



KEMENTERIAN PENDIDIKAN
Jabatan Pendidikan Negeri Terengganu

MPP 3

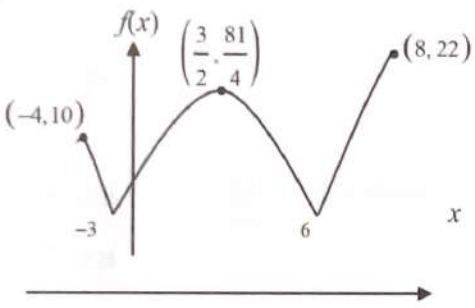
SPM 2022

PERATURAN PEMARKAHAN

MATEMATIK TAMBAHAN

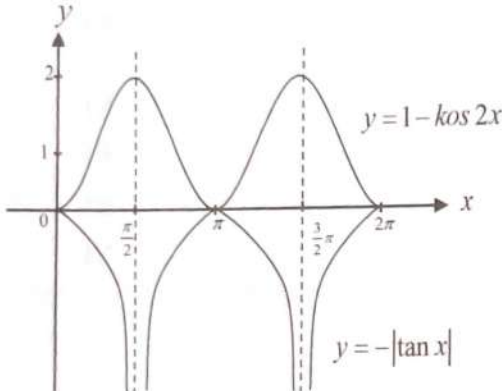
SKEMA PEMARKAHAN MATEMATIK TAMBAHAN KERTAS 1
MPP3 TINGKATAN 5 2022

No	Skema Pemarkahan	Σ Markah
1	(a) { Suhana, Danial, Rohani, Hamimah} N1 (b) Fungsi kerana setiap objek mempunyai hanya satu imej N1N1	3
2	(a) $p = 0.8, q = 0.2$ dan $P(X = n) = 0.1342$ $\left[{}^nC_n (0.8)^n (0.2)^0 = 0.1342 \right]$ K1 $n \log_{10} (0.8) = \log_{10} 0.1342$ K1 $n = 9$ N1 (b) $P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2)$ P1 ${}^9C_0 (0.8)^0 (0.2)^9 + {}^9C_1 (0.8)^1 (0.2)^8 + {}^9C_2 (0.8)^2 (0.2)^7$ K1 0.0003139 N1	6
3	(a) $\lim_{\delta x \rightarrow 0} \frac{\delta y}{\delta x} = \frac{(x + \delta x)^2 - x^2}{\delta x}$ atau $\lim_{\delta x \rightarrow 0} \frac{(x + \delta x)^2 - x^2}{\delta x}$ K1 $\frac{dy}{dx} = 2x$ N1 (b) Selesaikan persamaan $2a(4) - \frac{b}{(4)^2} = 7$ dan $a(4)^2 + \frac{b}{4} = 5$ K1 $a = \frac{11}{16}$ N1 $b = -24$ N1	5

4	(a) (i) $x = \frac{3}{2}$ N1 (ii) $f(x) = (\frac{3}{2} + 3)(6 - \frac{3}{2})$ atau kaedah lain K1 $f(x) \leq \frac{81}{4}$ N1 (b)  Bentuk P1 Modulus P1 Semua betul P1	6
5	$0.3p + 0.6q + 0.1r = 50$ @ $0.1p + 0.3q + 0.7r = 40$ @ $0.6p + 0.1q + 0.2r = 45$ P1 Hapus anu pertama dengan kaedah penggantian @ penghapusan K1 Hapus anu kedua dengan kaedah penggantian @ penghapusan K1 $r = 27.5$ @ $q = 50$ @ $p = 57.5$ N1 $q = 50$ @ $p = 57.5$ @ $r = 27.5$ N1 $r = 27.5, q = 50, p = 57.5$ N1	6
6	$y = \frac{x}{py} - \frac{q}{p^2}$ P1 $\frac{1}{p} = 2$ atau $-\frac{q}{p^2} = -5$ K1 $p = \frac{1}{2}, q = \frac{5}{4}$ N1N1	4

