PROGRAM GEMPUR KECEMERLANGAN
SIJIL PELAJARAN MALAYSIA 2018
NEGERI PERLIS

SIJIL PELAJARAN MALAYSIA 2018 — 3472/2(PP)

MATEMATIK TAMBAHAN

Kertas 2
Peraturan Pemarkahan
Ogos

UNTUK KEGUNAAN PEMERIKSA SAHAJA

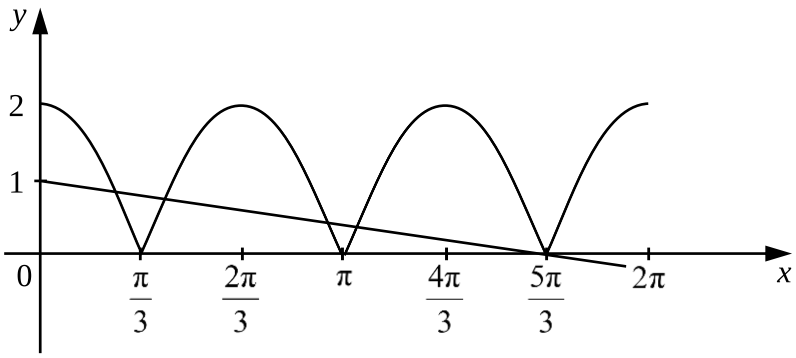
Peraturan pemarkahan ini mengandungi 16 halaman bercetak

[*Lihat halaman sebelah*

No.	Solution and Mark Scheme	Sub Marks	Total Marks
1(*a*)	$\overrightarrow{PR} = \overrightarrow{PO} + \overrightarrow{OR}$ <u>*or*</u> $\overrightarrow{OQ} = \overrightarrow{OP} + \overrightarrow{PQ}$ **K1**		
(i)	$\overrightarrow{PR} = -3\underset{\sim}{a} + 9\underset{\sim}{b}$ **N1**		
(ii)	$\overrightarrow{OQ} = 3\underset{\sim}{a} + 6\underset{\sim}{b}$ **N1**	3	
(*b*)	$\overrightarrow{OT} = \overrightarrow{OP} + \overrightarrow{PT}$ $= \overrightarrow{OP} + k\overrightarrow{PR}$ $= 3\underset{\sim}{a} + k*(-3\underset{\sim}{a} + 9\underset{\sim}{b})$ $= (3* - 3k)\underset{\sim}{a} + *9k\underset{\sim}{b}$ $\overrightarrow{OQ} = \lambda\overrightarrow{OT}$ *or* $\overrightarrow{OQ} = \lambda\overrightarrow{TQ}$ *or* $\overrightarrow{OT} = \lambda\overrightarrow{TQ}$ **K1** Collinear $*(3\underset{\sim}{a} + 6\underset{\sim}{b}) = \lambda\left[(3* - 3k)\underset{\sim}{a} + *9k\underset{\sim}{b}\right]$ $*(3\underset{\sim}{a} + 6\underset{\sim}{b}) = (3* - 3k)\lambda\underset{\sim}{a} + *9k\lambda\underset{\sim}{b}$ $*3 = \lambda(3* - 3k)$ <u>*or*</u> $*6 = *9k\lambda$ **K1** Equate the coefficients of $\underset{\sim}{a}$ and $\underset{\sim}{b}$ and solve simultaneous equations for k $\lambda = \frac{*3}{3* - 3k}$ <u>*or*</u> $\lambda = \frac{*2}{*3k}$ $3 = \left(\frac{*2}{*3k}\right)(3* - 3k)$ <u>*or*</u> $*6 = *9k\left(\frac{*3}{3* - 3k}\right)$ $k = \frac{2}{5}$ **N1**	3	6

