Ex. CONVERT THE FOLLOWINGS IN TO RADIAN

(a) 45° (b) 210° (c) 120°

(a) $180° \longrightarrow \pi$

$45° \longrightarrow ? = \frac{\pi \times 45}{180} = \frac{\pi}{4}$

(b) $180° \longrightarrow \pi$

$210° \longrightarrow ? = \frac{\pi \times 210}{180} = \frac{7\pi}{6}$

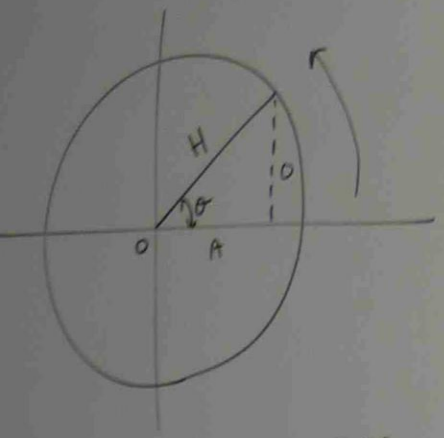
$\frac{5}{12} \rightarrow \frac{5 \times 180}{12}$

$= 75°$

(c) $180° \longrightarrow \pi$

$120° \longrightarrow ? = \frac{\pi \times 120}{180} = \frac{2\pi}{3}$

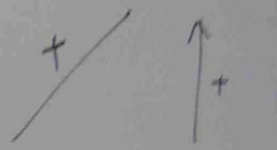
CIRCULAR FUNCTIONS



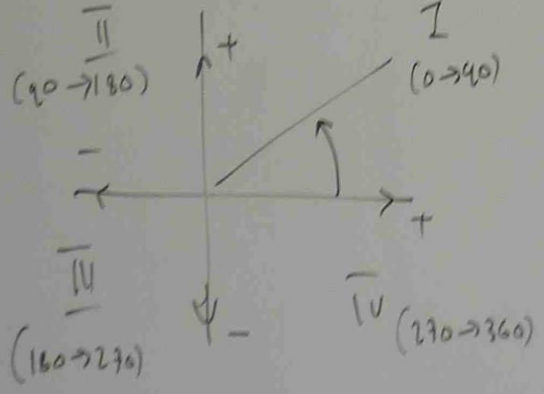
A - ADJACENT SIDE
O - OPPOSITE SIDE
H - HYPOTENUSE

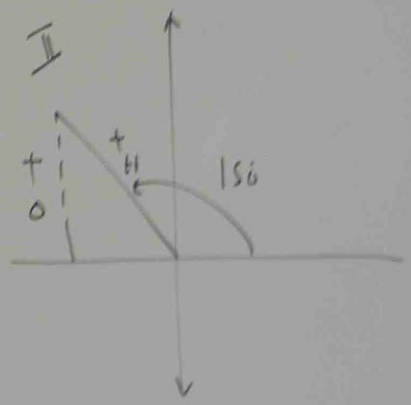
$\sin\theta = \frac{\text{OPPOSITE SIDE } (O)}{\text{HYPOTENUSE } (H)}$

