

**SULIT**

**PROGRAM GEMPUR KECEMERLANGAN  
SIJIL PELAJARAN MALAYSIA 2020  
NEGERI PERLIS**

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**SIJIL PELAJARAN MALAYSIA 2020  
MATEMATIK TAMBAHAN  
Kertas 2  
Peraturan Pemarkahan  
Oktober**

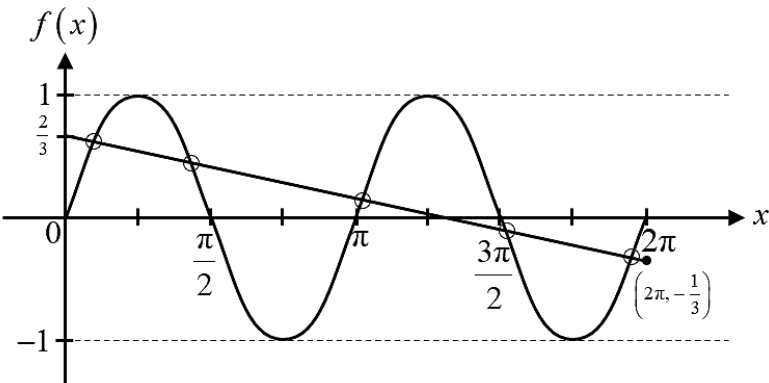
**3472/2(PP)**

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**UNTUK KEGUNAAN PEMERIKSA SAHAJA**

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Peraturan pemarkahan ini mengandungi 19 halaman bercetak

No.	Solution and Mark Scheme	Sub Marks	Total Marks						
1(a)	$f(x) = \sin 2x$ $\sin x$ <span style="border: 1px solid black; padding: 2px;">P1</span> $2x$ <span style="border: 1px solid black; padding: 2px;">P1</span>	2							
(b)	$2 \cot x \sin^2 x = \sin 2x$ LHS = $2 \cot x \sin^2 x$ $= 2 \left( \frac{\cos x}{\sin x} \right) \sin^2 x$ $= 2 \sin x \cos x$ $= \sin 2x$ $= \text{RHS}$ $\cot x = \frac{\cos x}{\sin x}$ <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> LHS = $\sin 2x$ <span style="border: 1px solid black; padding: 2px;">N1</span>	2							
(c)	$2 \cot x \sin^2 x = f(x) \dots \textcircled{1}$ $6 \cot x \sin^2 x = 2 - \frac{3x}{2\pi}$ $3(2 \cot x \sin^2 x) = 2 - \frac{3x}{2\pi}$ $2 \cot x \sin^2 x = \frac{2}{3} - \frac{x}{2\pi} \dots \textcircled{2}$ Substitute $\textcircled{2}$ into $\textcircled{1}$ $f(x) = \frac{2}{3} - \frac{x}{2\pi}$ $f(x) = \frac{2}{3} - \frac{x}{2\pi}$ <span style="border: 1px solid black; padding: 2px;">N1</span> Sketch the straight line involving $x$ and $y$ with *gradient or *y-intercept correct. <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> Number of solutions = 5 <span style="border: 1px solid black; padding: 2px;">N1</span>	3							
<table border="1" style="margin-bottom: 10px;"> <tr> <td><math>x</math></td> <td>0</td> <td><math>2\pi</math></td> </tr> <tr> <td><math>y</math></td> <td><math>\frac{2}{3}</math></td> <td><math>-\frac{1}{3}</math></td> </tr> </table>  <p>Number of solution = 5</p>		$x$	0	$2\pi$	$y$	$\frac{2}{3}$	$-\frac{1}{3}$	3	7
$x$	0	$2\pi$							
$y$	$\frac{2}{3}$	$-\frac{1}{3}$							

