PROGRAM GEMPUR KECEMERLANGAN
SIJIL PELAJARAN MALAYSIA 2020
NEGERI PERLIS

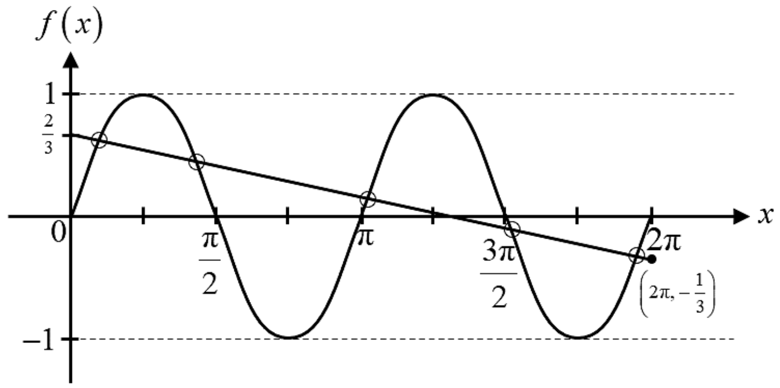
SIJIL PELAJARAN MALAYSIA 2020 **3472/2(PP)**
MATEMATIK TAMBAHAN
Kertas 2
Peraturan Pemarkahan
Oktober

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 19 halaman bercetak

No.	Solution and Mark Scheme			Sub Marks	Total Marks
1(*a*)	$f(x)=\sin 2x$	$\sin x$	P1		
		$2x$	P1	**2**	
(*b*)	$2\cot x\sin^2 x = {*}\sin 2x$ $\text{LHS} = 2\cot x \sin^2 x$ $= 2\left(\frac{\cos x}{\sin x}\right)\sin^2 x$ $= 2\sin x\cos x$ $= \sin 2x$ $= \text{RHS}$	$\cot x = \frac{\cos x}{\sin x}$ $\text{LHS} = \sin 2x$	K1 N1	**2**	
(*c*)	$2\cot x\sin^2 x = f(x)$ ...① $6\cot x\sin^2 x = 2-\frac{3x}{2\pi}$ $3(2\cot x\sin^2 x) = 2-\frac{3x}{2\pi}$ $2\cot x\sin^2 x = \frac{2}{3}-\frac{x}{2\pi}$ ...② Substitute ② into ① $f(x)=\frac{2}{3}-\frac{x}{2\pi}$	$f(x)=\frac{2}{3}-\frac{x}{2\pi}$	N1		
		Sketch the straight line involving *x* and *y* with *gradient or *y*-intercept correct.	K1		
		Number of solutions = 5	N1		

x	0	2π
y	$\frac{2}{3}$	$-\frac{1}{3}$



Number of solution = 5

		Sub Marks	Total Marks
		3	**7**

No.	Solution and Mark Scheme		Sub Marks	Total Marks
2(*a*)	Let, O = centre of the circle r = radius of the circle Then, $OA = OB = OC = OD = r$ $r = \sqrt{\left(\frac{x}{2}\right)^2 + 4^2}$ $r = \sqrt{\frac{x^2}{4} + 16}$ The area of the shaded region, $L = \pi r^2 - 8x$ $L = \pi\left(\sqrt{\frac{x^2}{4} + 16}\right)^2 - 8x$ $\therefore L = \frac{\pi x^2}{4} - 8x + 16\pi \quad (\text{Proved})$	Find the radius of the circle (P1) $r = \sqrt{\left(\frac{x}{2}\right)^2 + 4^2}$ Area of circle – Area of rectangle (K1) $L = \pi\left(*\sqrt{\frac{x^2}{4} + 16}\right)^2 - 8x$ $L = \frac{\pi x^2}{4} - 8x + 16\pi \quad (\text{Proved})$ [N1]	3	
(*b*)	$\frac{dL}{dx} = \frac{2\pi x}{4} - 8 = \frac{\pi x}{2} - 8$ When L is minimum, $\frac{dL}{dx} = 0$ Then, $\frac{\pi x}{2} - 8 = 0$ $x = \frac{16}{\pi}$ cm $\frac{d^2L}{dx^2} = \frac{\pi}{2} > 0$ $\therefore$ The area of the shaded region is minimum when $x = \frac{16}{\pi}$ cm	Find $\frac{dL}{dx}$ and equate to 0 (K1) $\frac{\pi x}{2} - 8 = 0$ Find $\frac{d^2L}{dx^2}$ (K1) $\frac{\pi}{2} > 0$ The area of the shaded region is minimum when $x = \frac{16}{\pi}$ cm (N1)	3	6

