2. Trigometric ratios 3

X^0	0^0	30^0	60^0	90^0	120^0	150^0	180^0	210^0	240^0	270^0	300^0	330^0
Cos x	1.00	0.87	0.50	0	-0.5	-0.87	-1	-0.87	-0.5	0.5	0.7	1
2cos ½ x	2.00	1.93	1.73	1.41	1	0.52	0.00	-0.52	-1	-1.73	-1.93	-2.00

1.

Q2/

y = Cos x

y = 2 cos ½ x.
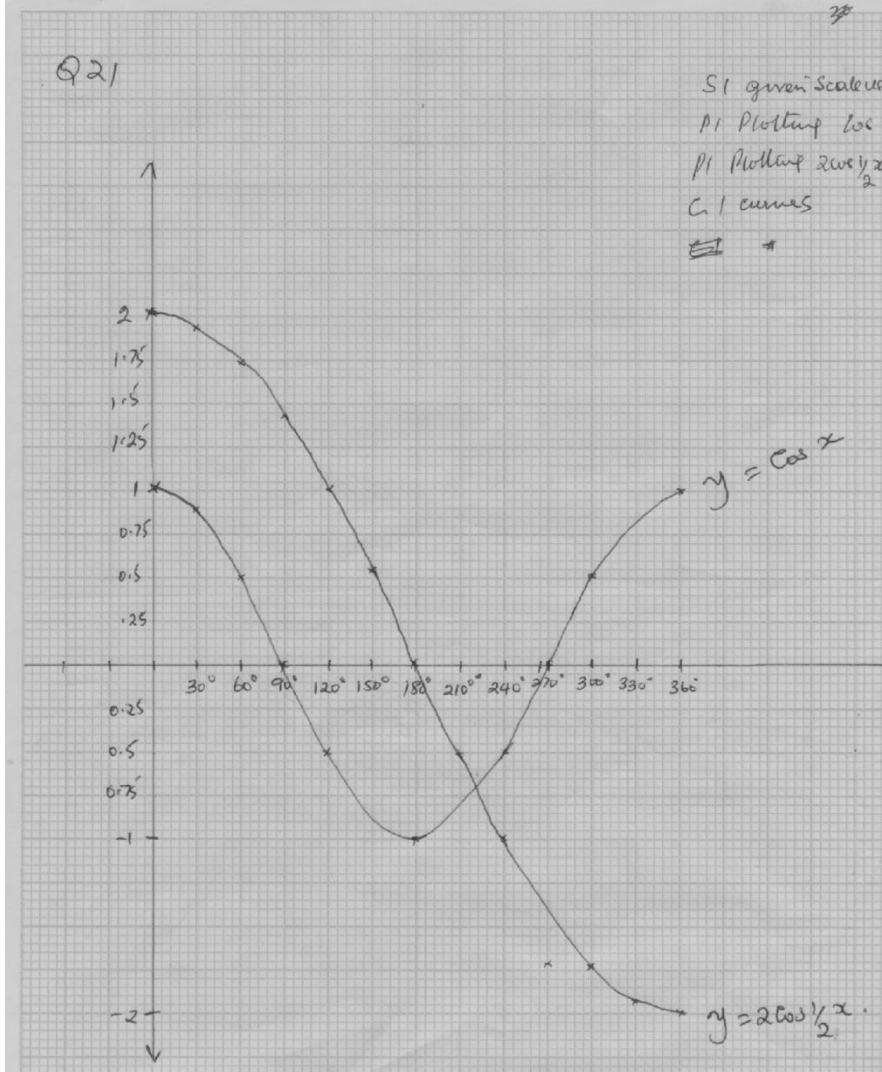
B1	All values of cos x
B1	All values of cos ½ x
S1	Given scale used
P1	Plotting cos x
P1	Ploting 2 cos ½ x
C1	Curve smooth continous
B1	
B1	

(a) amplititude = 2 B1
   period = 720^0 B1
(b) 2cos ½ x = cos x
   X = $222^0 \pm 6^0$

1.   a)

