

(12)  $\text{Cosec } 10x$

$= \text{Cosec}(10x + 2\pi)$

$= \text{Cosec } 10(x + \frac{2\pi}{10})$

$= \text{Cosec } 10(x + \frac{\pi}{5})$

$\therefore \text{period of } \text{Cosec } 10x = \frac{\pi}{5} \text{ Ans.}$

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مقصدیت رکھو عزیز

(عام محمود)

(13)  $3 \sin x = 3 \sin(x + 2\pi)$

$\therefore \text{period of } 3 \sin x = 2\pi \text{ Ans.}$

(14)  $2 \cos x = 2 \cos(x + 2\pi)$

$\therefore \text{period of } 2 \cos x = 2\pi \text{ Ans.}$

(15)  $3 \cos \frac{x}{5} = 3 \cos(\frac{x}{5} + 2\pi)$

$= 3 \cos \frac{1}{5}(x + 10\pi)$

$\therefore \text{period of } 3 \cos \frac{x}{5} = 10\pi \text{ Ans.}$

## EXERCISE 11.2

Amir Mahmood

Lecturer.

Govt. College Farooka (Sgd)

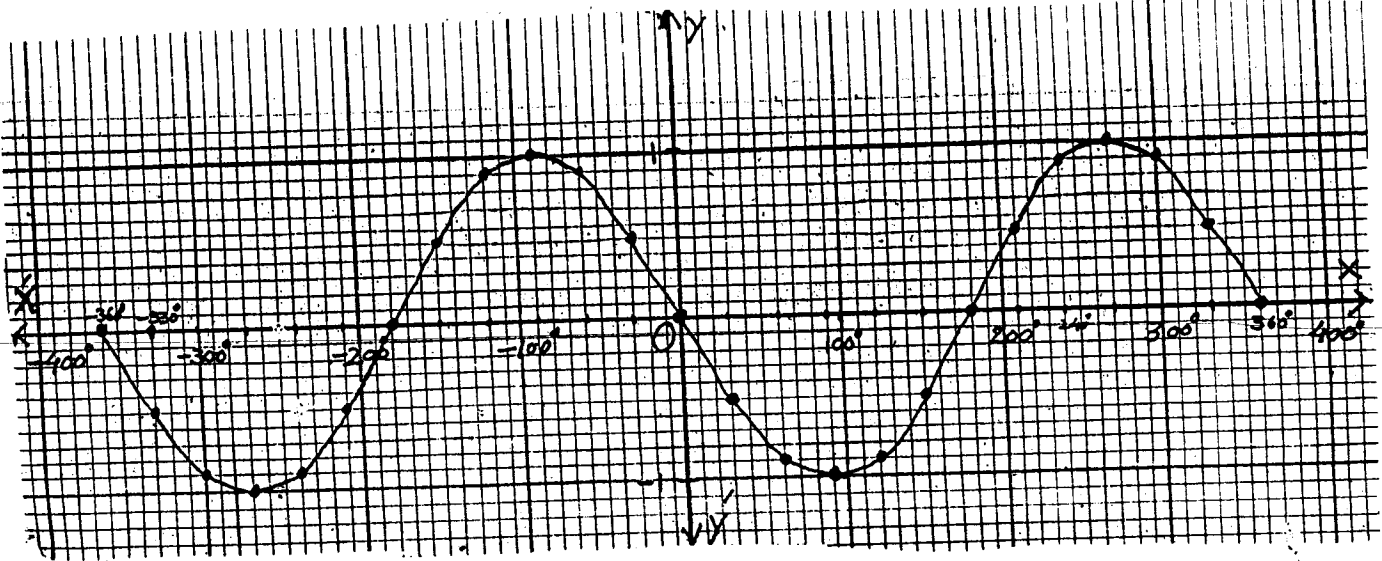
1. i)  $y = -\sin x ; x \in [-2\pi, 2\pi]$

x	-360°	-330°	-300°	-270°	-240°	-210°	-180°	-150°	-120°	-90°	-60°	-30°	0°
y	0	-0.5	-0.9	-1	-0.9	-0.5	0	0.5	0.9	1	0.9	0.5	0
x	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°	
y	-0.5	-0.9	-1	-0.9	-0.5	0	0.5	0.9	1	0.9	0.5	0	

