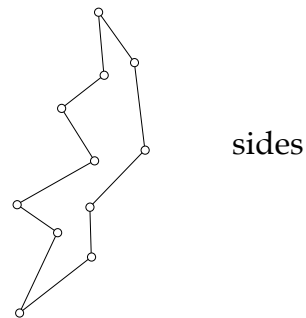


Constructing a Sketchpad Kaleidoscope

Follow the directions below to construct a Sketchpad kaleidoscope. The numbered steps tell you in general what you need to do, and the lettered steps give you more detailed instructions. *Make sure you did each step correctly before you go on to the next step.*

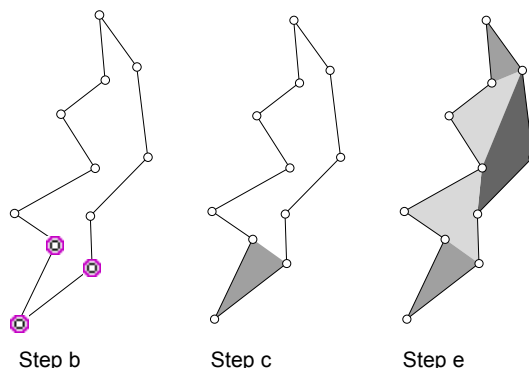
1. Open a new sketch and construct a many-sided polygon.

- a. Go to the File menu and choose **New Sketch**.
- b. Use the **Segment** tool to construct a polygon with many (make it long and somewhat slender).



2. Construct several polygon interiors within your polygon. Shade them different colors.

- a. Click on the **Selection Arrow** tool. Click in any blank space to deselect objects.
- b. Select three or four points in clockwise or counterclockwise order.
- c. Go to the Construct menu and choose **Triangle Interior** or **Quadrilateral Interior**.



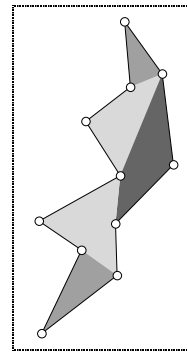
- d. While the polygon interior is still selected, go to the Display menu and choose a color for your polygon interior.
- e. Click in any blank space to deselect objects. Repeat steps b, c, and d until you have constructed several polygon interiors with different colors or shades.

3. Mark the bottom vertex point of your polygon as the center. Hide the points and rotate the polygon by an angle of 60° .

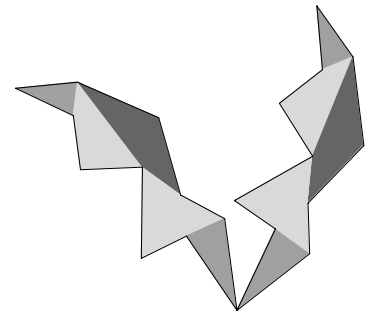
- a. Click in any blank space to deselect objects.
- b. Select the bottom vertex point. Go to the Transform menu and choose **Mark Center**.
- c. Click on the **Point** tool. Go to the Edit menu and choose **Select All Points**. Go to the Display menu and choose **Hide Points**.

Constructing a Sketchpad Kaleidoscope (continued)

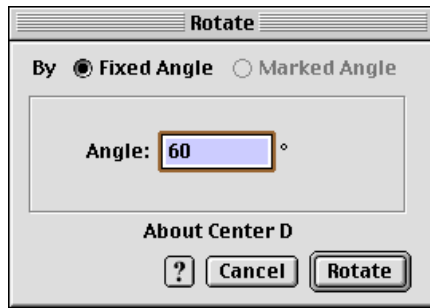
- d. Click on the **Selection Arrow** tool. Use a selection marquee to select your polygon. Go to the Transform menu and choose **Rotate**.
- e. Enter 60 and then click Rotate. (Pick a different factor of 360 if you wish.)



