

Program Peningkatan Prestasi Sains & Matematik 2011 (Trial)
Additional Mathematics Marking Scheme - Paper 2

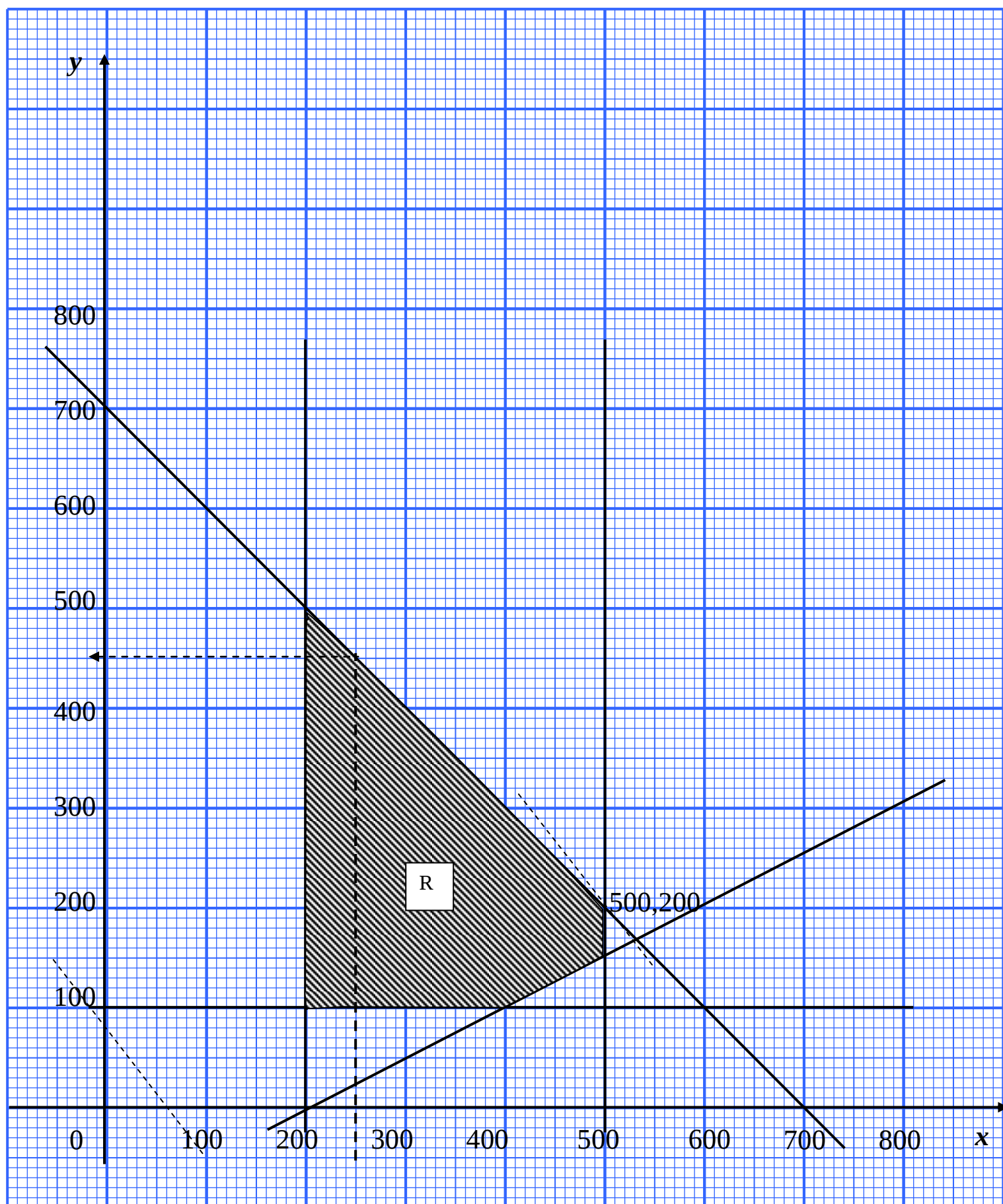
Solution	Marks	Solution	Marks
1 $x = \frac{y+2}{3}$ or $y = 3x - 2$ $x^2 + 2(3x - 2)^2 - x(3x - 2) = 4$ or $\left(\frac{y+2}{3}\right)^2 + 2y^2 - \left(\frac{y+2}{3}\right)y = 4$ $8x^2 - 11x + 2 = 0$ or $8y^2 - y - 16 = 0$ $x = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(8)(2)}}{2(8)}$ or $y = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(8)(-16)}}{2(8)}$ $x = 1.159, 0.216,$ $y = 1.478, -1.353$	P1 K1 K1 N1 <u>N1</u> 5	2a) $(x - 1)(x - 4) = 0$ $f(x) = x^2 - 5x + 4$ b)(i) $f(x) = x^2 - 5x + 4$ $= \left(x - \frac{5}{2}\right)^2 - \frac{25}{4} + 4$ $= \left(x - \frac{5}{2}\right)^2 - \frac{9}{4}$ Minimum point $\left(\frac{5}{2}, -\frac{9}{4}\right)$ (ii) $(-5)^2 - 4(1)(4 - p) < 0$ $p < -\frac{9}{4}$	K1 N1 K1 N1 K1 <u>N1</u> 6
3 a) $\frac{dy}{dx} = 3px + 2qx,$ $3px^2 + 2qx = 6x^2 - 6x$ $3p = 6$ @ $2q = -6$ $p = 2,$ $q = -3$ $9 = 2(2)^3 - 3(2)^2 + r$ $r = 5$ b) $6x(x - 1) = 0$ $x = 0, x = 1$ $\therefore$ turning point (0,5) $\therefore$ turning point (1,4)	P1 K1 N1 N1 N1 K1 N1 <u>N1</u> 8	4 a) Shape of graph (sin θ) Max = 1 and Min = -1 $1\frac{1}{2}$ cycles Reflection about x-axis b) $4\pi \sin \frac{3}{2}x + 3x = 0$ $-\sin \frac{3}{2}x = \frac{3x}{4\pi}$ $y = \frac{3x}{4\pi}$ Number of solution = 3	K1 (line) P1 P1 P1 P1 N1 <u>N1</u> 7