[*Lihat halaman sebelah*

No.	Solution and Mark Scheme		Sub Marks	Total Marks
3	Arc PU = Arc $ST = \frac{\pi}{2}x$ Then, $y - 2\left(\frac{\pi}{2}x\right) = 15\pi$ $y - \pi x = 15\pi$ ...① Area of the field, $xy + \frac{\pi}{2}x^2 = 3437.5\pi$ ...② From ① : $y = 15\pi + \pi x$ ...③ Substitute ③ into ① $x(15\pi + \pi x) + \frac{\pi}{2}(15\pi + \pi x)^2 = 3437.5$ $3x^2 + 30x - 6875 = 0$ $x = \frac{-(30) \pm \sqrt{(30)^2 - 4(3)(6875)}}{2(3)}$ $x_1 = 43.13$ $x_2 = -53.13$ (Rejected) $y_1 = 58.13\pi$ $\therefore x = 43.13$; $y = 58.13\pi$ // 182.64	$y - 2\left(\frac{\pi}{2}x\right) = 15\pi$ P1 $xy + \frac{\pi}{2}x^2 = 3437.5\pi$ P1 $y = 15\pi + \pi x$ P1 Eliminate x or y (involving one linear and one non-linear equations in term of x and y) K1 $x(15\pi + \pi x) + \frac{\pi}{2}(15\pi + \pi x)^2 = 3437.5$ Solve the *quadratic equation K1 **Formulae** $x = \frac{-(30) \pm \sqrt{(30)^2 - 4(3)(6875)}}{2(3)}$ a, b, c must be correct $x_1 = 43.13$ $x_2 = -53.13$ (Rejected) N1 $y = 58.13\pi$ // 182.64 N1	7	7

No.	Solution and Mark Scheme		Sub Marks	Total Marks
4(*a*)	$\text{LHS} = \log_2 P + \log_2 Q$	Use law $\log_a b + \log_a c = \log_a bc$ (K1)		
	$= \log_2 PQ$	$\log_2 PQ$		
	$= \dfrac{\log_4 P}{\log_4 2}$			
	$= \log_4 P \times \log_2 4$	Change to base 4 (K1)		
	$= (\log_4 P)2$	$\dfrac{\log_4 P}{\log_4 2}$		
	$= 2(\log_4 P)$			
	$= \text{RHS}$ (Proved)			
		Use law $a \log_c b = \log_c b^a$ (K1)		
		$2\log_2 2$		
		$\text{LHS} = 2(\log_4 P)$ (Proved) N1	**4**	
(b)	$2^{x+1} \bullet 3^{x-2} = 8$	Use law $a^b \times a^c = a^{b+c}$ (K1)		
	$2^x \times 2 \times 3^x \times 3^{-2} = 8$	$2^x \times 2$ *or* $3^x \times 3^{-2}$		
	$2^x \times 2 \times 3^x \times \dfrac{1}{9} = 8$			
	$2^x \times 3^x = 36$	Use law $a^c \times b^c = (ab)^c$ (K1)		
	$(2 \times 3)^x = 36$	$(2 \times 3)^x$		
	$6^x = 6^2$			
	$\therefore x = 2$			
		$x = 2$ N1	**3**	**7**

<table>
<tr><th>No.</th><th colspan="2">Solution and Mark Scheme</th><th>Sub Marks</th><th>Total Marks</th></tr>
<tr><td>5(a)</td><td>$s_1 = (j_1 + j_2)\theta$
$j_1 + j_2 = 28 + 3.5 = 31.5$
Perimeter of the glued fabric
$= \left(\frac{105\pi}{4} + 56\right)\text{cm}$
$2(j_1) + (j_1 + j_2)\theta + j_2\theta = \frac{105\pi}{4} + 56$
$2(28) + (31.5)\theta + 3.5\theta = \frac{105\pi}{4} + 56$
$56 + 35\theta = \frac{105\pi}{4} + 56$
$35\theta = \frac{105\pi}{4}$
$\theta = \frac{105(3.142)}{4(35)}$
$\theta = 2.3565\,\text{rad}$

Area of fabric needed
$= 2\left[\frac{1}{2}(j_1 + j_2)^2\theta - \frac{1}{2}j_2^2\theta\right]$
$= 2\left[\left(\frac{1}{2} \times 31.5^2 \times 2.3565\right) - \left(\frac{1}{2} \times 3.5^2 \times 2.3565\right)\right]$
$= 2(1169.1186 - 14.4336)$
$\therefore 2309.37\,\text{cm}^2$</td><td>$s_1 = 31.5\theta$ <u>or</u> $j_2 = 3.5\theta$ (seen) P1

