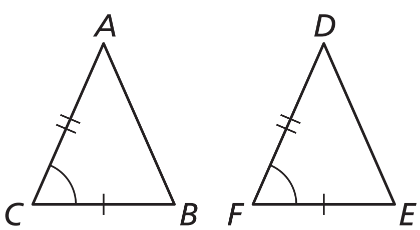
5.6 Start Thinking

Use a straightedge and a protractor to construct $\triangle XYZ$, with $\angle X = 70°$, $\angle Y = 50°$, and $\angle Z = 60°$. Use a ruler to measure the side lengths. Without measuring, construct $\triangle ABC$, with $\angle X \cong \angle A$, $\angle Y \cong \angle B$, and $\angle Z \cong \angle C$. Measure the side lengths of $\triangle ABC$. Is $\triangle XYZ \cong \triangle ABC$? What does this lead you to believe about triangles with the same angle measures?

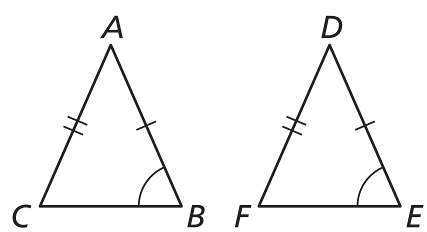
5.6 Warm Up

Determine which triangle congruence theorem, if any, can be used to prove the triangles are congruent.

1.



2.



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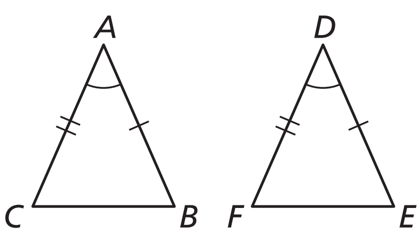

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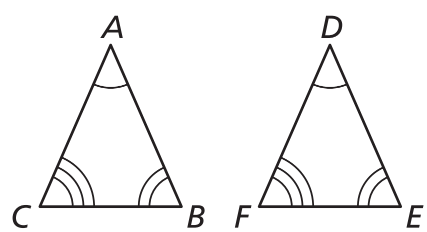


5.6 Cumulative Review Warm Up

1. Graph $\triangle XYZ$, with vertices $X(3, 3)$, $Y(7, -1)$, $Z(8, 1)$, and and its image after the transformations.

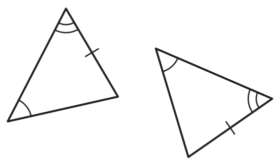
Translation: $(x, y) \rightarrow (x - 13, y - 3)$

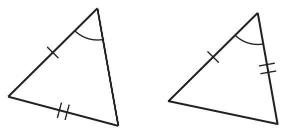
Translation: $(x, y) \rightarrow (x + 6, y + 8)$

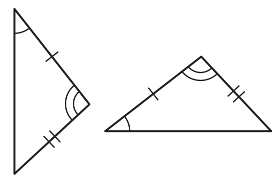
Name____ Date__________

5.6 Practice A

In Exercises 1–3, decide whether enough information is given to prove that the triangles are congruent. If so, state the theorem you would use.

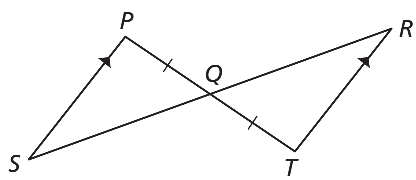
1. 

2. 

3. 

