



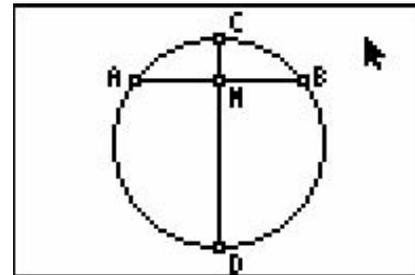
Introduction

When hikers and skiers go into terrain where there is a risk of avalanches, they take safety equipment including avalanche rescue beacons. An avalanche rescue beacon sends and receives electromagnetic field signals that can travel up to about 30 meters. The search pattern used to locate a beacon buried in the snow is based on the properties of chords and diameters in circles.

Problem 1 – Relationship between a chord and its perpendicular bisector

1. Open Cabri Jr. and construct a circle to represent the beacon signal. Hide the center of the circle.
2. Construct any chord to represent the path of a rescuer as he walks a straight path, beginning at a point where the signal starts and ending where the signal disappears. Label the endpoints of this chord *A* and *B*.
3. The rescuer walks back to the midpoint of this path. Find the midpoint of segment *AB* and label it *M*.
4. Construct a line perpendicular to segment *AB* through *M*, to represent the rescuer walking away from the path at a 90° angle until the signal disappears.
5. Find one intersection point of the perpendicular line and the circle. Label it *C*.
6. The rescuer turns around and walks in the opposite direction until the signal disappears again. Find the other intersection point of the perpendicular line and the circle. Label it *D*.
7. Hide the perpendicular line. Construct a segment connecting points *C* and *D*. A sample figure is shown.
8. The rescuer walks back to the midpoint of this new path.

Find the midpoint of segment *CD* and label it *X*. This will be the center of the circle formed by the beacon signals. The rescuer finds the missing person here!



9. To confirm that you have located the center of the circle, measure the distances from *X* to *A*, *B*, *C*, and *D*.

Problem 2 – Extension

10. Write a proof of the relationship used in the activity. Given a chord of a circle and its perpendicular bisector, prove that the perpendicular bisector passes through the center of the circle.
11. Use a compass and straightedge to construct a circle and a chord. Construct the perpendicular bisector of the chord and see that it passes through the center of the circle.