sin	cos	tan	cot	sec	cosec
O	A	O	A	H	H
H	H	A	O	A	O

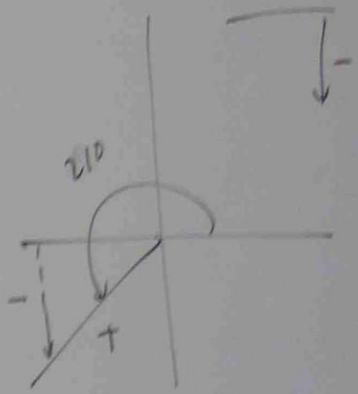


$\sin 45 = +0.707$

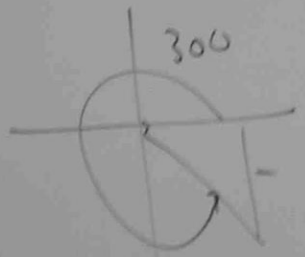




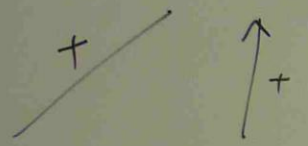
$\sin 150 = +0.5$

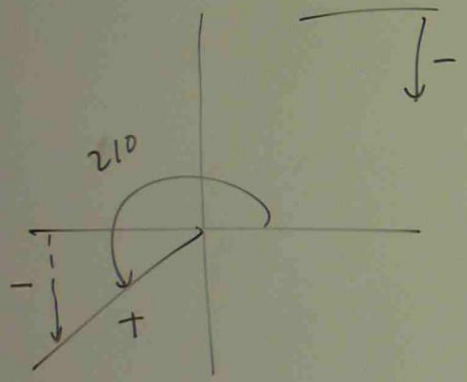


$\sin 210 = -0.5$



$\sin 300 = -0.866$





$\sin 210 = -0.5$

$\cos 0 = 1$

$\cos 90 = 0$

$\cos 180 = -1$

$\cos 270 = 0$

$\cos 360 = 1$

$\sin 0 = 0$

$\sin 90 = 1$

$\sin 180 = 0$

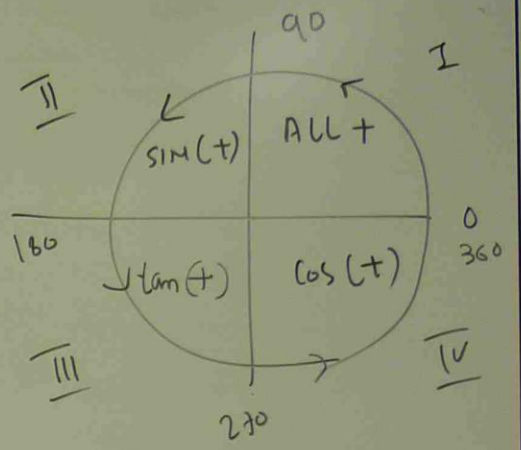
$\sin 270 = -1$

$\sin 360 = 0$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\tan 0 = \frac{\sin 0}{\cos 0} = \frac{0}{1} = 0$$