$2(28) + (31.5)\theta + 3.5\theta = \frac{105\pi}{4} + 56$ K1

$\theta = 2.3565\,\text{rad}$ N1

$A_1 = \frac{1}{2} \times 31.5^2 \times 2.3565$
<u>or</u> K1
$A_2 = \frac{1}{2} \times 3.5^2 \times 2.3565$

$2[{*A_1} - {*A_2}]$ K1

$2309.37\,\text{cm}^2$ N1</td><td>6</td><td>6</td></tr>
</table>

No.	Solution and Mark Scheme		Sub Marks	Total Marks
6(*a*)	Syuhada's annual salaries form a geometric progression with, $a = 18000$ (Year 2002) $r = 1.05$ Annual salary in 2007 $= T_6$ $T_6 = 18000(1.05)^{6-1}$ $= 22973.07$ $\therefore$ Annual salary in 2007 = RM22973	$r = 1.05$ P1 $T_6 = 18000(*1.05)^{6-1}$ K1 RM22973 N1	**3**	
(*b*)	Annual salary in n^{th} year exceed RM36000, $T_n > 36000$ $18000(1.05)^{n-1} > 36000$ $(1.05)^{n-1} > 2$ $(n-1)\log_{10} 1.05 > \log_{10} 2$ $n - 1 > \dfrac{\log_{10} 2}{\log_{10} 1.05}$ $n > 15.21$ $\therefore$ Thus the minimum value of n is 16	$18000(*1.05)^{n-1} > 36000$ K1 $n = 16$ N1	**2**	
(*c*)	The total salary for the years 2002 to 2007 $= S_6$ $S_6 = \dfrac{18000(1.05^6 - 1)}{1.05 - 1}$ $= 122434.43$ $\therefore$ Thus The total salary for the years 2002 to 2007 = RM122434	$S_6 = \dfrac{18000(*1.05^6 - 1)}{1.05 - 1}$ K1 RM122434 N1	**2**	**7**

No.	Solution and Mark Scheme		Sub Marks	Total Marks
7(*a*)(i)	At $(h, 2)$, $2 = (h-1)^2 + 1$ $h^2 - 2h = 0$ $h(h-2) = 0$ $h = 0$ (Rejected) $\therefore h = 2$	$h = 2$ N1	**1**	
(ii)	$y = (x-1)^2 + 1$ $y^2 = (x-1)^4 + 2(x-1)^2 + 1$ Solid volume generated, $= \pi\int_0^2 2^2\,dx - \pi\int_0^2 y^2\,dx$ $= \pi\int_0^2 4\,dx - \pi\int_0^2 (x-1)^4 + 2(x-1)^2 + 1\,dx$ $= \pi\left([4x]_0^2 - \left[\frac{(x-1)^5}{5} + \frac{2(x-1)^3}{3} + x\right]_0^2\right)$ $= \pi\left(4(2) - \left[\left(\frac{1}{5} + \frac{2}{3} + 2\right) - \left(-\frac{1}{5} + \left(-\frac{2}{3}\right) + 0\right)\right]\right)$ $= \pi\left(8 - \left[\frac{43}{15} - \left(-\frac{13}{15}\right)\right]\right)$ $= \frac{64}{15}\pi$ unit^3	Integrate $\pi\int y^2\,dx$ $A_1 = \frac{(x-1)^5}{5} + \frac{2(x-1)^3}{3} + x$ K1 Use limit $\int_0^{*2}$ into $*\left[\frac{(x-1)^5}{5} + \frac{2(x-1)^3}{3} + x\right]$ K1 $\pi\left([4x]_0^2 - *A_1\right)$ K1 $\frac{64}{15}\pi$ unit^3 N1	**4**	
(*b*)(i)	Gradient of tangent of 1st curve, $\frac{dy}{dx} = 4x - 5$ Gradient of tangent of 2nd curve, $\frac{dy}{dx} = px - 3$ When two curves intersect at the right angle, $(4x-5)(px-3) = -1$ At $x = 2$, $3(2p-3) = -1$ $6p - 9 = -1$ $\therefore p = \frac{4}{3}$	$3(2p-3) = -1$ K1 $p = \frac{4}{3}$ N1	**2**	

