Skills Practice

Name _____ **Date** _____

I. Formal Reasoning in Euclidean Geometry

A. Provide a counterexample for each statement to demonstrate it is not true.

1. All birds can fly.

2. All vegetables are green.

3. All mammals walk on four legs.

4. All numbers divisible by 3 are odd.

5. All numbers are either even or odd.

6. All fractions can be written as terminating decimals.

B. Write each statement as a conditional statement in the form "if *p*, then *q*."

1. The measure of an angle is 90°. So, the angle is a right angle.

2. Three points are all located on the same line. So, the points are collinear points.

3. Two lines are not on the same plane. So, the lines are skew.

4. Two angles are supplementary angles if the sum of their angle measures is equal to 180°.

5. Two angles share a common vertex and a common side. So, the angles are adjacent angles.

6. A ray divides an angle into two congruent angles. So, the ray is an angle bisector.

C. Identify the hypothesis and the conclusion of each conditional statement.

1. If two lines intersect at right angles, then the lines are perpendicular.

2. If the sum of two angles is 180°, then the angles are supplementary.

3. If the sum of two adjacent angles is 180°, then the angles form a linear pair.

4. If the measure of an angle is 180°, then the angle is a straight angle.

5. If two lines are located in the same plane, then the lines are coplanar lines.

6. If the sum of two angle measures is equal to 90°, then the angles are complementary angles.

D. Answer each question about the given conditional statement.

1. Conditional statement: If the measure of angle *ABC* is 45° and the measure of angle *XYZ* is 45°, then ∠*ABC* ≅ ∠*XYZ*.

What does it mean if the hypothesis is false and the conclusion is true? What is the truth value of the conditional statement?

**2.** Conditional statement: If the measure of angle *XYZ* is less than 90°, then angle *XYZ* is acute.

What does it mean if the hypothesis is true and the conclusion is false? What is the truth value of the conditional statement?

3. Conditional statement: If ∠1 and ∠2 are two nonadjacent angles formed by two intersecting lines, then they are vertical angles.

What does it mean if the hypothesis is true and the conclusion is true? What is the truth value of the conditional statement?

4. Conditional statement: If the measure of ∠*LMN* is 180°, then ∠*LMN* is a straight angle.

What does it mean if the hypothesis is false and the conclusion is false? What is the truth value of the conditional statement?

II. Triangle Congruence Theorems

A. Determine whether each pair of given triangles is congruent by SSS.
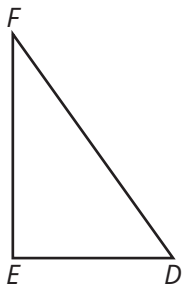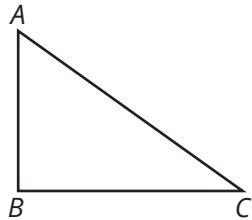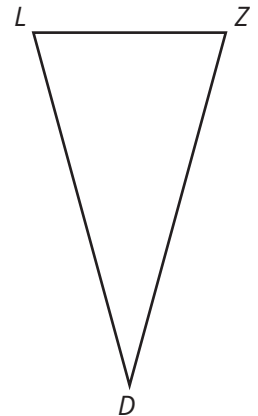
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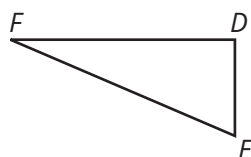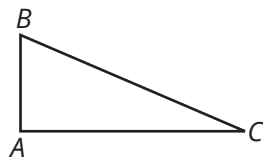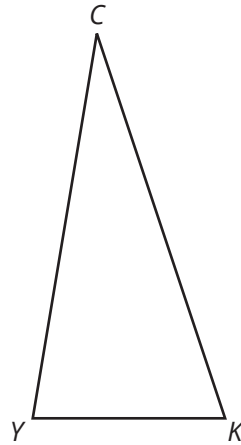

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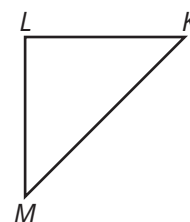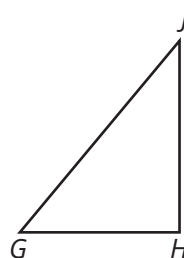
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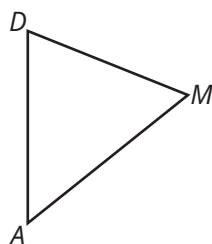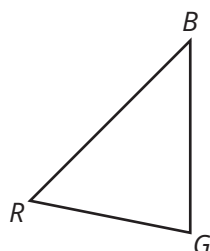
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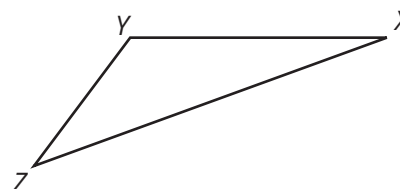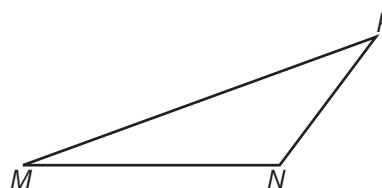
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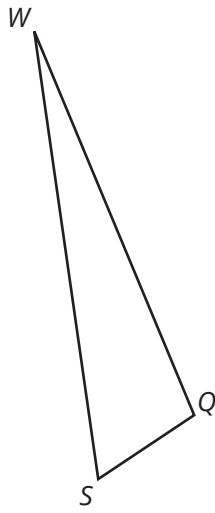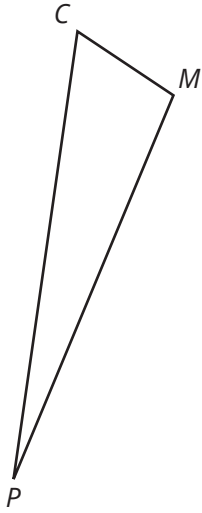
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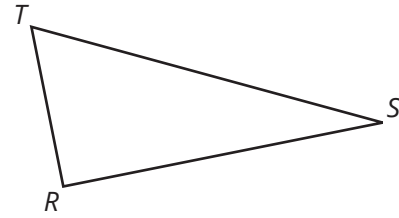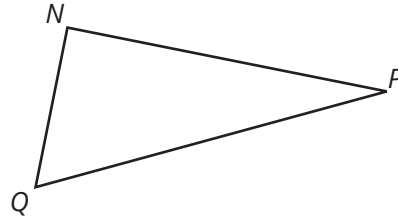
B. Determine whether each pair of given triangles is congruent by SAS.

1.

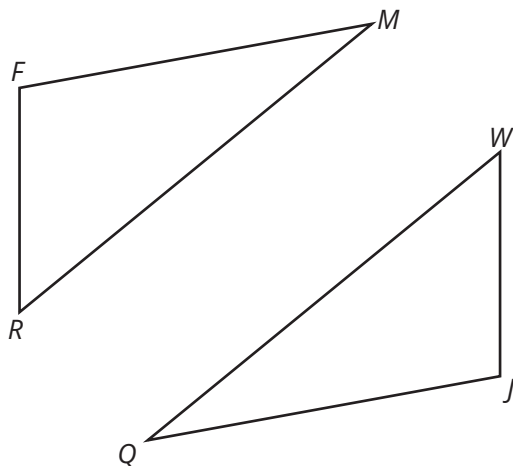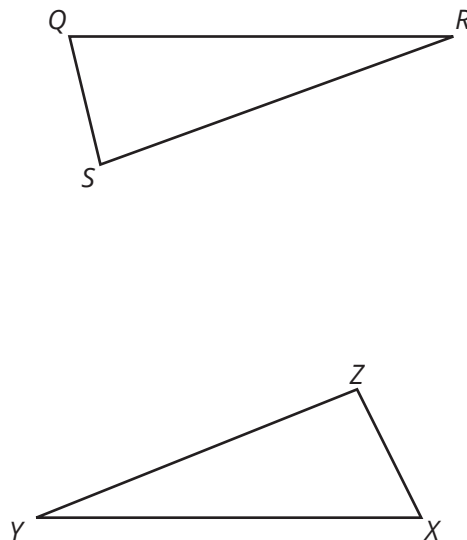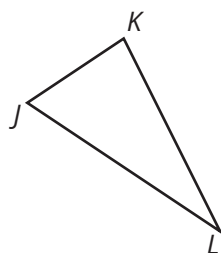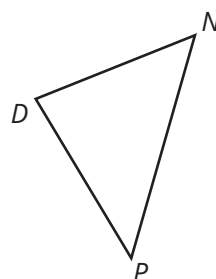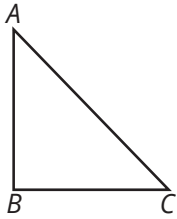**2.**
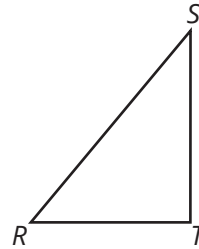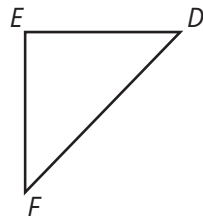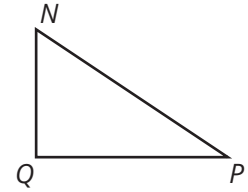
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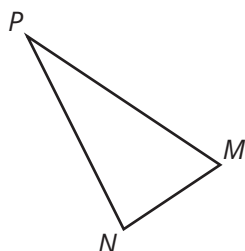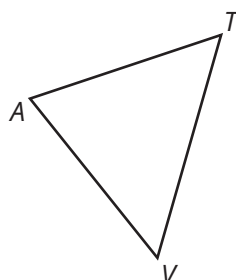
C. Determine whether each pair of given triangles is congruent by ASA.