selection marquee

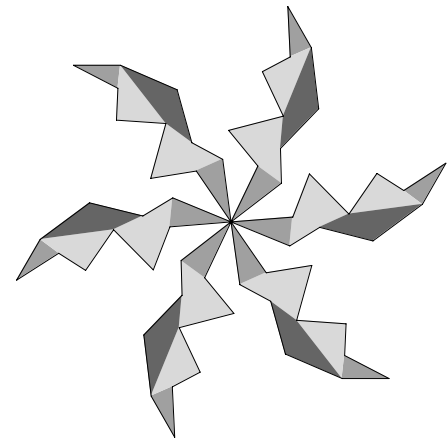


after 60° rotation

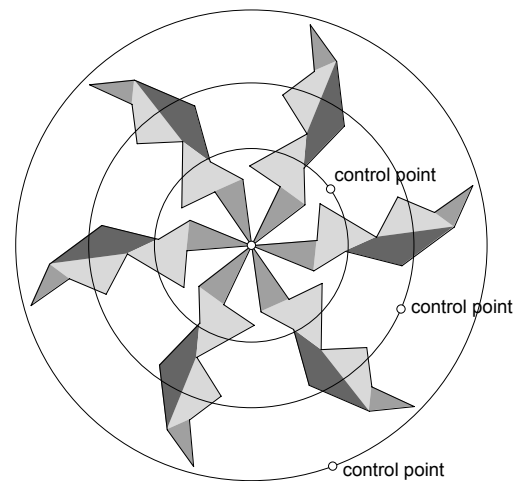


Rotate Dialog Box (Mac)

4. Continue to rotate the new rotated images until you have completed your kaleidoscope.
 - a. While the new rotated image is still selected, go to the Transform menu and rotate this image by an angle of 60°. Remember to click Rotate.
 - b. When the newer rotated image appears, and while it is still selected, go to the Transform menu and rotate this image by an angle of 60°. Remember to click Rotate.
 - c. Repeat this process until you have constructed your complete kaleidoscope.
 - d. Go to the Display menu and choose **Show All Hidden**. You should see the points on the original arm reappear.



5. Construct circles with their centers at the center of your kaleidoscope.
 - a. Click in any blank space to deselect all objects.
 - b. Click on the **Compass** tool. Press on the center point of your kaleidoscope and drag a circle with a radius a little larger than the outside edge of your kaleidoscope.



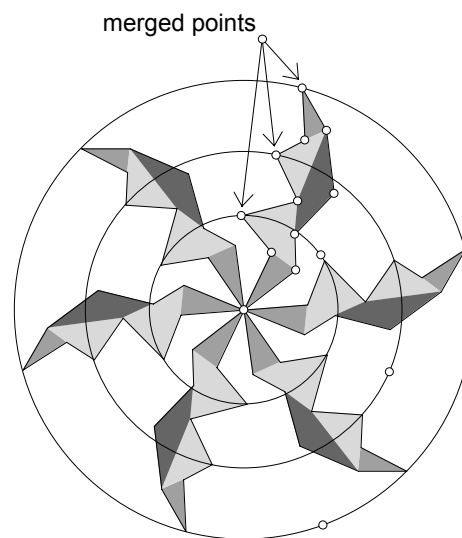
Constructing a Sketchpad Kaleidoscope (continued)

- c. Using the **Compass** tool, construct another circle with its center at the center of your kaleidoscope, but this time let the radius be about half the radius of your kaleidoscope. Repeat for a circle with a radius about one-third the radius of your kaleidoscope.

Note: Make sure you release your mouse in a blank space between two arms of your kaleidoscope. You do not want the outside control points of your circles to be constructed on any part of your kaleidoscope.

6. Merge points of your kaleidoscope onto the three circles.

- a. Click on the **Selection Arrow** tool. Click in any blank space to deselect objects.
- b. Select one point on the original polygon near the outside circle and select the outside circle (do not click on one of the control points of the circle). Go to the Edit menu and choose **Merge Point To Circle**.
- c. Click in any blank space to deselect all objects. Repeat step b. for the middle circle and a point near the middle circle. Do this one more time for the smallest circle and a point near the smallest circle.



7. Animate points of your kaleidoscope on the three circles.

- a. Click in any blank space to deselect all objects.
- b. Select the three points you merged onto circles in the previous step.
- c. Go to the Edit menu, choose Action Button, and drag to the right and choose **Animation**. Click on OK in the Animate dialog box.
- d. When the *Animate Points* button appears, click on it to start the animation. Watch your kaleidoscope turn!
- e. To hide all the points, click on the **Point** tool. Go to the Edit menu and choose **Select All Points**. Go to the Display menu and choose **Hide Points**. Click on the **Compass** tool, select all the circles, and hide them.