X^o	-225	-180	-135	-90	-45	0	45	90	135	180	225
$y = \sin 2x$		0		0	1.0		1.0	0		0	
$y = 2\cos x$		-2.0		0	1.4		1.4	0		-2.0	

b)
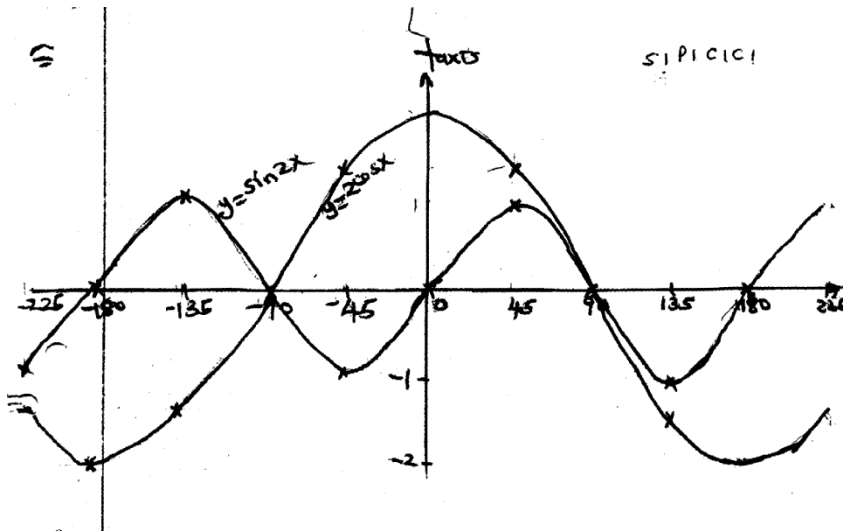
(c) -90° or 90°
(d) (i) Highest point 1 unit
        Lowest point   - 1.4

2.

x	0	30	60	90	120	150	180	210
$2\sin(x+15^o)$	0.52	1.41	1.93	1.93	1.41	0.52	-0.52	- 1.41
$\cos(2x -30^o)$	0.87	0.87	0	-0.87	0.87	0	0.87	0.87

x	240	270	300	330	360		
$2\sin(x+15^o)$	-1.93	-1.93	-1.41	-0.52	0.52	B_1	B_1
$\cos (2x -30^o)$	0	-0.87	-0.87	0	0.87		B_1

(i) Amplitudes:, y = 2 sin (x + 15)
                = 2units
                y = cos (2x – 30) B_1
                =1unit B_1

            12°, 159°

y =2sin(x + 15)

y =cos(2x - 30)

