Chapter 4.2: Apply Congruence and Triangles

YOU WILL IDENTIFY CONGRUENT FIGURES, PARTS, AND WRITE CONGRUENCE STATEMENTS.

CONGRUENCE

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

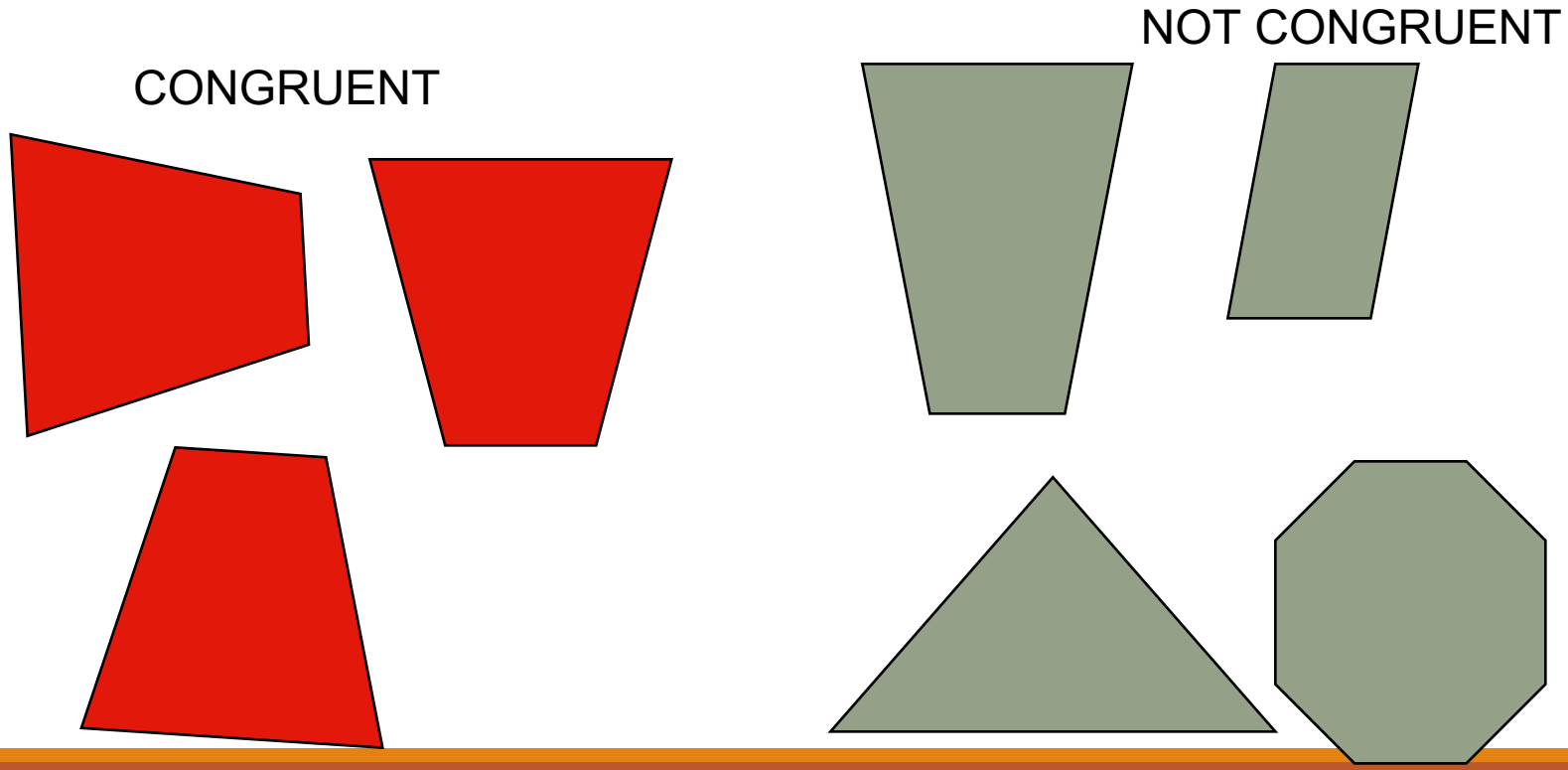
Congruence Statements

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

In congruent polygons, this means that the ***corresponding sides*** and the ***corresponding angles are congruent.***