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

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

No.	Solution and Mark Scheme	Sub Marks	Total Marks
4(a)	$\begin{aligned} \text{LHS} &= \log_2 P + \log_2 Q \\ &= \log_2 PQ \\ &= \frac{\log_4 P}{\log_4 2} \\ &= \log_4 P \times \log_2 4 \\ &= (\log_4 P) 2 \\ &= 2(\log_4 P) \\ &= \text{RHS (Proved)} \end{aligned}$		
(b)	$\begin{aligned} 2^{x+1} \cdot 3^{x-2} &= 8 \\ 2^x \times 2 \times 3^x \times 3^{-2} &= 8 \\ 2^x \times 2 \times 3^x \times \frac{1}{9} &= 8 \\ 2^x \times 3^x &= 36 \\ (2 \times 3)^x &= 36 \\ 6^x &= 6^2 \\ \therefore x &= 2 \end{aligned}$	<p>Use law <math>\log_a b + \log_a c = \log_a bc</math> (K1)</p> <p><math>\log_2 PQ</math></p> <p>Change to base 4 (K1)</p> <p><math>\frac{\log_4 P}{\log_4 2}</math></p> <p>Use law <math>a \log_c b = \log_c b^a</math> (K1)</p> <p><math>2 \log_2 2</math></p> <p>LHS = <math>2(\log_4 P)</math> (Proved) (N1)</p> <p>Use law <math>a^b \times a^c = a^{b+c}</math> (K1)</p> <p><math>2^x \times 2</math> <u>or</u> <math>3^x \times 3^{-2}</math></p> <p>Use law <math>a^c \times b^c = (ab)^c</math> (K1)</p> <p><math>(2 \times 3)^x</math></p>	4
	$x = 2 \quad \boxed{\text{N1}}$	3	7

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No.	Solution and Mark Scheme	Sub Marks	Total Marks	
5(a)	$s_1 = (j_1 + j_2)\theta$ $j_1 + j_2 = 28 + 3.5 = 31.5$ <p>Perimeter of the glued fabric</p> $= \left( \frac{105\pi}{4} + 56 \right) \text{cm}$ $2(j_1) + (j_1 + j_2)\theta + j_2\theta = \frac{105\pi}{4} + 56$ $2(28) + (31.5)\theta + 3.5\theta = \frac{105\pi}{4} + 56$ $56 + 35\theta = \frac{105\pi}{4} + 56$ $35\theta = \frac{105\pi}{4}$ $\theta = \frac{105(3.142)}{4(35)}$ $\theta = 2.3565 \text{ rad}$ <p>Area of fabric needed</p> $= 2 \left[ \frac{1}{2}(j_1 + j_2)^2 \theta - \frac{1}{2}j_2^2 \theta \right]$ $= 2 \left[ \left( \frac{1}{2} \times 31.5^2 \times 2.3565 \right) - \left( \frac{1}{2} \times 3.5^2 \times 2.3565 \right) \right]$ $= 2(1169.1186 - 14.4336)$ $\therefore 2309.37 \text{ cm}^2$	<p><math>s_1 = 31.5\theta</math> or <math>j_2 = 3.5\theta</math> (seen) <span style="border: 1px solid black; padding: 2px;">P1</span></p> <p><math>2(28) + (31.5)\theta + 3.5\theta = \frac{105\pi}{4} + 56</math> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span></p> <p><math>\theta = 2.3565 \text{ rad}</math> <span style="border: 1px solid black; padding: 2px;">N1</span></p> <p><math>A_1 = \frac{1}{2} \times 31.5^2 \times 2.3565</math></p> <p style="text-align: center;">or <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span></p> <p><math>A_2 = \frac{1}{2} \times 3.5^2 \times 2.3565</math></p> <p><math>2[*A_1 - *A_2]</math> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span></p> <p><math>2309.37 \text{ cm}^2</math> <span style="border: 1px solid black; padding: 2px;">N1</span></p>	6	6