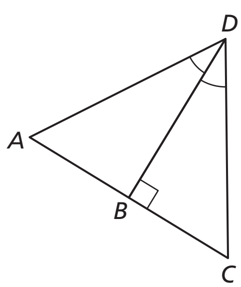
4. **Given:** $\overline{PS} \parallel \overline{RT}$, $\overline{PQ} \cong \overline{TQ}$

Prove: $\triangle PSQ \cong \triangle TRQ$

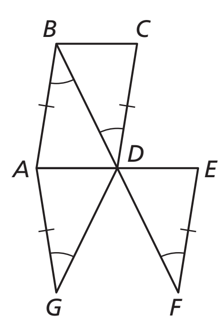


5. **Given:** $\overline{BD}$ bisects $\angle ADC$, $\overline{BD} \perp \overline{AC}$

Prove: $\triangle ABD \cong \triangle CBD$



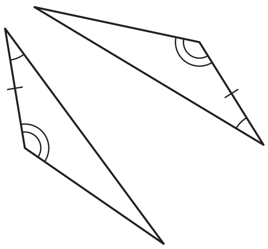
6. Use the information given in the figure and the triangle congruence theorems to determine which pairs of triangles you can prove are congruent. Show your steps. Are there any pairs of triangles that cannot be proven congruent? Explain.

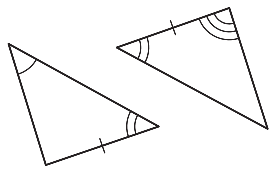


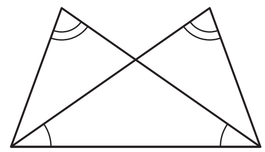
Name ____ Date __________

5.6 Practice B

In Exercises 1–3, decide whether enough information is given to prove that the triangles are congruent. If so, state the theorem you would use.

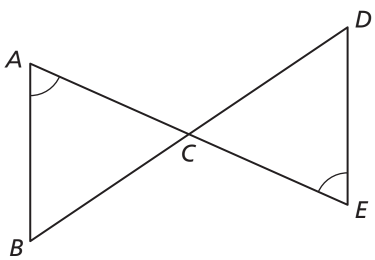
1. 

2. 

3. 

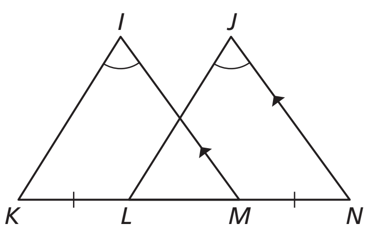
4. **Given:** $\overline{BD}$ bisects $\overline{AE}$, $\angle A \cong \angle E$

Prove: $\triangle ABC \cong \triangle EDC$



5. **Given:** $\angle I \cong \angle J$, $\overline{IM} \parallel \overline{JN}$ and $\overline{KL} \cong \overline{MN}$

Prove: $\triangle IKM \cong \triangle JLN$

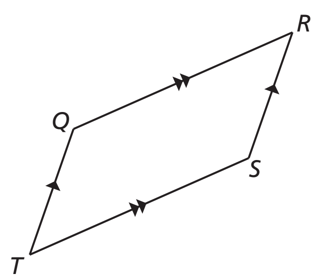


6. Write a paragraph proof to show that opposite sides of a parallelogram are congruent.

Given: $QRST$ is a parallelogram.

Prove: $\overline{QR} \cong \overline{TS}$ and $\overline{RS} \cong \overline{QT}$

$\left(\textit{Hint:}\ \text{Draw } \overline{RT}.\right)$



Name____ Date__________

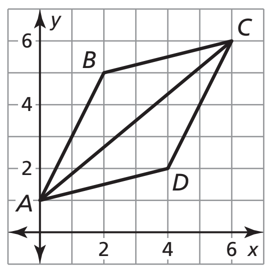
5.6 Enrichment and Extension

Proving Triangle Congruence by ASA and AAS

1. Graph the lines $y = 2x + 5$, $y = 2x - 3$, and $x = 0$. Consider the equation $y = mx + 1$. For what values of m will the graph of the equation form two triangles if added to your graph? For what values of m will those triangles be congruent right triangles? Explain.

2. Graph the lines $-x + y = -1$, $-x + 2y = -1$, $x + 2y = 13$, and $x + y = 7$ in the same coordinate plane. Label the vertices of the two triangles formed by the lines. Prove that the triangles are congruent.

