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JABATAN PELAJARAN NEGERI TERENGGANU

PEPERIKSAAN PERCUBAAN SPM 2011 3472/2

ADDITIONAL MATHEMATICS

Kertas 2

Peraturan Pemarkahan

Ogos 2011

Peraturan pemarkahan ini mengandungi 15 halaman bercetak.

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INSTRUCTIONS FOR EXAMINERS

1. MARKING GUIDE

1.1 Mark all the answers.

1.2 Do not mark working / answer that has been cancelled.

1.3 Give the mark P / K / N in line with steps of calculation given by the students.

1.4 Give the mark P0 / K0 / N0 for the incorrect working / answer.

1.5 If more than one final answer is given, mark all the solution and choose the answer with the highest mark.

1.6 Accept other corect methods which are not given in the marking scheme.

2. NOTATION

P – The mark is given if the working / answer in accordance with the **Knowledge** assessed as stated in the marking scheme.

K – The mark is given if the working / answer in accordance with the **Skills** assessed as stated in the marking scheme.

N – The mark is given if the working / answer in accordance with the **Values** assessed as stated in the marking scheme.

PA – Subtract 1 mark (only once) from the **N** mark when students make an early rounding of numbers.

KP – Subtract 1 mark (only once) from the **P** mark or **N** mark when students do not write the important steps of the calculations.

3. Accept answers correct to 4 significant figures unless stated otherwise in the marking scheme.

4. Accept other correct methods which are not given in the marking scheme.

5. Accept answers in Bahasa Melayu.

6. Calculating total marks.

$$\frac{\sum \text{Score for Paper 1} + \sum \text{Score for Paper 2}}{180} \times 100\%$$

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SPM TRIAL EXAM 2011
MARK SCHEME ADDITIONAL MATHEMATICS 2

SECTION *A* [40 MARKS]		
No.	**MARK SCHEME**	**Σ MARK**
1	$k = 2h - 4$ **P1** **OR** $h = \frac{k+4}{2}$ $(2h-4)^2 = 4(h+5)$ **K1** **OR** $k^2 = 4\left[\left(\frac{k+4}{2}\right)+5\right]$ $h^2 - 5h - 1 = 0$ **or** equivalent $k^2 - 2k - 28 = 0$ $h = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-1)}}{2(1)}$ **K1** **OR** $k = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-28)}}{2(1)}$ $h = 5{\cdot}19, -0{\cdot}19$ (both) **N1** $k = 6{\cdot}39, -4{\cdot}39$ (both) **N1** *Note* : If the formula is **not** used, give **K1N1N1** but **OW –1**. Accept completing the square method.	5
2	(*a*) $\frac{dy}{dx} = -6(1-2x)^{-3}(-2)$ **K1** -12 **N1** (*b*) $y - 3 = -12(x-1)$ **K1** **P1** for (1, 3) $12x + y = 15$ **or** equivalent **N1** (*c*) Use $\frac{dy}{dt} = \frac{dy}{dx} \times \frac{dx}{dt}$ $= -12 \times 5$ **K1** $= -60$ unit per second **N1**	7

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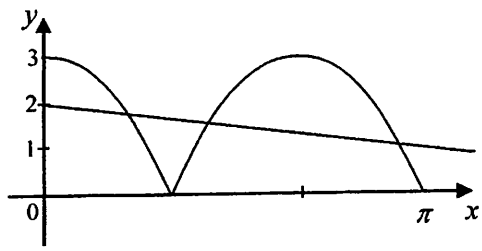
No.	MARK SCHEME	Σ MARK
3	(a) $d = \pi$ **P1** $T_{10} = \pi r + (10-1)\pi = 18\pi$ **K1** $r = 9$ cm **N1** (b) $\frac{n}{2}\left[2(9\pi) + (n-1)\pi\right] = 630\pi$ **K1** $n^2 + 17n - 1260 = 0$ $(n+45)(n-28) = 0$ **K1** $n = 28$ **N1**	6
4	(a)  - shape of cosine graph **N1** - amplitude (max = 3) **N1** - periodic/cycle in $0 \le x \le \pi$ **N1** (ignore sketch range more than π) - reflect at x-axis **N1** (b) $y = 2 - \frac{x}{\pi}$ **K1** (equation of straight line) **K1** (Given either *gradient **or** *y-intercept) No. of solutions = 3 **N1** (without any mistake done)	7

