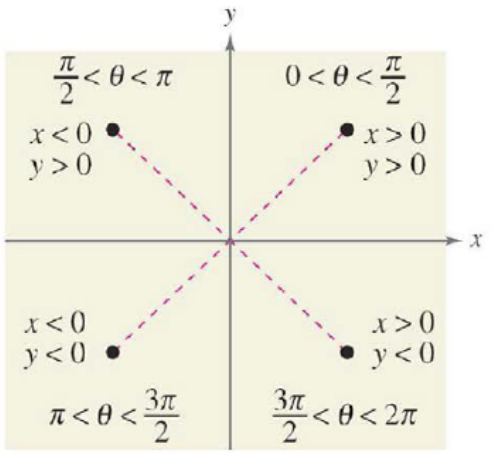
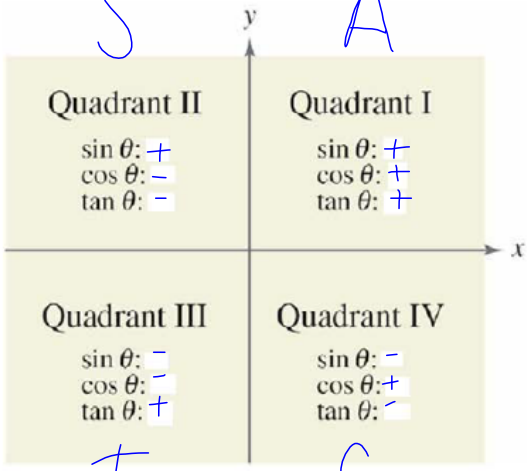
Determining the Signs of Trigonometric Functions



S A

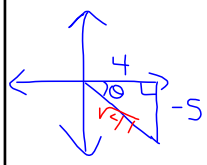


T C

θ : II or IV QI IV

6. Given $\tan\theta = -\frac{5}{4}$ and $\cos\theta > 0$, find $\sin\theta$ and $\sec\theta$.

(A)



$4^2 + (-5)^2 = c^2$

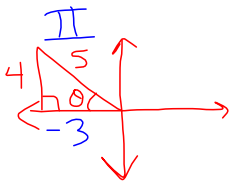
$16 + 25 = c^2$

$c = \sqrt{41}$

$\sin\theta = -\frac{5\sqrt{41}}{41}$

H/A $\sec\theta = \frac{\sqrt{41}}{4}$

7. Given $\sin\theta = \frac{4}{5}$ and $\tan\theta < 0$, find $\cos\theta$ and $\tan\theta$.



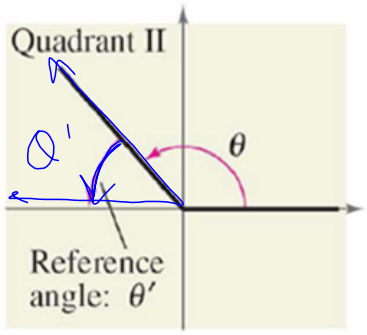
$\cos\theta = -\frac{3}{5}$

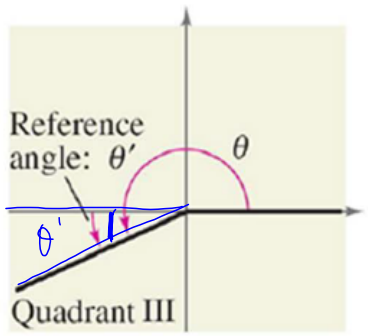
$\tan\theta = -\frac{4}{3}$

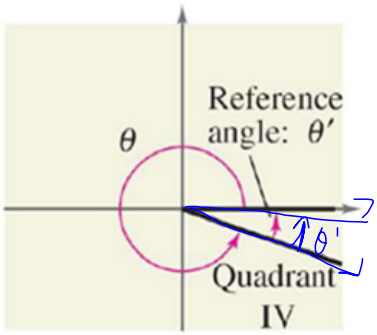
Reference Angles

must be positive

Let θ be an angle in standard position. Its reference angle is the acute angle θ' formed by the terminal side of θ and the horizontal axis. x-axis

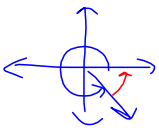






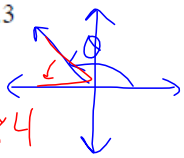
In 8 – 13, find the reference angle for each angle.

8. 300°



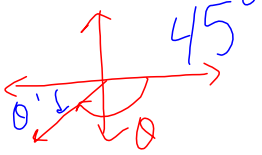
$\theta' = 60°$

9. 2.3



$\theta = 0.84$

10. -135°



$45°$

θ'

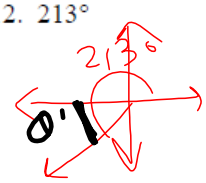
θ

11. $\frac{7\pi}{4}$

$\frac{\pi}{4}$

$33°$

12. 213°



213°

θ'

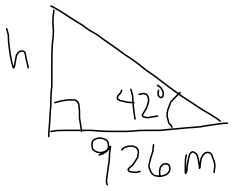
13. 1.7

1.44

4.3 - 4.4 Applications

1. Devan stands 926 meters from a point directly below the peak of a mountain. The angle of elevation between Devan and the top of the mountain is 42°.

   a. What is the height of the mountain?