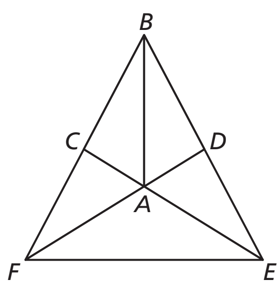
3. Use the graph to prove that $\triangle ABC \cong \triangle CDA$.



In Exercises 4–6, use the diagram to write a two-column proof.

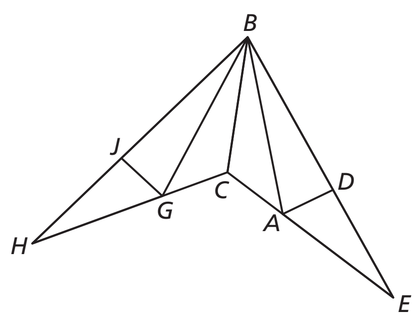
4. **Given:** $\triangle ABC \cong \triangle ABD$, $\angle FCA \cong \angle EDA$

   Prove: $\triangle CAF \cong \triangle DAE$



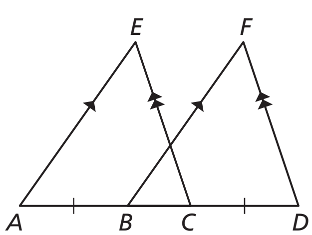
5. **Given:** $\overline{HB} \cong \overline{EB}$, $\angle BHG \cong \angle BEA$, $\angle HGJ \cong \angle EAD$, $\angle JGB \cong \angle DAB$

   Prove: $\triangle BHG \cong \triangle BEA$



6. **Given:** $\overline{AE} \parallel \overline{BF}$, $\overline{CE} \parallel \overline{DF}$, $\overline{AB} \cong \overline{CD}$

   Prove: $\triangle AEC \cong \triangle BFD$



Name ______________________________ Date __________

5.6 Puzzle Time

What Has Two Hands But Can't Clap?

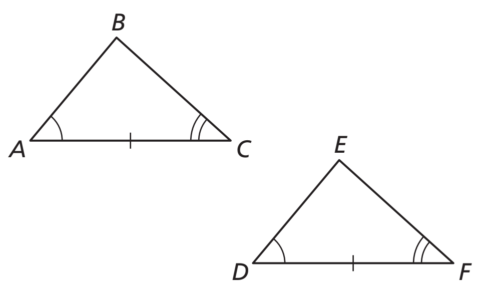
Circle the letter of each correct answer in the boxes below. The circled letters will spell out the answer to the riddle.

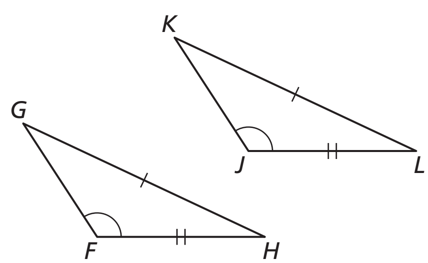
Name the correct theorem.

1. If two angles and the included side of one triangle are congruent to two angles and the included side of a second triangle, then the two triangles are congruent.

2. If two angles and a non-included side of one triangle are congruent to two angles and the corresponding non-included side of a second triangle, then the two triangles are congruent.

Using the diagrams, is there enough information given to prove that the triangles are congruent? If so, state the theorem you would use.

3. 

4. 

Name the third congruence statement that is needed to prove that $\triangle ABC \cong \triangle XYZ$ using the given theorem.

5. **Given:** $\overline{AC} \cong \overline{XZ}$, $\angle C \cong \angle Z$,

   Use AAS: ___ $\cong$ ___

6. **Given:** $\overline{AC} \cong \overline{XZ}$, $\angle C \cong \angle Z$

   Use ASA: ___ $\cong$ ___

A $\angle B \cong \angle Y$	**W** ASA	**A** Yes by ASA	**L** Yes by AAS	**E** $\angle C \cong \angle Y$	**T** AAS
C $\angle A \cong \angle X$	**I** Yes by HL	**H** No	**T** SSA	**E** $\angle A \cong \angle Z$	**R** SAS