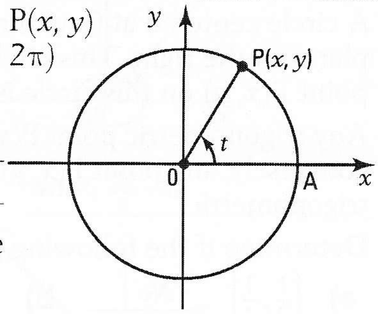
ACTIVITY 3 Locating a trigonometric point

Consider the trigonometric circle on the right, a trigonometric point $P(x, y)$ and the measure t, in radians, of the trigonometric angle AOP. $(0 \leqslant t \leqslant 2\pi)$

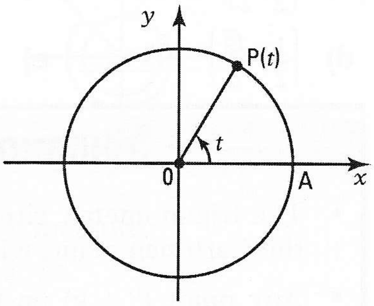


a) What is the length of arc AP? Justify your answer.

The unit circle has a radius of r = 1 unit. The length s of the arc AP is therefore s = rt = 1 × t = t units.

b) Let $P(t)$ represent the trigonometric point associated with the trigonometric angle t. $(t \in \mathbb{R})$

Determine the Cartesian coordinates (x, y) of the following trigonometric points $P(t)$.



1. $P(0)$ ***(1, 0)*** 2. $P\left(\frac{\pi}{2}\right)$ ***(0, 1)*** 3. $P(\pi)$ ***(-1, 0)***

4. $P\left(\frac{3\pi}{2}\right)$ ***(0, -1)*** 5. $P(2\pi)$ ***(1, 0)*** 6. $P\left(-\frac{\pi}{2}\right)$ ***(0, -1)***

7. $P(-\pi)$ ***(-1, 0)*** 8. $P\left(-\frac{3\pi}{2}\right)$ ***(0, 1)*** 9. $P(-2\pi)$ ***(1, 0)***

c) Is it true to say that for each real number t, there is a unique corresponding trigonometric point on the trigonometric circle? ***Yes***

d) Can we say that each trigonometric point $P(x, y)$ on the trigonometric circle corresponds to a unique trigonometric angle t? ***No***

LOCATING A TRIGONOMETRIC POINT

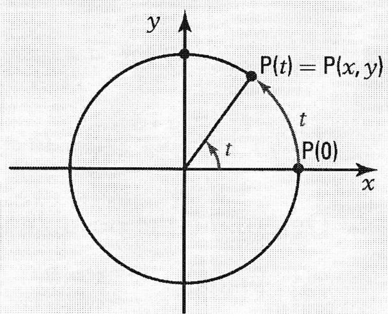
- Each real number t corresponds to a unique point on the unit circle written as $P(t)$.

  $P(t)$ is the extremity of the arc whose origin is the point $P(0)$ and whose directed measure is equal to t.

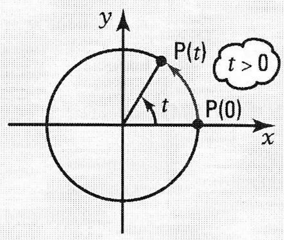
  $P(x, y)$ is the Cartesian notation of this point.

  Ex.: $P(0°) = P(1, 0)$

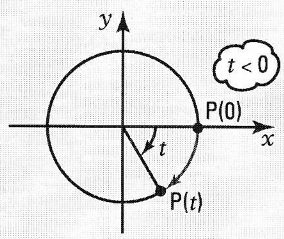
  $P(90°) = P(0, 1)$



- If t is **positive**, we locate the point $P(t)$ by moving in a **counter-clockwise** direction.



- If t is **negative**, we locate the point $P(t)$ by moving in a **clockwise** direction.



Ex.: