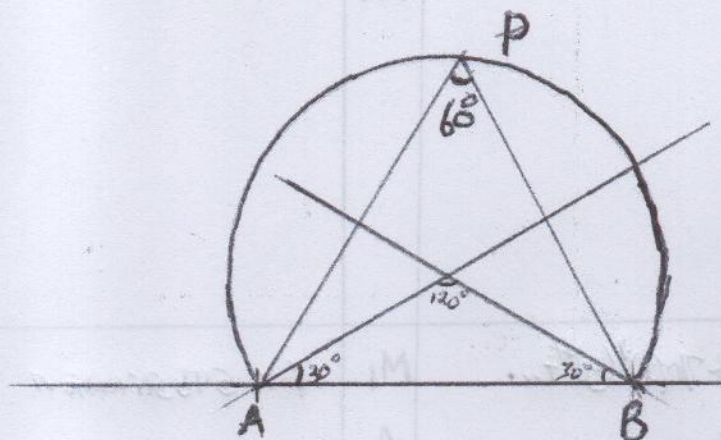


1	$A = P(1 - \frac{r}{100})^n$ $= 80000(1 - \frac{15}{100})^2$ $= 57800$	<p>M₁</p> <p>A₁</p>	
2a)	$1(x)^8(y)^0 + 8(x)^7(y)^1 + 28(x)^6(y)^2 + 56(x)^5(y)^3 + 70(x)^4(y)^4 \dots$ $= x^8 + 8x^7y + 28x^6y^2 + 56x^5y^3 + 70x^4y^4$	<p>M₁</p> <p>A₁</p>	for substitution
b)	$(x+y)^8 = (1+0.2)^8$ $x=1; y=0.2$ $= 1^8 + 8(0.2) + 28(0.2)^2 + 56(0.2)^3 + 70(0.2)^4$ $= 1 + 1.6 + 1.12 + 0.448 + 0.112$ $= 4.28$	<p>M₁</p> <p>A₁</p>	For correct x and y
3	$\log\left(\frac{3x+4}{3-x}\right) = \log(10)$ $= \frac{3x+4}{3-x} = \frac{10}{1}$ $= 3x+4 = 30-10x$ $13x = 26$ $x = 2$	<p>M₁</p> <p>M₁</p> <p>A₁</p>	Logs on both sides
4	$\frac{dy}{dx} = 12x^2 + 2$ $\text{at } x=1$ $\text{Gradient} = 14$ $\text{Gradient of normal} = -\frac{1}{14}$ $\frac{y-4}{x-1} = -\frac{1}{14}$ $14y - 56 = -x + 1$ $\frac{14}{14}y = -\frac{x}{14} + \frac{57}{14}$	<p>M₁</p> <p>M₁</p>	<p>Correct gradient function</p> <p>Equation to $-\frac{1}{14}$</p>

$$y = -\frac{1}{14}x + 4\frac{1}{14}$$

5



B_1 for $AB = 5 \text{ cm}$.

B_1 for centre.

B_1 for locus P.

$$6 = \frac{2 \times (1 + \frac{1}{\sqrt{2}})}{1 - \frac{1}{\sqrt{2}} (1 + \frac{1}{\sqrt{2}})}$$

$$= 2 + \frac{2}{\sqrt{2}}$$

$$= 4 + \frac{1}{\sqrt{2}}$$

$$= 4(1 + \frac{1}{\sqrt{2}})$$

M_1

M_1

A_1

CAO

7

$$\frac{0.05 \times 0.05}{6 \times 3.5}$$

$$= 0.02261904 \times 100$$

$$= 2.261904\%$$

$$=$$

M_1

M_1

A_1

8

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

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

$$2\cos^2 \theta = 1$$

$$\cos^2 \theta = 0.5$$

$$\cos \theta = 0.7071$$

$$\theta = 45^\circ$$

M_1

for attempt to remove square root.