S₁ → S_1

P₁ → P_1

C₁ → C_1

C₁ → C_1
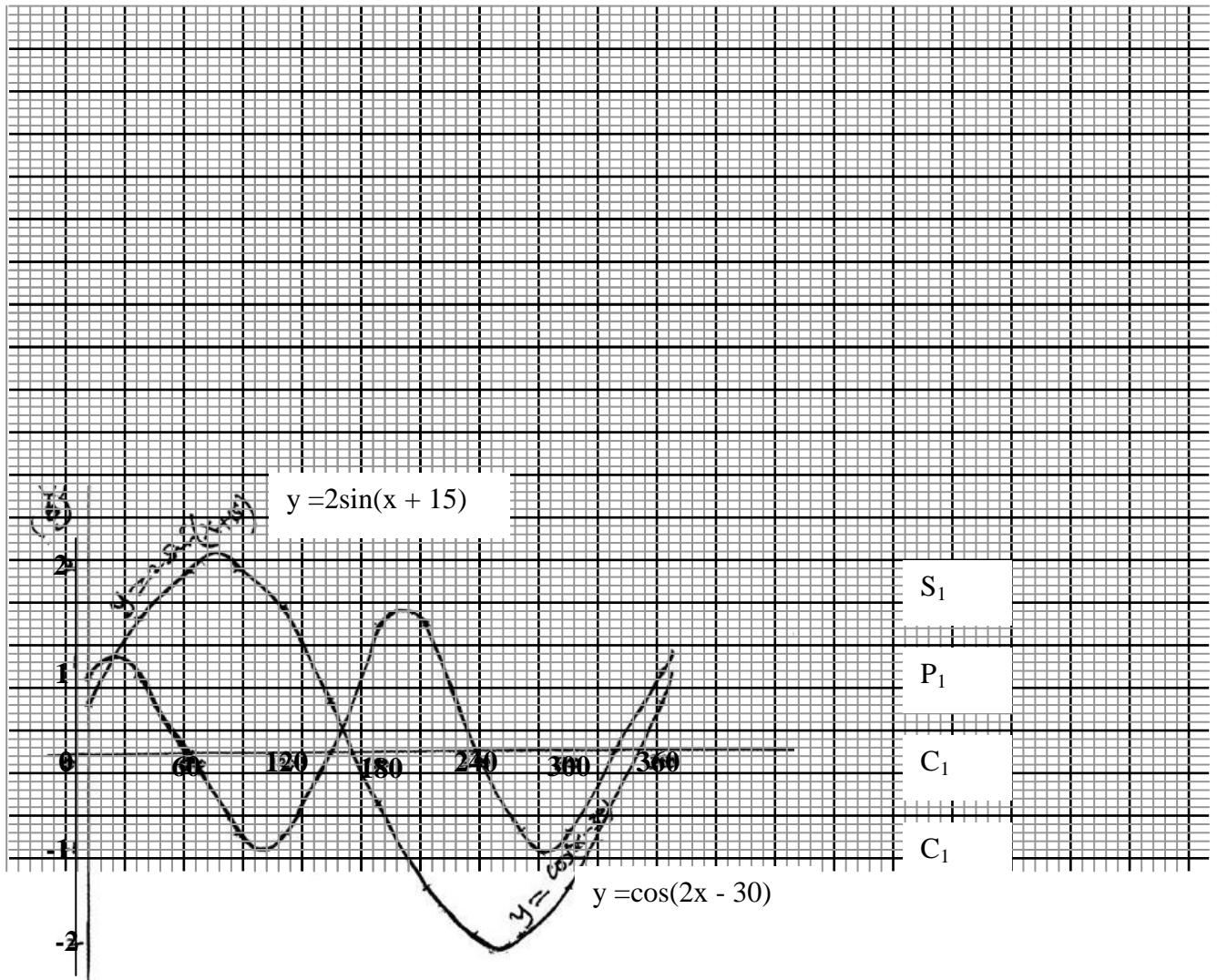
3.   *Determine the*
      i) Altitude of the frustrum
      Solution
      $A^1C^1 = \sqrt{4^2 + 4^2} \quad = \sqrt{32}$
      $AC = \sqrt{10^2 + 10^2}$
      $\quad\quad = \sqrt{200}$
      $\quad\quad = 10\sqrt{2}$
      $AM + XM = 10\sqrt{2} - 4\sqrt{2}$
      $\quad\quad\quad = 6\sqrt{2}$
      $AM = {^{6\sqrt{2}}/_2} = 3\sqrt{2}$
      $Height = AM = \sqrt{5^2 - (3\sqrt{2})^2} \quad = \sqrt{25 - 18}$
      $\quad\quad\quad\quad\quad\quad = \sqrt{7} = 2.646$
      ∴ *the altitude of the frustrum = 2.646 cm*

      A^1 ——— $4\sqrt{2}$ ——— C^1
      5cm   5cm
      A ———— $3\sqrt{2}$ M —— $4\sqrt{2}$ —— X $3\sqrt{2}$ C
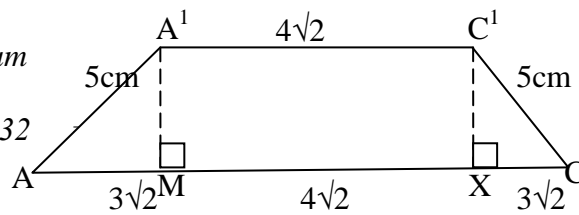
      ii) Angle between AC and the base
      $AX = 3\sqrt{2} + 4\sqrt{2} = 7\sqrt{2}$
      $Tan\; \phi = {^{CX}/_{AX}} = {^{\sqrt{7}}/_{7\sqrt{2}}} =$
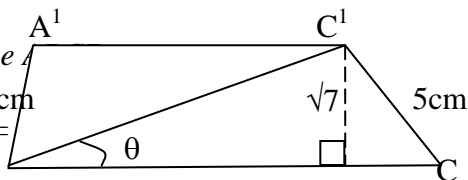
      A^1 ——— C^1
      5cm $\sqrt{7}$ 5cm
      θ   C

