

SKETCH AND INVESTIGATE

- Q1** The perpendicular bisector of any chord of a circle passes through the center of the circle.
- Q2** The closer the chord is to the center of the circle, the longer the chord. The chord is longest when its distance to the center is zero. This chord is a diameter of the circle.
- Q3** At the point where the locus intersects the y -axis, the length of \overline{BC} is zero (its minimum value) and the length of \overline{AD} is the radius of the circle (its maximum value). Likewise, at the point where the locus intersects the x -axis, the length of \overline{BC} is the diameter of the circle (its maximum value) and the length of \overline{AD} is zero (its minimum value).

As point G moves from left to right, its y -coordinate decreases in value, showing the chord \overline{BC} moving closer to the center of the circle (and also becoming longer).

Students may notice that the locus shows a portion of an ellipse in the first quadrant. This ellipse is centered at the origin and has a major axis of twice the diameter of the circle and a minor axis of twice the radius of the circle.

- Q4** If two chords in a circle are congruent, the chords are the same distance from the center of the circle. (The converse is also true.)

EXPLORE MORE

1. When $HI = BC$, the plotted point (length of \overline{HI} , distance from \overline{HI} to the center) is coincident with point G .
2. After constructing the arc, construct two chords anywhere on the arc. Construct the perpendicular bisectors of both these chords. Their point of intersection is the center of the circle.