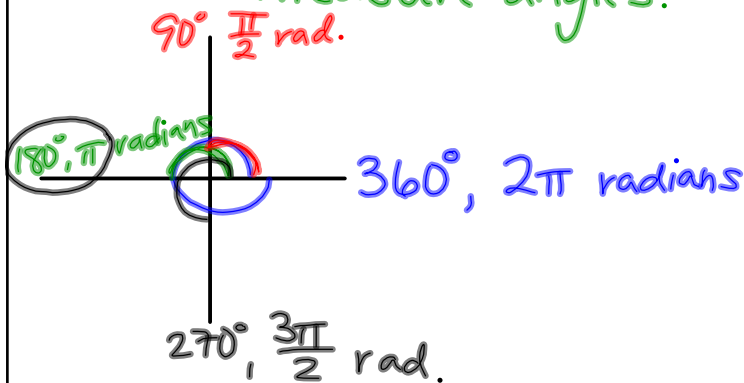


13.4 Radian Measure & Arc Length

- Obj: 1. Convert from degrees to radians & vice versa.
 2. Find arc length & area of a sector.

Radians: unit of measurement used to measure angles.



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Conversion: need to multiply by a ratio.

Convert 40° to radians

$$\star \frac{180^\circ}{\pi \text{ rad.}} = 1$$

$$\star \frac{\pi \text{ rad.}}{180^\circ} = 1$$

$$40^\circ \cdot \frac{\pi \text{ rad.}}{180^\circ}$$

$$\frac{40\pi}{180} = \frac{2\pi}{9} \text{ rad.}$$

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Convert 3π rad. to degrees.

$$3\pi \text{ rad.} \cdot \frac{180^\circ}{\pi \text{ rad.}} = 3 \cdot 180^\circ = 540^\circ$$

$$-120^\circ \cdot \frac{\pi \text{ rad.}}{180^\circ}$$

$$\frac{-120\pi}{180} = -\frac{2\pi}{3}$$

$$\frac{3\pi}{4} \text{ rad.} \cdot \frac{180^\circ}{\pi \text{ rad.}}$$

$$\frac{3 \cdot 180^\circ}{4} = 135^\circ$$

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1, 5, 9, 13

$$1. 135^\circ \cdot \frac{\pi}{180} = \frac{135\pi}{180} = \frac{3\pi}{4}$$

$$5. 105^\circ \cdot \frac{\pi}{180} = \frac{105\pi}{180} = \frac{7\pi}{12}$$

$$9. \frac{5\pi}{2} \text{ rad.} \cdot \frac{180^\circ}{\pi \text{ rad.}} = \frac{5 \cdot 180^\circ}{2} = 450^\circ$$

$$13. 8.25 \text{ rad.} \cdot \frac{180^\circ}{\pi \text{ rad.}} = \frac{8.25 \cdot 180^\circ}{\pi} = 472.69^\circ$$

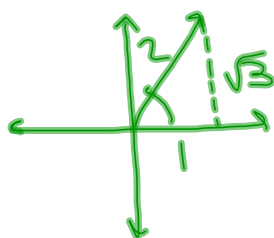
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Find the exact value:

$$\sin\left(\frac{\pi}{3}\right)$$

$$\frac{\pi}{3} \cdot \frac{180^\circ}{\pi} = 60^\circ$$

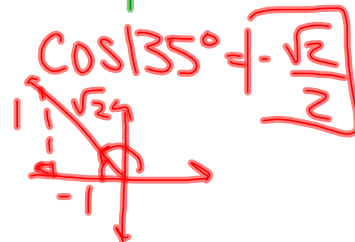
$$\sin 60^\circ = \frac{\sqrt{3}}{2}$$



$$\cos\left(\frac{3\pi}{4}\right)$$

$$\frac{3\pi}{4} \cdot \frac{180^\circ}{\pi}$$

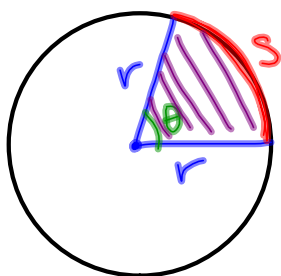
$$\frac{3 \cdot 180^\circ}{4} = 135^\circ$$



$$\cos 135^\circ = -\frac{\sqrt{2}}{2}$$

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Arc Length



$$s = r\theta$$

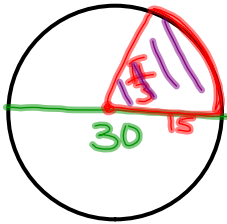
Area of a sector

$$A = \frac{1}{2}r^2\theta$$

θ has to be in radians

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A central angle in a circle w/ diameter 30 meters is $\frac{\pi}{3}$ radians. Find the arc length & area of the sector.



$$S = r\theta$$
$$= 15 \cdot \frac{\pi}{3} = 5\pi \approx 15.7 \text{ m}$$

$$A = \frac{1}{2}r^2\theta$$
$$= \frac{1}{2}(15^2)\left(\frac{\pi}{3}\right) \approx 117.81 \text{ m}^2$$

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