5.2 Congruent Polygons

Wednesday, December 7, 2016 3:53 PM

What You Will Learn

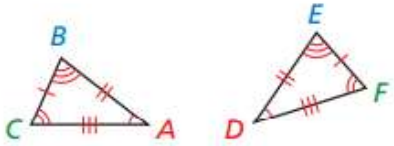
- Identify and use corresponding parts.
- Use the Third Angles Theorem.

Identifying and Using Corresponding Parts

Recall that two geometric figures are congruent if and only if a rigid motion or a composition of rigid motions maps one of the figures onto the other. A rigid motion maps each part of a figure to a **corresponding part** of its image. Because rigid motions preserve length and angle measure, corresponding parts of congruent figures are congruent. In congruent polygons, this means that the *corresponding sides* and the *corresponding angles* are congruent.

When $\triangle DEF$ is the image of $\triangle ABC$ after a rigid motion or a composition of rigid motions, you can write congruence statements for the corresponding angles and corresponding sides.

Corresponding parts of congruent triangles CPCT

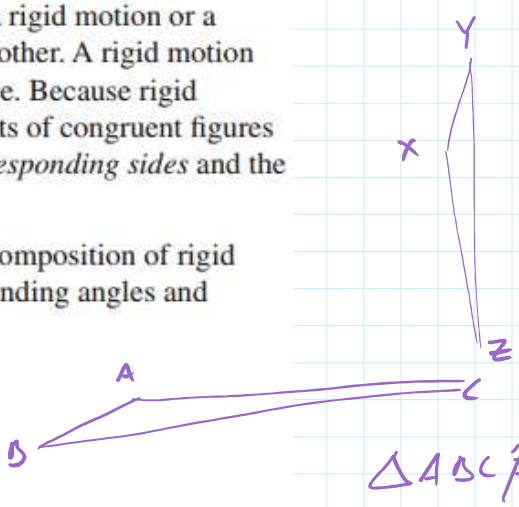


Corresponding angles

$\angle A \cong \angle D, \angle B \cong \angle E, \angle C \cong \angle F$

Corresponding sides

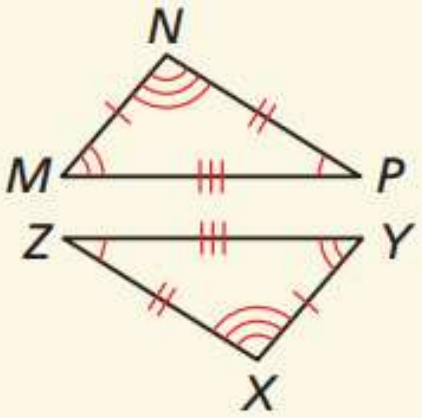
$\overline{AB} \cong \overline{DE}, \overline{BC} \cong \overline{EF}, \overline{AC} \cong \overline{DF}$



$\triangle ABC \not\cong \triangle YZX$

$\triangle ABC \cong \triangle XYZ$

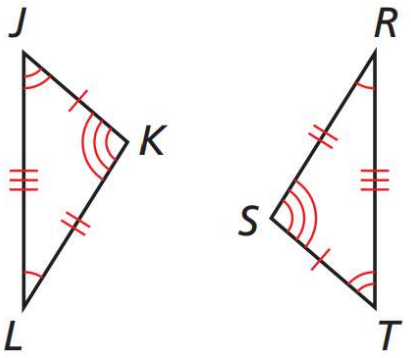
Write a congruence statement for the triangles. Identify all pairs of congruent corresponding parts.



$\overline{XY} \cong \overline{YX}$

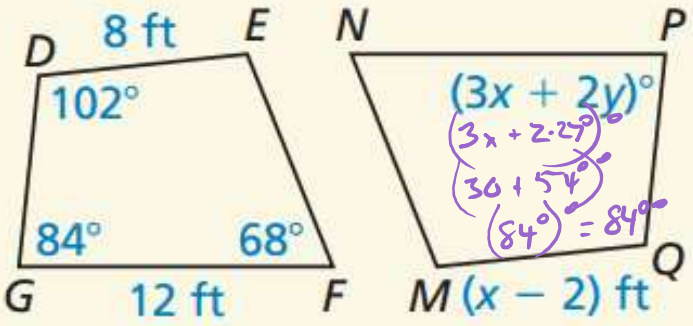
$\angle P \cong \angle Z$
$\angle M \cong \angle Y$
$\angle N \cong \angle X$
$\overline{MN} \cong \overline{XY}$
$\overline{NP} \cong \overline{ZX}$
$\overline{MP} \cong \overline{YZ}$
$\triangle PMN \cong \triangle ZYX$

Write a congruence statement for the triangles. Identify all pairs of congruent corresponding parts.