No.	Solution and Mark Scheme		Sub Marks	Total Marks
2	$h(x) = ax^2 + \frac{1}{2}x + 5$			
	$h(x) = a\left[x^2 + \frac{1}{2a}x + \left(\frac{1}{4a}\right)^2 - \left(\frac{1}{4a}\right)^2\right] + 5$	**K1**		
	$h(x) = a\left(x + \frac{1}{4a}\right)^2 - \frac{1}{16a} + 5$			
	At maximum point, $x = \frac{200}{2} = 100$	**P1**		
	$-\frac{1}{4a} = 100,\ a = -\frac{1}{400}$	**N1**		
	Height of the highest pole $= -\frac{1}{16\left(-\frac{1}{400}\right)} + 5$	**K1**		
	$= 30\,\text{m}$	**N1**		
	OR			
	$h(x) = ax^2 + \frac{1}{2}x + 5$			
	At maximum point, $x = \frac{200}{2} = 100$	**P1**		
	$x = -\frac{b}{2a},\ x = -\frac{\frac{1}{2}}{2a} = -\frac{1}{4a}$	**K1**		
	$-\frac{1}{4a} = 100,\ a = -\frac{1}{400}$	**N1**		
	Height of the highest pole,			
	$h(x) = -\frac{1}{400}(100)^2 + \frac{1}{2}(100) + 5$	**K1**		
	$= 30\,\text{m}$	**N1**	5	5

No.	Solution and Mark Scheme	Sub Marks	Total Marks
3	$2\pi x + 2\pi y = 16\pi$ **P1** and $\pi x^2 + \pi y^2 = 34\pi$ **P1**		
	$x = 8 - y$ *or* $y = 8 - x$ **P1**		
	$*(8-y)^2 + y^2 = 34$ *or* $x^2 + *(8-x)^2 = 34$ **K1**		
	Solve the quadratic equation $ax^2 + bx + c = 0$ for $b \neq 0$ **K1**		
	Factorisation		
	$(y-3)(y-5) = 0$ *or* $(x-3)(x-5) = 0$		
	OR		
	Formula		
	$y = \dfrac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(15)}}{2(1)}$ *or* $x = \dfrac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(15)}}{2(1)}$		
	a, b, c must correct		
	$y = 3, 5$ *or* $x = 3, 5$ **N1**		
	3 cm and 5 cm **N1**	7	7
4(*a*)	$\bar{x}_{\text{Ahmad}} = \dfrac{51.3 + 48.2 + 52.0 + 47.3 + 45.0 + 52.4}{6}$ *or*		
	$\bar{x}_{\text{Luqman}} = \dfrac{51.3 + 48.2 + 52.0 + 47.3 + 45.0 + 52.4}{6}$ **K1**		
	$\bar{x}_{\text{Ahmad}} = 49.37$ *or* $\bar{x}_{\text{Luqman}} = 49.43$ **N1**		
	$\sigma_{\text{Ahmad}} = \sqrt{\dfrac{14666.98}{6} - *(49.37)^2}$ *or*		
	$\sigma_{\text{Luqman}} = \sqrt{\dfrac{14698.14}{6} - *(49.43)^2}$ **K1**		
	$\sigma_{\text{Ahmad}} = 2.665$ **N1** and $\sigma_{\text{Luqman}} = 2.524$ **N1**	5	

No.	Solution and Mark Scheme		Sub Marks	Total Marks
4(*b*)	Luqman	**N1**		
	Luqman's achievement is **more consistent**	**N1**	**2**	**7**
5(*a*)	Use $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$			
	$\cos\frac{3}{4}x\cos\frac{3}{4}x - \sin\frac{3}{4}x\sin\frac{3}{4}x$ *or* $\cos\left(\frac{3}{4}x + \frac{3}{4}x\right)$	**K1**		
	LHS = RHS	**N1**	**2**	
(*b*)(i)				
	Shape of positive cosine graph at least 1 cycle	**P1**		
	$1\frac{1}{2}$ cycles for $0 \le x \le 2\pi$	**P1**		
	Modulus of cosine graph for $0 \le x \le 2\pi$ (Maximum = 2, Minimum = 0)	**P1**	**3**	
(ii)	$y = 1 - \frac{3}{5\pi}x$ *or* Implied	**N1**		
	Sketch the straight line with *gradient or *y-intercept and straight line involves x and y must be correct.	**K1**		
	No. of solutions = 5	**N1**	**3**	**8**