5 a) $\overrightarrow{BL} = \overrightarrow{BO} + \overrightarrow{OL}$ or $\overrightarrow{OM} = \overrightarrow{OA} + \overrightarrow{AB}$ or equivalent $\overrightarrow{BL} = 4\underline{x} - 8\underline{y}$ $\overrightarrow{OM} = 12\underline{x} + \frac{1}{2}(-12\underline{x} + 8\underline{y})$ $= 6\underline{x} + 4\underline{y}$ b) $\overrightarrow{ON} = h(6\underline{x} + 4\underline{y})$ $\overrightarrow{ON} = 4\underline{x} + k(8\underline{y} - 4\underline{x})$ $h(6\underline{x} + 4\underline{y}) = 4\underline{x} + k(8\underline{y} - 4\underline{x})$ $4h = 8k, h = 2k$ $6h = 4 - 4k$ $6(2k) = 4 - 4k$ $k = \frac{1}{4}, h = \frac{1}{2}$	K1 N1 N1 K1 K1 K1 <u>N1N1</u> 8	6(a) $r_1 = \frac{25}{\pi}, r_2 = \frac{25}{2\pi}, r_3 = \frac{25}{4\pi}$ $A_1 = \frac{625}{\pi}, A_2 = \frac{625}{4\pi}, A_3 = \frac{625}{8\pi}$ $\frac{r_2}{r_1} = \frac{1}{4}, \frac{r_3}{r_2} = \frac{1}{4}$ Since $\frac{r_2}{r_1} = \frac{1}{4}, \frac{r_3}{r_2} = \frac{1}{4}$, then it is a Geometric Progression $r = \frac{1}{4}$ (b) $S_\infty = \frac{\frac{625}{\pi}}{1 - \frac{1}{4}}$ $= \frac{2500}{3\pi}$	P1 K1 N1 N1 K1 <u>N1</u> 6														
7a) Area of $\Delta = \frac{1}{2}(6)(k - 2)$ $\int_0^2 (y^2 + 2)dy = \left[\frac{y^3}{3} + 2y \right]_0^2$ $= \left(\frac{2^3}{3} + 2(2) \right) - 0 = \frac{20}{3}$ $\frac{38}{3} = \frac{20}{3} + 3k - 6$ $12 = 3k$ $k = 4$ b) $V = \pi \int_0^2 (y^2 + 2)^2 dy$ $= \pi \int_0^2 (y^4 + 4y^2 + 4) dy$ $= \pi \left[\frac{y^5}{5} + 4 \frac{y^3}{3} + 4y \right]_0^2$ $= \pi \left[\frac{(2)^5}{5} + \frac{4(2)^3}{3} + 4(2) \right] - 0$ $= \frac{376}{15} \pi \text{ unit}^3$	K1 K1 K1 K1(+) K1(=) N1 P1 K1 <u>N1</u> 10	8 <table><tr><td>x</td><td>1</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr><tr><td>$\log_{10} y$</td><td>0.84</td><td>0.99</td><td>1.29</td><td>1.57</td><td>1.87</td><td>2.16</td></tr></table> Paksi betul, skala seragam & plot 1 titik Plot semua titik betul Garis lurus penyuaian terbaik $y = h k^x$ $\log_{10} y = \log_{10} h + x \log_{10} k$ i) $\log_{10} k = 0.146$ $k = 1.4$ (accept 1.35 – 1.43) $\log_{10} h = 0.70$ $h = 5.012$ ii) $\log_{10} y = 1.7, x = 6.8$	x	1	2	4	6	8	10	$\log_{10} y$	0.84	0.99	1.29	1.57	1.87	2.16	N 1 K1 N1 N1 P1 K1 N1 <u>N1</u> 10
x	1	2	4	6	8	10											
$\log_{10} y$	0.84	0.99	1.29	1.57	1.87	2.16											

