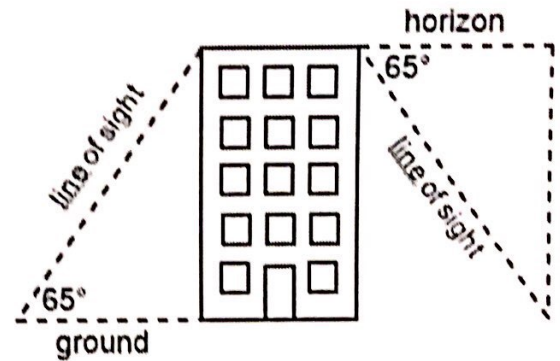


8.5 Applications of Trigonometry

Angle of elevation- is the angle made with the ground and your line of sight to an object above you.

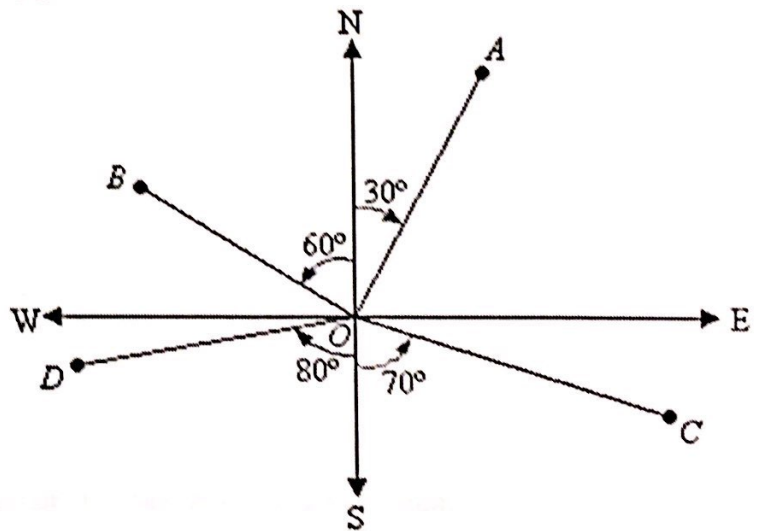
Angle of depression- is the angle from the horizon and your line of sight to an object below you.



Compass Bearing- is the direction towards which you are headed, as shown by a compass. It is most commonly written in the form N 6° E, meaning the bearing that makes an angle of 6° with North towards East. (North or South is usually given before East or West, and the angle never exceeds 90° .)

Write the correct compass bearing for the following points.

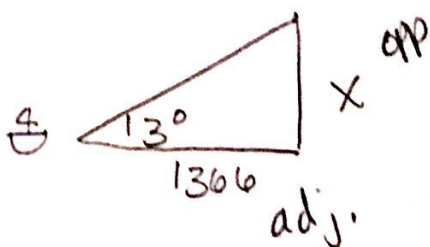
- A. N 30° E
- B. N 60° W
- C. S 70° E
- D. S 80° W



Draw a diagram for each of the following problems. Then write an equation to represent the situation and then solve the problem. Round your answers to the nearest tenth.

Example 1:

From a boat on the lake, the angle of elevation to the top of a cliff is 13° . If the base of the cliff is 1366 feet from the boat, how high is the cliff?



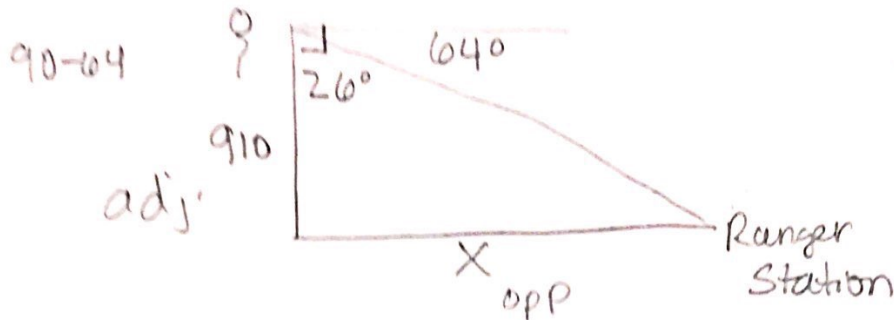
$$\tan 13 = \frac{x}{1366}$$

$$x = 1366 \tan 13$$

$$x = 315.37 \text{ ft}$$

Example 2:

From a balloon 910 feet high, the angle of depression to the ranger headquarters is 64° . How far is the headquarters from a point on the ground directly below the balloon?