1.

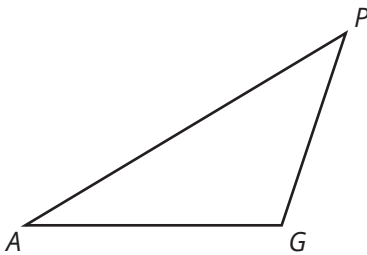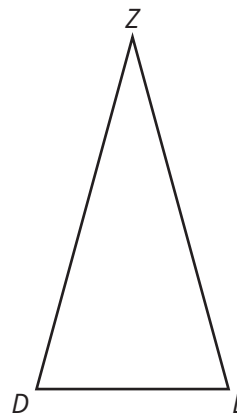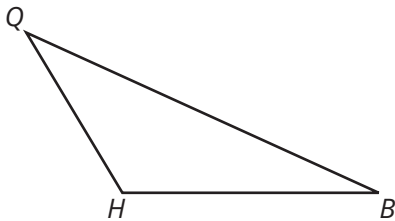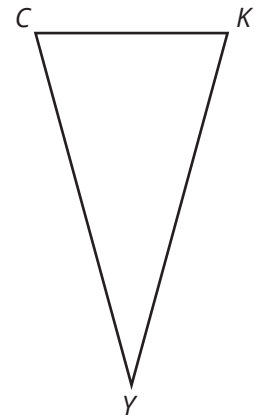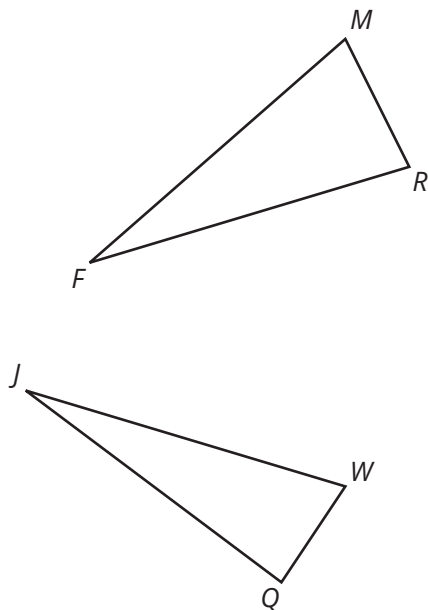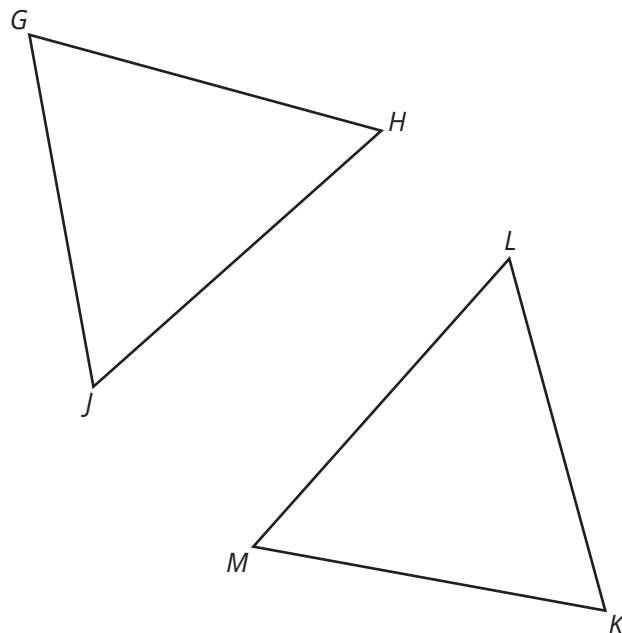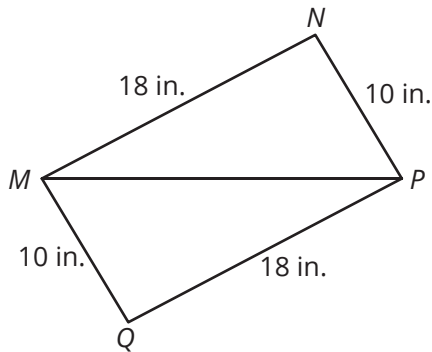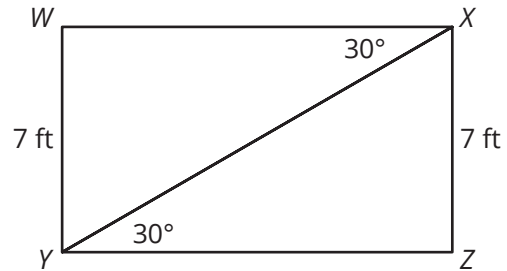**2.**

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D. Determine whether there is enough information to prove that each pair of triangles is congruent by SSS or SAS. Write the congruence statements to justify your reasoning.
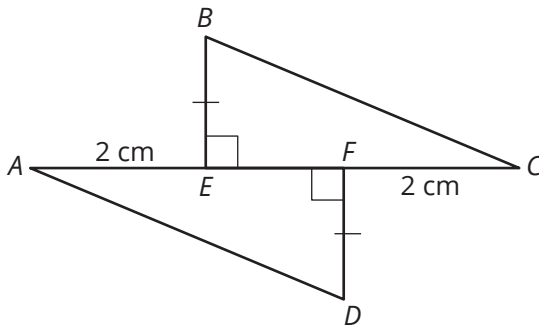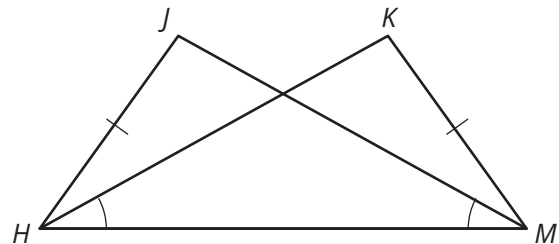
1. $\triangle MNP \overset{?}{=} \triangle PQM$
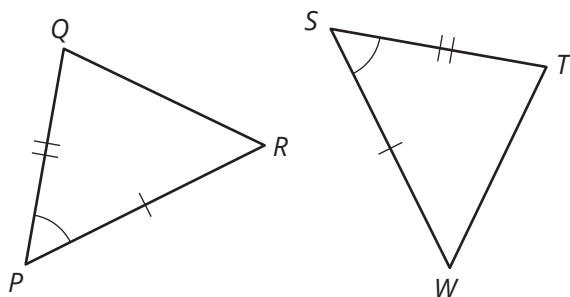

