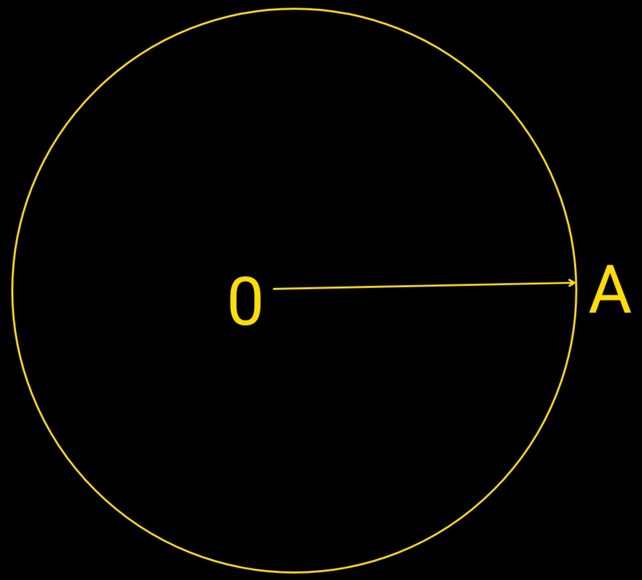
Centisimal System

(Base 100 System)

Smaller units : Minute, second.

One complete Rotation is divided into 400 equal parts and each part is called 1 Grade.



$$1\ \text{Grade} = \frac{1}{400\ \text{part of}\ 1\ \text{complete Rotation}}$$

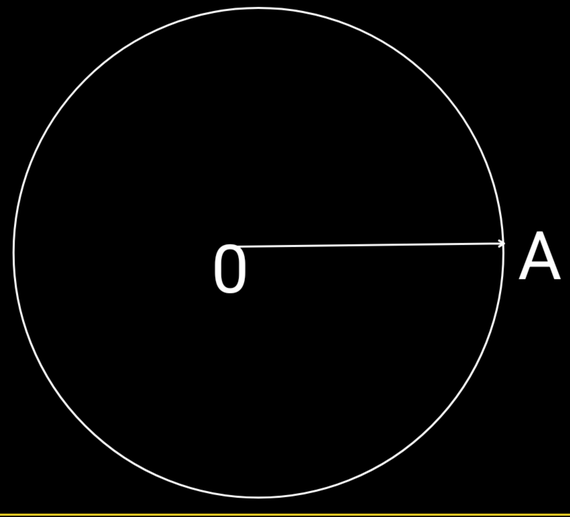
$$1\ \text{Minute} = \frac{1\ \text{Grade}}{100}$$

One complete Rotation = 400 Grades

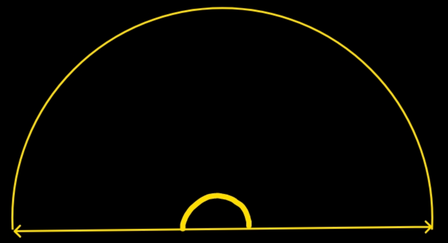
$$1\ \text{second} = \frac{1\ \text{Minute}}{100}$$

Circular System

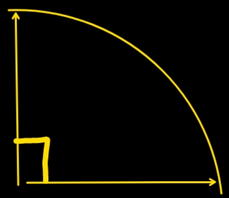
- Internationally Adopted system
- Angle is Measured in Radian