Scale,

One big square along x-axis = 100°

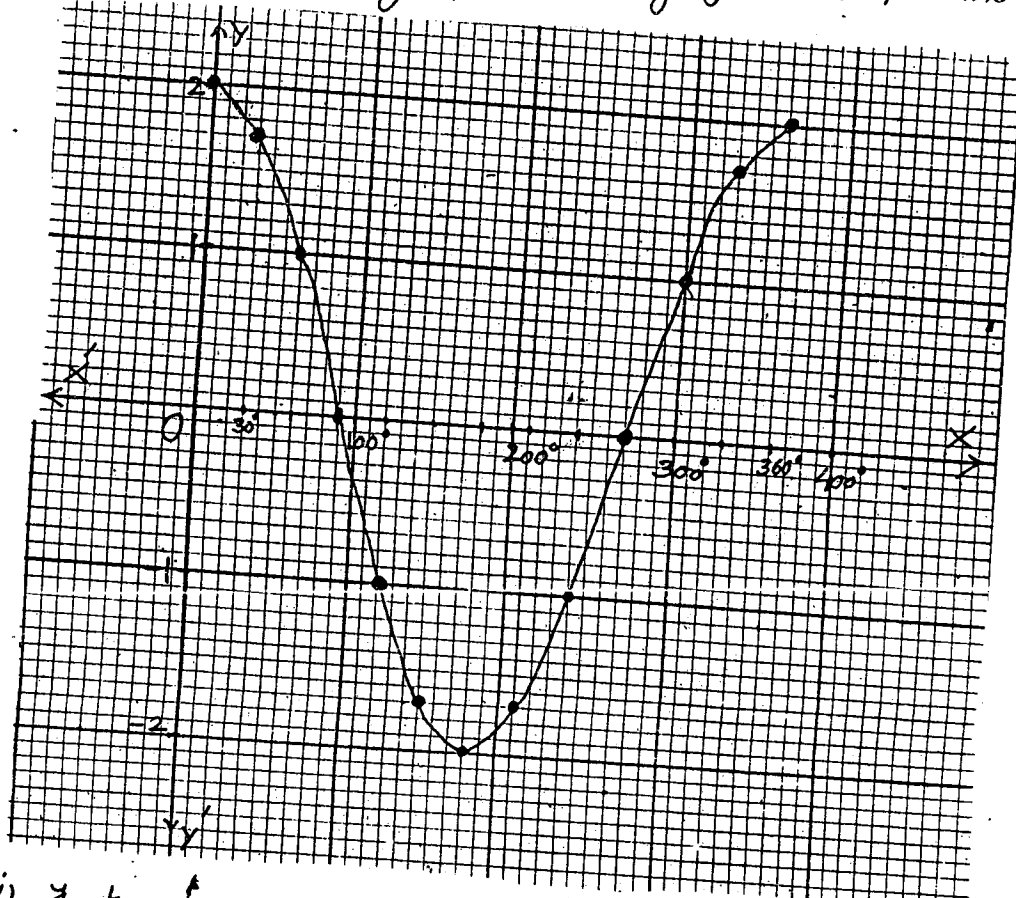
One big square along y-axis = 1 unit.



ii)  $y = 2 \cos x$  ;  $x \in [0, 2\pi]$  6

$x$	$0^\circ$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$	$210^\circ$	$240^\circ$	$270^\circ$	$300^\circ$	$330^\circ$	$360^\circ$
$y$	2	1.7	1	0	-1	-1.7	-2	-1.7	-1	0	1	1.7	2

