3.1. Radian Measure
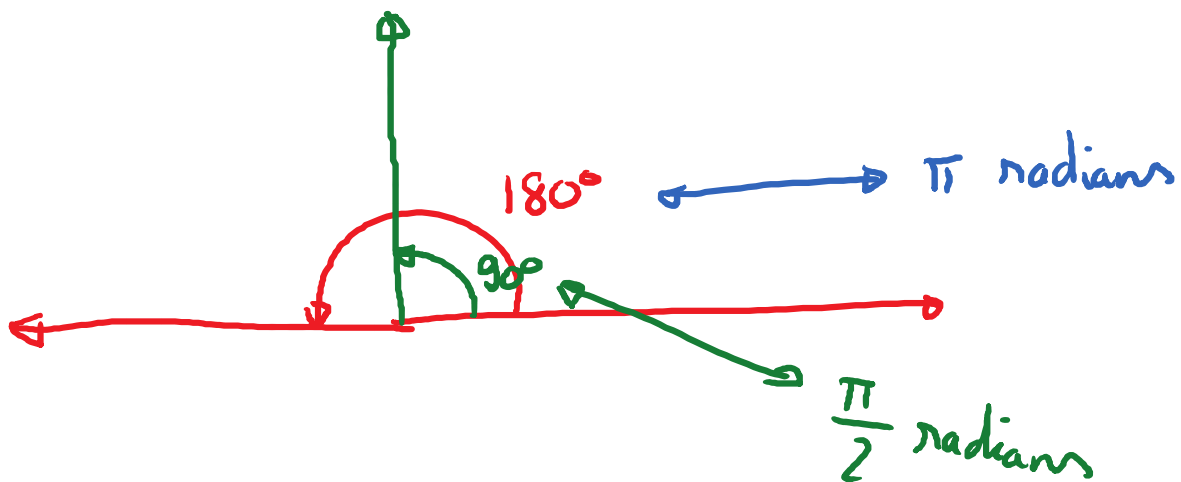
Obj 1: Define Radian Measure and convert between Radian Measure and the Degree Measure.

$360°$ angle $\longleftrightarrow$ 2π radians

$180°$ $\longleftrightarrow$ π radians

$90°$

$\dfrac{\pi}{2}$ radians

$60°$ angle $\longleftrightarrow$ $\dfrac{\pi}{3}$ radians

$61°$ angle $\longleftrightarrow$ $61 \cdot \dfrac{\pi}{180} = \dfrac{61\pi}{180}$

$\approx 0.3388\pi$

(1) To convert from a degree measure to a radian measure, we multiply the degree measure by $\dfrac{\pi}{180}$.

E.g. * Convert $45°$ to radian measure.

$$45° = \left(45 \cdot \frac{\pi}{180}\right) \text{ radian}$$

$$= \frac{45\pi}{180} = \frac{\pi}{4} \text{ radian}$$

* Convert $9°$ to radian measure

$$9° = \left(9 \cdot \frac{\pi}{180}\right) \text{ radian}$$

$$= \left(\frac{9\pi}{180}\right) \text{ radian} = \frac{\pi}{20} \text{ radian}$$

* Convert $-270°$ to radian measure.

$$-270 \cdot \frac{\pi}{180} = -\frac{270\pi}{180} = -\frac{3\pi}{2} \text{ radian}.$$

② To convert from a radian measure to a degree measure, we multiply the radian measure by $\left(\dfrac{180}{\pi}\right)^{\circ}$.

E.g.: Convert $\dfrac{5\pi}{6}$ radian to degrees

$$\dfrac{5\pi}{6} \text{ radian} = \left(\dfrac{5\pi}{6} \cdot \dfrac{180}{\pi}\right)^{\circ}$$

$$= 150^{\circ}$$

* 6 radian $\longrightarrow$ convert to degrees :

$$6 \text{ radian} = 6 \cdot \dfrac{180}{\pi} = \dfrac{1080}{\pi}$$

$$\approx 343.775^{\circ}$$

Degrees	Radians	$\sin\alpha$	$\cos\alpha$	$\tan\alpha$
0°	0	0	1	0
30°	$\dfrac{\pi}{6}$	$\dfrac{1}{2}$	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{\sqrt{3}}$
45°	$\dfrac{\pi}{4}$	$\dfrac{1}{\sqrt{2}}$	$\dfrac{1}{\sqrt{2}}$	1
60°	$\dfrac{\pi}{3}$	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{2}$	$\sqrt{3}$
90°				
120°				
150°				
180°				
360°				

Obj 2: Find trig function values of

angles given in radian measure.

E.g. $\tan\left(\dfrac{2\pi}{3}\right) = $?

1st step : convert to degree : $\dfrac{2\pi}{3} \cdot \dfrac{180}{\pi} = 120°$.

2nd step: $\tan\left(120°\right) = -\sqrt{3}$.

E.g. $\cos\left(-\dfrac{4\pi}{3}\right) = $?

1st step: convert to degree : $-\dfrac{4\pi}{3} \cdot \dfrac{180}{\pi} = $

$-240°$.

2nd step: $\cos\left(-240°\right) = -\dfrac{1}{2}$.