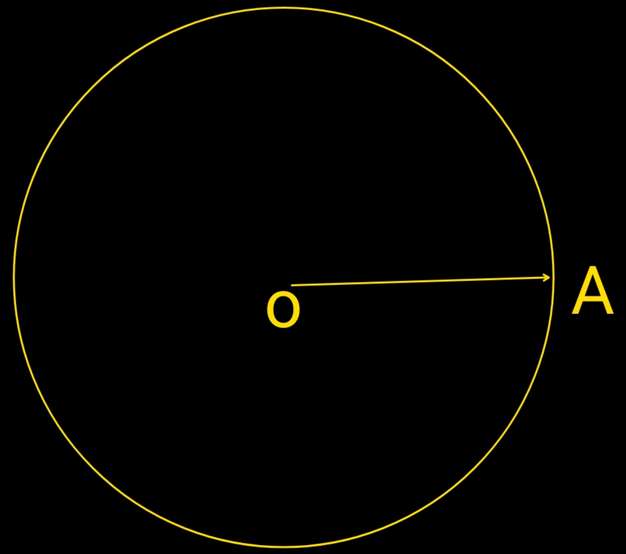
One complete Rotation $= 2\pi$ Radian



Half Rotation $= \pi$ Radian



Quarter Rotation $= \frac{\pi}{2}$ Radian



1 complete Rotation = 360° = 400 Grades = 2π Radian

360° = 400 Grades = 2π Radian

Half Rotation ← 180° = 200 Grades = π Radian

Quarter Rotation ← 90° = 100 Grades = $\frac{\pi}{2}$ Radian

Conversion : Degree to Radian

$180^\circ = \pi$ Radian

$1^\circ = \frac{\pi}{180}$ Radian

$x^\circ = \frac{\pi}{180} \cdot x$ Radian

Degree $\xrightarrow{\times \frac{\pi}{180}}$ Radian

Convert the following into Radian

1. $15^\circ \longrightarrow 15 \times \frac{\pi}{180}$ Radian $= \frac{\pi}{12}$ Radian
2. $30^\circ \longrightarrow \frac{\pi}{6}$ Radian
3. $45^\circ \longrightarrow \frac{\pi}{4}$ Radian
4. $60^\circ \longrightarrow \frac{\pi}{3}$ Radian
5. $75^\circ \longrightarrow 75 \times \frac{\pi}{180} = \frac{5\pi}{12}$ Radian
6. $90^\circ \longrightarrow \frac{\pi}{2}$ Radian
7. $120^\circ \longrightarrow 120 \times \frac{\pi}{180} = \frac{2\pi}{3}$ Radian
8. $135^\circ \longrightarrow 135 \times \pi/180 = \frac{3\pi}{4}$ Radian
9. $150^\circ \longrightarrow 150 \times \pi/180 = \frac{5\pi}{6}$ Radian
10. $180^\circ \longrightarrow 180^\circ \times \pi/180 = \pi$ Radian

Radian to Degree

π Radian $= 180^\circ$

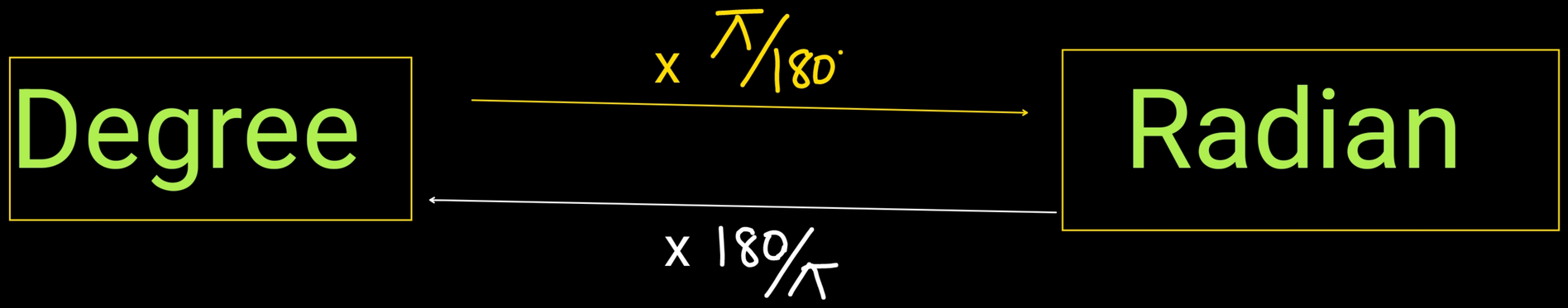
1 Radian $= \left(\frac{180}{\pi}\right)^\circ$

x Radian $= \left(\frac{180}{\pi} \cdot x\right)^\circ$

Radian $\xrightarrow{\times \frac{180}{\pi}}$ Degree

Convert the follwing into Degree

1. 5π Radian $\longrightarrow 5\pi \times \frac{180}{\pi} = 900^\circ$
2. 2π Radian
3. $= 2\pi \times \frac{180}{\pi} = 360^\circ$


