

Lesson 0.2 • Line Designs

You can use straight lines to create designs that appear to curve. On page 8 of your book is a line design called the *astrid*. In this activity, you'll learn how to use Sketchpad to create a dynamic version of the astrid.

Investigation: The Astrid

Sketch

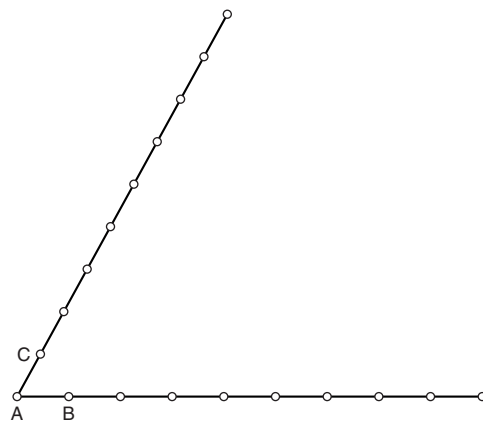
In Steps 1–10, you'll construct two segments with a common endpoint and equally spaced points along them.

- Step 1** In a new sketch, construct point A and another point, B , just to the right of it.
- Step 2** Select, in order, point A and point B and choose **Mark Vector** from the Transform menu.
- Step 3** Select point B and choose **Translate** from the Transform menu. Translate by the marked vector to construct point B' .
- Step 4** Translate point B' by the same marked vector to construct point B'' . Keep translating the most recently constructed point until you have about ten points in a line.
- Step 5** Drag point A and point B to see how they affect the other points.



Steps 1–5

- Step 6** Construct point C above point A . (Point C should be about as far from point A as point B .)
- Step 7** Select, in order, point A and point C and choose **Mark Vector** from the Transform menu.
- Step 8** Translate point C by this marked vector and repeat to construct the same number of points as you constructed in the direction of vector AB (about ten).
- Step 9** Drag point C to see how it affects the other points.



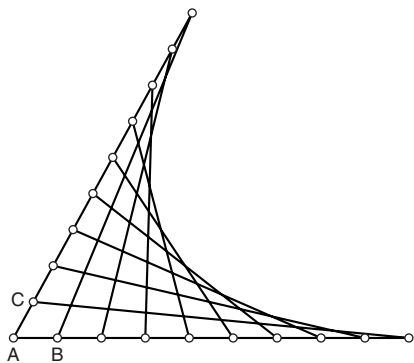
Steps 6–10

- Step 10** Draw a segment from point A to the last point at the end of each row of points.
- Step 11** Draw segments to connect the points as shown.
- Step 12** Hide all the points except points A , B , and C , and add color to the lines in your design by choosing **Color** from the Display menu.
- Step 13** Double-click on the segment that passes through points A and C to mark it as a reflection mirror.

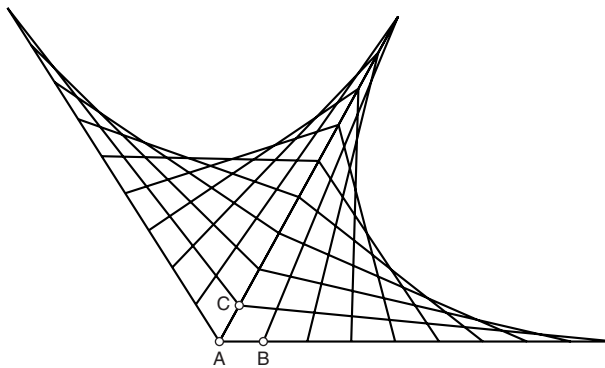
(continued)

Lesson 0.2 • Line Designs (continued)

Step 14 Select all the segments and choose **Reflect** from the Transform menu.



Step 11

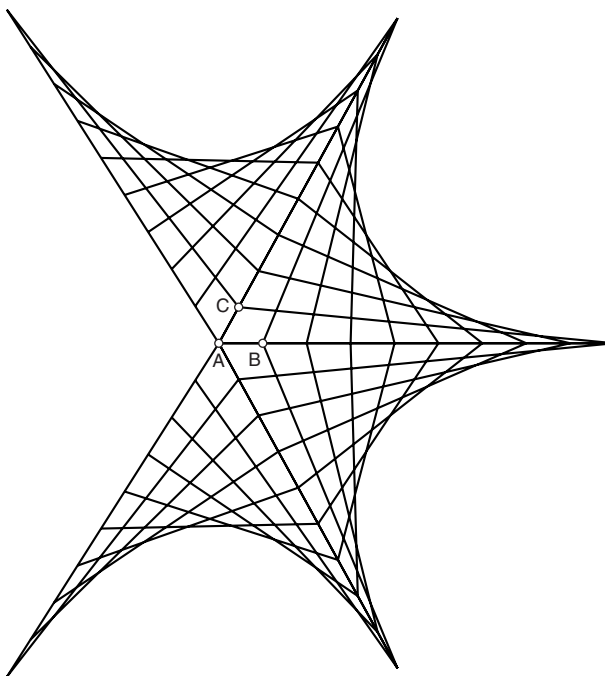


Steps 12–14

Step 15 Double-click on the segment that passes through points *A* and *B* to mark it as a mirror; then reflect all the segments again to make a design like the one shown here.

Investigate

1. This design has just one line of symmetry. Where is it?
2. Drag points *A*, *B*, and *C* to see how they change your design.
 - a. Manipulate your design so that it has exactly two lines of symmetry. Describe the lines.
 - b. Manipulate your design so that it has four lines of symmetry. Describe the lines.
 - c. Manipulate your design so that it has three lines of symmetry. Describe the lines.



Step 15

EXPLORE MORE

Open a new sketch and experiment with this method or other methods to make different line designs.