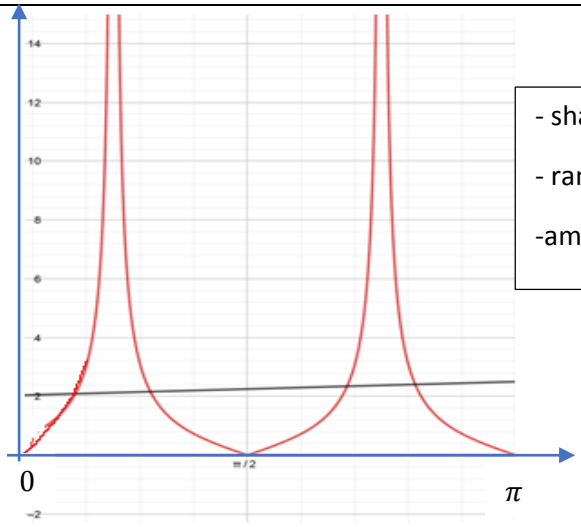
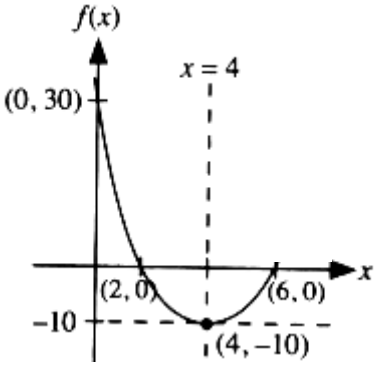
MARKING SCHEME

MODULE 2 PAPER 2

1.	(a)	$\frac{sin2x}{cosec^2x - 2sin^2x - cot^2x}$ $= \frac{sin2x}{1-2sin^2x}$ $= \frac{sin2x}{cos2x}$ $= tan2x$	1 1
	(b)	 - shape 1 m - range from 0 unti π 1 m -amplitude 1 m	3
	(c)	$\left\|\frac{sin2x}{cosec^2x - 2sin^2x - cot^2x}\right\| = \frac{x}{2\pi} + 2$ $\|tan2x\| = \frac{x}{2\pi} + 2$ $y = \frac{x}{2\pi} + 2$ Number of solutions/*bilangan penyelesaian* = 4	1 1
2.	(a)	$12000(0.95)^{n-1} = 10288.50$ $n - 1 = \frac{log_{10}(\frac{6859}{8000})}{log_{10}0.95}$ $n = 4$	1 1 1
	(b)	$\frac{12000(1-0.95^n)}{1-0.95} > 60000$ $1 - 0.95^n > 0.25$ $nlg0.95 < lg0.75$ $n > 5.61$ $n = 6$ $\therefore year\ 2015$	1 1 1 1

3.		$\text{Mean}_{\text{Ahmad}}=\frac{87+90+92+92+95}{5}=91.2$ $\text{Mean}_{\text{Chong}}=\frac{89+91+91+92+93}{5}=91.2$ Standard deviation$_{\text{Ahmad}}$ $=\sqrt{\frac{87^2+90^2+92^2+92^2+95^2}{5}-(91.2)^2}$ $=\sqrt{\frac{41622}{5}-8317.44}$ $=\sqrt{6.96}$ $=2.638$ Standard deviation$_{\text{Chong}}$ $=\sqrt{\frac{89^2+91^2+91^2+92^2+93^2}{5}-(91.2)^2}$ $=\sqrt{\frac{41596}{5}-8317.44}$ $=\sqrt{1.76}$ $=1.327$ Chong is more consistent because the standard deviation is smaller. *Chong adalah lebih konsisten kerana sisihan piawai lebih kecil.*	1 1 1 1 1 1 1 1
4.		$\frac{1}{x}+\frac{2}{y}=6x+y=4$ $\frac{1}{x}+\frac{2}{y}=4$……..(i) $6x+y=4$……...(ii) $\frac{y+2x}{xy}=4$ $y+2x=4xy$…….(iii) $y=4-6x$ ……(iv) Substitute (iv) into (iii) $4-6x+2x=4x(4-6x)$ $4-4x=16x-24x^2$ $24x^2-20x+4=0$ $12x^2-10x+2=0$ $(4x-2)(3x-1)=0$ $x=\frac{1}{2}$ or $x=\frac{1}{3}$ $y=1$ or $y=2$	1 1 1 1 1

