MAT-222-840 Name: _____

Team Problems for Chapter 4

Date: _____

Problem #1: Seeing that the Angles in a Triangle Add to 180° (by tearing)

1. Cut an acute triangle, a right triangle, and an obtuse triangle out of a piece of paper.
2. Label the three vertices of the acute triangle A, B, and C.
3. Tear (do not cut) all 3 corners off of your acute triangle. Then put the corners together vertex-to-vertex. Tape the vertices below, and label your figure "Vertices of an Acute triangle."

4. What do you notice? What does this tell you about the angles of your acute triangle?

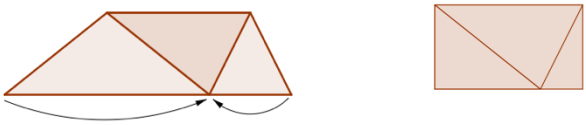
5. Repeat steps 2-4 with your right triangle and your obtuse triangle. Did you get the same results, or different results?

6. When you meet with your team on Tuesday, do you think they will have the same results, or different?

Problem #2: Seeing that the Angles in a Triangle Add to 180° (by folding)

1. Cut an acute triangle, a right triangle, and an obtuse triangle out of a piece of paper.
2. As indicated below, fold the corner that is opposite the longest side (or a longest side) of your acute triangle down to meet the longest side. Do this in such a way that the fold line is parallel to the longest side of your acute triangle.

3. As indicated below, fold the other two corners of your acute triangle in to meet the vertex that is now along the longest side of the acute triangle. Your acute triangle's three vertices should meet at a single point.



4. What does this way of folding the triangle show you about the angles of an acute triangle?

5. Repeat steps 2-4 with your right triangle and your obtuse triangle. Did you get the same results, or different results?

6. What you meet with your team on Tuesday, do you think they will have the same results, or different?

Problem #3 Triangles and Quadrilaterals of Specified Side Lengths

NOTE: For this activity, make sure to get some straws and string before you leave class on 2/14.

1. Cut a 3-inch, a 4-inch, and a 5-inch piece of straw, and thread all three straw pieces onto a piece of string. Tie a knot so as to form a triangle from the three pieces of straw.
2. Now cut two 3-inch pieces of straw and two 4-inch pieces of straw, and thread all four straw pieces onto another piece of string in the following order: 3-inch, 4-inch, 3-inch, 4-inch. Tie a knot so as to form a quadrilateral from the four pieces of straw.
3. Compare your straw triangle and your straw quadrilateral. What is an obvious difference between them (other than the fact that the triangle is made of three pieces and the quadrilateral is made of four)? *Hint: One figure is "floppier" than the other.*

4. When you made your triangle, if you had strung your three pieces of straw in a different order, would your triangle be different or not?

5. When you made your quadrilateral, if you had strung your four pieces in a different order, (say, 3-inch, 3-inch, 4-inch, 4-inch) would your quadrilateral be different or not?

6. The SSS Postulate from this chapter tells us that however you construct it, a triangle with side lengths 3-inches, 4-inches, and 5-inches will be congruent to any other such triangle. In future chapters when we talk about polygons with more sides (quadrilaterals, pentagons, and so forth) do you think we will have an SSSS Congruence Property, or an SSSSS Congruence Property?

   In other words, do you think that having a list of all of the side lengths guarantees the shape of the polygon?

Problem #4: Triangle Construction with Ruler, Protractor, and Compass

For each of the following, draw a triangle that has vertices A, B, and C and has the given specifications. Think about whether any other such triangle will necessarily be congruent to yours or not. If a postulate or theorem guarantees that your triangle WILL be congruent to any other such triangle, name it in the box below.

On Tuesday, check your triangles against those of your teammates. Are they congruent or not?

Triangle 1 Three side lengths are given:

From A to B is 3 cm.
From B to C is 5 cm.
From C to A is 6 cm.

Postulate/Theorem?

Triangle 2 Two side lengths and the angle between them are given:

From A to B is 5 cm.
The angle at A is 40°.
From A to C is 7cm.

Postulate/Theorem?

Triangle 3 All three angles are given:

The angle at A is 20°.
The angle at B is 70°.
The angle at C is 90°.

Postulate/Theorem?

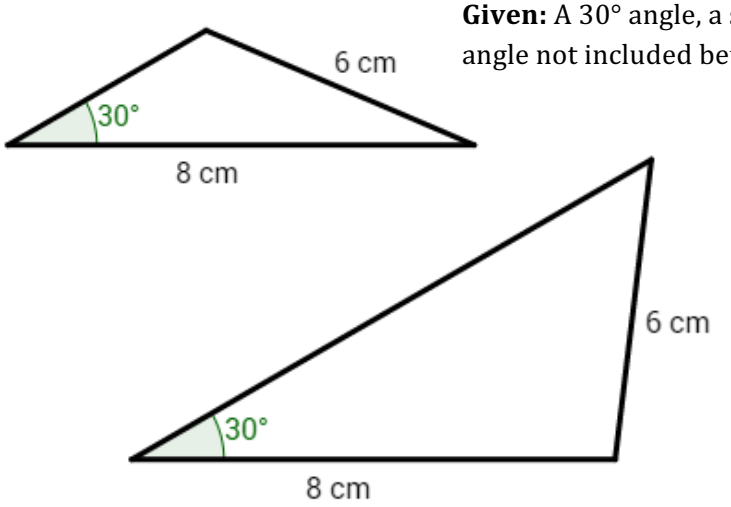
Triangle 4 A side length and the angle at both ends are given:

The angle at A is 30°.
From A to B is 8 cm.
The angle at B is 45°.

Postulate/Theorem?

Problem #5: The Nonexistent Angle-Side-Side

Use the figures below to explain why we cannot prove that two triangles are congruent based on the congruence of two sides and a nonincluded angle. (SSA)



Given: A 30° angle, a side of length 8 cm, and a side of 6 cm, with the angle not included between the 6 cm and 8 cm sides.