

The following activity is an introductory activity for use with the computer program Geometer's Sketchpad. It is adapted from the book, **Exploring Geometry with Geometer's Sketchpad**, by Key Curriculum Press.

## Points, segments, rays, and lines

### Objective

In this activity you will experiment with drawing, dragging, measuring, and labeling points, segments, rays, and lines in Geometry Sketchpad.

### IGOS: Students will be able to:

**G.1** represent points, lines, and planes pictorially with proper identification, as well as basic concepts derived from these undefined terms, such as segments, rays, and angles

**G.23** use appropriate software to practice and master Geometry instructional objectives

### Procedures

#### Points

1. Highlight the **Point tool** and click in the sketch window to construct a point. Construct a second point by clicking again. The last point is highlighted because it is selected.
2. Unselect everything by highlighting the **Selection Arrow** tool and click in a blank area in the sketch window.
3. To label the points, highlight the **Text tool**. Position the text tool's finger over a point. The text tool's hand will become dark close to the point. Click to display that point's label. Repeat to label the remaining point.
4. With the **Selection Arrow** tool, click on one point, press and hold down the **Shift key** on your keyboard, then click on the other point. Now, both points should be selected.
5. Position the cursor over one of the selected points. Press the mouse key and drag the point across the sketch window.

☺ *Describe what happens.*

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6. **Measure menu**, choose **Distance**.

7. Click in a blank area of the sketch window to unselect the points. Position the cursor above one of the two points, press on the mouse and drag the chosen point. Observe the measurement.

☺ *Describe what happens.*

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*How can you make the distance between the two points zero?*

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## Line segments

1. Draw a line segment connecting points A and B by:  
Placing the cursor over point A and press down on the mouse button. Move the cursor to point B and release.
2. Highlight the **Segment tool** and draw a segment connecting the two points. Two small black squares on the segment indicate that it is selected.
3. While the segment is selected, go to the **Measure menu** and choose **Length**.
4. Use the **Selection Arrow tool** to drag either endpoint of the segment.

☺ *Describe what happens as you drag one of the end points.*

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5. Use the **Segment tool** to construct a second segment with one endpoint attached to the first segment. To do this, press the mouse button in a blank area of the sketch window and drag until the crosshairs are directly over the first segment.

6. Show the labels of the new endpoints by using the text tool.

☺ *Draw the figure below.*

7. To confirm that point D is attached to AB use the **Selection Arrow tool** to drag point D.

8. Select segment CD. Two small black squares will appear on the segment to show that the segment is selected. Press on the **Construct menu** and choose **Point at midpoint**.

9. Click a blank area in the sketch window to unselect everything.

10. Highlight the **Selection Arrow**. Press and drag point D.

☺ Describe the path that the midpoint traces as point D is dragged back and forth.

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11. To save: Use the pull down **File Menu**. Select **Save As**. A gray box appears. Type in the file name INTRO1. Click on the green **OK** check mark.

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## Rays and Lines

1. In the **File menu**, choose **New Sketch**.
2. Press and hold down the mouse button on the **Segment tool**. Choose the **Ray tool**.
3. Draw a ray in the sketch window. Notice that the ray extends in one direction beyond the edge of your sketch window.
4. Use the **Text tool** to show the labels of the ray's control points.
5. Highlight the **Selection Arrow tool** and drag each point to observe how it controls the ray.
6. Select the ray and press the **Measure menu**. Note that **Length** is grayed out.

☺ Why do you think you can't measure the length of a ray?

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7. With the ray still selected, press the **Construct menu** and choose **Point On Object**.

8. Drag this new point to see how its behavior compares to that of the ray's two control points.
9. Press and hold down on the **Ray tool**, then drag right to choose the **Line tool**. Experiment by drawing lines in your sketch.

☺ *List the similarities and differences between segments, ray, and lines.*

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☺ *In Sketchpad, construct a line without using the **Line tool**. Explain what you did. Does your line remain when you drag points?*

**Web resources**

<http://www.mathtrainer.com/global/n-math.htm>

<http://www.tc.cornell.edu/Services/Edu/MathSciGateway/math.asp>

<http://www.enc.org/>