M_1

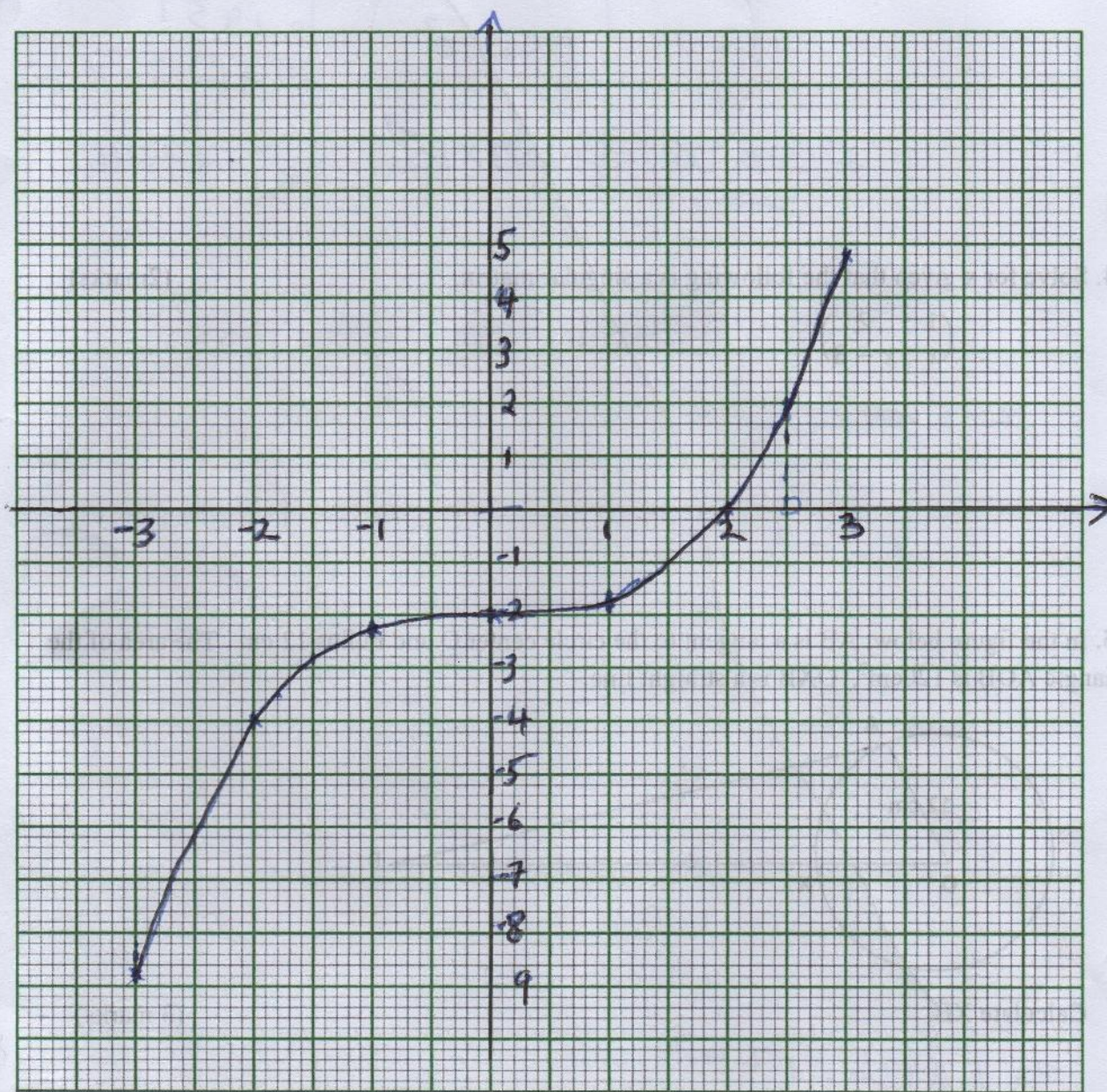
A_1

9	$Q^2 = \frac{T^2 + 1}{T^2}$ $= Q^2 T^2 = T^2 + 1$ $= Q^2 T^2 - T^2 = 1$ $= T^2 (Q^2 - 1) = 1$ $= T^2 = \frac{1}{(Q^2 - 1)}$ $= T = \pm \frac{1}{\sqrt{Q^2 - 1}}$	M_1 M_1 A_1	<p>Attempt of removing root sing</p> <p>collecting like terms.</p> <p>C.A.O.</p>
10	$4x^2 + 4y^2 = 144$ $x^2 + y^2 = 36$ $(x+0)^2 + (y+0)^2 = 36$ <p>Centre (0,0)</p> $r^2 = 36 \text{ units}$ $r = 6 \text{ units}$	M_1 M_1 A_1	<p>simplifying equation.</p> <p>correct Centre and radius.</p>
11 a)	$\frac{(3 \times 120) + (4 \times 90) + (5 \times 60)}{12}$ $= \text{sh } 85$	M_1 A_1	
b)	$B.P = 5 \times 85$ $= \text{sh } 425$ $S.P = \frac{108}{100} \times 425$ $= \text{sh } 459$	M_1 A_1	<p>attempting to get for B.P</p> <p>for S.P</p>

12. The table shows corresponding values of x and y for the curve $Y = \frac{1}{4}x^3 - 2$

X	-3	-2	-1	0	1	2	3
Y	-8.8	-4	-2.3	-2	-1.8	0	4.8

On the grid provided below, draw the graph of $Y = \frac{1}{4}x^3 - 2$ for $-3 \leq x \leq 3$. Use the graph to estimate the value of x when $y = 2$ (3 marks)

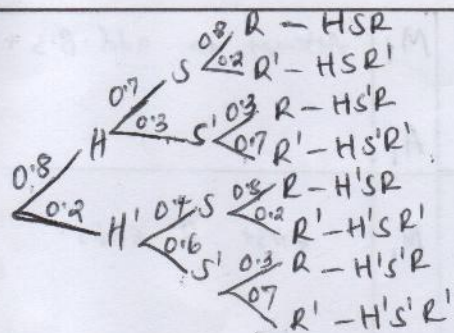


p1
C1

$$x = 2.5 \text{ B1}$$