Identifying congruent figures

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



Congruent Parts in Triangles

Corresponding angles

$\angle A \cong \angle P$

$\angle B \cong \angle Q$

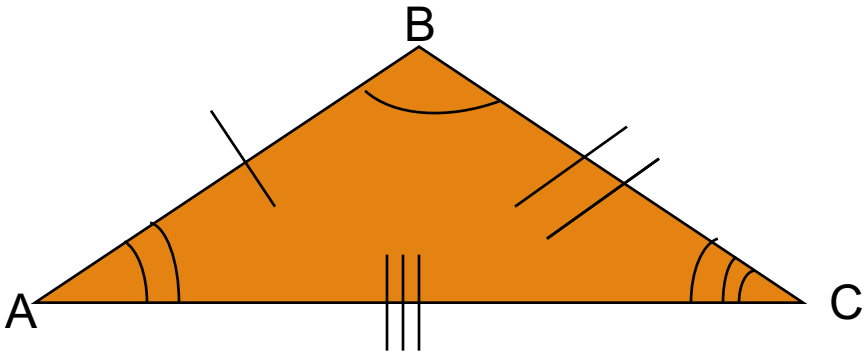
$\angle C \cong \angle R$

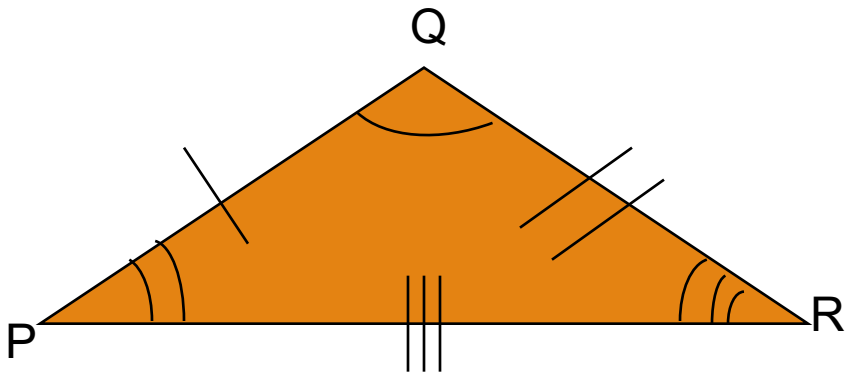
Corresponding Sides

$\overline{AB} \cong \overline{PQ}$

$\overline{BC} \cong \overline{QR}$

$\overline{CA} \cong \overline{RP}$

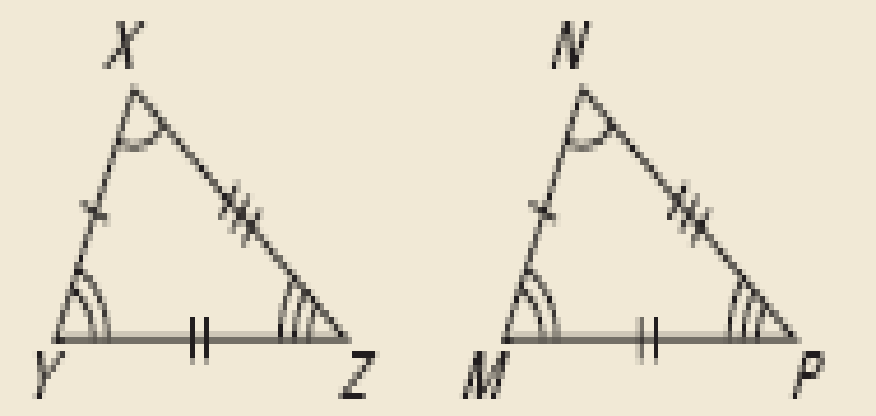




Congruence Statement: $\triangle ABC \cong \triangle PQR$

You Try

Ex.1: Write a congruence statement for the triangles. Identify all pairs of congruent corresponding parts.