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No.	MARK SCHEME	Σ MARK
5	(*a*) $h + k = 22$ **or** equivalent **P1** 3, 11, 33 – k, 33, 40 **P1** for cumulative frequency (**can be implied**) **P1** for $L = 29{\cdot}5$ **or** $F = 33 - k$ **or** $\frac{3N}{4} = 30$ **or** $11 + h$ $29{\cdot}5 + \left[\frac{30-(33-k)}{k}\right] \times 10 = 36{\cdot}5$ **OR** $29{\cdot}5 + \left[\frac{30-(11+h)}{k}\right] \times 10 = 36{\cdot}5$ **K1** $k = 10$ **N1** $h = 12$ **N1** (*b*) 20 – 29 **N1**	7

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No.	MARK SCHEME	Σ MARK
6	(a)(i) $\overrightarrow{OQ} = \overrightarrow{OA} + \overrightarrow{AQ}$ **K1** (Using triangle law either in a(i) **or** (a) (ii))	
	$= \underset{\sim}{a} + \frac{4}{5}(-\underset{\sim}{a} + \underset{\sim}{b})$	
	$= \frac{1}{5}\underset{\sim}{a} + \frac{4}{5}\underset{\sim}{b}$ **N1**	
	(ii) $\overrightarrow{AP} = \overrightarrow{AO} + \overrightarrow{OP}$	
	$= -\underset{\sim}{a} + 2\left(\frac{1}{5}\underset{\sim}{a} + \frac{4}{5}\underset{\sim}{b}\right)$	
	$= -\frac{3}{5}\underset{\sim}{a} + \frac{8}{5}\underset{\sim}{b}$ **N1**	
	(b) (i) (a) $\overrightarrow{AR} = -\underset{\sim}{a} + h\underset{\sim}{b}$ **N1**	
	(b) $\overrightarrow{AR} = k\left(-\frac{3}{5}\underset{\sim}{a} + \frac{8}{5}\underset{\sim}{b}\right)$ **N1**	8
	(ii) Use $\overrightarrow{OA} = \overrightarrow{OR} + \overrightarrow{RA}$	
	$\underset{\sim}{a} = h\underset{\sim}{b} + k\overrightarrow{PA}$	
	$\underset{\sim}{a} = h\underset{\sim}{b} + k\left(\frac{3}{5}\underset{\sim}{a} - \frac{8}{5}\underset{\sim}{b}\right)$ **K1**	
	K1 compare the coefficient of $\underset{\sim}{a}$ and $\underset{\sim}{b}$	
	and try to solve simultaneous equations (until one unknown left)	
	$\frac{3}{5}k = 1$ **and** $h - \frac{8}{5}k = 0$	
	$k = \frac{5}{3}$, $h = \frac{8}{3}$ (both) **N1**	

