

Using Trigonometric Ratios to Find Missing Angles

Warm Up: Find the appropriate ratio in decimal form to 3 decimal places:

a) $\sin 78^\circ = \underline{0.978}$ b) $\cos 60^\circ = \underline{0.5}$ c) $\tan 35^\circ = \underline{0.700}$

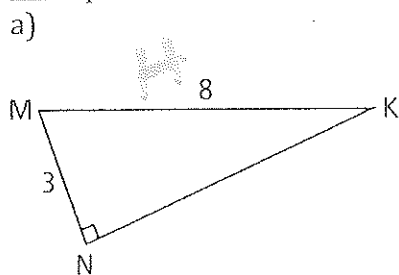
Sometimes we will be given the value of the trigonometric ratio. We can use the ratio to find the acute angle in the right triangle.

Example: Find the appropriate angle to the nearest degree for the following ratios:

a) $\sin \underline{3^\circ} = 0.0523$ b) $\cos \underline{12^\circ} = 0.978$ c) $\tan \underline{32^\circ} = 0.625$

d) $\tan \underline{89^\circ} = 57.290$ e) $\sin \underline{27^\circ} = 0.454$ f) $\cos \underline{3^\circ} = 0.999$

Example: Determine the measures of the indicated angles to the nearest tenth of a degree.

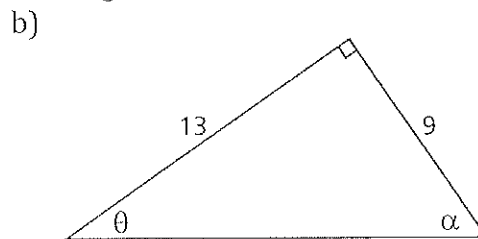


$\angle K = \underline{22.0^\circ}$

$\angle M = \underline{70.0^\circ}$

$\sin K = \frac{3}{8}$

$\cos M = \frac{3}{8}$



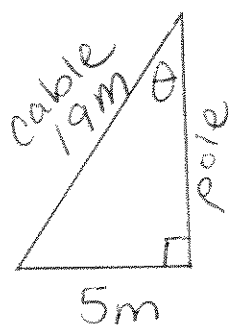
$\angle \theta = \underline{85.6^\circ}$

$\angle \alpha = \underline{55.3^\circ}$

$\tan \theta = \frac{9}{13}$

$\tan \alpha = \frac{13}{9}$

Example: A support cable is anchored to the ground 5 m from the base of a telephone pole. The cable is 19 m long. It is attached near the top of the pole. What angle, to the nearest degree, does the cable make with the pole?

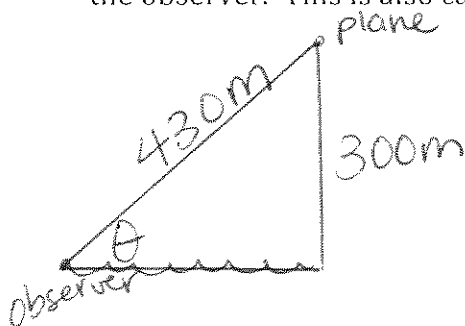


$$\sin \theta = \frac{5}{19}$$

$$\theta = 15^\circ$$

Example: An observer is sitting on a dock watching a float plane in Vancouver harbour. At a certain time, the plane is 300 m above the water and 430 m from the observer. Determine the angle of elevation of the plane measured from the observer, to the nearest degree.

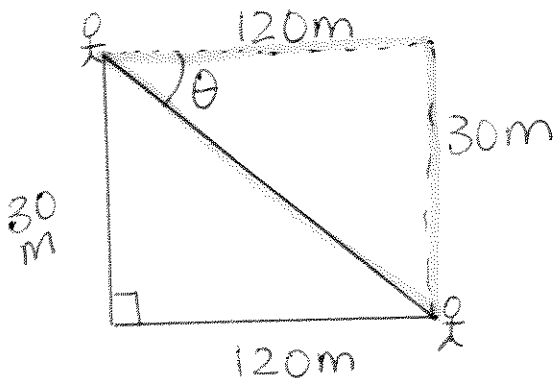
(Note: The angle of elevation of an object is the angle between the horizontal and the line of sight of the observer. This is also called the angle of inclination.)



$$\sin \theta = \frac{300}{430}$$

$$\theta = 44^\circ$$

Example: A person is in an observation deck 30 m above the ground. She sees her friend standing 120 m away from the base of the tower. Find the angle of depression between the girl and her friend.



$$\tan \theta = \frac{30}{120}$$

$$\theta = 14^\circ$$