Corresponding Angles:

Corresponding Sides:

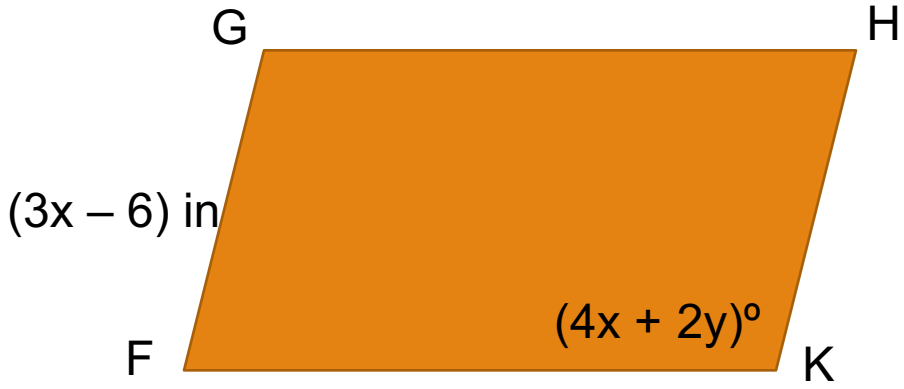
Congruence Statement:

$\triangle XYZ \cong \triangle NMP$

Ex.2: In the diagram, ABCD ≅ FGHK .

a. Find the value of x.

b. Find the value of y.



AB ≅ FG

9 = 3x – 6

15 = 3x

x = 5 in

$\angle FKH \cong \angle ADC$

4x + 2y = 136

4(5) + 2y = 136

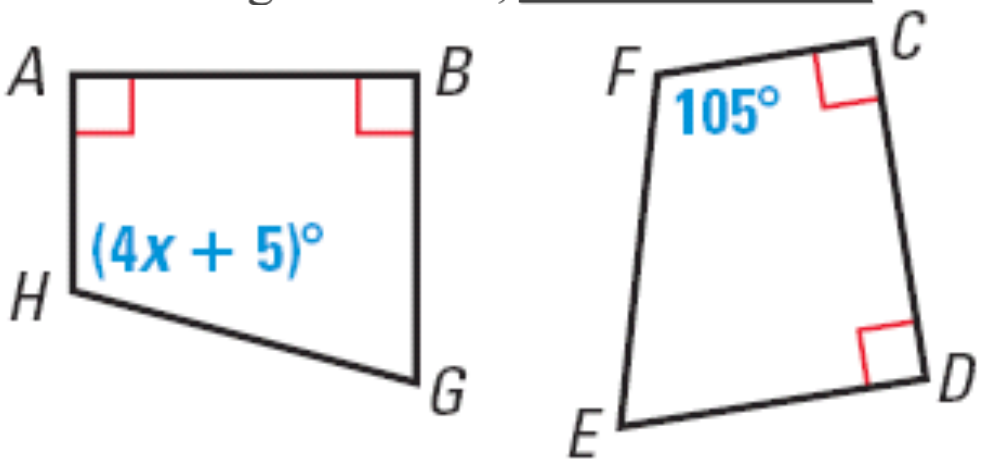
20 + 2y =136

2y = 116

y = 58°

You Try

Ex.3: In the diagram below, ABGH ≅ CDEF



a. Identify all pairs of congruent corresponding parts.

b. Find the value of x and find m ∠H.