$= 0.2673$

$\theta = \tan^{-1} 0.2673$

$= 14.96°$

A $7\sqrt{2}$ X

iii) Volume of pyramid $= \frac{1}{3} bh$

$AC = 10 \sqrt{2}$

$A1C1 = 4 \sqrt{2}$

$L.S.F = 10:4$

$\therefore \dfrac{h + 2.646}{h} = \dfrac{10}{4}$

$4(h + 2.646) = 10h$

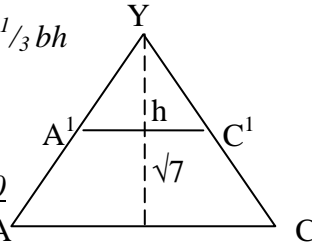$4h + 10.584 = 10h$

$6h = 10.584$

$h = 1.764$

$H = h + 2.646$

$= 1.764 + 2.646 \quad = 4.410$

$Vf = (\frac{1}{3} \times 10 \times 10 \times 4.41) - (\frac{1}{3} \times 4 \times 4 \times 1.76)$

$= \dfrac{441.0}{3} - \dfrac{28.224}{3}$

$= \dfrac{413.776}{3}$

$= 137.592 cm^3$

4.   ✓(a)   table completed

   (b)

   (c) (i) 3   P1 – plotting

           S1- scale

           C1 – smooth curve

   (ii) 180°

   (iii) Line $y = 1$ drawn

          $x = 4.5^o$ or $72.8^{o} - 107.2^o - 175.4^o$

5. $(^A/_B)^2 = \dfrac{p + 33q}{q - 3P}$

$A^2 q - 3A^2 P = BP + 3Bq$

$Aq^2 - 3Bq = BP + 3A^2 P$

$2(A^2 - 3B) = BP + 3A^2 P$

$Q = \dfrac{BP + 3A^2 P}{A^2 - 3B}$

6.

$x°$	-180	-150	-120	-90	-60	-30	0	30	60	90	120	150	180
$y = \cos(2x+45)°$	0.71	-0.26	-0.97	-0.71	0.26	0.97	0.71	0.26	-0.26	-0.71	0.26	0.97	0.71
$y = -\sin(x+30)°$	0.50	0.87	1.00	0.87	0.50	0.00	-0.50	-0.87	-1.00	-0.87	-0.50	0.00	0.50

$y = \cos(2x+45)°$
$y = -\sin(x+30)°$

$\cos(2x+45)° + \sin(x+30)° = 0$
$x = -54°, 67.5°$

7. 7.
$\dfrac{\sqrt3}{2} \quad x \; \tfrac12$

$\dfrac{1}{\sqrt3} \quad x \; \dfrac{1}{\sqrt2}$

$\dfrac{\sqrt3}{4} \quad x \; \dfrac{\sqrt6}{1}$

$\dfrac{\sqrt{18}}{4}$

$\dfrac{3}{4} \; \sqrt2$
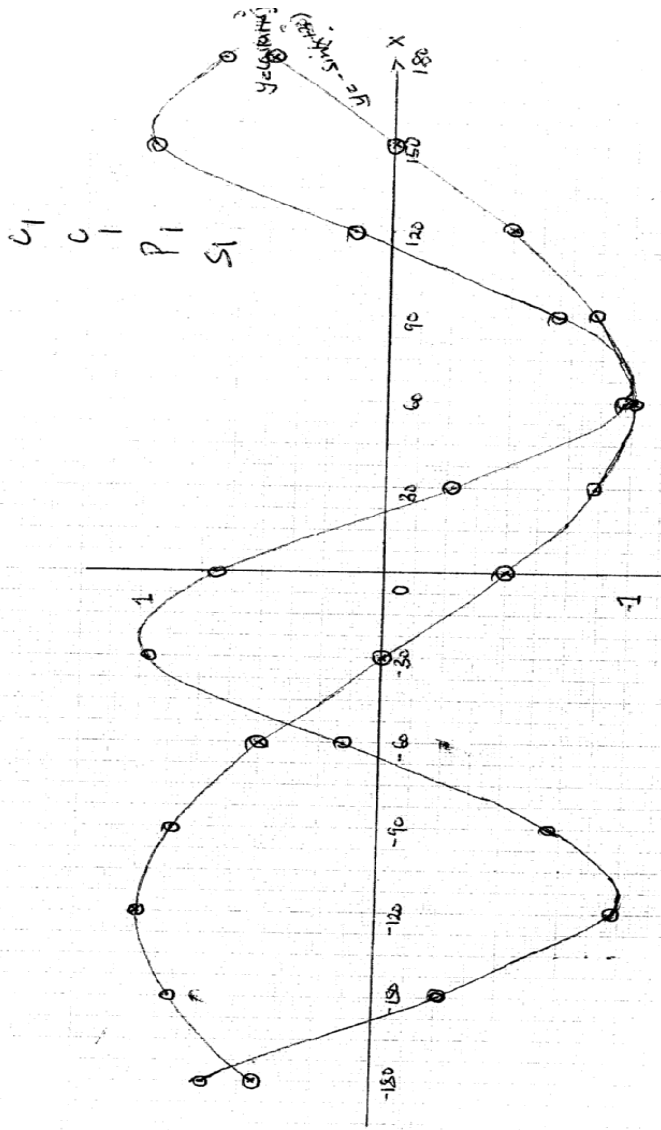
8. a)

