

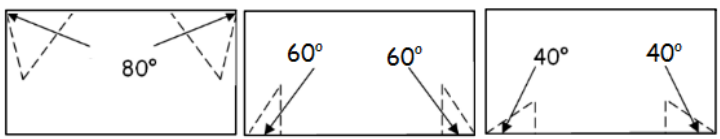
Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

**Discovering Congruent Triangles LAB**

**Question:** What do we need to know to prove triangles congruent?

**Materials needed:** straws, protractor or ruler, paper, and construction paper,

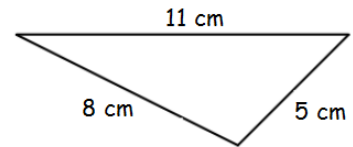
**Set up:**

<p>Cut straws into the following lengths:</p> <ul style="list-style-type: none"> <li>• 2 straws 8 centimeters in length</li> <li>• 2 straws 11 centimeters in length</li> <li>• 2 straws 5 centimeters in length</li> </ul>	<p>Measure 2 angles of <math>80^\circ</math>, 2 angles of <math>60^\circ</math>, and 2 angles <math>40^\circ</math> on the corners of 3 different colored pieces of construction paper, cut them out, and label them.</p> <div style="text-align: center;">  </div>
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**Procedure:** Follow the instructions below and draw conclusions

**Part 1 Side Side Side**

1. Put the 3 straws of different lengths together to form a triangle as shown.
2. Form another triangle with the other set of straws.
3. Measure the angles of both triangles using a protractor (tracing the shapes may make this easier).
4. Use the straws to try to form triangles with different angles.



**Questions:**

1. What are the measures of the 3 angles in the first triangle? \_\_\_\_\_
2. What are the measures of the 3 angles in the second triangle? \_\_\_\_\_
3. What is the relationship between the angles of each triangle? \_\_\_\_\_
4. Are the triangles congruent? \_\_\_\_\_ Why? \_\_\_\_\_
5. Can the straws be rearranged to form a triangle with different angles? \_\_\_\_\_

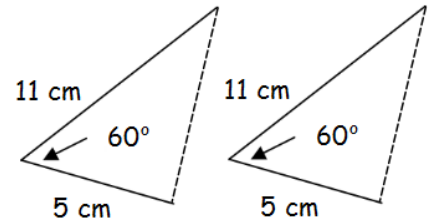
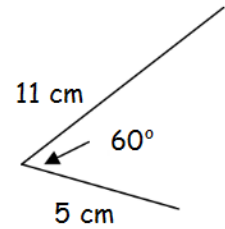
**Conclusion:**

What can we conclude about triangle congruence when all sides (SSS) are congruent?

\_\_\_\_\_

**Part 2 Side Angle Side**

1. Take 2 of the straws, place them on a piece of paper, and form a  $60^\circ$  angle between them (use the angle cut-out).
2. Take the 2 straws of the same length from the other set of straws and also form a  $60^\circ$  angle between them.
3. Draw a line to represent the 3<sup>rd</sup> side. Repeat the process for the 2<sup>nd</sup> triangle.
4. Measure the length of the 3<sup>rd</sup> side and the two remaining angles for each triangle.



**Questions:**

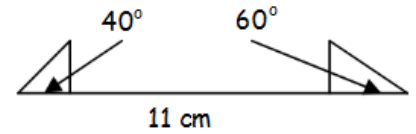
1. What is the length of the 3<sup>rd</sup> side for each triangle? \_\_\_\_\_
2. What are the measures of the remaining angles? \_\_\_\_\_
3. Are the two triangles congruent? \_\_\_\_\_ Why? \_\_\_\_\_
4. Use any two straws and any angle of your choice.
  - Do you get the same result? \_\_\_\_\_
  - Will you always get the same result? \_\_\_\_\_

**Conclusion:**

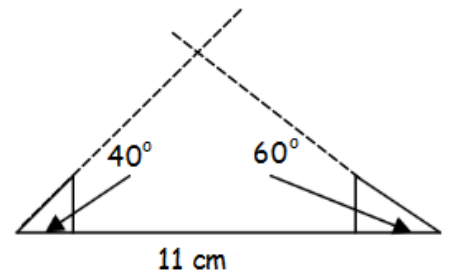
What can we conclude about triangle congruence when two sides and the included angle (SAS) are congruent? \_\_\_\_\_

**Part 3 Angle Side Angle**

1. On a piece of paper, take one of the straws, and place two of the cut-out angles on each end as shown. Repeat the process for the 2<sup>nd</sup> triangle.



2. Using a ruler, draw a segment along each of the angle. The two segments should intersect forming the last angle. Repeat the process for the 2<sup>nd</sup> triangle.



3. Measure the 3<sup>rd</sup> angle and the lengths of the 2 sides in each triangle.

**Questions:**

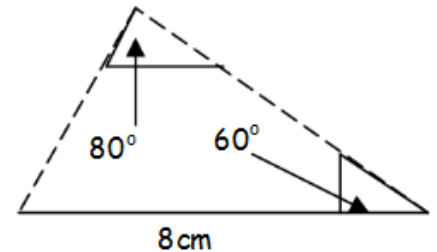
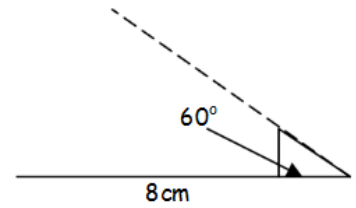
1. What is the measure of the 3<sup>rd</sup> angle for each triangle? \_\_\_\_\_
2. What are the measures of the remaining 2 sides for each triangle? \_\_\_\_\_
3. Are the triangles congruent? \_\_\_\_\_ Why? \_\_\_\_\_
4. Repeat process for other sets of angle measures and side measures. How do your results compare? \_\_\_\_\_

**Conclusion:**

What can we conclude about triangle congruence when two angles and the included side (ASA) are congruent? \_\_\_\_\_

**Part 4 Side Angle Angle**

1. Use one of the straws and place one of the cut-out angles alongside it as shown. Draw a long segment like the dashed one in the drawing. Repeat the process for the 2<sup>nd</sup> triangle.
2. Place the second angle along this segment so that when a 2<sup>nd</sup> segment is drawn, it will connect with the end of the straw.
3. Measure the 3<sup>rd</sup> angle and the two remaining sides.