**Scale:** One big square along  $x$ -axis =  $100^\circ$   
 One big square along  $y$ -axis = 1 unit.

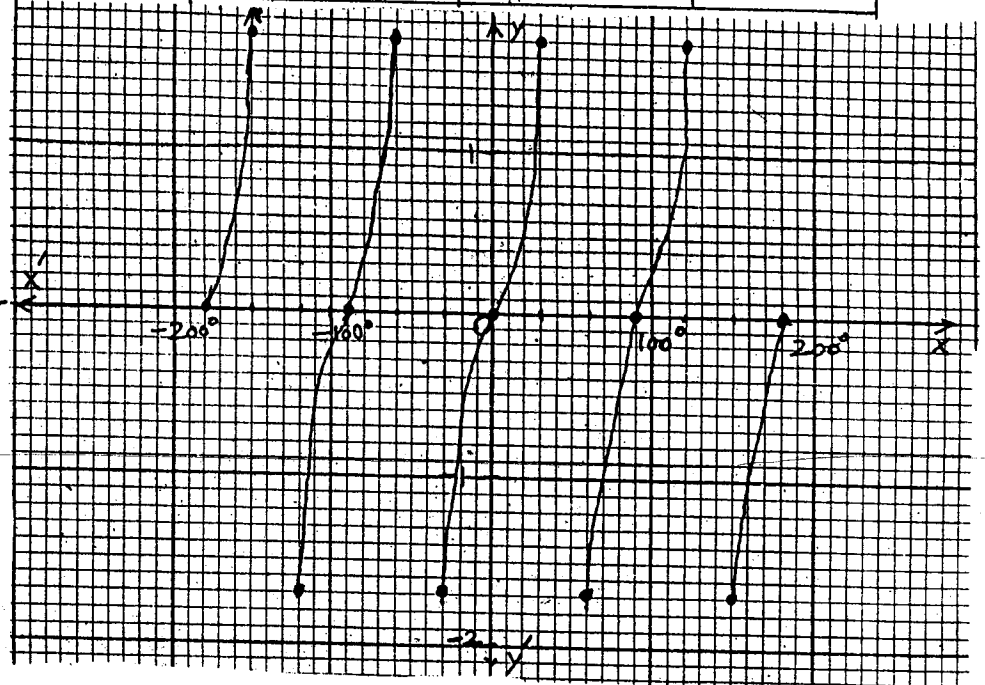


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iii)  $y = \tan 2x$  ;  $x \in [-\pi, \pi]$

$x$	$-180^\circ$	$-150^\circ$	$-120^\circ$	$-90^\circ$	$-60^\circ$	$-30^\circ$	$0^\circ$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$
$y$	0	1.7	-1.7	0	1.7	-1.7	0	1.7	-1.7	0	1.7	-1.7	0

