

Determine the coordinates of the following trig points.

a) $P(220^\circ) = \left(\cos 220^\circ, \sin 220^\circ\right) = (-0.7660, -0.6428)$

b) $P(105^\circ) = \left(-0.2588, 0.9659\right)$

c) $P(330^\circ) = \left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

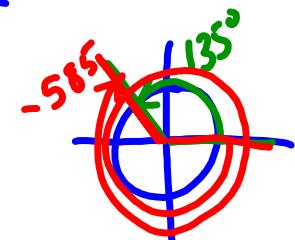
Angles that have the same terminal arm, but different rotations, are called **coterminal**.

They are created by going around the circle more than once, or by going in a clockwise (-) direction.

Examples: 135° and 495°



135° and -585°



Coterminal angles have the same trig point

coordinates. $P(135^\circ) = P(495^\circ) = P(-585^\circ) = \left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

Example: Determine the exact values of the coordinates of following points.

a) $P(1860^\circ) \Rightarrow 5(360^\circ) = 1800$ $1860 = \underline{1800} + \underline{60^\circ}$



$\frac{1860^\circ}{360^\circ} \cdot \sqrt{3} \dots \left(\frac{1}{2}, \frac{\sqrt{3}}{2} \right)$

1860° is coterminal with 60°

b) $P(1035^\circ) \Rightarrow 720^\circ + 315^\circ$ ~~(~~ $= \left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right)$

2. ...

c) $P(-840^\circ) = -720^\circ + -120^\circ = P(240^\circ) = \left(-\frac{1}{2}, -\frac{\sqrt{3}}{2} \right)$

~~(~~ \cancel{P}

Example: In which quadrant would you find trigonometric point P following a rotation of...

a) 882° ? $\underline{720^\circ} + \underline{162^\circ}$

Q_2

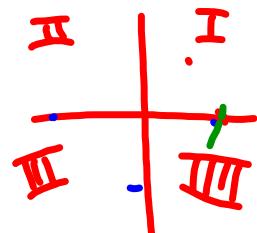
b) 4196° ?
 $3960^\circ + 236^\circ$

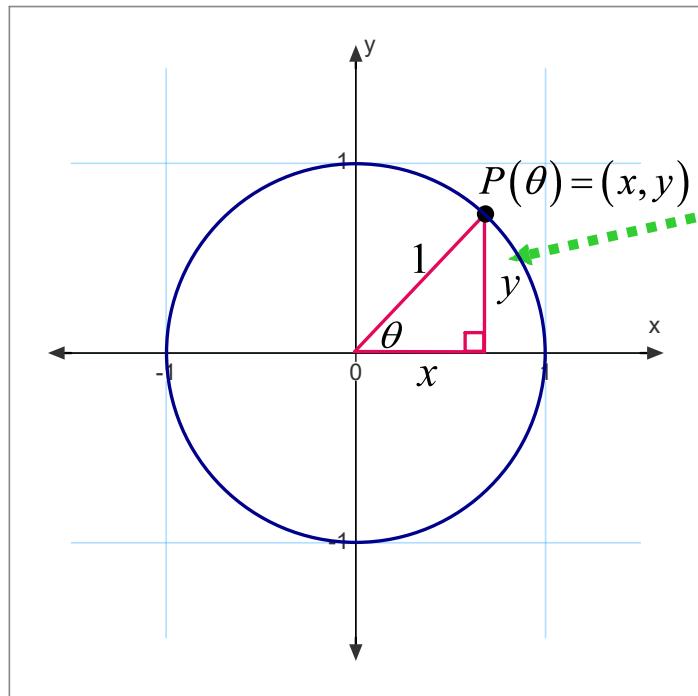
Q_3

c) $-1722^\circ = -1440^\circ + -282^\circ$

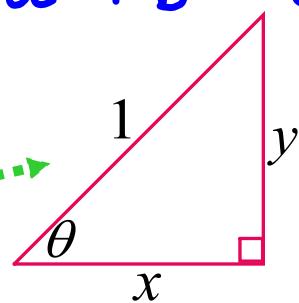
$4\text{turns } x$

Q_1





$$a^2 + b^2 = c^2$$



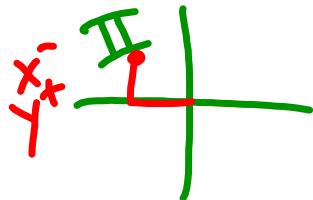
$$x^2 + y^2 = 1$$

or

$$\cos^2 \theta + \sin^2 \theta = 1$$

Pythagoras Identity

Determine the missing value (exact) of a trigonometric point in quadrant 2, if $P(\theta) = \left(x, \frac{5}{13}\right)$.



$$x^2 + y^2 = 1 \quad \text{or} \quad \cos^2 \theta + \sin^2 \theta = 1$$

$$x^2 + \left(\frac{5}{13}\right)^2 = 1$$

$$x^2 + \frac{25}{169} = 1$$

$$x^2 + \frac{25}{169} - \frac{25}{169} = 1 - \frac{25}{169}$$

$$x^2 = \frac{169}{169} - \frac{25}{169} = \frac{144}{169}$$

$$\rightarrow x^2 = \frac{144}{169}$$

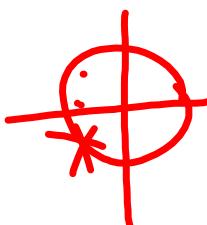
$$x = \sqrt{\frac{144}{169}} = \frac{\sqrt{144}}{\sqrt{169}}$$

$$x = \pm \frac{12}{13}$$

$$\boxed{x = -\frac{12}{13}}$$

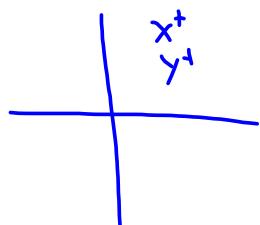
Determine the exact value of the y -coordinate of a trigonometric point in quadrant 3, if $P(\theta) = \left(-\frac{15}{17}, y\right)$

$$\begin{aligned} x^2 + y^2 &= 1 \\ \left(-\frac{15}{17}\right)^2 + y^2 &= 1 \\ \frac{225}{289} + y^2 &= 1 \end{aligned}$$

$$\begin{aligned} 1 - \frac{225}{289} &= y^2 \\ \frac{289 - 225}{289} &= y^2 \\ \frac{64}{289} &= y^2 \\ \pm \frac{8}{17} &= y \end{aligned}$$


$$-\frac{8}{17} = y$$

Determine the exact value of the x - coordinate of a trigonometric point in quadrant 1, if $P(\theta) = \left(x, \frac{7}{25}\right)$.



$$x^2 + \left(\frac{7}{25}\right)^2 = 1$$

$$x^2 + \frac{49}{625} = \frac{625}{625}$$

$$x^2 = \frac{625 - 49}{625}$$

$$x^2 = \frac{576}{625}$$

$$x = \pm \frac{24}{25}$$

$$x = \frac{24}{25}$$