

Equivalent Trigonometric Ratios

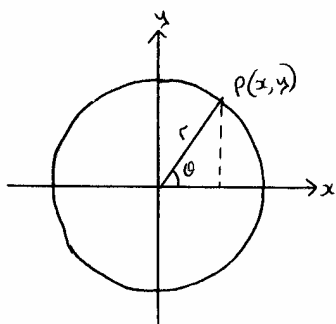
For all values of θ , the definition of $\sin \theta$, $\cos \theta$ and $\tan \theta$ are taken to be...

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

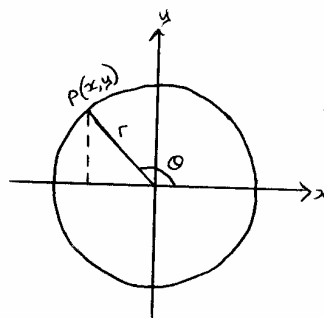
where x and y are the coordinates of P and r is the length OP

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

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



If θ is acute



If θ is obtuse

Some definitions are:-

$$\sin 90^\circ = 1$$

$$\sin(-90^\circ) = -1$$

$$\sin 180^\circ = 0$$

$$\sin(-180^\circ) = 0$$

$$\sin 270^\circ = -1$$

$$\sin(-270^\circ) = 1$$

$$\cos 180^\circ = -1$$

$$\cos(-180^\circ) = -1$$

$$\cos(-90^\circ) = 0$$

$$\cos 90^\circ = 0$$

$$\cos 450^\circ = 0$$

$$\cos(-450^\circ) = 0$$

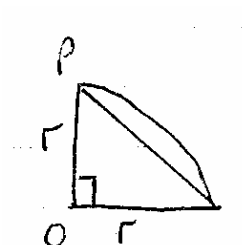
Why?

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

for $\sin 90^\circ$

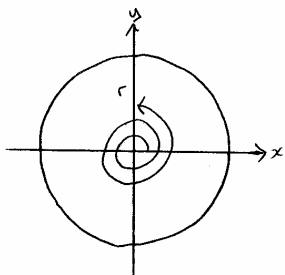
$$\sin 90^\circ = \frac{r}{r}$$

$$\sin 90^\circ = 1$$



Example 1.

Find the value of $\cos 810^\circ$



$$810^\circ = 360 + 360 + 90$$

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

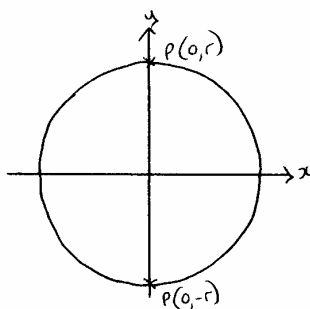
$$\cos 810^\circ = \frac{0}{r}$$

$$\cos 810^\circ = 0$$

For Tan

a) Tan is indeterminate when θ is an odd multiple of 90° .

When $y = 0$ $\tan \theta = 0$. This is because when P is at $(r, 0)$ or $(-r, 0)$



b) $\tan \theta = 0$ When θ is 0° or an even multiple of 90°