5.	(a)	$x-h=0$ $x=h$ $h=\frac{2+6}{2}=4$ $f(x)=5k$ $-10=5k$ $k=-2$	 1 1
	(b)	minimum point = (4,-10) when x = 0, y = 30  Shape of the graph of the quadratic function Passes through (2, 0) and (6, 0)	1 1 1
	(c)	$f(x)=\frac{5}{2}(x-4)^2-10$ reflected at x- axis $f(x)=-\frac{5}{2}(x-4)^2+10$	 1
6.	(a)		
	(i)	$k(2q)=4$ $k=\frac{2}{q}$	 1
	(ii)	$\frac{3}{2k}=-\frac{h}{2p}$ $h=-\frac{3p}{k}$	1 1

	(b)	$C(-\frac{8}{3}, 0)$	1
		$\sqrt{(x+\frac{8}{3})^2 + (y-0)^2} = \frac{8}{3}$	1
		$3x^2 + 3y^2 + 16x = 0$	1
	(c)	$A = 2(\frac{1}{2})\begin{vmatrix} 2p & 0 & -\frac{8}{3} & 2p \\ 0 & 2q & 0 & 0 \end{vmatrix}$	1
		$= 4pq + \frac{16}{3}q$	1

Section B

7.	(a) (i)	$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$ $= -2\underline{y} - 4\underline{x}$	1
	(ii)	$\overrightarrow{BE} = \overrightarrow{BC} + \overrightarrow{CE}$ $= -4\underline{x} + 5\underline{y}$	1
	(iii)	$\overrightarrow{AE} = \overrightarrow{AB} + \overrightarrow{BE}$ $= -2\underline{y} + (-4\underline{x} + 5\underline{y})$ $= -4\underline{x} + 3\underline{y}$	1 1
	(b)	AB = 2(4) = 8 units BC = 4(3) = 12 units area of $\Delta ABE = \frac{1}{2} \times 8 \times 12$ = 48 unit^2	1 1
	(c)	$\overrightarrow{BF} + \overrightarrow{FC} = \overrightarrow{BC}$ $h\overrightarrow{BE} + k\overrightarrow{AC} = \overrightarrow{BC}$ $h\left[-4\underline{x} + 5\underline{y}\right] + k\left[-2\underline{y} - 4\underline{x}\right] = -4\underline{x}$ $(-4h - 4k)\underline{x} + (5h - 2k)\underline{y} = -4\underline{x}$ $5h - 2k = 0$ $h = \frac{2}{5}k$ ……. (1) $-4h - 4k = -4$ $h + k = 1$ …… (2) substitude (1) into (2), $\frac{2}{5}k + k = 1$ $\frac{7}{5}k = 1$ $k = \frac{5}{7}$ from (1), h = 2/5 x 5/7 h = 2/7	1 1 1 1

