PERATURAN PEMARKAHAN

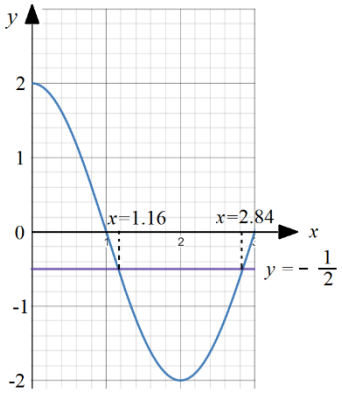
MATEMATIK TAMBAHAN

KERTAS 2 SET 01
3472/2 (PP)

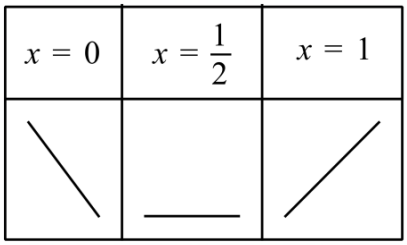
PEPERIKSAAN PERCUBAAN SPM 2021
JABATAN PELAJARAN NEGERI KEDAH

No.1	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	$a = 18$ cm, $r = 0.8$ N1 $18(0.8)^9$ K1 2.4159 cm N1	3	**7**
(b)	$18(0.8)^{n-1} < 2$ $(n-1)\lg(0.8) < \lg\left(\frac{1}{9}\right)$ K1 $n = 11$ N1	2	
(c)	$\frac{18}{1-0.8}$ K1 90 cm N1	2	

No.2	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)(i)	$m_{UT} = \frac{2}{5}$, $m_{UV} = -\frac{5}{2}$ $\frac{q-6}{p-5} = -\frac{5}{2}$ K1 $p = \frac{37-2q}{5}$ N1	2	**6**
(*a*)(ii)	Area of triangle TUV $= \frac{1}{2}\left\|(5q+4p)-(20+6p)\right\|$ K1 $= p - \frac{5}{2}q + 10$ (Proven) N1	2	
(*b*)	$p - \frac{5}{2}q + 10 = 29$ K1 $\frac{37-2q}{5} - \frac{5}{2}q + 10 = 29$ $V(9, -4)$ N1	2	

No.3	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	*LHS* $\tan^2 x - \cot^2 x = \left(\sec^2 -1\right) - \left(\cos ec^2 -1\right)$ K1 $\sec^2 - \cos ec^2$ N1 OR *RHS* $\left(1+\tan^2 x\right) - \left(1+\cot^2 x\right)$ K1 $\tan^2 x - \cot^2 x$ N1	2	8
(*b*)(i)	$y = 2 \text{ kos } \frac{\pi}{2} x$ <table><tr><td>*x*</td><td>0</td><td>0.5</td><td>1</td><td>1.5</td><td>2.0</td><td>2.5</td><td>3</td></tr><tr><td>*y*</td><td>2</td><td>1.41</td><td>0</td><td>-1.41</td><td>-2</td><td>-1.41</td><td>0</td></tr></table> N1 Refer to the graph Shape of cosines graph K1 7 points plotted correctly N1 Correct axes and uniforms scales K1	4	
(*b*)(ii)	$\text{kos } \frac{\pi}{2} x + \frac{1}{4} = 0$ $2 \times \left(\text{kos } \frac{\pi}{2} x \right) = \left(-\frac{1}{4} \right) \times 2$ $2\text{kos } \frac{\pi}{2} x = -\frac{1}{2}$ $y = -\frac{1}{2}$ K1 From the graph, $*x = 1.16, *x = 2.84$ N1 *follow the *x* values from their graph. 	2	

