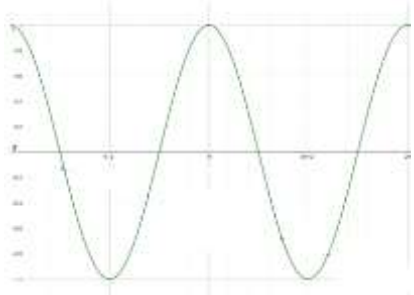
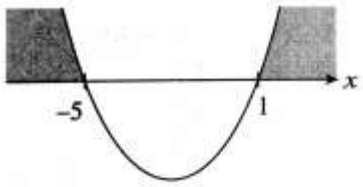
MARKING SCHEME

MODULE 1 PAPER 2

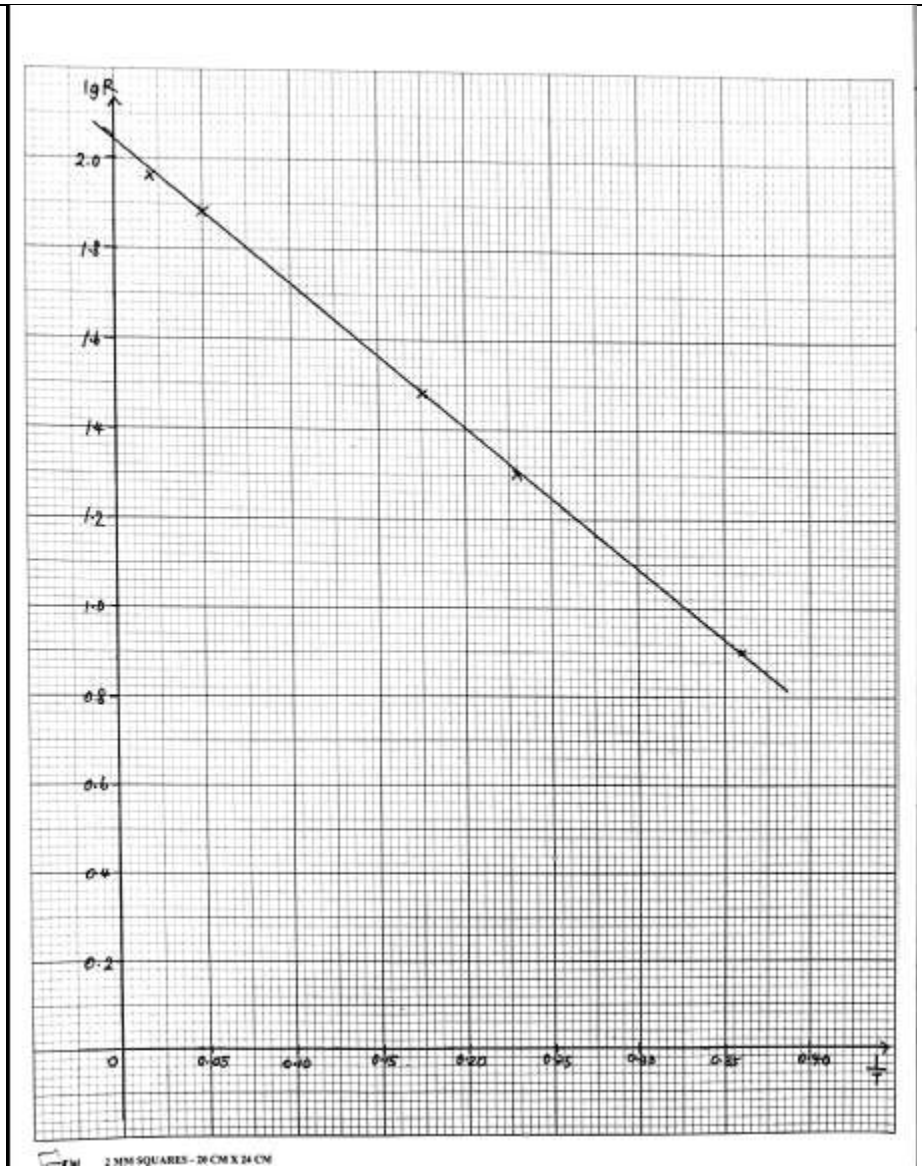
1.	(a) (i)	$\cos 12\frac{1}{2}^{\circ} \sin 12\frac{1}{2}^{\circ} = \cos\frac{25}{2}^{\circ} \sin\frac{25}{2}^{\circ}$ $= \frac{1}{2}\sin 25^{\circ}$ $= \frac{1}{2}x$	1
	(ii)	$\sin 80° = \sin(25^{o}+55^{o})$ $= \sin 25^{o}\cos 55^{o}+\cos 25^{o}\sin 55^{o}$ $= x\sqrt{1-y^2}+y\sqrt{1-x^2}$	1 1
	(iii)	$\sin 50^{o} = 2\sin 25°\cos 25^{o}$ $=2(x)(\sqrt{1-x^2})$ $=2x\sqrt{1-x^2}$	1
	(b)		1 1 1
2.	(a)	$a(2)^{n-1} = \frac{1}{4}a(2)^{29}$ $(2)^{n-1} = (2)^{27}$ $n = 28$	1 1 1
	(b)	$\frac{a(2)^{29}}{a(2)^{24}} = \frac{150}{x}$ $x = \frac{75}{16}m^2$	1 1
	(c)	$\frac{75}{16} \times RM\ 25$ = RM 117.20	1 1
3.	(a)	$\frac{5+9+10+12+p+q}{6} = 9$ $p+q = 18$	1 1
	(b)	$\frac{5^2+9^2+10^2+12^2+p^2+q^2}{6} - (9)^2 = \frac{62}{3}$ $\frac{350+p^2+q^2}{6} - 81 = \frac{62}{3}$	1

