

SLOPES AND TANGENTS

Consider a line that intersects the x -axis. Measuring counterclockwise, an angle θ is formed. In previous courses, you've seen that the tangent of θ is as follows:

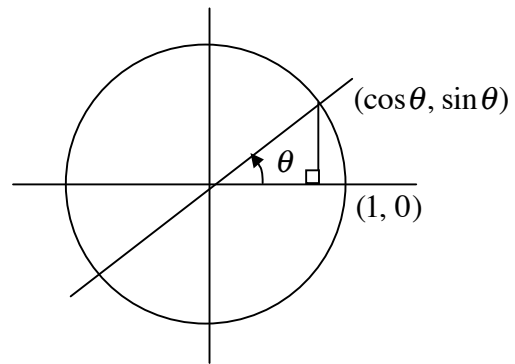
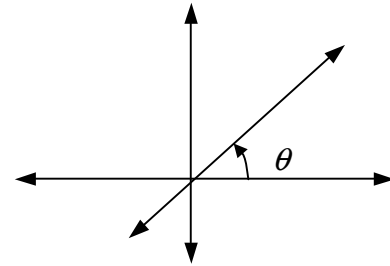
$$\tan(\theta) = \frac{\textit{opposite}}{\textit{adjacent}}.$$

If we view this in the unit circle, then we note that this may also be seen as

$$\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)} = \frac{\textit{rise}}{\textit{run}} = m,$$

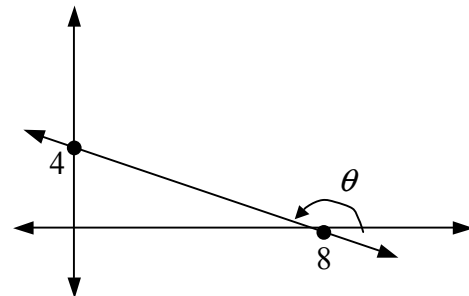
where m is the slope of the line.

In other words, if $y = mx + b$, then $\tan(\theta) = m$.



1. Find the tangent of θ for each line.
 - a. $3x - 5y + 2 = 0$

b.



2. What is the slope of a horizontal line? $m = \underline{\hspace{2cm}}$
 In this case, find:

$\theta = \underline{\hspace{2cm}}$ $\sin(\theta) = \underline{\hspace{2cm}}$ $\cos(\theta) = \underline{\hspace{2cm}}$ $\tan(\theta) = \underline{\hspace{2cm}}$

3. What is the slope of a line through $(0, 0)$ and $(3, 3)$? $m = \underline{\hspace{2cm}}$
 In this case, find:

$\theta = \underline{\hspace{2cm}}$ $\sin(\theta) = \underline{\hspace{2cm}}$ $\cos(\theta) = \underline{\hspace{2cm}}$ $\tan(\theta) = \underline{\hspace{2cm}}$

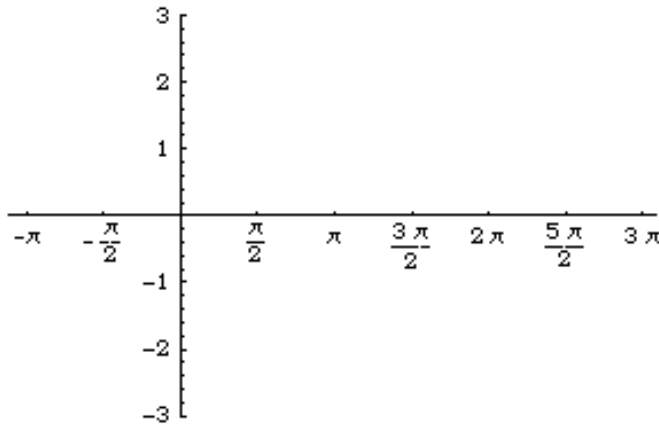
4. What is the slope of a vertical line? $m =$ _____

In this case, find:

$\theta =$ _____ $\sin(\theta) =$ _____ $\cos(\theta) =$ _____ $\tan(\theta) =$ _____

5. Considering $\tan(x) = \frac{\sin(x)}{\cos(x)}$, what is the domain of $f(x) = \tan(x)$?

6. Use ZoomTrig on your calculator to help sketch the graph of $f(x) = \tan(x)$ below.



What is the period of $\tan(x)$?

What is the range of $\tan(x)$?

7. Find the tangent of each angle.

$\tan\left(\frac{\pi}{3}\right)$

$\tan\left(\frac{5\pi}{6}\right)$

$\tan\left(\frac{3\pi}{4}\right)$

$\tan\left(\frac{-3\pi}{2}\right)$

8. Solve for x (in radians).

a. $\tan(x) = 1$

b. $\tan(x) = \sqrt{3}$

c. $\tan(x) = -1$

9. Find the tangent of each angle.

