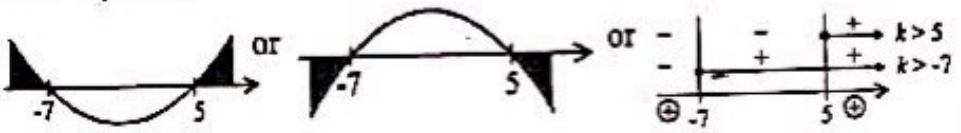
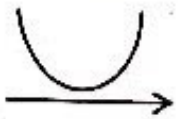
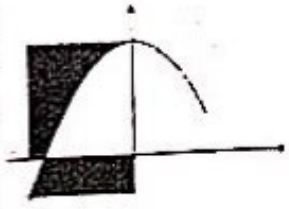
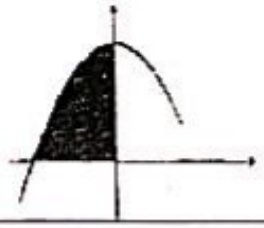
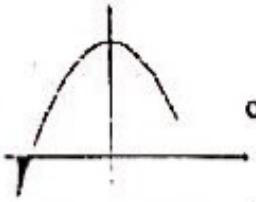
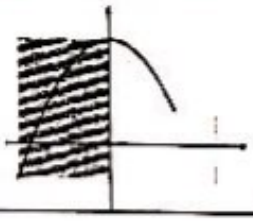
No	Answer	Marks
1	$n=2(p+2q)$ or equivalent	3
	$p+2q=\frac{n}{2}$	B2
	a^{p+q} or a^{q} or $a^{\frac{1}{2}}$	B1
2	$3n-\frac{2}{t}$	3
	$3n\log_5 5-2\log_5 k$ OR $t\left(3n-\square\right)=2$	B2
	$\frac{\log_5 5}{\log_5 k}$ or $\frac{\log_k\left(\frac{5^{3n}}{k^2}\right)}{\log_k 5}$ or $\log_5 5^{3n}-\log_5 k^2$ OR $5=k^1$	
	or $\frac{5^{3n}}{k^2}=5^{\square}$	B1
	Note: Use any one laws of logarithm correctly.	
3	(a) Many-to-one	1
	(b) $f(x)=x^2$ or $f:x\to x^2$	1
	(c) $4,-4$ (Both)	1
4	$m=\frac{1-n}{3}$ or equivalent	3
	$g(x)=1-3x$ OR $5-3m=n+4$	B2
	$g(x)+4$ OR $f^{-1}(x)=x-4$ OR $n+4$ or $5-3m$	B1
5	$x^2-(4k^2+6)x+9=0$	3
	$\left[\alpha^2+\beta^2\right]=4k^2+6$ and $\left[\alpha^2\beta^2\right]=9$	B2
	$\alpha+\beta=-2k$ or $\alpha\beta=-3$	B1
6	$k<-7,\ k>5$	4
		B3
	$(k+1)^2-4(3)(3)>0$	B2
	$3x^2+(k+1)x+3=0$	B1

7	(a)  Note: Accept any minimum graph sketched above x-axis.	1
	(b) $b > \frac{k}{2}$	1
8	4 $m+3-(3m-2)=4-(m+3)$	2 B1
9	Aminul , RM 87780 (Both) $\left[\frac{25}{2}\left[2(1600)+(24)(150)\right]-\frac{6}{2}\left[2(1600)+(5)(150)\right]\right]\times 0.1\times 12$ $n=7$, $n=9$ (Both) $\Rightarrow$ n < 7 or n > 9 $1600+(n-1)150 \geq 2500$ or $1600(1.06)^{n-1} \geq 2500$ Note: Accept ">" or "="	4 B3 B2 B1
10	540 $\frac{5(3^3-1)}{3-1}-65$ OR $5(3^3)+5(3^4)$ OR 5, 15, 45, 135, 405 $\frac{a(3^3-1)}{3-1}=65$ OR $a+3a+9a=65$	3 B2 B1
11	$X=x^2$ and $Y=xy$ $X=x^2$ or $Y=xy$ $xy=4x^2+12$	3 B2 B1
12	100.2 $1.715\times 31{\cdot}05+2(31{\cdot}05)\sin(49{\cdot}12^\circ)$ $[2](0.8575\times 31{\cdot}05)$ or $1.715\times 31{\cdot}05$ or $[2](31{\cdot}05)\sin(49{\cdot}12^\circ)$ or $[2](20.32)\tan(49{\cdot}12^\circ)$ or $[2]\times\sqrt{31{\cdot}05^2-20{\cdot}32^2}$ 31·05 or 49·12° or 98.24° or 0.8575 rad or 1·715 rad	4 B3 B2 B1
13	$(-2,4)$ and correct label $x=-2$ or $y=4$ $-2x=2x+8$ or $\frac{y-8}{2}=-\frac{y}{2}$ $\left(\frac{1}{2}\right)\times m=-1$	4 B3 B2 B1

