

**3472/2**  
**Matematik**  
**Tambahan**  
**Kertas 2**  
2 ½ jam  
Sept 2009

**SEKOLAH-SEKOLAH MENENGAH ZON A KUCHING**

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**PEPERIKSAAN PERCUBAAN**  
**SIJIL PELAJARAN MALAYSIA 2009**

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**MATEMATIK TAMBAHAN**

**Kertas 2**

**Dua jam tiga puluh minit**

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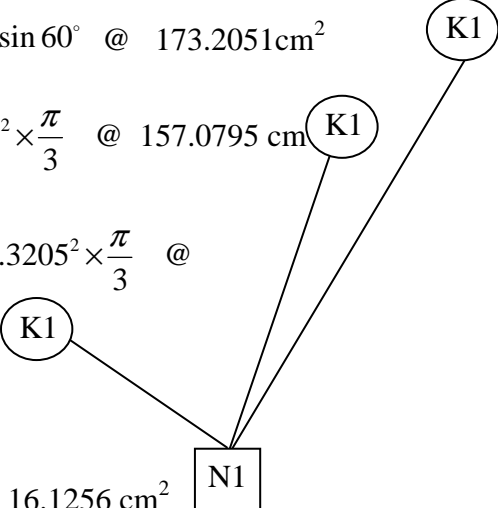
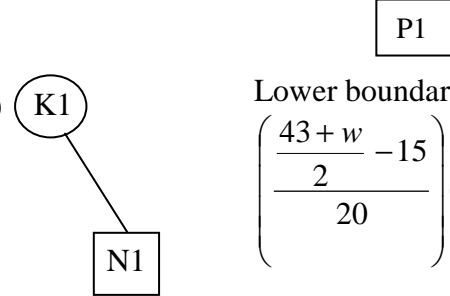
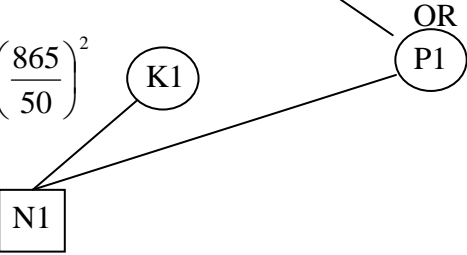
**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