No.	Solution and Mark Scheme			Sub Marks	Total Marks
7(*b*)(ii)	$y_1 = \int 4x - 5 \ dx$ $y_1 = 2x^2 - 5x + c$ At point $(2, 3)$, $3 = 2(2)^2 - 5(2) + c$ $c = 5$ $\therefore y_1 = 2x^2 - 5x + 5$ $y_2 = \int \frac{4}{3}x - 3 \ dx$ $y_1 = \frac{2}{3}x^2 - 3x + c$ At point $(2, 3)$, $3 = \frac{2}{3}(2)^2 - 3(2) + c$ $c = \frac{19}{3}$ $\therefore y_1 = \frac{2}{3}x^2 - 3x + \frac{19}{3}$	<u>Substitute $(2, 3)$ into $\int 4x - 5 \ dx$</u> $3 = 2(2)^2 - 5(2) + c$ <u>*or*</u> <u>Substitute $(2, 3)$ into $\int \frac{*4}{3}x - 3 \ dx$</u> $3 = \frac{2}{3}(2)^2 - 3(2) + c$ $y = 2x^2 - 5x + 5$ <u>*or*</u> $y = \frac{2}{3}x^2 - 3x + \frac{19}{3}$ $y = 2x^2 - 5x + 5$ <u>*and*</u> $y = \frac{2}{3}x^2 - 3x + \frac{19}{3}$	K1 N1 N1	3	10

No.	Solution and Mark Scheme	Sub Marks	Total Marks
8(*a*)	$X =$ Events to choose a good Harumanis $X \sim B(8,\ 0.85)$ $X = \{0, 1, 2, 3, 4, 5, 7, 8\}$ Probability that at least 6 Harumanis are good, $P(X \geq 6)$ $= P(X=6)+P(X=7)+P(X=8)$ $= {}^8C_6(0.85)^6(0.15)^2 + {}^8C_7(0.85)^7(0.15)^1 + {}^8C_8(0.85)^8(0.15)^0$ $= 0.8948$ ${}^nC_r(0.85)^r(0.15)^{n-r}$ (K1) $P(X=6)+P(X=7)+P(X=8)$ [P1] 0.8948 [N1]	**3**	
(*b*)(i)	$X =$ Mark obtained by a student $X \sim N(48,\ 6^2)$ $X = \{0 \leq X \leq 100\}$ Probability that a student obtained between 35 and 66 marks, $P(35 \leq X \leq 66)$ $= P\left(\frac{35-48}{6} \leq Z \leq \frac{66-48}{6}\right)$ $= P(-2.167 \leq Z \leq 3)$ $= 0.9835$ Number of students, $= 0.9835 \times 180$ ≈ 177 $\frac{35-48}{6}$ *or* $\frac{66-48}{6}$: -2.167, 3 (K1) $P(-2.167 \leq Z \leq 3)$ *or* equivalent (K1) 0.9835 [N1] 177 (N1)	**4**	
(*b*)(ii)	Let k as passing marks, $P(X < k) = 0.05$ $\frac{k-48}{6} = -1.645$ $k = 38.13$ $\therefore k = 38$ ± 1.645 (P1) $\frac{k-48}{6} = -1.645$ (K1) $k = 38.13$ [N1]	**3**	**10**

No.	Solution and Mark Scheme	Sub Marks	Total Marks
9(*a*)	<table><tr><td>x^2</td><td>1.00</td><td>4.00</td><td>12.25</td><td>16.00</td><td>25.00</td><td>36.00</td></tr><tr><td>xy</td><td>3.00</td><td>6.50</td><td>14.25</td><td>18.04</td><td>27.00</td><td>37.50</td></tr></table> N1 N1 Refer graph **9**(*a*) on Page **18**. Plot xy against x^2 (K1) 6 *points plotted correctly (K1) Line of best fit (At least *5 points plotted) (N1)	5	
(*b*)(i)	$\left(y=\frac{h}{px}+px\right)\times x$ $xy=\frac{h}{p}+px^2$ $\therefore xy=px^2+\frac{h}{p}$ $p=$ gradient of the line $=\frac{27.00-3.00}{25.00-1.00}$ $\therefore p=1$ $\frac{h}{p}=$ intersect of xy-axis $\frac{h}{p}=2$ $h=2p$ $h=2(1)$ $\therefore h=2$ $xy=px^2+\frac{h}{p}$ P1 $p=*m$ (K1) $p=1$ (N1) $\frac{h}{p}=*c$ (K1) $h=2$ (N1)	5	10