13	<table> <tr> <th>No.</th><th>St</th><th>log</th></tr> <tr> <td>83.6</td><td>8.36×10^1</td><td>1.9222</td></tr> <tr> <td>0.00541</td><td>5.41×10^{-3}</td><td>$\frac{3.7332}{7.6554} +$</td></tr> <tr> <td>156</td><td>1.56×10^2</td><td>$\frac{2.1931}{3.4623 \times \frac{1}{5}} -$</td></tr> <tr> <td>0.31078</td><td>3.1078×10^{-1}</td><td>$= 1.49246$</td></tr> </table>	No.	St	log	83.6	8.36×10^1	1.9222	0.00541	5.41×10^{-3}	$\frac{3.7332}{7.6554} +$	156	1.56×10^2	$\frac{2.1931}{3.4623 \times \frac{1}{5}} -$	0.31078	3.1078×10^{-1}	$= 1.49246$	<p>M_1 For reading all logs correctly</p> <p>M_1 Correct Sum of logs</p> <p>M_1 Correct Quotient</p> <p>A_1 C.A.O</p>
No.	St	log															
83.6	8.36×10^1	1.9222															
0.00541	5.41×10^{-3}	$\frac{3.7332}{7.6554} +$															
156	1.56×10^2	$\frac{2.1931}{3.4623 \times \frac{1}{5}} -$															
0.31078	3.1078×10^{-1}	$= 1.49246$															
14	$x - 3 - 2x = 0$ $-x = 3$ $x = -3$	<p>M_1 Equation set to zero</p> <p>M_1 for simplification</p> <p>A_1</p>															
15	$\frac{1}{2} \times 12h = 120$ $AB = h = 20 \text{ cm}$ $\sqrt{H^2} = \sqrt{20^2 + 12^2}$ $OB = H = 23.32 \text{ cm}$ $XB = 23.32 - 12$ $= 11.3 \text{ cm}$	<p>M_1 for h. (AB)</p> <p>M_1 for OB</p> <p>A_1</p>															
16	$3x + 4y \leq 120 \quad \text{--- (i)}$ $400x + 150y \leq 900$ $8x + 3y \leq 18 \quad \text{--- (ii)}$ $x \geq 8 \quad \text{--- (iii)}$ $y > 12 \quad \text{--- (iv)}$	<p>B_1</p> <p>B_1</p> <p>B_1</p> <p>B_1</p>															