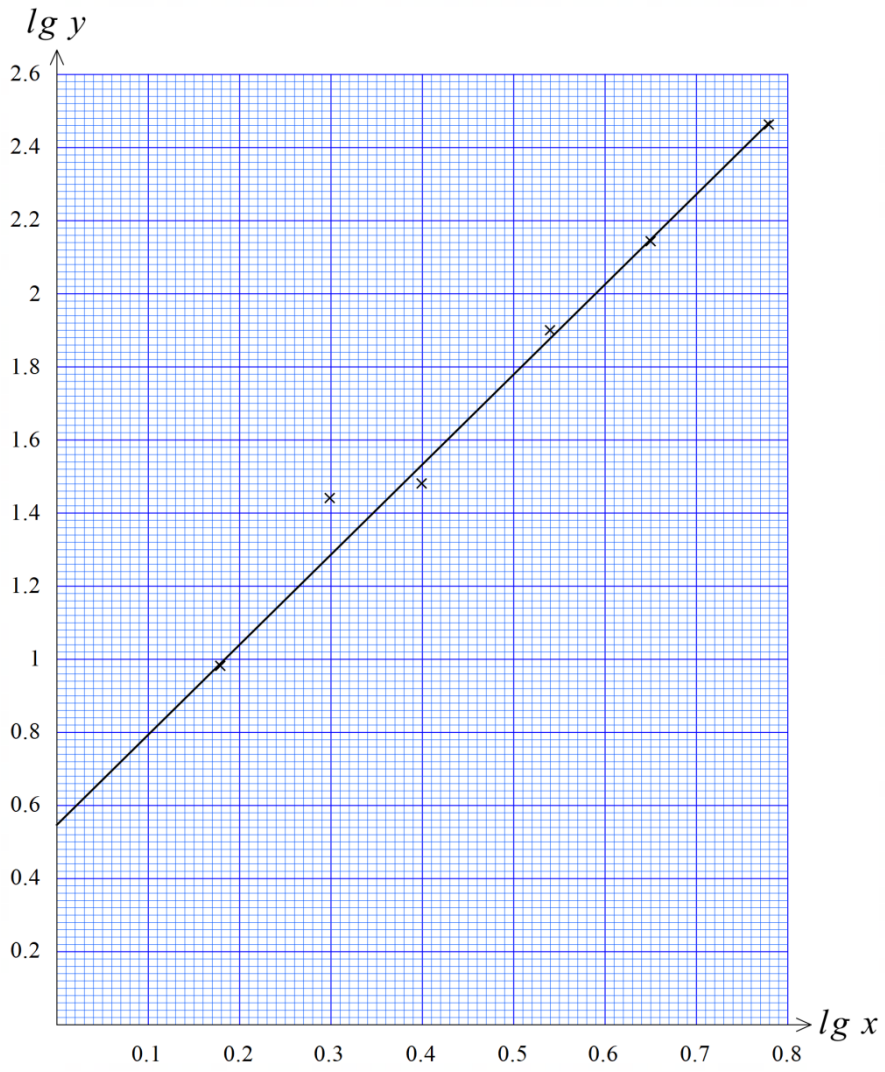
No.4	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	$(a)\ \sqrt{9q} = \frac{3\sqrt{70}}{10}$ K1 $q = 0.7$ N1 $m(0.3) = 9$ $m = 30$ N1	**3**	**7**
b(i)	$= {}^{10}C_4 (0.3)^4 (0.7)^6$ K1 $= 0.2001$ N1	**4**	
b(ii)	$= {}^{10}C_9 (0.7)^9 (0.3)^1 + {}^{10}C_{10} (0.7)^{10} (0.3)^0$ K1 $= 0.1493$ N1		

No.5	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	$m_T = -\frac{2}{3}$ or $\frac{dy}{dx} = 2bx$ K1 $b = -\frac{1}{9}$ N1 $\frac{a-2x}{3} = -\frac{1}{9}x^2$ OR $(-6)^2 - 4(1)(3a) = 0$ K1 OR equivalent $a = 3$ N1	4	**8**
(*b*)(i)	 P1 Stationary point is a minimum point N1	4	
(*b*)(ii)	$(4x^2 - 1)(4x^2 + 1) = 0$ K1 2^{nd} stationary point is $\left(-\frac{1}{2}, \frac{2}{5}\right)$ N1		

No.6	Solution and Mark Scheme	Sub Marks	Total Marks
	$3s-r=1.....(1)$ $s-4t+2r=2.....(2)$ $12-3r=1.....(3)$ From (1) $r=3s-1.....(4)$ P1* express any variables s or t or r substitute (4) into (2) $s-4t+2(3s-1)=2$ $7s-4t=4.....(5)$ K1 * eliminated any variables s or t or r substitute (4) into (3) $12t-3(3s-1)=11$ $12t-9s=8.....(6)$ Solve simultenous equation $7s-4t=4.....(5)$ $12t-9s=8.....(6)$ K1 $t=\frac{23}{12}$ N1 $s=\frac{5}{3}$ seen N1 substitute $s=\frac{5}{3}$ into (4) $r=3\left(\frac{5}{3}\right)-1$ $r=4$ N1	6	**6**