No.	Solution and Mark Scheme	Sub Marks	Total Marks
6(a)	<p>Syuhada's annual salaries form a geometric progression with,  <math>a = 18000</math> (Year 2002) <math>r = 1.05</math> <span style="border: 1px solid black; padding: 2px;">P1</span></p> <p><math>r = 1.05</math></p> <p>Annual salary in 2007 = <math>T_6</math> <math>T_6 = 18000(*1.05)^{6-1}</math> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span></p> <p><math>T_6 = 18000(1.05)^{6-1}</math> <math>\text{RM}22973</math> <span style="border: 1px solid black; padding: 2px;">N1</span></p> <p><math>= 22973.07</math></p> <p><math>\therefore</math> Annual salary in 2007 = <math>\text{RM}22973</math></p>	3	
(b)	<p>Annual salary in <math>n^{\text{th}}</math> year exceed <math>\text{RM}36000</math>,</p> <p><math>T_n &gt; 36000</math></p> <p><math>18000(1.05)^{n-1} &gt; 36000</math> <math>18000(*1.05)^{n-1} &gt; 36000</math> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span></p> <p><math>(1.05)^{n-1} &gt; 2</math></p> <p><math>(n-1)\log_{10} 1.05 &gt; \log_{10} 2</math> <math>n = 16</math> <span style="border: 1px solid black; padding: 2px;">N1</span></p> <p><math>n-1 &gt; \frac{\log_{10} 2}{\log_{10} 1.05}</math></p> <p><math>n &gt; 15.21</math></p> <p><math>\therefore</math> Thus the minimum value of <math>n</math> is 16</p>	2	
(c)	<p>The total salary for the years 2002 to 2007 = <math>S_6</math></p> <p><math>S_6 = \frac{18000(1.05^6 - 1)}{1.05 - 1}</math> <math>S_6 = \frac{18000(*1.05^6 - 1)}{1.05 - 1}</math> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span></p> <p><math>= 122434.43</math> <math>\text{RM}122434</math> <span style="border: 1px solid black; padding: 2px;">N1</span></p> <p><math>\therefore</math> Thus The total salary for the years 2002 to 2007 = <math>\text{RM}122434</math></p>	2	7

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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) $\therefore h = 2$	1	
(ii)	$y = (x-1)^2 + 1$ $y^2 = (x-1)^4 + 2(x-1)^2 + 1$ Solid volume generated, $= \pi \int_0^2 2^2 dx - \pi \int_0^2 y^2 dx$ $= \pi \int_0^2 4 dx - \pi \int_0^2 (x-1)^4 + 2(x-1)^2 + 1 dx$ $= \pi \left( [4x]_0^2 - \left[ \frac{(x-1)^5}{5} + \frac{2(x-1)^3}{3} + x \right]_0^2 \right)$ $= \pi \left( 4(2) - \left[ \left( \frac{1}{5} + \frac{2}{3} + 2 \right) - \left( -\frac{1}{5} + \left( -\frac{2}{3} \right) + 0 \right) \right] \right)$ $= \pi \left( 8 - \left[ \frac{43}{15} - \left( -\frac{13}{15} \right) \right] \right)$ $= \frac{64}{15} \pi \text{ unit}^3$	4	
(b)(i)	Gradient of tangent of 1 <sup>st</sup> curve, $\frac{dy}{dx} = 4x - 5$ Gradient of tangent of 2 <sup>nd</sup> curve, $\frac{dy}{dx} = px - 3$ When two curves intersect at the right angle, $(4x-5)(px-3) = -1$ At $x = 2$ , $3(2p-3) = -1$ $6p-9 = -1$ $\therefore p = \frac{4}{3}$	2	



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

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

No.	Solution and Mark Scheme	Sub Marks	Total Marks																
<p><b>9(a)</b></p> <table border="1" data-bbox="292 327 1166 450"> <tr> <td><math>x^2</math></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> <td style="border: none;">N1</td> </tr> <tr> <td><math>xy</math></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> <td style="border: none;">N1</td> </tr> </table> <p>Refer graph <b>9(a)</b> on Page <b>18</b>. Plot <math>xy</math> against <math>x^2</math> (K1)</p> <p>6 *points plotted correctly (K1)</p> <p>Line of best fit (At least *5 points plotted) (N1)</p>	$x^2$	1.00	4.00	12.25	16.00	25.00	36.00	N1	$xy$	3.00	6.50	14.25	18.04	27.00	37.50	N1	<p>(b)(i)</p> $\left( y = \frac{h}{px} + px \right) \times x$ $xy = \frac{h}{p} + px^2$ $\therefore xy = px^2 + \frac{h}{p}$ <p><math>p =</math> gradient of the line</p> $= \frac{27.00 - 3.00}{25.00 - 1.00}$ $\therefore p = 1$ <p><math>\frac{h}{p} =</math> intersect of <math>xy</math>-axis</p> $\frac{h}{p} = 2$ $h = 2p$ $h = 2(1)$ $\therefore h = 2$	<p style="text-align: center;"><b>5</b></p>	
$x^2$	1.00	4.00	12.25	16.00	25.00	36.00	N1												
$xy$	3.00	6.50	14.25	18.04	27.00	37.50	N1												
		<p style="text-align: center;"><b>5</b></p>	<p><b>10</b></p>																

