Geometry 4.3

Name and use corresponding parts of congruent polygons

Prove triangles congruent using the definition of congruence

≅ congruent geometrically equal

corresponding parts

reflexive property $\overline{AB} \cong \overline{AB}$

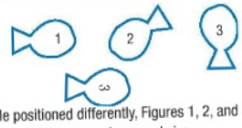
symmetric property $\overline{CD} \cong \overline{FN}$ $\overline{FN} \cong \overline{CD}$

transitive property $a=b$ $b=c$ then $a=c$

Quiz 4.1-4.2

activity: triangle cutouts
exploragons

1 Congruence and Corresponding Parts If two geometric figures have exactly the same shape and size, they are **congruent**.

Congruent	Not Congruent
 While positioned differently, Figures 1, 2, and 3 are exactly the same shape and size.	 Figures 4 and 5 are exactly the same shape but not the same size. Figures 5 and 6 are the same size but not exactly the same shape.

Fold your strip of paper in half so that
you can cut two copies

KeyConcept Definition of Congruent Polygons

Words Two polygons are congruent if and only if their corresponding parts are congruent.

Example

Corresponding Angles

$\angle A \cong \angle H$ $\angle B \cong \angle J$ $\angle C \cong \angle K$

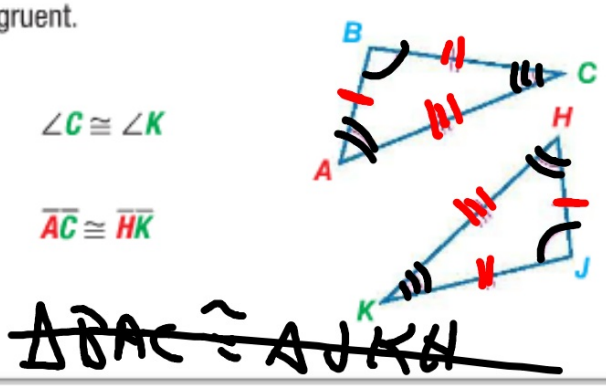
Corresponding Sides

$\overline{AB} \cong \overline{HJ}$ $\overline{BC} \cong \overline{JK}$ $\overline{AC} \cong \overline{HK}$

Congruence Statement

$\triangle ABC \cong \triangle HJK$

Model



$\triangle ABC \cong \triangle JKH$

$\triangle ABC \cong \triangle HJK$

Valid Statement

$\triangle BCA \cong \triangle JKH$

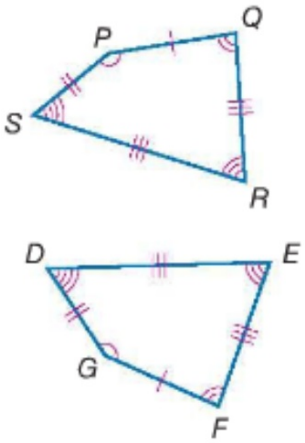
Not a Valid Statement

$\triangle ABC \cong \triangle HKJ$

→ PQRS ≅ GFED

Example 1 Identify Corresponding Congruent Parts

Show that the polygons are congruent by identifying all the congruent corresponding parts. Then write a congruence statement.



$\angle S \cong \angle D$ $\quad \overline{PQ} = \overline{GF}$

$\angle P \cong \angle G$ $\quad \overline{QR} = \overline{FE}$

$\angle Q \cong \angle F$ $\quad \overline{RS} = \overline{ED}$

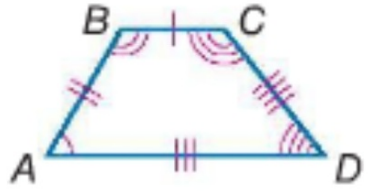
$\angle R \cong \angle E$ $\quad \overline{SP} = \overline{DG}$

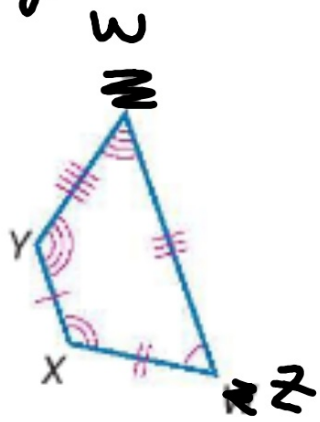
$ABCD \cong WXYZ$

$ABCD \cong ZXYW$

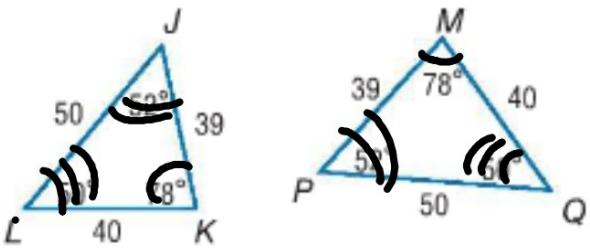
GuidedPractice

1A.





