TRIGONOMETRIC FUNCTIONS
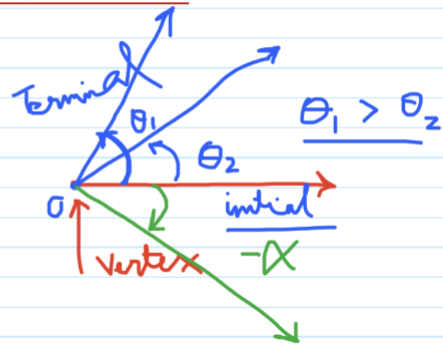
Angle: < degree / radians

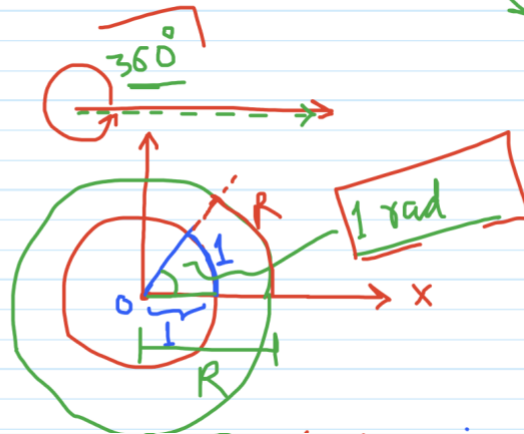Anticlockwise = +ve ↻ +
Clockwise = -ve ↺
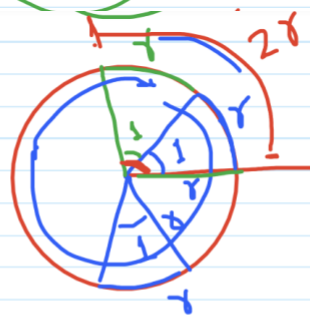
Terminal
θ_1
θ_2
O
Vertex
initial
$-\alpha$
$\theta_1 > \theta_2$

$\overline{360}°$

Radian:

$\gamma \rightarrow 1$

$2\pi\gamma \rightarrow 2\pi$ rad

1 rad
R
o
x
R

2π rad $= \overline{360}°$

2γ
$K\gamma = K$

$\frac{\ell}{\gamma} = \theta$
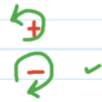
$360° = 2\pi$ radians
$180° = \pi$ radians
$90° = \pi/2$ radians

$1° = 60'$ 1 degree = 60 minutes

$1' = 60''$ 1 minute = 60 seconds

$\theta = \dfrac{\ell}{\gamma}$ $\ell \rightarrow$ legth of arc

$\theta \rightarrow$ angle subtended by arc at center of circle

$\boxed{\pi = 180°}$ ✔

Degree --	0.	30.	45.	60.	90.	180.	270.	360
Radians.	0.	$\pi/6$.	$\pi/4$.	$\pi/3$.	$\pi/2$.	π.	$3\pi/2$.	2π

Relation between Radian and Real numbers:

$$\frac{1 \to rad}{2} \longleftrightarrow \frac{1 \text{ on } \mathbb{R}}{2}$$

Sinx. ... x

θ° $\leftarrow$ degree

$\boxed{\alpha \quad \underline{\theta}} \neq rad$

$\theta = 45°$

$\alpha = 3 \rightarrow 3\ \text{rad}$

Radian is the default measure.
Degree has to be explicitly mentioned

Ex1 - Convert 40°20' into radian
Sol:
$180° = \pi$ rad
$\Rightarrow 1° = \pi/180$ radians

$60' = 1°$

$1' \rightarrow \left(\dfrac{1}{60}\right)°$

$20' \rightarrow \underset{3}{\left(\dfrac{1}{60} \times 20\right)}°$

40°20'
$= 40° + 20'$
$= 40° + 1/3°$
$= (121/3)°$
$= (121/3)\pi$ radians
$= (121\pi/3)$ radians ✓

Ex2 - Convert 6 radians into degree

$\boxed{\pi = \dfrac{22}{7}} \approx 3.14$

Sol:
π rad $= 180°$
$\Rightarrow 22/7$ rad $= 180°$
$\Rightarrow 1$ rad $= 180 \times 7/22°$
$\Rightarrow 6$ rad $= 180 \times 7 \times 6/22°$
$\qquad = 180 \times 21/11$
$\qquad = 3780/11°$
$\qquad = 343\ (7/11)°$
$\qquad = 343° + (7 \times 60/11)'$
$\qquad = 343° + (420/11)'$
$\qquad = 343° + 38' + (2/11)'$
$\qquad = 343° + 38' + (120/11)''$
$\qquad = 343° + 38' + 11''$
$6 \qquad = 343°\ 38'\ 11''$

Ex3 - Find the radius of the circle in which a central angle of 60°
intercepts an arc of length 37.4 cm.

Sol:

$$\theta = \frac{\ell}{\gamma} \checkmark$$
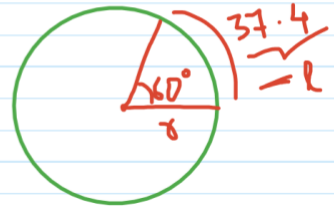radians

$$\Rightarrow \quad 60° = \frac{\pi}{3} = \theta$$

$$\frac{\pi}{3} = \frac{37.4}{\gamma}$$

$$\Rightarrow \quad \gamma = \frac{37.4 \times 3 \times 7}{22} = \boxed{35.7 \text{ cm}}$$

Ex4 - A wheel makes 360 revolutions in one minute. Through how
many radians does it turn in 1 second?

Sol:

360 revolutions in 1 minute

360 revs / 60 sec

= 6 revs/1 sec

1 revolution = 2π rads

6 revs = 12π rads

So, the wheel is making 12π radians per
second

Ex5- In a circle of diameter 40cm, the length of chord is 20cm. Find the length of minor arc of the chord.
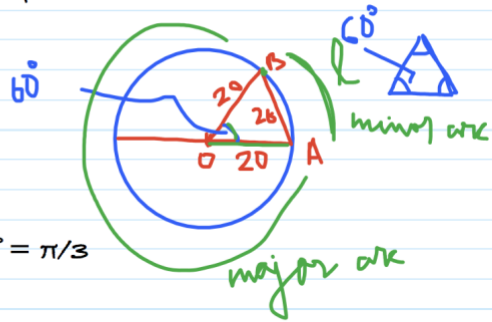
Sol:

OA = 20cm $= r$

OB = 20cm

AB = 20cm

So, OAB is an equilateral triangle.

So, angle subtended by chord at center = $60° = \pi/3$

$= \theta$

$$l = \theta r$$
$$= \frac{\pi}{3} \times 20 \text{ cm}$$
$$= \frac{20\pi}{3} \text{ cm}$$