7	(a) 1 (b) $\log_m a = 2 \log_m \left(\frac{b}{2} \right)$ $a = \frac{b^2}{4}$ $b = 2\sqrt{a}$	N1 K1 K1 N1	4
8	(a) $\overline{TQ} = \overline{TP} + \overline{PQ}$ dan $6\underline{b} + 3\underline{a}$ $\overline{TQ} = \sqrt{12^2 + 3^2}$ dan $\sqrt{153}$ (b) $\overline{TR} = 6\underline{a} + 4\underline{b}$ dan $\overline{SQ} = -3\underline{a} + 6\underline{b}$ $\frac{9}{2}\underline{a} + 3\underline{b} = \lambda(6\underline{a} + 4\underline{b})$ $\overline{TU} = \frac{3}{4}\overline{TR}$ dan segaris	K1 N1 K1 K1 N1	5
9	(a) (i) -10 (ii) $\frac{1}{2}(-10)$ -5 (b) $g(x) = \frac{3x^3}{3} - \frac{24x^2}{2} + 17x + c$ dan $96 = \frac{3(1)^3}{3} - \frac{24(1)^2}{2} + 17(1) + c$ $g(x) = x^3 - 12x^2 + 17x + 90$	N1 K1 N1 K1 N1	5

10	(a) BAKU = $4! = 24$ K1 BAKA = $\frac{4!}{2!} = 12$ K1 Tidak sama kerana perkataan BAKA mempunyai objek secaman atau setara N1 (b) (i) ${}^7P_5 = 2520$ N1 (ii) 2P_1 atau 5P_1 atau 5P_3 P1 ${}^2P_1 \times {}^5P_1 \times {}^5P_3$ K1 600 N1	7
11	$\tan \alpha = \frac{5}{6.5}$ atau $10^2 = (8.2006)^2 + (8.2006)^2 - 2(8.2006)(8.2006)\cos \theta$ K1 $75.14^\circ @ 1.312^*$ $L_{\text{sektor}} = \frac{1}{2}(8.2006)^2(1.312^*)$ atau $L_{\text{sagittiga}} = \frac{1}{2}(8.2006)^2 \sin 75.14^\circ$ K1 $\frac{1}{2}(8.2006)^2(1.312^*) - \frac{1}{2}(8.2006)^2 \sin 75.14^\circ$ K1 $130 + 2(11.62)$ K1 153.24 N1 Kos pembinaan = 13025.40 N1 Tidak, kerana kos pembinaan melebihi peruntukan. N1	7

12	(a) bentuk graf kos amplitud 2 kala untuk $0 \leq x \leq 2\pi$  (b) bentuk graf tan modulus 3 penyelesaian	P1 P1 P1 6 P1 P1 N1
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13	(a) (i) $T_1 = 2\pi r$, $T_2 = 2\pi(r+1)$, $T_3 = 2\pi(r+2), \dots$ $2\pi r, 2\pi r + 2\pi, 2\pi r + 4\pi, \dots$ $T_2 - T_1 = 2\pi$ and $T_3 - T_2 = 2\pi$ Maka, lilitan bulatan ini membentuk suatu Jajjang Aritmetik. (ii) $\frac{10}{2}[2(2\pi r) + (10-1)(2\pi)] = m\pi$ $m = 20r + 90$ (b) $r = \frac{1}{2}$ $32\left(\frac{1}{2}\right)^{n-1} = \frac{1}{2^8}$ $n = 14$	P1 K1 N1 K1 N1 P1 K1 N1 8
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14	(a) $5a-1=2$ or $\frac{3}{2(2)+b}=1$	K1
	$a=\frac{2}{5}, b=-1$	N1N1
	(b) (i) Let $y=\frac{3}{2z-1}$ $g^{-1}(y)=\frac{y+3}{2y}, y \neq 0$	N1
	(ii) $g^{-1}\left(\frac{2}{5}x-1\right)$ $\frac{\frac{2}{5}x-1+3}{2\left(\frac{2}{5}x-1\right)}$	K1
	$\frac{x+5}{2x-5}, x \neq \frac{5}{2}$	N1
	(iii) $\frac{x+5}{2x-5} = -1$ 0	K1 N1