$$\tan 90 = \frac{\sin 90}{\cos 90} = \frac{1}{0} = \infty$$



EXERCISE

USE CALCULATOR AND FIND THE VALUES OF THE FOLLOWING ANGLES

$\tan 130$, $\tan 230$, $\tan 180$

$\sin 50$, $\sin 315$

$\cos 120$, $\cos 230$

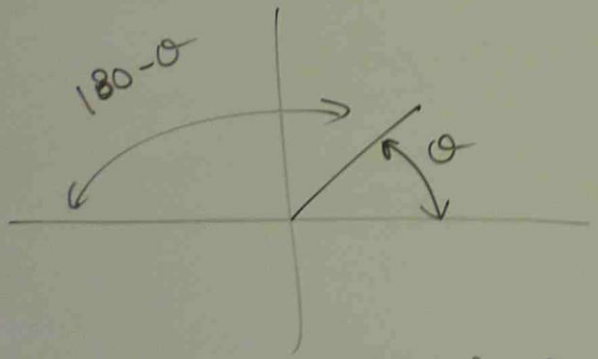
$\cos 315$

$$\sin\theta = \frac{1}{\operatorname{cosec}\theta}$$

$$\cos\theta = \frac{1}{\sec\theta}$$

$$\tan\theta = \frac{1}{\cot\theta}$$

SUPPLEMENTARY ANGLES FOR 180°



$$\sin(180-\theta) = \sin\theta$$

$$\cos(180-\theta) = -\cos\theta$$

$$\tan(180-\theta) = -\tan\theta$$

NEGATIVE ANGLES

$$\sin(-\theta) = -\sin\theta$$

$$\cos(-\theta) = \cos\theta$$

$$\tan(-\theta) = -\tan\theta$$

THE TRIGO RATIO FOR 90° SUPPLEMENTARY ANGLES

$$\sin(90-\theta) = +\cos\theta$$

$$\cos(90-\theta) = +\sin\theta$$

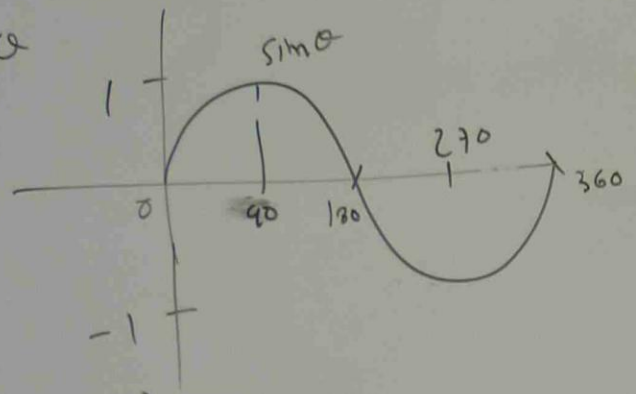
$$\sin(90+\theta) = +\cos\theta$$

$$\cos(90+\theta) = -\sin\theta$$

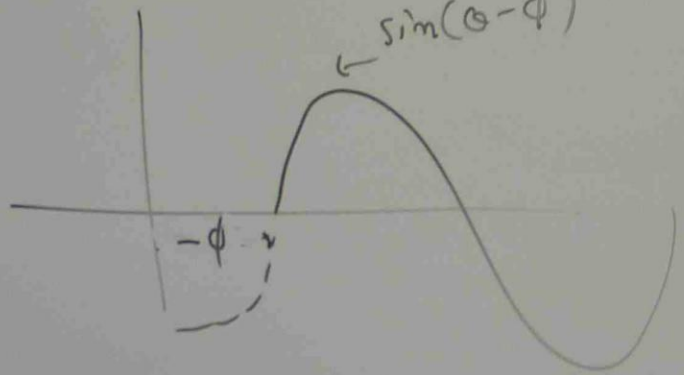
$\sec S = \frac{1}{\cos \sec S}$

PLOTTING GRAPHS FOR TRIGONOMETRIC ANGLES:

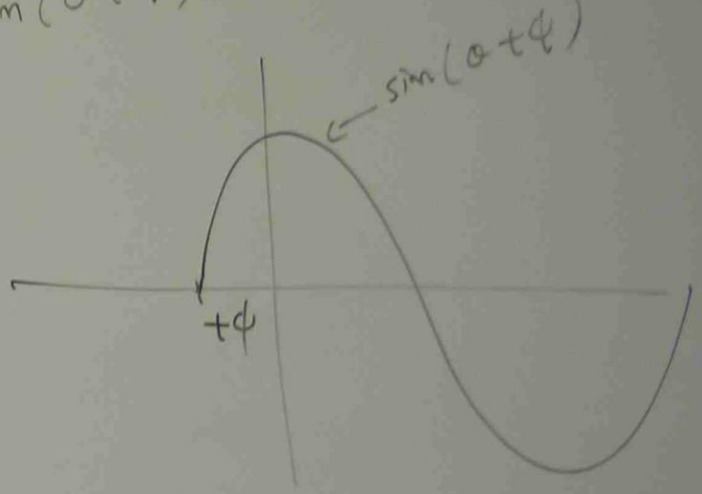
$\sin\theta$



$\sin(\theta - \phi)$



$\sin(\theta + \phi)$



EX. PLOT THE FOLLOWING GRAPHS

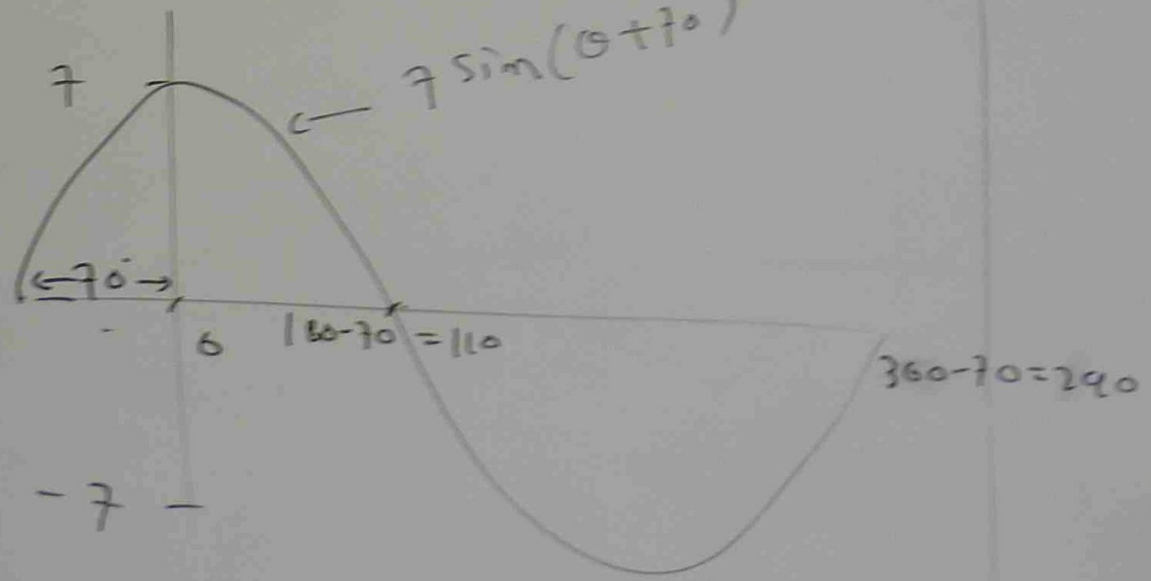
(a) $7 \sin(\theta + 70^\circ)$

(b) $50 \cos(\theta - 40)$

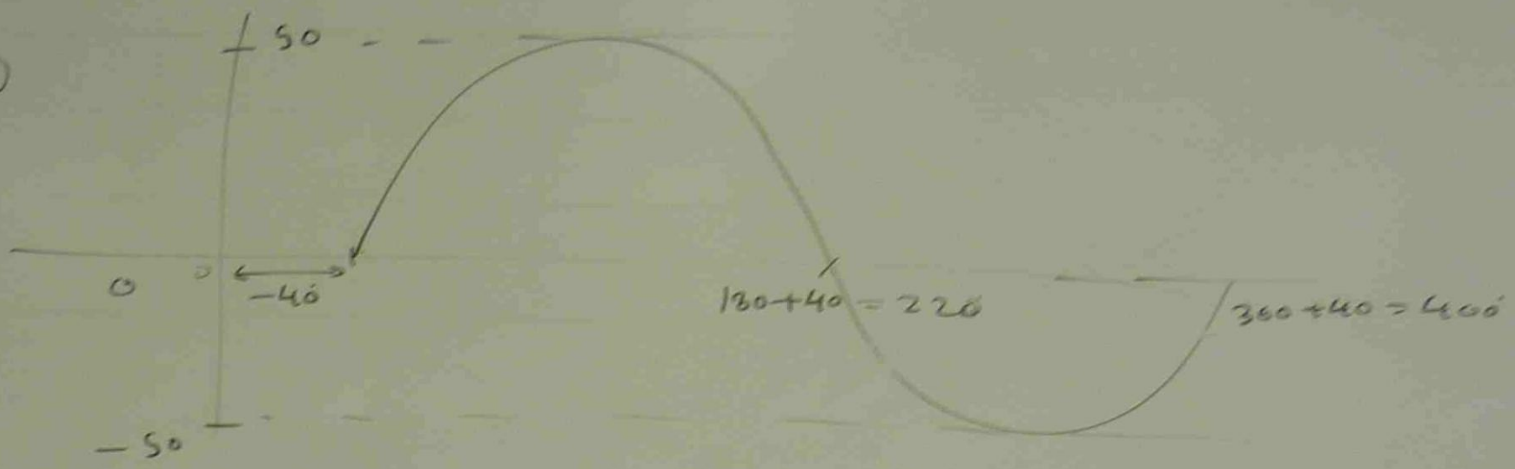
(c) $8 \cos\left(\theta - \frac{\pi}{3}\right)$

(d) $10 \sin\left(\theta + \frac{\pi}{4}\right)$

(a)



(b)