2. $\triangle WXY \overset{?}{=} \triangle ZYX$

3. $\triangle BCE \overset{?}{=} \triangle DAF$

4. $\triangle HJM \overset{?}{=} \triangle MKH$

5. $\triangle PQR \overset{?}{=} \triangle STW$

6. $\triangle MAT \overset{?}{=} \triangle MHT$
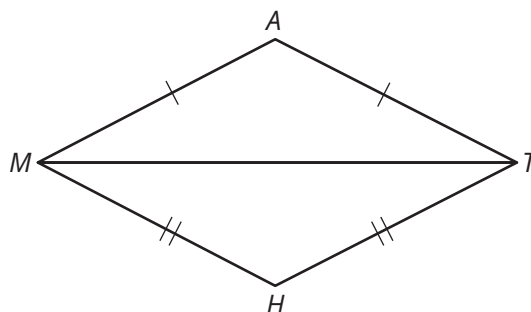
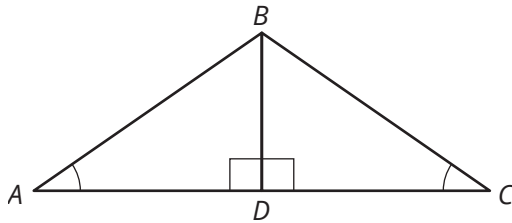**7.** $\triangle BDW \overset{?}{=} \triangle BRN$
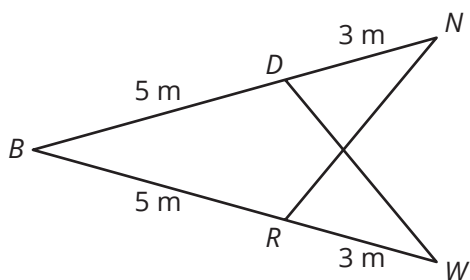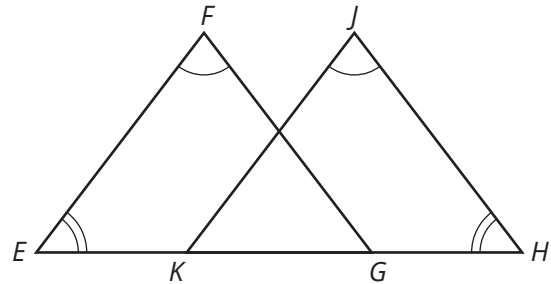
8. $\triangle ABC \overset{?}{=} \triangle EDC$
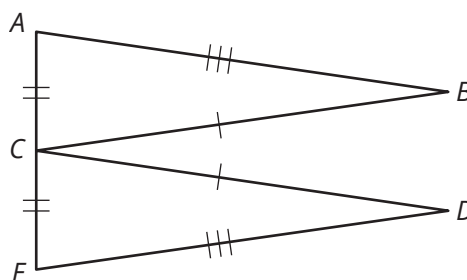
E. Determine whether there is enough information to prove that each pair of triangles is congruent by ASA or AAS. Write the congruence statements to justify your reasoning.
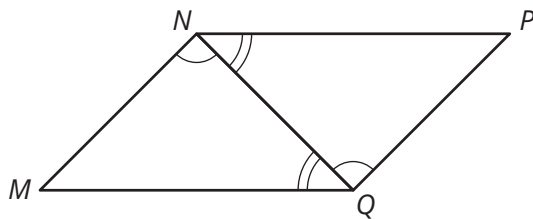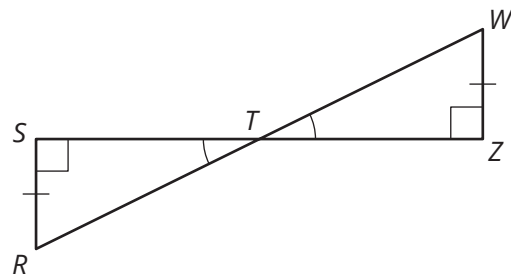
1. $\triangle ABD \overset{?}{=} \triangle CBD$
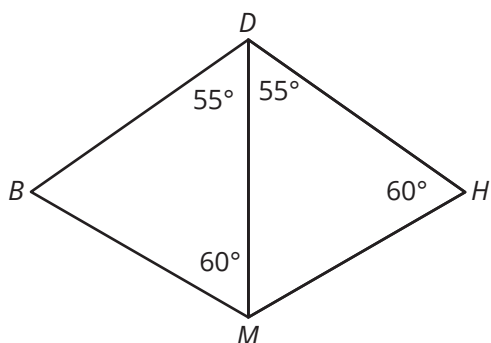
2. $\triangle EFG \overset{?}{=} \triangle HJK$

3. $\triangle MNQ \overset{?}{=} \triangle PQN$

4. $\triangle RST \overset{?}{=} \triangle WZT$

5. $\triangle BDM \overset{?}{\cong} \triangle HDM$

6. $\triangle FGH \overset{?}{\cong} \triangle JHG$
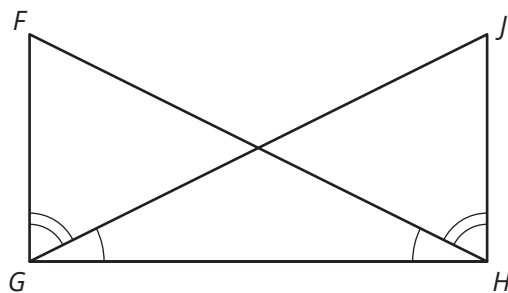
7. $\triangle DFG \overset{?}{\cong} \triangle JMT$
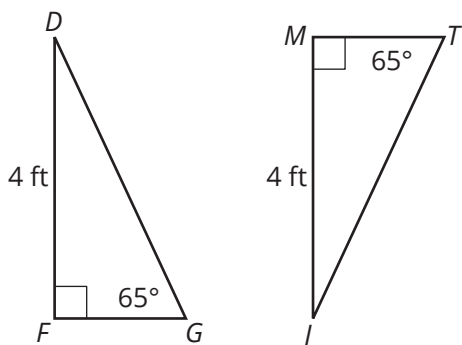
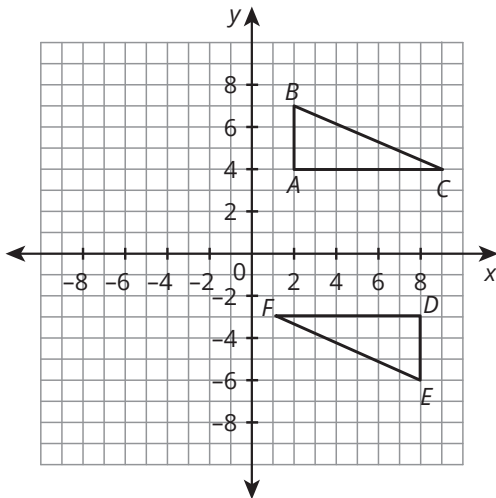**8.** $\triangle RST \overset{?}{\cong} \triangle WXY$
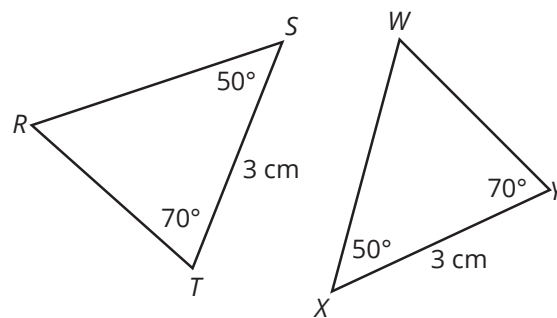
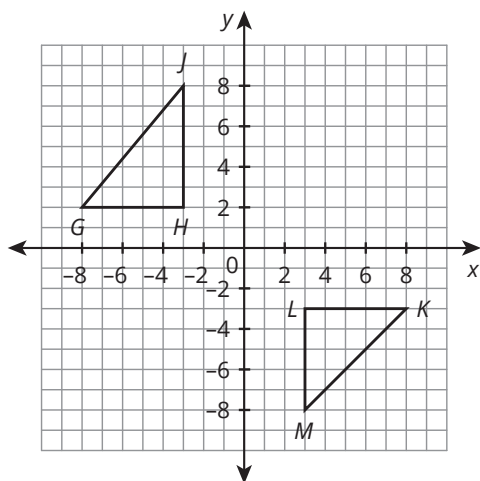## III. Using Triangle Congruence to Solve Problems