No.	Solution and Mark Scheme		Sub Marks	Total Marks
6(*a*)	Find $\frac{\delta y}{\delta x}$			
	$\frac{\delta y}{\delta x} = \frac{6x\delta x + 3(\delta x)^2}{\delta x}$ <u>*or*</u> $\frac{\delta y}{\delta x} = 6x - \delta x$	**K1**		
	Use limit $\delta x \to 0$			
	$\lim_{\delta x \to 0} *\frac{\delta y}{\delta x} = 6x$	**K1**		
	$\frac{dy}{dx} = 6x$	**N1**	**3**	
(*b*)	Solve $*\frac{dy}{dx} = 0$			
	$*6x = 0$	**K1**		
	$x = 0,\ y = 3$			
	$(0, 3)$	**N1**	**2**	
(*c*)	$\frac{d^2y}{dx^2} = 6 > 0$	**K1**		
	$(0, 3)$ is **minimum point**	**N1**	**2**	**7**
7(*a*)	$\frac{dy}{dx} = 2\left(\frac{1}{2}\right)x$ <u>*or*</u> $\frac{dy}{dx} = x$	**K1**		
	$y - 6 = *2(x - 2)$	**K1**		
	$y = 2x + 2$	**N1**	**3**	

No.	Solution and Mark Scheme	Sub Marks	Total Marks
7(*b*)	Find the area of rectangular shape OR Integrate $\int\left(\frac{1}{2}x^2+4\right)dx$		
	$A_1 = 6\times 2$ OR $A_2 = \frac{x^3}{6}+4x$ **K1**		
	Use limit $\int_0^2$ into $*\left[\frac{x^3}{6}+4x\right]$; $*A_1 - *A_2$		
	$A_2 = 9\frac{1}{3}$ **K1** ; $*12 - *9\frac{1}{3}$ **K1**		
	$\frac{8}{3}$ **N1**		
	OR		
	$x=\sqrt{2y-8}$ **P1**		
	Integrate $\int(2y-8)^{\frac{1}{2}}\,dy$; Use limit $\int_4^6$ into$*\left[\frac{(2y-8)^{\frac{3}{2}}}{2\left(\frac{3}{2}\right)}\right]$ **K1**		
	$\frac{(2y-8)^{\frac{3}{2}}}{2\left(\frac{3}{2}\right)}$ **K1**		
	$\frac{8}{3}$ **N1**	4	
(*c*)	Use $\pi\int x^2 dy$ and integrate with respect to y ; Use limit $\int_4^6$ into$*\left[\frac{2y^2}{2}-8y\right]$ **K1**		
	$\pi\left[\frac{2y^2}{2}-8y\right]$ **K1**		
	4π **N1**	3	10

[*Lihat halaman sebelah*

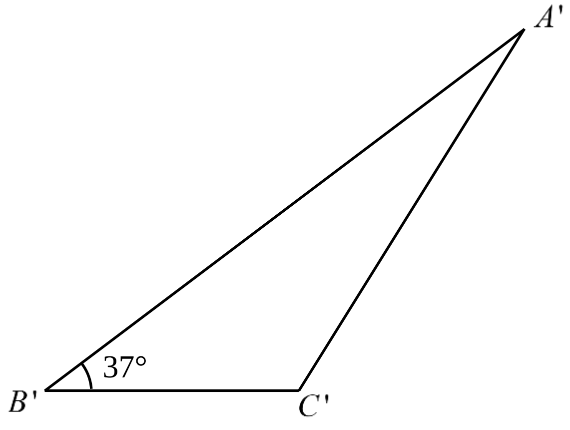
No.	Solution and Mark Scheme		Sub Marks	Total Marks
8 (*a*)(i)	Use $^{10}C_r(0.65)^r(0.35)^{10-r}$	**K1**		
	Write $P(X=8)+P(X=9)+P(X=10)$	**P1**		
	0.2616	**N1**	**3**	
(ii)	$\sigma^2 = 960(0.35)(0.65)$	**K1**		
	218.4	**N1**	**2**	
(*b*)(i)	$Z=\dfrac{140-150}{\sqrt{225}}$	**K1**		
	Find the probability in the correct region $P(Z<{*}-0.667)$			
	0.2523 // 0.25239 // 0.2524	**N1**	**2**	
(ii)	Find the probability in the correct region $P(Z>0.667)-P(Z>2)$			
	0.2295 // 0.22964 // 0.2296	**K1**		
	*0.2295(27)	**K1**		
	6	**N1**	**3**	**10**
9(*a*)	(table below)	**N1**	**1**	
(*b*)	Plot $\log_{10} y$ against *x* (Correct axes and uniform scales)	**K1**		
	6 *points plotted correctly	**N1**		
	Line of best fit	**N1**	**3**	
	(Refer graph on page 15)			