(c) DEGREE ⟷ RADIAN CONVERSION

$\pi \rightarrow 180^\circ$

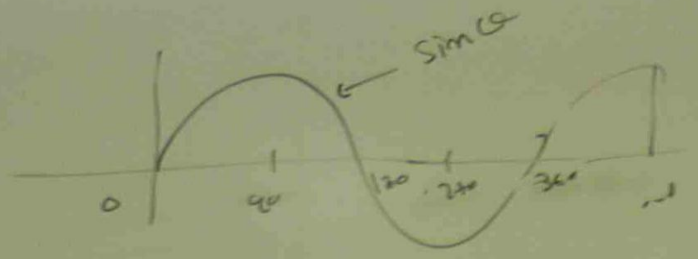
$\frac{\pi}{3} \rightarrow \frac{180}{3} = 60^\circ$

70=290

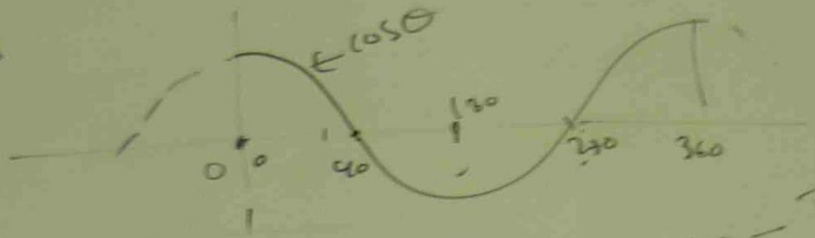
$8\cos(\theta - \pi/3) = 8\cos(\theta - 60^\circ)$

