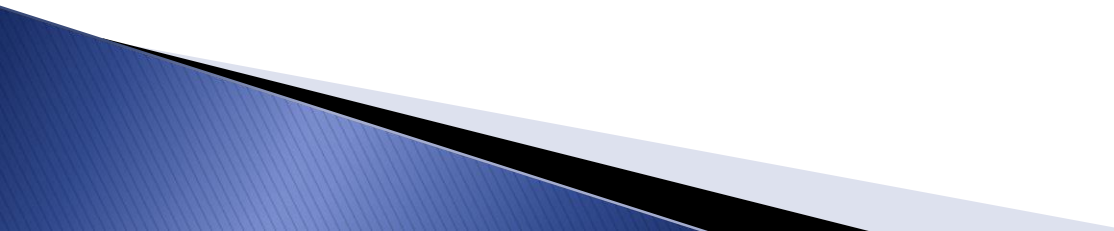


Lesson 25

Triangle Congruence: SSS

Corresponding sides and corresponding angles of polygons are those that are in the same position in two different polygons with the same number of sides.

These corresponding parts are indicated by the names of the polygons. When naming congruent polygons, it is important that the order of the points, or vertices, in the names correspond.



Example 1 Identifying Corresponding Parts

Identify the corresponding angles and sides for $\triangle XYZ$ and $\triangle KLM$.

SOLUTION

$\angle X$ corresponds to $\angle K$

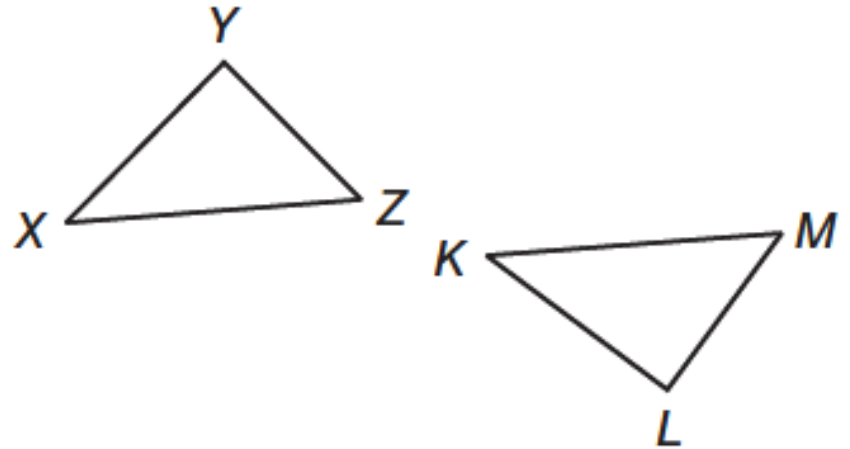
$\angle Y$ corresponds to $\angle L$

$\angle Z$ corresponds to $\angle M$

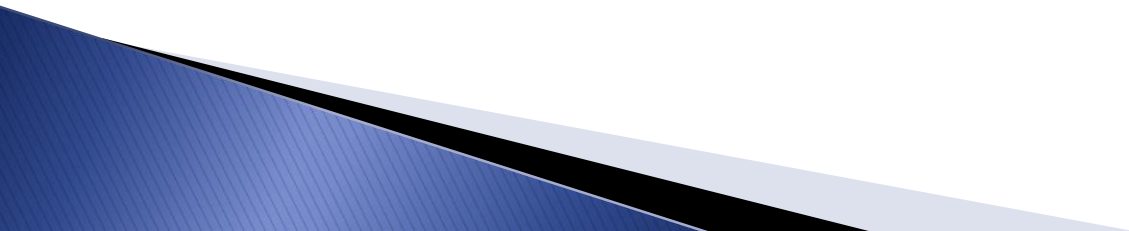
Side \overline{XY} corresponds to side \overline{KL}

side \overline{XZ} corresponds to side \overline{KM}

Side \overline{YZ} corresponds to side \overline{LM}



Congruent Triangles – when all of the triangles' corresponding sides and angles are congruent.