x	3	5	6	9	10	12
$\log_{10} y$	0.37	0.22	0.15	– 0.09	– 0.16	– 0.31

No.	**Solution and Mark Scheme**		**Sub Marks**	**Total Marks**
9 (*c*)(i)	$\log_{10} y = \left(-\log_{10} q\right) x + \log_{10} \dfrac{h}{2}$	**P1**		
	Use $*m = -\log_{10} q$	**K1**		
	$q = 1.19$	**N1**	**3**	
(ii)	Use $*c = \log_{10} \dfrac{h}{2}$	**K1**		
	$h = 7.96$	**N1**	**2**	
(iii)	$1.95 \leftrightarrow 2.00$	**N1**	**1**	**10**
10 (*a*)(i)	$p = 4$	**N1**	**1**	
(ii)	Use $m_{JK} \times m_{KL} = -1$			
	$m_{KL} = -3$			
	$m_{JK} = -\dfrac{1}{3}$	**K1**		
	$y - 5 = * - \dfrac{1}{3}(x - 3)$ *or* $y - *4 = * - \dfrac{1}{3}(x - 6)$	**K1**		
	$y = -\dfrac{1}{3}x + 6$ *or* equivalent	**N1**	**3**	
(iii)	$A = \dfrac{1}{2}\left\lvert \begin{matrix} 3 \\ 5 \end{matrix} \times \begin{matrix} 6 \\ *4 \end{matrix} \times \begin{matrix} 0 \\ -14 \end{matrix} \times \begin{matrix} 3 \\ 5 \end{matrix} \right\rvert$			
	$\dfrac{1}{2}\left\lvert (*12 - 84 + 0) - (30 + 0 - 42) \right\rvert$	**K1**		
	30	**N1**	**2**	

No.	Solution and Mark Scheme		Sub Marks	Total Marks
10 (*b*)(i)	Use distance formula for *WJ* or *WK*			
	$WJ=\sqrt{(x-3)^2+(y-5)^2}$ *or* $WK=\sqrt{(x-6)^2+(y-4)^2}$			
	OR			
	$WJ=2WK$ *or* Implied	**K1**		
	$3x^2+3y^2-42x-22y+174=0$ *or* equivalent	**N1**	**2**	
(ii)	Substitute $x=0$ into the locus of *W and use b^2-4ac			
	$(-22)^2-4(3)(174)$	**K1**		
	$-1604<0$			
	Locus *W* not intersect the *y*-axis	**N1**	**2**	**10**
11(*a*)	Use $2r\sin\left(\frac{\theta}{2}\right)$ OR other valid method			
	$2(7)\sin\left(\frac{40°}{2}\right)$	**K1**		
	4.79 // 4.788	**N1**	**2**	
(*b*)	$A_1=7\left(\frac{80°\times3.142}{180°}\right)$ OR $A_2=*4.79\left(\frac{220°\times3.142}{180°}\right)$	**K1**		
	$*A_1+*A_2$	**K1**		
	$9.78+18.39$			
	28.16 // 28.17	**N1**	**3**	

