

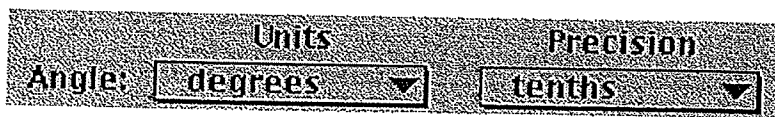
## Introducing Angles

Name(s): \_\_\_\_\_

An *angle* is sometimes defined as two rays that share an endpoint. But two segments with a common endpoint also determine an angle. And we usually name an angle after three points. If that's not confusing enough, *angle measure* is usually considered something different from an angle. In this activity, you'll explore angles and angle measures with Sketchpad.

### Sketch and Investigate

1. In the Edit menu, choose Preferences. Set the angle unit to degrees with precision to the nearest tenth.

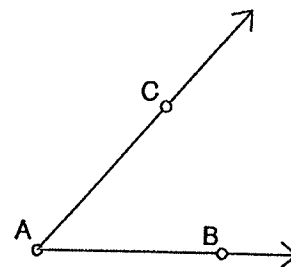


Angle Units and Precision menus from the Preferences dialog box



Hold down the mouse button on the active **Straightedge** tool to see the Straightedge tool palette, then drag to choose the **Ray** tool.

2. Use the Ray tool to construct  $\overrightarrow{AB}$ .
3. Construct another ray,  $\overrightarrow{AC}$ , with the same endpoint A.
4. Drag each of the three points to make sure the two rays always share a common endpoint (point A).



To display or hide a label, choose the **Text** tool, then click on the point. To change the label, double-click the label itself.

5. If necessary, use the Text tool to display the point labels. Change them to match the figure.
- Q1** Two rays with a common endpoint form an angle. The common endpoint of the rays is called the *vertex* of the angle. Name the vertex of the angle you just made.

When you select an angle in Sketchpad, the vertex must be in the middle, just as when you name an angle.

6. Select, in order, points B, A, and C; then, in the Measure menu, choose **Angle**.
  7. Drag point B or point C and observe how the angle measure changes.
- Q2** Angles are usually named after three points: a point on one side, the vertex, and a point on the other side. What are two possible names for the angle you just made?

$\angle$  \_\_\_\_\_ and  $\angle$  \_\_\_\_\_

## Introducing Angles (continued)

**Q3** What's the smallest angle measure you can make by dragging? What's the greatest?

**Q4** Drag a point on your angle until the angle's measure is as close to  $0^\circ$  as possible. Describe this angle.

**Q5** Drag a point on your angle until the angle's measure is as close to  $90^\circ$  as possible. Describe this angle.

**Q6** Drag a point on your angle until the angle's measure is as close to  $180^\circ$  as possible. Describe this angle.

**Q7** An *acute angle* has measure between  $0^\circ$  and  $90^\circ$ . Drag a point on your angle to make it acute. Sketch an example of an acute angle in the space at right.

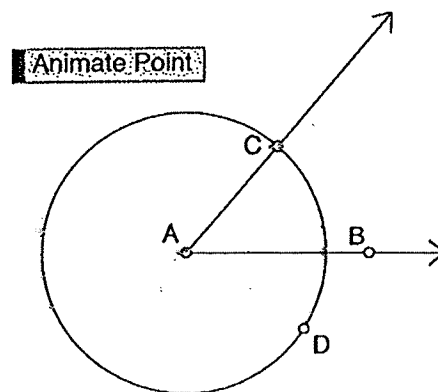
**Q8** An *obtuse angle* has measure between  $90^\circ$  and  $180^\circ$ . Drag a point on your angle to make it obtuse. Sketch an example of an obtuse angle in the space at right.

8. Draw a circle centered at point A but not attached to any other points in your sketch.

9. Select the circle and point C; then, in the Edit menu, choose **Merge Point To Circle**. Point C will attach itself to the circle.

Select point C. Then choose **Edit | Action Button | Animation**. Choose **slow** from the Speed pop-up menu. Then click OK.

→ 10. Make an action button to animate point C around the circle.



## Introducing Angles (continued)

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11. Press the button (click on it, in other words) to play it. Watch the angle measurement during the animation. (Press the button again to stop the animation.)
- Q9** With Preferences set to degrees, Sketchpad displays angle measures from  $0^\circ$  to  $180^\circ$ . So when one angle side rotates by more than one-half of a revolution from the other angle side, the angle measure starts to decrease. Suppose the angle measure kept increasing until the angle side had completed one whole revolution. What would be the largest angle measure?
- Q10** Draw an angle using the Segment tool. Does the measure of the angle depend on the lengths of the sides? Explore this question in Sketchpad, then give your answer and explain your method below.

### Explore More

1. Use Sketchpad to model a clock. Choose **Other** in the Speed pop-up menu (see step 10) to set the speeds of the hands properly relative to one another. Once you have a working clock, explain what you did.