Double Trig Practice
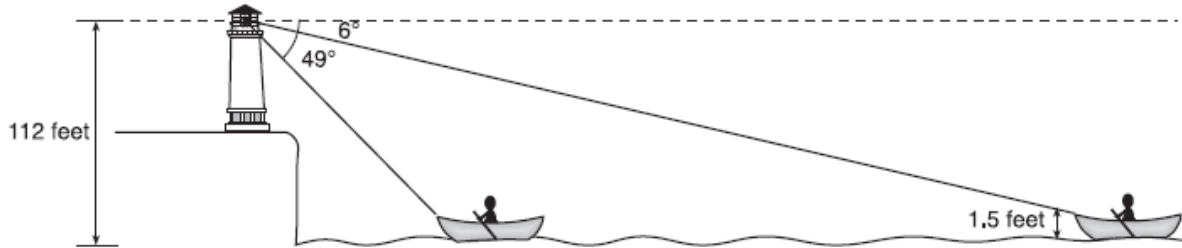
1. As shown below, a canoe is approaching a lighthouse on the coastline of a lake. The front of the canoe is 1.5 feet above the water and an observer in the lighthouse is 112 feet above the water.


(Not drawn to scale)

At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed at which the canoe traveled toward the lighthouse.

2. At Mogul's Ski Resort, the beginner's slope is inclined at an angle of 12.3°, while the advanced slope is inclined at an angle of 26.4°. If Rudy skis 1,000 meters down the advanced slope while Valerie skis the same distance on the beginner's slope, how much longer was the horizontal distance that Valerie covered?

   1) 81.3 m   3) 895.7 m

   2) 231.6 m   4) 977.0 m

3. As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7°. A short time later, at point D, the angle of elevation was 16°.

   To the *nearest foot*, determine and state how far the ship traveled from point A to point D.
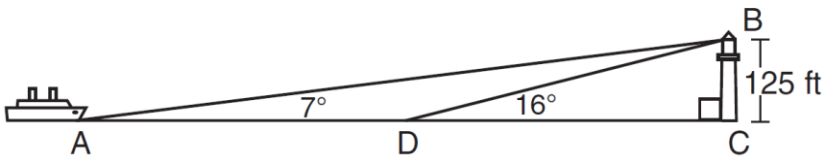
4. A lighthouse is built on the edge of a cliff near the ocean, as shown in the accompanying diagram. From a boat located 200 feet from the base of the cliff, the angle of elevation to the top of the cliff is 18° and the angle of elevation to the top of the lighthouse is 28°. What is the height of the lighthouse, x, to the *nearest tenth of a foot*?
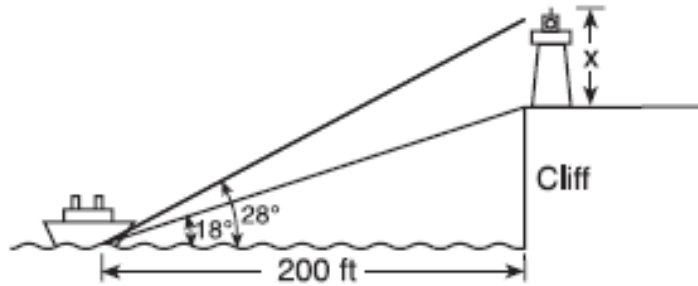
ANSWERS

1. 195

   x represents the distance between the lighthouse and the canoe at 5:00; *y* represents the distance between the lighthouse and the canoe at 5:05.

   $$\tan 6 = \frac{112 - 1.5}{x}$$

   $$x \approx 1051.3$$

   $$\tan(49 + 6) = \frac{112 - 1.5}{y}$$

   $$y \approx 77.4$$

   $$\frac{1051.3 - 77.4}{5} \approx 195$$

2. (1)

   $$\cos 12.3 = \frac{\text{adjacent}}{1000}$$

   adjacent ≈ 977 feet

   $$\cos 26.4 = \frac{\text{adjacent}}{1000}$$

   adjacent ≈ 895.7 feet

   $$977 - 895.7 = 81.3$$

3. 582

   $$\tan 7 = \frac{125}{x}$$

   $$x \approx 1018$$

   $$\tan 16 = \frac{125}{y}$$

   $$y \approx 436$$

   $$1018 - 436 \approx 582$$

4. 41.4

   $$\tan 18 = \frac{x}{200}$$

   $$x \approx 64.98$$

   $$\tan 28 = \frac{x}{200}$$

   $$x \approx 106.34$$

   $$106.34 - 64.98 \approx 41.4$$