x	0	30	60	90	120	150	180	210	240	270	300	330	360
3sinx		1.5			2.6	1.5					-2.6		0
2cos x	2			0	-1.0			-1.7		0			
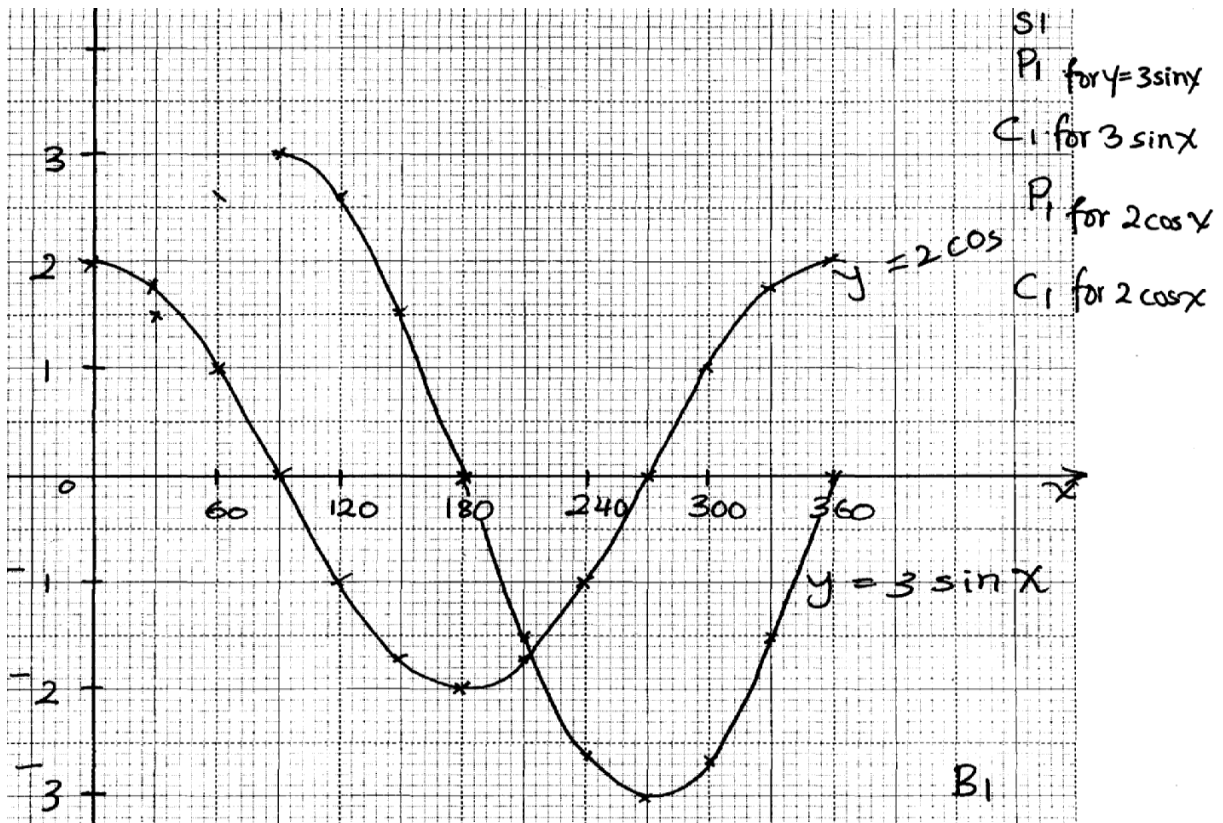
(c) (i) Amplitude =3
(ii) x = 36°
x = 216°
(iii) 33° ≤ x ≤ 213°

9.

