



**MAJLIS PENGETUA SEKOLAH MALAYSIA  
NEGERI SEMBILAN**

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**PROGRAM PENINGKATAN AKADEMIK TINGKATAN 5  
SEKOLAH-SEKOLAH MENENGAH NEGERI SEMBILAN 2018**

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**ADDITIONAL MATHEMATICS**

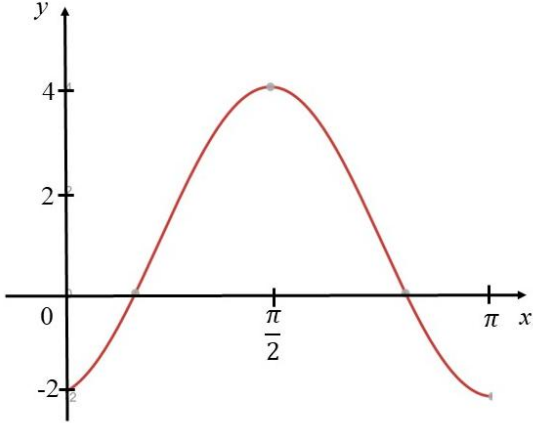
Kertas 2

**PERATURAN PEMARKAHAN**

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No	Solution and Mark Scheme	Sub Marks	Total Marks														
1(a)	<table border="1" data-bbox="337 302 1247 415"> <tr> <td>Score</td> <td>6 – 10</td> <td>11 – 15</td> <td>16 – 20</td> <td>21 – 25</td> <td>26 – 30</td> <td>31 – 35</td> </tr> <tr> <td>Number of pupils</td> <td>3</td> <td>5</td> <td>9</td> <td>11</td> <td>8</td> <td>4</td> </tr> </table> <p>Correct histogram</p> <p>Method to find mode</p> <p>Mode = 22.5</p>	Score	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	Number of pupils	3	5	9	11	8	4	P1  P1  P1  N1	
Score	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35											
Number of pupils	3	5	9	11	8	4											
(b)	12	N1	5														
2	$xy - \frac{1}{4}\pi\left(\frac{1}{2}x\right)^2 = 343\pi$ $y = 2\left(\frac{1}{4}\right)2\pi\left(\frac{x}{2}\right) = \frac{\pi x}{2}$ $x\left(\frac{\pi x}{2}\right) - \frac{1}{4}\pi\left(\frac{1}{2}x\right)^2 = 343\pi$ $(x - 28)(x + 28) = 0$ $x = 28$ $y = 14\pi$	P1  P1  K1  K1  N1  N1	6														
3(a)	$r^2 = 15^2 - (15 - h)^2 \quad \text{or} \quad r^2 = 30h - h^2$ $A = \pi(30h - h^2)$	K1  N1															
(b)	$\frac{dA}{dh} = \pi(30 - 2h) \quad \text{or} \quad \frac{dh}{dt} = 0.1$ $\frac{dA}{dt} = \pi[30 - 2(4)](0.1)$ $2.2\pi$	P1  K1  N1															
(c)	$\delta r = p$ $\delta A = \pi[30 - 2(12)](p)$ $6p\pi$	P1  K1  N1	8														

