Angles are measured in two units

DEGREE | RADIAN

$$\boxed{180 \text{ degrees} = \pi \text{ radians}}$$

Famous angles to be memorized in terms of π

$90^\circ \longrightarrow \frac{\pi}{2}$

$45^\circ \longrightarrow \frac{\pi}{4}$

$30^\circ \longrightarrow \frac{\pi}{6}$

$60 \longrightarrow \frac{\pi}{3}$

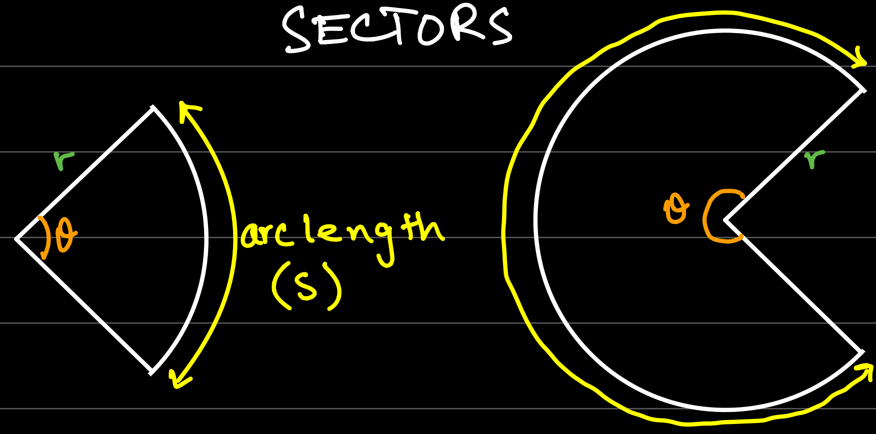
$360 \longrightarrow 2\pi$

Syllabus : Recall these:

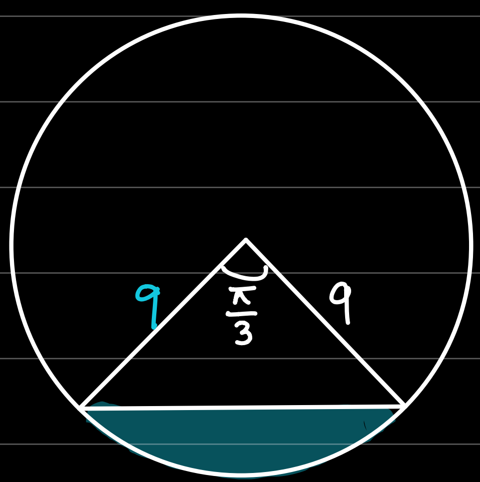
Degrees	0	30	45	60	90
Radian	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0

tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞ infinite.

SECTORS



	DEGREE	RADIAN
ARC LENGTH	Arc Length $= \frac{\theta}{360} \times 2\pi r$	$S = r\theta$
Area of Sector	$A = \frac{\theta}{360} \times \pi r^2$	$A = \frac{1}{2} r S$ $A = \frac{1}{2} r^2 \theta$



Find shaded region:

Shaded area = Sector − Triangle.

$$= \frac{1}{2} r^2\theta - \frac{1}{2}\,\square\,\square \sin \bigcirc$$

$$\text{Shaded} = \frac{1}{2}(9)^2\left(\frac{\pi}{3}\right) - \frac{1}{2}\,\boxed{9}\,\boxed{9}\sin\left(\frac{\pi}{3}\right)$$

Area $\quad \frac{}{2} (\;)\left(\frac{}{3}\right) \quad \frac{}{2}$

Shaded Area =

Change calculator to radian MODE.

RADIAN MODE:

CHANGE CALCULATOR MODE ONLY WHEN ANGLE IS IN RADIANS AND YOU ARE DEALING WITH

$\sin(\quad)$ $\quad\quad$ $\sin^{-1}(\quad)$

$\cos(\quad)$ $\quad\quad$ $\cos^{-1}(\quad)$

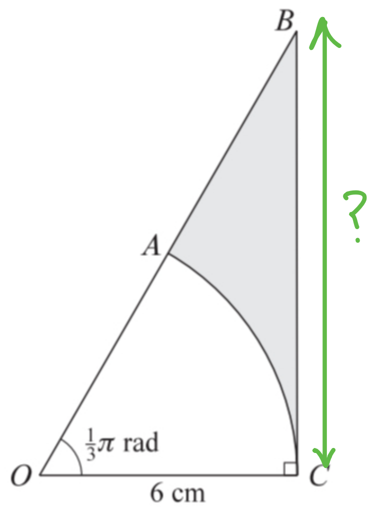
$\tan(\quad)$ $\quad\quad$ $\tan^{-1}(\quad)$

2

$\tan\frac{\pi}{3} = \frac{BC}{6}$

$\sqrt{3} = \frac{BC}{6}$

$BC = 6\sqrt{3}$



$= 6\sqrt{3}$

In the diagram, AC is an arc of a circle, centre O and radius 6 cm. The line BC is perpendicular to OC and OAB is a straight line. Angle $AOC = \frac{1}{3}\pi$ radians. Find the area of the shaded region, giving your answer in terms of π and $\sqrt{3}$. [5]