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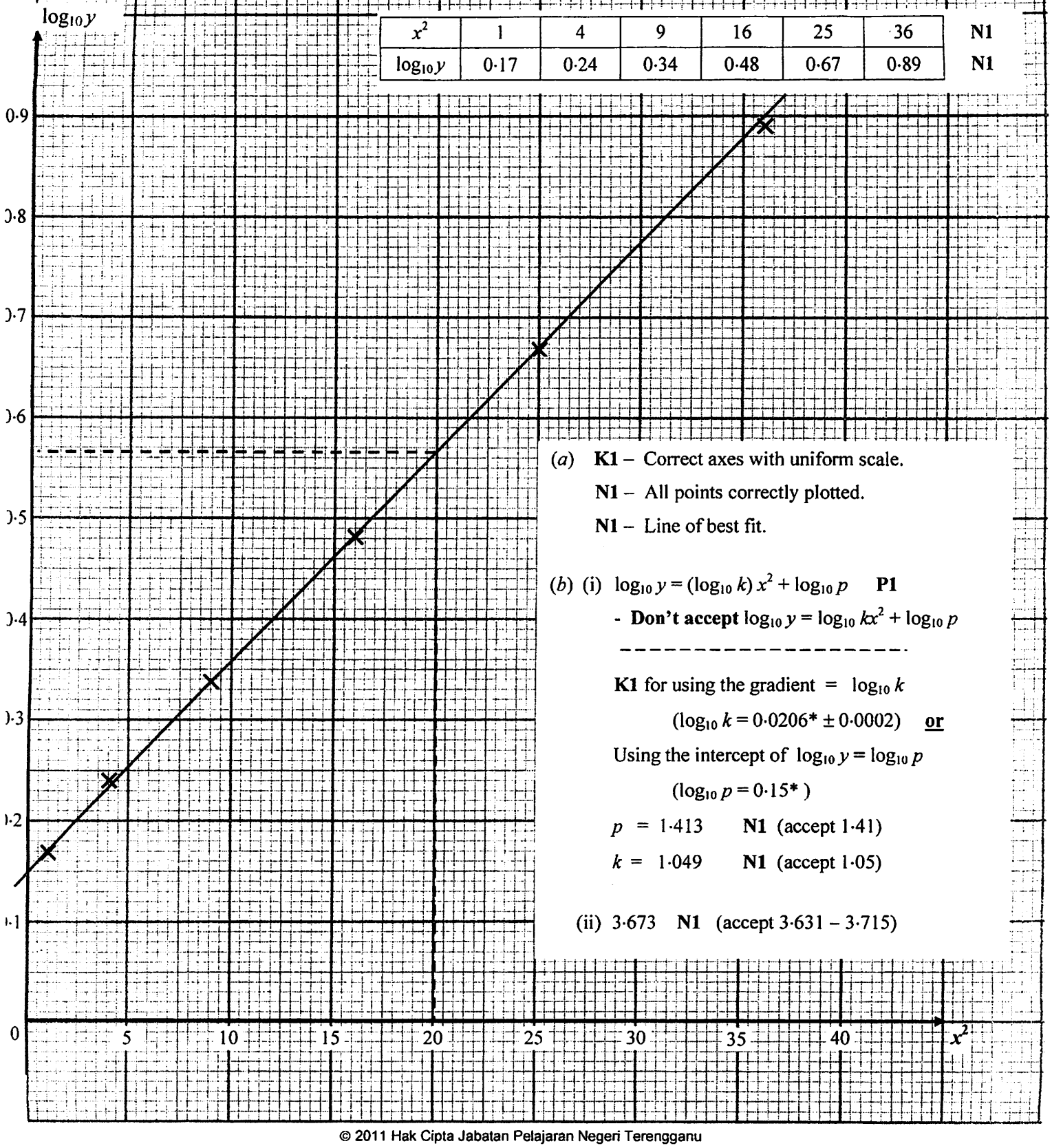
SECTION *B* [40 MARKS]

x^2	1	4	9	16	25	36	N1
$\log_{10} y$	0·17	0·24	0·34	0·48	0·67	0·89	N1



(*a*) **K1** – Correct axes with uniform scale.

N1 – All points correctly plotted.

N1 – Line of best fit.

(*b*) (i) $\log_{10} y = (\log_{10} k)\, x^2 + \log_{10} p$ **P1**

- **Don't accept** $\log_{10} y = \log_{10} kx^2 + \log_{10} p$

K1 for using the gradient = $\log_{10} k$

($\log_{10} k = 0{\cdot}0206^* \pm 0{\cdot}0002$) **<u>or</u>**

Using the intercept of $\log_{10} y = \log_{10} p$

($\log_{10} p = 0{\cdot}15^*$)

p = 1·413 **N1** (accept 1·41)

k = 1·049 **N1** (accept 1·05)

(ii) 3·673 **N1** (accept 3·631 – 3·715)

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No.	MARK SCHEME	Σ MARK
8	(a) $y-4=-\frac{1}{2}(x-1)$ **OR** $4=-\frac{1}{2}(1)+c$ **K1** **P1** for $-\frac{1}{2}$ $x+2y=9$ **or** equivalent **N1** (b) Use $\int_0^1 (x^2+3)\,dx$ and try to integrate $\left[\frac{x^3}{3}+3x\right]_0^1$ **K1** Area of $\Delta = \frac{1}{2}\times 8\times 4$ **K1** Total area $= A_1 + A_2$ **K1** $= 19\frac{1}{3}$ unit^2 **N1**	10
	(c) Use $V=\pi\int_3^4 (y-3)\,dy$ and try to integrate $\pi\left[\frac{y^2}{2}-3y\right]_3^4$ **K1** **P1** for limit $=\frac{1}{2}\pi$ unit^3 **N1**	