A. Determine whether each pair of given triangles is congruent by SSS. Use the Distance Formula and/or protractor when necessary.
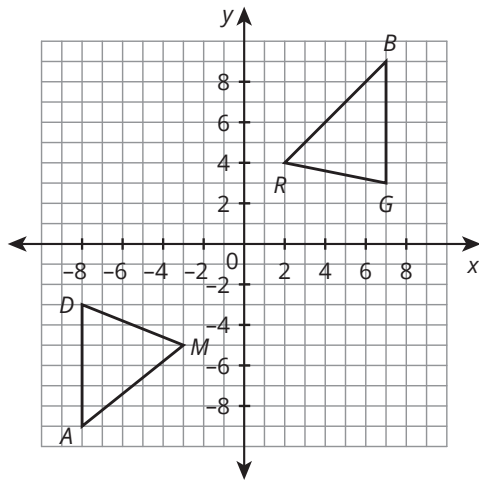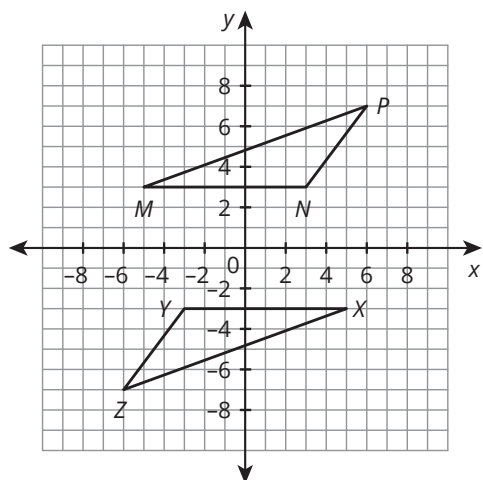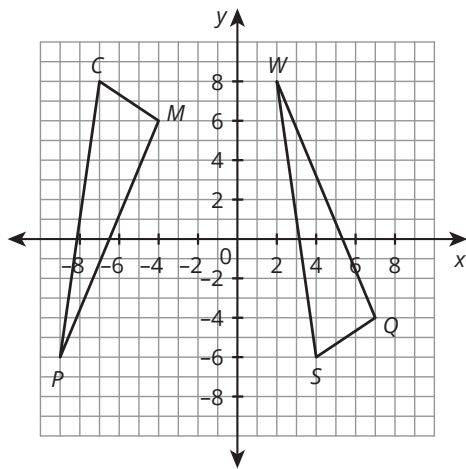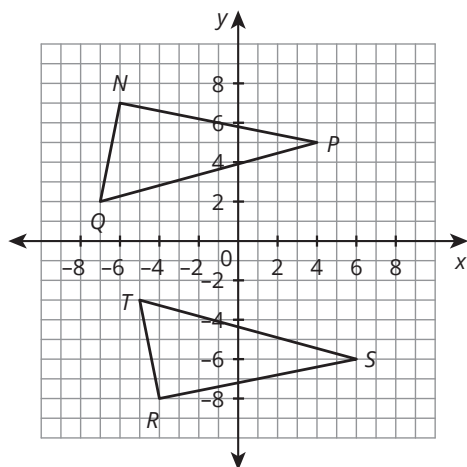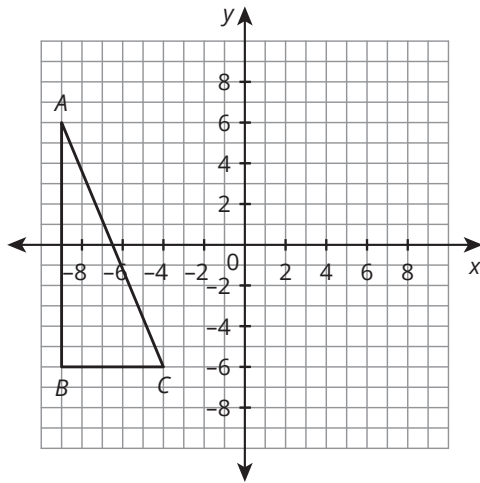**TEKS G.2B, G.6B**

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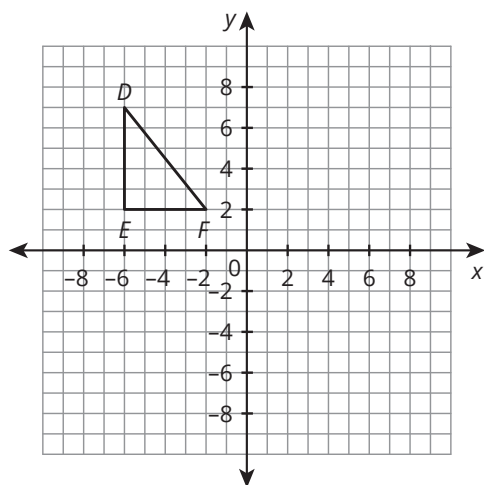**B.** Perform the transformation described on each given triangle. Then, verify that the triangles are congruent by SSS. Use the Distance Formula and/or protractor when necessary.
TEKS G.2B, G.6B, G.6C

1. Reflect ΔABC over the y-axis to form ΔXYZ. Verify that ΔABC ≅ ΔXYZ by SSS.

2. Rotate Δ*DEF* 180° clockwise about the origin to form Δ*QRS*. Verify that Δ*DEF* ≅ Δ*QRS* by SSS.

3. Reflect Δ*JKL* over the *x*-axis to form Δ*MNP*. Verify that Δ*JKL* ≅ Δ*MNP* by SSS.
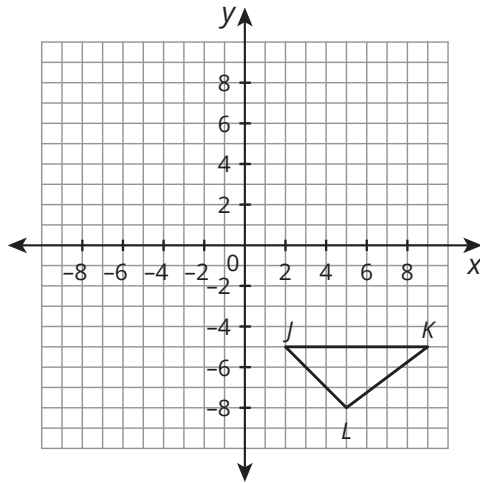
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

4. Translate Δ*HMZ* 10 units to the left and 1 unit down to form Δ*BNY*. Verify that Δ*HMZ* ≅ Δ*BNY* by SSS.
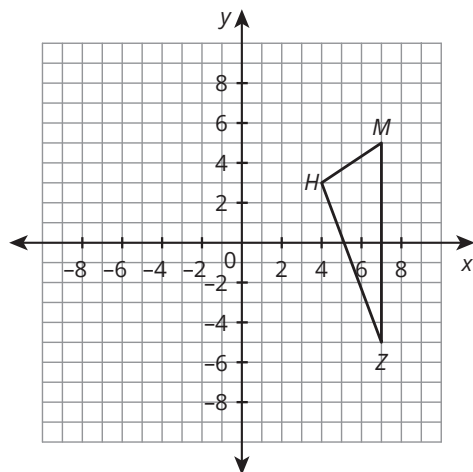
5. Rotate Δ*AFP* 90° counterclockwise about the origin to form Δ*DHW*. Verify that Δ*AFP* ≅ Δ*DHW* by SSS.

6. Translate ΔACE 3 units to the right and 9 units up to form ΔJKQ. Verify that ΔACE ≅ ΔJKQ by SSS.
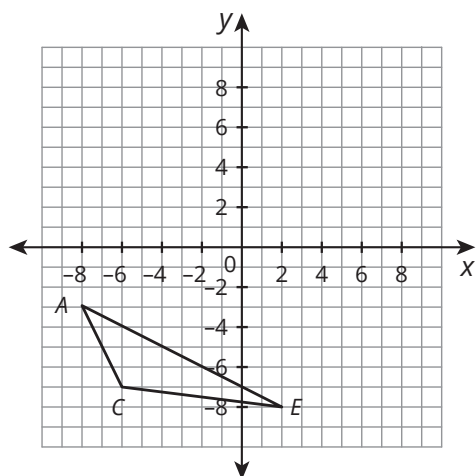
C. Determine whether each pair of given triangles is congruent by SAS. Use the Distance Formula and/or protractor when necessary.
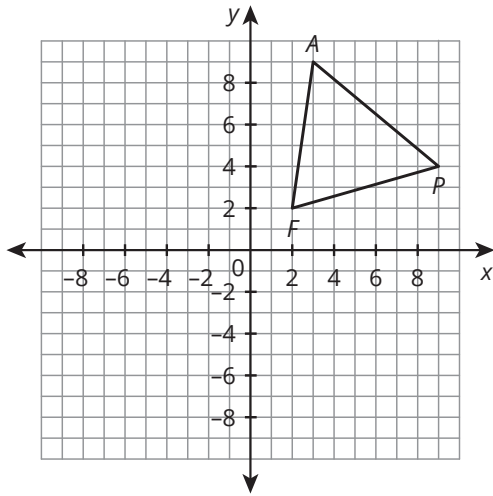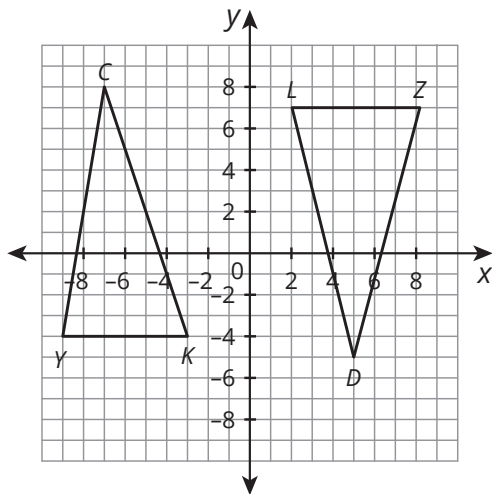
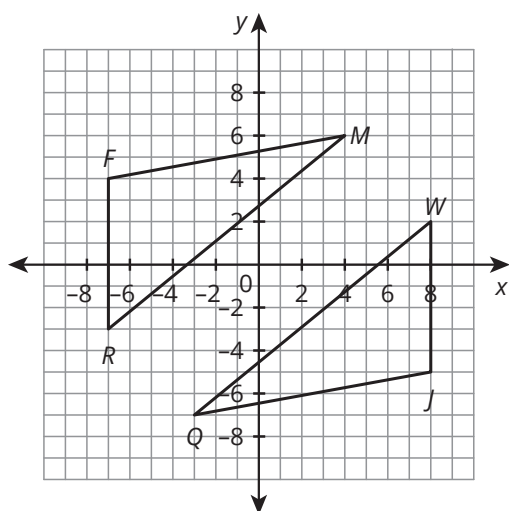**1.** Determine whether ΔABC is congruent to ΔDEF by SAS.
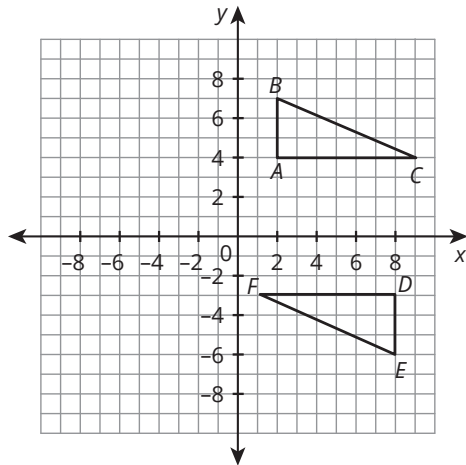
2. Determine whether ΔCKY is congruent to ΔDLZ by SAS.

