Name: Date: Period:

Congruent Polygons and Corresponding Parts

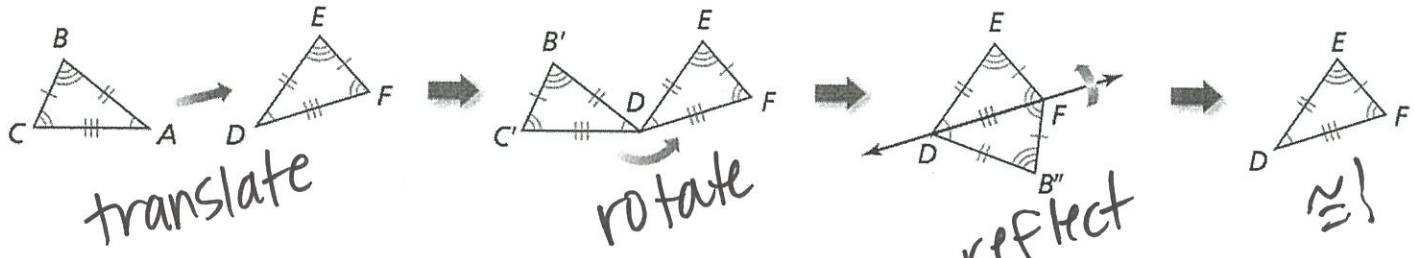
Lesson Objective WBAT identify and use ≅ corresp. parts of figures to prove 2 figures are ≅

Two figures are congruent if and only if a rigid motion or a composition of rigid motions maps each part of a figure 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. This means that corresponding sides and corresponding angles are ≅.

Using Rigid Motions to prove two figures are congruent

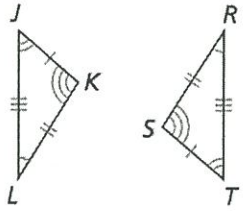


If two triangles above are congruent, we can write a congruence statement

$\triangle ABC \cong \triangle DEF$ (or $\triangle CAB \cong \triangle FDE$)

Example:

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



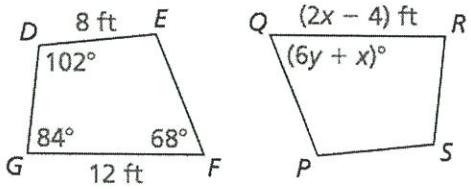
$\triangle TSR \cong \triangle JKL$

$\angle T \cong \angle J$
$\angle R \cong \angle L$
$\angle K \cong \angle S$

$\overline{JK} \cong \overline{TS}$
$\overline{KL} \cong \overline{SR}$
$\overline{JL} \cong \overline{TR}$

~~$\overline{JK} \cong \overline{ST}$~~

2. In the diagram, $DEFG \cong SPQR$.
   a. Find the value of x.
   b. Find the value of y.



Showing That Figures are Congruent

Example:

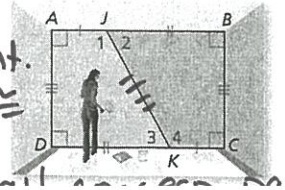
3. You divide the wall into orange (left) and blue (right) sections along $\overline{JK}$. Will the sections of the wall be the same size and shape? Explain.

given: $\overline{AJ} \cong \overline{CK}$, $\overline{AD} \cong \overline{CB}$, $\overline{DK} \cong \overline{BJ}$

$\angle A \cong \angle C$, $\angle D \cong \angle B$ } given

* $\overline{AB} \parallel \overline{CD}$: both are ⊥ to $\overline{AD}$.