<b>MARKING SCHEME</b>
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## ADDITIONAL MATHEMATICS MARKING SCHEME

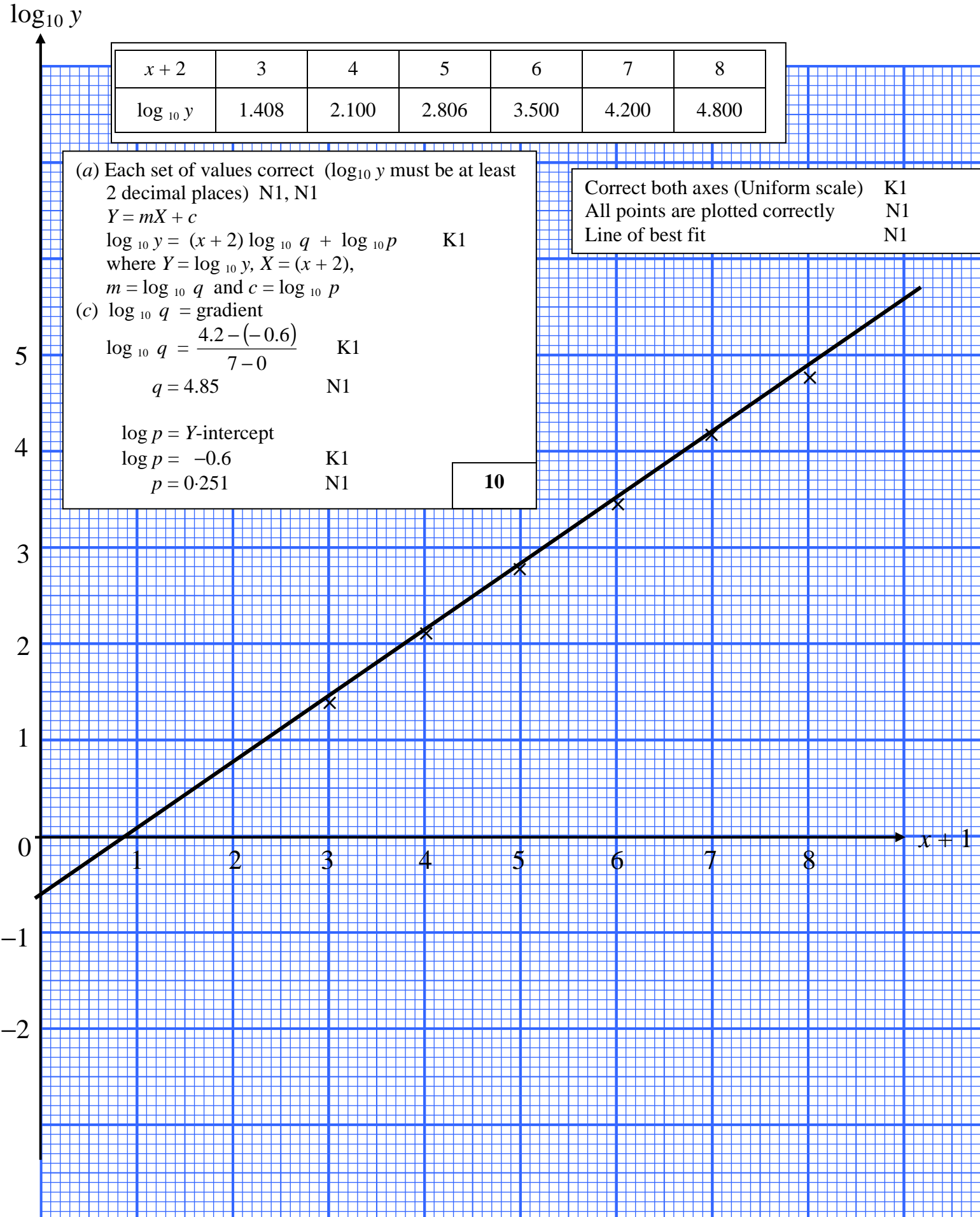
## TRIAL SBP 2009 – PAPER 2

QUESTION NO.	SOLUTION	MARKS
1	$x = 2y - 6$ $(2y - 6)^2 + (2y - 6)y - 20 = 0$ $3y^2 - 15y + 8 = 0$ $y = 0.6070, y = 4.393$ <p>@</p> $x = -4.786, x = 2.786$ <div style="text-align: right; margin-right: 100px;"> <div style="border: 1px solid black; display: inline-block; padding: 2px;">P1</div>  <div style="border: 1px solid black; border-radius: 50%; display: inline-block; padding: 2px;">K1</div> Eliminate <math>x</math> or <math>y</math>  <div style="border: 1px solid black; border-radius: 50%; display: inline-block; padding: 2px;">K1</div> Solve the quadratic equation by using the factorization @ quadratic formula @ completing the square must be shown  <div style="border: 1px solid black; display: inline-block; padding: 2px;">N1</div>  <div style="border: 1px solid black; border-radius: 50%; display: inline-block; padding: 2px;">N1</div> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; width: fit-content;"> <p><b>Note :</b>  <b>OW-1</b> if the working of solving quadratic equation is not shown.</p> </div>	5
2 (a)	$OT = 17.3205 \text{ cm}$ $s_{STR} = 17.3205 \times \frac{\pi}{3}$ $s_{STR} = 18.1380 \text{ cm}$ <div style="text-align: right; margin-right: 100px;"> <div style="border: 1px solid black; border-radius: 50%; display: inline-block; padding: 2px;">K1</div>  <div style="border: 1px solid black; border-radius: 50%; display: inline-block; padding: 2px;">K1</div> <math>\frac{\pi}{3}</math>  <div style="border: 1px solid black; border-radius: 50%; display: inline-block; padding: 2px;">K1</div> Use the formula <math>s = r\theta</math>  <div style="border: 1px solid black; display: inline-block; padding: 2px;">N1</div> </div>	4