1B.



The phrase "if and only if" in the congruent polygon definition means that both the conditional and its converse are true. So, if two polygons are congruent, then their corresponding parts are congruent. For triangles, we say *Corresponding parts of congruent triangles are congruent*, or CPCTC.

p 256

if F → S

CPCTC

p 259

if S → F

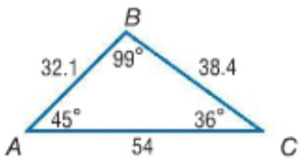
9-25 odd

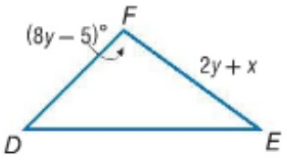
27, 31

Identify corresponding parts
Write/solve an equation

Example 2 Use Corresponding Parts of Congruent Triangles

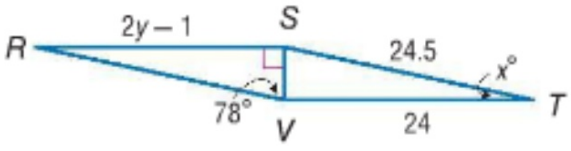
In the diagram, $\triangle ABC \cong \triangle DFE$. Find the values of x and y.





GuidedPractice

2. In the diagram, $\triangle RSV \cong \triangle TVS$. Find the values of x and y.



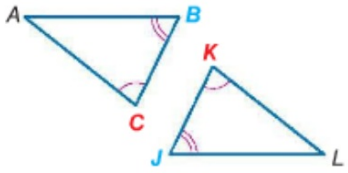
2 Prove Triangles Congruent

The Triangle Angle-Sum Theorem you learned in Lesson 4-2 leads to another theorem about the angles in two triangles.

Theorem 4.3 Third Angles Theorem

Words: If two angles of one triangle are congruent to two angles of a second triangle, then the third angles of the triangles are congruent.

Example: If $\angle C \cong \angle K$ and $\angle B \cong \angle J$, then $\angle A \cong \angle L$.



You will prove this theorem in Exercise 21.

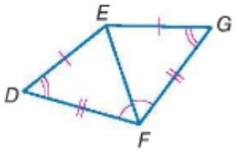
Prove that all corresp parts are congruent

Example 4 Prove That Two Triangles are Congruent

Write a two-column proof.

Given: $\overline{DE} \cong \overline{GE}$, $\overline{DF} \cong \overline{GF}$, $\angle D \cong \angle G$, $\angle DFE \cong \angle GFE$

Prove: $\triangle DEF \cong \triangle GEF$



Proof:

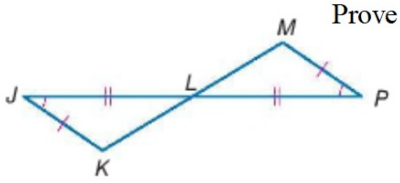
Statements	Reasons
1. $\overline{DE} \cong \overline{GE}$, $\overline{DF} \cong \overline{GF}$	1. Given
2. $\overline{EF} \cong \overline{EF}$	2. Reflexive Property of Congruence
3. $\angle D \cong \angle G$, $\angle DFE \cong \angle GFE$	3. Given
4. $\angle DEF \cong \angle GEF$	4. Third Angles Theorem
5. $\triangle DEF \cong \triangle GEF$	5. Definition of Congruent Polygons

GuidedPractice

4. Write a two column proof.

Given: $\angle J \cong \angle P$, $\overline{JK} \cong \overline{PM}$, $\overline{JL} \cong \overline{PL}$, and L bisects $\overline{KM}$.

Prove: $\triangle JLK \cong \triangle PLM$



Prove all pairs of corresp. parts congruent

Like congruence of segments and angles, congruence of triangles is reflexive, symmetric, and transitive.

Theorem 4.4 Properties of Triangle Conguruence

Reflexive Property of Triangle Congruence

$\triangle ABC \cong \triangle ABC$

Symmetric Property of Triangle Congruence

If $\triangle ABC \cong \triangle EFG$, then $\triangle EFG \cong \triangle ABC$.

Transitive Property of Triangle Congruence

If $\triangle ABC \cong \triangle EFG$ and $\triangle EFG \cong \triangle JKL$, then $\triangle ABC \cong \triangle JKL$.