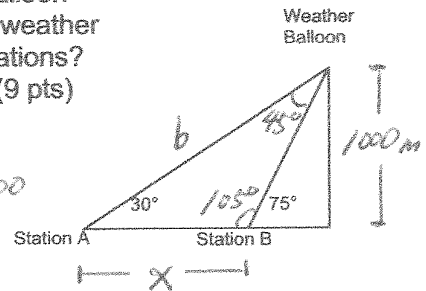


10. Two tracking stations measure angles of elevation of a weather balloon to be 30 degrees and 75 degrees as indicated in the figure. If the weather balloon is 1000 meters high, how far apart are the two tracking stations? Find the **exact distance**. (Do not approximate your answer.) (9 pts)



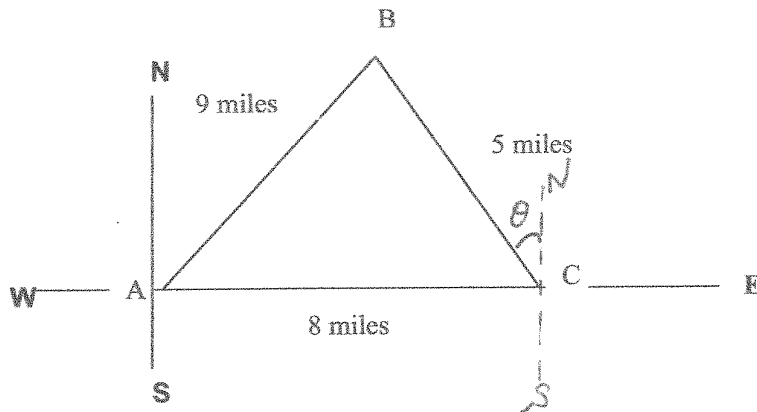
$$\sin 30^\circ = \frac{1000}{b} \Rightarrow b = \frac{1000}{\sin 30^\circ} = \frac{1000}{\frac{1}{2}} = 2000$$

$$\frac{x}{\sin 45^\circ} = \frac{2000}{\sin 105^\circ} \Rightarrow x = \frac{2000}{\sin 105^\circ} \cdot \sin 45^\circ$$

$$= \frac{2000}{\sin 105^\circ} \cdot \frac{\sqrt{2}}{2} = \frac{1000\sqrt{2}}{\sin 105^\circ}$$

The distance is  $\frac{1000\sqrt{2}}{\sin 105^\circ}$  meters.

11. The diagram shows three islands A, B, and C in Florida Bay, including the distances between A and B, B and C, and C and A. You rent a boat and plan to visit each of these remote islands. If you are on island C, on what bearing should you navigate to go to island B? Find the **exact bearing**. (9 pts)



$$9^2 = 5^2 + 8^2 - 2(5)(8)\cos C$$

$$\frac{81 - 25 - 64}{-2(5)(8)} = \cos C$$

$$\frac{-8}{-80} = \cos C \Rightarrow C = \cos^{-1}\left(\frac{1}{10}\right)$$

$$\theta = 90^\circ - \left(\cos^{-1}\left(\frac{1}{10}\right)\right)^\circ$$

The bearing is  $N \left(90^\circ - \cos^{-1}\left(\frac{1}{10}\right)\right)^\circ W$ .