17a)

 B_1

for tree diagram

 B_1

for outcomes

$$b) (i) P(HS'R') \text{ or } P(H'S'R')$$

$$= (0.8 \times 0.3 \times 0.7) + (0.2 \times 0.4 \times 0.2) \\ = (0.8 \times 0.3 \times 0.7) + (0.2 \times 0.6 \times 0.7) \\ = 0.252$$

 M_1 A_1

$$ii) (0.8 \times 0.7 \times 0.2) + (0.8 \times 0.3 \times 0.3) + (0.2 \times 0.4 \times 0.2) \\ = 0.2$$

 M_1 A_1

$$iii) P(HS'R')$$

$$= 0.8 \times 0.3 \times 0.7 \\ = 0.168$$

 M_1 A_1

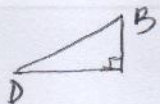
$$iv) P(HSR) \text{ or } P(HSR') \text{ or } P(H'SR)$$

$$(0.8 \times 0.7 \times 0.8) + (0.8 \times 0.7 \times 0.2) + (0.8 \times 0.3 \times 0.3) \\ = 0.632$$

 M_1 A_1

18 9	<p>(i) $19200 + 12000 + 13000 + 23000$ $= \text{sh } 46500$ $= \text{£ } 2325$</p>	<p>M₁ Attempt to add B.S + A. A₁</p>
	<p>(ii) $\frac{8420}{20} \times 2 = 840$ $480 \times 3 = 1440$ $600 \times 4 = 2400$ $300 \times 5 = 1500$ $525 \times 6 = 3150$ <hr/> Gross tax sh 9300 Net tax = sh 8090</p>	<p>M₁ first 2 slabs M₁ next 2 slabs M₁ Last slabs. M₁ Gross tax A₁ Net tax.</p>
	<p>b) Total deductions = $8090 + 230 + 100 + 4000 + 1200$ $= \text{sh } 13620$ Net salary = $46500 - 13620$ Net salary = 32880</p>	<p>M₁ Adding deduction M₁ Subtracting T.I and T.deten A₁ C.A.D</p>
19	<p>$P \propto \frac{Y}{\sqrt{R}}$ (a) $P = \frac{KY}{\sqrt{R}}$ $180 = \frac{9K}{5}$ $K = 100$ $P = \frac{100Y}{\sqrt{R}}$ $P = \frac{100 \times 6}{\sqrt{26}}$ $= 117.6697$ $P = 118$</p>	<p>M₁ For formula with value K M₁ A₁ C.A.D</p>

<p>b) $360 = \frac{100 \times V}{\sqrt{0.64}}$</p> <p>$360 = \frac{100V}{0.8}$</p> <p>$V = 2.88$</p>	<p>M_1</p> <p>M_1</p> <p>A_1</p>	<p>Substitution</p> <p>Attempting to solve</p> <p>C.A.D</p>
<p>c Before</p> <p>$100 \rightarrow \frac{10000}{10}$</p> <p>100 \rightarrow 1000</p> <p>After</p> <p>$\frac{100 \times 116}{\sqrt{75}}$</p> <p>$= 1339.45$</p> <p>100% \Rightarrow 1000</p> <p>? \in 1339.45</p> <p>$\frac{1339.45 \times 100}{1000}$</p> <p>$= 133.95$</p> <p>Percentage change $= 33.95\%$</p>	<p>M_1</p> <p>M_1</p> <p>M_1</p> <p>A_1</p>	<p>New Percentage</p> <p>Change in percentage (at least 2 d.p)</p>

