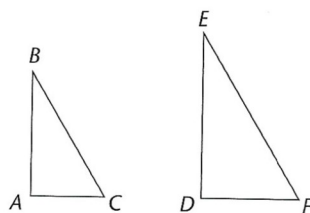
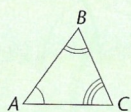
Solution Make a sketch and label the given. Then determine which theorem—SAS, SSS, or ASA—proves congruence. Answer: Because the given does not satisfy SAS, SSS, or ASA, $\triangle ABC$ is not congruent to $\triangle DEF$.

Similar

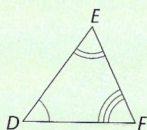
Figures that have the same shape but not the same size

Figures that have the same shape but not the same size are **similar**. The symbol for *similar* is \sim . $\triangle ABC \sim \triangle DEF$ is read “Triangle ABC is similar to triangle DEF .”

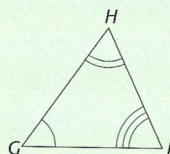
Similar triangles have equal corresponding angles but not equal corresponding sides. These triangles are similar because their corresponding angles are equal.

**EXAMPLE 4**

$$\angle A = \angle D = \angle G$$



$$\angle B = \angle E = \angle H$$



$$\angle C = \angle F = \angle I$$

Given $\triangle ABC \sim \triangle DEF$, $m\angle A = 55^\circ$, and $m\angle B = 60^\circ$, find $m\angle F$.

Step 1 Find $m\angle C$.

$$m\angle A + m\angle B + m\angle C = 180^\circ$$

$$55^\circ + 60^\circ + m\angle C = 180^\circ$$

$$m\angle C = 180^\circ - 55^\circ - 60^\circ$$

$$m\angle C = 65^\circ$$

Step 2 Find $m\angle F$.

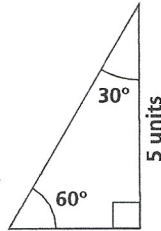
Since the triangles are similar, their corresponding angles are equal, and $m\angle C = m\angle F$. So $m\angle F = 65^\circ$.

Congruent and Similar Triangles

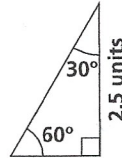
Directions Two triangles in each row are *similar*. Write the letters of the similar triangles on the blank.

1. _____

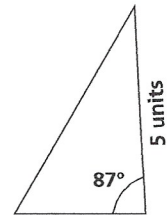
a.



b.

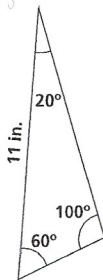


c.

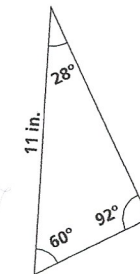


2. _____

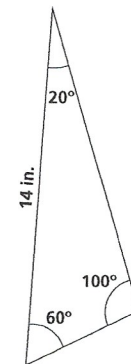
a.



b.



c.



Directions Two triangles in each row are *congruent*. Write the letters of the congruent triangles on the blank.

3. _____

a.



b.

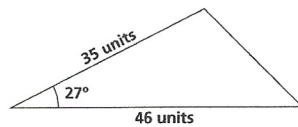


c.

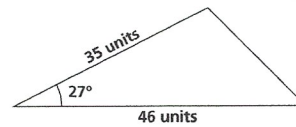


4. _____

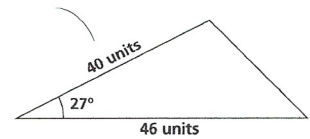
a.



b.

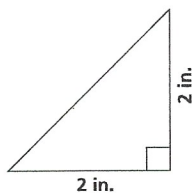


c.

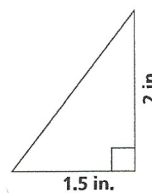


5. _____

a.



b.



c.