*Postulate 13: Side–Side–Side (SSS) Congruence
Postulate – If three sides of one triangle are
congruent to three sides of another triangle,
then the triangles are congruent.*

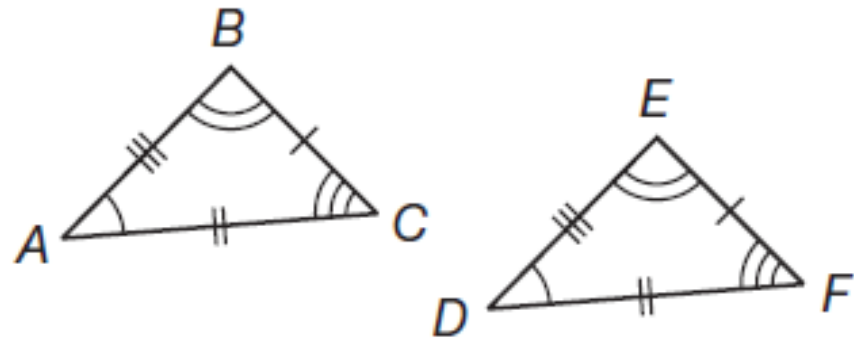
Exploration Exploring the SSS Postulate

In this exploration, you will work with a partner to find out if three congruent line segments can form two different triangles.

1. Your teacher will give three segments of different lengths to each student. Make sure that your segments are the same lengths as your partner's.
2. Assemble a triangle using the segments provided.
3. Compare the triangle that you assembled with your partner's triangle. Are they the same or different? If they are different, in what way(s) are they different?
4. Working with your partner, try to assemble two triangles that are different than the ones originally formed. What do you notice about the triangles you assemble?

Triangle Rigidity – The triangle can have only one size and shape because side–side–side congruence indicates that all the sides of a triangle are of a fixed length.

If triangles $\triangle ABC$ and $\triangle DEF$ are congruent, their relationship can be shown by the congruence statement $\triangle ABC \cong \triangle DEF$.

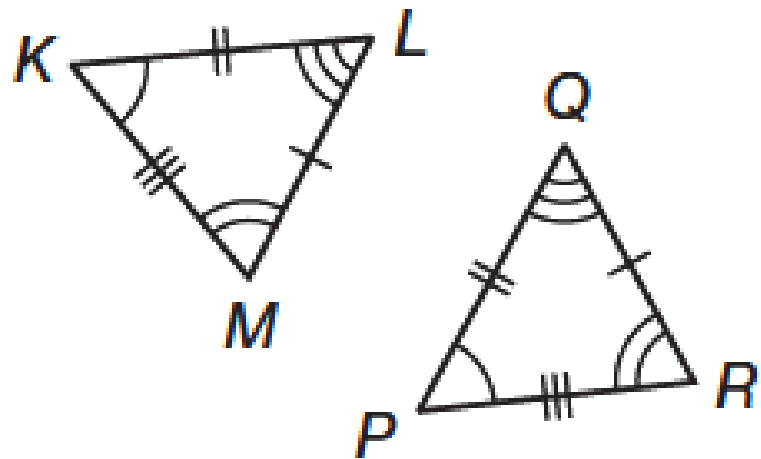


Example 2 Naming Congruent Triangles

Write a congruence statement for the two triangles below.

SOLUTION

In these two triangles, M corresponds to R , K corresponds to P , and L corresponds to Q .
Therefore, $\triangle MLK \cong \triangle RPQ$.



CPCTC – Corresponding Parts of Congruent Triangles are Congruent – When two triangles are congruent, then the corresponding angles and sides of those triangles will also be congruent.

For example, if $\triangle ABC \cong \triangle DEF$, then by CPCTC, all of the following congruence statements can be written.