**Scale**  
 One big square  
 along  $x$ -axis =  $100^\circ$   
 One big square  
 along  $y$ -axis = 1 unit

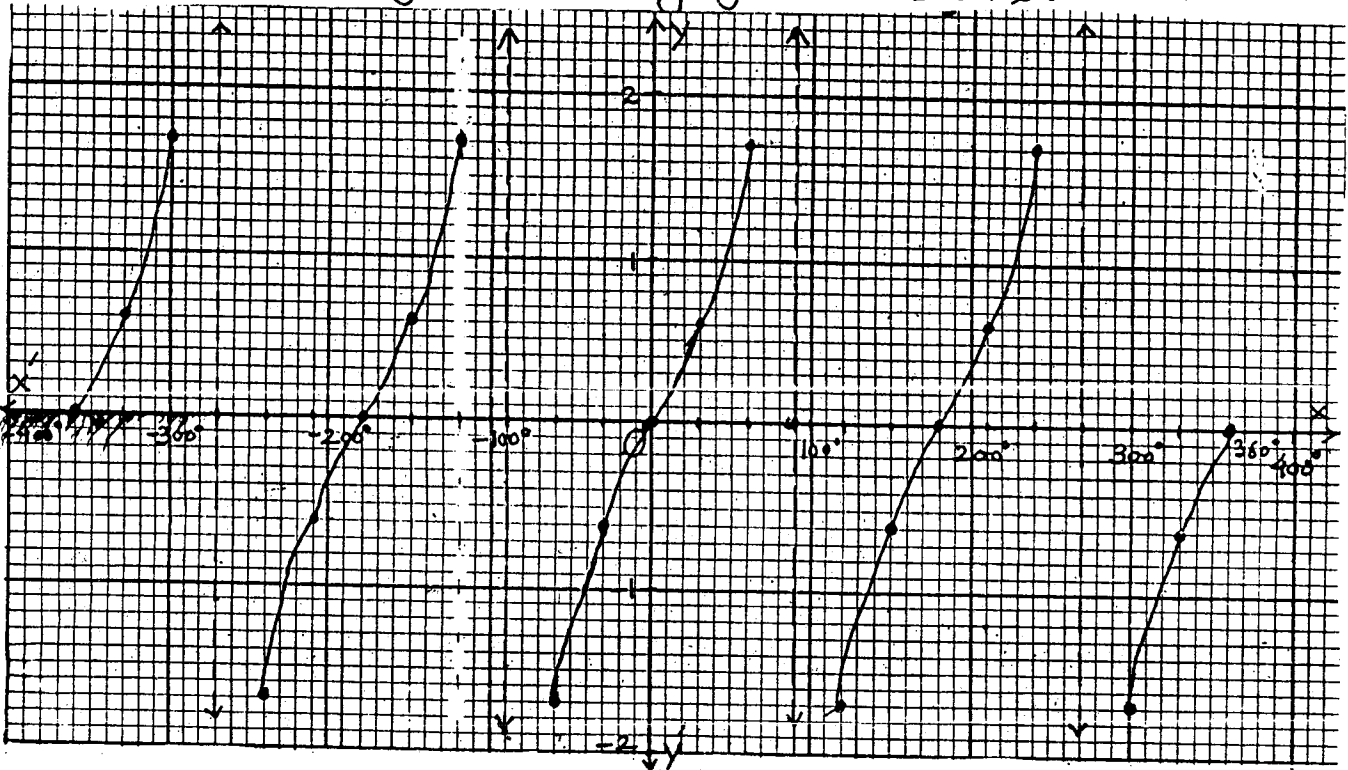


[7]

(iv)  $y = \tan x$  ;  $x \in [-2\pi, 2\pi]$

$x$	$-360^\circ$	$-330^\circ$	$-300^\circ$	$-270^\circ$	$-240^\circ$	$-210^\circ$	$-180^\circ$	$-150^\circ$	$-120^\circ$	$-90^\circ$	$-60^\circ$	$-30^\circ$	$0^\circ$
$y$	$0$	$0.6$	$1.7$	$\infty$	$-1.7$	$-0.6$	$0$	$0.6$	$1.7$	$\infty$	$-1.7$	$-0.6$	$0$
$x$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$	$210^\circ$	$240^\circ$	$270^\circ$	$300^\circ$	$330^\circ$	$360^\circ$	
$y$	$0.6$	$1.7$	$\infty$	$-1.7$	$-0.6$	$0$	$0.6$	$1.7$	$\infty$	$-1.7$	$-0.6$	$0$	

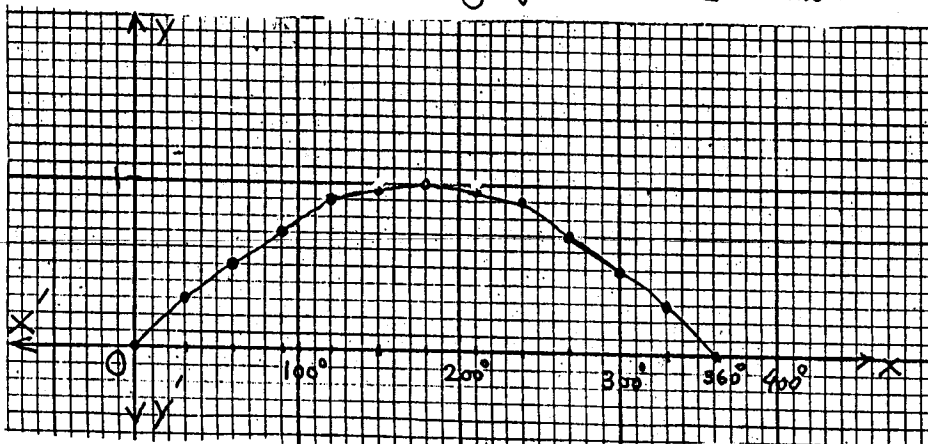
**Scale:** One big square along  $x$ -axis =  $100^\circ$   
 One big square along  $y$ -axis = 1 unit.



(v)  $y = \sin \frac{x}{2}$  ;  $x \in [0, 2\pi]$

$x$	$0^\circ$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$	$210^\circ$	$240^\circ$	$270^\circ$	$300^\circ$	$330^\circ$	$360^\circ$
$y$	$0$	$0.3$	$0.5$	$0.7$	$0.9$	$0.96$	$1.0$	$0.96$	$0.9$	$0.7$	$0.5$	$0.3$	$0$