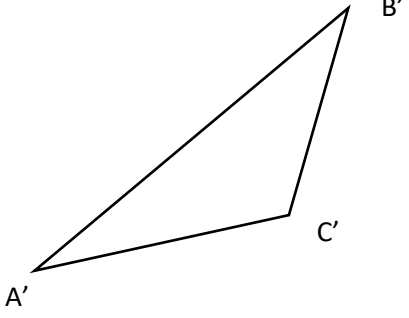
No	Solution and Mark Scheme	Sub Marks	Total Marks
4	 <p>Seen <math>\cos x</math> graph  Seen <math>\cos 2x</math> graph – <math>x</math>-axis  Seen <math>-\cos 2x</math> graph – reflected  Seen graph move up – amplitude  <math>y = k - 1</math>  <math>k = 5</math></p>	P1 P1 P1 P1 K1 N1	6
5(a)	$\overrightarrow{DC} = \overrightarrow{DA} + \overrightarrow{AB} + \overrightarrow{BC}$ $\overrightarrow{DC} = -n\underline{x} + ny + m\underline{x} = (m - n)\underline{x} + ny$ $m - n = 5 \quad \text{or} \quad \frac{6-n}{2} = n$ $m = 7$ $n = 2$	K1 P1 K1 N1 N1	
(b)	$\frac{\text{Area } \Delta ABC}{\text{Area } \Delta ABD} = \frac{\frac{1}{2} \times AB \times  7\underline{x} }{\frac{1}{2} \times AB \times  2\underline{x} }$ $63 \text{ unit}^2$	K1 N1	7
6(a)	$\pi r^2(29) = 10\,469\pi \quad \text{OR} \quad r = 19 \quad \text{OR} \quad a = 20$ <p>Radius of 10<sup>th</sup> cylinder = <math>20 + 9(-1) = 11</math> or  Height of 10<sup>th</sup> cylinder = <math>30 + 9(-1) = 21</math> or equivalent</p> $\pi(11)^2(21)$ $2541\pi$	K1 K1 K1 N1	
(b)	<p>Radius of <math>n</math>th cylinder = <math>20 + (n - 1)(-1) = 21 - n</math> or  Height of <math>n</math>th cylinder = <math>30 + (n - 1)(-1) = 31 - n</math> or equivalent</p> $2\pi(21 - n)^2 + 2\pi(21 - n)(31 - n) = 144\pi$ $(n - 30)(n - 17) = 0$ <p>17<sup>th</sup> cylinder</p>	K1 K1 K1 N1	8

No	Solution and Mark Scheme							Sub Marks	Total Marks
7(a)	$\log_{10}(x+1)$	0.18	0.30	0.48	0.60	0.70	0.78	P1	
	$\log_{10} y$	0.97	0.66	0.19	-0.12	-0.38	-0.60	P1	
(b)	One point plotted correctly with correct scale All 6 points plotted correctly Line of best fit $\log_{10} y = \log_{10} p - k \log_{10}(x+1)$							P1 P1 P1 P1	
(c)(i)	$-k = \text{*gradient}$ or $\log_{10} p = \text{*y-intercept}$ $k = \text{*2.617}$							K1 N1	
(ii)	$p = \text{*27.54}$							N1	
(iii)	$y = 3.02$							N1	10
8(a)(i)	$P(X=8) = {}^8C_8 p^8 q^0 = 0.0168$							K1	
	$p = 0.6$							N1	
(ii)	$P(X \geq 7) = {}^8C_7 (0.6)^7 (0.4)^1 + 0.0168$							K1	
	0.1064							N1	
(b)(i)	$P\left(Z < \frac{H-165}{5}\right) = 0.166$							K1	
	$\frac{H-165}{5} = -0.97$							K1	
	160.15							N1	
(ii)	$P\left(\frac{165-165}{5} < Z < \frac{175-165}{5}\right)$ or $P(0 < Z < 2)$							K1	
1500 $\times$ 0.4772							K1		
715							N1		

No	Solution and Mark Scheme	Sub Marks	Total Marks
9(a)	$\tan\left(\frac{\beta}{2}\right) = \frac{15}{6} \text{ or } 68.2^\circ \text{ or } 1.190 \text{ rad}$ $\beta = 136.4^\circ \text{ or } 136.4^\circ \times \frac{3.142}{180^\circ} \text{ or } 2 \times 1.190$ 2.381 / 2.380	K1  K1  N1	
(b)	$6 \times 2.381 \text{ or } 10.11 \times \left(68.2^\circ \times \frac{3.142}{180^\circ}\right) \text{ or } 10.11 \times \frac{2.381}{2}$ or equivalent $6 \times 2.381 + 10.11 \times \left(68.2^\circ \times \frac{3.142}{180^\circ}\right) \text{ or equivalent}$ 26.32 / 26.31	K1  K1  N1	
(c)	$\frac{1}{2}(6)^2(2.381) \text{ or } \frac{1}{2}(6)^2 \sin 136.4^\circ$ $\left(\frac{1}{2} \times (10.11)^2 \times 1.1905\right) - \left(\frac{1}{2} \times (10.11)(10.11) \times \sin 68.2^\circ\right)$ $\left(\frac{1}{2} \times (6)^2 \times 2.381\right) - \left(\frac{1}{2} \times (6)(6) \times \sin 136.4^\circ\right) -$ $\left(\frac{1}{2} \times (10.11)^2 \times 1.1905\right) - \left(\frac{1}{2} \times (10.11)(10.11) \times \sin 68.2^\circ\right)$ 17.054 cm <sup>2</sup>	K1  K1  K1  N1	10