Degree
x π/180°
Radian
x 180/π

Conversion: Minute to Degree

$60' = 1^\circ$

$1' = \left(\frac{1}{60}\right)^\circ$

$\underset{\sim}{A'} = \left(\frac{1}{60} \cdot \underset{\sim}{A}\right)^\circ$

Question Convert 30' into Radian

$30' \longrightarrow \left(\cancel{30} \times \frac{1}{\cancel{60}_2}\right)^\circ = \left(\frac{1}{2}\right)^\circ$

$= \left(\frac{1}{2} \times \frac{\pi}{180}\right)$ Radian

$= \frac{\pi}{360}$ Radian

Convert 20' into degree & Radian.

$= \left(\frac{1}{3}\right)^\circ$

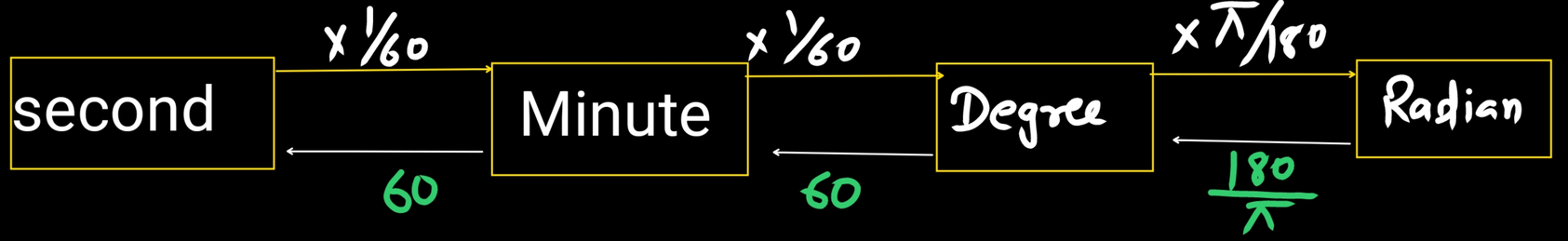
$= \left(\frac{\pi}{540}\right)$ Rad.

Conversion: Second to Minute

$60'' = 1'$

$1'' = \left(\frac{1}{60}\right)'$

$$5'' = \left(\frac{1}{60} \cdot 5\right)'$$



Question: Convert 30'' into Radian

Question: Convert 20'' into Radian.

$$30'' \longrightarrow \left(30 \times \frac{1}{60}\right)' = \left(\frac{1}{2}\right)'$$

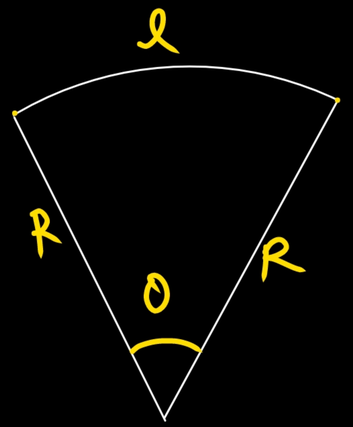
$$= \left(\frac{1}{2} \times \frac{1}{60}\right)' = \left(\frac{1}{120}\right)^{\circ} = \left(\frac{1}{120} \times \frac{\pi}{180}\right) \text{Radian.}$$

Convert $460^\circ\ 50'\ 35''$ into Radian.

$460^\circ\ \ 50'\ \ 35''$

$$= \left(460 \times \frac{\pi}{180}\right) + \left(50 \times \frac{1}{60} \times \frac{\pi}{180}\right) + \left(35 \times \frac{1}{60} \times \frac{1}{60} \times \frac{\pi}{180}\right)$$

Convert $670'\ 45'\ 30''$ into Radian.



Plane Angle is defined as Ratio of Arclength to Radius

$$\text{Plane Angle} = \frac{\text{Arclength}}{\text{Radius}}$$

$$\boxed{\theta = \frac{l}{R} \text{ radian}}$$