No.	Solution and Mark Scheme		Sub Marks	Total Marks
10(*a*)(i)	$\underline{a} = p\underline{i} + 8\underline{j}$; $\underline{b} = -3\underline{i} + 4\underline{j}$ If $\underline{a}$ and $\underline{b}$ are parallel, then $\underline{a} = \lambda\underline{b}$ $p\underline{i} + 8\underline{j} = \lambda(-3\underline{i} + 4\underline{j})$ $4\lambda = 8$ $\quad p = -3\lambda$ $\lambda = 2$ $\quad \therefore p = -6$	Use $\underline{a} = \lambda\underline{b}$ *or* $\underline{b} = \lambda\underline{a}$ (K1) $p = -6$ [N1]	**2**	
(ii)	$\underline{a} + \underline{b} = p\underline{i} + 8\underline{j} + (-3\underline{i} + 4\underline{j})$ $= (p-3)\underline{i} + 12\underline{j}$ $\lvert\underline{a} + \underline{b}\rvert = \sqrt{(p-3)^2 + 12^2}$ $13 = \sqrt{p^2 - 6p + 9 + 144}$ $p^2 - 6p - 16 = 0$ $(p+2)(p-8) = 0$ $\therefore p = -2$ or $p = 8$	$\sqrt{(p-3)^2 + 12^2} = 13$ (K1) $p = -2$, $p = 8$ [N1]	**2**	
(*b*)(i)	$\overrightarrow{AP} = 6\underline{i} + 8\underline{j}$; $\overrightarrow{AQ} = 4\underline{i} + 3\underline{j}$; $\overrightarrow{PR} = \frac{1}{2}\overrightarrow{PQ}$ $\overrightarrow{AR} = \overrightarrow{AP} + \overrightarrow{PR}$ $= \overrightarrow{AP} + \frac{1}{2}\overrightarrow{PQ}$ $= \overrightarrow{AP} + \frac{1}{2}(-\overrightarrow{AP} + \overrightarrow{AQ})$ $= \frac{1}{2}(\overrightarrow{AP} + \overrightarrow{AQ})$ $= \frac{1}{2}(6\underline{i} + 8\underline{j} + 4\underline{i} + 3\underline{j})$ $= \frac{1}{2}(10\underline{i} + 11\underline{j})$ $\therefore \overrightarrow{AR} = 5\underline{i} + \frac{11}{2}\underline{j}$	Use $\overrightarrow{AR} = \overrightarrow{AP} + \frac{1}{2}\overrightarrow{PQ}$ (K1) $\overrightarrow{AR} = 5\underline{i} + \frac{11}{2}\underline{j}$ [N1]	**2**	
(ii)	$\overrightarrow{BR} = -\overrightarrow{AR}$ $\overrightarrow{BR} = -\left(5\underline{i} + \frac{11}{2}\underline{j}\right)$ $\therefore \overrightarrow{BR} = -5\underline{i} - \frac{11}{2}\underline{j}$	$\overrightarrow{BR} = -^*\left(5\underline{i} + \frac{11}{2}\underline{j}\right)$ *or* $-5\underline{i} - \frac{11}{2}\underline{j}$ (N1)	**1**	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
10(*c*)	$\overrightarrow{BA} = \overrightarrow{BQ} + \overrightarrow{QA}$ $= -\overrightarrow{AP} - \overrightarrow{AQ}$ $= -6\underline{i} - 8\underline{j} - 4\underline{i} - 3\underline{j}$ $= -10\underline{i} - 11\underline{j}$ $\frac{1}{2}\overrightarrow{BA} = \frac{1}{2}(-10\underline{i} - 11\underline{j})$ $= -5\underline{i} - \frac{11}{2}\underline{j}$ $= \overrightarrow{BR}$ (Proved)		
	Find $\overrightarrow{BA} = \overrightarrow{BQ} + \overrightarrow{QA}$ / $-10\underline{i} - 11\underline{j}$ K1 Use $\frac{1}{2}\overrightarrow{BA} = \frac{1}{2}(-10\underline{i} - 11\underline{j})$ K1 $\overrightarrow{BR} = -5\underline{i} - \frac{11}{2}\underline{j}$ (Proved) N1	3	10
11(*a*)	$A(2, 2)$; $B(6, 2)$ $C(x_C, y_C)$ Area of isosceles ΔABC, $\frac{1}{2} \times (6-2) \times h = 10$ $h = 5$ $x_C = \frac{2+6}{2} = 4$ $y_C = 2 - 5 = -3$ $\therefore C(4, -3)$		
	Use $\frac{1}{2} \times (6-2) \times h = 10$ *or* equivalent / $h = 5$ K1 $x_C = \frac{2+6}{2} = 4$ *or* $y_C = 2 - 5 = -3$ K1 $C(4, -3)$ N1	3	
(*b*)	$B(6, 2)$; $C(4, -3)$; $D(x_D, y_D)$ $\frac{x_D + 4}{2} = 6$ $\quad$ $\frac{y_D + (-3)}{2} = 2$ $x_D = 8$ $\quad$ $y_D = 7$ $\therefore D(8, 7)$		
	$\frac{x_D + 4}{2} = 6$ *or* $\frac{y_D + (-3)}{2} = 2$ K1 $D(8, 7)$ N1	2	
(*c*)(i)	$A(2, 2)$; $C(4, -3)$; $D(8, 7)$ $m_{AC} = \frac{2-(-3)}{2-4} = -\frac{5}{2}$ $m_{DE} = m_{AC}$ $\frac{k-7}{11-8} = -\frac{5}{2}$ $\therefore k = -\frac{1}{2}$		
	Use $m_{DE} = m_{AC}$ / $\frac{k-7}{11-8} = -\frac{5}{2}$ K1 $k = -\frac{1}{2}$ N1	2	