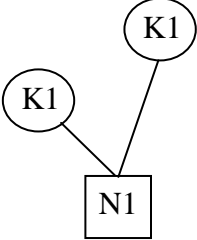
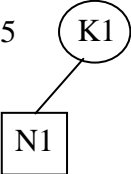
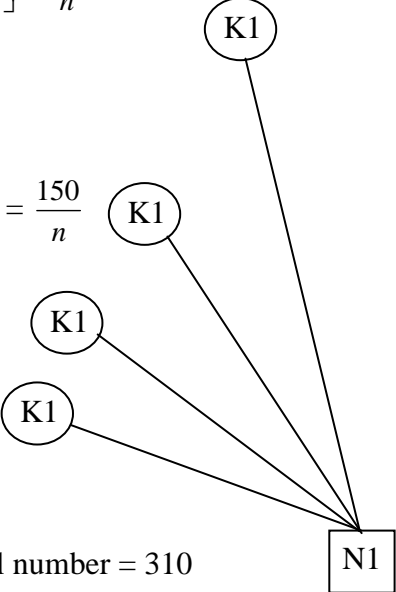
QUESTION NO.	SOLUTION	MARKS																																													
(b)	$\text{Area } OPQ = \frac{1}{2} \times 20 \times 20 \times \sin 60^\circ @ 173.2051 \text{ cm}^2$ $\text{Area } OSTR = \frac{1}{2} \times 17.3205^2 \times \frac{\pi}{3} @ 157.0795 \text{ cm}^2$ $\frac{1}{2} \times 20 \times 20 \times \sin 60^\circ - \frac{1}{2} \times 17.3205^2 \times \frac{\pi}{3} @$ $173.2051 - 157.0795$ $16.1256 \text{ cm}^2$ 	<p style="text-align: center;"><b>4</b></p> <p style="text-align: right;"><b>8</b></p>																																													
3 (a)	$17 = 14.5 + \left( \frac{\frac{43+w}{2} - 15}{20} \right) (5)$ $w = 7$ <p style="text-align: right;">Lower boundary OR  <math display="block">\left( \frac{\frac{43+w}{2} - 15}{20} \right) (5)</math></p> 	<p style="text-align: center;"><b>3</b></p>																																													
(b)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Score</th> <th>Frequency, <math>f</math></th> <th>Mid-point, <math>x</math></th> <th><math>fx</math></th> <th><math>fx^2</math></th> </tr> </thead> <tbody> <tr> <td>0-4</td> <td>2</td> <td>2</td> <td>4</td> <td>8</td> </tr> <tr> <td>5-9</td> <td>3</td> <td>7</td> <td>21</td> <td>147</td> </tr> <tr> <td>10-14</td> <td>10</td> <td>12</td> <td>120</td> <td>1440</td> </tr> <tr> <td>15-19</td> <td>20</td> <td>17</td> <td>340</td> <td>5780</td> </tr> <tr> <td>20-24</td> <td>7</td> <td>22</td> <td>154</td> <td>3388</td> </tr> <tr> <td>25-29</td> <td>6</td> <td>27</td> <td>162</td> <td>4374</td> </tr> <tr> <td>30-34</td> <td>2</td> <td>32</td> <td>64</td> <td>2048</td> </tr> <tr> <td></td> <td><math>\sum f = 50</math></td> <td>(P1)</td> <td><math>\sum fx = 865</math></td> <td><math>\sum fx^2 = 17185</math></td> </tr> </tbody> </table> $\text{Variance} = \frac{17185}{50} - \left( \frac{865}{50} \right)^2$ $= 44.41$ 	Score	Frequency, $f$	Mid-point, $x$	$fx$	$fx^2$	0-4	2	2	4	8	5-9	3	7	21	147	10-14	10	12	120	1440	15-19	20	17	340	5780	20-24	7	22	154	3388	25-29	6	27	162	4374	30-34	2	32	64	2048		$\sum f = 50$	(P1)	$\sum fx = 865$	$\sum fx^2 = 17185$	<p style="text-align: center;"><b>4</b></p> <p style="text-align: right;"><b>7</b></p>
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QUESTION NO.	SOLUTION	MARKS
4 (a)	$\delta V = -0.6 \quad \text{OR} \quad \frac{dV}{dx} = 3x^2 \quad \text{OR} \quad x = 5 \quad \text{K1}$ $-0.6 \approx 3(5)^2 \times \delta x \quad \text{K1}$ $\delta x \approx -0.008 \quad \text{N1}$	3
(b)	$f'(x) = \frac{(3-x^2)(3) - (3x+4)(-2x)}{(3-x^2)^2} \quad \text{K1}$ $f'(2) = \frac{[3-(2)^2](3) - [(3(2)+4)(-2(2))]}{[3-(2)^2]^2} \quad \text{K1}$ $37 \quad \text{N1}$	3
5 (a)	$2 \sin^2 x \left( \frac{\cos x}{\sin x} \right) \quad \text{K1}$ $= 2 \sin x \cos x$ $= \sin 2x \quad \text{N1}$	2
(b)	$y = \frac{2x}{\pi} \quad \text{Sketch straight line correctly} \quad \text{P1}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">       Sine curve <span style="border: 1px solid black; padding: 2px;">P1</span>        Period <span style="border: 1px solid black; padding: 2px;">P1</span>        Amplitude <span style="border: 1px solid black; padding: 2px;">P1</span>        Modulus <span style="border: 1px solid black; padding: 2px;">P1</span> </div> <p>Number of solutions = 4 <span style="border: 1px solid black; padding: 2px;">N1</span></p>	6
		<b>8</b>