No.7	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)(i)	$\left(\sqrt{16-8x}\right)^2 = (2-x)^2$ K1 $x^2 - 4x - 12 = 0$ $(x+2)(x-6) = 0$ $x = -2, x = 6$ K1 $\therefore x = 6$ N1	3	**8**
(a)(ii)	$3^x(3) + 3^x(15) + 3^x(27)$ K1 $(45)3^x$ $(5)(3^2)3^x$ $5(3^{x+2}) = m(3^{x+k})$ $5+2$ 7 N1	2	
(*b*)	$2^S = 6^u$ $3^t = 6^u$ $2 = 6^{\frac{u}{s}}$ $3 = 6^{\frac{u}{t}}$ $(2\times 3) = 6$ K1 $\left(6^{\frac{u}{s}} \times 6^{\frac{u}{t}}\right) = 6$ $6^{\frac{u}{s}+\frac{u}{t}} = 6$ K1 $u = \frac{st}{t+s}$ N1	3	

No.8	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)(i)	$\overrightarrow{PA} = \overrightarrow{PO} + \overrightarrow{OA}$ atau $\overrightarrow{OB} = \overrightarrow{OP} + \overrightarrow{PB}$ K1 $\overrightarrow{PA} = -4\underline{y} + 3\underline{x}$ N1	3	**10**
(*a*)(ii)	$\overrightarrow{OB} = \frac{5}{3}\underline{x} + \frac{8}{3}\underline{y}$ N1		
(*b*)	$\overrightarrow{OC} = \frac{5}{3}h\underline{x} + \frac{8}{3}h\underline{y}$ K1 $\overrightarrow{OC} = 3k\underline{x} + (4-4k)\underline{y}$ K1 $\frac{5}{3}h = 3k$ or $\frac{8}{3}h = (4-4k)$ K1 $h = \frac{9}{11}$ N1 $k = \frac{5}{11}$ N1	5	
(*c*)	$\frac{1}{2} \times 15 \times h = 90$ K1 $h = 12$ NI	2	

No.9	Solution and Mark Scheme	Sub Marks	Total Marks
(a)	All values of ln y are correct N1 $\log_{10} x$: 0.18 | 0.3(0) | 0.4(0) | 0.54 | 0.65 | 0.78 $\log_{10} y$: 0.98 | 1.44 | 1.48 | 1.9(0) | 2.14 | 2.46  Plot $\log_{10} y$ against $\log_{10} x$ K1 (Correct axes and uniform scales) 6 points plotted correctly N1 Line of best fit N1	**4**	**10**

(b)(i)	$\log_{10} y = 2q(\log_{10} x) + \log_{10} p$ P1 $\log_{10} p = 0.54$ p = 3.47 (at least 2 decimal places) N1 $2q = \dfrac{2.14 - 0.98}{0.65 - 0.18}$ K1 q = 1.23 (at least 2 decimal places) N1	**6**	
(b) (ii)	y = 60.26 N1		
(b) (iii)	y = 19.05 N1		

No.10	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	$\frac{dy}{dx} = 6 - 6x$ At maximum point $\frac{dy}{dx} = 0$ $0 = 6 - 6x$ K1 $x = 1$ $y = 6(1) - 3(1)^2$ K1 $y = 3$ N1	3	**10**
(*b*)	$\int_0^2 6x - 3x^2$ P1 $= \left[\frac{6x^2}{2} - \frac{3x^2}{2} \right]_0^2$ K1 $= \left[\frac{6(2)^2}{2} - \frac{3(2)^2}{2} \right] - \left[\frac{6(0)^2}{2} - \frac{3(0)^2}{2} \right]$ K1 $= 4$ unit N1	4	
(b)	$\pi(3)^2(1) - \pi\int_0^1 36x^2 - 36x^3 + 9x^4 \ dx$ $= 9\pi - \pi\left[\frac{36x^3}{3} - \frac{36x^4}{4} + \frac{9x^5}{5} \right]_0^1$ K1 $= 9\pi - \pi\left[\left(\frac{36(1)^3}{3} - \frac{36(1)^4}{4} + \frac{9(1)^5}{5} \right) - \left(\frac{36(0)^3}{3} - \frac{36(0)^4}{4} + \frac{9(0)^5}{5} \right) \right]$ K1 $= 9\pi - \frac{24}{5}\pi$ $= \frac{21}{5}\pi \text{unit}^3$ N1	3	