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No.	MARK SCHEME	Σ MARK
9	(a) $m_{SQ} = -2$ **P1** $y - 5 = -2(x - 2)$ **OR** $5 = -2(2) + c$ **K1** $y = -2x + 9$ **N1** (b) $T(0, 9)$ **N1** $\left(\frac{3(0)+2x}{5}, \frac{3(9)+2y}{5}\right)$ **K1** $\frac{3(0)+2x}{5} = 2$ **or** $\frac{3(9)+2y}{5} = 5$ **K1** $S(5, -1)$ **N1** (c) (i) $\sqrt{(x-0)^2+(y-9)^2}$ **or** $\sqrt{(x-2)^2+(y-5)^2}$ **P1** $\sqrt{(x-0)^2+(y-9)^2} = 2\sqrt{(x-2)^2+(y-5)^2}$ **K1** $3x^2 + 3y^2 - 16x - 22y + 35 = 0$ **or** equivalent **N1**	10

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No.	MARK SCHEME	Σ MARK
10	(*a*) $S = (6)(1{\cdot}222)$ **K1** $= 7{\cdot}332$ **or** $7{\cdot}331$ **N1** (*b*) $8{\cdot}9 = (6)(1{\cdot}222 + \theta)$ **K1** $\theta = 0{\cdot}2613$ rad **or** $0{\cdot}2614$ rad **N1** (accept $0{\cdot}261$) (*c*) Area of sector $EOF = \frac{1}{2}(6)(6)(*0{\cdot}2613)$ **K1** $= 4{\cdot}703\ \text{cm}^2$ **N1** (*d*) Area of $\Delta OFB = \frac{1}{2}(8)(6)\sin 14{\cdot}97°$ **or** $\frac{1}{2}(8)(6)\sin 14{\cdot}98°$ **OR** $\frac{1}{2} \times 8 \times 1{\cdot}55$ **or** $\frac{1}{2} \times 8 \times 1{\cdot}551$ (F to perpendicular OB) **K1** $= 6{\cdot}2$ **or** $6{\cdot}204$ **N1** --- Area of $\Delta AOB = \frac{1}{2}(8)(8)\sin 110°$ **OR** $\frac{1}{2} \times 8 \times 7{\cdot}518$ (B to perpendicular AC) **or** $\Delta AOF = \frac{1}{2}(8)(6)\sin 95{\cdot}02°$ **or** $\frac{1}{2}(8)(6)\sin 95{\cdot}03°$ **OR** $\frac{1}{2} \times 8 \times 7{\cdot}52$ (F to perpendicular AC) **K1** $= 30{\cdot}07\ \text{cm}^2$, $23{\cdot}91\ \text{cm}^2$ **N1** (both) $(30{\cdot}08)$ --- Total area = Area of ΔAOB – Area of ΔAOF – Area sector ΔEOF **OR** Area of ΔOFB – Area sector ΔEOF **K1** $= 1{\cdot}497\ \text{cm}^2$ **N1** (*Accept answers* $1{\cdot}453$ - $1{\cdot}501$)	10

