Lesson 8: Drawing Triangles

Classwork

Exercises 1–2

1. Use your protractor and ruler to draw right triangle DEF. Label all sides and angle measurements.
   a. Predict how many of the right triangles drawn in class are identical to the triangle you have drawn.

   b. How many of the right triangles drawn in class are identical to the triangle you drew? Were you correct in your prediction?

2. Given the following three sides of $\triangle ABC$, use your compass to copy the triangle. The longest side has been copied for you already. Label the new triangle $A'B'C'$, and indicate all side and angle measurements. For a reminder of how to begin, refer to Lesson 6 Exploratory Challenge Problem 10.

A_____B

B_____C

A_____C

A_____C

Exploratory Challenge

A triangle is to be drawn provided the following conditions: the measurements of two angles are $30°$ and $60°$, and the length of a side is 10 cm. Note that where each of these measurements is positioned is not fixed.

a. How is the premise of this problem different from Exercise 2?

b. Given these measurements, do you think it will be possible to draw more than one triangle so that the triangles drawn will be different from each other? Or do you think attempting to draw more than one triangle with these measurements will keep producing the same triangle, just turned around or flipped about?

c. Based on the provided measurements, draw $\triangle ABC$ so that $\angle A = 30°$, $\angle B = 60°$, and $AB = 10$ cm. Describe how the 10 cm side is positioned.

d. Now, using the same measurements, draw $\triangle A'B'C'$ so that $\angle A' = 30°$, $\angle B' = 60°$, and $AC = 10$ cm. Describe how the 10 cm side is positioned.

e. Lastly, again, using the same measurements, draw $\triangle A''B''C''$ so that $\angle A'' = 30°$, $\angle B'' = 60°$, and $B''C'' = 10$ cm. Describe how the 10 cm side is positioned.

f. Are the three drawn triangles identical? Justify your response using measurements.

g. Draw $\triangle A'''B'''C'''$ so that $\angle B''' = 30°$, $\angle C''' = 60°$, and $B'''C''' = 10$ cm. Is it identical to any of the three triangles already drawn?

h. Draw another triangle that meets the criteria of this challenge. Is it possible to draw any other triangles that would be different from the three drawn above?

Lesson Summary

The following conditions produce identical triangles:

What Criteria Produce Unique Triangles?

Criteria	Example

Problem Set

1. Draw three different acute triangles XYZ, $X'Y'Z'$, and $X''Y''Z''$ so that one angle in each triangle is $45°$. Label all sides and angle measurements. Why are your triangles not identical?

2. Draw three different equilateral triangles ABC, $A'B'C'$, and $A''B''C''$. A side length of $\triangle ABC$ is 3 cm. A side length of $\triangle A'B'C'$ is 5 cm. A side length of $\triangle A''B''C''$ is 7 cm. Label all sides and angle measurements. Why are your triangles not identical?

3. Draw as many isosceles triangles that satisfy the following conditions: one angle measures $110°$, and one side measures 6 cm. Label all angle and side measurements. How many triangles can be drawn under these conditions?

4. Draw three nonidentical triangles so that two angles measure $50°$ and $60°$ and one side measures 5 cm.
   a. Why are the triangles not identical?
   b. Based on the diagrams you drew for part (a) and for Problem 2, what can you generalize about the criterion of three given angles in a triangle? Does this criterion determine a unique triangle?