		$\frac{350+p^2+q^2}{6}-81=\frac{62}{3}$ $350+p^2+q^2=610$ $p^2+(18-p)^2=260$ $p^2+324-36p+p^2=260$ $2p^2-36p+64=0$ $p^2-18p+32=0$ $(p-16)(p-2)=0$ $p=16\,,2$	1 1 1
4.		$\log_x y+3=2+\log_x 4$ $\log_x 4-\log_x y=1$ $\log_x \frac{4}{y}=\log_x x$ $\frac{4}{y}=x$ $xy=4$ ……(i) $2^x\cdot 4=32\cdot 2^y.$ $2^x\cdot 2^2=2^5\cdot 2^y$ $x+2=5+y$ $x=y+3$ ……..(ii) Substitute (ii) into (i) $y(y+3)=4$ $y^2+3y-4=0$ $(y-1)(y+4)=0$ $y=1$ or $y=-4$ $x=1+3$ or $x=-4+3$ $x=4$ or $x=-3$ (ignored)	1 1 1 1 1 1
5.	(a)	$p\left[x^2+\frac{4}{p}x+\left(\frac{2}{p}\right)^2-\left(\frac{2}{p}\right)^2+\frac{8}{p}\right]$ $p\left(x+\frac{2}{p}\right)^2-\frac{4}{p}+8$ $p=-2$	1 1 1
	(b)	$(x-1)(x+5)\geq 0$	1 1

		 $x \le -5, x \ge 1$	1
6.	(a)	$2\theta + 3\theta + \theta = 1.571$ $\theta = 0.2618\ rad$	1
	(b)	$\frac{30.91}{4x} = \cos 15°$ $x = 8\ cm$	1 1
	(c)	$\frac{BC}{32} = \sin 60°$ $BC = 27.71\ cm$ Area rectangle $= 30.91 \times 27.71 = 865.52\ cm^2$ Area sector 1 $= \frac{1}{2} \times 8^2 \times 0.2618 = 8.378\ cm^2$ Area sector 2 $= \frac{1}{2} \times 16^2 \times 0.5236 = 67.02\ cm^2$ Area sector 3 $= \frac{1}{2} \times 32^2 \times 0.7854 = 402.12\ cm^2$ Area of shaded region $= 865.52 - 8.378 - 67.02 - 402.12 = 388\ cm^2$	1 1 Either one 1 2