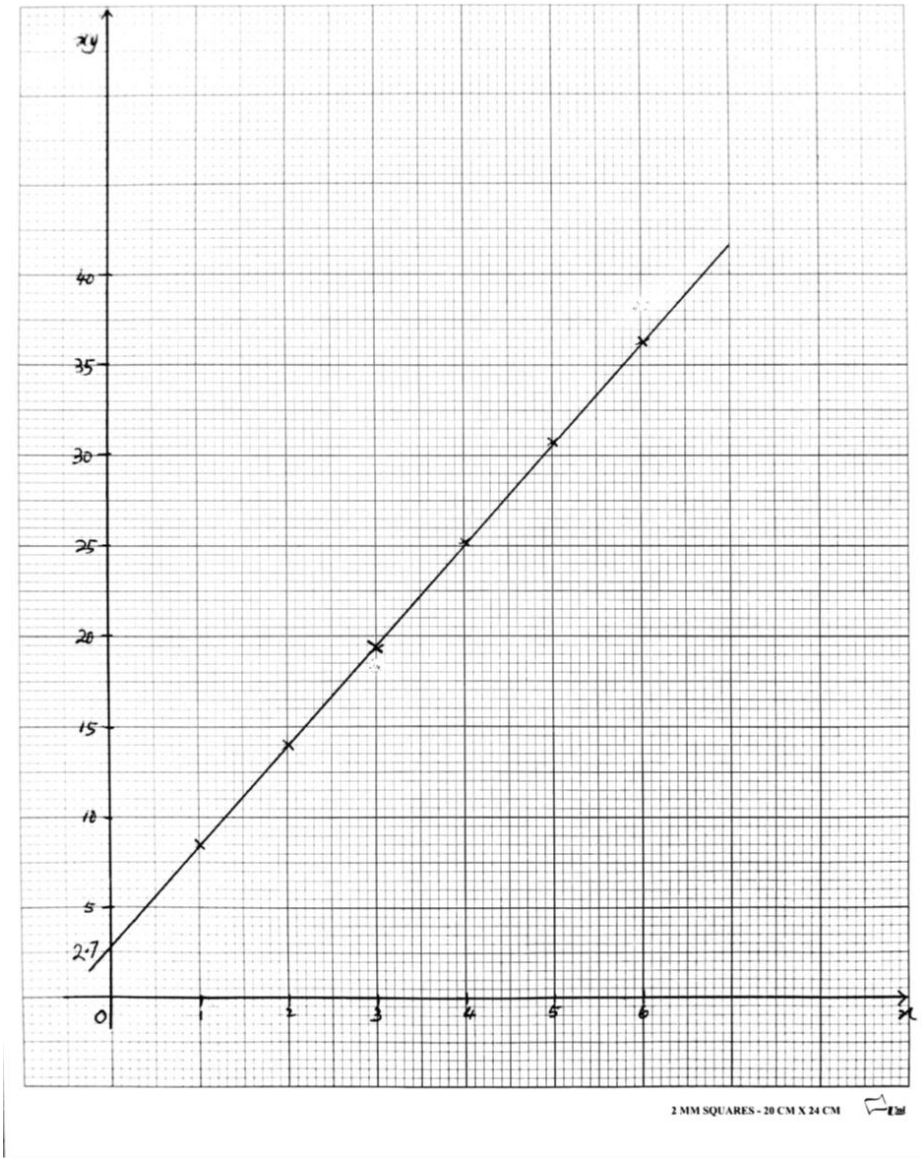
8.	(a)	$2x + x = 180°$ $x = 60°$ $\angle FBC = 60° + 20° = 80°$ $\angle FBC = 1.396\ rad$	1 1 1
	(b)	Area sector ABF = $\frac{1}{2}$ x $10^2 \times 1.047 = 52.35$ Area sector BFC = $\frac{1}{2}$ x $10^2 \times 1.396$ = 69.80 Area sector BED = $\frac{1}{2}$ x $17^2 \times 1.396$ = 201.72 Area of shaded region = 201.72 – 69.80 + 52.35 $= 184.27\ m^2$.	1 Either one, 1 1 1
	(c)	Arc AFC = 10 x (1.047 + 1.396) = 24.43 Arc ED = 17 x (1.396) = 23.73 Perimeter = 24.43 +23.73+ 10+ 17+ 7 = 82.16	Either one, 1 1 1

9.	(a)			1

x	1	2	3	4	5	6
xy	8.50	14.00	19.38	25.04	30.80	36.36

Graph:
uniform scale 1 m
all points plotted correctly 1m
best fit 1m

3



	(b)	$\frac{p}{qx} = \frac{y}{2} - q$	
		$\frac{p}{q} = \frac{xy}{2} - qx$	1
		$xy = 2qx + \frac{2p}{q}$	1

		$2q = m$ $2q = \frac{36.36 - 8.50}{6 - 1}$ $2q = 5.572$ $q = 2.786$ $\frac{2p}{q} = 2.7$ $\frac{2p}{2.786} = 2.7$ *P =3.761*	1 1 1 1
10.	(a)	$y^2 = x - 4$ $0 = x - 4$ $x = 4$ Point C is (4, 0)	1 1
	(b)	Area of ABCDE $= 2\left[\int_2^8 \frac{x}{4}\,dx - \int_4^8 (x-4)^{\frac{1}{2}}\,dx\right]$ $= 2\left[\left[\frac{x^2}{8}\right]_2^8 - \left[\frac{(x-4)^{\frac{3}{2}}}{\frac{3}{2}}\right]_4^8\right]$ $= 2\left[\left(\frac{64}{8} - \frac{4}{8}\right) - \left(\frac{16}{3} - 0\right)\right]$ $= \frac{13}{3}\ unit^2$	1 1 1 1
	(c)	Volume $= \pi\int_2^8 \frac{x^2}{16}\,dx - \int_4^8 (x-4)dx$ $= \pi\left[\frac{x^3}{48}\right]_2^8 - \pi\left[\frac{x^2}{2} - 4x\right]_4^8$ $= \pi\left[\frac{21}{2} - 8\right]$ $= 2\frac{1}{2}\ \pi\ unit^3$	1 1 1 1
11.	(a) (i)	*Write* ${}^nC_r(p)^r(1-p)^{n-r}$ *and equates to P (X = x)* $0.008 = {}^3C_0(m)^0(1-m)^3$ or its equivalent $m = 0.8$	1 1 1

