Applications of Law of Sines and Law of Cosines

1. Tracking a Satellite

The path of a satellite orbiting the Earth causes it to pass directly over two satellite stations A and B, which are 65 miles apart. When the satellite is on one side of the two stations, the angle of elevations is measured as 70° and 80° respectively.

- a) How far is the satellite from station A?
- b) What is the altitude of the satellite above the ground?



2. Flight of a Plane

A pilot is flying over a straight highway. He determines the angles of depression to two posts, 8 miles apart, to be 35^{o} and 46^{o} respectively.

- a) What is the distance of the plane from point A?
- b) Find the elevation of the place?



3. Height of a Tree

A tree on a hill side casts a shadow 200 feet down the hill. If the angle of inclination on the hillside measures 25° to the horizontal and the angle of elevation to the sun measures 55° to the sun, find the height of the tree.



4. Calculating Distance

Observers at P and Q are located on the side of a hill that is inclined at 28° to the horizontal. The observer at P determine the angle of elevation to the hot air balloon to be 62° . At the same instant another observer at Q measures the angle of elevation to be 72° . If P is 50 meters downhill from Q, find the distance from Q to the balloon.



5. Calculating Distance

Two straight roads diverge at an angle of 75° . Two cars leave an intersection at 2:00 PM, one traveling at 55 mph and the other traveling at 72 mph. How far are the cars apart at 4:30 PM?



6. Mountain

A man walks toward a mountain along a flat surface and measures the angle of elevation to be 32° . He proceeds to walk another 200 meters toward the mountain and measures the angle of elevation to be 38° . How tall is the mountain?



7. Dead Reckoning

A pilot travels for 2.5 hours along a straight path, then makes a course correction, heading 35° to the right of her original path for an additional 2 hours. If the plane has maintained a constant speed of 600 mph, how far is she from her starting point?



8. Navigation

Two boats leave the same port at the same time. One travels at a speed of 40 mph in the direction of $N50^{\circ}E$ and the other travels at 28 mph in the direction $S80^{\circ}E$. How far apart are the two boats after 3 hours?



9. Navigation

Two boats leave the same port at the same time. One travels at a speed of 40 mph in the direction of $N50^{o}E$ and the other travels at 28 mph in the direction due South. How far apart are the two boats after 3 hours?



10. Navigation

A fisherman leaves his home port and travels in the direction $N70^{\circ}W$ for 40 miles and reaches Egg Island. The next day, he travels $N65^{\circ}E$ for 60 miles, reaching Forrest Island.

- (a) Find the distance between Fisherman's home port and Forrest Island.
- (b) Find the bearing from Forrest Island back to the Fisherman's home port.