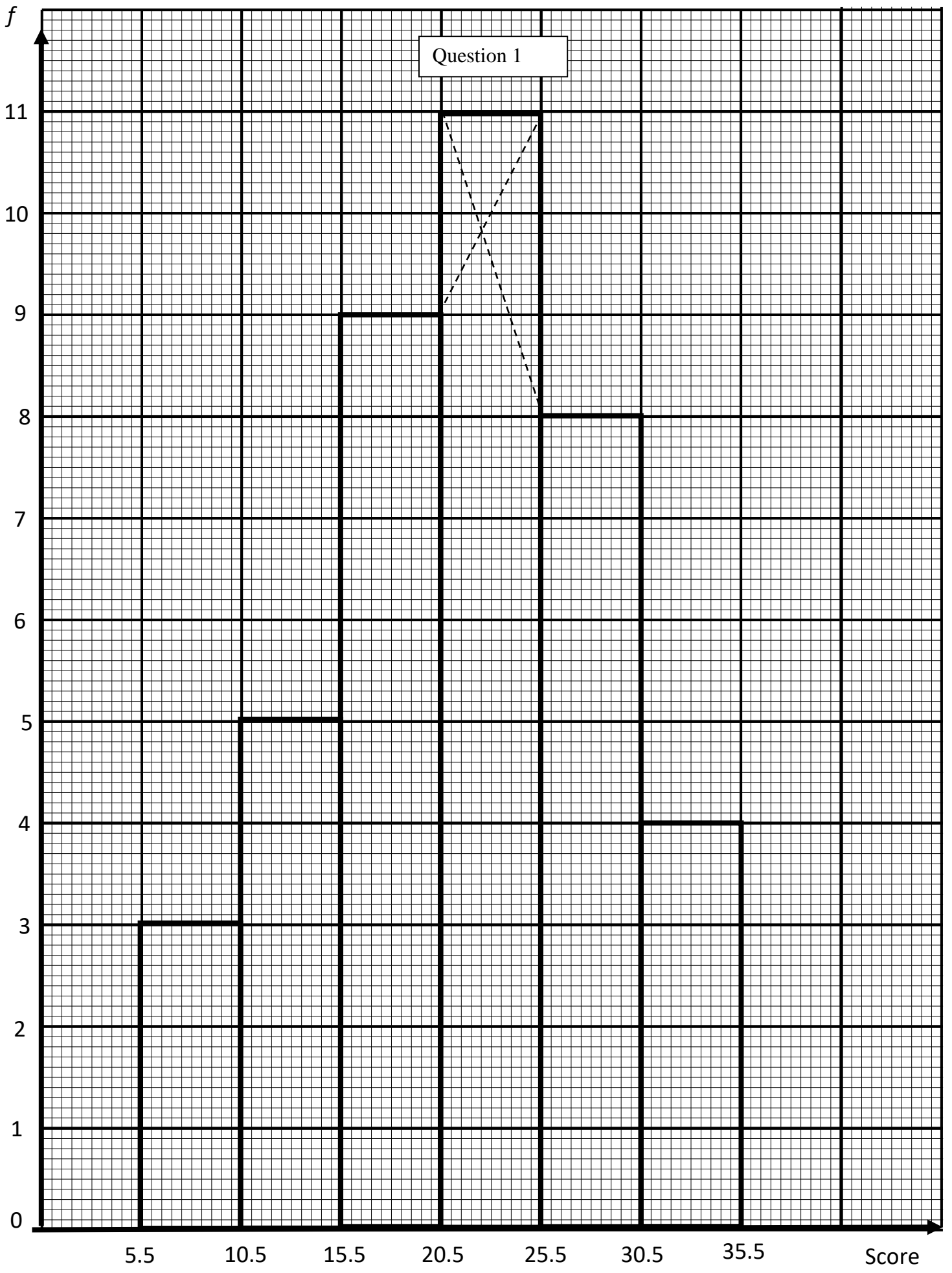
No	Solution and Mark Scheme	Sub Marks	Total Marks
10(a)	$x + (x-1)^2 = 3$ $(x-2)(x+1) = 0$ $A(2,1)$	K1 K1 N1	
(b)(i)	$\int_1^2 (x-1)^2 dx \text{ or } \frac{1}{2} \times 1 \times 1$ $\left[ \frac{(x-1)^3}{3} \right]_1^2 + \frac{1}{2} \times 1 \times 1$ $\frac{5}{6}$	K1 K1 N1	
(b)(ii)	$\pi \int_2^3 \left[ (x-1)^2 \right]^2 dx$ $\frac{1}{3} \pi (1)^2 (1)$ $\pi \left[ \frac{(x-1)^5}{5} \right]_2^3 - \frac{1}{3} \pi$ $\frac{88}{15} \pi \text{ or } 5.867\pi$	K1 K1 K1 N1	10

