

Congruent Triangles

MCC9–12.G.CO.7

MCC9–12.G.CO.8

Essential Questions

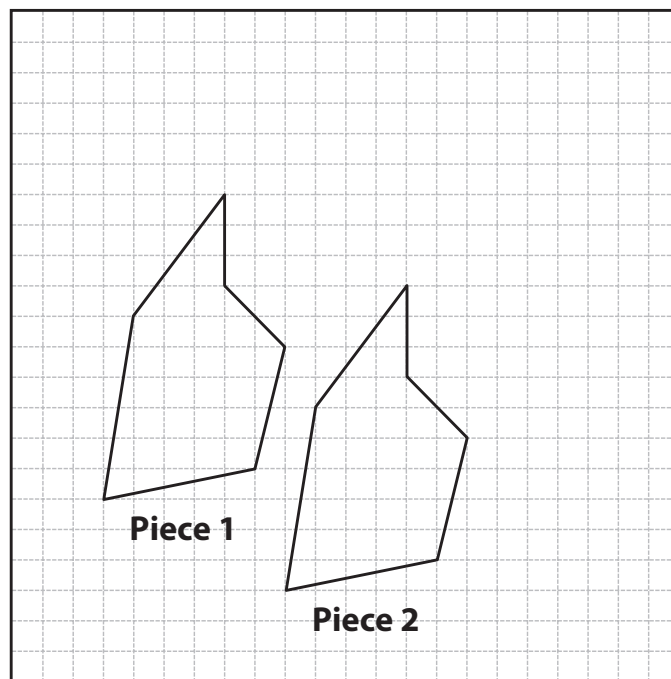
1. Why is it important to know how to mark congruence on a diagram?
2. What does it mean if two triangles are congruent?
3. If two triangles have two sides and one angle that are equivalent, can congruence be determined?
4. How many equivalent measures are needed to determine if triangles are congruent?

<http://www.mathopenref.com/congruenttriangles.html>

Lesson 1.5.1: Triangle Congruency

Warm-Up 1.5.1

Cutting mats used in crafting are similar to coordinate planes, except that the axes are labeled with inches or centimeters, rather than positive and negative numbers. Juliet is in the middle of a sewing project and has laid out two congruent pieces of fabric on her cutting mat.



1. What is the series of transformations that has taken place between Piece 1 and Piece 2?

2. Is Piece 1 and Piece 2 congruent? Explain.

If a rigid motion or a series of rigid motions, including translations, rotations, or reflections, is performed on a triangle, then the transformed triangle is congruent to the original. When two triangles are congruent, the corresponding angles have the same measures and the corresponding sides have the same lengths. It is possible to determine whether triangles are congruent based on the angle measures and lengths of the sides of the triangles.

Corresponding sides are the sides of two figures that lie in the same position relative to the figure.

If two triangles are congruent, then any pair of corresponding sides is also congruent.

Congruent triangles have three pairs of corresponding angles and three pairs of corresponding sides, for a total of six pairs of corresponding parts.

If two or more triangles are proven congruent, then all of their corresponding parts are congruent as well. This postulate is known as **Corresponding Parts of Congruent Triangles are Congruent (CPCTC)**. A **postulate** is a true statement that does not require a proof.

The corresponding angles and sides can be determined by the order of the letters.

If $\triangle ABC$ is congruent to $\triangle DEF$, the angles of the two triangles correspond in the same order as they are named.

Use the symbol \rightarrow to show that two parts are corresponding.

Angle $A \rightarrow$ Angle D ; they are equivalent.

Angle $B \rightarrow$ Angle E ; they are equivalent.

Angle $C \rightarrow$ Angle F ; they are equivalent.

The corresponding angles are used to name the corresponding sides.

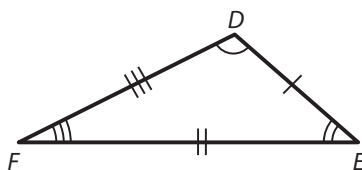
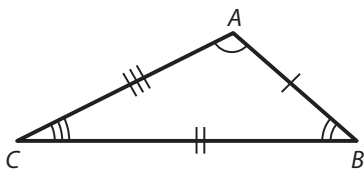
$\overline{AB} \rightarrow \overline{DE}$; they are equivalent.