20
a)

$$\sin 25 = \frac{BE}{12}$$

$$BE = 5.07 \text{ cm}$$

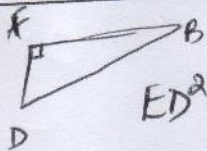
M₁A₁

b) $\tan 25 = \frac{5.07}{CE}$

$$CE = 10.88 \text{ cm}$$

M₁A₁

c)



$$ED^2 = 16^2 + 10.88^2$$

$$ED = 19.35 \text{ cm}$$

$$DB^2 = 19.35^2 + 5.07^2$$

$$DB = 20.03 \text{ cm}$$

$$FB^2 = 16^2 + 5.07^2$$

$$FB = 16.78$$

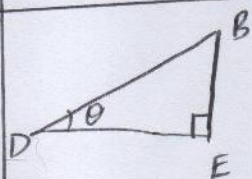
M₁M₁M₁

$$\tan \theta = \frac{10.88}{16.78}$$

$$\theta = 32.95^\circ$$

A₁

d)



$$\tan \theta = \frac{5.07}{19.35}$$

$$\theta = 14.68$$

M₁A₁

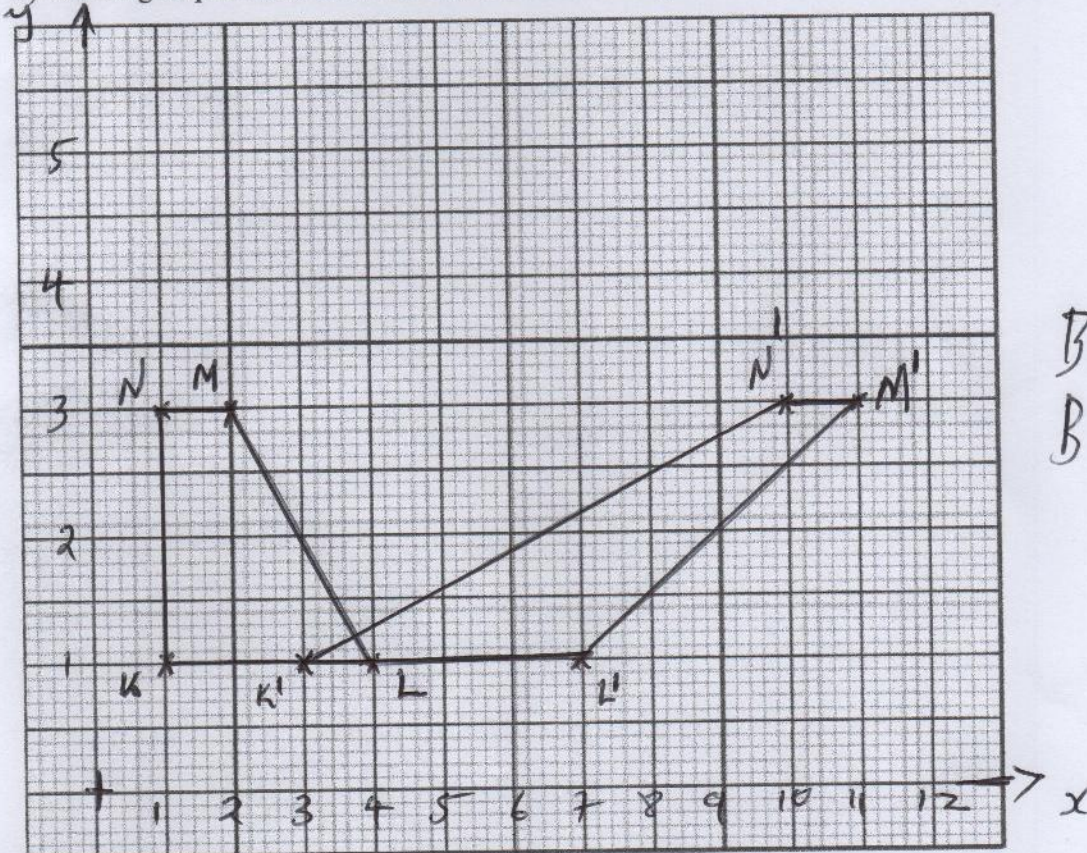
21. A quadrilateral with vertices at K (1,1), L(4,1), M(2, 3) and N (1, 3) is transformed by a matrix $T = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$ to a quadrilateral K'L'M'N'

a) Determine the coordinates of the image M_1 (3marks)

$$\begin{pmatrix} 1 & 3 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} K & L & M & N \\ 1 & 4 & 2 & 1 \\ 1 & 1 & 3 & 3 \end{pmatrix} = \begin{pmatrix} K' & L' & M' & N' \\ 3 & 7 & 11 & 10 \\ 1 & 1 & 3 & 3 \end{pmatrix} M_1$$

$$K'(3,1) \quad L'(7,1) \quad M'(11,3) \quad N'(10,3) A_1$$

b) On the grid provided draw the object and the image (2marks)



