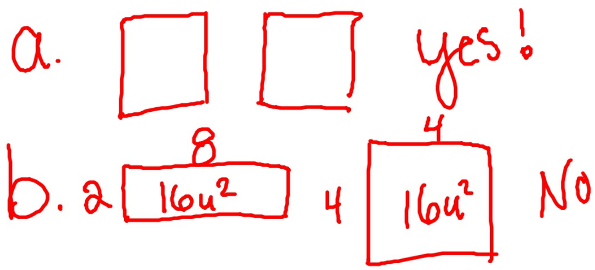
LAUNCH

You can compare figures in many different ways. Congruence is a *shape* comparison. Area is a *quantitative* comparison. Use what you know about area to answer the following questions.

a. If two polygons are congruent, must they have the same area? Explain.

b. If two polygons have the same area, must they be congruent? Explain.



2.4 Triangle Congruence

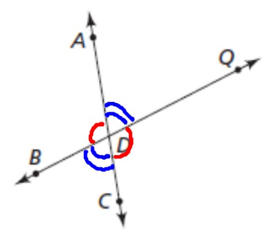
Objective: Students will test for congruence in triangles

PROPERTIES OF CONGRUENCE

Reflexive Property	$\overline{AB} \cong \overline{AB}$ $\angle A \cong \angle A$
Symmetric Property	If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$. If $\angle A \cong \angle B$, then $\angle B \cong \angle A$.
Transitive Property	If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$. If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$.

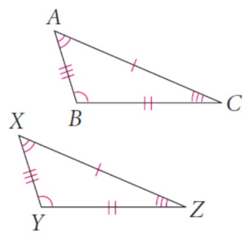
Theorem 2.1 *The Vertical Angles Theorem*

In the figure below, $m\angle ADB = m\angle CDQ$ and $m\angle BDC = m\angle ADQ$.



If all of the corresponding sides and angles in two triangles are congruent, then the two triangles must be congruent.

If you know this,	then you know this.
$\angle A \cong \angle X$	$\triangle ABC \cong \triangle XYZ$
$\angle B \cong \angle Y$	
$\angle C \cong \angle Z$	
$\overline{AB} \cong \overline{XY}$	
$\overline{AC} \cong \overline{XZ}$	
$\overline{BC} \cong \overline{YZ}$	

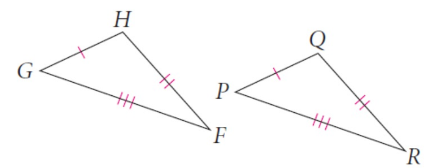


However, you do not need to know that all six corresponding parts are congruent in order to conclude that two triangles are congruent.

postulate - a statement that is accepted without proof.

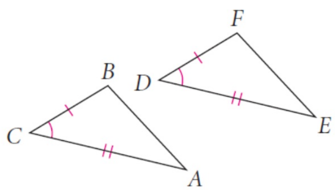
Side-Side-Side (SSS) Postulate

$\triangle GHF \cong \triangle PQR$



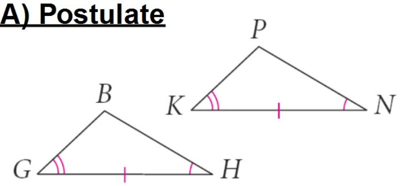
Side-Angle-Side (SAS) Postulate

$\triangle BCA \cong \triangle FDE$



Angle-Side-Angle (ASA) Postulate

$\triangle HGB \cong \triangle NKP$



Postulate *The Triangle Congruence Postulates*

If two triangles share the following triplets of congruent corresponding parts, then the triangles are congruent.

