

## 4.1 Congruent Figures

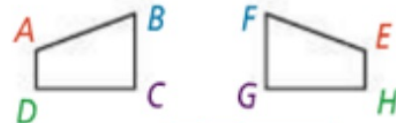
### Learning Targets for today

- ① To be able to identify congruent figures and their corresponding parts.
- ① To be able to prove two triangles are congruent using the definition of congruence.
- ① To be able to use the Third Angles Congruence Theorem.

### Key Concept

**Congruent Polygons** – have congruent corresponding parts (sides and angle!). When you name the parts you must list them in the same order.

#### Example



$$ABCD \cong EFGH$$

$$\overline{AB} \cong \overline{EF}$$
$$\overline{CD} \cong \overline{GH}$$

$$\overline{BC} \cong \overline{FG}$$
$$\overline{DA} \cong \overline{HE}$$

$$\angle A \cong \angle E$$

$$\angle B \cong \angle F$$

$$\angle C \cong \angle G$$

$$\angle D \cong \angle H$$

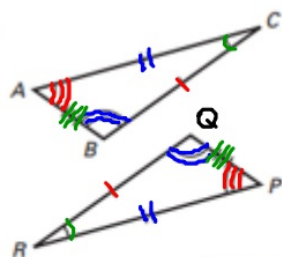
Congruence  
Statement

### Naming Congruent Parts

#### Example for you...

Name the congruent corresponding parts of the figures below.

1.



<u>SIDES</u>	<u>ANGLES</u>
$\overline{BC} \cong \overline{QR}$	$\angle A \cong \angle P$
$\overline{AC} \cong \overline{PR}$	$\angle B \cong \angle Q$
$\overline{BA} \cong \overline{QP}$	$\angle C \cong \angle R$

$\triangle ABC \cong \triangle PQR$

#### Your turn to try...

Name the congruent corresponding parts of the figures in the statement.

1.  $\triangle ABC \cong \triangle DEF$

SIDES  $\rightarrow \overline{AB} \cong \overline{DE}, \overline{BC} \cong \overline{EF}, \overline{CA} \cong \overline{FD}$

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

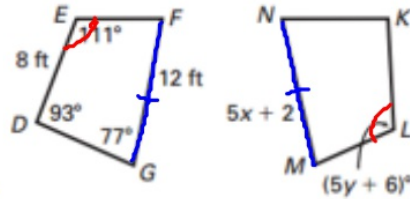
### Using Congruent Parts

#### Example for you...

In the diagram  $\triangle DEF \cong \triangle LMN$ .

1. Find  $x$ .

$$\begin{aligned} \overline{MN} &\cong \overline{FG} \\ 5x + 2 &= 12 \\ \underline{-2} \quad \underline{-2} & \\ 5x &= 10 \\ \underline{\quad} \quad \underline{\quad} & \\ x &= 2 \end{aligned}$$



2. Find  $y$ .

$$\begin{aligned} \angle L &\cong \angle E \\ 5y + 6 &= 111 \\ \underline{-6} \quad \underline{-6} & \\ 5y &= 105 \\ \underline{\quad} \quad \underline{\quad} & \\ y &= 21 \end{aligned}$$

#### Your turn to try...

Find the measures of the numbered angles.

$\triangle MNPQR \cong \triangle STUVW$



$$\begin{aligned} \angle M &\cong \angle S \\ 90 &= 3 \end{aligned}$$

$$m\angle 3 = 90$$

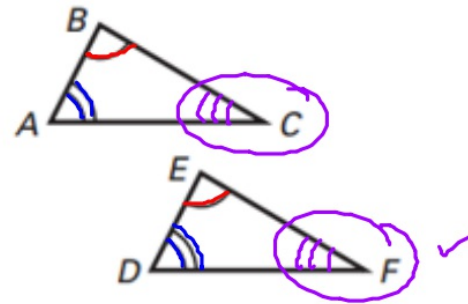
$$\begin{aligned} \angle W &\cong \angle R \\ m\angle 4 &= 135^\circ \end{aligned}$$

### Third Angles Theorem

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



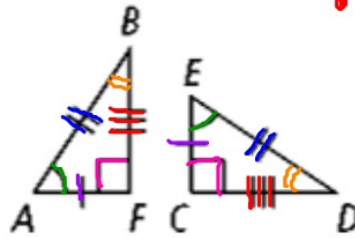
SHORT-CUT #1

## Proving Triangles Congruent

### Example for you...

Decide whether the triangles are congruent.  
Justify your answer.

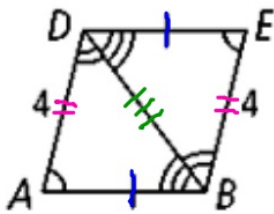
1.



- All 3 sets of sides are congruent ✓
- $\angle B \cong \angle D$  by the Third Angles Thm.

Yes!  $\Delta ABF \cong \Delta EDC$

2.



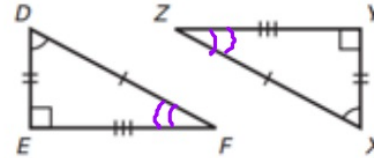
- All sides are congruent ✓
- All angles are congruent ✓

$\Delta ADB \cong \Delta EDB$

### Your turn to try...

Decide whether the triangles are congruent.  
Justify your answer.

1.

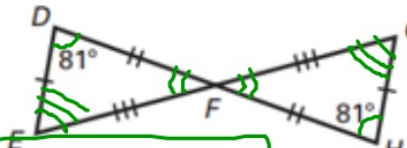


- All corresponding are congruent ✓

- $\angle F \cong \angle Z$  by Third Angles Thm. ✓

Yes!  $\Delta DFE \cong \Delta XZY$

2.



- All corresponding Sides are congruent ✓

- $\angle DFE \cong \angle HFG$  by Vertical Angles Thm ✓

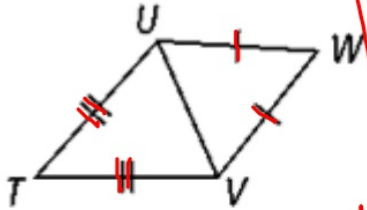
- $\angle E \cong \angle G$  Third Angles Thm ✓

$\Delta DFE \cong \Delta HFG$

#3 on next page!



3.



Not Enough  
Information!

- Angles?
- Sides are NOT  
Congruent !!