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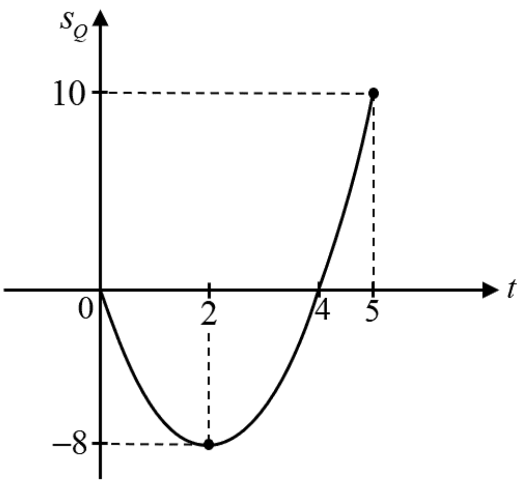
No.	Solution and Mark Scheme		Sub Marks	Total Marks
11(*c*)(ii)	$C(4,-3)$; $E\left(11,-\frac{1}{2}\right)$; $P(x, y)$ $\frac{PC}{PE}=\frac{1}{4}$; $4PC=PE$ $4\sqrt{(x-4)^2+(y+3)^2}=$ $\sqrt{(x-11)^2+\left(y+\frac{1}{2}\right)^2}$ $16\left[\left(x^2-8x+16\right)+\left(y^2+6y+9\right)\right]=$ $\left(x^2-22x+121\right)+\left(y^2+y+\frac{1}{4}\right)$ $15x^2+15y^2-106x+95y+\frac{1115}{4}=0$ $\therefore 60x^2-60y^2-424x+380y+1115=0$	Use $\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$ (K1) $(x-4)^2+(y+3)^2$ *or* $(x-11)^2+\left(y+\frac{1}{2}\right)^2$ $4PC=PE$ (Can be implied) [P1] $60x^2-60y^2-424x+380y+1115=0$ [N1]	3	10
12(*a*)	$7500x+4500y\geq 225000$ $\therefore 5x+3y\geq 150$ $6000x+7500y\geq 300000$ $\therefore 4x+5y\geq 200$ $1500x+3000y\geq 90000$ $\therefore x+2y\geq 60$	$7500x+4500y\geq 225000$ [N1] $6000x+7500y\geq 300000$ [N1] $1500x+3000y\geq 90000$ [N1] *or* equivalent	3	
(*b*)	Refer graph **12**(*b*) on Page **19**.	Draw correctly at least one straight line from the *inequalities involve *x* and *y*. (K1) Draw correctly all the three *straight lines (N1) Region shaded correctly [N1]	3	
(c)(i)	$2000x+1000y=k$ Maximum point $=(60, 0)$ $\therefore$ *H*-*Ziez* $=60$ days $\therefore$ *S*-*Ziez* $=0$ day	*H*-*Ziez* $=60$ days [N1] *S*-*Ziez* $=0$ day [N1]	2	
(ii)	$=2000(60)+1000(0)$ $=120000$ $\therefore$ Maximum average profit = RM120000	$2000(60)+1000(0)$ (K1) RM120000 [N1]	2	10

