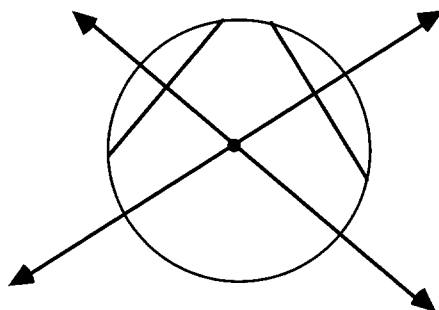


# Chords, Secants, and Tangents

## Exploration

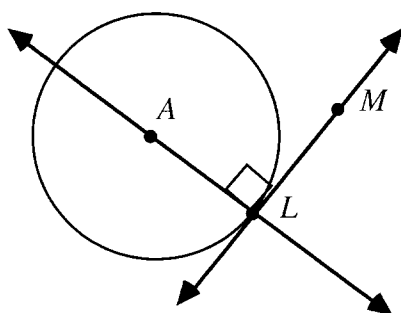
Students use a geometry utility to investigate properties of chords, secants, and tangents. (This exploration also can be completed with a compass and straightedge.)

- a. For best results, the diameter of the circle should be at least two-thirds the width of the screen.
- b.
  1. See sample drawing given in Step 3 below.
  2. Predictions may vary.
  3. Sample drawing:



- 4–5. Students should observe that the perpendicular bisectors of chords intersect at the center of the circle.

- c. Students should observe that when the angle has a measure of  $90^\circ$ , the line intersects the circle at a single point and is therefore a tangent line. The final sketch should resemble the following:

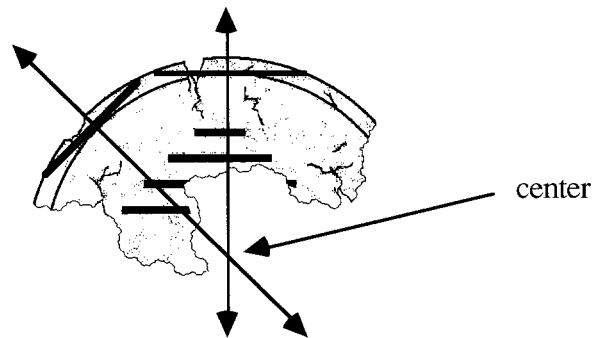


## Teacher Note

Before discussing Part **d** below, you may wish to distribute copies of template D (one per student).

### Discussion 2

- a. 1.  $90^\circ$   
2. The angle cannot measure  $90^\circ$ .
- b. Sample response: A line tangent to a circle can be created by first folding a circle onto itself through a line containing the center of the circle. This fold represents a secant containing a diameter. Next, without unfolding the first fold, fold the crease onto itself where the first fold intersects the circle. This second fold creates a tangent line perpendicular to a diameter, through the point of tangency.
- c. Sample response: The tangents are parallel. Two lines in the same plane perpendicular to the same line must be parallel to each other because alternate interior angles are congruent.
- d. Sample response: The center of the circular plate can be found by drawing two chords and their perpendicular bisectors as shown in the sketch below. The intersection of the perpendicular bisectors is the center of the circle.



- e. Sample response: Fold to create two chords on the circle. Fold to create the perpendicular bisector of each chord. The intersection of the perpendicular bisectors is the center of the circle.
- f. The point of intersection of the perpendicular bisectors is the point equidistant from the four endpoints of the two chords. The center of a circle is the point that is equidistant from all points on the circle.
- g. The altitude of an isosceles triangle is the perpendicular bisector of the base.