Try #7 on page 9:

4. c) $\cos 43° = \frac{43}{g}$

$(\cos 43°) \times g = 43$

$\frac{(\cos 43°) \times g}{\cos 43°} = \frac{43}{\cos 43°}$

$g = \frac{43}{\cos 43°}$

$\boxed{g \doteq 58.8 \text{ in.}}$

Feb 5-11:25 AM

Solve Problems Using Trigonometric Ratios

The angle of elevation is the angle you make with the horizontal line when looking up, whereas the angle of depression is the angle you make with the horizontal line when looking down.

Note that angle of inclination is another name for the angle of elevation.

Example 1: While walking to school you pass a barn with a silo. Looking up to the top of the silo you estimate the angle of elevation to the top of the silo to be about 14°. At this point you were around 40 m from the silo. Using this information and your knowledge of trigonometric ratios calculate the height of the silo.

Solution: Draw a diagram
Let h represent the height of the silo.

$\tan 14° = \frac{h}{40}$

$40 \times (\tan 14°) = \cancel{40} \times \left(\frac{h}{\cancel{40}}\right)$

$\therefore \boxed{h \doteq 10}$

$\therefore$ The silo is approximately 10 m tall.

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Example 2: A video camera is mounted on the top of a 120 m tall building. When the camera tilts down 36° with the horizontal, it views the bottom of another building. If it tilts up 47° with the horizontal, it can view the top of the same building.

a) How far apart are the buildings?
b) How tall is the building viewed by the camera?

Solution: - Draw a diagram
a)
Let x represent the distance between the two buildings.

$\tan 36° = \frac{120}{x}$

$x = \frac{120}{\tan 36°}$

$x \doteq 165.2$

$\therefore$ The buildings are approx. 165.2 m apart.

b) Let y represent the difference in height.

$\tan 47° = \frac{y}{165.2}$

$165.2 \times \tan 47° = y$

$\boxed{y \doteq 177.2}$

So, $x + y = 120 + 177.2$
$= 297.2$

$\therefore$ The taller building is approx. 297.2 m tall.

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Example 3: A boat sails to a harbour. The boat sails 4.5 km on a bearing to 160°. Determine the distance of the boat straight to the shore.

Solution:

$x = 180° - 160°$
$= 20°$

$\cos 20° = \frac{d}{4.5}$

$4.5 \times \cos 20° = d$

$d \doteq 4.2$

$\therefore$ The distance of the boat to the shore is approx. 4.2 km.

Example 4: A ladder leaning against a wall at certain angles can be unstable. Some repair manuals recommend that the angle the ladder makes with the ground should be no more than 75° and no less than 60°. If the base of an 8 m ladder is placed 1.5 m from the wall,

a) is the ladder safe? Explain.
b) Determine the minimum and maximum distances the base of the ladder can be placed from the wall safely.

Hwk: Pg. 9: #5, 6, 8-14 b, 16

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