3. Determine whether ∆*FMR* is congruent to ∆*JQW* by SAS.

4. Determine whether ∆*QRS* is congruent to ∆*XYZ* by SAS.
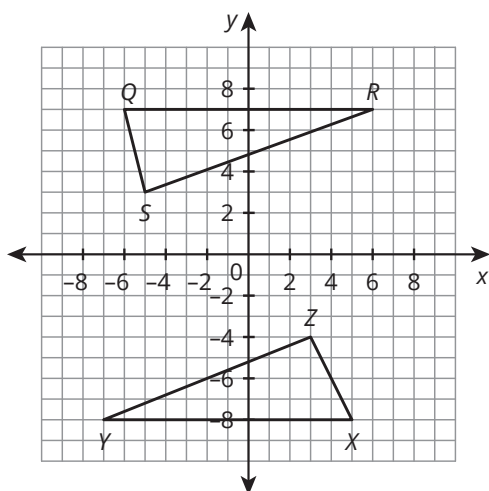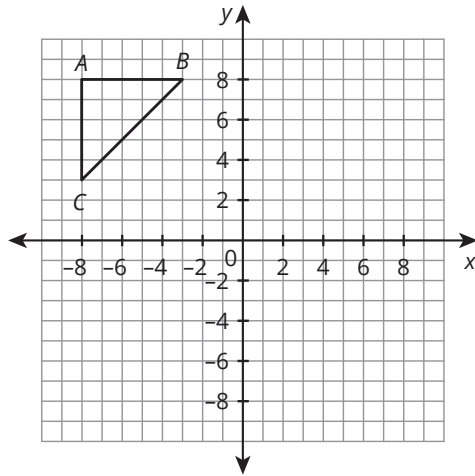
5. Determine whether Δ*JKL* is congruent to Δ*MNP* by SAS.
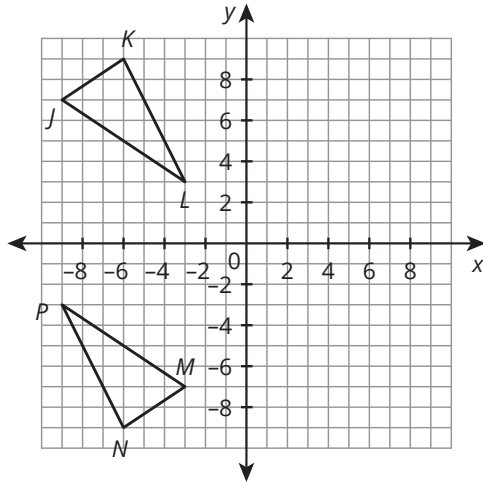
6. Determine whether Δ*ATV* is congruent to Δ*DNP* by SAS.
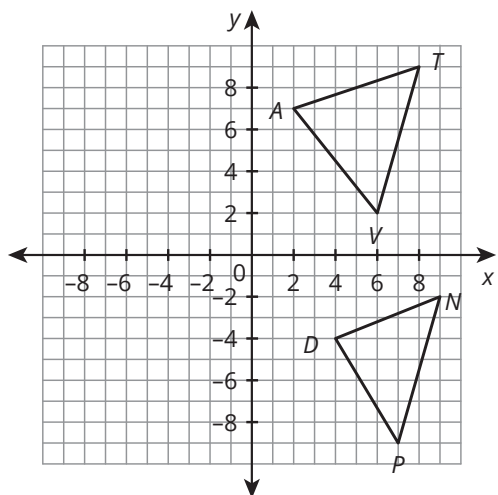
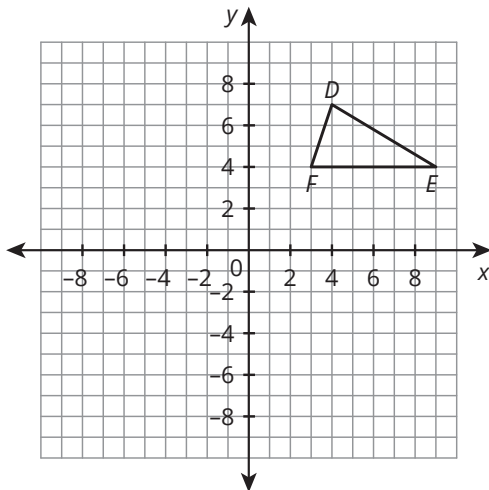**D.** Perform the transformation described on each given triangle. Then, verify that the triangles are congruent by SAS. Use the Distance Formula and/or protractor when necessary.

