Geometry
4.2 Apply Congruence and Triangles

Name : Key
Date : _____ Period : ____

LEARNING TARGETS

- I can identify and name congruent figures

Two geometric figures are Congruent if they have exactly the same ***size*** and ***shape***.

↳ all sides and all angles

In two congruent figures, ***all parts*** of one figure are congruent to corresponding parts of the other figure.

So when you write a congruence statement, always list the corresponding vertices in the same order.

Example #1

Since corresponding parts across corresponding figures are congruent, complete the following congruence statements for $\triangle ABC$ and $\triangle DEF$ below.

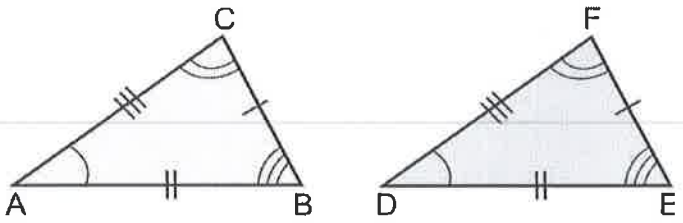
We can look at the markings on angles and the sides to determine that:

Congruent angles:

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

Congruent sides:

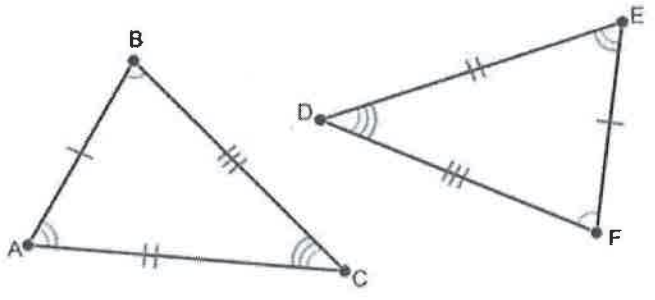
$\overline{AC} \cong \overline{DF}$
$\overline{CB} \cong \overline{FE}$
$\overline{AB} \cong \overline{DE}$



Since we know corresponding parts of congruent triangles are congruent : Δ ACB $\cong \Delta$ DFE

Example #2 Try On Your Own!

State the corresponding parts of the triangles below, then write a congruence statement.



Congruent angles:

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

Congruent sides:

$\overline{AB} \cong \overline{EF}$
$\overline{BC} \cong \overline{FD}$
$\overline{AC} \cong \overline{ED}$

So since we know corresponding parts of congruent triangles are congruent : Δ ABC $\cong \Delta$ EFD

Key Concept	
Reflexive Property Used when something is congruent or equal to itself	Examples: $\overline{AB} \cong \overline{AB}$ $m\angle A = m\angle A$

In triangle congruence, the reflexive property is used when two triangles Share a side.

Example #3

Congruent angles:

$\angle KNL \cong \angle MLN$

$\angle NLK \cong \angle LNM$

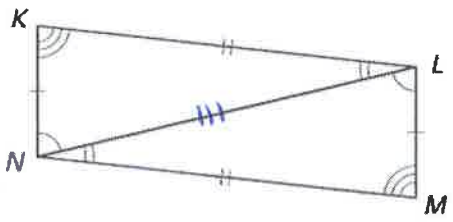
$\angle NKL \cong \angle LMN$

Congruent sides:

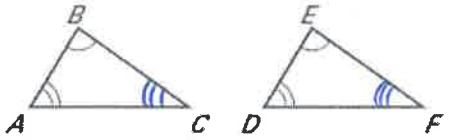
$\overline{KN} \cong \overline{ML}$

$\overline{KL} \cong \overline{MN}$

$\overline{NL} \cong \overline{NL}$ by the reflexive property



So since we know corresponding parts of congruent triangles are congruent : $\triangle NLK \cong \triangle LNM$

Theorem 4.3	
Third Angles Theorem: If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also Congruent.	 If $\angle B \cong \angle E$ and $\angle A \cong \angle D$ then $\angle C \cong \angle F$ by the third angles theorem

Example #4

Congruent angles:

$\angle GDE \cong \angle EFG$

$\angle DEG \cong \angle FGE$

$\angle EGD \cong \angle GEF$

by the third angles theorem

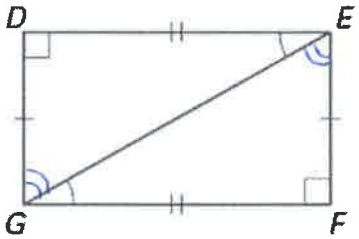
Congruent sides:

$\overline{DG} \cong \overline{FE}$

$\overline{DE} \cong \overline{FG}$

$\overline{GE} \cong \overline{GE}$

by the reflexive property



So since we know corresponding parts of congruent triangles are congruent : $\triangle GDE \cong \triangle EFG$

Example #5

Given $\triangle ABC \cong \triangle DEF$, find the values of x and y.

$\angle A \cong \angle D \rightarrow 87 = 5x + 2$

$\angle B \cong \angle E \quad 85 = 5x$

$\angle C \cong \angle F \quad x = 17$

$\downarrow$

$3y = 51$

$y = 17$