x	0	90	180	270	360	450	540	630	720	810
sin ½x	0	0.71	1	0.71	0	-0.71	-1	-0.71	0	0.71
3Sin (½x + 60)	2.6	2.9	1.5	-0.78	-2.6	2.9	-1.5	0.78	2.6	2.9

10.

x	*0°*	*30°*	*60°*	*90°*	*120°*	*150°*	*180°*
2 sin x	*0*	*1*	*1.73*	*2*	*1.73*	*1.00*	*0*
1-Cos X	*1*	*0.13*	*0.50*	*1*	*0.06*	*1.87*	*2*
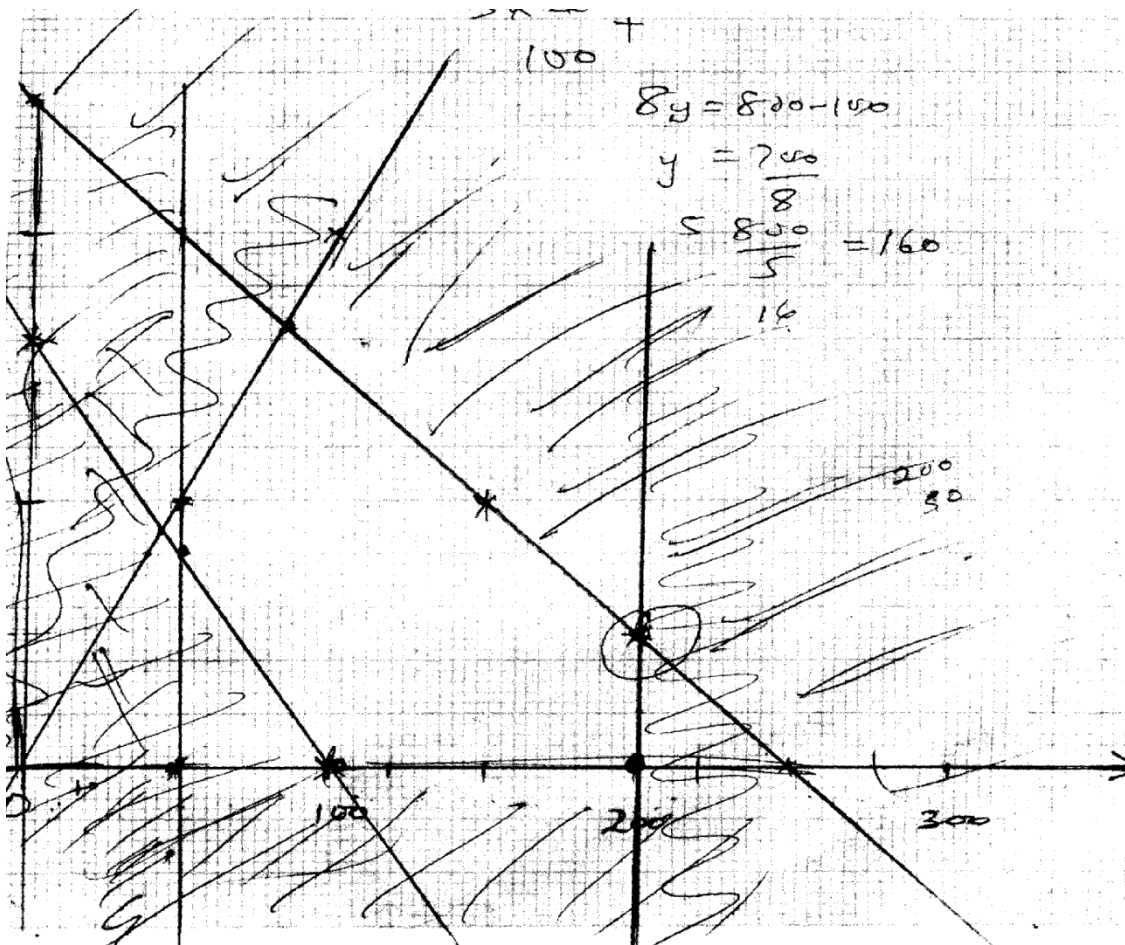
11.   *Sin (x + 30) = 0.5*
         x + 30 = 30°
         x = 0
         0, 180, 360