- ASA
- SAS
- SSS

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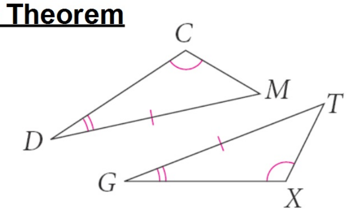
Angle-Angle-Side (AAS) Theorem

$\triangle CDM \cong \triangle XGT$



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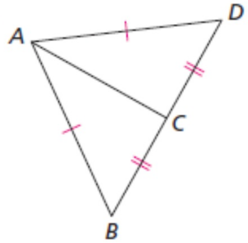
Check Your Understanding **(In your notes)**

In Exercises 3 and 4, is $\triangle ABC \cong \triangle ADC$? If the two triangles are congruent, state which triangle congruence postulate helped you decide.

3.



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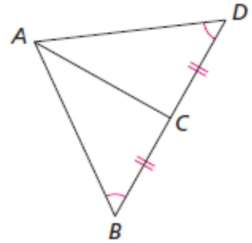
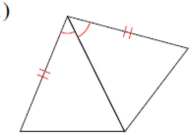


2.4 Triangle Congruence EXIT TICKET

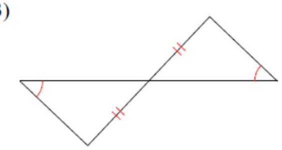
State if the two triangles are congruent. If they are, state how you know.

1)



2)

3)



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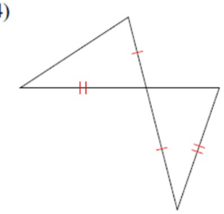

On Your Own

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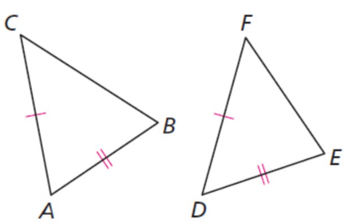
For Exercises 8–12, do each of the following:

a. Tell whether the given information is enough to show that the triangles are congruent. The triangles are not necessarily drawn to scale.

b. If the given information is enough, list the pairs of corresponding vertices of the two triangles. Then state which triangle congruence postulate guarantees that the triangles are congruent.

8.



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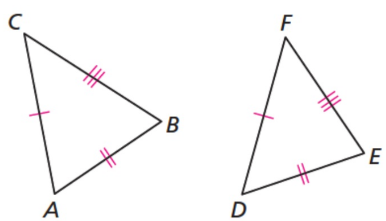

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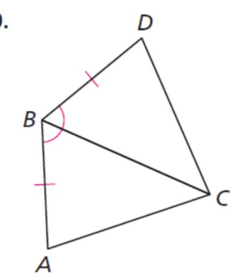
10.



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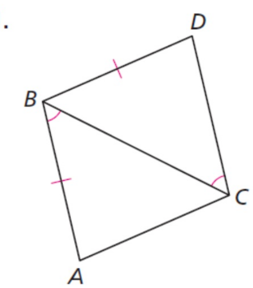
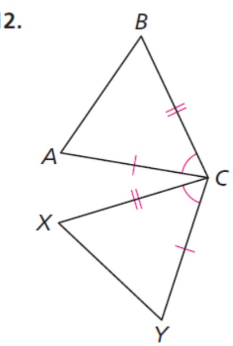


12.



13. **Standardized Test Prep** In $\triangle ABC$, $\overline{CD}$ is the bisector of $\angle ACB$. Which of the following conjectures is true?

A. There is not sufficient evidence to prove that $\triangle ACD \cong \triangle BCD$.

B. $\triangle ACD \cong \triangle BCD$ is true by the Angle-Side-Angle postulate. In each triangle, the side between the two angles is $\overline{CD}$.

C. $\triangle ACD \cong \triangle BCD$ is true by the Side-Angle-Side postulate. Angle ACD and $\angle BCD$ are the congruent angles that are between the two pairs of congruent sides.

D. $\triangle ACD \cong \triangle BCD$ is true by the Side-Side-Side postulate.

14. In the figure at the right, $\overline{BD}$ is the perpendicular bisector of $\overline{AC}$. Based on this statement, which two triangles are congruent? Prove that they are congruent.