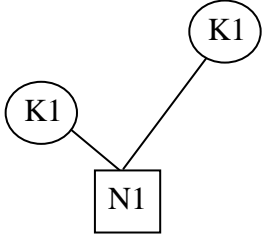
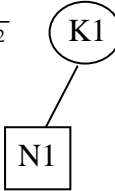
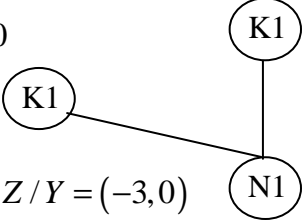
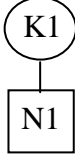
QUESTION NO.	SOLUTION	MARKS
6 (a)	<p>(i) <math>T_{15} = 2 + 14(3)</math> <span style="margin-left: 100px;">(K1)</span></p> <p style="margin-left: 100px;"><math>= 44 \text{ cm}</math> <span style="margin-left: 100px;">(N1)</span></p> <p>(ii) Area of the fifteenth circle = <math>1936\pi \text{ cm}^2</math> <span style="margin-left: 100px;">(N1)</span></p>	<b>3</b>
(b)	<p>100, 50 , 25 , .....</p> <p><math>a = 100</math> AND <math>r = \frac{1}{2}</math></p> <p><math>T_7 = 1.563</math></p> <div style="margin-left: 200px;"> <p>(K1)</p> <p>(K1)</p> <p>(N1)</p> </div>	<b>3</b>
		<b>6</b>



QUESTION NO.	SOLUTION	MARKS
8 (a) (i)	$\overline{QR} = 9\hat{x} - 9\hat{y} \quad \boxed{\text{N1}}$	3
(ii)	$\overline{OS} = 9\hat{y} + \frac{1}{2}(-9\hat{y} + 12\hat{x}) \quad (\text{K1})$ $= 6\hat{x} + \frac{9}{2}\hat{y} \quad \boxed{\text{N1}}$	5
(b)	$\overline{OT} = h\overline{OS}$ $= 6h\hat{x} + \frac{9}{2}h\hat{y}$ <p><b>OR</b></p> $\overline{QT} = k\overline{QR}$ $= 9k\hat{x} - 9k\hat{y}$ $\overline{QT} = \overline{QO} + \overline{OT}$ $= -9\hat{y} + 6h\hat{x} + \frac{9}{2}h\hat{y}$ $= 6h\hat{x} + \left(-9 + \frac{9}{2}h\right)\hat{y}$ <p>Comparing <math>\overline{QT}</math>,</p> $9k = 6h \Rightarrow k = \frac{2}{3}h \quad \text{-----(1)}$ <p>OR</p> $-9k = -9 + \frac{9}{2}h \Rightarrow k = 1 - \frac{1}{2}h \quad \text{-----(2)}$ <p>(d) Solving the simultaneous equations <math>(\text{K1})</math></p> $h = \frac{6}{7}, k = \frac{4}{7} \quad \boxed{\text{N1}}$	2
	$\overline{PQ} = -12\hat{x} + 9\hat{y} \quad (\text{K1})$ $ \overline{PQ}  = \sqrt{(12(3))^2 + (9(5))^2}$ $= 57.63 \text{ units} \quad \boxed{\text{N1}}$	10

