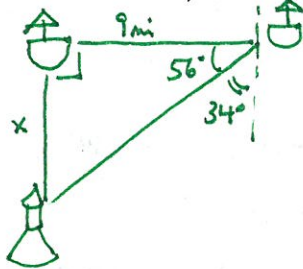


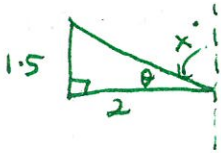
1. A ship sights a lighthouse directly to the south. A second ship, 9 miles east of the first ship, also sights the lighthouse. The bearing from the second ship to the lighthouse is S 34° W. How far, to the nearest tenth, is the first ship from the lighthouse?



$$\tan 56^\circ = \frac{x}{9}$$

$$x = 13.3 \text{ miles}$$

2. You leave your house and run 2 miles due west followed by 1.5 miles due north. At that time, what is your bearing from your house?



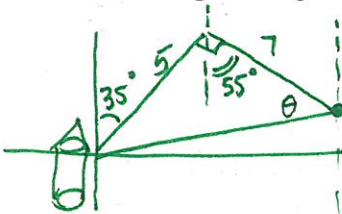
$$\tan \theta = \frac{1.5}{2}$$

$$\theta = \tan^{-1}(1.5/2) = 36.9^\circ$$

$$x = 53.1^\circ$$

$$\boxed{N 53.1^\circ W}$$

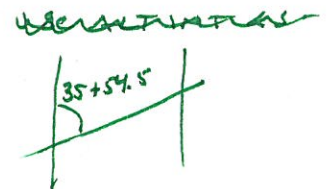
3. A jet leaves a runway whose bearing is N 35° E from the control tower. After flying 5 miles, the jet turns 90° and flies on a bearing of S 55° E for 7 miles. At that time, what is the bearing of the jet from the control tower?



$$\tan \theta = \frac{5}{7}$$

$$\theta = 35.5^\circ$$

which makes $90 - \theta = 54.5^\circ$
(corner \angle)



$$\boxed{N 89.5^\circ E}$$

4. A surveyor wishes to find the distance across a swamp. The bearing from A to B is N 32° W. The surveyor walks 50 m from A to C, and a C the bearing to B is N 68° W. Find the bearing from A to C and the distance from A to B.



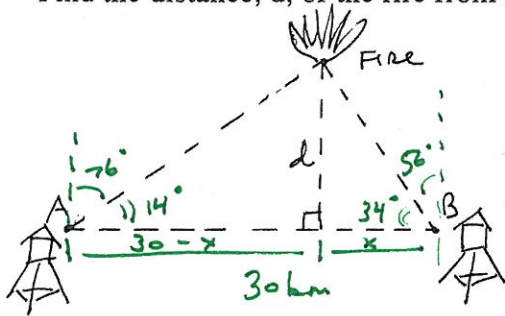
$$\boxed{\text{From A to C } N 58^\circ E}$$

$$\tan 54^\circ = \frac{x}{50}$$

$$x = 68.82 \text{ mi}$$

ALT INT \angle s

5. Two fire towers are 30 km apart, tower A being due west of tower B. A fire is spotted from the towers, and the bearings from A and B are N 76° E and N 56° W respectively. Find the distance, d , of the fire from the line segment AB.



$$\tan 14^\circ = \frac{d}{30-x} \quad \tan 34^\circ = \frac{d}{x}$$

$$\tan 14^\circ (30-x) = d \quad \tan 34^\circ x = d$$

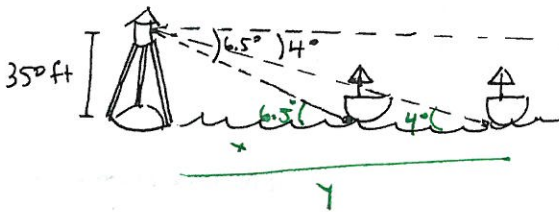
$$\tan 14^\circ (30-x) = \tan 34^\circ x$$

$$\tan 14^\circ (30) = \tan 14^\circ x + \tan 34^\circ x$$

$$2.4798 = .9238 x$$

$$x = 8.096 \rightarrow \boxed{d = 5.46 \text{ km}}$$

6. An observer in a lighthouse 350 feet above sea level sights two ships offshore. The angles of depression to the ships are 4° and 6.5°. How far apart are the ships?



$$\tan 6.5^\circ = \frac{350}{x}$$

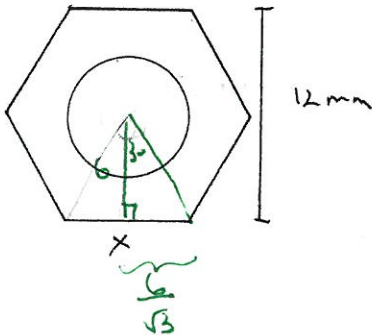
$$\tan 4^\circ = \frac{350}{y}$$

$$x = \frac{350}{\tan 6.5^\circ}$$

$$y = \frac{350}{\tan 4^\circ}$$

$$y - x = \frac{350}{\tan 4^\circ} - \frac{350}{\tan 6.5^\circ} = \boxed{1933.3 \text{ ft}}$$

7. Find the length of the flat side of a hexagonal nut if the distance across it is 12 mm.



$$x = 2 \cdot \frac{6}{\sqrt{3}} = \frac{12}{\sqrt{3}}$$

$$\boxed{4\sqrt{3} \text{ mm} \text{ or } 6.9 \text{ mm}}$$