1. Reflect Δ*ABC* over the *y*-axis to form Δ*XYZ*. Verify that Δ*ABC* ≅ Δ*XYZ* by SAS.

2. Translate Δ*DEF* 11 units to the right and 10 units up to form Δ*QRS*. Verify that Δ*DEF* ≅ Δ*QRS* by SAS.

3. Reflect Δ*JKL* 180° counterclockwise about the origin to form Δ*MNP*. Verify that Δ*JKL* ≅ Δ*MNP* by SAS.
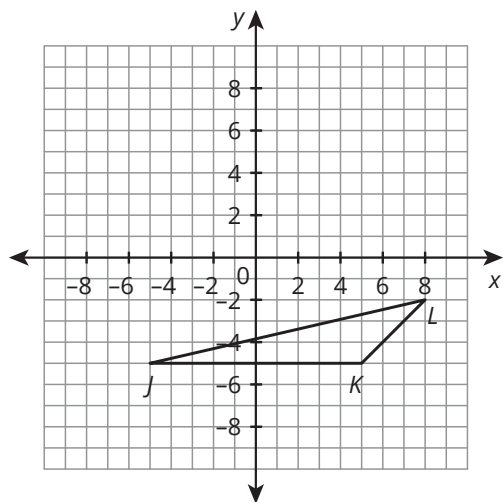
4. Reflect Δ*AFP* over the *y*-axis to form Δ*DHW*. Verify that Δ*AFP* ≅ Δ*DHW* by SAS.
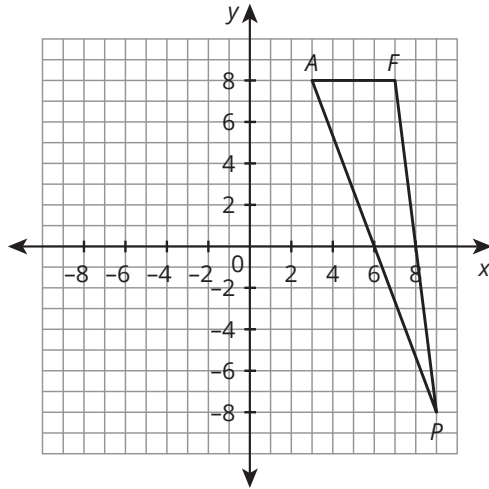
5. Translate Δ*ACE* 4 units to the right and 4 units up to form Δ*JKQ*. Verify that Δ*ACE* ≅ Δ*JKQ* by SAS.
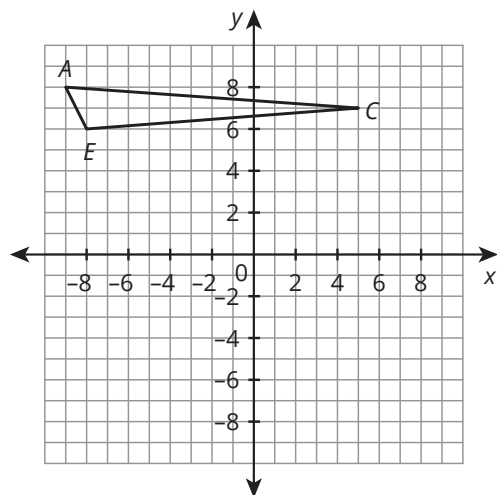
6. Rotate Δ*BMZ* 90° counterclockwise about the origin to form Δ*DRT*. Verify that Δ*BMZ* ≅ Δ*DRT* by SAS.
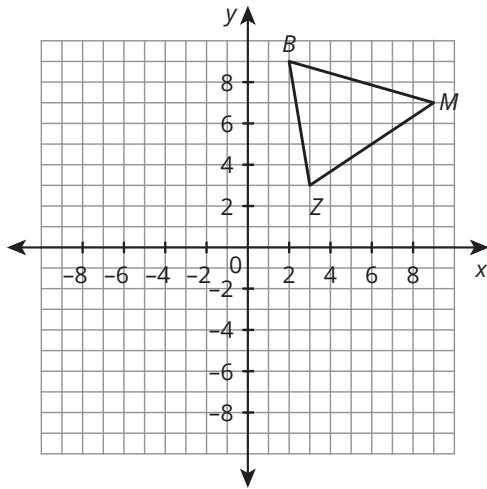
E. Determine whether each pair of given triangles is congruent by ASA. Use the Distance Formula and/or protractor when necessary.

1. Determine whether ΔABC is congruent to ΔDEF by ASA.
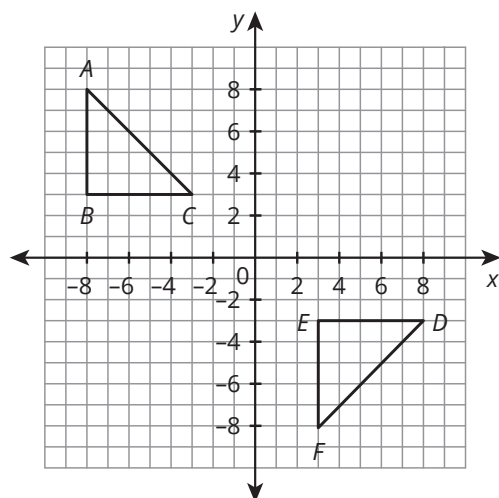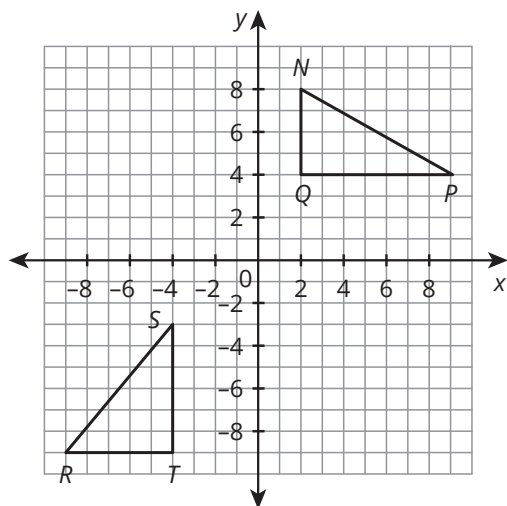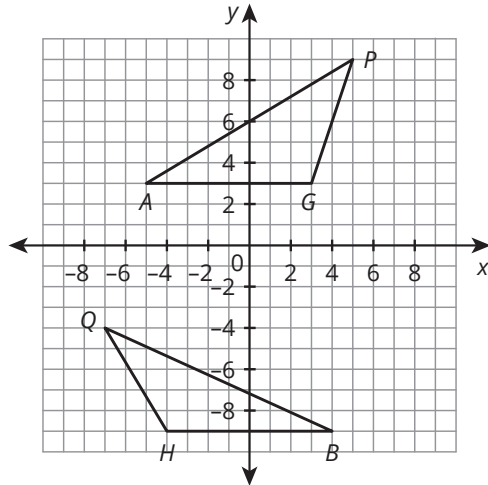

2. Determine whether ΔNPQ is congruent to ΔRST by ASA.

3. Determine whether Δ*AGP* is congruent to Δ*BHQ* by ASA.

4. Determine whether Δ*CKY* is congruent to Δ*DLZ* by ASA.
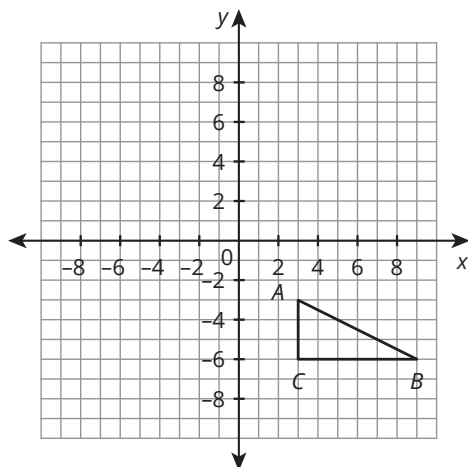
5. Determine whether ΔFMR is congruent to ΔJQW by ASA.

**6.** Determine whether Δ*GHJ* is congruent to Δ*KLM* by ASA.
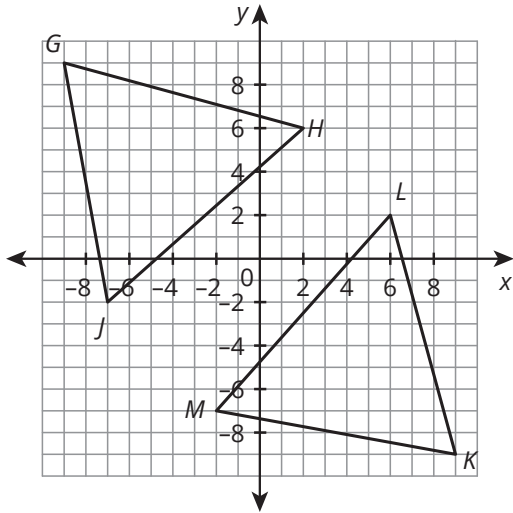
F. Perform the transformation described on each given triangle. Then, verify that the triangles are congruent by ASA. Use the Distance Formula and/or protractor when necessary.
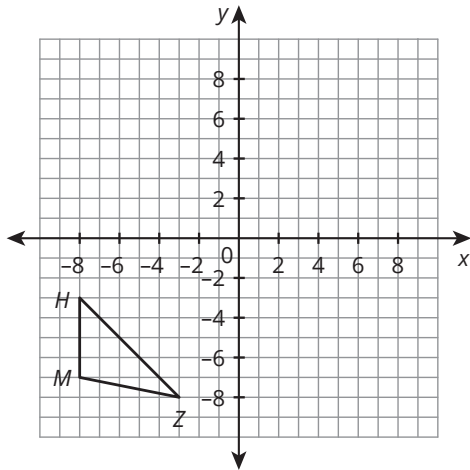
1. Reflect ΔABC over the y-axis to form ΔXYZ. Verify that ΔABC ≅ ΔXYZ by ASA.

2. Rotate ΔDEF 90° clockwise about the origin to form ΔQRS. Verify that ΔDEF ≅ ΔQRS by ASA.
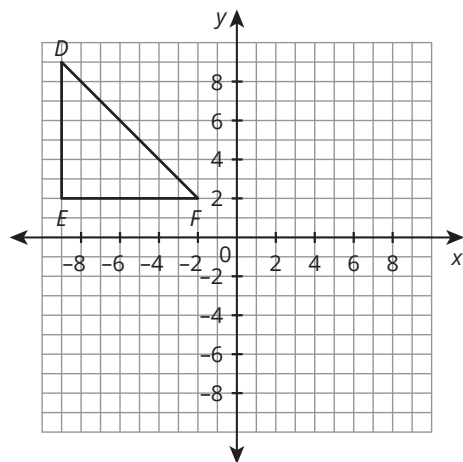
3. Translate Δ*HMZ* 6 units to the right and 10 units up to form Δ*BNY*. Verify that Δ*HMZ* ≅ Δ*BNY* by ASA.