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No.	MARK SCHEME	Σ MARK
11	(*a*) (i) $p = 0{\cdot}75$ **or** $\frac{3}{4}$ (accept $\frac{3}{4}$) **OR** $q = 0{\cdot}25$ **or** $\frac{1}{4}$ **P1** $P(X = 5)$ ${}^{10}C_5(0\cdot75)^5(0\cdot25)^5$ **K1** 0·05840 **N1** (ii) $1 - P(X = 9) - P(X = 10)$ **OR** $P(X = 1) + P(X = 2) + \ldots\ldots + P(X = 8)$ **OR** $1 - {}^{10}C_9(0\cdot75)^9(0\cdot25)^1 - {}^{10}C_{10}(0\cdot75)^{10}(0\cdot25)^0$ **K1** 0·7560 **N1** (*b*) (i) $P(X > 125)$ $P\left(Z > \frac{125-110}{12}\right)$ **K1** for using $\frac{X-\mu}{\sigma}$ either in (*b*)(i) or (ii) 0·1057 **N1** (ii) $P\left(\frac{95-110}{12} < Z < \frac{116-110}{12}\right)$ $P(Z > -1{\cdot}25) - P(Z > 0{\cdot}5)$ **or** $P(Z < 0{\cdot}5) - P(Z < -1{\cdot}25)$ **or** $1 - P(Z < -1{\cdot}25) - P(Z > 0{\cdot}5)$ **K1** Total numbers $= \frac{853}{0\cdot5858}$ **K1** $= 1457$ **N1** (accept 1456)	10

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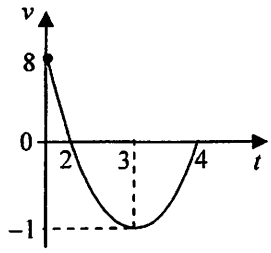
SECTION *C* [20 MARKS]		
No.	**MARK SCHEME**	**Σ MARK**
12	(*a*) $\frac{dV}{dt} = 2t - 6 = 0$ **K1** $t = 3$ $v(3) = -1 \text{ ms}^{-1}$ **N1** (*b*) $v > 0$ $(t-2)(t-4) > 0$ **K1** $0 \le t < 2,\ t > 4$ **N1** (*c*)  **P1** for minimum shape graph **P1** passing thro' points (0, 8), and (4, 0) (*d*) Use $\int_0^2 v\,dt + \left\lvert \int_2^4 v\,dt \right\rvert$ **K1** for limits $= \left\lvert \left[\frac{t^3}{3} - 3t^2 + 8t\right]_0^2 \right\rvert + \left\lvert \left[\frac{t^3}{3} - 3t^2 + 8t\right]_2^4 \right\rvert$ **K1** for integration $= \left\lvert \frac{20}{3} \right\rvert + \left\lvert -\frac{4}{3} \right\rvert$ **P1** (substitution) $= 8$ m **N1**	**10**

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No.	MARK SCHEME	Σ MARK
13	(*a*) (i) $\frac{9\cdot20}{Q_{09}}\times100=115$ **K1** RM 8 **N1** (ii) $\frac{120\times Q}{100}=130$ **K1** **P1** for 130 = 108·3 **N1** (*b*) (i) $\frac{120(10)+x(20)+110(40)+115(30)}{100}=111\cdot5$ **K1** **P1** for Σw $x=105$ **N1** (ii) $\frac{33\cdot45}{Q_{09}}\times100=111\cdot5$ **K1** = RM 30 **N1**	10

