5.5 Start Thinking

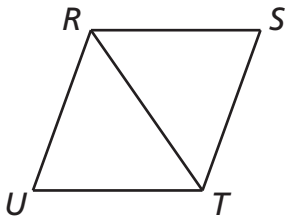
Use a ruler to construct $\triangle JKL$ with $JK = 1$ in., $KL = 0.5$ in., $JL = 1$ in.

What are the angle measurements in $\triangle JKL$? Classify $\triangle JKL$. Construct a new triangle, $\triangle PQR$, with $\overline{JK} \cong \overline{PQ}$, $\overline{KL} \cong \overline{QR}$, $\overline{JL} \cong \overline{PR}$. Are the angles congruent? Do you think it would be possible to create triangles with congruent side lengths but different angles? Why or why not?

5.5 Warm Up

Name the included angle between the pair of sides given.

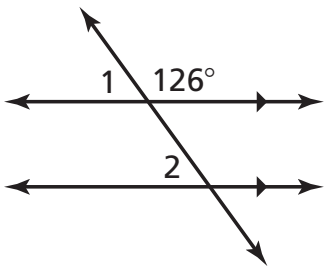
1. $\overline{RU}$ and $\overline{UT}$
2. $\overline{ST}$ and $\overline{TR}$
3. $\overline{TR}$ and $\overline{RS}$
4. $\overline{UT}$ and $\overline{TR}$
5. $\overline{SR}$ and $\overline{RT}$
6. $\overline{RS}$ and $\overline{ST}$



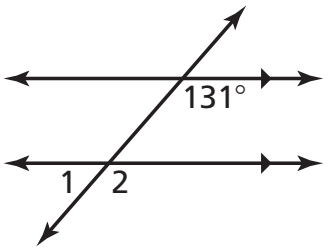
5.5 Cumulative Review Warm Up

Find $m\angle 1$ and $m\angle 2$. Tell which theorem you used.

1.



2.

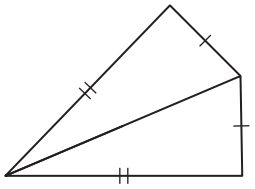


Name _____ Date _____

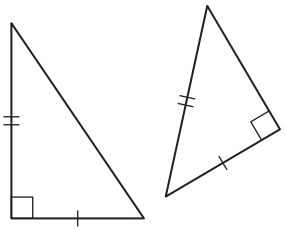
5.5 Practice A

In Exercises 1–3, decide whether enough information is given to prove that the triangles are congruent using either the SSS Congruence Theorem (Theorem 5.8) or the HL Congruence Theorem (Theorem 5.9). Explain.

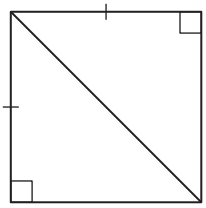
1.



2.

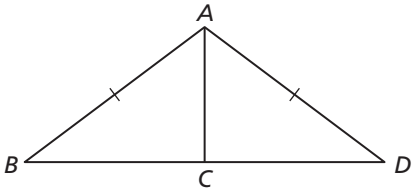


3.



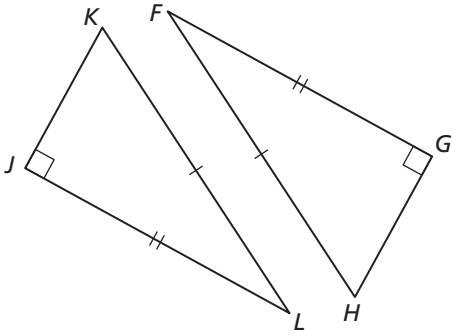
4. **Given:** $\overline{AC}$ bisects $\overline{BD}$, $\overline{AB} \cong \overline{AD}$

Prove: $\triangle ABC \cong \triangle ADC$



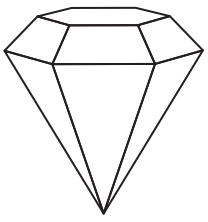
5. **Given:** $\overline{JL} \cong \overline{GF}$, $\overline{KL} \cong \overline{HF}$, $\angle J$ and $\angle G$ are right angles.

Prove: $\triangle JKL \cong \triangle GHF$



6. The coordinates of two triangles are given by $A(2, 3)$, $B(1, -2)$, $C(4, 5)$ and $F(-2, 2)$, $G(-4, 4)$, $H(-4, -4)$. Use the coordinates to determine whether $\triangle ABC \cong \triangle FGH$.

7. The figure shows a cut gem.



a. What lengths can you measure to determine whether any two adjacent triangular faces of the gem are congruent?

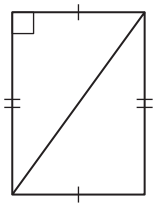
b. Assume that all of the triangular faces are congruent. What shape is the outline of the gem when viewed from above?

Name_____ Date _____

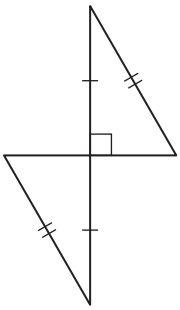
5.5 Practice B

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

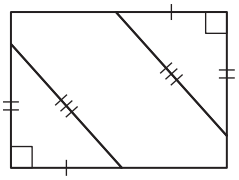
1.



2.

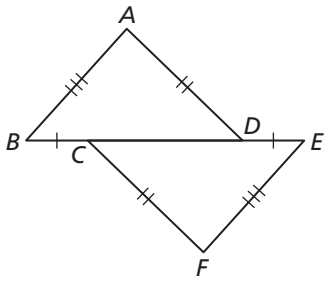


3.