9 a)(i) $m_{AB} = \frac{1}{3}$ $\frac{0+3}{k-4} = \frac{1}{3}$ $k = 13$ (ii) $y - 0 = \frac{1}{3}(x - 13)$ $y = \frac{1}{3}x - \frac{13}{3}$ or equivalent (b)(i) $\frac{3x+26}{5} = 4$, $\frac{3y+0}{5} = -3$ $E(-2, -5)$ (ii) Area of triangle ODE $= \frac{1}{2} \begin{vmatrix} 0 & 4 & -2 & 0 \\ 0 & -3 & -5 & 0 \\ -20 & -6 & & \end{vmatrix}$ $= \frac{1}{2} -20 - 6$ $= 13 \text{ unit}^2$ (c) $\sqrt{(x-6)^2 + (y-4)^2} =$ $\sqrt{(x-4)^2 + (y+3)^2}$ $4x + 14y - 27 = 0$	K1 N1 K1 N1 K1 N1 K1 N1 K1 N1 K1 N1 <u>N1</u> 10	10 a) $\angle ABC = 45^\circ, \angle AOC = 90^\circ$ $\frac{1}{2}r^2(1.571) = 9\pi$ $r = 6 \text{ cm}$ b) $\text{arc } AC = 6(1.571)$ or equivalent $= 9.426 \text{ cm}$ $\text{Perimeter} = 2(6) + 9.426$ $= 21.426 \text{ cm}$ c) $\angle BOC = 135^\circ$ or $\frac{3}{2}\pi$ or 4.713rad $A_{\text{sector}} = \frac{1}{2}(6^2)(4.713) = 84.834\text{cm}^2$ $A_{\text{segment}} = \frac{1}{2}(6^2)(4.713) - \frac{1}{2}(6^2)\sin 135^\circ$ $= 72.104$ $\text{Area of shaded region} = 2(72.104)$ $= 144.208 \text{ cm}^2$	P1 K1 N1 K1 K1 N1 P1 K1 K1 <u>N1</u> 10
11a)(i) $P(X \leq 2)$ $= P(x=0) + P(x=1) + p(x=2)$ $= {}^6C_0 \left(\frac{3}{5}\right)^0 \left(\frac{2}{5}\right)^6 +$ ${}^6C_1 \left(\frac{3}{5}\right)^1 \left(\frac{2}{5}\right)^5 + {}^6C_2 \left(\frac{3}{5}\right)^2 \left(\frac{2}{5}\right)^4$ $= 0.1792$ (ii) $\text{Min} = np = \frac{2}{5}(120) = 48 @$ $\text{Sisihan piawai} = 28$ $\text{Min} = 48 \text{ \& Sisihan piawai} = 48$ b)(i) $P(X > 50) = P(Z > \frac{50-30}{9})$ $= P(Z > 2.22)$ $= 0.01321$ (ii) $P(X < t) = 0.70$ $P(Z < \frac{t-30}{9}) = 0.70$ $P(Z > \frac{t-30}{9}) = 0.3$ $\frac{t-30}{9} = 0.524$ $t = 34.716$	K1 K1 N1 K1 N1 K1 N1 K1 N1 K1 N1 P1 K1 <u>N1</u> 10	12(a) $\frac{\sin \angle ADB}{6} = \frac{\sin 35^\circ}{9}$ $\angle ADB = 22.48^\circ$ or $22^\circ 29'$ (b) $\angle ADC = 57.48^\circ$ $AC^2 = 9^2 + 12^2 - 2(9)(12)\cos 57.48^\circ$ $AC = 10.43 \text{ cm}$ (c) $\angle BAD = 180^\circ - 35^\circ - 22.48^\circ$ $= 122.52^\circ$ $\frac{BD}{\sin 122.52^\circ} = \frac{6}{\sin 22.48^\circ}$ $BD = 13.23 \text{ cm}$ (d) $\text{Area} = \frac{1}{2}(12)(13.23)\sin 35^\circ$ $= 45.53 \text{ cm}^2$	K1 N1 P1 K1 N1 K1 K1 N1 K1 N1 10

