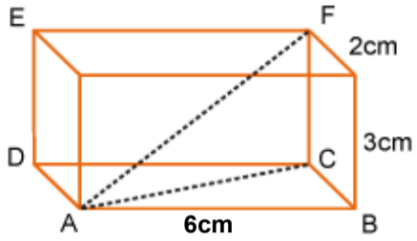
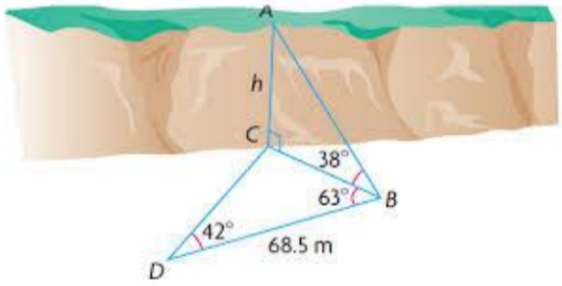
Problems in Three Dimensions

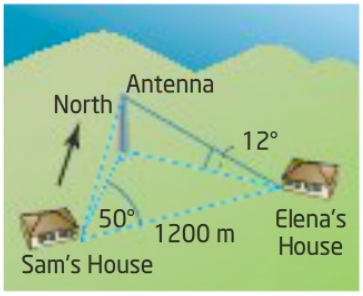
1. A rectangular prism has side lengths of 6cm, 3cm and 2cm. Find the length of the diagonal *AF*.



2. From point *B*, a surveyor measures an angle of elevation of 38° to point *A* at the top of a cliff. From point *D*, 68.5 m away from point *B*, a 2nd surveyor measures an angle of 42° between point *B* and point *C* at the base of the cliff. From point *B*, the angle between point *D* and point *C* is measured at 63°. Find the height of the cliff.



3. A radio antenna lines due north of Sam's house. Sam walks to Elena's house, a distance of 1200 m, $50°$ east of north. From Elena's house, the antenna appears due west, with an angle of elevation of $12°$. Determine the height of the antenna, to the nearest metre.



4. Justine is flying her hot-air balloon. She reports that her position is over a golf course located halfway between Emerytown and Fosterville, at an altitude of 1500 m. Fosterville is 16.0 km east of Danburg, and Emerytown is 16.5 km from Danburg, in a direction $42°$ south of east. What is the angle of elevation of Justine's balloon as seen from Danburg, to the nearest degree?