$\overline{BC} \rightarrow \overline{EF}$; they are equivalent.

$\overline{AC} \rightarrow \overline{DF}$; they are equivalent.

Observe the diagrams of $\triangle ABC$ and $\triangle DEF$.

$$\triangle ABC \cong \triangle DEF$$



$$\angle A \cong \angle D$$

$$\angle B \cong \angle E$$

$$\angle C \cong \angle F$$

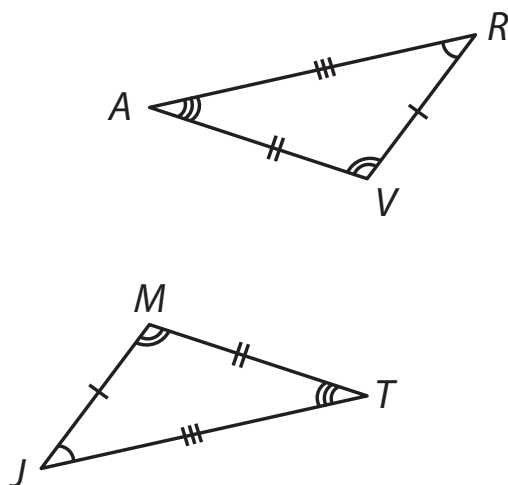
$$\overline{AB} \cong \overline{DE}$$

$$\overline{BC} \cong \overline{EF}$$

$$\overline{AC} \cong \overline{DF}$$

Example 1

Use corresponding parts to identify the congruent triangles.



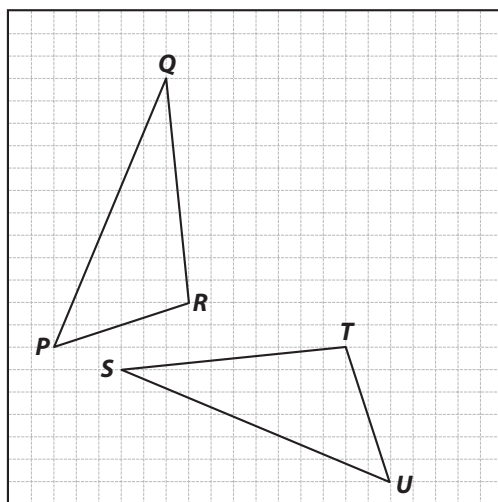
Example 2

$$\triangle BDF \cong \triangle HJL$$

Name the corresponding angles and sides of the congruent triangles.

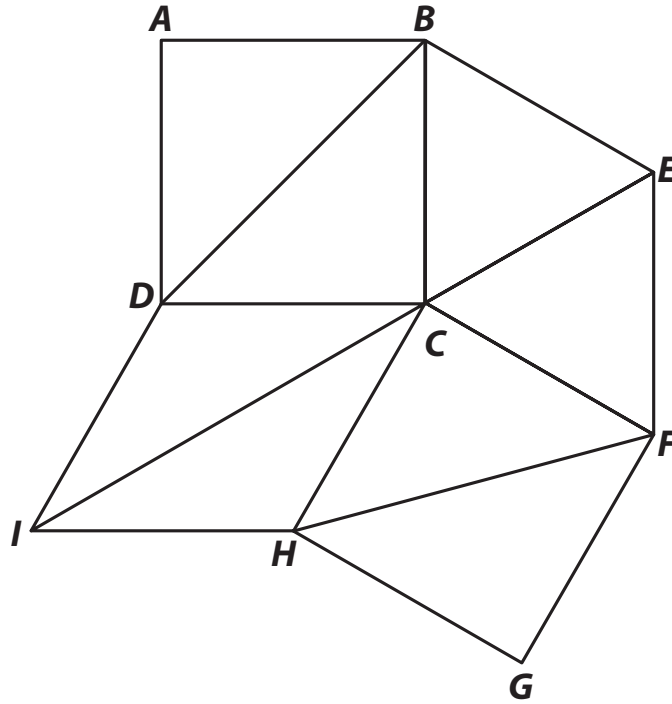
Example 3

Use construction tools to determine if the triangles are congruent. If they are, name the congruent triangles and corresponding angles and sides.