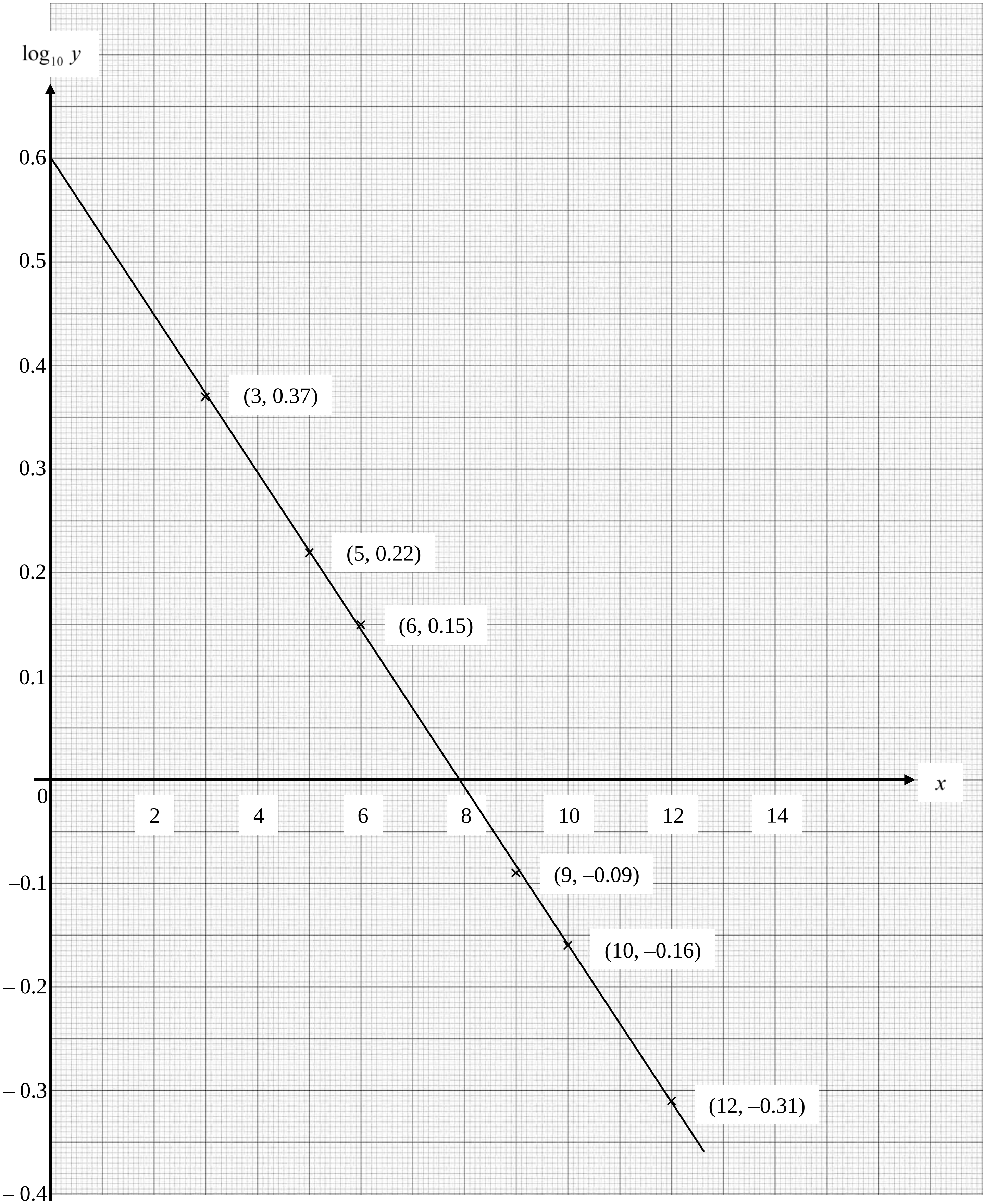
No.	Solution and Mark Scheme		Sub Marks	Total Marks
11(*c*)	$A_1 = \frac{1}{2}(*4.79)^2\left(\frac{220°\times 3.142}{180°}\right)$ OR $A_2 = \frac{1}{2}(7)^2\left(\frac{40°\times 3.142}{180°}\right)$	**K1**		
	$A_3 = \frac{1}{2}(7)^2 \sin 40°$	**K1**		
	$*A_4 = *A_2 - *A_3$	**K1**		
	$*A_1 - 2(*A_4)$	**K1**		
	$41.30 \leftrightarrow 41.34$	**N1**	**5**	**10**
12(*a*)	$x \le 60$	**N1**		
	$y \le 50$	**N1**		
	$30x + 20y \ge 1500$	**N1**		
	$x \ge y$	**N1**	**4**	
(*b*)	Draw correctly at least one straight line from the *inequalities involves *x* and *y*	**K1**		
	Draw correctly all four *straight lines Note: Accept dotted lines	**N1**		
	Region shaded correctly	**N1**	**3**	
	(Refer graph on page 16)			
(*c*)	Minimum point (30, 30)	**N1**		
	Substitute any points in shaded *region into $8\ 000x + 4\ 000y$	**K1**		
	360 000	**N1**	**3**	**10**