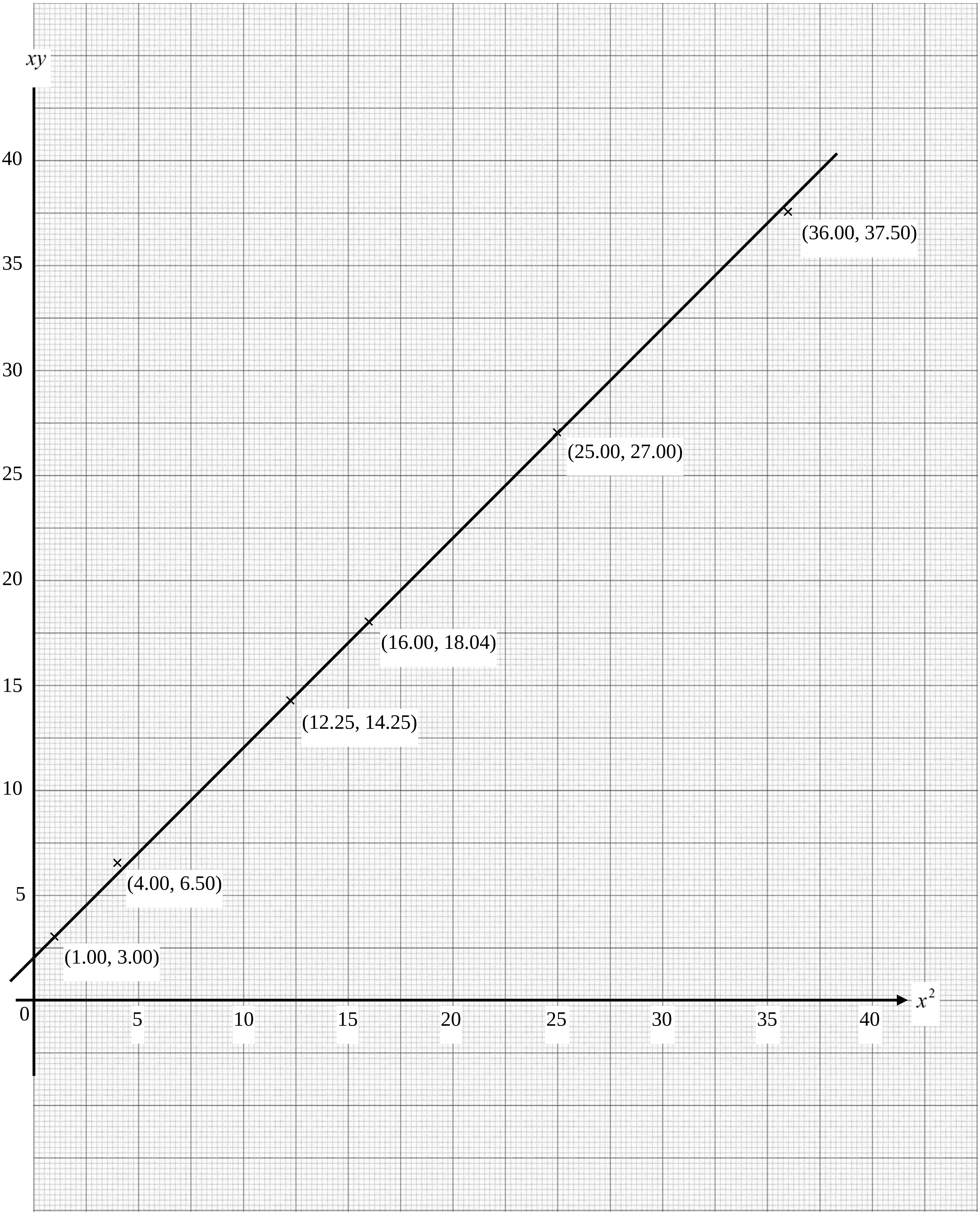
No.	Solution and Mark Scheme		Sub Marks	Total Marks
13(*a*)	$UW = \sqrt{TU^2 + TW^2}$ $= \sqrt{12^2 + 5^2}$ $\therefore UW = 13$ $UR = \sqrt{QU^2 + QR^2}$ $= \sqrt{10^2 + 5^2}$ $\therefore UR = \sqrt{125}$ // 11.1803	$UW = 13$ N1 $UR = \sqrt{125}$ // 11.1803 N1	**2**	
(*b*)	Area of plane $RUW = 69.2 \text{ m}^2$ $\frac{1}{2} \times 13 \times \sqrt{125} \times \sin \angle WUR = 69.2$ $\angle WUR = 72.2172^\circ$ Since $\angle WUR$ is obtuse angle, then $\therefore \angle WUR = 107.7828^\circ$	$\frac{1}{2} \times 13 \times \sqrt{125} \times \sin\theta = 69.2$ (K1) $\theta = 72.2172^\circ$ N1 $\angle WUR = 107.7828^\circ$ (N1)	**3**	
(*c*)	$RW^2 = 13^2 + \left(\sqrt{125}\right)^2 - 2(13)\left(\sqrt{125}\right)\cos 107.7828^\circ$ $RW = 19.5647$ m $\frac{\sin\angle UWR}{\sqrt{125}} = \frac{\sin 107.7828^\circ}{19.5647}$ $\therefore \angle UWR = 32.9667^\circ$ $\angle URW = 180^\circ - 32.9667^\circ - 107.7828^\circ$ $\therefore \angle URW = 39.2505^\circ$	$RW^2 = 13^2 + \left(\sqrt{125}\right)^2 - 2(13)\left(\sqrt{125}\right)\cos 107.7828^\circ$ (K1) 19.5647 m N1 $\frac{\sin\angle UWR}{\sqrt{125}} = \frac{\sin 107.7828^\circ}{19.5647}$ (K1) $\angle UWR = 32.9667^\circ$ N1 $\angle URW = 39.2505^\circ$ (N1)	**5**	**10**