**Questions:**

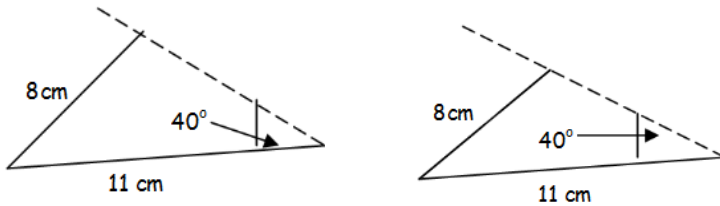
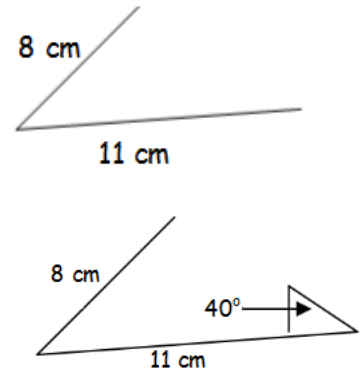
1. What is the measure of the 3<sup>rd</sup> angle for each triangle? \_\_\_\_\_
2. What are the measures of the remaining 2 sides for each triangle? \_\_\_\_\_
3. Are the triangles congruent? \_\_\_\_\_ Why? \_\_\_\_\_

**Conclusion:**

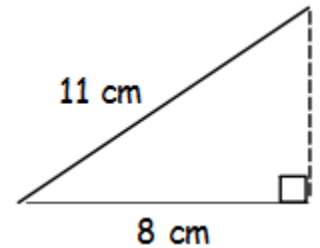
What can we conclude about triangle congruence when a side and the next two consecutive angles (SAA) are congruent? \_\_\_\_\_

**Part 5 Side Side Angle (Special case: Hypotenuse Leg)**

1. Place two of the straws together forming an angle of any degree for one triangle, and repeat the process for the 2<sup>nd</sup> triangle.
2. Use one of the pre-cut angles and place alongside the longer of the sides but not as the included angle.
3. Draw a segment to connect the 3<sup>rd</sup> side to the other two sides.



4. Swing the 8cm straw so that it hits the 3<sup>rd</sup> side at a different spot in the 2<sup>nd</sup> triangle as in the first.
5. Measure the 3<sup>rd</sup> side and the remaining 2 angles in each triangle.
6. Repeat the exercise above, but instead of using a 40° angle, snip corners of the construction paper to make two right angles. Form two triangles using the same length hypotenuse and one leg the same. Measure the other angles and side.



**Questions**

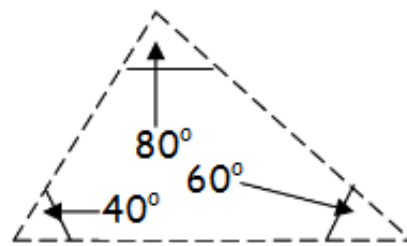
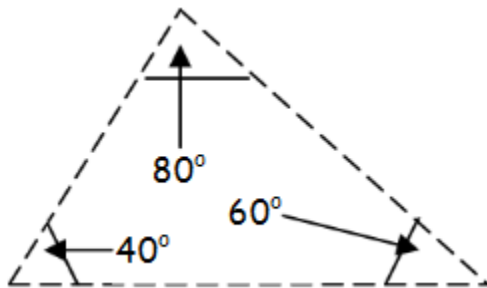
1. What is the measure of the 3<sup>rd</sup> side for each triangle? \_\_\_\_\_
2. What are the measures of the remaining 2 angles for each triangle? \_\_\_\_\_
3. Are the two triangles congruent? \_\_\_\_\_
4. What were the measurements with the right triangle? \_\_\_\_\_ Were the triangles congruent? \_\_\_\_\_

**Conclusion:**

What can we conclude about triangle congruence when a side, the next side, and the next angle (SSA) are congruent? \_\_\_\_\_ What about when a hypotenuse and leg (HL) are congruent? \_\_\_\_\_

**Part 6 Angle Angle Angle**

1. Place the 3 angles so that they can form a triangle without measuring the sides initially. Draw segments connecting the angles. Repeat the process for the second triangle.



2. Measure the 3 sides for each triangle.

**Questions**

1. What are the measures of the 3 sides for each triangle? \_\_\_\_\_
2. Are the two triangles congruent? \_\_\_\_\_

**Conclusion:**

What can we conclude about triangle congruence when all angles are congruent? \_\_\_\_\_

**Grand Conclusions!**

SSS, SAS, ASA, SAA, SSA, HL, AAA

- S means that the corresponding sides of the triangles are congruent.
- A means that the corresponding angles of the triangles are congruent.
- H and L mean corresponding hypotenuses and legs are congruent in right triangles.

1. Which of the above acronyms **can be used** to prove triangle congruence? \_\_\_\_\_
2. Which of the above **do not** prove triangle congruence? \_\_\_\_\_
3. What kind of reasoning have we used to "prove" congruence here? \_\_\_\_\_
4. What kind of reasoning do we need to extend our conclusions to all cases? \_\_\_\_\_