No.	Solution and Mark Scheme		Sub Marks	Total Marks
13 (*a*)(i)	$\angle ACB = 58^\circ$	**P1**		
	$\dfrac{AP+13}{\sin 58^\circ} = \dfrac{34}{\sin 85^\circ}$	**K1**		
	15.94 // 15.944	**N1**	**3**	
(ii)	$PQ^2 = 13^2 + 14^2 - 2(13)(14)\cos 37^\circ$	**K1**		
	8.62	**N1**	**2**	
(*b*)	$A_1 = \dfrac{1}{2}(13 + {*15.94})(34)\sin 37^\circ$ OR $A_2 = \dfrac{1}{2}(13)(14)\sin 37^\circ$	**K1**		
	$*A_1 - *A_2$	**K1**		
	$241.31 \leftrightarrow 241.35$	**N1**	**3**	
(*c*)(i)				
	Note: $\angle A'C'B'$ obtuse angle	**N1**	**1**	
(ii)	$\angle A'C'B' = 122^\circ$	**N1**	**1**	**10**

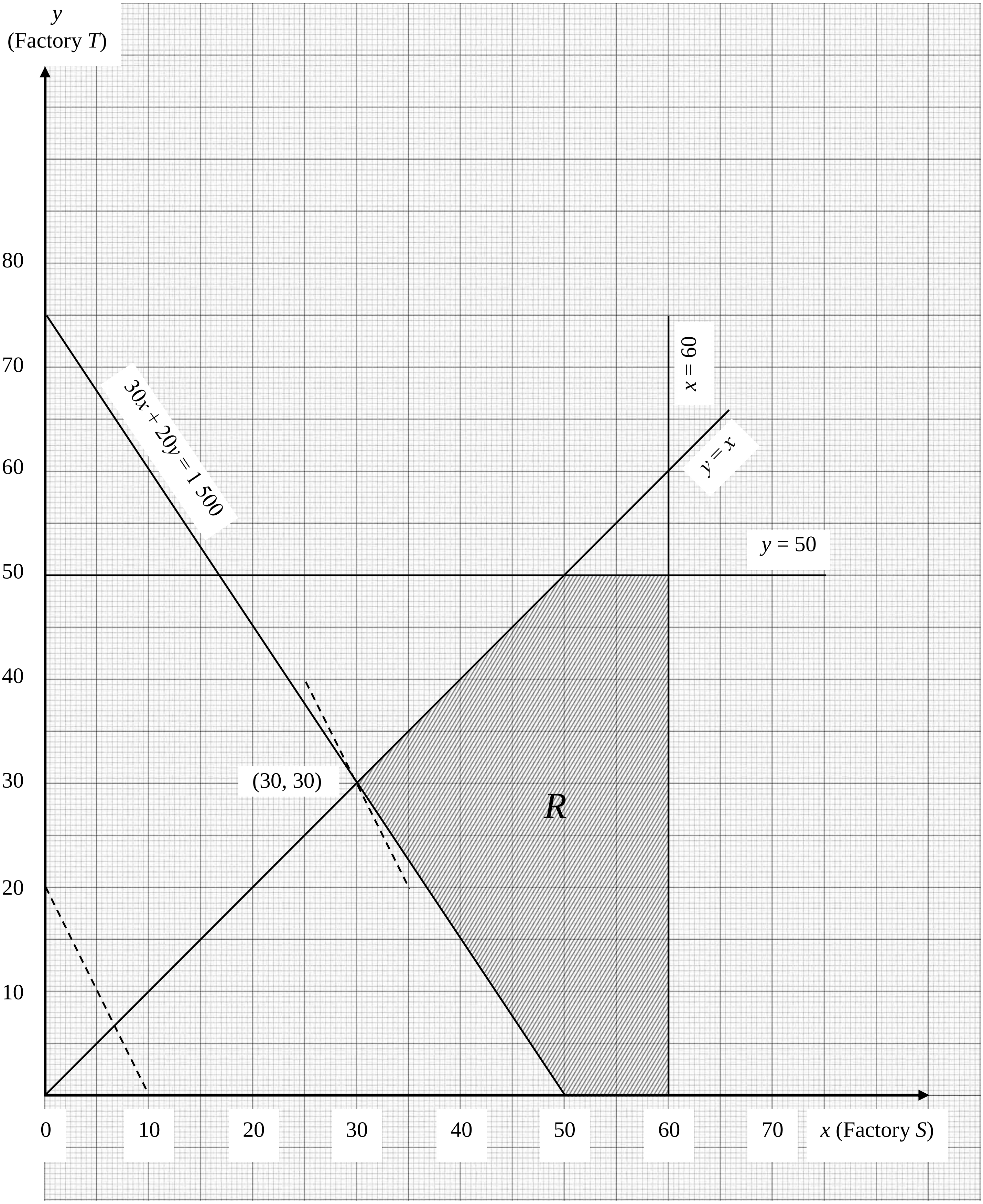
No.	Solution and Mark Scheme		Sub Marks	Total Marks
14(*a*)	Substitute $t=5$ and $v=0$			
	$25m+5n=0$ *or* $5m+n=0$	**K1**		
	Differentiate mt^2+nt w.r.t t $a=\frac{dv}{dt}$			
	$a=2mt+n$	**K1**		
	Substitute $t=1$ and $a=3$ into $*\frac{dv}{dt}$			
	$2m+n=3$	**K1**		
	Solve simultaneous equation to find *m* and *n*			
	$m=-1$	**N1**		
	$n=5$	**N1**	**5**	
(*b*)	$*(-t^2+5t)>0$	**K1**		
