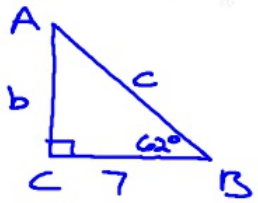
Solve the triangle ABC for all of its unknown parts. Assume C is the right angle.

$\beta = 62^\circ \quad a = 7$




$C =$

$m\angle A = 28^\circ$

$\cos 62^\circ = \frac{7}{c}$

$c = \frac{7}{\cos 62^\circ}$

$= 14.91$

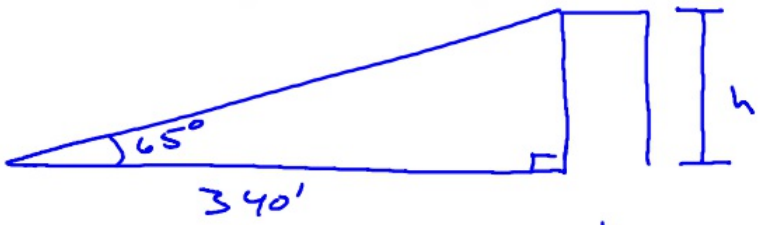
$b =$

$\tan 62^\circ = \frac{b}{7}$

$7 \tan 62^\circ = b$

$b = 13.165$

Example 6: From a point 340 feet away from the base of the Peachtree Center Plaza in Atlanta, Georgia, the angle of elevation to the top of the building is $65^\circ$. Find the height of the building.




$\tan 65^\circ = \frac{h}{340}$

$h = 340 \tan 65^\circ$

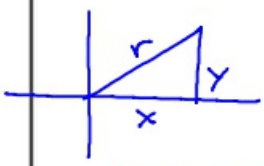
$729$ ft

| | |
|---|---|
| | |

What you'll Learn About

- Trig functions of any angle/Trig functions of real numbers
- Periodic Functions/The Unit Circle

$(x, y)$




$r = \sqrt{x^2 + y^2}$

$\sin\theta = \frac{y}{r}$

$\cos\theta = \frac{x}{r}$

$\tan\theta = \frac{y}{x}$

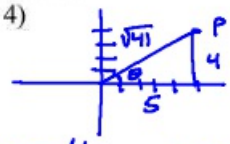
$\csc\theta = \frac{r}{y}$

$\sec\theta = \frac{r}{x}$

$\cot\theta = \frac{x}{y}$

Point P is on the terminal side of angle $\theta$. Evaluate the six trigometric functions for $\theta$.

A) (5, 4)

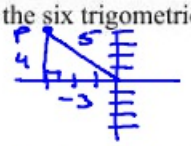



$\sin\theta = \frac{4}{\sqrt{41}}$ $\csc\theta = \frac{\sqrt{41}}{4}$

$\cos\theta = \frac{5}{\sqrt{41}}$ $\sec\theta = \frac{\sqrt{41}}{5}$

$\tan\theta = \frac{4}{5}$ $\cot = \frac{5}{4}$

B) (-3, 4)

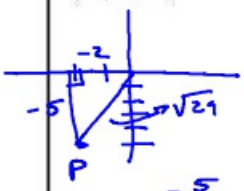



$\sin\theta = \frac{4}{5}$ $\csc\theta = \frac{5}{4}$

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

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

C) (-2, -5)




$\sin\theta = -\frac{5}{\sqrt{29}}$ $\csc\theta = \frac{\sqrt{29}}{-5}$

$\cos\theta = \frac{-2}{\sqrt{29}}$ $\sec\theta = \frac{\sqrt{29}}{-2}$

$\tan\theta = \frac{5}{2}$ $\cot\theta = \frac{2}{5}$

D) (-4, -1)

$x = -4$ $y = -1$

$r = \sqrt{17}$

$\sin\theta = \frac{-1}{\sqrt{17}}$ $\csc\theta = \frac{-\sqrt{17}}{1}$

$\cos\theta = \frac{-4}{\sqrt{17}}$ $\sec\theta = \frac{-\sqrt{17}}{4}$

$\tan\theta = \frac{1}{4}$ $\cot\theta = 4$

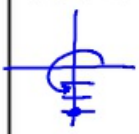
$r = \sqrt{0^2 + (-3)^2}$

$= \sqrt{0 + 9}$

$= \sqrt{9}$

$= 3$

E) (0, -3)



$\sin\theta = \frac{-3}{3} = -1$

$\cos\theta = \frac{0}{3} = 0$

$\tan\theta = \frac{-3}{0} =$ undefined

$\csc\theta = -1$

$\sec\theta = \frac{3}{0}$ - undefined

$\cot\theta = \frac{0}{-3} = 0$

F) (3, 0)

$\sin\theta = \frac{0}{3} = 0$

$\cos\theta = \frac{3}{3} = 1$

$\tan\theta = \frac{0}{3} = 0$

$\csc\theta = \frac{3}{0} \rightarrow$ undefined

$\sec\theta = 1$

$\cot\theta =$ undefined

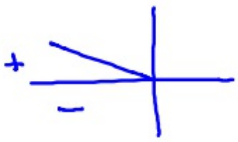


| | |
|---|---|
| sin/csc | All |
| tan/cot | cos/sec |

Determine the sign (+ or -) of the given value without the use of a calculator.

A) $\sin 53^\circ$ +

B) $\cos \frac{2\pi}{5}$ +




C) $\tan 154^\circ$ −

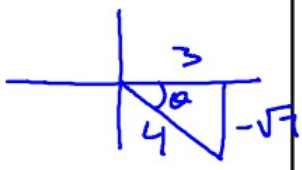
D) $\cot \frac{\pi}{9}$ +

E) $\csc 220^\circ$ −

F) $\sec \frac{8\pi}{5}$ = +

Evaluate without using a calculator

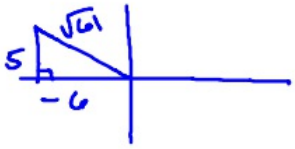
A) Find $\sin\theta$ and $\tan\theta$ if $\boxed{\cos\theta = \frac{3}{4} \text{ and } \cot\theta < 0}$




$\sin\theta = -\frac{\sqrt{7}}{4}$

$\tan\theta = -\frac{\sqrt{7}}{3}$

B) Find $\sec\theta$ and $\csc\theta$ if $\cot\theta = \frac{-6}{5}$ and $\underline{\sin\theta > 0}$


$\sec\theta = -\frac{\sqrt{61}}{6}$

$\csc\theta = \frac{\sqrt{61}}{5}$

Find the exact value of the remaining trigonometric functions. Draw your picture in the indicated quadrant.

7. $\cos\theta = \frac{3}{5}$, and $\sin\theta < 0$

8. $\sec\theta = \frac{-12}{5}$, and $\cot\theta > 0$

9. $\cot\theta = \frac{-\sqrt{3}}{5}$, and $\sec\theta < 0$

10. $\sin\theta = \frac{\sqrt{3}}{2}$, and $\sec\theta > 0$