8

15	(a) $(-1, 1)$ dan $m = -2$ $y - 1 = -2(x - (-1))$ atau $1 = -2(-1) + c$ $y = -2x - 1$	P1 K1 N1	
	(b) $Q(0, -1)$	K1	
	$(-1, 1) = (\frac{0+x}{2}, \frac{-1+y}{2})$		
	$-1 = \frac{0+x}{2}$ atau $1 = \frac{-1+y}{2}$	K1	
	$S(-2, 3)$	N1	8
	(c)		
	$A = \frac{1}{2} ((3 \times 3) + (-2 \times -1) + (-5 \times -1) + (0 \times 3)) - ((-2 \times 3) + (-5 \times 3) +$		
	$(0 \times -1) + (3 \times -1)) $	K1	
	20 unit^2	N1	

PEPERIKSAAN PERCUBAAN SPM TAHUN 2022

Bil	Peraturan Pemarkahan	Jumlah
1	$(a) (i) y = 60 - x \text{ dan } A = x(60 - x)$ K1 $A = 60x - x^2$ N1 $(ii) 60 - 2x = 0$ K1 $A = 60(30) - (30)^2$ K1 $A = 900$ N1 $(b) \frac{dy}{dt} = (1 + 6(4)) \times \left(\frac{1}{5}\right)$ K1 5 N1	7
2	$(a) f(x) = (0 - 4)^2 + p = 7$ K1 $p = -9$ N1 $f(x) = (x - 4)^2 - 9$ $x^2 - 8x + 7 = 0$ dan cari hasil tambah punca K1 $8 = \frac{-(q+10)}{-3}$ atau setara K1 $q = 14$ N1 $(b) g(x) = -3 \left[x^2 - 8x + \left(\frac{-8}{2}\right)^2 - \left(\frac{-8}{2}\right)^2 + 7 \right]$ K1 $g(x) = -3(x - 4)^2 + 27$ N1 $(4, 27)$ N1	8

Bil	Peraturan Pemarkahan	Jumlah
3	(a) $9 - 2x = \frac{x-2}{2}$ or $\frac{9-y}{2} = 2y+2$	K1
	$(4,1)$	N1
	(b) $-2 \times \frac{1}{2} = -1$	K1
	berserenjang.	N1
	(c) $\frac{12}{5} = \frac{0+4m}{m+n}$ atau $\frac{1}{5} = \frac{-n+m}{m+n}$	K1
	$m:n = 3:2$	N1
	(d) Pagar (x,y) dan Menara Telekomunikasi (h,k)	
	$\sqrt{(x-h)^2 + (y-k)^2} = 1$	K1
	$x^2 + y^2 - 2hx - 2ky + h^2 + k^2 - 1 = 0$	
	$2h = 4$ dan $2k = 4$	K1
	Koordinat Menara Telekomunikasi $(2,2)$	N1
		9
4	$\angle LOK = \frac{\pi}{2} - \alpha$	P1
	$\angle LOJ_{\text{major}} = 2\pi - 2(\frac{\pi}{2} - \alpha)$	K1
	$14(\pi + 2\alpha) + 14 + 14$	K1
	$14\pi + 28\alpha + 28$	N1
		4