	$0<t<5$	**N1**	**2**	
(*c*)	Integrate $\int *(-t^2+5t)\,dt$			
	$s=-\frac{t^3}{3}+\frac{5t^2}{2}$	**K1**		
	Use $*s_{t=2}-*s_{t=1}$ OR $\int_1^2 *(-t^2+5t)\,dt$			
	$\left(-\frac{(2)^3}{3}+\frac{5(2)^2}{2}\right)-\left(-\frac{(1)^3}{3}+\frac{5(1)^2}{2}\right)$	**K1**		
	$5\frac{1}{6}$ // $\frac{31}{6}$ // 5.167	**N1**	**3**	**10**

No.	Solution and Mark Scheme	Sub Marks	Total Marks
15(*a*)	$\frac{3900}{P_{15}} \times 100 = 130$ **K1**		
	3 000 **N1**	**2**	
(*b*)	Use $I_{16/15} = \frac{I_{16/15} \times I_{18/16}}{100}$ **K1**		
	108, 147, 156, 125 **N2** (All correct) **N1** (Only 3 correct)	**3**	
(*c*)(i)	$W = 600 : 400 : 300 : 200$ *or* Implied (seen) **P1**		
	$\bar{I}_{18/15} = \frac{*600(*108) + *400(*147) + *300(*156) + *200(*125)}{*600 + *400 + *300 + *200}$ **K1**		
	130.27 // 130.267 **N1**	**3**	
(ii)	$\frac{P_{18}}{900\,000} \times 100 = *130.27$ **K1**		
	1 172 430 **N1**	**2**	**10**

Graph for Question 9(b)



Graph for Question 12(*b*)



PERATURAN PEMARKAHAN TAMAT