7.	(a)	$\overrightarrow{AE} = \overrightarrow{AD} + \overrightarrow{DE}$ $= 12\underline{y} + 12\ \underline{x}$	1 1
	(b)	$\left\|-\overrightarrow{EA}\right\| = \sqrt{\left\|12\underline{y}\right\|^2 + \left\|12\underline{x}\right\|^2}$ $= \sqrt{(12 \times 1.2)^2 + (12 \times 0.5)^2}$ $= \sqrt{243.36}$ $= 15.6$	1 1
	(c)	$\overrightarrow{AG} = h\ \overrightarrow{AE}$ $= h(12\underline{x} + 12\underline{y})$ $= 12h\underline{x} + 12k\underline{y}$ (ii) $\overrightarrow{BG} = k\ \overrightarrow{BF}$ $= k\ \ (-15\ \underline{x} + 9\ \underline{y})$ $= -15k\ \underline{x} + 9\ k\underline{y}$ (iii) $\overrightarrow{AB} = \overrightarrow{AG} + \overrightarrow{GB}$ $15\underline{x} = 12h\underline{x} + 12h\underline{y} + 15k\underline{x} - 9k\underline{y}$ $15\underline{x} = (12h + 15k)\underline{x} + (12h - 9k)\ \underline{y}$ $15 = 12h + 15k$ ----------(1)	1 1 1

		$12h - 9k = 0$ $h = \frac{9}{12}k$ ----------(2) From (1), $15 = 12(\frac{9}{12}k) + 15k$ $k = \frac{5}{8}$ From (2) , $h = \frac{9}{12} \times \frac{5}{8}$ $h = \frac{15}{32}$	1 1 1 1
8.	(a)	$m_{BD} = \frac{5-2}{-1-8} = -\frac{1}{3}$ $m_{AM} = 3$ $\frac{13-k}{5-h} = 3$ $k = 3h - 2$	1 1 1
	(b)	$\sqrt{(5-h)^2 + (13-k)^2} = 3\sqrt{10}$ $h^2 - 10h + 16 = 0$ $(h-8)(h-2) = 0$ h = 8 or h = 2 k = 22 (ignored) or k = 4	1 1 1 1
	(c)	$\frac{1}{2}\begin{vmatrix} 8 & -1 & -1 & 8 \\ 2 & 5 & m & 2 \end{vmatrix} = \frac{1}{2}\begin{vmatrix} 8 & 5 & -1 & 8 \\ 2 & 13 & 5 & 2 \end{vmatrix}$ $45 - 9m = \pm 90$ $m = -5 \quad or \quad m = 15$	1 1 1
9	(a)	$\frac{1}{T}$ | 0.02 | 0.05 | 0.18 | 0.23 | 0.36 log R | 1.96 | 1.88 | 1.48 | 1.30 | 0.90 Graph	*1* *1* *1* *scale* *1plotting* *1* *smoothness*