Congruent Angles Congruent Sides

$4x + 5 = 105$

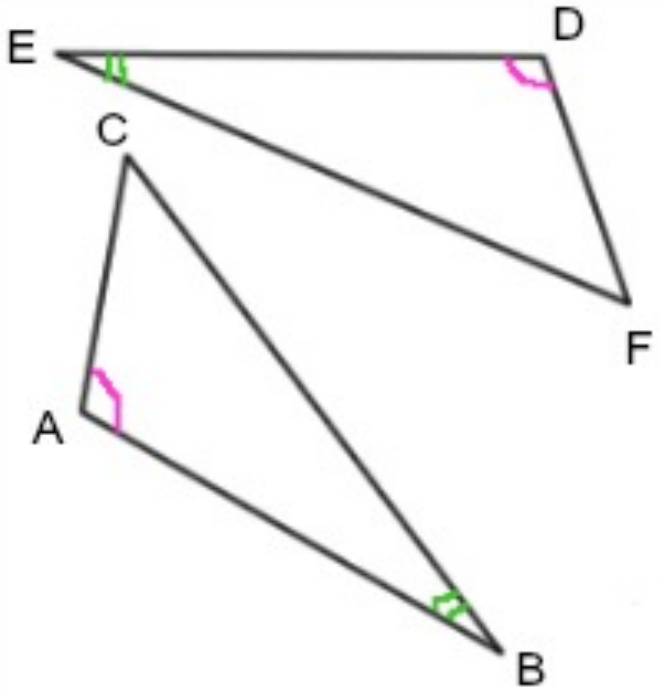
$4x = 100$

$x = \mathbf{25}$

m ∠H = **105°**

Third Angles Theorem

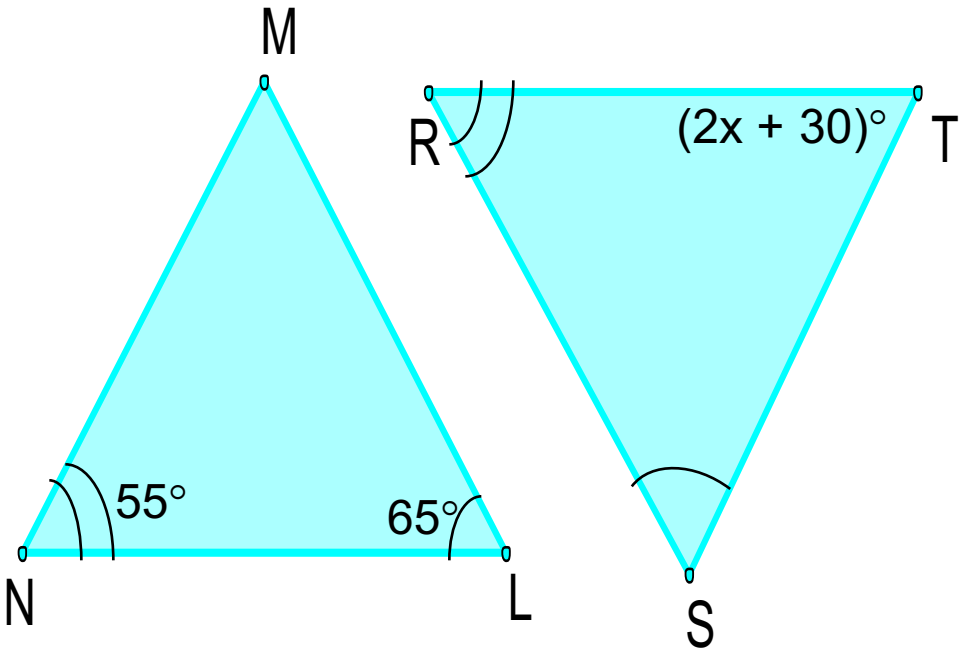
If two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent.



If angle A and angle D are congruent and angle B and angle E are congruent, then angle C and angle F are congruent as well.

Ex. 3 Using the Third Angles Theorem

Find the value of x.



$\angle N \cong \angle R$ and $\angle L \cong \angle S$

$\angle M \cong \angle T$. So $m\angle M = m\angle T$

From the Triangle Sum Theorem….

$m\angle M = 180° - 55° - 65° = 60°$

$m\angle M = m\angle T$

$60° = (2x + 30)°$

$30 = 2x$

$15 = x$

Writing a Proof:

Given: SV≅ RV, TV≅ WV, ST≅ RW. ∠W ≅ ∠T

Prove: $\triangle STV \cong \triangle RWV$

Statement	Reason
1. SV ≅ RV, SV ≅ RV, SV ≅ RV, ∠W ≅ ∠T	1. Given
2. ∠SVT ≅ ∠RVW	2. Vert. Angles Thm
3. ∠S ≅ ∠R	3. Third Angles Thm
4. $\triangle STV \cong \triangle RWV$	4. Congruent Angles, Sides

Theorem 4.4 Properties of Congruent Triangles:

- **Reflexive Property of Congruent Triangles:**
- For any triangle ABC, $\Delta ABC \cong \Delta ABC$

- **Symmetric Property of Congruent Triangles:**

  If $\Delta ABC \cong \Delta DEF$, then $\Delta DEF \cong \Delta ABC$

- **Transitive Property of Congruent Triangles:**

  If $\Delta ABC \cong \Delta DEF$ and $\Delta DEF \cong \Delta JKL$, then $\Delta ABC \cong \Delta JKL$