↑ Amplitude

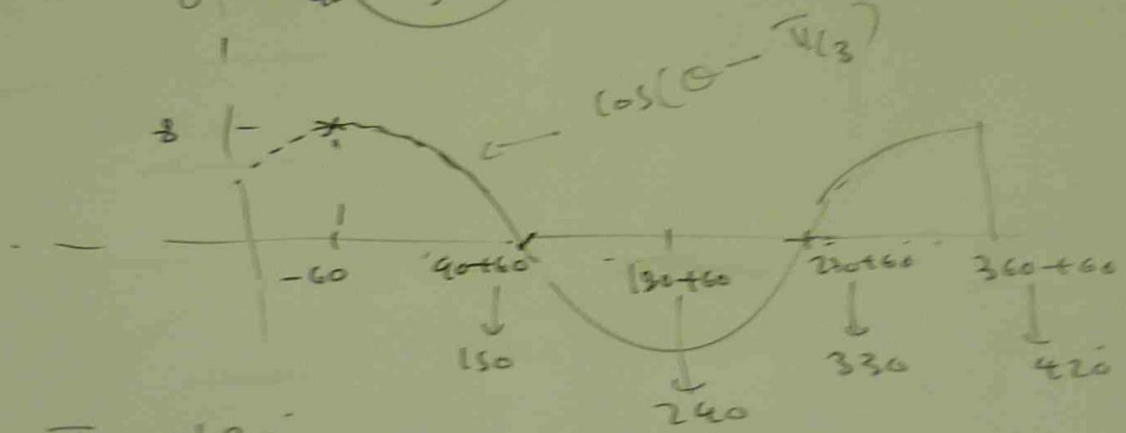
SINE



COS

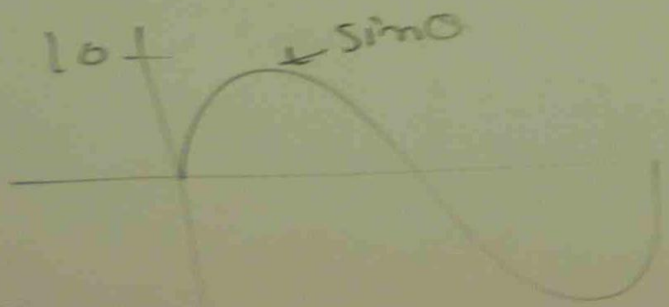


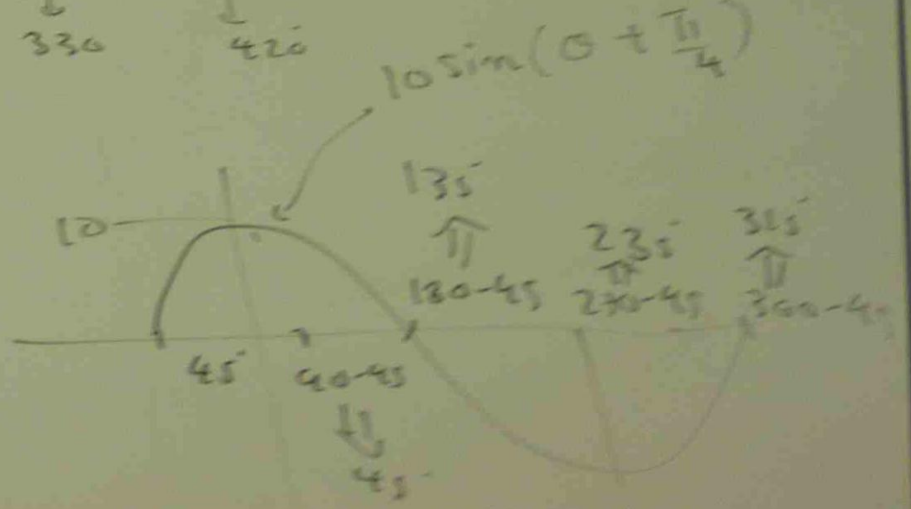
(c)



(d) $\pi = 180^\circ$

$\frac{\pi}{4} \Rightarrow \frac{180}{4} = 45^\circ$





EXERCISE

PLOT (a) $12 \sin(\theta + 50^\circ)$

(b) $24 \cos(\theta - 60^\circ)$

(c) $8 \cos(\theta - \frac{\pi}{6})$

(d) $10 \sin(\theta + \frac{\pi}{6})$

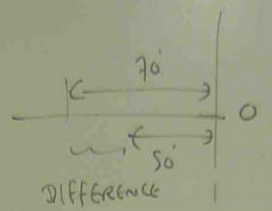
EX FIND THE PHASE ANGLE DIFFERENCE OF THE FOLLOWING TRIGO FUNCTIONS

(a) $7 \sin(\theta + 70)$ & $12 \sin(\theta + 50)$

(b) $6 \cos(\theta + 10)$ & $24 \cos(\theta - 60)$

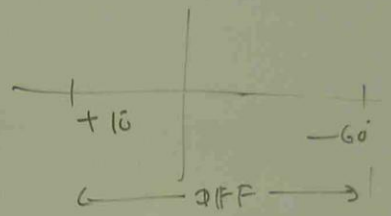
(c) $50 \cos(\theta - 40)$ & $12 \sin(\theta - 40)$

(a)



ANGLE DIFFERENCE = $70 - 50 = 20^\circ$

(b)



ANGLE DIFFERENCE = $10 + 60 = 70^\circ$

(c) $\sin(90 - \theta) = \cos\theta$

$\theta - 40$

$\sin(90 - (\theta - 40)) = \cos(\theta - 40)$

$\sin(90 - \theta + 40) = \cos(\theta - 40)$

$\sin(130 - \theta) = \cos(\theta - 40)$

$\sin -(\theta - 130) = \cos(\theta - 40)$

$-\sin(\theta - 130) = \cos(\theta - 40)$

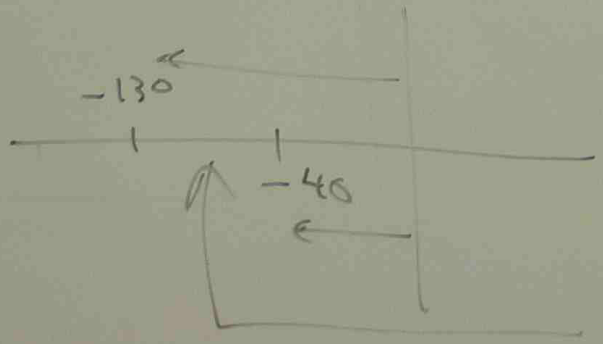
INSTEAD of $\cos(\theta - 40)$

IT IS SUBSTITUTED

$\cos\left(-\sin(\theta - 130)\right)$

$-\cos\sin(\theta - 130)$ & $12\sin(\theta - 40)$

ARE TO BE COMPARED.



ANGLE DIFFERENCE = $130 - 40 = 90$