Congruent Angles

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

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

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

Congruent Sides

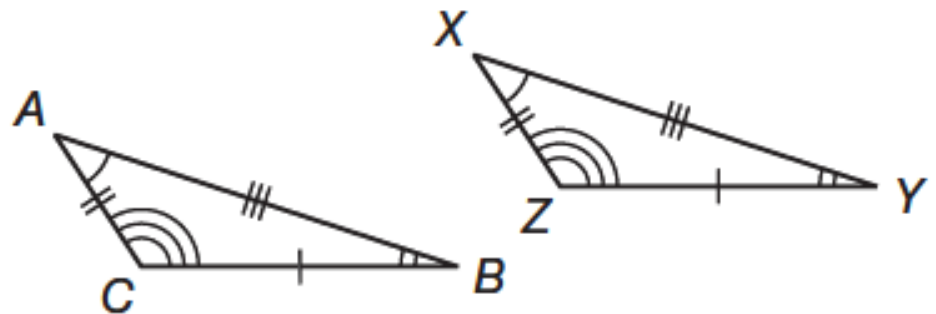
$$\overline{AB} \cong \overline{DE}$$

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

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

Example 3 Writing Congruence Statements

Identify the congruent sides and angles of the two triangles below and write six congruence statements.



Example 3 Writing Congruence Statements

SOLUTION

In these congruent triangles, A corresponds to X , B corresponds to Y , and C corresponds to Z .
Therefore,

Congruent Angles

$$\angle A \cong \angle X$$

$$\angle B \cong \angle Y$$

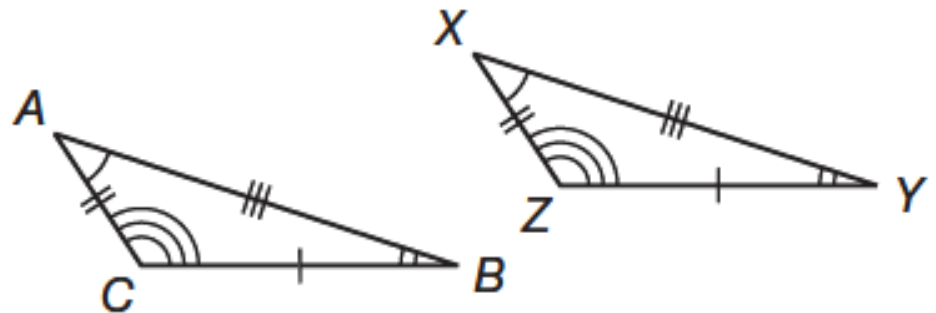
$$\angle C \cong \angle Z$$

Congruent Sides

$$\overline{AB} \cong \overline{XY}$$

$$\overline{BC} \cong \overline{YZ}$$

$$\overline{AC} \cong \overline{XZ}$$

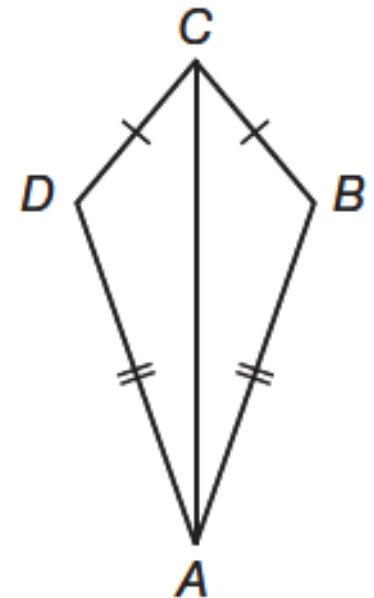


Example 4 Application: Making a Kite

Regina is making her own kite. It is made of two perpendicular pieces of wood, to which she will attach a plastic kite shape. The kite shape is made of two congruent triangles as shown in the picture below. Regina has already found the measures that two of the angles need to be so that the kite can fit on the wooden frame. These measures are:

$$m\angle DAB = 40^\circ \text{ and } m\angle DCB = 80^\circ.$$

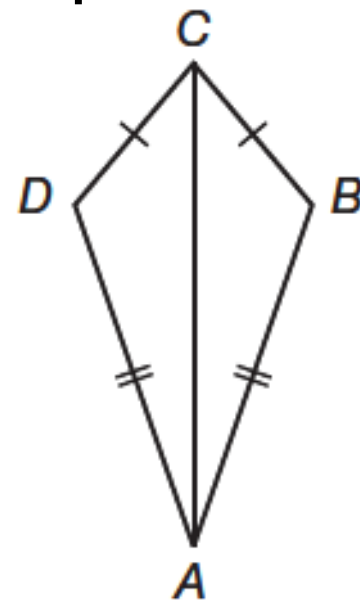
What should the measure of $\angle B$ be?