12.   (c) $10\sin x = ^{-1}/_{50} + 5$
        $Y = ^{-1}/_{50} + 5$

X	0	50
y	5	4

        $X_1 = 28^o \pm 1$
        $X_2 = 70^o \pm 1$

12.
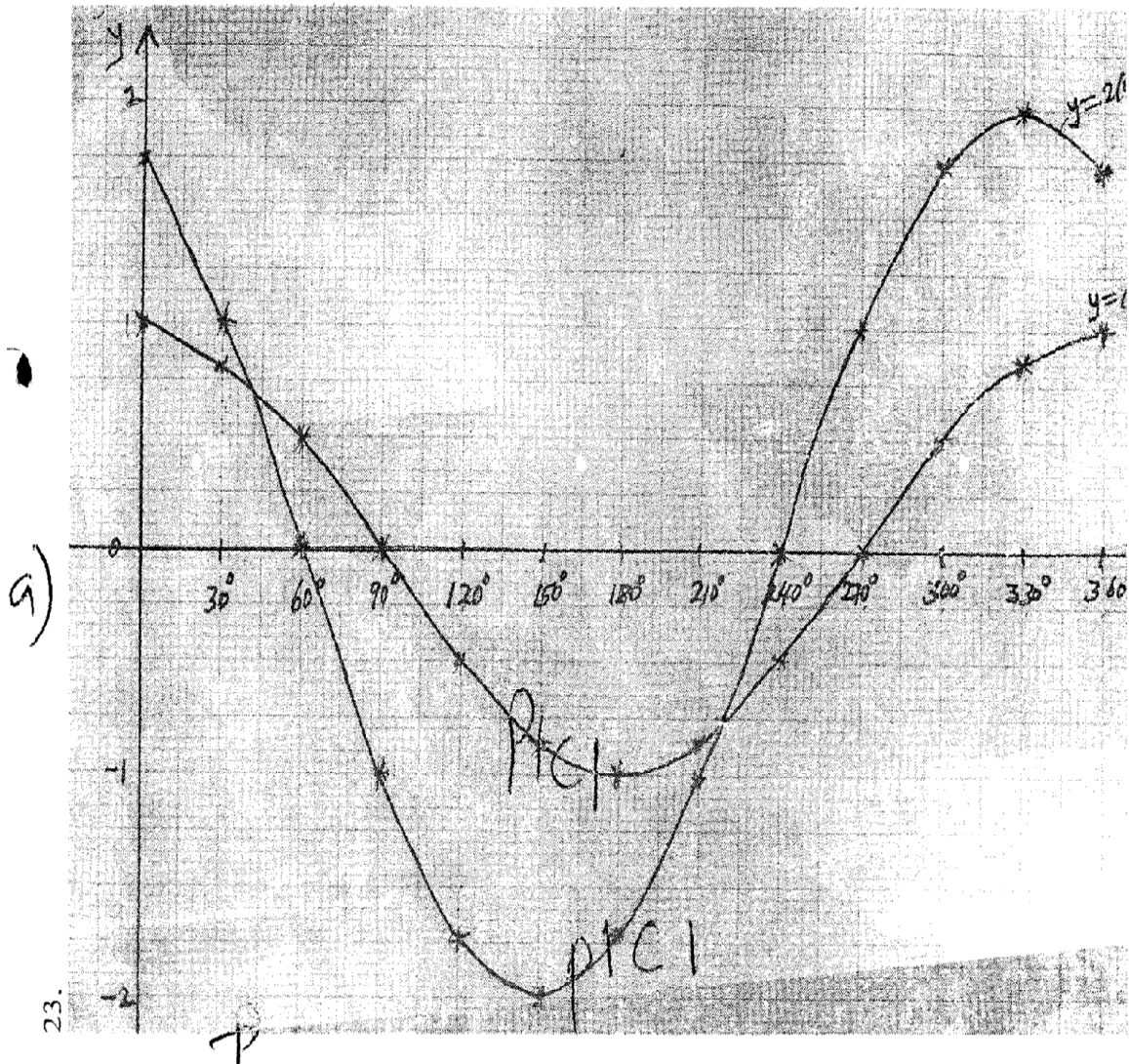
b)   i) amplitude = 1
        ii) Period = 360°
         iii) 45°, 219°

