

Trigonometric Equations

e.g. (i) $\tan \theta = -2.3673$

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

Q2, Q4 ← locate quadrants

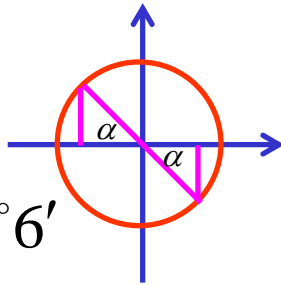
$$\tan \alpha = 2.3673 \leftarrow \text{find acute angle}$$

$$\alpha = 67^\circ 6'$$

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

$$\theta = 180 - 67^\circ 6', 360 - 67^\circ 6'$$

$$\underline{\theta = 112^\circ 54', 292^\circ 54'}$$



← solve the problem

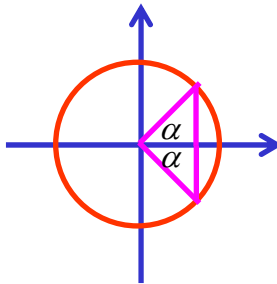
(ii) $\cos \theta = \frac{1}{2}$

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

Q1, Q4

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

$$\alpha = 60^\circ$$



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

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

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

$$(iii) \operatorname{cosec} \theta = 4$$

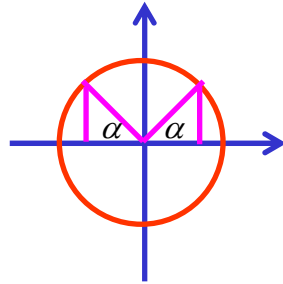
$$\sin \theta = \frac{1}{4}$$

Q1, Q2

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

$$\alpha = 14^\circ 29'$$

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



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

$$\theta = 14^\circ 29', 180 - 14^\circ 29'$$

$$\underline{\theta = 14^\circ 29', 165^\circ 31'}$$

$$(iv) 2 \sin x + 1 = 0$$

$$2 \sin x = -1$$

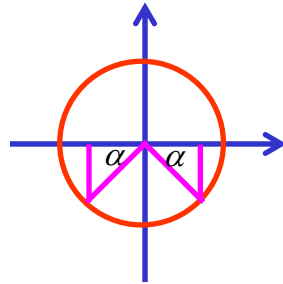
$$\sin x = -\frac{1}{2}$$

Q3, Q4

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

$$\alpha = 30^\circ$$

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



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

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

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

$$(v) 5 \sin \theta = -2 \cos \theta$$

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

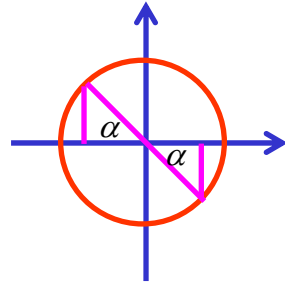
$$\frac{\sin \theta}{\cos \theta} = \frac{-2}{5}$$

$$\tan \theta = \frac{-2}{5}$$

Q2, Q4

$$\tan \alpha = \frac{2}{5}$$

$$\alpha = 21^\circ 48'$$



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

$$\theta = 180 - 21^\circ 48', 360 - 21^\circ 48'$$

$$\theta = \underline{158^\circ 12', 338^\circ 12'}$$

$$(vi) \cos 2\theta = 0.75$$

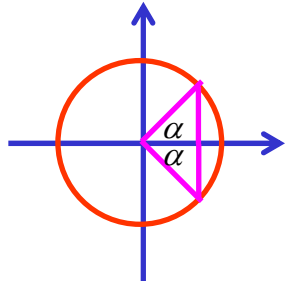
$$0^\circ \leq \theta \leq 360^\circ$$

Q1, Q4

$$0^\circ \leq 2\theta \leq 720^\circ$$

$$\cos \alpha = 0.75$$

$$\alpha = 41^\circ 25'$$



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

$$2\theta = 41^\circ 25', 360 - 41^\circ 25'$$

$$2\theta = 41^\circ 25', 318^\circ 35', 401^\circ 25', 678^\circ 35'$$

$$\theta = \underline{20^\circ 43', 159^\circ 18', 200^\circ 43', 339^\circ 18'}$$

$$(vii) \sec^2 \theta + \tan \theta = 3$$

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

$$1 + \tan^2 \theta + \tan \theta = 3$$

$$\tan^2 \theta + \tan \theta - 2 = 0$$

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

$$\tan \theta = -2$$

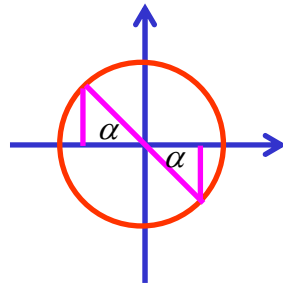
or

$$\tan \theta = 1$$

Q2, Q4

$$\tan \alpha = 2$$

$$\alpha = 63^\circ 26'$$



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

$$\theta = 180 - 63^\circ 26', 360 - 63^\circ 26'$$

$$\theta = 116^\circ 34', 296^\circ 34'$$

$$\underline{\theta = 45^\circ, 116^\circ 34', 225^\circ, 296^\circ 34'}$$

Q1, Q3

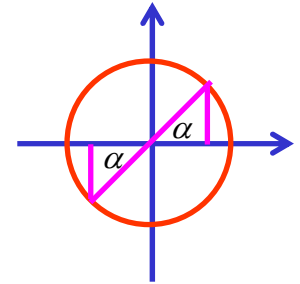
$$\tan \alpha = 1$$

$$\alpha = 45^\circ$$

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

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

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



**Exercise 4G; 1af, 2be, 3af, 4bfjo, 5b, 6ac, 7a, 8bd, 9aeg, 10af,
12a, 13b, 14d, 15*ag**