Problem-Based Task 1.5.1: Stained Glass Pattern, Part I

Mary creates stained glass art. She is in the planning stages of creating a new piece and has found a pattern she really likes. Mary studies the pattern to determine which triangles in the pattern are congruent, so that she can cut the correct size pieces of glass. Pictured below is a portion of the pattern. Use the pattern and the information that follows to determine which triangles are congruent. How could Mary use this information to help plan her project?

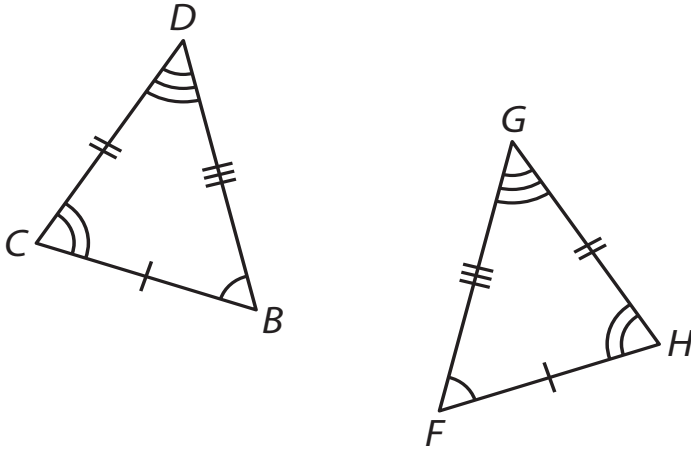


- $\square ABCD$ and $\square CFGH$ are squares. Each diagonal of a square bisects an opposite pair of angles.
- $\square BEFC$ and $\square DCHI$ are rhombuses. The diagonals of a rhombus bisect the opposite pairs of angles. Remember that opposite pairs of angles are congruent.
- $\overline{EC} \cong \overline{BC}$

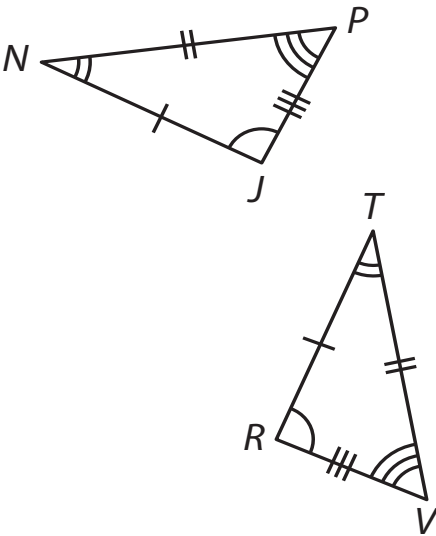
Practice 1.5.1: Triangle Congruency

Use the diagrams to correctly name each set of congruent triangles according to the corresponding parts.

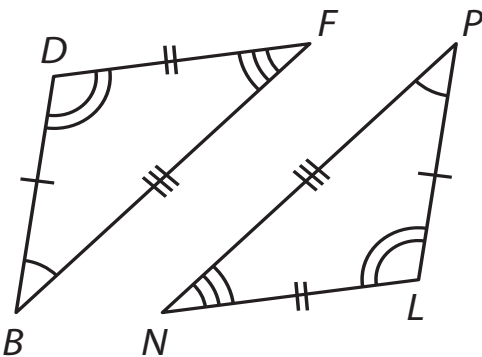
1.



2.



3.



Name the corresponding angles and sides for each

4. $\triangle QRS \cong \triangle WXY$

5. $\triangle AFH \cong \triangle CGJ$

6. $\triangle LPQ \cong \triangle HJK$