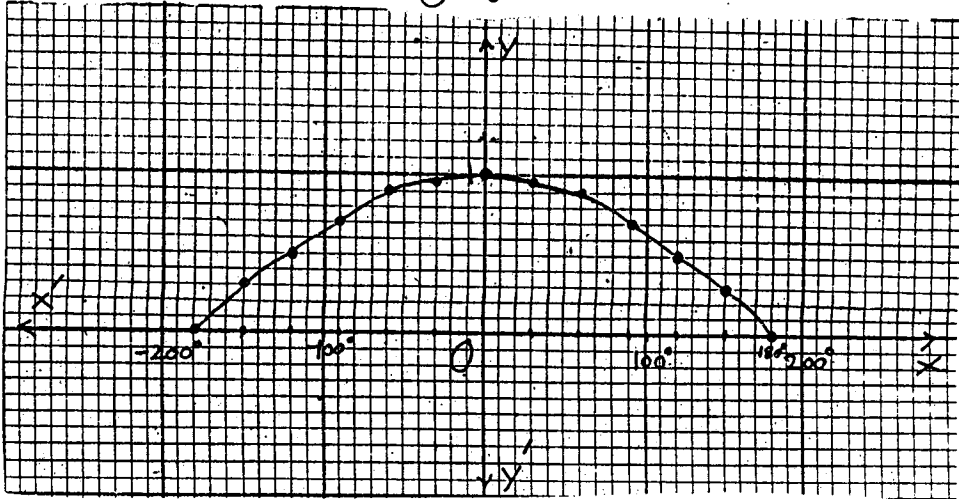
**Scale:** One big square along  $x$ -axis =  $100^\circ$   
 One big square along  $y$ -axis = 1 unit.



vi)  $y = \cos \frac{x}{2}$  ;  $x \in [-\pi, \pi]$  8

x	-180°	-150°	-120°	-90°	-60°	-30°	0°	30°	60°	90°	120°	150°	180°
y	0	0.3	0.5	0.7	0.9	0.96	1	0.96	0.9	0.7	0.5	0.3	0

**Scale:** One big square along x-axis = 100°  
One big square along y-axis = 1 unit



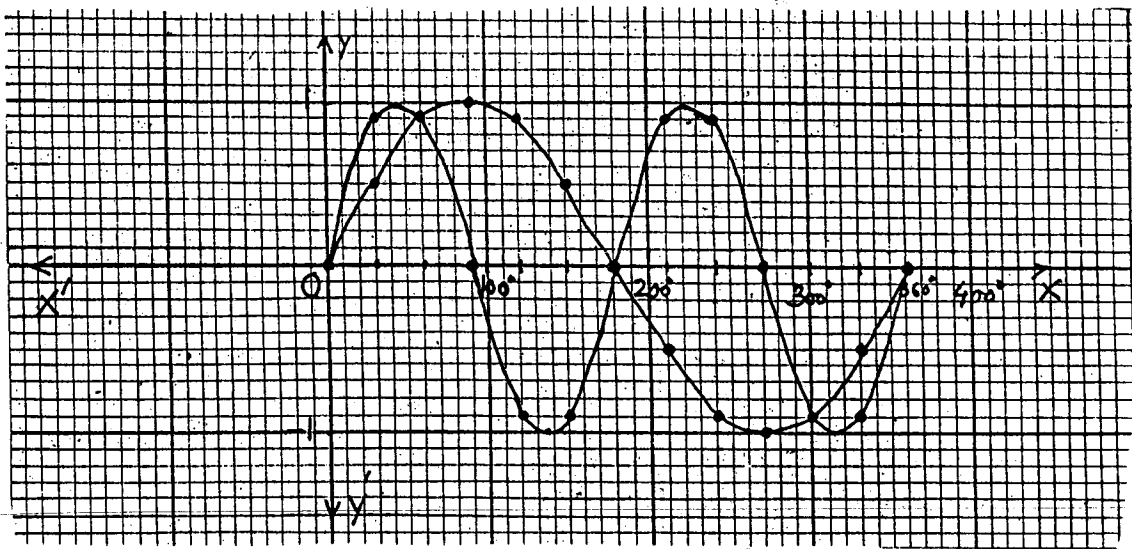
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2. (i)  $y = \sin x$  and  $y = \sin 2x$  ;  $x \in [0, 2\pi]$

x	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
y = sin x	0	0.5	0.9	1	0.9	0.5	0	-0.5	-0.9	-1	-0.9	-0.5	0
y = sin 2x	0	0.9	0.9	0	-0.9	-0.9	0	0.9	0.9	0	-0.9	-0.9	0

