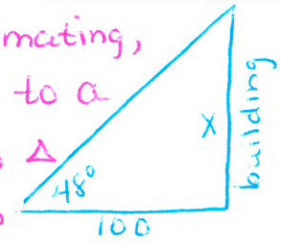
angle of elevation: from a horizontal line "looking" up

angle of depression: from a horizontal line "looking" down.

Section 2-5 Applying Trigonometry to Real life

1. You are measuring the height of a building. You stand 100 feet from the base of the building. You measure the angle of elevation from a point on the ground to the top of the building to be 48°. Estimate the height of the building.

* if estimating, it's close to a 45-45-90 △ in which case the building ≈ 100 ft.

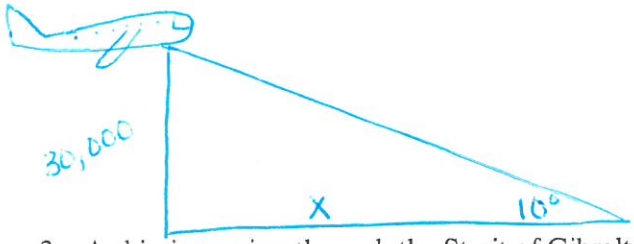


$\tan 48° = \frac{x}{100}$

$x = 100(\tan 48°)$

$x = 111.06 \text{ ft}$

2. An airplane flying at an altitude of 30,000 ft is headed toward an airport. To guide the airplane to a safe landing, the airport's landing system sends radar signals from the runway to the airplane at a 10° angle of elevation. How far is the airplane (measured along the ground) from the airport runway?



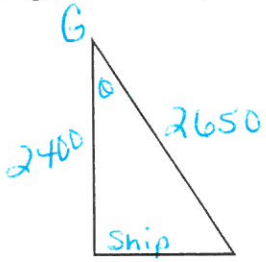
$\tan 10° = \frac{30,000}{x}$

$x(\tan 10°) = 30,000$

$x = \frac{30,000}{\tan 10°}$

$x \approx 170,138 \text{ ft}$

3. A ship is passing through the Strait of Gibraltar. At its closest point of approach, Gibraltar radar determines that the ship is 2400 m away. Later, the radar determines that the ship is 2650 m away. By what angle did the ship's bearing from Gibraltar change?



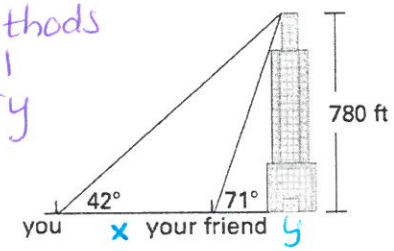
$\cos\theta = \frac{2400}{2650}$

$\cos^{-1}\left(\frac{2400}{2650}\right) = \theta$

$\theta \approx 25°$

4. **Skyscraper** You are a block away from a skyscraper that is 780 feet tall. Your friend is between the skyscraper and yourself. The angle of elevation from your position to the top of the skyscraper is 42°. The angle of elevation from your friend's position to the top of the skyscraper is 71°. To the nearest foot, how far are you from your friend?

* methods will vary



$\tan 71° = \frac{780}{y}$

$y = \frac{780}{\tan 71}$

$y \approx 268.58 \text{ ft}$

$\tan 42° = \frac{780}{x + 268.58}$

$x + 268.58 = \frac{780}{\tan 42}$

$x + 268.58 = 866.28$

$x = 597.70 \text{ ft}$