

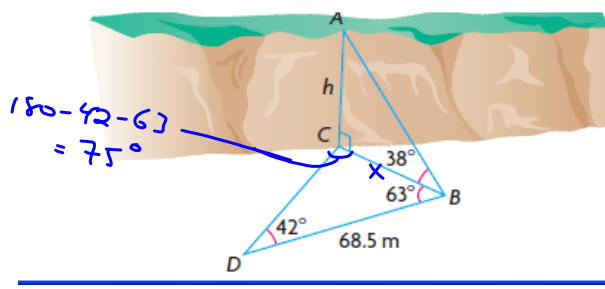
5.8

Solving Three-Dimensional Problems by Using Trigonometry

MAY 7

From point B , Manny uses a clinometer to determine the angle of elevation to the top of a cliff as 38° . From point D , 68.5 m away from Manny, Joe estimates the angle between the base of the cliff, himself, and Manny to be 42° , while Manny estimates the angle between the base of the cliff, himself, and his friend Joe to be 63° .

Find the height of the cliff.



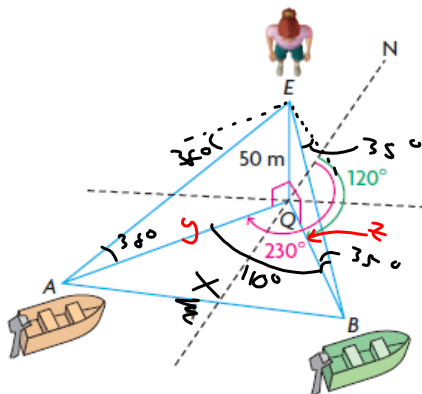
$$\frac{x}{5.742} = \frac{68.5}{5.575}$$

$$x = \frac{68.5 \cdot 5.742}{5.575} = 47.4523$$

$$\tan 38^\circ = \frac{h}{47.4523}$$

$$h = 47.4523 (\tan 38^\circ) = 37.1 \text{ m}$$

Emma is on a 50 m high bridge and sees two boats anchored below. From her position, boat A has a bearing of 230° and boat B has a bearing of 120° . Emma estimates the angles of depression to be 38° for boat A and 35° for boat B . How far apart are the boats to the nearest metre?



$$\tan 38^\circ = \frac{50}{y} \rightarrow y = \frac{50}{\tan 38^\circ} = 63.997$$

$$\tan 35^\circ = \frac{50}{z} \rightarrow z = \frac{50}{\tan 35^\circ} = 71.407$$

$$x^2 = 63.997^2 + 71.407^2 - 2(63.997)(71.407)\cos 110^\circ$$

$$x^2 = 12320$$

$$\therefore x = 110.998 \approx 111.0 \text{ m}$$

p. 332#3,4,6,7,13,15