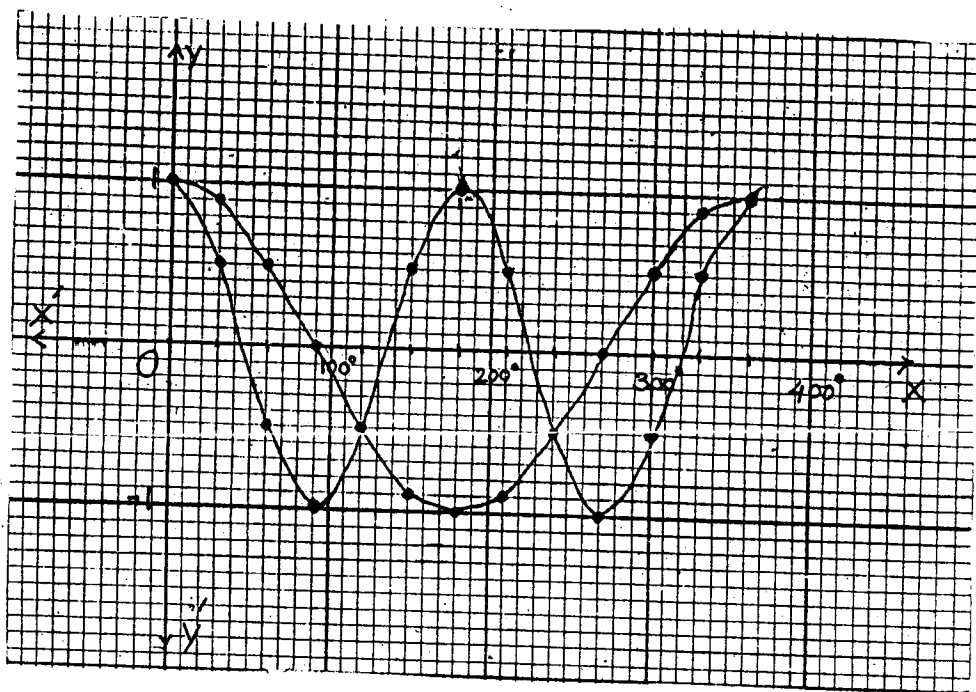
**Scale:** One big square along x-axis = 100°  
One big square along y-axis = 1 unit.



ii)  $y = \cos x$  and  $y = \cos 2x$  ;  $x \in [0, 2\pi]$

$x$	$0^\circ$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$	$210^\circ$	$240^\circ$	$270^\circ$	$300^\circ$	$330^\circ$	$360^\circ$
$y = \cos x$	1	0.9	0.5	0	-0.5	-0.9	-1	-0.9	-0.5	0	0.5	0.9	1
$y = \cos 2x$	1	0.5	-0.5	-1	-0.5	0.5	1	0.5	-0.5	-1	-0.5	0.5	1

**Scale:** One big square along  $x$ -axis =  $100^\circ$   
 One big square along  $y$ -axis = 1 unit.



**3. Solve graphically:**

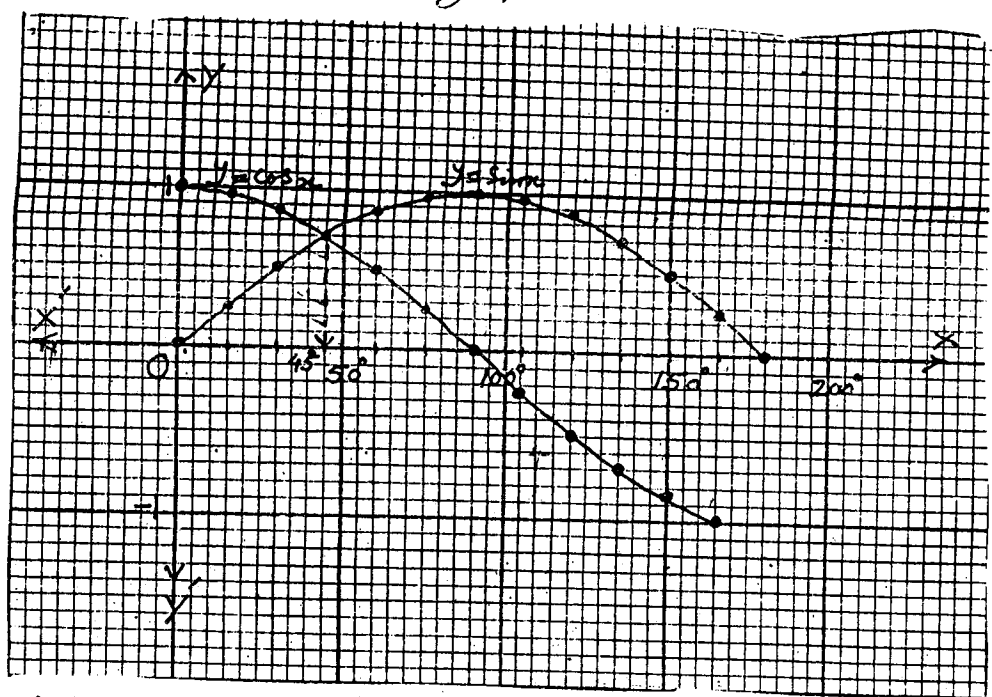
(i)  $\sin x = \cos x$  ;  $x \in [0, \pi]$

