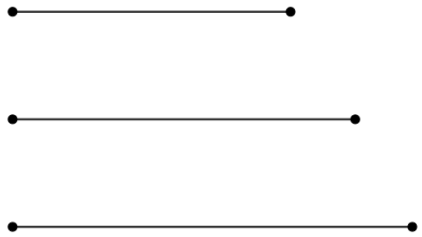
Name: _____

Lesson 2.06
SSS Congruence

Geometry GT

Experiment

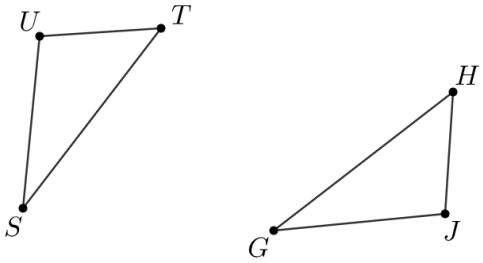
Construct a triangle with the given side lengths on patty paper.



Can you make one that doesn't look like anyone else's?

Explore

Claire is attempting to prove that there is a sequence of rigid motions that take ΔSTU to ΔGHJ, given that $\overline{ST} \cong \overline{GH}$, $\overline{TU} \cong \overline{HJ}$, and $\overline{SU} \cong \overline{GJ}$.



Help fill in the missing pieces to Claire's proof.

A. $\overline{ST}$ is the same length as _____ , so they are congruent. Therefore, there is a rigid motion that takes $\overline{ST}$ to _____ .

B. Apply this rigid motion to ΔSTU. The image of T will coincide with ____ , and the image of S will coincide with ____ .

C. We cannot be certain that the image of U, which we will call U', coincides with ____ yet. If it does, then our rigid motion takes ΔSTU to ΔGHJ, proving $\Delta STU \cong \Delta GHJ$. If it does not, then we continue.

D. $\overline{HJ}$ is congruent to the image of _____ , because rigid motions preserve distance.

E. Therefore, H is equidistant from U' and ____ .

F. A similar argument shows that G is equidistant from U' and ____ .

G. $\overline{GH}$ is the _____ of segment $\overline{U'J}$, because the _____ is determined by two points that are both equidistant from the endpoints of a segment.

H. Reflecting across the _____ of $\overline{U'J}$ takes ____ to ____ .

I. Therefore, after the reflection, all three pairs of vertices coincide, proving triangles _____ and _____ are congruent.

Theorem

Side-Side-Side Triangle Congruence Theorem: in two triangles, if all three pairs of corresponding sides are congruent, then the two triangles are congruent

Discuss

It follows from the Side-Side-Side Triangle Congruence Theorem that, if the lengths of three sides of a triangle are known, then the measures of all the angles must be determined.
On a separate sheet of paper, use a ruler and protractor to make triangles where two sides are 4 cm and the third side is the length given in the table below, then measure the angle between the 4 cm sides.

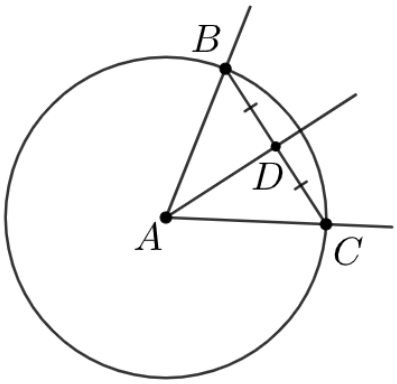
Side Length	Angle Measure	Side Length	Angle Measure
1 cm		5 cm	
2 cm		6 cm	
3 cm		7 cm	
4 cm			

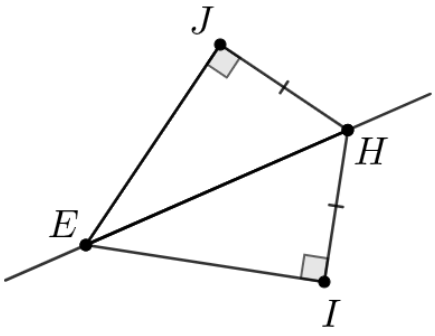
Do you notice any relationships between the side lengths and angle measures?

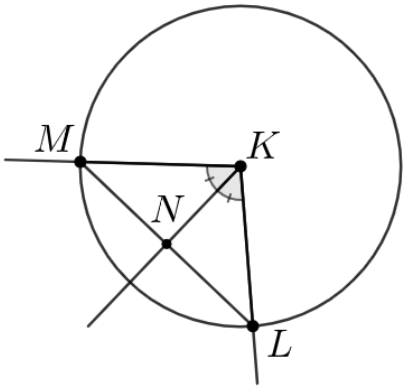
Demonstrate

Label each of the following by whether you could prove the triangles congruent using:

- Side-Side-Side Triangle Congruence Theorem
- Side-Angle-Side Triangle Congruence Theorem
- Angle-Side-Angle Triangle Congruence Theorem
- Angle-Angle-Side Triangle Congruence Theorem
- None of the above

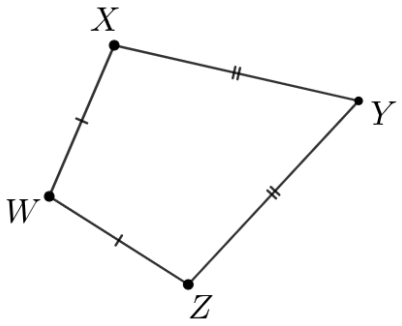




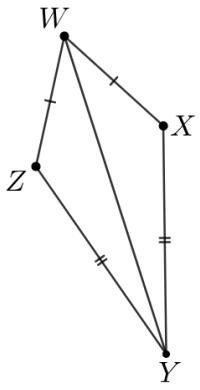


Practice

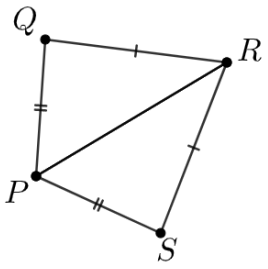
1. A kite is a quadrilateral which has two adjacent sides that are congruent and the other two adjacent sides are also congruent. Given kite $WXYZ$, show that at least one of the diagonals of a kite decomposes the kite into two congruent triangles.



2. $WXYZ$ is a kite. Given $m\angle WXY = 133°$ and $m\angle ZWX = 60°$, find $m\angle ZYW$.



3. Lorin has proven that ΔPRS is congruent to ΔPRQ using the Side-Side-Side Triangle Congruence Theorem. Why can she now conclude that diagonal $\overline{PR}$ bisects angles $\angle SPQ$ and $\angle SRQ$?



4. Each statement is always true. Select **all** statements for which the converse is also always true.

A. Statement: if two angles form a straight angle, then they are supplementary.
Converse: if two angles are supplementary, then they form a straight angle.

B. Statement: in an isosceles triangle, the base angles are congruent.
Converse: if the base angles of a triangle are congruent, then the triangle is isosceles.

C. Statement: if a point is equidistant from the endpoints of a segment, then it lies on the perpendicular bisector of the segment.
Converse: if a point lies on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.

D. Statement: if two angles are vertical, then they are congruent.
Converse: if two angles are congruent, then they are vertical.

E. Statement: if two lines are perpendicular, then they intersect to form four right angles.
Converse: if two lines intersect to form four right angles, then they are perpendicular.