

The Problem:

Cambridge Construction Company is currently building a bank in Naperville. They are on schedule and would like to complete the project as quickly and efficiently as possible. They are in the beginning stages of constructing the triangular roof supports for the entrance. In order to have maximum support for the entrance, the triangular supports need to all be the exact same size. All three sides and all three angles must be exactly the same. The problem is that if the men and women take the time to measure all six components of the triangles, they will run behind schedule. They would like to find a way to construct the triangular roof supports faster, and they have time to measure at most three of the sides and/or angles.

Your task is to find methods that Cambridge Construction can use to construct congruent triangular supports without measuring all three sides and all three angles of the triangles.

The Prediction:

In the space below, make a prediction on the easiest way that Cambridge Construction can use. Explain why you made the prediction you did.

The Plan:

You will be working with a partner. Each pair will be assigned 5 different triangles to investigate. In order to investigate each triangle, I would like you to draw a triangle with the given information (on the back of this worksheet) on an overhead. Be sure to:

- a.) Write your names and the method that you are using on the top of the overhead.
- b.) Construct the triangle, labeling all the given information on your triangle.
- c.) Be as exact as possible when constructing each triangle. Part of your grade will be based on how accurate your triangles are.

For each of the 5 methods that you are assigned from the list below, construct a triangle that has the exact specifications listed. The rest of the triangle can be constructed in any way possible. Use your knowledge of triangles to determine any other measurements that you may need. Remember that our goal is to determine, for each of the following methods, if it is possible to create two **different** triangles that both have the given measurements. Based on that information we will form a conjecture about which methods will produce triangles that are **always congruent**.

- 1.) **S – (Side):** Construct a triangle that has a side 7 cm in length.
- 2.) **A – (Angle):** Construct a triangle that has a 40° angle.
- 3.) **SS – (Side, Side):** Construct a triangle that has side lengths of 7 cm and 9 cm.
- 4.) **AA – (Angle, Angle):** Construct a triangle that has a 40° and a 60° angle.
- 5.) **AS – (Angle, Side):** Construct a triangle that has a 40° angle and an adjacent side of 9 cm.
- 6.) **AAA – (Angle, Angle, Angle):** Construct a triangle that has a 40° angle, a 60° angle, and an 80° angle.
- 7.) **SSS – (Side, Side, Side):** Construct a triangle that has side lengths of 2 in, 3 in, and 4 in.
- 8.) **SAS – (Side, Angle, Side):** Construct a triangle that has a side length of 7 cm, a 40° angle, and a side length of 9 cm. Be sure that the 40° angle is **between** the two sides.
- 9.) **ASA – (Angle, Side, Angle):** Construct a triangle that has a 40° angle, a side length of 12 cm, and a 60° angle. Be sure that the 12 cm side is **between** the two angles.
- 10.) **AAS – (Angle, Angle, Side):** Construct a triangle that has a 40° angle, a 60° angle, and a side length of 9 cm. Be sure that the 9 cm side is **not between** the two angles.
- 11.) **SSA – (Side, Side Angle):** Construct a triangle that has a side length of 7 cm, a side length of 9 cm, and a 60° angle. Be sure that the 60° angle is **not between** the two sides.

The Results:

As we compare the triangles constructed by you and your classmates, write any observations that you have about whether or not a method can be used to produce triangles that are always congruent.

Summary of Class Investigation:

S –

A –

SS –

AA –

AS –

AAA –

SSS –

SAS –

ASA –

AAS –

SSA –

The Reflection:

Make a conjecture about which methods the contractors can use to be sure that the triangles they construct are congruent. **Support your answer!**

This assignment was completed with a partner. Please describe in detail what role you played as you and your partner completed this assignment.