Bil	Peraturan Pemarkahan		Jumlah
5	(a)	$a + ar + ar^2 = 8(ar^3 + ar^4 + ar^5)$	K1
		$1 + r + r^2 = 8r^3(1 + r + r^2)$ dan selesaikan	K1
		$r = \frac{1}{2}$	N1
	(b) (i)	$a + ar + ar^2 - (ar^3 + ar^4 + ar^5) = 98$	
		$a + a\left(\frac{1}{2}\right) + a\left(\frac{1}{2}\right)^2 - \left(a\left(\frac{1}{2}\right)^3 + a\left(\frac{1}{2}\right)^4 + a\left(\frac{1}{2}\right)^5\right) = 98$	K1
		$a = 64$	N1
	(ii)	$S_{\infty} = \frac{64}{1 - \frac{1}{2}}$	K1
		$= 128$	N1

Bil	Peraturan Pemarkahan	Jumlah
6	(a) $(\sin x)\left(\frac{\sqrt{3}}{2}\right) + (\cos x)\left(\frac{1}{2}\right) = 2\cos x$	7
	$\tan x = 1.732$	
	$x = 60^\circ, 240^\circ$	
	(b) (i) $\frac{1}{1 - 2\left(\frac{15}{17}\right)^2}$	
	$-\frac{289}{161}$	
	(ii) $\pm \sqrt{\frac{1 - \left(-\frac{7}{25}\right)}{2}}$	
	$\frac{4}{5}$	

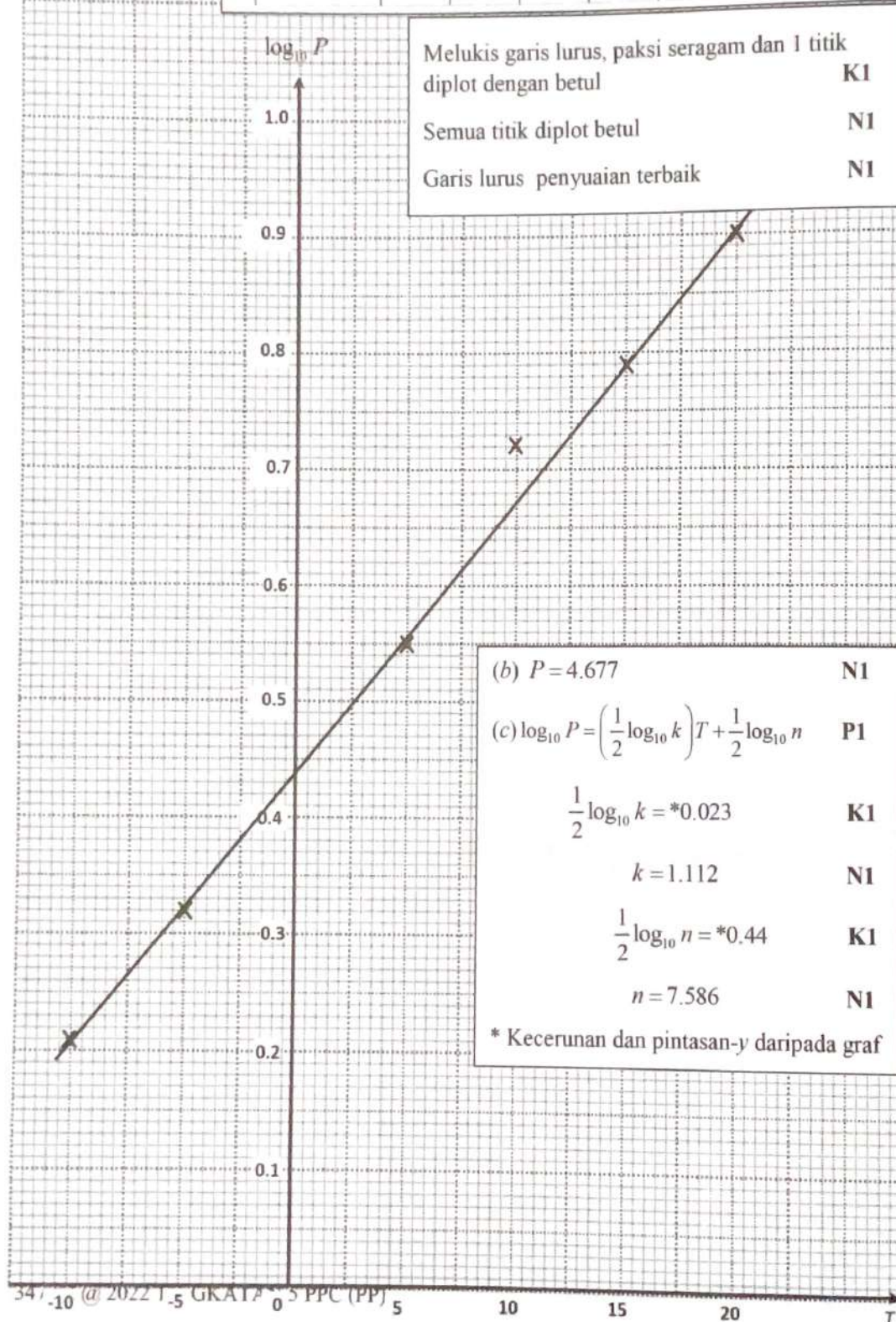
Bil	Peraturan Pemarkahan	Jumlah
7	(a) $\frac{3}{\sqrt{3}-3} \times \frac{\sqrt{3}+3}{\sqrt{3}+3}$ dan kembangkan	8
	$-\frac{\sqrt{3}+3}{2}$	
	(b) (i) $\frac{\log_a hk}{\log_a a^2}$	
	$\frac{\log_a h + \log_a k}{2}$	
	$\frac{1}{2} \log_a h + \frac{1}{2} \log_a k$	
	(ii) $\log_{a^2} 5q = 1$	
	$5q = a^2$	
	$a = \sqrt{5q}$	

