Geometry G.6 (4.3 4.4 4.5) Triangle Congruence LAB   Mrs. Grieser
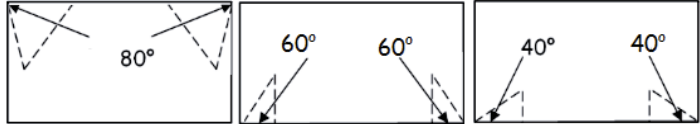
Name: _____ Date: _____ Block: _____

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:

Cut straws into the following lengths:	Measure 2 angles of 80°, 2 angles of 60°, and 2 angles 40° on the corners of 3 different colored pieces of construction paper, cut them out, and label them.
2 straws 8 centimeters in length 2 straws 11 centimeters in length 2 straws 5 centimeters in length	

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.
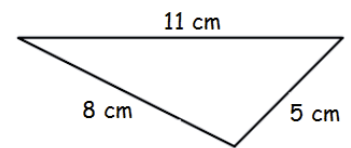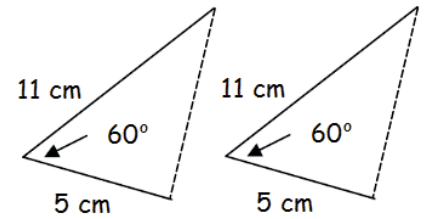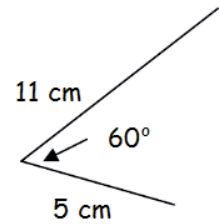
Questions:

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°
    angle between them (use the angle cut-out).

    11 cm

    60°

    5 cm

2. Take the 2 straws of the same length from the other set of straws
    and also form a 60° angle between them.

3. Draw a line to represent the 3rd side. Repeat the process for
    the 2nd triangle.

    11 cm   11 cm

    60°   60°

    5 cm   5 cm

4. Measure the length of the 3rd side and the two remaining
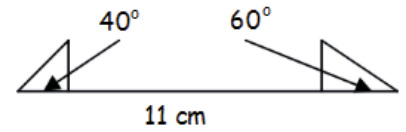   angles for each triangle.

Questions:

1. What is the length of the 3rd 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? _____

2

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 2nd 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 2nd triangle.
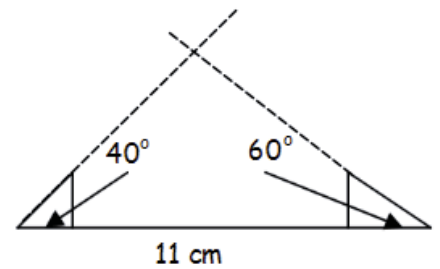
3. Measure the 3rd angle and the lengths of the 2 sides in each triangle.
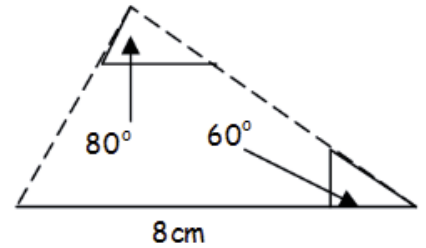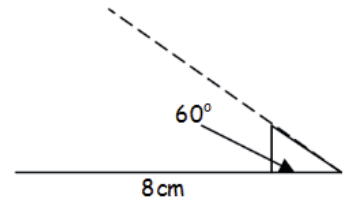
Questions:

1. What is the measure of the 3rd 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? _____

3

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 2nd triangle.

2. Place the second angle along this segment so that when a 2nd segment is drawn, it will connect with the end of the straw.

3. Measure the 3rd angle and the two remaining sides.
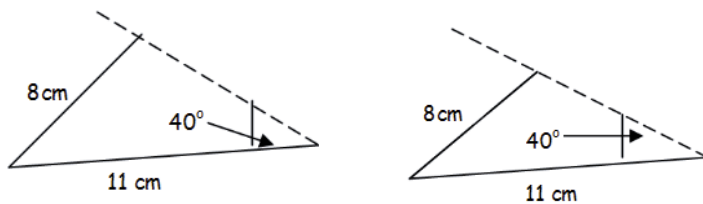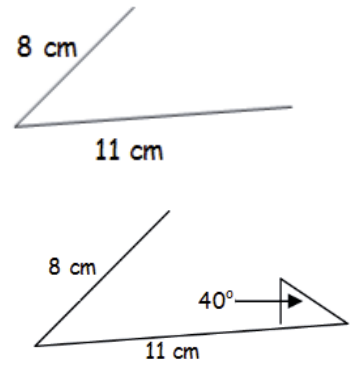
Questions:

1. What is the measure of the 3rd angle for each triangle? _____

2. What are the measures of the remaining 2 sides for each triangle? _____

3. Are the triangles congruent? _____ Why? _____
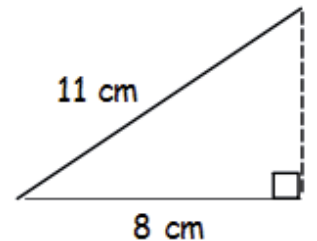
Conclusion:

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 2nd 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 3rd side to the other two sides.

4. Swing the 8cm straw so that it hits the 3rd side at a different spot in the 2nd triangle as in the first.

5. Measure the 3rd 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.
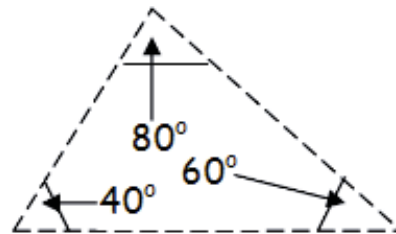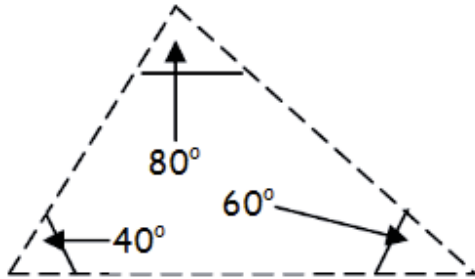
Questions

1. What is the measure of the 3rd 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? _____