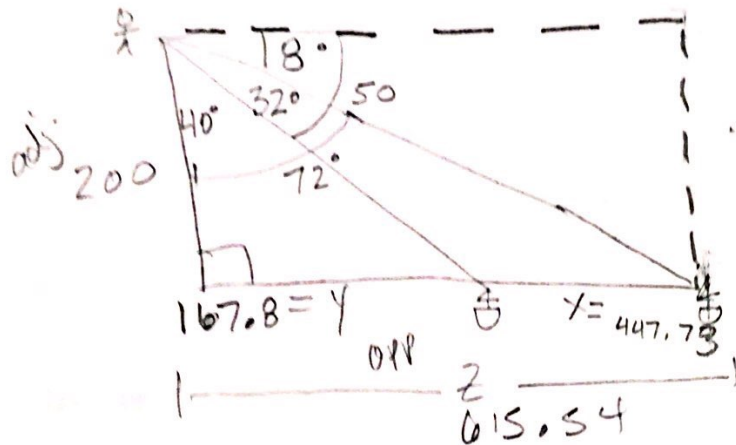
$$\tan 26 = \frac{x}{910}$$

$$x = 910 \tan 26$$

$$x = 443.84 \text{ ft.}$$

Example 3:

A person is watching a boat from the top of lighthouse. The boat is approaching the lighthouse directly. When first noticed, the angle of depression is 18° . When the boat stops, the angle of depression is 50° . The lighthouse is 200 feet tall. How far did the boat travel from when it was first noticed until it stopped?



$$\tan 40 = \frac{y}{200}$$

$$y = 200 \tan 40$$

$$y = 167.82$$

$$\tan 72 = \frac{z}{200}$$

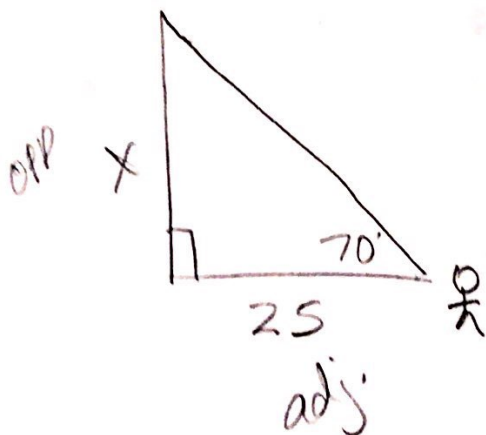
$$z = 200 \tan 72$$

$$z = 615.54$$

$$\begin{array}{r} 615.54 \\ - 167.82 \\ \hline 447.72 \end{array}$$

Example 4:

A person is 25 feet from the base of a barn. The angle of elevation from the level ground to the top of the barn is 70° . How tall is the barn?



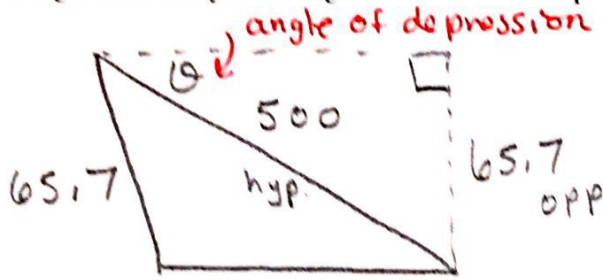
$$\tan 70 = \frac{x}{25}$$

$$x = 25 \tan 70$$

$$x = 68.69 \text{ ft.}$$

Example 5:

A sledding run is 500 yards long with a vertical drop of 65.7 yards. Find the angle of depression of the run.

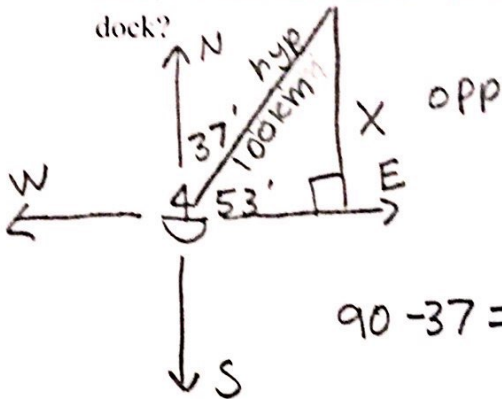


$$\sin \theta = \frac{65.7}{500}$$

$$\theta = \sin^{-1} \left(\frac{65.7}{500} \right)$$

$$\theta = 7.55^\circ$$

Example 6: A sailboat leaves the dock at a bearing of $N 37^\circ E$ and travels a distance of 100 km. Immediately after, the boat turns and travels due south. How far does the boat need to travel in order to be due east of the dock?



$$\frac{\sin 53}{1} = \frac{X}{100}$$

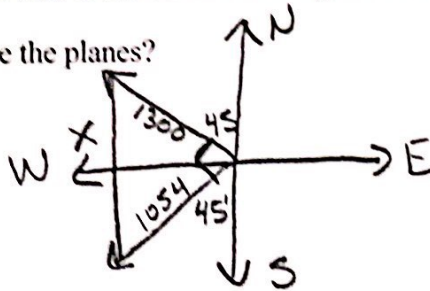
$$X = 100 \sin 53$$

$$X = 79.86 \text{ km}$$

$$90 - 37 = 53^\circ$$

Example 7: Two planes leave from the airport at the same time. Plane A travels at a bearing of $S 45^\circ W$ and travels at a speed of 527 mph. Plane B travels at a bearing of $N 45^\circ W$ and travels at a speed of 650 mph.

After 2 hours how far apart are the planes?



Solve the triangle created by the two planes and the airport after the 2 hours of travel?

$$1300^2 + 1054^2 = X^2$$

$$1690000 + 1110916 = X^2$$

$$\sqrt{2800916} = \sqrt{X^2}$$

$$1673.59 = X$$

miles