Bil	Peraturan Pemarkahan		Jumlah
8	(a)	(i) $k(4) - 12 = 0$	K1
		$k = 3$	N1
		(ii) $m_1 \left(\frac{1}{3} \right) = -1$ atau $3x - 12 = -3$	K1
		$(3, -6)$	N1
	(b)	$y = \frac{3}{2}x^2 - 12x + c$	
		$-6 = \frac{3}{2}(3)^2 - 12(3) + c$	K1
		$y = \frac{3}{2}x^2 - 12x + \frac{33}{2}$	N1
	(c)	$y = \frac{3}{2}x^2 - \frac{15}{2}$	P1
		$V = \pi \int_{-7.5}^{-6} \left(\frac{2}{3}y + 5 \right) dy$	
		$\pi \left[\frac{2y^2}{2(3)} + 5y \right]_{-7.5}^{-6}$	K1
		$\pi \left[\left(\frac{2(-6)^2}{2(3)} + 5(-6) \right) - \left(\frac{2(-7.5)^2}{2(3)} + 5(-7.5) \right) \right]$	K1
		0.75π	N1

Bil	Peraturan Pemarkahan	Jumlah
9	(a) $\overrightarrow{BC} = \overrightarrow{BO} + \overrightarrow{OC}$ atau $\overrightarrow{OD} = \overrightarrow{OA} + \overrightarrow{AD}$ dan $\overrightarrow{BC} = -9\underline{y} + \frac{3}{4}(20\underline{x})$ atau $\overrightarrow{OD} = 20\underline{x} + \frac{1}{2}(-20\underline{x} + 9\underline{y})$	K1
	(i) $15\underline{x} - 9\underline{y}$	N1
	(ii) $10\underline{x} + \frac{9}{2}\underline{y}$	N1
	(b) $\overrightarrow{BE} = -9\underline{y} + n\left(10\underline{x} + \frac{9}{2}\underline{y}\right)$	K1
	$m(15\underline{x} - 9\underline{y}) = -9\underline{y} + n\left(10\underline{x} + \frac{9}{2}\underline{y}\right)$	K1
	$15m = 10n$, $-9m = \frac{9}{2}n - 9$ dan selesaikan	K1
	$m = \frac{4}{7}, n = \frac{6}{7}$	N1 N1
	(c) $\frac{1}{2}(20 \times 2)h = 140$	K1
	$h = 7$	N1
		10