Area of shaded = Triangle − Sector

$= \frac{1}{2}(OC)(BC) - \frac{1}{2}r^2\theta$

$= \frac{1}{2}(6)(\;?\;) - \frac{1}{2}(6)^2\left(\frac{\pi}{\;}\right)$

$$= \frac{1}{2}(6)(6\sqrt{3}) - \frac{1}{2}(6)^2\left(\frac{\pi}{3}\right)$$

Shaded Area $= 18\sqrt{3} - 6\pi$

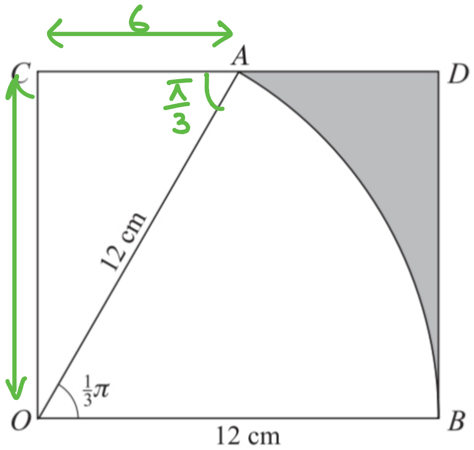
6

$\sin\frac{\pi}{3} = \frac{OC}{12}$

$\frac{\sqrt{3}}{2} = \frac{OC}{12}$

$OC = 12 \times \frac{\sqrt{3}}{2}$

$OC = 6\sqrt{3}$



$\cos\frac{\pi}{3} = \frac{AC}{12}$

$\frac{1}{2} = \frac{AC}{12}$

$AC = 6$

In the diagram, AOB is a sector of a circle with centre O and radius 12 cm. The point A lies on the side CD of the rectangle $OCDB$. Angle $AOB = \frac{1}{3}\pi$ radians. Express the area of the shaded region in the form $a(\sqrt{3}) - b\pi$, stating the values of the integers a and b. [6]

Shaded Area = Rectangle − Sector − Triangle

$$= (OC)(OB) - \frac{1}{2}r^2\theta - \frac{1}{2}(OC)(AC)$$

$$= (6\sqrt{3})(12) - \frac{1}{2}(12)^2\left(\frac{\pi}{3}\right) - \frac{1}{2}(6\sqrt{3})(6)$$

$$= 72\sqrt{3} - 24\pi - 18\sqrt{3}$$

$$= 54\sqrt{3} - 24\pi$$

$$a\sqrt{3} - b\pi$$

$a = 54$, $-b = -24$

$b = 24.$

16

(ii) $\cos 0.6 = \dfrac{AX}{5}$

$AX = 5\cos 0.6 = 4.126$

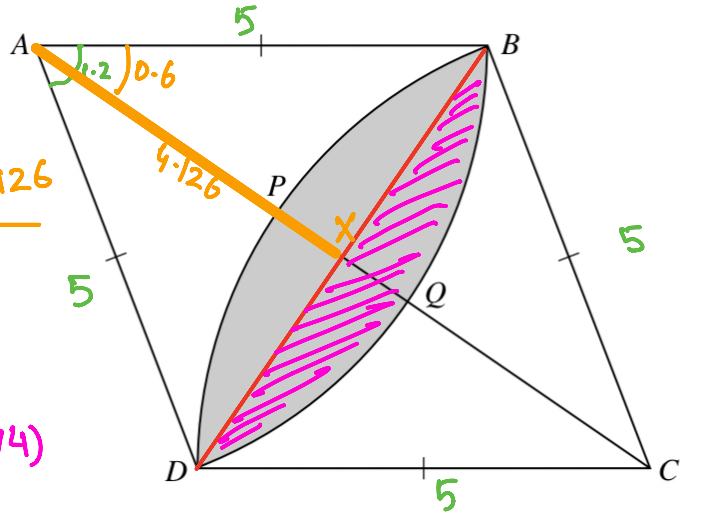
$XQ = AQ - AX$

$= 5 - 4.126$

$XQ = 0.874$

$PQ = 2(XQ) = 2(0.874)$

$= 1.748$



The diagram shows a rhombus $ABCD$. Points P and Q lie on the diagonal AC such that BPD is an arc of a circle with centre C and BQD is an arc of a circle with centre A. Each side of the rhombus has length 5 cm and angle $BAD = 1.2$ radians.

(i) Find the area of the shaded region $BPDQ$. [4]

(ii) Find the length of PQ. [4]

Pink region = Sector ABQD − $\triangle$ ABD

$= \frac{1}{2}(5)^2(1.2) - \frac{1}{2}(5)(5)\sin 1.2$

Pink region = 3.34

SHADED AREA = $2 \times 3.34 = 6.68$