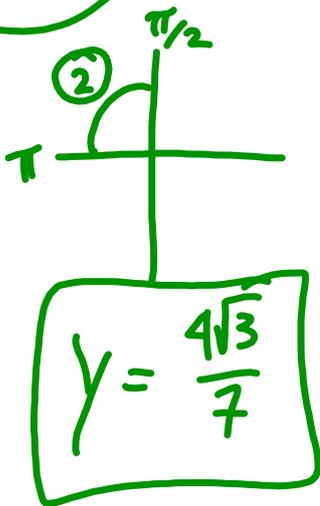


Given the trigonometric point $P(\theta) = \left(-\frac{1}{7}, y\right)$, where

$\frac{\pi}{2} \leq \theta \leq \pi$, determine the exact value of y .



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

$$\left(-\frac{1}{7}\right)^2 + y^2 = 1$$

$$\frac{1}{49} + y^2 = 1$$

$$y^2 = 1 - \frac{1}{49}$$

$$y^2 = \frac{99}{49} - \frac{1}{49}$$

$$y = \frac{48}{49}$$

$$y = \pm \frac{\sqrt{48}}{7}$$

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

$$y = \pm \frac{\sqrt{16 \cdot 3}}{7}$$

$$y = \pm \frac{4\sqrt{3}}{7}$$

Given the trigonometric point $P(\theta) = \left(\frac{\sqrt{7}}{4}, -\frac{3}{4} \right)$, determine the exact value of

$$\begin{aligned} \text{a) } \sec \theta &= \frac{4}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} \\ &= \frac{4\sqrt{7}}{7} \end{aligned}$$

$$\begin{aligned} \text{b) } \tan \theta &= \frac{\sin \theta}{\cos \theta} = \frac{-\frac{3}{4}}{\frac{\sqrt{7}}{4}} \\ &= \frac{-3}{\sqrt{7}} \cdot \frac{4}{\sqrt{7}} \\ &= \frac{-3}{\sqrt{7}} \\ &= \frac{-3\sqrt{7}}{7} \end{aligned}$$

Arc Length

Recall: $\frac{\text{central angle}}{360^\circ} = \frac{\text{arc length}}{\text{circumference}}$

Replacing with radians: $\frac{\theta}{2\pi} = \frac{\overset{?}{arc}}{2\pi r}$

$$\frac{\cancel{2\pi r}\theta}{\cancel{2\pi}} = arc$$

Arc Length: $L = \theta r$

Note: θ ^{central angle} must be in radians.

Examples:

1. Determine the length of the arc, given
 $r = 12\text{cm}$ and $\theta = \frac{2\pi}{3}\text{rad}$.

$$L = \theta r$$

$$L = \frac{2\pi}{3} \times 12$$

$$L = \frac{24\pi}{3}$$

$$L = 8\pi\text{cm} \text{ or } 25.13\text{cm}$$

2. Determine the diameter of the circle if

$$\theta = \frac{5\pi}{6} \text{ rad and } L = 18 \text{ cm.}$$

$$L = \theta r$$

$$6 \cdot 18 = \left(\frac{5\pi}{6} r \right) \cdot 6$$

$$108 = 5\pi r$$

$$\frac{108}{5\pi} \text{ cm} = r$$

$$r \cdot 2 \quad \therefore d = \frac{216}{5\pi} \text{ cm} \quad \text{or } 13.751 \text{ cm}$$

3. Determine the measure of the central angle, if $L = 36\text{cm}$ and $r = 18\text{cm}$.

$$L = \theta r$$

$$36 = 18\theta$$

$$2\text{rad} = \theta$$

4. Determine the length of the arc (using $L = \theta r$)
if $r = 5m$ and $\theta = 400^\circ$

$$\frac{400^\circ}{180^\circ} = \frac{\theta}{\pi}$$

$$\frac{400\pi}{180} = \theta$$

$$\frac{20\pi}{9} = \theta$$

$$L = \theta r$$

$$L = \frac{20\pi}{9} \times 5$$

$$L = \frac{100\pi}{9} m \quad \text{or} \quad 34.91m$$

The radius of a fairground Ferris wheel is 6 m. If a ride consists of a dozen revolutions, then how far have you, as a passenger, travelled?

$$L = \theta \cdot r$$

$$\begin{aligned} L &= 24\pi \cdot 6\text{m} \\ &= 144\pi\text{m} \\ &= 452.4\text{m} \end{aligned}$$

$$1 \text{ revolution} = 2\pi \text{ rad}$$

$$12 \text{ rev} = \boxed{24\pi \text{ rad}}$$

$$\theta = 24\pi$$