Bil	Peraturan Pemarkahan	Jumlah
10	(a) (i) $P(X=1) = {}^nC_1 \left(\frac{1}{8}\right)^1 \left(\frac{7}{8}\right)^{n-1}$ atau $P(X=0) = {}^nC_0 \left(\frac{1}{8}\right)^0 \left(\frac{7}{8}\right)^n$ K1 $n \left(\frac{1}{8}\right) \left(\frac{7}{8}\right)^{n-1} = 15 \left(\frac{7}{8}\right)^n$ selesaikan K1 $n \left(\frac{1}{8}\right) = 15 \left(\frac{7}{8}\right)$ $n = 105$ N1 (ii) sisihan piawai = $\sqrt{105 \left(\frac{1}{8}\right) \left(\frac{7}{8}\right)}$ K1 $= 3.389$ N1 (b) (i) 0.58 dilihat P1 $\frac{V - 990}{15} = 0.58$ K1 $V = 998.7$ N1 (ii) $P(970 < X < 1015) = P\left(\frac{970 - 990}{15} < Z < \frac{1015 - 990}{15}\right)$ K1 $= 0.8609 // 0.8610$ N1	10

T	-10	-5	5	10	15	20	
$\log_{10} P$	0.21	0.33	0.55	0.72	0.79	0.90	N1



Bil	Peraturan Pemarkahan	Jumlah
12	(a) $v = 8$ N1 (b) $2 - 2t = 0$ K1 $t = 1$ $v = 8 + 2(1) - (1)^2$ K1 $= 9$ N1 (c) $8 + 2t - t^2 = 0$ dan selesaikan pers. kuadratik K1 $t = 4$ N1 (d) $s = \int (8 + 2t - t^2) dt$ $s = 8t + t^2 - \frac{t^3}{3} + c$ K1 $s = 8(4) + (4)^2 - \frac{(4)^3}{3}$ atau $s = 8(6) + (6)^2 - \frac{(6)^3}{3}$ K1 Jumlah jarak = $\frac{80}{3} + [8(4) + (4)^2 - \frac{(4)^3}{3} - [8(6) + (6)^2 - \frac{(6)^3}{3}]]$ K1 $= \frac{124}{3}$ N1	10

Bil	Peraturan Pemarkahan		Jumlah
13	(a)	$\frac{125}{\sin \angle BAC} = \frac{96}{0.7}$	K1
		$\angle BAC = 65.71^\circ$	N1
		$\angle ABC = 69.86^\circ$	P1
		$\frac{AC}{\sin 69.86^\circ} = \frac{96}{\sin 44.43^\circ}$ atau setara	
		$AC = 128.75$	N1
	(b)	(i) $128.75^2 = 55^2 + 99^2 - 2(55)(99)\cos \angle ADC$	K1
		$\angle ADC = 110.15^\circ$	N1
		(ii) $\frac{1}{2}(55)(99)\sin 110.15^\circ$	K1
		2555.87	N1
	(c)	$\frac{1}{2} \times d \times 128.75 = 2555.87$	K1
		39.70	N1
			10

Bil	Peraturan Pemarkahan			Jumlah
14	(a)	$175 = \frac{7}{x} \times 100$ atau $y = \frac{55}{40} \times 100$	K1	10
		$x = 4.00$	N1	
		$y = 137.50$	N1	
	(b)	$\frac{175(15) + 125(30) + *137.50(24) + 150(33) + 120(12)}{15 + 30 + 24 + 33 + 12}$	K1	
		140.92	N1	
	(c)	$\frac{P_{2022}}{4560} \times 100 = 140.92$ dan 6425.95	K1	
		917.99 // 918	N1	
		Cukup kerana RM 1000 melebihi RM 917.99 // RM 918	N1	
	(d)	$\frac{140.92 \times 120}{100}$	K1	
		169.10	N1	