$\angle L \cong \angle R$
$\angle J \cong \angle T$
$\angle K \cong \angle S$
$\overline{JK} \cong \overline{ST}$
$\overline{LK} \cong \overline{RS}$
$\overline{LJ} \cong \overline{RT}$
$\triangle TSR \cong \triangle JKL$
$\triangle STR \cong \triangle KJL$

In the diagram, $DEFG \cong QMNP$.



a. Find the value of x.

$\overline{MQ} \cong \overline{DE}$

$(x-2)\text{ ft} = 8\text{ ft}$

$+2 \quad +2$

$(x)\text{ ft} = 10\text{ ft}$

$x = 10$

b. Find the value of y.

$\angle P \cong \angle G$

$(3x+2y)^\circ = 84^\circ$

$(3 \cdot 10 + 2y)^\circ = 84^\circ$

$(30+2y)^\circ = 84^\circ$

$-30 \quad -30$

$\frac{(2y)^\circ}{2} = \frac{54^\circ}{2}$

$(y) = 27^\circ$

$y = 27$

Theorem

Theorem 5.3 Properties of Triangle Congruence

Triangle congruence is reflexive, symmetric, and transitive.

Reflexive For any triangle $\triangle ABC$, $\triangle ABC \cong \triangle ABC$.

Symmetric If $\triangle ABC \cong \triangle DEF$, then $\triangle DEF \cong \triangle ABC$.

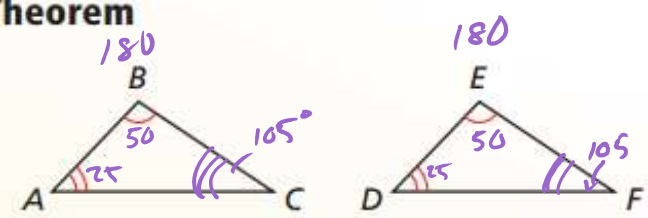
Transitive If $\triangle ABC \cong \triangle DEF$ and $\triangle DEF \cong \triangle JKL$, then $\triangle ABC \cong \triangle JKL$.

1 2 2 3 1 3

Theorem

Theorem 5.4 Third Angles Theorem

If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.



Proof Ex. 19, p. 244

If $\angle A \cong \angle D$ and $\angle B \cong \angle E$, then $\angle C \cong \angle F$.

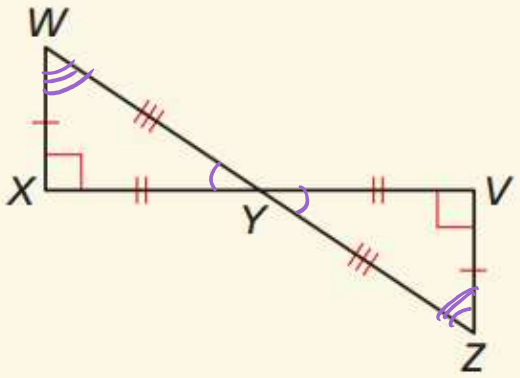
50
25
75

180
−75
105°

25
+50
75

180
−75
105

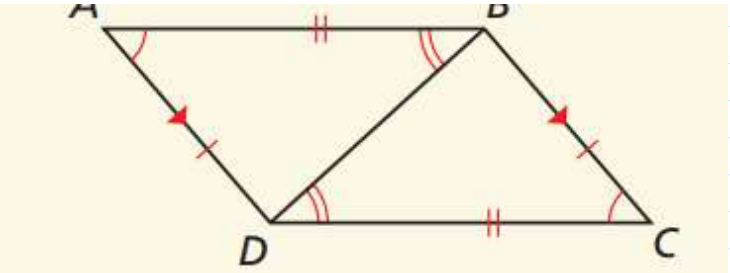
Use the information in the figure to prove that $\triangle WXY \cong \triangle ZVY$.



$\overline{XW} \cong \overline{VZ}$	given
$\overline{XY} \cong \overline{VY}$	given
$\overline{WY} \cong \overline{ZY}$	given
$\angle X \cong \angle V$	given
$\angle WYX \cong \angle VYZ$	vert. $\angle$s
$\angle W \cong \angle Z$	3rd $\angle$s Thm
$\triangle WXY \cong \triangle ZVY$	$\angle$PCT

Show that $\triangle ABD \cong \triangle CDB$. Explain your reasoning.

$\angle A \cong \angle C$	given
$\angle ABD \cong \angle CDB$	given
$\angle ADB \cong \angle CBD$	Alt. Int. $\angle$s
$\overline{AD} \cong \overline{BC}$	given



$\angle ABD \cong \angle CDB$

$\overline{AD} \cong \overline{BC}$ given

$\overline{AB} \cong \overline{DC}$ given

$\overline{DD} \cong \overline{BD}$ reflexive PoC

$\triangle ABD \cong \triangle CDB$ CPCT

Practice sec 5.2 ~~pg.~~

243: 3-13A skip 12