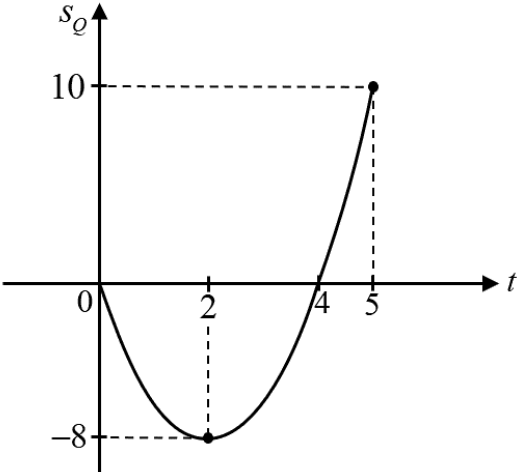
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No.	Solution and Mark Scheme	Sub Marks	Total Marks
10(a)(i)	$\underline{a} = p\underline{i} + 8\underline{j} \quad ; \quad \underline{b} = -3\underline{i} + 4\underline{j}$ <p>If <math>\underline{a}</math> and <math>\underline{b}</math> are parallel, then</p> $\underline{a} = \lambda \underline{b}$ $p\underline{i} + 8\underline{j} = \lambda(-3\underline{i} + 4\underline{j})$ $4\lambda = 8 \quad p = -3\lambda$ $\lambda = 2 \quad \therefore p = -6$ <p style="text-align: right;">Use <math>\underline{a} = \lambda \underline{b}</math> or <math>\underline{b} = \lambda \underline{a}</math> (K1)</p> $p = -6 \quad \boxed{\text{N1}}$	2	
(ii)	$\underline{a} + \underline{b} = p\underline{i} + 8\underline{j} + (-3\underline{i} + 4\underline{j})$ $= (p-3)\underline{i} + 12\underline{j}$ $ \underline{a} + \underline{b}  = \sqrt{(p-3)^2 + 12^2}$ $13 = \sqrt{p^2 - 6p + 9 + 144}$ $p^2 - 6p - 16 = 0$ $(p+2)(p-8) = 0$ $\therefore p = -2 \text{ or } p = 8$ <p style="text-align: right;"><math>\sqrt{(p-3)^2 + 12^2} = 13</math> (K1)</p> $p = -2, p = 8 \quad \boxed{\text{N1}}$	2	
(b)(i)	$\overline{AP} = 6\underline{i} + 8\underline{j} \quad ; \quad \overline{AQ} = 4\underline{i} + 3\underline{j} \quad ;$ $\overline{PR} = \frac{1}{2}\overline{PQ}$ $\overline{AR} = \overline{AP} + \overline{PR}$ $= \overline{AP} + \frac{1}{2}\overline{PQ}$ $= \overline{AP} + \frac{1}{2}(-\overline{AP} + \overline{AQ})$ $= \frac{1}{2}(\overline{AP} + \overline{AQ})$ $= \frac{1}{2}(6\underline{i} + 8\underline{j} + 4\underline{i} + 3\underline{j})$ $= \frac{1}{2}(10\underline{i} + 11\underline{j})$ $\therefore \overline{AR} = 5\underline{i} + \frac{11}{2}\underline{j}$ <p style="text-align: right;">Use <math>\overline{AR} = \overline{AP} + \frac{1}{2}\overline{PQ}</math> (K1)</p> $\overline{AR} = 5\underline{i} + \frac{11}{2}\underline{j} \quad \boxed{\text{N1}}$	2	