4. Reflect Δ*AFP* over the *y*-axis to form Δ*DHW*. Verify that Δ*AFP* ≅ Δ*DHW* by ASA.
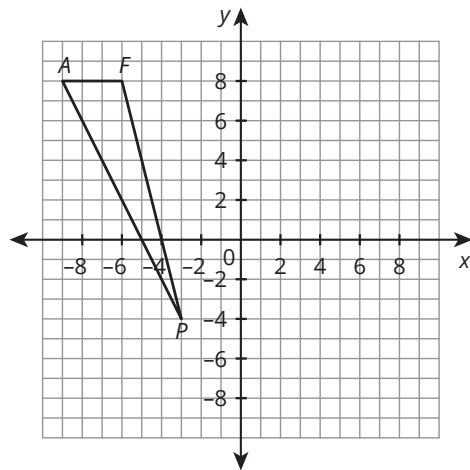
5. Rotate Δ*ACE* 180° counterclockwise about the origin to form Δ*JKQ*. Verify that Δ*ACE* ≅ Δ*JKQ* by ASA.
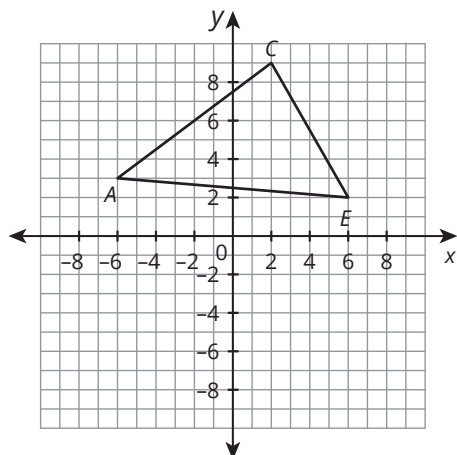
6. Reflect Δ*JKL* over the *x*-axis to form Δ*MNP*. Verify that Δ*JKL* ≅ Δ*MNP* by ASA.
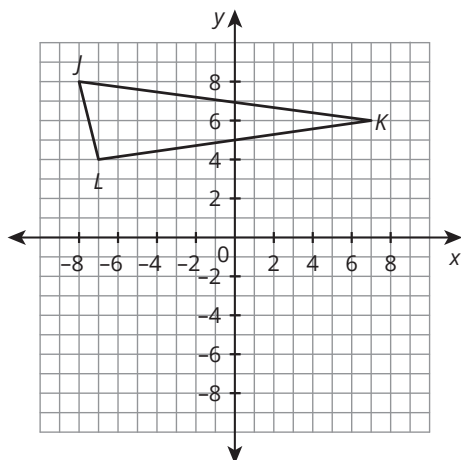
G. Determine whether each set of given triangles is congruent by AAS. Use the Distance Formula and/or protractor when necessary.
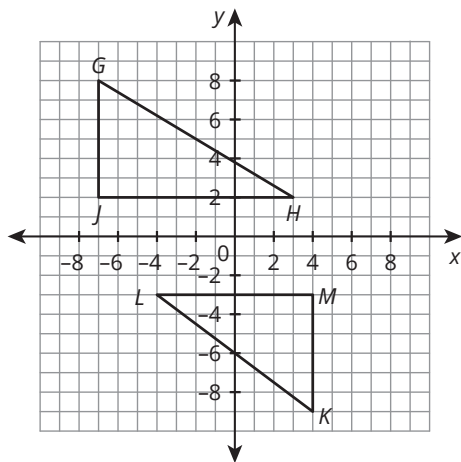
1. Determine whether ΔABC is congruent to ΔDEF by AAS.
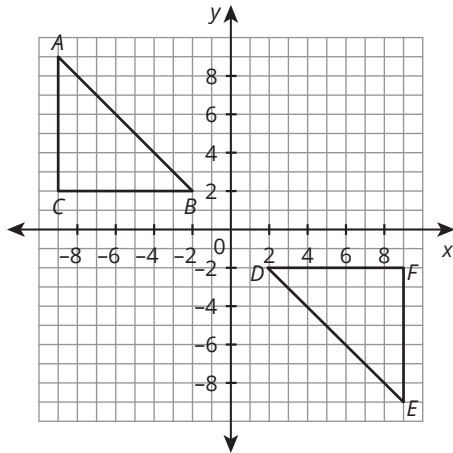
2. Determine whether ΔGHJ is congruent to ΔKLM by AAS.

3. Determine whether Δ*AGP* is congruent to Δ*BHQ* by AAS.
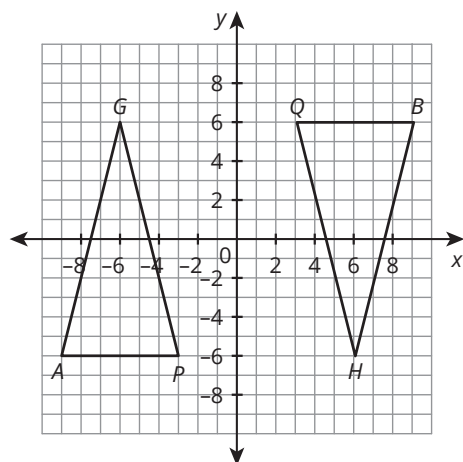
4. Determine whether Δ*CKY* is congruent to Δ*DLZ* by AAS.
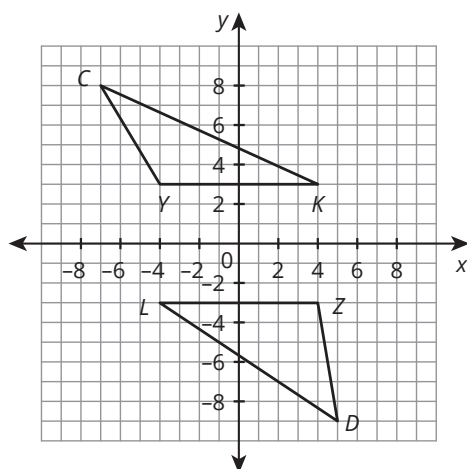
5. Determine whether Δ*FMR* is congruent to Δ*JQW* by AAS.
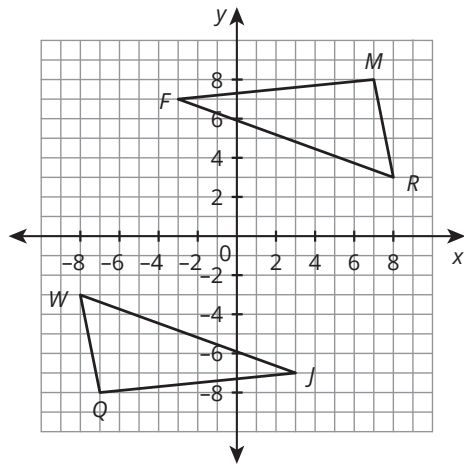
6. Determine whether Δ*NPQ* is congruent to Δ*RST* by AAS.
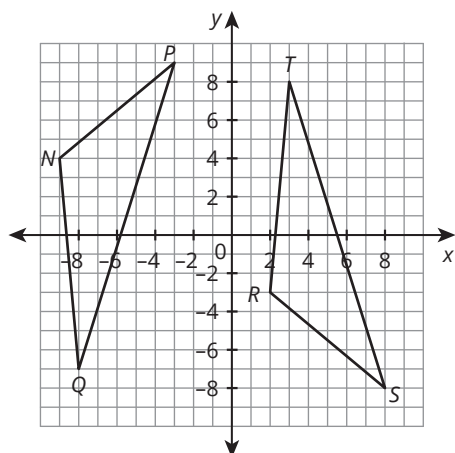
H. Perform the transformation described on each given triangle. Then, verify that the triangles are congruent by AAS. Use the Distance Formula and/or protractor when necessary.