	(ii)	0.2 X 75	1
		15	1
	(b)		
	(i)	$-0.4 = \frac{2.8-3.0}{\sigma}$	1
		$\sigma^2 = \frac{1}{4}$ @ 0.25	1
	(ii)	$P(x > n) = 0.6$	1
		$\frac{n-3.0}{0.5} = -0.253$	1
		n = 2.8735	1

Section C

No		Answer	Marks
12.	(a)	(i) $v_p = 6t - t^2 + 4$ $\frac{dv_p}{dt} = 6 - 2t$ $\frac{d^2v_p}{dt^2} = -2\ (< 0), v_p$ is maximum $\frac{dv_p}{dt} = 0$ $6 - 2t = 0$ $t = 3$ maximum velocity/ *Halaju maksimum* $= 6(3) - (3)^2 + 4$ $= 13\ \text{cms}^{-1}$	1 1 1
		(ii) After 4 seconds/ *Selepas 4 saat*, $S_Q = x + 3(4)$ $= x + 12$ $S_P = \int (6t - t^2 + 4)\, dt$ $= 3t^2 - \frac{t^3}{3} + 4t + c$ At point / *Pada titik M*, t = 0, s = 0 and/ *dan* c = 0 $S_P = 3t^2 - \frac{t^3}{3} + 4t$ When /*Bila* t = 4, $S_P = 3(4)^2 - \frac{4^3}{3} + 4(4)$ $= 42\frac{2}{3}\,cm$ At point of collision/*Pada titik perlanggaran*, $S_P = S_Q$ $42\frac{2}{3} = x + 12$ $x = 30\frac{2}{3}$ cm	1 1 1 1 1
	(b)	When maximum velocity / *Pada halaju maksimum* , $t = 3$ $S_P = 3(3)^2 - \frac{3^3}{3} + 4(3)$ $= 30$ cm $S_Q = x + vt$ $= 30\frac{2}{3} + 3(3)$ $= 39\frac{2}{3}$ Distance between *P* and *Q*/ *jarak antara P dan Q* $= 39\frac{2}{3} - 30$ $= 9\frac{2}{3}$ cm	1 1 1

<table>
<tr><td>13.</td><td>(a)</td><td>$\frac{8000}{Q_{2017}}$x100 = 140

Q_{2017} = RM 5714.29</td><td>1

1</td></tr>
<tr><td></td><td>(b)</td><td>$\bar{I} = \frac{140(160)+125(110)+110(90)}{360}$

$\bar{I} = 127.92$</td><td>2

1</td></tr>
<tr><td></td><td>(c)</td><td>$\frac{Q_{2018}}{\text{RM25000}} x100 = 127.92$

Q_{2018} = RM 31980</td><td>1

1</td></tr>
<tr><td></td><td>(d)</td><td><table><tr><th>Price index for the year 2018 based on the year 2017</th><th>Price index for the year 2019 based on the year 2018</th><th>Price index for the year 2019 based on the year 2017</th></tr><tr><td>140</td><td>100</td><td>140</td></tr><tr><td>125</td><td>130</td><td>162.5</td></tr><tr><td>110</td><td>125</td><td>137.5</td></tr></table>$\bar{I} = \frac{140(160)+162.5(110)+137.5(90)}{360}$

$\bar{I} = 146.25$</td><td>1

1

1</td></tr>
<tr><td>14.</td><td>(a)</td><td>I : $x + y \leq 100$

II : $y \geq \frac{2}{3} x$

III : $7000x + 5000y \geq 350\,000$</td><td>1

1

1</td></tr>
<tr><td></td><td>(b)</td><td>all lines drawn correctly
(one line correct 1m)
Region shaded correctly</td><td>2

1</td></tr>
<tr><td></td><td>(c)</td><td>(i) Minimum number of Satria model cars
$x = 10$