QUESTION NO.	SOLUTION	MARKS
<p>9</p> <p>(a)</p> <p>(i)</p> <p>(ii)</p>	<p><math>p = 0.3, q = 0.7, n = 8</math></p> <p><math>1 - (0.7)^8 - {}^8C_1(0.3)(0.7)^7</math></p> <p><math>= 0.7447</math></p> <p><math>n(0.3)(0.7) = 315</math></p> <p><math>n = 1500</math></p>  	<p>5</p>
<p>(b)</p> <p>(i)</p> <p>(ii)</p>	<p><math>P\left[\frac{30-33.5}{5} &lt; Z &lt; \frac{36.5-33.5}{5}\right] = \frac{150}{n}</math></p> <p>OR</p> <p><math>P[-0.7 &lt; Z &lt; 0.6] = \frac{150}{n}</math></p> <p><math>1 - P[Z &gt; 0.7] - P[Z &gt; 0.6] = \frac{150}{n}</math></p> <p><math>1 - 0.2420 - 0.2743 = \frac{150}{n}</math></p> <p><math>n = 310.11</math></p> <p>Total number = 310</p> 	<p>5</p> <p>10</p>



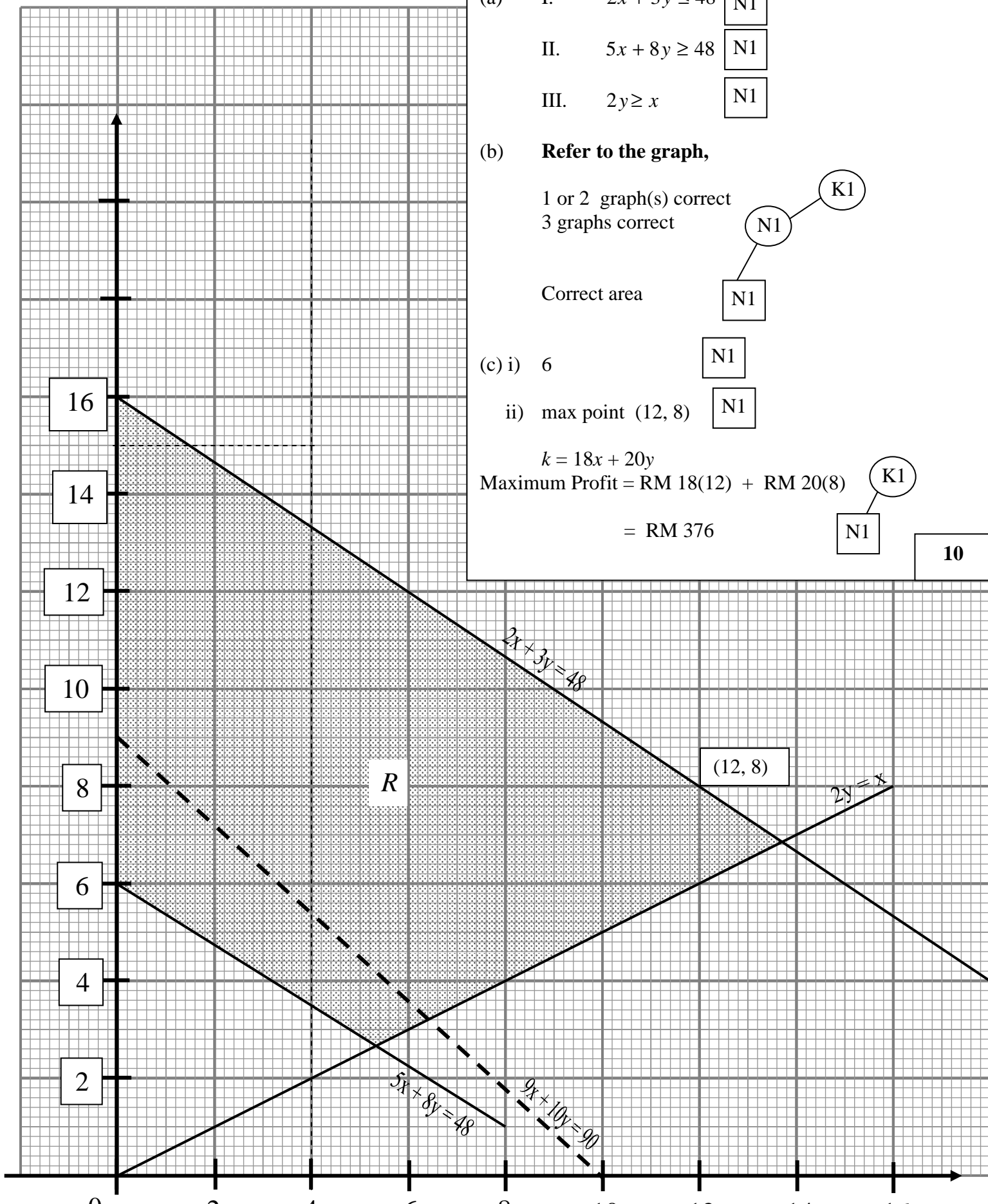
QUESTION NO.	SOLUTION	MARKS
10 (a)	<p>Get <math>m = -1</math></p> <p><math>y - 4 = -1(x - 1)</math> (K1)</p> <p><math>y + x - 5 = 0</math> (N1)</p> 	3
(b)	<p><math>\sqrt{(x-1)^2 + (y-4)^2} = 2\sqrt{(4-2)^2 + (1-3)^2}</math> (K1)</p> <p><math>x^2 - 2x + 1 + y^2 - 8y + 16 = 4(8)</math></p> <p><math>x^2 + y^2 - 2x - 8y - 15 = 0</math> (N1)</p> 	2
(c)	<p><math>x^2 - 2x - 15 = 0</math></p> <p><math>(x - 5)(x + 3) = 0</math></p> <p><math>x = 5, x = -3</math> (K1)</p> <p>Get both</p> <p><math>Y/Z = (5, 0)</math> and <math>Z/Y = (-3, 0)</math> (N1)</p> 	3
(d)	<p>Get <math>T = (2, 3)</math>, (K1)</p> <p><math>x</math>-intercept = <math>-1</math> (N1)</p> 	2
		<b>10</b>