(ii)	$\overline{BR} = -\overline{AR}$ $\overline{BR} = -\left(5\underline{i} + \frac{11}{2}\underline{j}\right)$ $\therefore \overline{BR} = -5\underline{i} - \frac{11}{2}\underline{j}$ <p style="text-align: right;"><math>\overline{BR} = -\left(5\underline{i} + \frac{11}{2}\underline{j}\right)</math> or <math>-5\underline{i} - \frac{11}{2}\underline{j}</math> (N1)</p>	1	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
10(c)	$\begin{aligned}\overline{BA} &= \overline{BQ} + \overline{QA} \\ &= -\overline{AP} - \overline{AQ} \\ &= -6\underline{i} - 8\underline{j} - 4\underline{i} - 3\underline{j} \\ &= -10\underline{i} - 11\underline{j} \\ \frac{1}{2}\overline{BA} &= \frac{1}{2}(-10\underline{i} - 11\underline{j}) \\ &= -5\underline{i} - \frac{11}{2}\underline{j} \\ &= \overline{BR} \text{ (Proved)}\end{aligned}$	<p>Find <math>\overline{BA} = \overline{BQ} + \overline{QA}</math> (K1)</p> $-10\underline{i} - 11\underline{j}$ <p>Use <math>\frac{1}{2}\overline{BA} = \frac{1}{2}(-10\underline{i} - 11\underline{j})</math> (K1)</p> $\overline{BR} = -5\underline{i} - \frac{11}{2}\underline{j} \text{ (Proved)} \quad \text{(N1)}$	<p>3</p> <hr/> <p>10</p>
11(a)	<p>(a) <math>A(2, 2)</math> ; <math>B(6, 2)</math> <math>C(x_c, y_c)</math> Use <math>\frac{1}{2} \times (6-2) \times h = 10</math> or equivalent (K1)</p> <p>Area of isosceles <math>\triangle ABC</math>,</p> $\frac{1}{2} \times (6-2) \times h = 10$ $h = 5$ $x_c = \frac{2+6}{2} = 4$ $y_c = 2-5 = -3$ <p><math>\therefore C(4, -3)</math></p> <p>(b) <math>B(6, 2)</math> ; <math>C(4, -3)</math> ; <math>D(x_D, y_D)</math></p> $\frac{x_D + 4}{2} = 6$ $x_D = 8$ <p><math>\therefore D(8, 7)</math></p> <p>(c)(i) <math>A(2, 2)</math> ; <math>C(4, -3)</math> ; <math>D(8, 7)</math></p> $m_{AC} = \frac{2 - (-3)}{2 - 4} = -\frac{5}{2}$ $m_{DE} = m_{AC}$ $\frac{k - 7}{11 - 8} = -\frac{5}{2}$ <p><math>\therefore k = -\frac{1}{2}</math></p>	<p><math>h = 5</math></p> $x_c = \frac{2+6}{2} = 4 \text{ or } y_c = 2-5 = -3 \quad \text{(K1)}$ <p><math>C(4, -3)</math> (N1)</p> <p><math>\frac{x_D + 4}{2} = 6</math> or <math>\frac{y_D + (-3)}{2} = 2</math> (K1)</p> $D(8, 7) \quad \text{(N1)}$ <p>Use <math>m_{DE} = m_{AC}</math> (K1)</p> $\frac{k - 7}{11 - 8} = -\frac{5}{2}$ <p><math>k = -\frac{1}{2}</math> (N1)</p>	<p>3</p> <p>2</p> <p>2</p>