B_1 - object
 B_1 - image

i) Describe fully the transformation which maps KLMN onto K'L'M'N' (2marks)

It's a shear, x-axis invariant, B_1

ii) Determine the area scale factor of the image and its object. (1mark)

$K(1,1)$ mapped onto $K'(3,1) B_1$

B_1

iii) Find a matrix which maps K'L'M'N' onto KLMN (2marks)

$$-\frac{1}{3} \begin{pmatrix} 1 & -3 \\ 0 & 1 \end{pmatrix} = M_1$$

$$= \begin{pmatrix} -\frac{1}{3} & 1 \\ 0 & -\frac{1}{3} \end{pmatrix} A_1$$

22. a) $140^\circ + 39^\circ = 179^\circ$ $60 \times 179 \cos 61^\circ$ $= 52.06.86 \text{ nm}$	M_1 M_1 A_1	
b) $180 - (61 \times 2) = 58^\circ$ $\frac{58}{360} \times 22 \times 2 \times 6370$ $= 6450.89 \text{ km}$	M_1 M_1 A_1	
c. $\frac{\alpha}{360} \times 2 \times 22 \times 6370 \cos 61^\circ = 430$ $\frac{53.92^\circ \alpha}{53.92} = \frac{430}{53.92}$ $\alpha = 7.97^\circ$ Position D = $39 + 7.97$ $= 46.97^\circ \text{ W}$	M_1 M_1 M_1 A_1	

23	Class	M.P (x)	d=x-A	f	fd	d ²	fd ²
a)	45-49	47	-15	3	-45	225	675
	50-54	52	-10	9	-90	100	900
	55-59	57	-5	13	-65	25	325
	60-64	62	0	15	0	0	0
	65-69	67	5	5	25	25	125
	70-74	72	10	4	40	100	400
	75-79	77	15	1	15	225	225
				$\Sigma f =$ 50	$\Sigma fd =$ -120		$\Sigma fd^2 =$ 2650

B₁ for x column

B₁ for d column

B₁ for fd column

$$\bar{X} = \frac{\Sigma fd}{\Sigma f} + A$$

$$= \frac{-120}{50} + 62$$

$$= 59.6 \text{ marks}$$

M₁

A₁

$$\text{Var} = \frac{\Sigma fd^2}{\Sigma f} - \left(\frac{\Sigma fd}{\Sigma f} \right)^2$$

