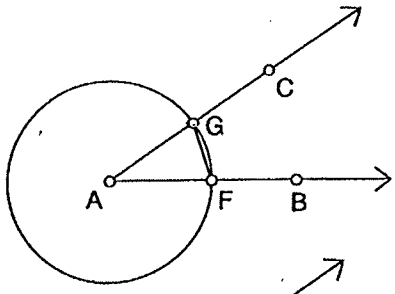
Duplicating an Angle

Name(s): _____

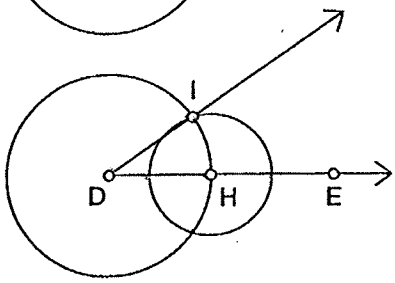
In this activity, you'll learn how to duplicate a given angle. The method described is equivalent to the method you would use with a compass and straightedge. You might want to follow the first few steps, then try to figure out the rest on your own.

1. Construct $\overrightarrow{AB}$ and $\overrightarrow{AC}$. (This is your given angle.)
2. Below $\angle CAB$, construct $\overrightarrow{DE}$, one side of a new angle.
3. Construct circle AF, with point F on $\overrightarrow{AB}$.
4. Construct $\overline{AF}$ overlapping $\overrightarrow{AB}$.
5. Construct $\overline{FG}$, where point G is the point of intersection of the circle and $\overrightarrow{AC}$.



Select the point and the segment; then, in the Construct menu, choose **Circle By Center+Radius**.

6. Construct a circle with center D and radius equal to AF.



7. Construct H, the point of intersection of this circle with $\overrightarrow{DE}$.
8. Construct a circle with center H and radius equal to FG.
9. Construct $\overrightarrow{DI}$, where point I is the point of intersection of these two circles.
10. If you wish, hide the circles, the segments, and points H, F, and G.
11. Drag point A, B, C, D, or E and observe how the angles behave. Measure the angles to confirm your observations.

Q1 Explain why this construction works the way it does.

Explore More

1. Here's an easier way to duplicate an angle using the Transform menu instead of Euclidean tools: Construct rays AB and AC to construct $\angle CAB$. Select, in order, points B, A, and C; then, in the Transform menu, choose **Mark Angle**. Construct $\overrightarrow{DE}$. Mark point D as center and rotate the ray by the marked angle.