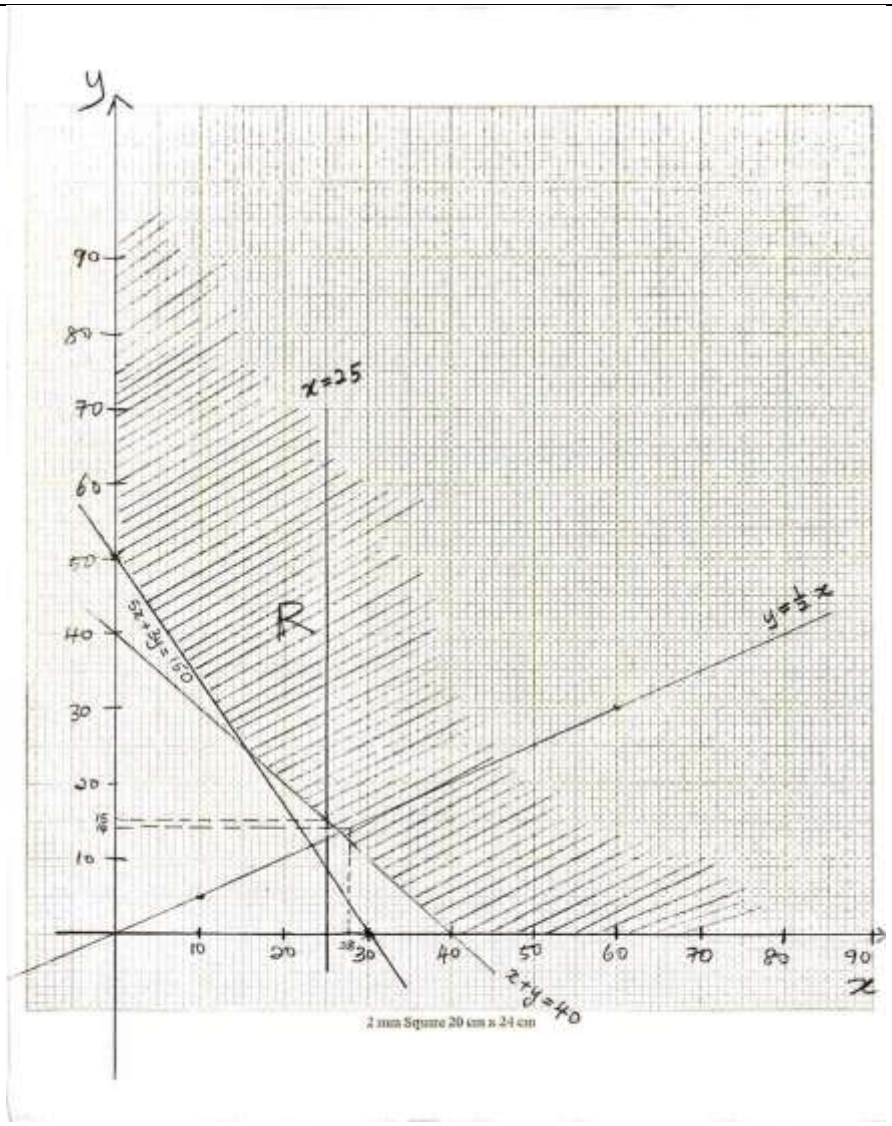
			
	(b)	$R = p2^{\frac{-q}{T}}$ $\log R = \log p + (\frac{-q}{T})\log 2$ $\log R = \log p - q\log 2\frac{1}{T}$	*1* *1*
	(i)	$\log p = c$ $\log p = 2.04$ $p = 109.6$	*1*
	(ii)	$-qlog2 = m$ $-qlog2 = \frac{0.90 - 1.88}{0.36 - 0.05}$ $q = \frac{-3.161}{-\log 2}$ q = 10.50	*1* *1*

10.	(a)	$m = \frac{dy}{dx} = \frac{-8}{x^3}$	1
		when $x = 4$, $m = \frac{-8}{4^3}$	
		$m = \frac{-1}{8}$	1
		$y = \frac{-3}{16}x + c$	
		$\frac{1}{4} = \frac{-1}{18}(4) + c$	
		$c = \frac{3}{4}$	1
		When $y = 0$, $x = 6$	
	(b)	Area of shaded region = $\int_4^8 \frac{4}{x^2}\,dx - \frac{1}{2}(2)\frac{1}{4}$	1
		$= \frac{1}{2} - \frac{1}{4}$	1
		$= \frac{1}{4}\ unit^2$	1
	(c)	$\pi \int_4^k \left(\frac{4}{x^2}\right)^2 dx = \frac{93}{1372}\pi$	1
		$\frac{-16}{3}\pi\left[\frac{1}{k^3} - \frac{1}{4^3}\right] = \frac{93}{1372}\pi$	1,1
		$\frac{1}{k^3} - \frac{1}{64} = \frac{-279}{21952}$	
		$\frac{1}{k^3} = \frac{1}{343}$	
		$k^3 = 343$	1
		$k = 7$	
11.	(a)	$p = \frac{2}{5}$ atau $q = \frac{3}{5}$	1
	(i)	1- P (X=0) – P (X=1) – P (X=2) atau	1
		1- 0.0467 – 0.1866 – 0.31104	
		0.4557	1
	(ii)	1308	1
		σ = 28.01	1