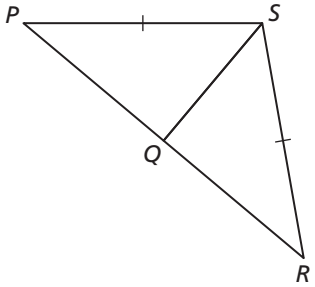
4. **Given:** $\overline{BC} \cong \overline{ED}$, $\overline{AB} \cong \overline{FE}$, and $\overline{AD} \cong \overline{FC}$

Prove: $\triangle ABD \cong \triangle FEC$



5. **Given:** $\overline{PS} \cong \overline{RS}$, $\overline{SQ} \perp \overline{PR}$

Prove: $\triangle PSQ \cong \triangle RSQ$



6. Two triangles are formed by the four lines described below. Both triangles share lines a and b. A side of one triangle is contained in line c, and a side of the other triangle is contained in line d. How can you use this information to determine whether the triangles are congruent?

Line a: $y = 3x + 2$

Line b: $y = -\frac{1}{3}x - 1$

Line c: passes through points $(1, 5)$ and $(3, -2)$

Line d: passes through points $(-6, 1)$ and $(-3, -7)$

Name _____ Date _____

5.5 Enrichment and Extension

Proving Triangle Congruence by SSS

1. If $\triangle ABC \cong \triangle DEF$, solve for the missing variable.

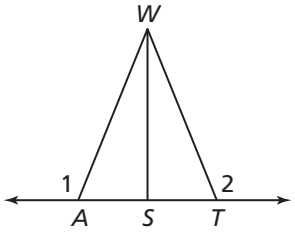
a. $A(1, 3), B(4, 1), C(5, 3), D(3, -3), E(6, -5), F(x, -3)$

b. $A(1, -1), B(-2, 2), C(-3, -4), D(3, 3x - 10), E(6, -1), F(7, 5)$

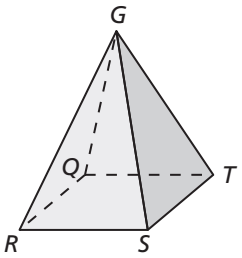
c. $A(-3, 0), B(6, 2), C(-1, 9), D(x^2 - 12, -10), E(13, -8), F(6, -1)$

In Exercises 2 and 3, use the diagram to write a two-column proof.

2. **Given:** $\overline{WA} \cong \overline{WT}$; S is the midpoint of $\overline{AT}$.
Prove: $\angle 1 \cong \angle 2$

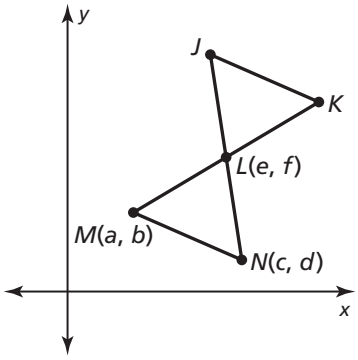


3. **Given:** $\overline{GR} \cong \overline{GT}$, $\overline{RS} \cong \overline{ST}$
Prove: $\triangle GRS \cong \triangle GST$



4. Write a paragraph proof showing that if one side of an equilateral triangle is congruent to one side of a second equilateral triangle, then the two triangles are congruent. Include a diagram.

5. In the figure, $\triangle MLN \cong \triangle KLJ$. Find the coordinates of J and K.



Name_____ Date _____

5.5 Puzzle Time

What Did Mozart Become On His Thirteenth Birthday?

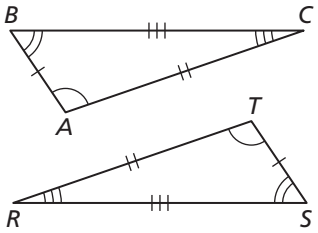
Write the letter of each answer in the box containing the exercise number.

Complete the statement.

1. In a right triangle, the sides adjacent to the right angle are the _____.
2. The side opposite the right angle is the _____ of the right triangle.
3. If the hypotenuse and a leg of a right triangle are congruent to the hypotenuse and a leg of a second right triangle, then the two triangles are congruent according to the _____ Theorem.
4. If three sides of one triangle are congruent to three sides of a second triangle, then the two triangles are congruent according to the _____ Theorem.

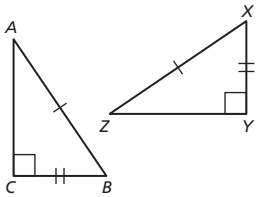
Solve for the indicated measure.

5. $R = 19°$, $\angle B = 56°$, find $m\angle T$.
6. $R = 19°$, $\angle B = 56°$, find $m\angle S$.
7. $R = 19°$, $\angle B = 56°$, find $m\angle C$.

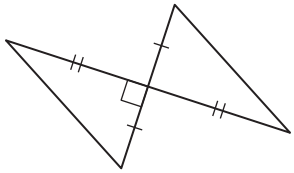


Solve.

8. True or false?
$\triangle ABC \cong \triangle ZXY$



9. Are the two triangles congruent? Yes or no?



Answers

E. SSS
H. 65°
E. legs
A. SSA
A. yes
T. 115°
C. diagonal
T. hypotenuse
M. AAS
C. arms
G. true
Y. no
E. false
R. 56°
N. HL
A. 105°
E. 19°
A. 91°

5		2	4	7	3	9	8	1	6