$\angle 1 \cong \angle 4$, $\angle 2 \cong \angle 3$ } ∥ → alt. int. ∠s ≅



$\overline{JK} \cong \overline{KJ}$ by reflex. prop. ≅ ... yes! ≅ since all corresp. parts are ≅

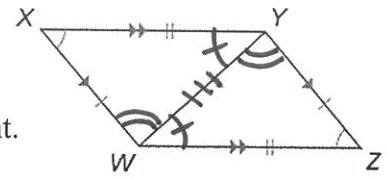
erties of Triangle Congruence

Reflexive: $\Delta 1 \cong \Delta 1$

mmetric: $\Delta 1 \cong \Delta 2 \rightarrow \Delta 2 \cong \Delta 1$

Transitive: $\Delta 1 \cong \Delta 2$ and $\Delta 2 \cong \Delta 3 \rightarrow \Delta 1 \cong \Delta 3$

Proving that Triangles are Congruent



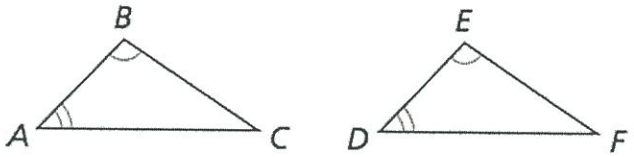
Example:

4. Use the information in the figure to prove that the triangles are congruent.

Statements	Reasons
① $\angle X \cong \angle Z$, $\overline{XY} \cong \overline{ZW}$, $\overline{XW} \cong \overline{ZY}$ $\overline{XY} \parallel \overline{ZW}$, $\overline{XW} \parallel \overline{ZY}$	① given
② $\overline{WY} \cong \overline{YW}$	② reflex. prop. $\cong$
③ $\angle XWY \cong \angle ZYW$ $\angle XYW \cong \angle ZWY$	③ $\parallel \rightarrow$ alt. int. $\angle$s $\cong$
④ $\Delta XYW \cong \Delta ZWY$	④ all corresp. parts are $\cong$

Third Angles Theorem

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



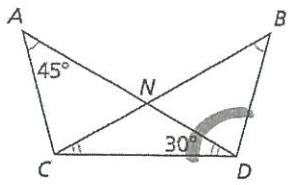
PROOF: **Given:** $\angle A \cong \angle D$ and $\angle B \cong \angle E$
Prove: $\angle C \cong \angle F$

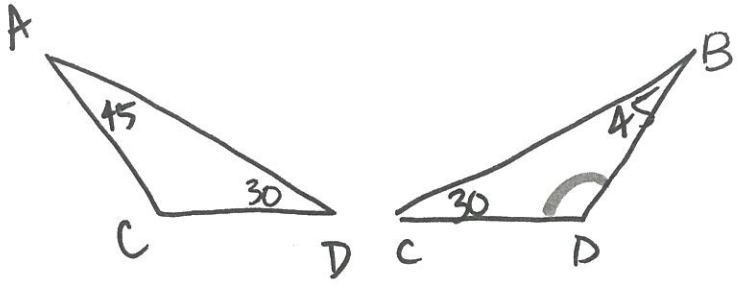
Statements	Reasons
① $\angle A \cong \angle D$, $\angle B \cong \angle E$	① given
② $m\angle A + m\angle B + m\angle C = 180$ $m\angle D + m\angle E + m\angle F = 180$	② Δ sum thm
③ $m\angle A + m\angle B + m\angle C = m\angle D + m\angle E + m\angle F$	③ trans. prop. $=$
④ $m\angle A = m\angle D$, $m\angle B = m\angle E$	④ $\cong \rightarrow =$
⑤ $m\angle D + m\angle E + m\angle C = m\angle D + m\angle E + m\angle F$	⑤ subst. prop. $=$
⑥ $m\angle C = m\angle F$ ⑦ $\angle C \cong \angle F$	⑩ subtract prop. $=$ ⑦ $= \rightarrow \cong$

Examples:

5. Find $m\angle BDC$.

105°

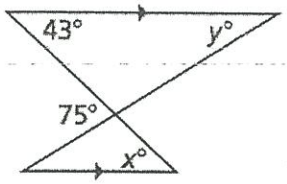




6. Which of the following could represent the measures of an exterior angle and two interior angles of a triangle? Select all that apply.

Ⓐ 100°, 62°, 38°
Ⓑ 81°, 57°, 24°
Ⓒ 119°, 68°, 49°
Ⓓ 95°, 85°, 28°
Ⓔ 92°, 78°, 68°
Ⓕ 149°, 101°, 48°

7. Find the values of x and y.



8. Find the values of x and y.