13			
a) $\frac{x}{168} \times 100 = 125$ or $y = \frac{99}{90} \times 100$ $x = RM210$ $y = 110$	K1 N1 N1	14a) $200 \leq x \leq 500$ $x + y \leq 700$ $x - 2y \leq 200$	N1 N1 N1
c) $m + n = 35$ $\frac{(125 \times 25 + 120m + 105n + 110 \times 40)}{100} = 115$ $8m + 7n = 265$ $8(35 - n) + 7n = 265$ $m = 20$ $n = 15$	P1 K1 K1 N1 N1	b) Graf (satu garis betul) (semua garis betul) (rantau betul)	K1 N1 N1
d) $\bar{I} = \frac{120}{100} \times 115$ $= 138$	K1 <u>N1</u> 10	c)(i) Kek lapis maksimum = 450 (ii) (500, 200) $k = 0.8x + 0.6y$ $= 0.8(500) + 0.6(200)$ $= RM 520$	N1 N1 K1 <u>N1</u> 10
15 a) $v = 2t^2 - t - 6$ $t = 0, v = -6 \text{ cms}^{-1}$	N1	15d) $t = 2, s = \frac{2(2)^3}{3} - \frac{(2)^2}{2} - 6(2)$ $= -\frac{26}{3}$ or	
b) $\frac{dv}{dt} = 4t - 1 = 0$ $t = \frac{1}{4}$	K1	$t = 4, s = \frac{2(4)^3}{3} - \frac{(4)^2}{2} - 6(4)$ $= \frac{32}{3} s$	K1
$v_{\min} = 2\left(\frac{1}{4}\right)^2 - \left(\frac{1}{4}\right) - 6$ $= -\frac{49}{8} \text{ cms}^{-1}$	K1 N1	Total distance travelled $= 2\left(\frac{26}{3}\right) + \frac{32}{3}$ $= 28 \text{ cm}$	K1 N1
c) $v > 0, 2t^2 - t - 6 > 0$ $(2t + 3)(t - 2) > 0$ $t > 2$	K1 N1		
d) $s = \int (2t^2 - t - 6) dt$ $s = \frac{2t^3}{3} - \frac{t^2}{2} - 6t + c$ $s = \frac{2t^3}{3} - \frac{t^2}{2} - 6t$	K1		10

Graph for Question 14



Question 8