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No. 14

(*a*) $x + y \le 120$ **N1**

$y \ge \frac{1}{2}x$ **N1**

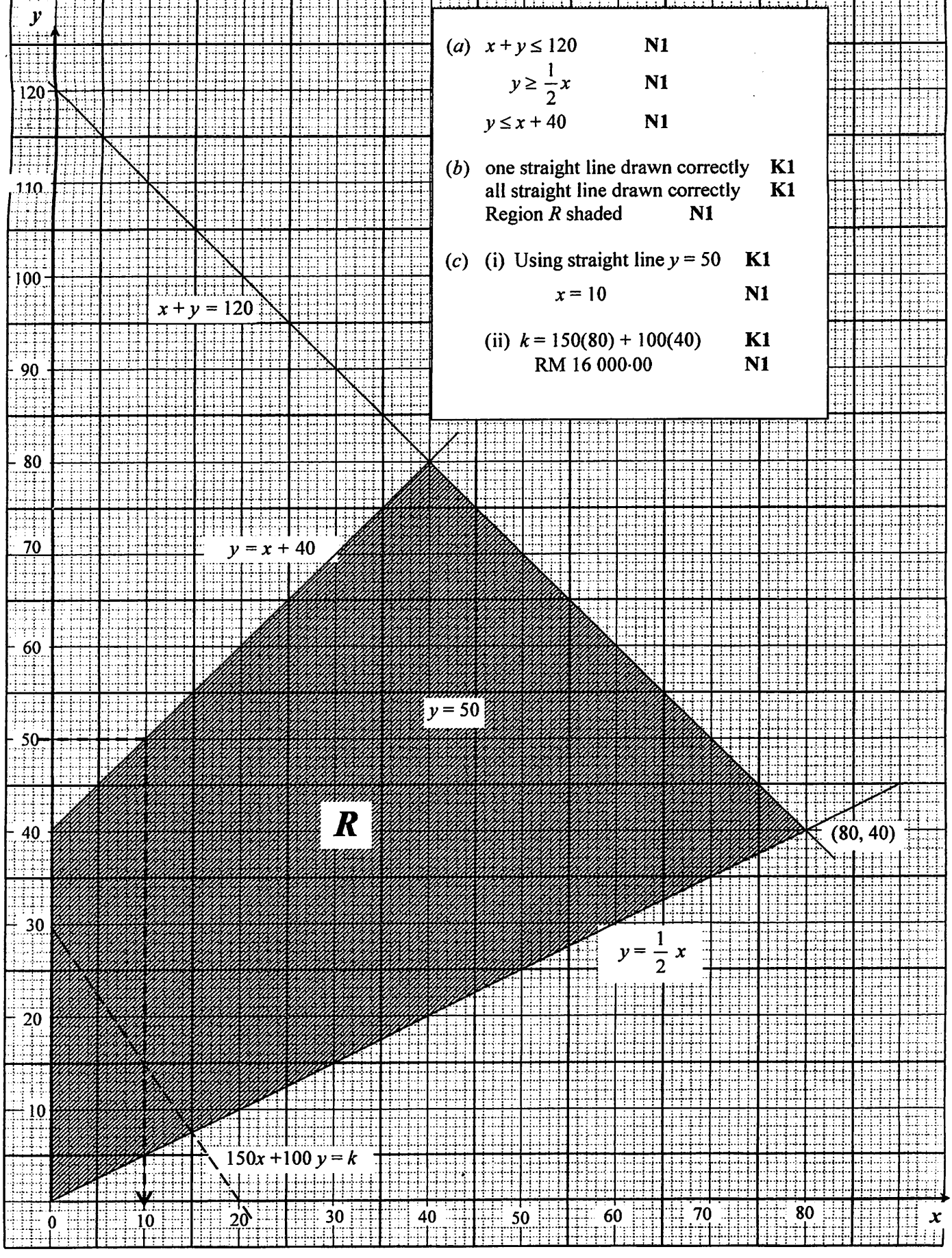
$y \le x + 40$ **N1**

(*b*) one straight line drawn correctly **K1**
all straight line drawn correctly **K1**
Region *R* shaded **N1**

(*c*) (i) Using straight line $y = 50$ **K1**

$x = 10$ **N1**

(ii) $k = 150(80) + 100(40)$ **K1**
RM 16 000·00 **N1**



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No.	MARK SCHEME	Σ MARK
15	(*a*) $PR^2 = 7^2 + 5^2 - 2(7)(5)\cos 80°$ **K1** $PR = 7{\cdot}864$ cm **N1** (*b*) $\frac{\sin S}{7\cdot 864} = \frac{\sin 50°}{6\cdot 2}$ **K1** $\angle S = 76{\cdot}32°$ **or** $76{\cdot}31°$, $103{\cdot}68°$ **or** $103{\cdot}69°$ **N1** (both) (*c*) (i) $\angle SPR = 53{\cdot}68°$ **or** $53{\cdot}69°$ **P1** $\frac{RS}{\sin 53\cdot 68} = \frac{7\cdot 864}{\sin 76\cdot 32}$ **K1** $RS = 6{\cdot}521$ cm **or** $6{\cdot}522$ **N1** (ii) Area $\Delta PQR = \frac{1}{2}(5)(7)\sin 80°$ **or** Area $\Delta PSR = \frac{1}{2}(6{\cdot}2)(7{\cdot}864)\sin 53{\cdot}68°$ **K1** Area of the quadrilateral = Area ΔPQR + Area ΔPSR **K1** $= 36{\cdot}87$ cm^2 **N1**	10

END OF MARK SCHEME

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