$$= \frac{2650}{50} - \left(\frac{-120}{50} \right)^2$$

$$= 53 - 5.76$$

$$= 47.24 \text{ marks}$$

M₁

M₁

A₁

c $S_d = \sqrt{\text{Var}}$

$$= \sqrt{47.24}$$

$$= 6.873 \text{ marks}$$

M₁

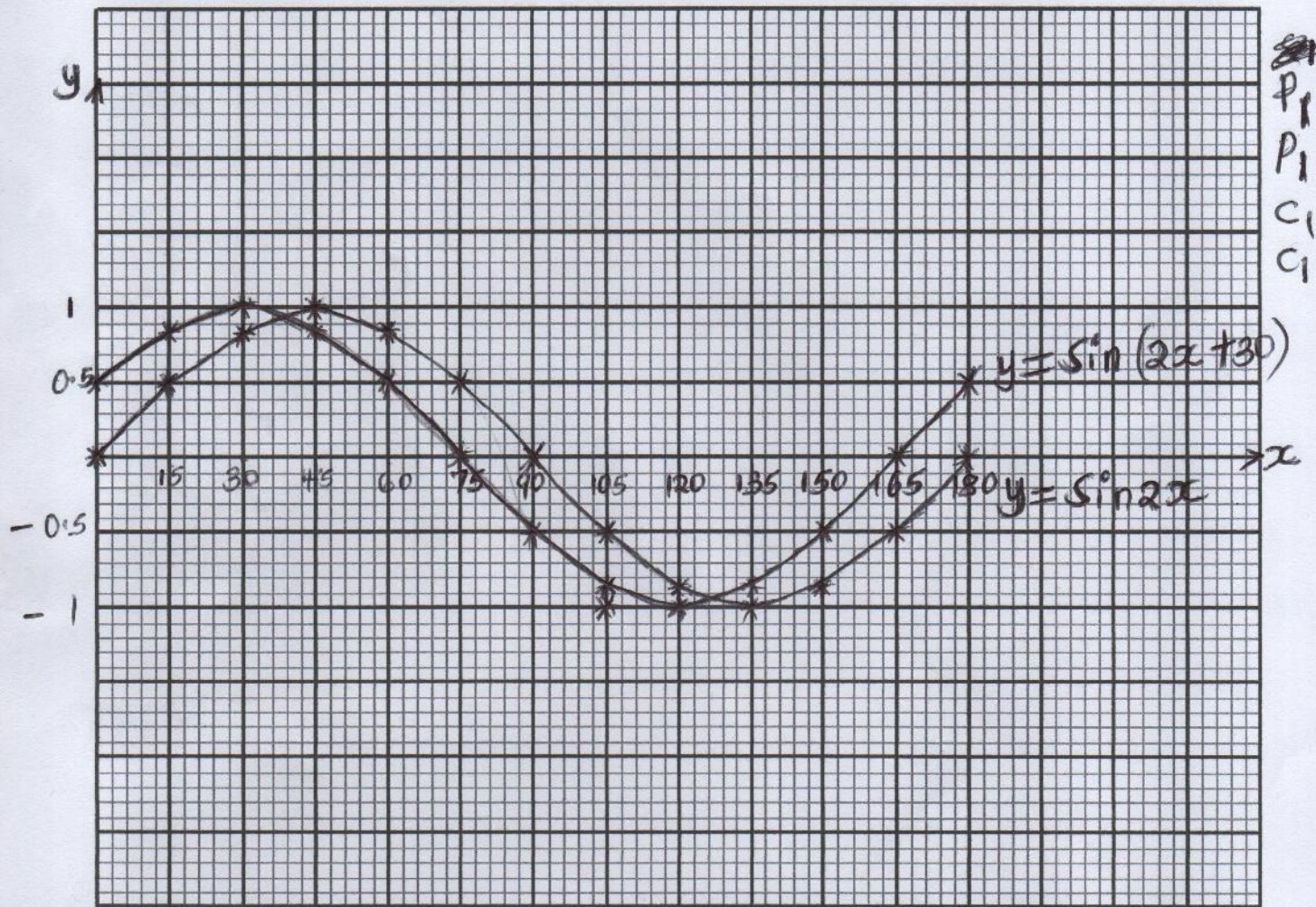
A₁

24. a) Complete the table below for $y = \sin 2x$ and $y = \sin (2x + 30)$ giving values to 2d.p (2 marks)

X	0	15	30	45	60	75	90	105	120	135	150	165	180
$\sin 2x$	0	0.5	0.87	1	0.87	0.5	0	-0.5	-0.87	-1	-0.87	-0.5	0
$\sin (2x + 30)$	0.5	0.87	1	0.87	0.5	0	-0.5	-0.87	-1	-0.87	-0.5	0	0.5

b). On the same axes, draw the curves

(4 marks)



c) Use the graph to solve $\sin (2x + 30) - \sin 2x = 0$

$$\sin (2x + 30) = \sin 2x$$

$$x = 36^\circ, 126^\circ$$

(2 mark)

M₁

A₁

d) State the period and amplitude of $y = \sin (2x + 30)$

(2 marks)

Period 180°

Amplitude = 1 unit

B₁

B₁