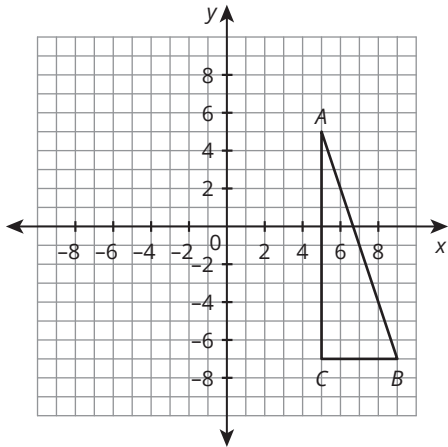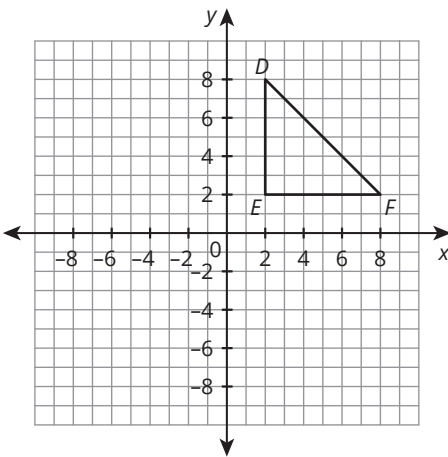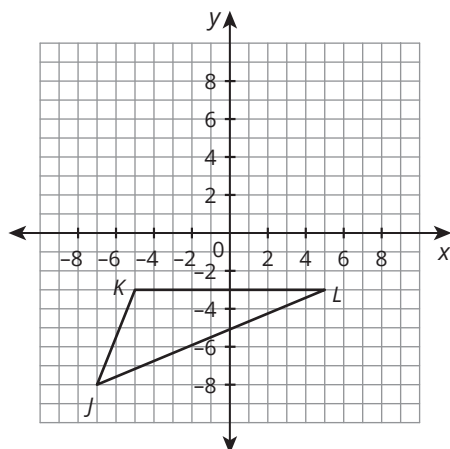**1.** Reflect ΔABC over the y-axis to form ΔXYZ. Verify that ΔABC ≅ ΔXYZ by AAS.

2. Translate ΔDEF 11 units to the left and 11 units down to form ΔQRS. Verify that ΔDEF ≅ ΔQRS by AAS.

3. Rotate Δ*JKL* 180° counterclockwise about the origin to form Δ*MNP*. Verify that Δ*JKL* ≅ Δ*MNP* by AAS.

4. Translate Δ*CUP* 9 units to the left and 4 units down to form Δ*JAR*. Verify that Δ*CUP* ≅ Δ*JAR* by AAS.
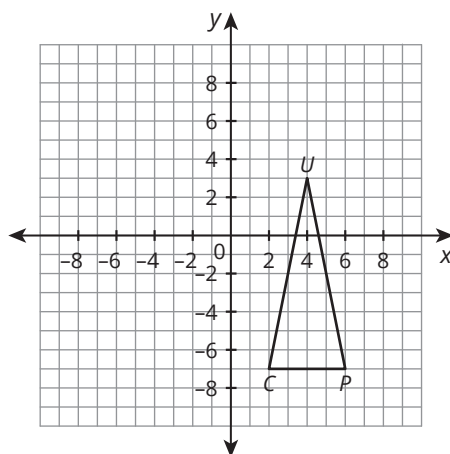
5. Reflect Δ*AFP* over the *x*-axis to form Δ*DHW*. Verify that Δ*AFP* ≅ Δ*DHW* by AAS.
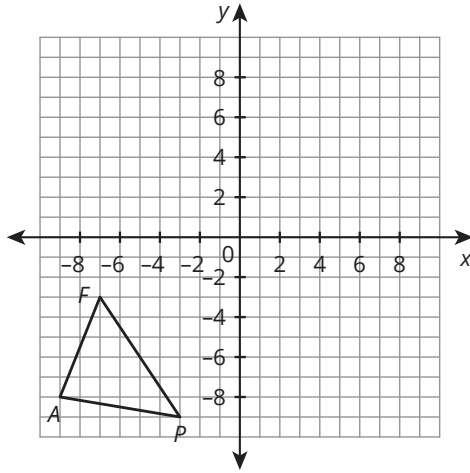
6. Rotate ΔACE 270° clockwise about the origin to form ΔJKQ. Verify that ΔACE ≅ ΔJKQ by AAS.
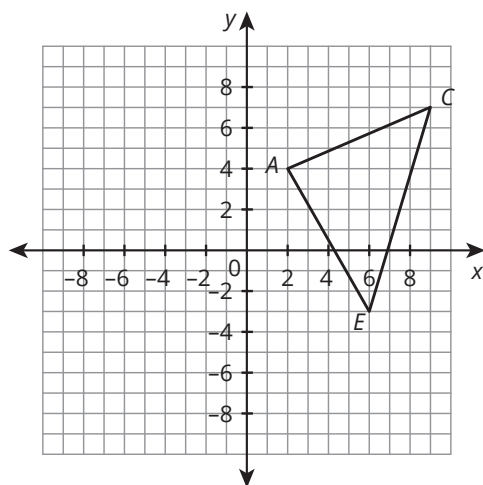
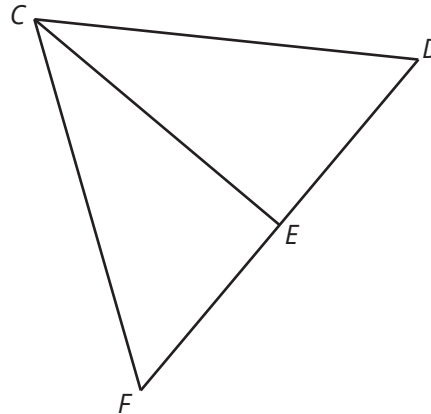**I.** Mark each diagram with the given information. State the congruence theorem that proves the triangles in each diagram are congruent. If not enough information is given, name an example of information that could be given for you to use to prove congruency. Explain your reasoning.
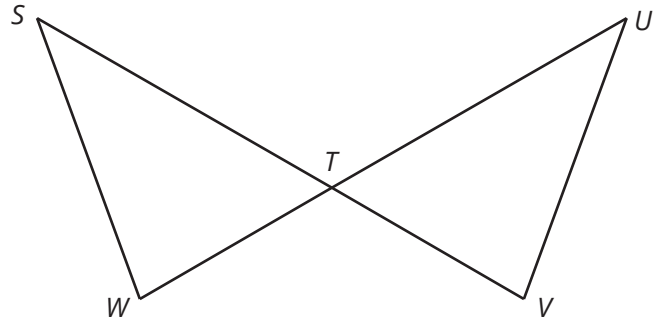
1. Given: $\overline{VW} \cong \overline{XW}$

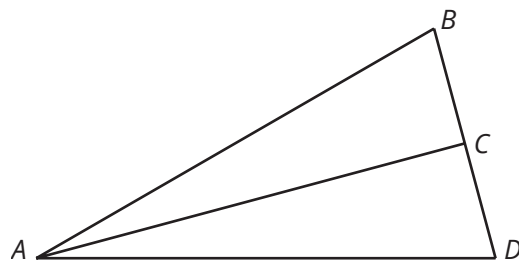Prove: $\triangle VYW \cong \triangle XYW$
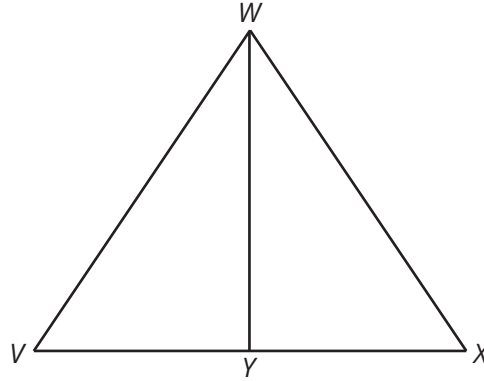
2. Given: $\overline{CE}$ is a perpendicular bisector of $\overline{FD}$
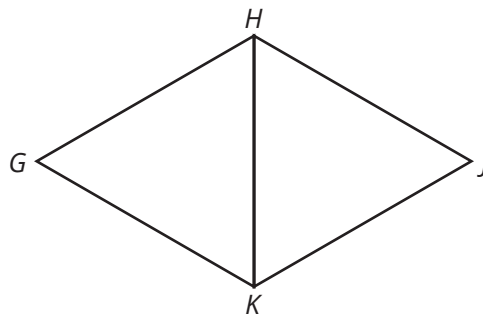
Prove: $\triangle FEC \cong \triangle DEC$

3. Given: $\angle WST \cong \angle VUT, \overline{ST} \cong \overline{UT}$

Prove: $\triangle WST \cong \triangle VUT$

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4. Given: $\triangle ABD$ is isosceles with $\overline{AB} \cong \overline{AD}$
Prove: $\triangle ABC \cong \triangle ADC$

5. Given: $\overline{GH} \cong \overline{JK}$, $\overline{HJ} \cong \overline{KG}$
Prove: $\triangle GHK \cong \triangle JKH$

6. Given: $\overline{PT} \cong \overline{RS}$, $\angle PQT \cong \angle RQS$
Prove: $\triangle TPQ \cong \triangle SRQ$