

Lesson 11: Conditions on Measurements that Determine a Triangle

Classwork

Exploratory Challenge 1

- a. Can any three side lengths form a triangle? Why or why not?
- b. Draw a triangle according to these instructions:
- ✓ Draw segment of length cm in your notebook.
 - ✓ Draw segment of length cm on one piece of patty paper.
 - ✓ Draw segment of length cm on the other piece of patty paper.
 - ✓ Line up the appropriate endpoint on each piece of patty paper with the matching endpoint on .
 - ✓ Use your pencil point to hold each patty paper in place, and adjust the paper to form .
- c. What do you notice?
- d. What must be true about the sum of the lengths of and if the two segments were to just meet? Use your patty paper to verify your answer.
- e. Based on your conclusion for part (c), what if cm as you originally had, but cm in length. Could you form ?
- f. What must be true about the sum of the lengths of and if the two segments were to meet and form a triangle?

Exercise 1

Two sides of _____ have lengths of _____ cm and _____ cm. What are all the possible whole-number lengths for the remaining side?

Exploratory Challenge 2

a. Which of the following conditions determine a triangle? Follow the instructions to try and draw _____. Segment _____ has been drawn for you as a starting point in each case.

- i. Choose measurements of _____ and _____ for _____ so that the sum of measurements is greater than _____. Label your diagram.

Your chosen angle measurements:

Were you able to form a triangle? Why or why not?

A _____ B

- ii. Choose measurements of _____ and _____ for _____ so that the measurement of _____ is supplementary to the measurement of _____. Label your diagram.

Your chosen angle measurements:

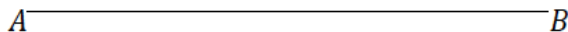
Were you able to form a triangle? Why or why not?

A _____ B

- iii. Choose measurements of and for so that the sum of measurements is less than . Label your diagram.

Your chosen angle measurements:

Were you able to form a triangle? Why or why not?



- b. Which condition must be true regarding angle measurements in order to determine a triangle?
- c. Measure and label the formed triangle in part (b) with all three side lengths and the angle measurement for . Now, use a protractor, ruler, and compass to draw with the same angle measurements, but side lengths that are half as long.
- d. Do the three angle measurements of a triangle determine a unique triangle? Why or why not?

Exercise 2

Which of the following sets of angle measurements determines a triangle?

a. 30° , 40° , 50°

b. 30° , 40° , 110°

c. 30° , 40° , 120°

d. 30° , 40° , 130°

e. 30° , 40° , 140°

Choose one example from above that does determine a triangle and one that does not. For each, explain why it does or does not determine a triangle using words and a diagram.

Problem Set

- Decide whether each set of three given lengths determines a triangle. For any set of lengths that does determine a triangle, use a ruler and compass to draw the triangle. Label all side lengths. For sets of lengths that do not determine a triangle, write “Does not determine a triangle,” and justify your response.
 - cm, cm, cm
 - cm, cm, cm
 - cm, cm, cm
 - cm, cm, cm
 - cm, cm, cm
 - cm, cm, cm
- For each angle measurement below, provide one angle measurement that will determine a triangle and one that will not determine a triangle. Provide a brief justification for the angle measurements that will not form a triangle. Assume that the angles are being drawn to a horizontal segment ; describe the position of the non-horizontal rays of angles and .

	: A Measurement that Determines a Triangle	: A Measurement that Doesn't Determine a Triangle	Justification for No Triangle

- For the given side lengths, provide the minimum and maximum whole-number side lengths that determine a triangle.

Given Side Lengths	Minimum Whole Number Third Side Length	Maximum Whole Number Third Side Length
cm, cm		
cm, cm		
cm, cm		
cm, cm		