

# Ellipses and Hyperbolas

---

There are many different methods that can be used to create ellipses and parabolas. The method that we will use here is closely related to a method that involves drawing a circle on wax paper selecting a point outside (for the hyperbola) or inside (for the ellipse) the circle and folding and folding such that the point corresponds with a point on the circle. This is repeated several times until an ellipse or hyperbola appears.

## SKETCH AND INVESTIGATE

1. Begin with a new sketch. Use the Compass Tool to create a circle. Label the center of the circle  $A$ , and the point on the circle,  $B$ . Place another point on the circle and label it  $C$ .
2. Place a point outside the circle and label the point  $D$ .
3. Select points  $C$  and  $D$  and choose Segment from the Construct menu.
4. Select segment  $CD$  and choose Midpoint from the Construct menu. Label the midpoint  $E$ .
5. Select midpoint  $E$  and segment  $CD$  and choose Perpendicular Line from the Construct menu.
6. Select the perpendicular line and then choose Trace Perpendicular Line from the Display menu.
7. Drag point  $C$  around the circle.

Q1. What do you notice about the traces formed by the perpendicular lines as you drag point  $C$  around the circle? Why does this make sense?

Q2. What will happen if you drag point  $D$  so that it is further from the center of the circle?

8. Select point  $D$  and drag it. Choose Erase Traces from the Display menu. Drag point  $C$  around the circle. What do you notice?
9. Rather than trace the line we can also create the locus that will update when point  $D$  is moved. Select the perpendicular line and point  $C$ . Choose Locus from the Construct menu.

Q3. Drag point  $D$  so that it is near the circle and inside the circle. What happens to the locus? Explain why this makes sense.