QUESTION NO.	SOLUTION	MARKS
11 (a)	$px^2 + x = -2$ <p style="text-align: center;">(K1)</p> $p(2)^2 + 2 = -2$ <p style="text-align: center;">(K1)</p> $p = -1, q = 2$ <p style="text-align: center;">(N1)</p>	<b>3</b>
(b) (i)	<p>Area of the shaded region</p> $= \int_0^1 (x^2 - 6x + 9) dx - \int_0^1 (2x + 2) dx$ $= \int_0^1 (x^2 - 8x + 7) dx$ $= \left[ \frac{x^3}{3} - \frac{8x^2}{2} + 7x \right]_0^1$ $= \left( \frac{1}{3} - \frac{8}{2} + 7 \right) - 0$ $= 3\frac{1}{3} \text{ unit}^2.$ <p style="text-align: center;">(K1)</p> <p style="text-align: center;">(K1)</p> <p style="text-align: center;">(K1)</p> <p style="text-align: center;">(N1)</p>	<b>7</b>
(ii)	<p>Volume of revolution</p> $= \pi \int_0^2 y^2 dx$ $= \pi \int_0^2 (x-3)^4 dx$ $= \pi \left[ \frac{(x-3)^5}{5} \right]_0^2$ $= \pi \left[ \frac{(1-3)^5}{5} - \left( \frac{(0-3)^5}{5} \right) \right]$ $= 48\frac{2}{5} \pi \text{ unit}^3.$ <p style="text-align: center;">(K1)</p> <p style="text-align: center;">(K1)</p> <p style="text-align: center;">(N1)</p>	<b>10</b>

QUESTION NO.	SOLUTION	MARKS
12 (a)	$v = 5 \text{ ms}^{-1}$ <span style="border: 1px solid black; padding: 2px;">P1</span>	<b>1</b>
(b)	$a = 2t - 6$ and $a = 0$ or $\frac{dv}{dt} = 0$ <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> $t = 3$ <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> $v_{\min} = -4 \text{ ms}^{-1}$ <span style="border: 1px solid black; padding: 2px;">N1</span>	<b>3</b>
(c)	$(t - 1)(t - 5) < 0$ <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> $1 < t < 5$ <span style="border: 1px solid black; padding: 2px;">N1</span>	<b>2</b>
(d)	$s = \frac{t^3}{3} - 3t^2 + 5t$ <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> $ s_1 - s_0  +  s_5 - s_1 $ OR $\left  \int_0^1 v dt \right  + \left  \int_1^5 v dt \right $ <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> $\left  \frac{7}{3} - 0 \right  + \left  -\frac{25}{3} - \frac{7}{3} \right $ <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">K1</span> OR $\left  \frac{1^3}{3} - 3(1)^2 + 5(1) - 0 \right  + \left  \frac{5^3}{3} - 3(5)^2 + 5(5) - \left[ \frac{1^3}{3} - 3(1)^2 + 5(1) \right] \right $ 13 m <span style="border: 1px solid black; padding: 2px;">N1</span>	<b>4</b>
		<b>10</b>

