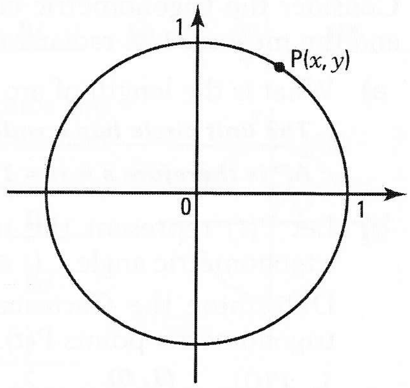
ACTIVITY 2 Trigonometric circle and trigonometric points

A circle centered at 0 with radius 1 has been drawn in the Cartesian plane on the right. This circle is called the **trigonometric circle**. Any point $P(x, y)$ on this circle is called a **trigonometric point**.



Any trigonometric point $P(x, y)$ verifies the equation $x^2 + y^2 = 1$ and, conversely, any point $P(x, y)$ that verifies the equation $x^2 + y^2 = 1$ is trigonometric.

Determine if the following points are trigonometric.

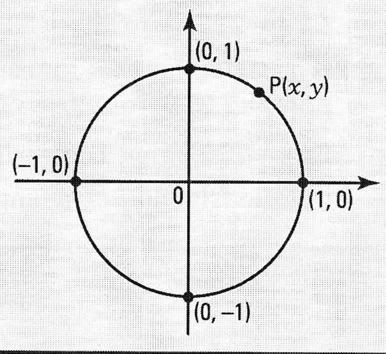
a) $\left(\frac{1}{2}, \frac{1}{2}\right)$ ***No*** **b)** $(1, 0)$ ***Yes*** **c)** $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$ ***Yes***

d) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ ***Yes*** **e)** $\left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$ ***Yes*** **f)** $(0, -1)$ ***Yes***

TRIGONOMETRIC CIRCLE AND TRIGONOMETRIC POINTS

- The **trigonometric circle** is a circle centered at 0, the origin of the Cartesian plane, with a radius of 1.
- Any point $P(x, y)$ on the unit circle is called a **trigonometric point**. We have:

$$P(x, y) \text{ is trigonometric} \Leftrightarrow x^2 + y^2 = 1$$



4. The point $\left(\frac{a-4}{13}, \frac{a+3}{13}\right)$ is a trigonometric point. Determine the possible values for a.

$\left(\frac{a-4}{13}\right)^2 + \left(\frac{a+3}{13}\right)^2 = 1$ $(a-4)^2 + (a+3)^2 = 169 \Leftrightarrow 2a^2 - 2a - 144 = 0 \Leftrightarrow a = 9$ *or* $a = -8$.

5. Determine the possible values for x if the following points are trigonometric.

a) $P(x, 1)$ $x = 0$

b) $P\left(x, \frac{1}{2}\right)$ $x = -\frac{\sqrt{3}}{2}$ *or* $x = \frac{\sqrt{3}}{2}$

c) $P(x, 0.6)$ $x = -0.8$ *or* $x = 0.8$

d) $P\left(x, \frac{5}{13}\right)$ $x = -\frac{12}{13}$ *or* $x = \frac{12}{13}$

6. In each of the following cases, determine the coordinates of the trigonometric point P.

a) $P\left(\frac{1}{2}, y\right) \in$ 4th quadrant. $P\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

b) $P(-0.6, y) \in$ 2nd quadrant. $P(-0.6, 0.8)$

c) $P\left(\frac{\sqrt{3}}{2}, y\right) \in$ 1st quadrant. $P\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

d) $P\left(-\frac{1}{2}, y\right) \in$ 3rd quadrant. $P\left(-\frac{1}{2}, \frac{-\sqrt{3}}{2}\right)$