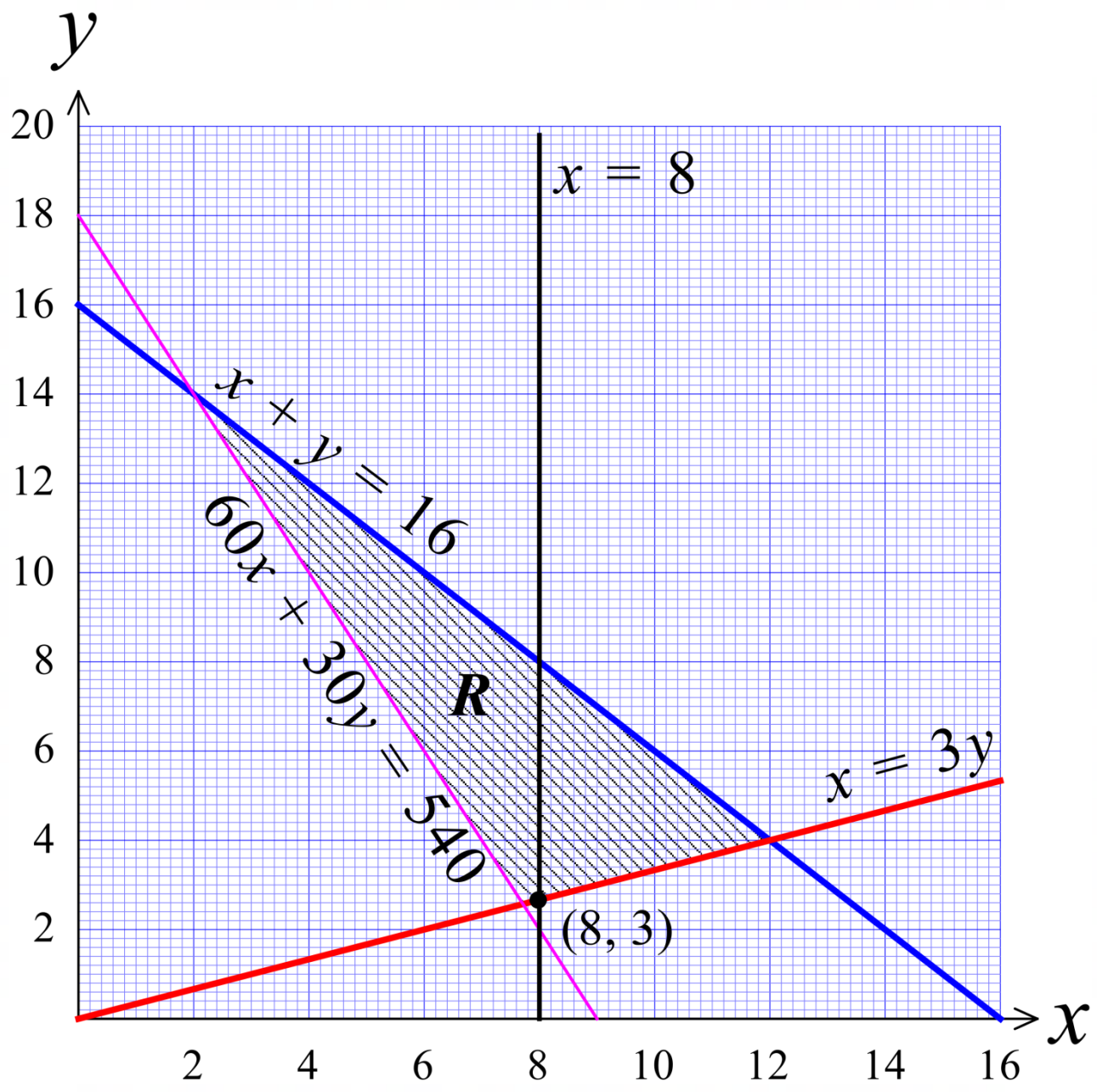
No.11	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	$r = \left(\sin 28.65^{o}\right)(5)(2)$ K1 $r = 4.79$ cm N1	2	
(*b*)	$4.79(3.6) + 5(1)2$ K1 27.24 cm N1	2	
(*c*)	$\frac{1}{2}(5)^{2}(1)$ K1 $12.5\ \text{cm}^{2}$ N1	2	
(d)	Area of the sector JMLK $= \frac{1}{2} \times 4.794 \times 4.794 \times 3.6$ $= 41.37\ cm^{2}$ K1 Area of the segment $= \frac{1}{2} \times 4.794 \times 4.794 \times (1 - \sin 57.30) \times 2$ $= 3.64\ cm^{2}$ K1 Area of the shaded region = 41.37 – 3.64 K1 $= 37.37\ cm^{2}$ N1	4	**10**