13. $2\theta + 10 = 210^o, 330^o, 570^o, 690^o$

 $2\theta = 200, 320, 560, 680$

 $= 100^o, 160^o, 280^o, 340^o$

 $= \dfrac{5\pi}{90}, \dfrac{8\pi}{9}, \dfrac{14\pi}{9}, \dfrac{17\pi}{9}$

14. $4\sin 2x + 4\cos x - 5 = 0$

 $4(1 - \cos2X) + 4\cos x - 5 = 0$

 $4\cos2x - 4\cos x + 1 = 0$

 $4\cos2x - 2\cos x - 2\cos x + 1 = 0$

 $(2\cos x - 1)2 = 0$

 $X = 60°, 300°$

15.

x	15°	60°	150°	165°
4 Cos 2x	3.46			3.46
2Sin (2x + 30º)		1.00	-1.00	

(b) graph
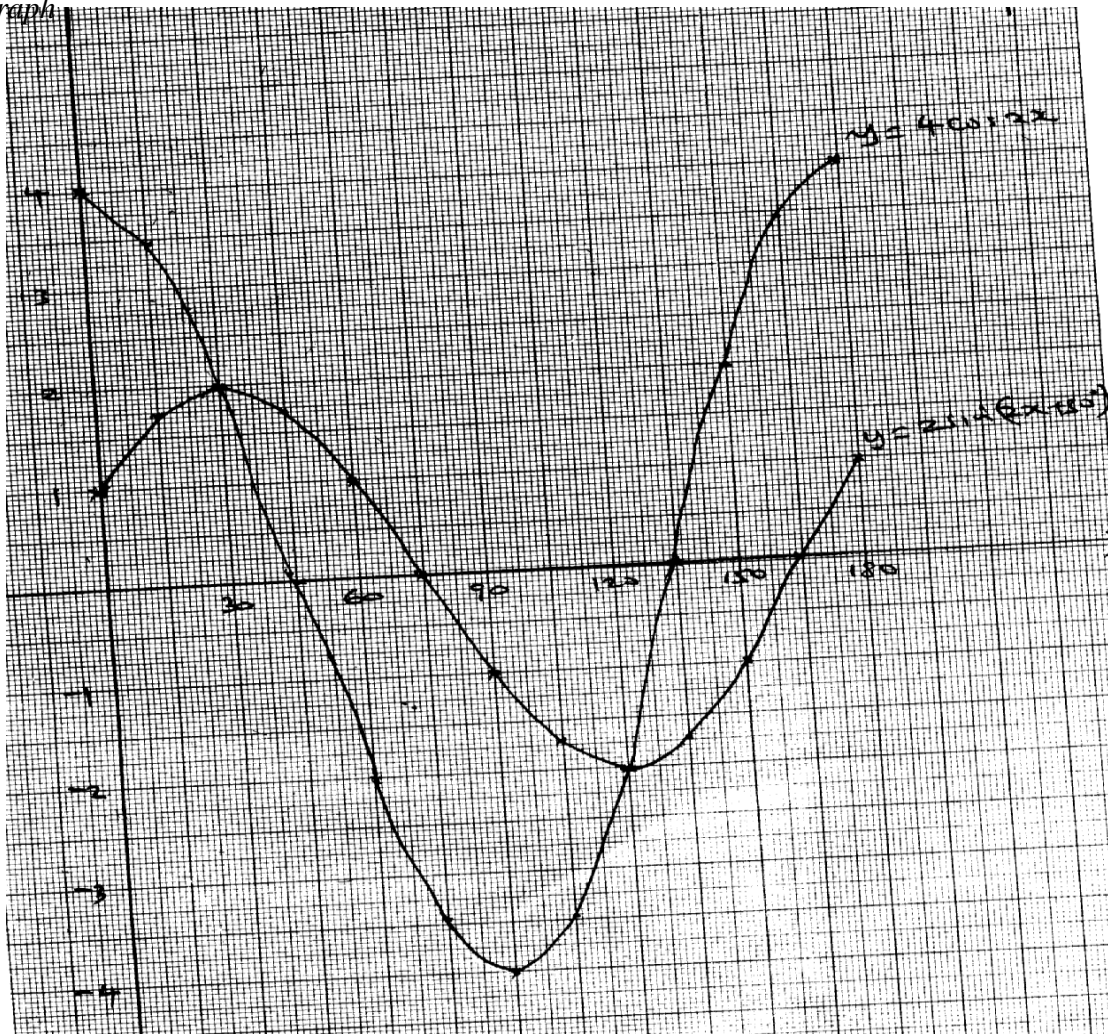
(c)(i) Amplitude = 4

   (ii) period = 180°

(d) x = 30°, 120°