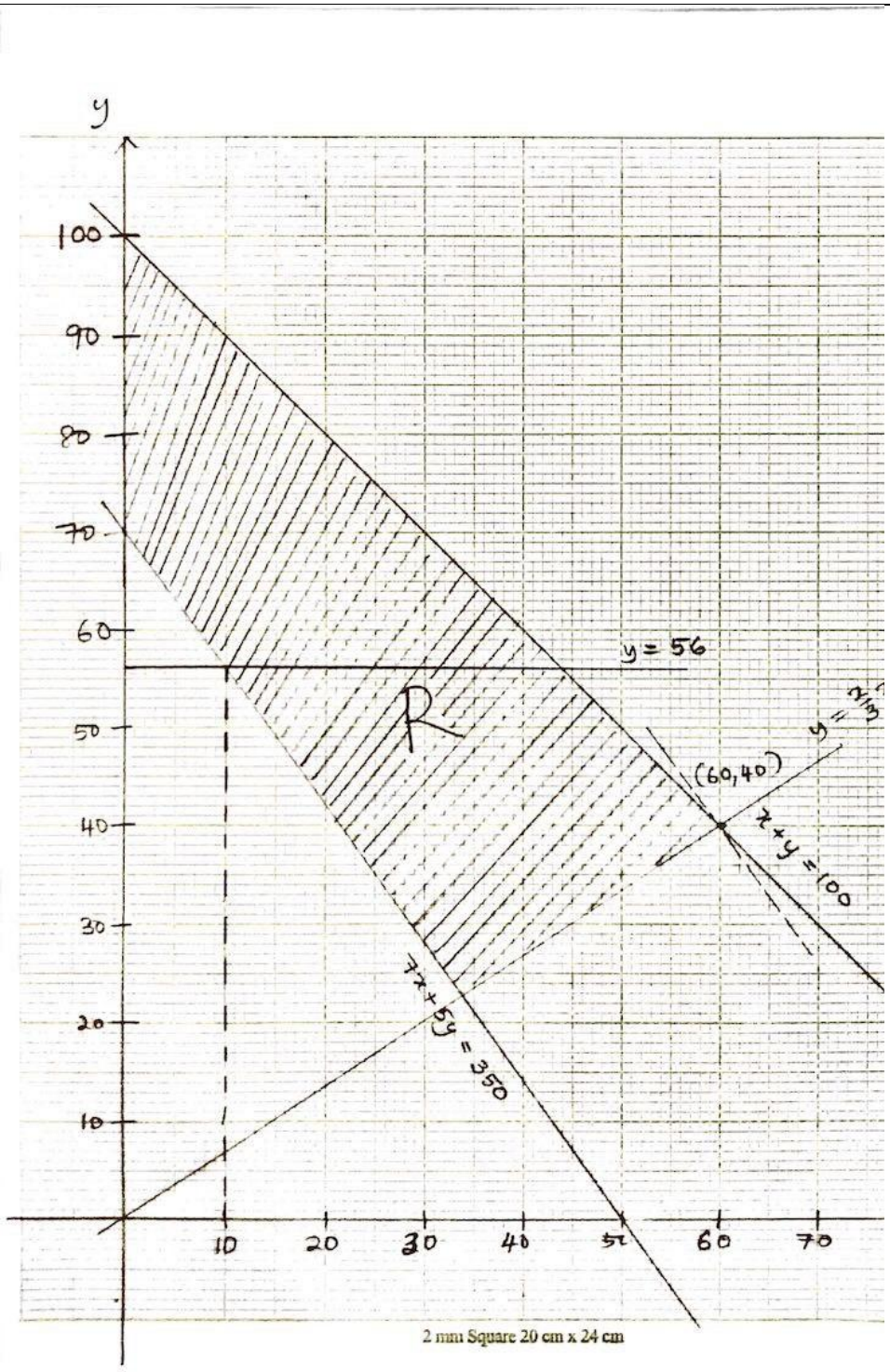
(ii) Maximum Profit
point (60, 40)
$= 7000(60) + 5000(40)$

$= RM\ 620\,000$</td><td>1

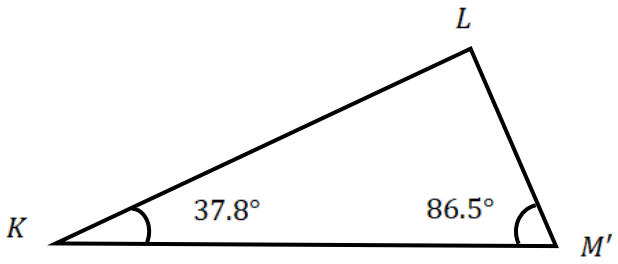
1

1

1</td></tr>
</table>



2 mm Square 20 cm x 24 cm

15	(a) (i)	$LM^2 = 15.25^2 + 18.5^2 - 2(15.25)(18.5)\cos 37.8°$ $LM = 11.36\ cm$	1 1
	(ii)	$\frac{\sin \angle KML}{18.5} = \frac{\sin 37.8°}{11.36}$ $\angle KML = 86.5°$ $\angle KML = 180° - 86.5° = 93.5°$	1 1 1
	(b)	 $\frac{KM'}{\sin 55.7°} = \frac{11.36}{\sin 37.8°}$ $KM' = 15.31\ cm$ $\frac{1}{2} \times 15.31 \times h = 86.81$ $h = 11.34\ cm$	1 1 1 1 1