No.12	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	R$ABC = 108^o$ P1 $AC^2 = 8^2 + 8^2 - 2(8)(8)\cos 108^o$ K1 $AC = 12.9443$ or $AC = 12.94$ cm N1	3	**10**
(*b*)	R$B'CD = 144^o$ P1 $BD^2 = 8^2 + 12.94^2 - 2(8)(12.94)\cos 144^o$ K1 $BD = 19.9777$ or 19.98 cm N1	3	
(*c*)	Area of the shaded region = Area ΔAGD – Area ΔACG $2(12.94)$ or 25.88 is seen P1 $= \frac{1}{2}(8)\left[2(12.94)\right]\sin 72^0 - \frac{1}{2}(8)(12.94)\sin 72^0$ K1K1 $= 49.23$ cm^2 N1	4	

No.13	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)(i)	$\frac{7.5}{P_{2018}} \times 100 = 96$ K1 $P_{2018} = \text{RM}7.81$ $\frac{750}{1000} \times \text{RM}7.81 = \text{RM}5.86$ N1	4	**10**
(*a*)(ii)	$\frac{2020}{2018} = \frac{2020}{2019} \times \frac{2019}{2018}$ $\frac{120 \times 80}{100}$ K1 $= 96$ N1		
(*b*)(i)	$\frac{(120 \times 1000) + (115 \times 750) + (x \times 1000) + (104 \times 250)}{(1000 + 750 + 1000 + 250)} = 110$ K1,K1 $x = 97.75$ N1	3	
(*b*)(ii)	$\frac{C_{2020}}{5.00} \times 100 = 110$ K1 $C_{2020} = \text{RM}5.50$ $\frac{150}{100} \times 5.50 = 110$ K1 $= \text{RM}8.25$ N1	3	

No.14	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	$6-2t=0$ K1 $t=3$ N1	2	**10**
(*b*)	$6t-t^2=0$ $t(6-t)=0$ K1 $t=0, t=6$ $3<t<6$ N1	2	
(*c*)	$\int_0^4 6t-t^2 dt$ $=\left[\frac{6t^2}{2}-\frac{t^3}{3}\right]_0^4$ K1 $=\left[\frac{6(4)^2}{2}-\frac{(4)^3}{3}\right]-\left[\frac{6(0)^2}{2}-\frac{(0)^3}{3}\right]$ K1 $=\frac{80}{3}$ Nyatakan: luas mewakili jarak $\frac{80}{3}$ m untuk julat masa $0 \le t \le 4$ Jarak $\frac{80}{3}$ m N1, untuk julat masa $0 \le t \le 4$ N1	4	
	$\frac{\frac{80}{3}\text{ m}}{4\text{ s}}$ K1 $=\frac{20}{3}$ ms^{-1} N1	2	

No.14	Solution and Mark Scheme	Sub Marks	Total Marks
(*a*)	I $x + y \leq 16$ N1 II $x \leq 3y$ N1 III $60x + 30y \geq 540$ N1 OR equivalent	3	**10**
(*b*)	Refer graph: Draw correctly at least one straight line from *inequalities involve *x* and *y* K1 Draw correctly all the *straight line from *inequalities involves *x* and *y* N1 Note: Accept dotted line and solid line Region shaded correctly N1	3	
(*c*)	*Refer to graph N1	1	
	$(12, 4)$ N1 $40x + 20y$ $40(12) + 20(4)$ K1 $RM560$ N1	3	



PERATURAN PEMARKAHAN TAMAT