Example 4 Application: Making a Kite

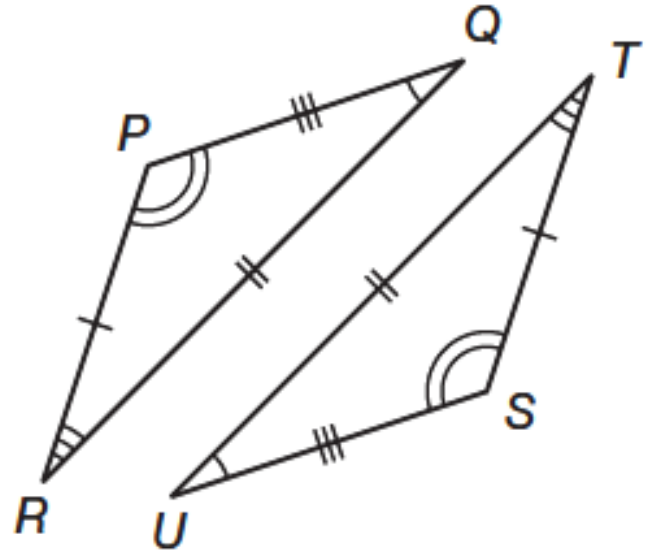
SOLUTION

Since the two triangles are congruent, their corresponding parts are congruent. This means that $\angle BAC \cong \angle DAC$ and, since together they measure 40° , each one must measure 20° . Similarly, each of the angles that make up $\angle DCB$ must be 40° . Using the Triangle Angle Sum Theorem, $\triangle ABC$'s angles must add up to 180° , so $m\angle B = 180^\circ - 40^\circ - 20^\circ = 120^\circ$. So $m\angle B = 120^\circ$.



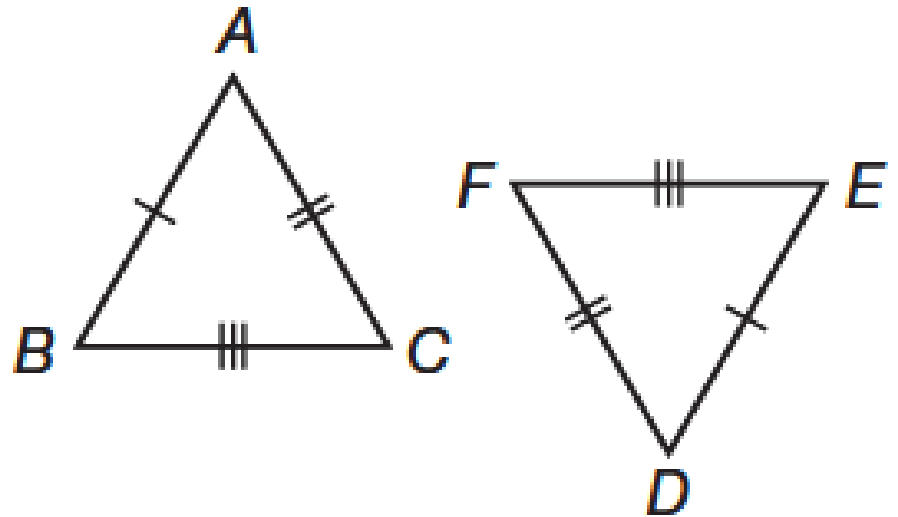
You Try!!!!

a. Identify the corresponding angles and sides.



You Try!!!!

c. Identify the congruent sides and angles of the two triangles below and write six congruence statements.



You Try!!!!

d.Kites Imagine you are making a kite, as in Example 4, with two congruent triangles that make up the kite shape. You know that one obtuse angle of the kite shape is 110° . What is the measure of the other obtuse angle? What will be the total measure of the kite's other two angles?

Assignment

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Lesson Practice (Ask Mr. Heintz)

Page 160

Practice 1–30 (Do the starred ones first)