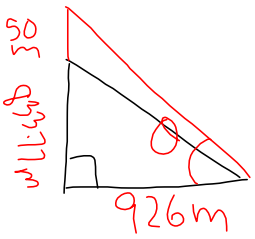


$\tan 42^\circ = \frac{h}{926}$

$h = 926(\tan 42^\circ)$

$h = 833.77\text{m}$

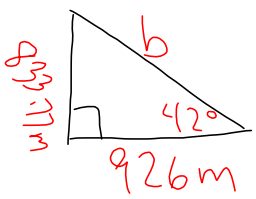
b. A tower 50 m high is built on top of the mountain. What is the angle of elevation from Devan's position to the top of the tower?



$\tan\theta = \frac{883.77}{926}$

$\tan^{-1}\left(\frac{883.77}{926}\right) = 43.66^\circ$

c. If a bird flew from Devan's position to the top of the mountain, how many meters would it travel?



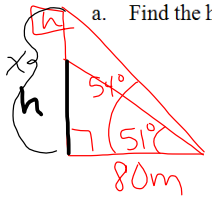
$833.77^2 + 926^2 = b^2$

$b = 1246.05\text{ m}$

2. An engineer builds a 75 foot-cellular telephone tower. Find the angle of elevation to the top of the tower at a point on level ground 50 feet from its base.

3. From a point 80 meters from the base of a building to the top of the building the angle of elevation is 51°. From the same point to the top of a flag staff on the building the angle of elevation is 54°.

a. Find the height of the building.



$\tan 51° = \frac{h}{80}$

$h = 80(\tan 51°) = 98.79m$

b. Find the combined height of the building and flagpole.

$\tan 54° = \frac{x}{80}$

$x = 80(\tan 54°) = 110.11m$

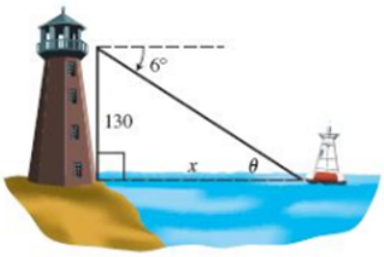
c. What is height of the flagpole alone?

$110.11m - 98.79m$

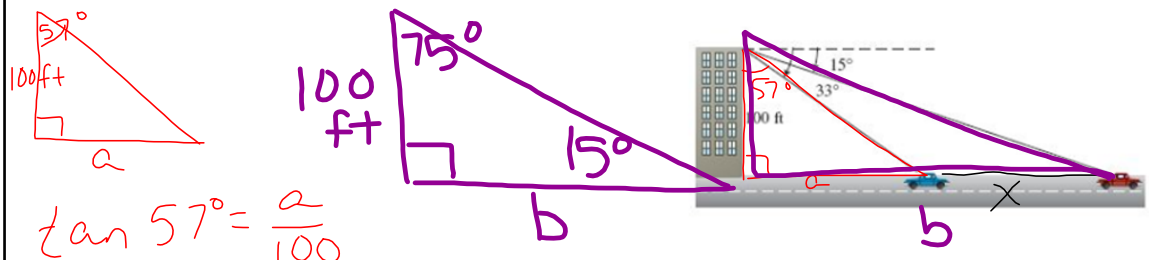
$11.32m$

d. How long must a cable be in order to stretch from the observation point to the top of the building?

4. The angle of depression of a buoy from the top of the Barnegat Bay lighthouse 130 feet above the surface of the water is 6°. Find the distance from the base of the lighthouse to the buoy.



5. From the top of a 100-ft building a man observes a car moving toward him. If the angle of depression of the car changes from 15° to 33° during the period of observation, how far does the car travel?



$\tan 57° = \frac{a}{100}$

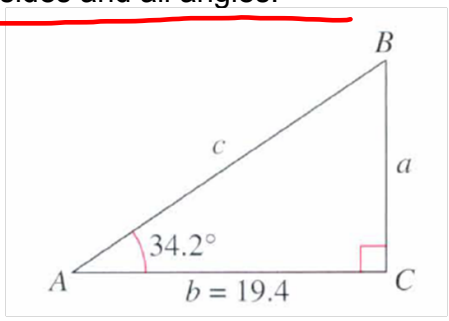
$a = 100(\tan 57°)$

$a = 153.99$ ft

Solving Right Triangles

Solve the right triangle. In other words, find the measure of all sides and all angles.

6.)



Solve the right triangle.

7.)