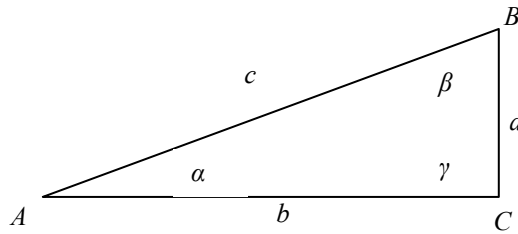


Trigonometric Applications — 9.1

Labeling a Right Triangle



Inverse Sine, Cosine and Tangent

If x is an acute angle and $\sin(\text{angle}) = \text{ratio}$ or $\sin(x) = y$
then $\sin^{-1}(\text{ratio}) = \text{angle}$ or $\sin^{-1}(y) = x$.

If x is an acute angle and $\cos(\text{angle}) = \text{ratio}$ or $\cos(x) = y$
then $\cos^{-1}(\text{ratio}) = \text{angle}$ or $\cos^{-1}(y) = x$.

If x is an acute angle and $\tan(\text{angle}) = \text{ratio}$ or $\tan(x) = y$
then $\tan^{-1}(\text{ratio}) = \text{angle}$ or $\tan^{-1}(y) = x$.

Given the indicated parts of triangle ABC with $\gamma = 90^\circ$, find the exact values of the remaining parts.

1. $\alpha = 60^\circ$ $c = 6$

Given the indicated parts of triangle ABC with $\gamma = 90^\circ$, find the approximate the remaining parts.

2. $a = 31$ $b = 9.0$

Given the indicated parts of triangle ABC with $\gamma = 90^\circ$, express the third part in terms of the first two.

3. $\beta, c; b$

4. $a, b; c$

Angle of Elevation

If an observer at point X sights an object, then the angle of that the line of sight makes with the horizontal line is the angle of elevation, if the object is above the horizontal line.

Angle of Depression

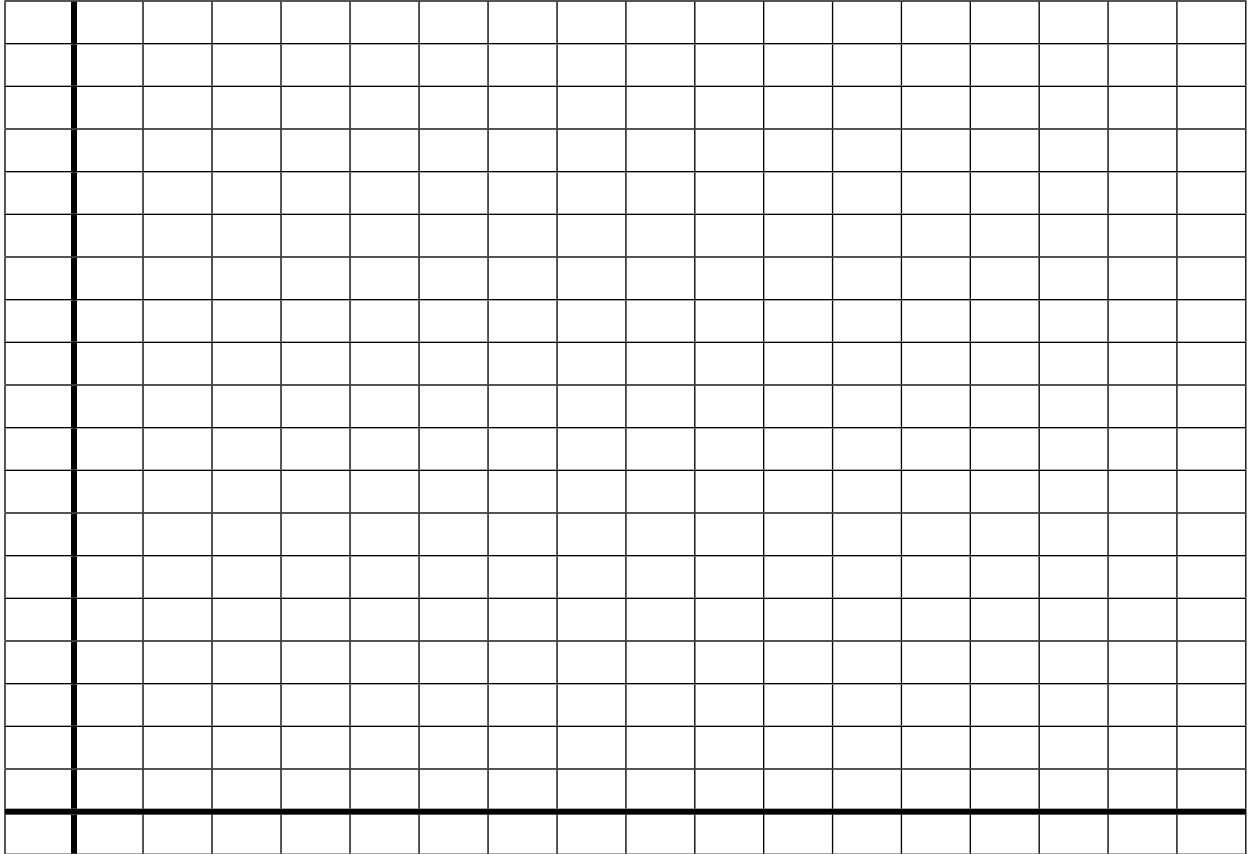
If an observer at point X sights an object, then the angle of that the line of sight makes with the horizontal line is the angle of depression, if the object is below the horizontal line.

5. From an point on level ground 135 feet from the base of a tower, the angle of elevation of the top of the tower is $57^\circ 20'$. Approximate the height of the tower. *Give your answer accurate to the nearest whole foot.*

6. A guy wire is attached to the top of a radio antenna and to a point on horizontal ground that is 40.0 meters from the base of the antenna. If the wire makes an angle of $58^\circ 20'$ with the ground, approximate the length of the wire. *Give your answer accurate to one decimal place.*

7. An airplane takes off at a 10° angle and travels at the rate of 250 ft/sec. Approximately how long does it take the airplane to reach an altitude of 15,000 feet? *Give your answer accurate to two decimal places.*
8. From a point P on level ground, the angle of elevation of the top of a tower is $26^\circ 50'$. From a point 25.0 meters closer to the tower and on the same line with P and the base of the tower, the angle of elevation of the top is $53^\circ 30'$. Approximate the height of the tower. *Give your answer accurate to one decimal place.*

9. At the County Fair, there is a Ferris-wheel that has a radius of 30 feet. It takes 10 seconds for a seat to go from its lowest height to its highest height above the ground. For clearance, the bottom of the Ferris-wheel is 5 feet above the ground. Let $h(t)$ be the height (in feet) above the ground of a certain seat at time t (in seconds), with the seat at its lowest point at $t = 0$.
- a) Sketch a graph of $h(t)$. Include at least one revolution of the Ferris wheel and label enough points to define the trigonometric function.



- b) Write an expression for $h(t)$.