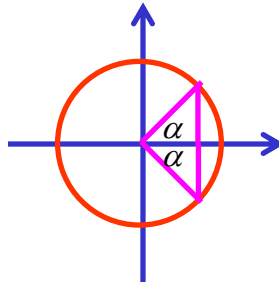


Trig Equations

e.g. (i) $\cos 2\theta = \frac{1}{2}$ $0^\circ \leq \theta \leq 360^\circ$
 Q1, Q4 $0^\circ \leq 2\theta \leq 720^\circ$

$$\cos \alpha = \frac{1}{2}$$

$$\alpha = 60^\circ$$



$$2\theta = \alpha, 360 - \alpha$$

$$2\theta = 60^\circ, 360 - 60^\circ$$

$$2\theta = 60^\circ, 300^\circ, 420^\circ, 660^\circ$$

$$\underline{\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ}$$

OR $\cos 2\theta = \frac{1}{2}$ $0^\circ \leq \theta \leq 360^\circ$
 Q1, Q2, Q3, Q4

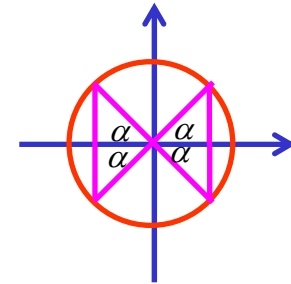
$$2\cos^2 \theta - 1 = \frac{1}{2}$$

$$\cos^2 \theta = \frac{3}{4}$$

$$\cos \theta = \pm \frac{\sqrt{3}}{2}$$

$$\cos \alpha = \frac{\sqrt{3}}{2}$$

$$\alpha = 30^\circ$$



$$\theta = \alpha, 180 - \alpha, 180 + \alpha, 360 - \alpha$$

$$\theta = 30^\circ, 180 - 30^\circ, 180 + 30^\circ, 360 - 30^\circ$$

$$\underline{\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ}$$

$$(ii) 4\sec^2 x = 3\tan x + 5$$

$$0^\circ \leq x \leq 360^\circ$$

$$4 + 4\tan^2 x = 3\tan x + 5$$

$$4\tan^2 x - 3\tan x - 1 = 0$$

$$(4\tan x + 1)(\tan x - 1) = 0$$

$$\tan x = -\frac{1}{4}$$

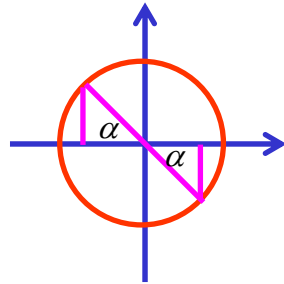
or

$$\tan x = 1$$

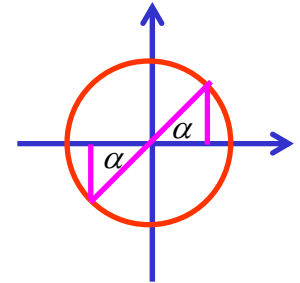
Q2, Q4

Q1, Q3

$$\tan \alpha = \frac{1}{4}$$



$$\tan \alpha = 1$$



$$\alpha = 14^\circ 2'$$

$$\alpha = 45^\circ$$

$$x = 180 - \alpha, 360 - \alpha$$

$$x = \alpha, 180 + \alpha$$

$$x = 180 - 14^\circ 2', 360 - 14^\circ 2'$$

$$x = 45^\circ, 180 + 45^\circ$$

$$x = 165^\circ 58', 345^\circ 58'$$

$$x = 45^\circ, 225^\circ$$

$$\underline{x = 45^\circ, 165^\circ 58', 225^\circ, 345^\circ 58'}$$

$$(iii) \cos 2\theta = 4\cos^2 \theta - 2\sin^2 \theta$$

$$0^\circ \leq \theta \leq 360^\circ$$

$$\cos^2 \theta - \sin^2 \theta = 4\cos^2 \theta - 2\sin^2 \theta$$

$$3\cos^2 \theta = \sin^2 \theta \quad \text{Q1, Q2, Q3, Q4}$$

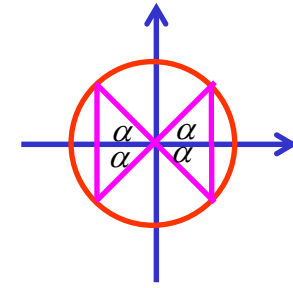
$$\tan^2 \theta = 3 \quad \tan \alpha = \sqrt{3}$$

$$\tan \theta = \pm\sqrt{3} \quad \alpha = 60^\circ$$

$$\theta = \alpha, 180 - \alpha, 180 + \alpha, 360 - \alpha$$

$$\theta = 60^\circ, 180 - 60^\circ, 180 + 60^\circ, 360 - 60^\circ$$

$$\underline{\theta = 60^\circ, 120^\circ, 240^\circ, 300^\circ}$$



$$(iv) \cos 2\theta = \sin \theta,$$

$$0 \leq \theta \leq 360^\circ \quad \text{2000 Extension 1 HSC Q2c)}$$

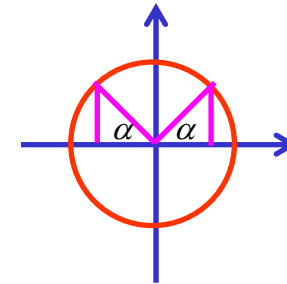
$$1 - 2\sin^2 \theta = \sin \theta$$

$$2\sin^2 \theta + \sin \theta - 1 = 0$$

$$(2\sin \theta - 1)(\sin \theta + 1) = 0$$

$$\sin \theta = \frac{1}{2} \quad \text{or} \quad \sin \theta = -1$$

$$\text{Q1, Q2} \quad \theta = 270^\circ$$



$$\sin \alpha = \frac{1}{2}$$

$$\alpha = 30^\circ$$

$$\theta = \alpha, 180 - \alpha$$

$$\theta = 30^\circ, 180 - 30^\circ$$

$$\theta = 30^\circ, 150^\circ$$

$$\underline{\theta = 30^\circ, 150^\circ, 270^\circ}$$

$$(v) \quad 2\sin^2 \theta = \sin 2\theta, \quad 0 \leq \theta \leq 360^\circ \quad 1992 \text{ Extension 1 HSC Q2a)}$$

$$2\sin^2 \theta = 2\sin \theta \cos \theta$$

$$2\sin^2 \theta - 2\sin \theta \cos \theta = 0$$

$$2\sin \theta(\sin \theta - \cos \theta) = 0$$

$$\sin \theta = 0 \quad \text{or} \quad \sin \theta = \cos \theta$$

$$\theta = 0^\circ, 180^\circ, 360^\circ \quad \tan \theta = 1$$

$$Q1, Q3$$

$$\tan \alpha = 1$$

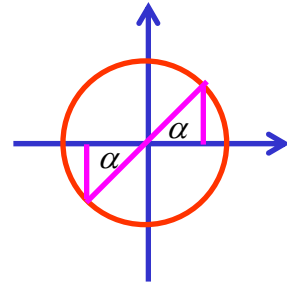
$$\alpha = 45^\circ$$

$$\theta = \alpha, 180 + \alpha$$

$$\theta = 45^\circ, 180 + 45^\circ$$

$$\theta = 45^\circ, 225^\circ$$

$$\underline{\theta = 0^\circ, 45^\circ, 180^\circ, 225^\circ, 360^\circ}$$



Exercise 2D;
2ac, 4ac, 5adgi,
9adgj, 10bdfij,
16, 24*