Portfolio Projects

To make a portfolio, an artist selects a variety of original work to represent the range of his or her skills. Each of the following projects will give you a chance to create a finished product that you will be proud to add to your geometry portfolio.

The projects will help you develop your ability to present and communicate your ideas. They will also help you develop your problem-solving and reasoning abilities as you make connections between what you know and what is new. Your individual insight and creativity will help shape the mathematics you discover.

Let these projects be springboards for further exploration. Feel free to expand them to include new questions or areas of interest that arise. Most of all, have fun!

Drawing a Star (Chapter 1)

Materials: Ruler, protractor

1. Following the directions given below, draw a five-pointed star. Use a ruler and a protractor.
   a. Mark a starting point on a piece of paper, and choose a starting direction. Move in that direction for 2 in., drawing the line segment that marks your path.
   b. Change your direction by turning clockwise through an angle of $\frac{2}{5}(360°) = 144°$, as shown. Move in the new direction for 2 in., again drawing your path.
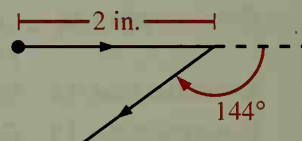
   c. Repeat step (b) until you end up where you started. (If you don't quite make it back, it is because of slight inaccuracies in your measurements; in that case, re-measure and correct your drawing.)

2. What figure do you think will result if you follow the star-drawing directions given above using each of the following turning angles? Draw each figure and see if your predictions are correct.

   a. $\frac{2}{9}(360°) = 80°$ b. $\frac{4}{9}(360°) = 160°$ c. $\frac{1}{9}(360°) = 40°$

3. Follow the star-drawing directions using a turning angle of $\frac{n}{6}(360°)$ for $n = 1, 2, 3, 4$, and 5. For each turning angle, describe the resulting figure. Do any of these turning angles produce six-pointed stars?

4. Analyze the shapes produced by following the star-drawing directions using turning angles of $\frac{n}{8}(360°)$ for $n = 1, 2, 3, \ldots, 7$.

5. Based on your work in Exercises 1–4, write a paragraph in which you discuss how to predict the shape that will result from following the star-drawing directions using any turning angle expressed as a fraction times 360°.