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

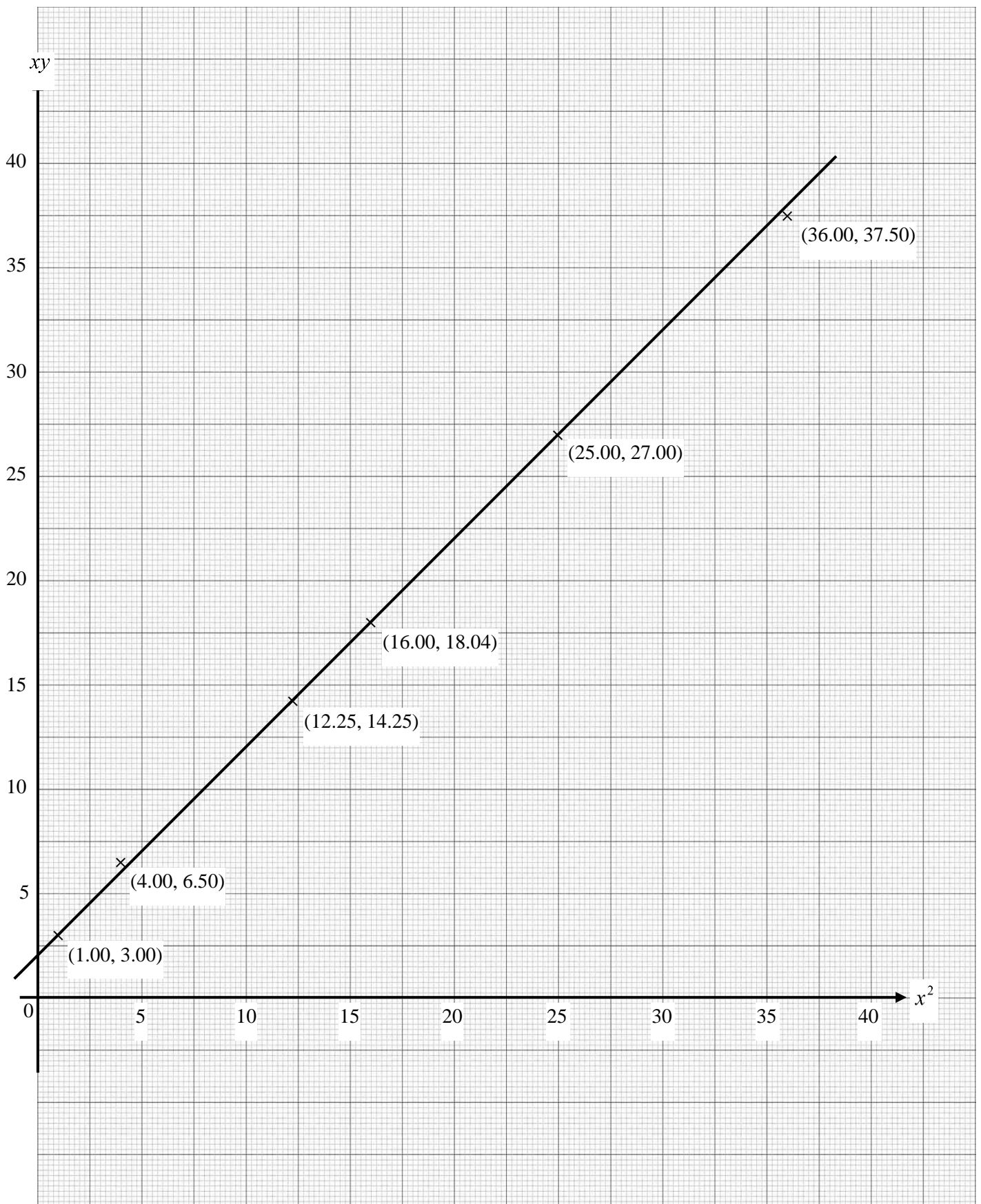
No.	Solution and Mark Scheme	Sub Marks	Total Marks
13(a)	$  \begin{aligned}  UW &= \sqrt{TU^2 + TW^2} \\  &= \sqrt{12^2 + 5^2} \\  \therefore UW &= 13  \end{aligned}  $ $  \begin{aligned}  UR &= \sqrt{QU^2 + QR^2} \\  &= \sqrt{10^2 + 5^2} \\  \therefore UR &= \sqrt{125} // 11.1803  \end{aligned}  $	2	
(b)	$  \begin{aligned}  \text{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 \\  \text{Since } \angle WUR &\text{ is obtuse angle, then} \\  \therefore \angle WUR &= 107.7828^\circ  \end{aligned}  $	3	
(c)	$  \begin{aligned}  RW^2 &= 13^2 + (\sqrt{125})^2 - 2(13)(\sqrt{125})\cos 107.7828^\circ \\  RW &= 19.5647 \text{ 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  \end{aligned}  $	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 $t = 2$ , $s = \int_0^2 v dt = \left[ 2t^2 - 8t \right]_0^2$ $=  (8 - 16) - 0  =  -8  = 8 \text{ m}$ $\therefore \text{Particle } P \text{ didn't reach } R$	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)	$s = \left  \int_0^2 v dt \right  + \int_2^5 v dt$ $=  -8  + \left[ (2(5)^2 - 8(5)) - (2(2)^2 - 8(2)) \right]$ $= 8 + [10 - (-8)]$ $= 26$ $\therefore \text{Total distance travelled} = 26 \text{ m}$	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)	 <p>U shape (N1)                      All correct (N1)</p>	2	10



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

Graph for Question 9(a)



Graph for Question 12(b)