No.	Solution and Mark Scheme	Sub Marks	Total Marks
14(*a*)	$v = 0$ $4t - 8 = 0$ $t = 2$ $\therefore 0 < t < 2$ Use $v = 0$ (K1) $4t - 8 = 0$ $0 < t < 2$ [N1]	**2**	
(*b*)	$s = \int v\,dt = 2t^2 - 8t + c$ $t = 0,\ s = 0,\ c = 0$ $s = 2t^2 - 8t$ When $t = 2$, $s = \left\|\int_0^2 v\ dt\right\| = \left\|\left[2t^2 - 8t\right]_0^2\right\|$ $= \left\|(8 - 16) - 0\right\| = \left\|-8\right\| = 8\text{ m}$ $\therefore$ Particle P didn't reach R Integrate $\int v\ dt$ (K1) $s = 2t^2 - 8t$ Substitute $t = {*2}$ and $t = 0$ into $\int v\ dt$ (K1) 8 m (No) [N1]	**3**	
(*c*)	$s = \left\|\int_0^2 v\,dt\right\| + \int_2^5 v\,dt$ $= \left\|-8\right\| + \left[\left(2(5)^2 - 8(5)\right) - \left(2(2)^2 - 8(2)\right)\right]$ $= 8 + \left[10 - (-8)\right]$ $= 26$ $\therefore$ Total distance travelled $= 26\text{ m}$ Substitute $t = 4$ or $t = 5$ into $\int v\ dt$ (K1) $s = \left\|\int_0^2 v\,dt\right\| + \int_2^5 v\,dt$ (K1) 26 m [N1]	**3**	
(*d*)	 $\cup$ shape [N1] All correct [N1]	**2**	**10**

No.	Solution and Mark Scheme		Sub Marks	Total Marks
15(*a*)	$I_{\frac{20}{18}(A)}=135$ $\frac{x}{50}\times 100=135$ $x=\text{RM}67.50$	$\frac{x}{50}\times 100=135$ (K1) RM67.50 [N1]	**2**	
(*b*)	$I_{\frac{20}{18}(C)}=125$ $P_{20(C)}=18+P_{18(C)}$ $z=18+y$ $\frac{18+y}{y}\times 100=120$ $\therefore y=\text{RM}90.00$ $z=90+18$ $\therefore z=\text{RM}108.00$	$\frac{18+y}{y}\times 100=120$ (K1) $y=\text{RM}90.00$ [N1] $z=\text{RM}108.00$ (N1)	**3**	
(*c*)(i)	$I_{\frac{20}{18}(A)}=135$; $I_{\frac{20}{18}(B)}=160$ $I_{\frac{20}{18}(C)}=120$; $I_{\frac{20}{18}(D)}=110$ $\bar{I}_{\frac{20}{18}}=\frac{135(1)+160(1)+120(1)+110(1)}{4}$ $\therefore \bar{I}_{\frac{20}{18}}=131.25$	160 *or* 110 [P1] $\frac{135(1)+{*160}(1)+120(1)+{*110}(1)}{4}$ (K1) 131.25 [N1]	**3**	
(ii)	$\frac{1716}{P_{18}}\times 100=131.25$ $\therefore P_{18}=\text{RM}1307.43$	$\frac{1716}{P_{18}}\times 100$ (K1) 131.25 [N1]	**2**	**10**

PERATURAN PEMARKAHAN TAMAT

Graph for Question **9**(*a*)



Graph for Question **12**(*b*)