We draw the graphs of  $y = \sin x$  and  $y = \cos x$  ;  $x \in [0, \pi]$

$x$	$0^\circ$	$15^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$75^\circ$	$90^\circ$	$105^\circ$	$120^\circ$	$135^\circ$	$150^\circ$	$165^\circ$	$180^\circ$
$y = \sin x$	0	0.25	0.5	0.7	0.86	0.96	1	0.96	0.86	0.7	0.5	0.25	0
$y = \cos x$	1	0.96	0.86	0.7	0.5	0.25	0	-0.25	-0.5	-0.7	-0.86	-0.96	-1

**Scale:** One big square along  $x$ -axis =  $50^\circ$   
 One big square along  $y$ -axis = 1 unit.

(P.T.O)



Amir Mahmood  
 Lecturer  
 Govt. College Farooka (Sgd)

The graph shows that the two curves intersect each other at a point where  $x = 45^\circ$ .  
 Thus the solution set =  $\{45^\circ\}$  Ans.

ii)  $\sin x = x$  ;  $x \in [0, \pi]$

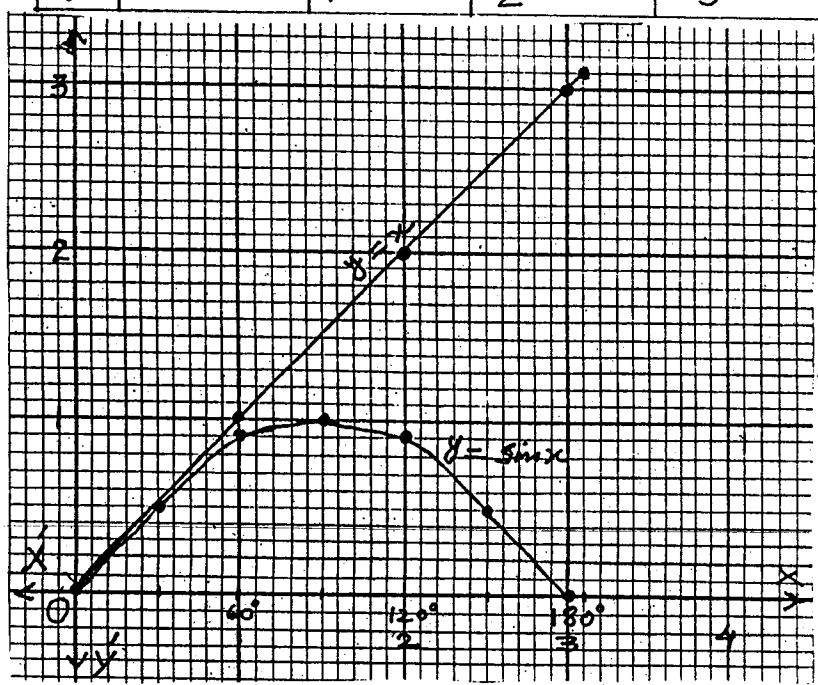
Amir Mahmood  
 Lecturer  
 Govt. College Farooka (Sgd)

We draw the graphs of  $y = \sin x$  and  $y = x$   
 For  $y = \sin x$

$x$	$0^\circ$	$30^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$150^\circ$	$180^\circ$
$y = \sin x$	0	0.5	0.9	1	0.9	0.5	0

For  $y = x$

$x$	0	1	2	3	3.14
$y$	0	1	2	3	3.14



Scale For  $y = \sin x$   
 One big square along x-axis =  $60^\circ$   
 One big square along y-axis = 1 unit  
 For  $y = x$   
 One big square along x-axis = 1 unit  
 One big square along y-axis = 1 unit.  
 The graph shows that the line  $y = x$  intersects the curve  $y = \sin x$  at the point where  $x = 0^\circ$   
 Hence the solution set =  $\{0^\circ\}$   
Ans.