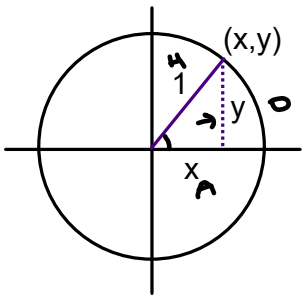
Cartesian Coordinates of a Trigonometric Point



Given $0 \leq \theta \leq \pi/2$

What trig ratio can help you find....

x: $\cos\theta = \frac{x}{1} \Rightarrow x = \cos\theta$

y: $\sin\theta = \frac{y}{1} \Rightarrow y = \sin\theta$

Very important!

Any point on the trig circle can be expressed as

$P(\theta) = (\cos\theta, \sin\theta)$

x-axis - cosine axis

y-axis - sine axis

Remarkable points

Without using a calculator, find the following points. (Hint: Special triangles will help!)

$P(0) = (\cos 0, \sin 0) = (1, 0)$

$P(\pi/2) = (\cos\frac{\pi}{2}, \sin\frac{\pi}{2}) = (0, 1)$

$P(\pi/6) = (\cos\frac{\pi}{6}, \sin\frac{\pi}{6}) = (\frac{\sqrt{3}}{2}, \frac{1}{2})$

$P(\pi/4) = (\cos\frac{\pi}{4}, \sin\frac{\pi}{4}) = (\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

$P(\pi/3) = (\cos\frac{\pi}{3}, \sin\frac{\pi}{3}) = (\frac{1}{2}, \frac{\sqrt{3}}{2})$

You can also find the Cartesian coordinates of any degree measure.

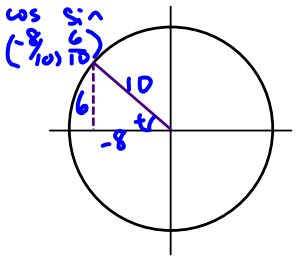
$P(40°) = (\cos 40°, \sin 40°) = (0.7660, 0.6428)$

$P(115°) = (\cos 115°, \sin 115°) = (-0.4226, 0.9063)$

Examples:

1)If P(t) = (cos t, sin 6/10) is a point located in the 2nd quadrant, determine:

A sketch helps:



a) cos t = $-\frac{8}{10} = -\frac{4}{5}$

b) sec t = $-\frac{10}{8} = -\frac{5}{4}$

c) csc t = $\frac{10}{6} = \frac{5}{3}$

2) A trigonometric point P(t) has an x-coordinate of cos t = 0.8.

a) If the point is located in the 1st quadrant, determine:

1) the y-coordinate, sin t

$(0.8)^2 + y^2 = 1$

$0.64 + y^2 = 1$

$y^2 = 0.36$

$y = \pm 0.6$

Select 0.6 since 1st Quadrant

2) the measure of t in degrees, if 0° ≤ t ≤ 90°

$P(t) = (\cos 0.8, \sin 0.6)$ * $\cos^{-1}$ and $\sin^{-1}$

$= (36.87°, 36.87°)$

$\Rightarrow t = 36.87°$

3) the measure of t in degrees, if 360° ≤ t ≤ 450°

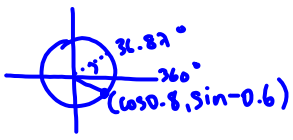
$360° + 36.87°$

$396.87°$

b) If the point is located in the 4th quadrant, determine:

1) the y-coordinate, sin t

$\sin t = -0.6$



2) the measure of t in degrees, if 270° ≤ t ≤ 360°

$360° - 36.87° = 323.13°$

3) the measure of t in degrees, if 630° ≤ t ≤ 720°

$720° - 36.87° = 683.13°$