	(b)	$\frac{13-10}{4}$ @ 0.75 *seen* 0.7734 (ii) P (X > 136) atau P (X < 9.6) 0.1841 x 145 atau 0.4602 x 145 33:13	1 1 1 1 1

12.	(a)	$v = t^3 - 5t^2 + 6t$ $a = \frac{dv}{dt}$ $a = 3t^2 - 10t + 6$ When t = o, a = 6 ms $^{-2}$	 1 1
	(b)	a < 3 $3t^2 - 10t + 6 < 3$ $3t^2 - 10t + 3 < 0$ $(3t - 1)(t - 3) < 0$ $\frac{1}{3} < t < 3$	 1 1 1
	(c)	$v = 0$ $t^3 - 5t^2 + 6t = 0$ $t(t^2 - 5t + 6) = 0$ $t(t-2)(t-3) = 0$ $t = 0, \quad t = 2, \quad t = 3$ (ignored)	 1 1
		$s = \int (t^3 - 5t^2 + 6t)\, dt$ $= \frac{1}{4}t^4 - \frac{5}{3}t^3 + 3t^2 + c$ t= 0, s = 0, c = 0 s = $\frac{1}{4}t^4 - \frac{5}{3}t^3 + 3t^2$ $t^2(3t^2 - 20t + 36) = 0$ $b^2 - 4ac = (-20)^2 - 4(3)(36)$ $= -32$ < 0 (no real root) The particles not return to the fixed point O	 1 1 1
13.	(a)	$I_{2018/2017} = (I_{2018/2016} / I_{2017/2016}) \times 100$ $= \frac{144}{120} \times 100$ = 120	 1 1
	(b)(i)	y= $\frac{10.40}{8.00} \times 100$ = 130	 1

	(ii)	$\frac{Q_{2017}}{8}$x100=115 Q_{2017}= RM 9.20	1 1
	(c)(i)	Composite index $\frac{120(3)+115(1)+2x}{3+1+2}=115.83$ x = 110	2 1
	(ii)	$\frac{Q_{2017}}{Q_{2016}}$x100=115.83 $\frac{135.50}{Q_{2016}}$x100=115.83 Q_{2016}=RM 117	1 1
14.		I : $x+y \geq 40$ II : $300x+180y \geq 9000$ Scale and Line correctly drawn Region correctly shaded (i) Akumi = 28 Jane Perry = 14 (ii) x = 25, y = 15 Total sale = 300 (25) + 180 (15) = 10 200 Minimum amount of commission = RM 10 200 × 6% = RM 612.00	1 1 1,1 1 1 1 1 1 1 1

			
15.	(a) (i)	$DF^2 = 14^2 + 20^2 - 2(14)(20)\cos 77°$ $DF = 47\ cm$	1 1
	(ii)	$\frac{\sin \angle EDF}{14} = \frac{\sin 77°}{47}$ $\angle EDF = 16.87°$	1 1
	(iii)	$\angle HDF = 540° - 100° - 115° - 120° - 77° - 16.87° = 111.13°$ $\angle DHF = 100° - \left(\frac{180° - 115°}{2}\right) = 67.5°$ $\frac{HF}{\sin 111.13°} = \frac{47}{\sin 67.5°}$ $HF = 47.45$	1 1 1
	(b)	Area $\Delta\ DEF = \frac{1}{2} \times 20 \times 14 \times \sin 77° = 136.41\ cm^2$ Area of quadrilateral $DFGH = 450 - 136.41 = 313.59\ cm^2$	1 2