No	Solution and Mark Scheme	Sub Marks	Total Marks
11(a) (i)	$m_2 = -\frac{3}{2}$ $y = -\frac{3}{2}x + 2$	K1  N1	
(ii)	$3\left(-\frac{3}{2}x + 2\right) - 2x - 19 = 0$ $Q(-2, 5)$	K1  N1	
(b)(i)	$\frac{0-5m}{n-m+m} = -2 \quad \text{or} \quad \frac{2(n-m)+\frac{19}{2}m}{n-m+m} = \frac{19}{2}$ $m : n = 2 : 5$	K1  N1	
(ii)	$\frac{1}{2} \left  0\left(\frac{19}{2}\right) + (-5)(p) + (2)(p-8) - \left[ 2(-5) + \left(\frac{19}{2}\right)(p-8) + (p)(0) \right] \right  = \frac{65}{4}$ $3$	K1  N1	
(c)	$(-10)^2 - 4(1)(4) = 84 \quad (b^2 - 4ac > 0)$ <p>Intersects y-axis</p>	K1 N1	10
12(a)	$a = 2pt + 2q \quad \text{or} \quad 4p + 4q = 0$ <p>Solve simultaneous equation for <math>4p + 4q = 0</math> and <math>4p + 2q = 8</math></p> $q = -4$ $p = 4$	K1 K1 N1 N1	
(b)	$s = \frac{4t^3}{3} - 4t^2 + c$ $t^2\left(\frac{4}{3}t - 4\right) = 0$ $t = 3$	K1 K1 N1	
(c)	$S_5 = \frac{4(5)^3}{3} - 4(5)^2 \quad \text{atau} \quad S_4 = \frac{4(4)^3}{3} - 4(4)^2$ $\frac{4(5)^3}{3} - 4(5)^2 - \left[ \frac{4(4)^3}{3} - 4(4)^2 \right] \text{ or } 66.67 - 21.33 \text{ or equivalent}$ $45.34 \text{ or } 45.33 \text{ or } \frac{136}{3}$	K1 K1 N1	10