14	$3y-4x-12=0$ or $-3y+4x+12=0$	2
	$[m]=\frac{4}{3}$ or $\frac{x}{-3}+\frac{y}{4}=1$	B1
15	$\frac{1}{2}\underline{a}+\frac{1}{2}\underline{b}$	3
	$[\overrightarrow{PR}]=\frac{1}{2}(-\underline{a}+\underline{b})$ or $[\overrightarrow{QR}]=\frac{1}{2}(\underline{a}-\underline{b})$ or $\underline{a}+\underline{b}$	B2
	$[\overrightarrow{PQ}]=-\underline{a}+\underline{b}$ or $[\overrightarrow{QP}]=\underline{a}-\underline{b}$	B1
16	(a) $\begin{pmatrix}1\\-6\end{pmatrix}$	2
	$-\begin{pmatrix}3\\4\end{pmatrix}+\begin{pmatrix}4\\-2\end{pmatrix}$ or $-(3\underline{i}+4\underline{j})+(4\underline{i}-2\underline{j})$	B1
	(b) $\frac{1}{\sqrt{37}}\begin{pmatrix}1\\-6\end{pmatrix}$ or $\frac{(\underline{i}-6\underline{j})}{\sqrt{37}}$ or $\frac{1}{\sqrt{37}}(\underline{i}-6\underline{j})$	2
	$\sqrt{(1)^2+(-6)^2}$	B1
17	(a) $\frac{27k}{4}$ or equivalent	3
	$\frac{-108}{2^4}\times(-k)$	B2
	$-k$ or $\frac{-108}{u^4}$	B1
	(b) $\frac{9}{2}+\frac{27k}{4}$ or equivalent	1
18	$y=\frac{x^2}{8}-x+5$ or equivalent $y=\frac{1}{8}(x-4)^2+3$	4
	$3=\frac{4^2}{8}-4+c$	B3
	$y=\frac{1}{8}x^2-x+c$	B2
	$2ax-1=0$ or $y=ax^2-x+[c]$ or $y=a(x-4)^2+3$	B1
19		2

	 or  or 	B1
20	(a) t	1
	(b) $-\frac{2t\sqrt{1-t^2}}{1-2t^2}$ // $\frac{2t\sqrt{1-t^2}}{2t^2-1}$	3
	$\frac{2\left(-\frac{t}{\sqrt{1-t^2}}\right)}{1-\left(-\frac{t}{\sqrt{1-t^2}}\right)^2}$	B2
	$\sqrt{1^2-t^2}$	B1
21	$0°, 120°, 180°, 240°, 360°$	4
	$0°, 60°$ (Both)	B3
	$\sin^2\theta(2\cos\theta+1)=0$ OR $(\cos\theta-1)(\cos\theta+1)(2\cos\theta+1)=0$	B2
	$2\sin^2\theta\cos\theta=1-\sin^2\theta$ OR $2(1-\cos^2\theta)\cos\theta=\cos^2\theta-1$	B1
22	$54\le\beta\le59$	3
	$\beta\le59$ or $\beta\ge54$	B2
	$[\alpha]=60$	B1
23	$\frac{47}{72}$	3
	$\left(\frac{5}{12}\times\frac{1}{3}\right)+\left(\frac{5}{12}\times\frac{1}{4}\right)+\left(\frac{1}{4}\times\frac{1}{3}\right)+\left(\frac{1}{3}\times\frac{5}{12}\right)+\left(\frac{1}{4}\times\frac{5}{12}\right)+\left(\frac{1}{3}\times\frac{1}{4}\right)$ OR $1-\left[\left(\frac{1}{3}\times\frac{1}{3}\right)+\left(\frac{5}{12}\times\frac{5}{12}\right)+\left(\frac{1}{4}\times\frac{1}{4}\right)\right]$	B2
	$\left(\frac{5}{12}\times\frac{5}{12}\right)$ or $\left(\frac{5}{12}\times\frac{1}{4}\right)$ or $\left(\frac{5}{12}\times\frac{1}{3}\right)$ or $\left(\frac{1}{4}\times\frac{1}{3}\right)$ or $\left(\frac{1}{3}\times\frac{1}{3}\right)$ or $\left(\frac{1}{4}\times\frac{1}{4}\right)$	B1
24	$1-p$	3
	$q^n=npq^{n-1}$	B2
	${}^nC_0p^0q^n$ or ${}^nC_1p^1q^{n-1}$	B1
25	25	3
	${}^7C_4\times({}^2C_2\times{}^5C_2)$	B2
	${}^7C_4$ or ${}^5C_2$ or ${}^2C_2$	B1