QUESTION NO.	SOLUTION	MARKS
<p>13 (a) (i)</p>	$\cos \angle AMB = \frac{5^2 + 8^2 - 12^2}{2(5)(8)}$ <p style="text-align: right;">(K1) <span style="margin-left: 100px;">(N1)</span></p> $\angle AMB = 133.43^\circ @ 133^\circ 26'$	<b>2</b>
<p>(ii)</p>	$\frac{\sin \angle ACM}{5} = \frac{\sin 46.57^\circ}{4}$ $\angle ACM = 65.20^\circ @ 65^\circ 24'$ $\angle MAC = 180^\circ - 46.57^\circ - 65.20^\circ = 68.23^\circ$ <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>Area of <math>\triangle ACM</math></p> <math display="block">= \frac{1}{2}(5)(4)\sin 68.23^\circ</math> <math display="block">= 9.287 \text{ cm}^2</math> </div> <div style="width: 45%;"> <p>Area of <math>\triangle AMB</math></p> <math display="block">= \frac{1}{2}(5)(8)\sin 133.43^\circ</math> <math display="block">= 14.52 \text{ cm}^2</math> </div> </div> <p>Area of <math>\triangle ABC = 14.52 + 9.287</math></p> $= 23.807 \text{ cm}^2$ <div style="text-align: right; margin-top: 20px;"> <p>(K1) <span style="margin-left: 100px;">(K1)</span> (K1) <span style="margin-left: 100px;">(K1)</span> (N1)</p> </div>	<b>5</b>
<p>(b)</p>	<p>Get <math>\angle B'M'M = 46.57^\circ</math> @ <math>\angle B'MM' = 46.57^\circ</math> @ <math>\angle M'B'M = 86.86^\circ</math></p> $\frac{MM'}{\sin 86.86^\circ} = \frac{8}{\sin 46.57^\circ}$ <p><math>MM' = 10.999 \text{ cm @ } 11 \text{ cm}</math></p> <p><math>A'M' = 5 + 10.999</math> <math>= 15.999 \text{ cm @ } 16 \text{ cm}</math></p> <div style="text-align: right; margin-top: 20px;"> <p>(K1) <span style="margin-left: 100px;">(K1)</span> (N1)</p> </div>	<b>3</b>
		<b>10</b>

Answer for question 14



- (a) I.  $2x + 3y \leq 48$  N1  
 II.  $5x + 8y \geq 48$  N1  
 III.  $2y \geq x$  N1

(b) Refer to the graph,

1 or 2 graph(s) correct K1  
 3 graphs correct N1  
 Correct area N1

- (c) i) 6 N1  
 ii) max point (12, 8) N1

$k = 18x + 20y$   
 Maximum Profit = RM  $18(12) + RM 20(8)$  K1  
 = RM 376 N1

10

QUESTION NO.	SOLUTION	MARKS
15 (a) (i)	$140 = \frac{\text{RM } 50.40}{Q_{97}} \times 100$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $Q_{97} = \text{RM } 36$ <div style="text-align: center; margin-left: 100px;">(N1)</div> (ii) $I_{00,97} = \frac{I_{00,94}}{I_{97,94}} \times 100$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $125 = \frac{I_{00,94}}{120} \times 100$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $I_{00,94} = 150$ <div style="text-align: center; margin-left: 100px;">(N1)</div>	<b>5</b>
(b) (i)	$\frac{125 \times 20 + 140 \times 10 + 30x + 110 \times 40}{100} = 122$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $30x + 8300 = 12200$ <div style="text-align: center; margin-left: 100px;">(K1)</div> $x = 130$ <div style="text-align: center; margin-left: 100px;">(N1)</div> (ii) $122 = \frac{\text{RM } 288}{\bar{Q}_{1997}} \times 100$ <div style="text-align: right; margin-right: 50px;">(K1)</div> $\bar{Q}_{1997} = \text{RM } 236.07$ <div style="text-align: center; margin-left: 100px;">(N1)</div>	<b>5</b>
		<b>10</b>