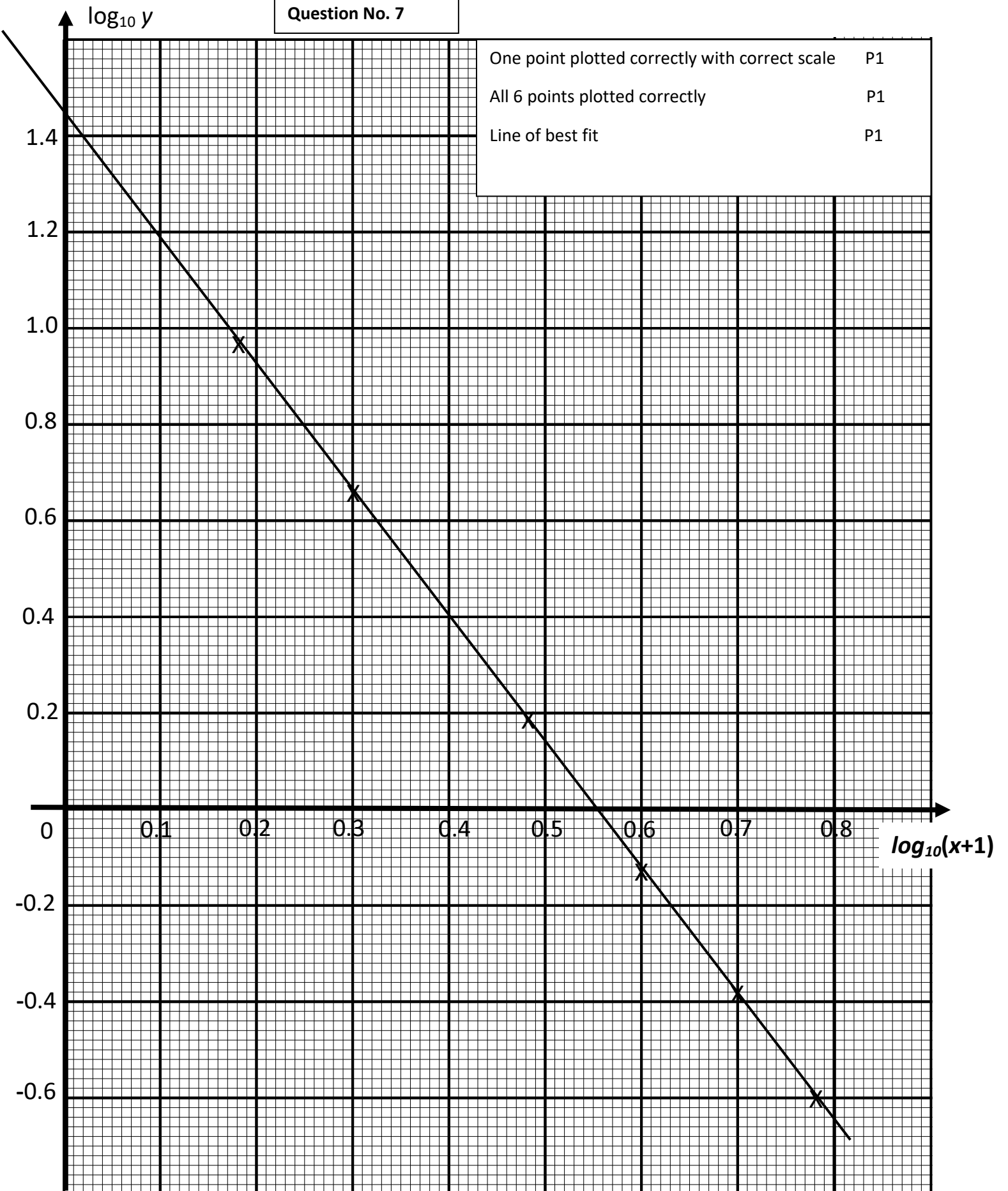
No	Solution and Mark Scheme	Sub Marks	Total Marks
13(a) (i)	$\frac{12.5}{\sin C} = \frac{9.6}{\sin 43.2}$ $\angle ACB = 63.04^\circ$	K1 N1	
(ii)	$\frac{AC}{\sin 73.76} = \frac{9.6}{\sin 43.2}$ $13.46^2 = 5.5^2 + 9.9^2 - 2(5.5)(9.9) \cos D$ $119.07^\circ$	K1 K1 N1	
(iii)	$\frac{1}{2}(5.5)(9.9) \sin 119.07$ $23.80$	K1 N1	
(b)	$\frac{1}{2} \times d \times 13.46 = 23.80$ $3.536$	K1 N1	
(c)		N1	10



No	Solution and Mark Scheme	Sub Marks	Total Marks
14(a)	$20x + 10y \leq 10\,000$ $6x + 8y \geq 2\,400$ $x \leq 2y$	P1 P1 P1	
(b)	Refer to graph		
(c) (i)	400	N1	
(ii)	300 $6(300) + 8(150)$ 3 000	P1 K1 N1	10
15(a)	$\frac{155}{PI} = \frac{125}{100}$ 124	K1 N1	
(b) (i)	$\frac{9.10}{6.50} \times 100$ or $\frac{P_{1006}}{6.50} \times 100 = 116$ $x = 140$	K1 N1	
(ii)	7.54	N1	
(c)	$\frac{(125 \times 3) + (116 \times 1) + (y \times 2)}{6}$ $\frac{(125 \times 3) + (116 \times 1) + (y \times 2)}{6} = 118.5$ $y = 110$	K1 K1 N1	
(d)	$\frac{47.40}{P_{2004}} \times 100 = 118.5$ RM40	K1 N1	



## Question No. 7



One point plotted correctly with correct scale P1

All 6 points plotted correctly P1

Line of best fit P1

Question No. 15

