



KEMENTERIAN PENDIDIKAN MALAYSIA

i-MODUL KECEMERLANGAN SPM SMKA DAN SABK 2021

SIJIL PELAJARAN MALAYSIA 2021 (SET 3)

MATEMATIK TAMBAHAN

Kertas 2

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

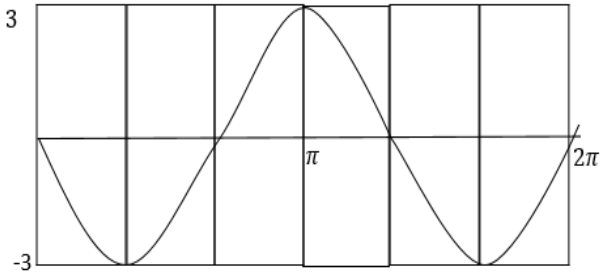
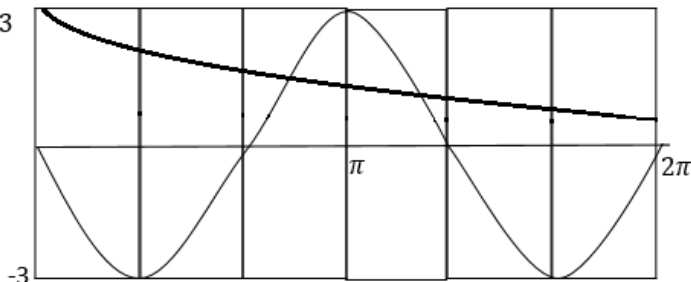
AMARAN

Peraturan pemarkahan ini SULIT dan **Hak Cipta Majlis Pengetua SMKA** dan **Majlis Pengetua SABK**. Kegunaan khusus untuk guru-guru tingkatan 5 di SMKA dan SABK sahaja. Peraturan ini tidak boleh dikeluarkan dalam apa jua bentuk media cetak.

Peraturan pemarkahan ini mengandungi 9 halaman bercetak

CADANGAN PERATURAN PEMARKAHAN (SKEMA)

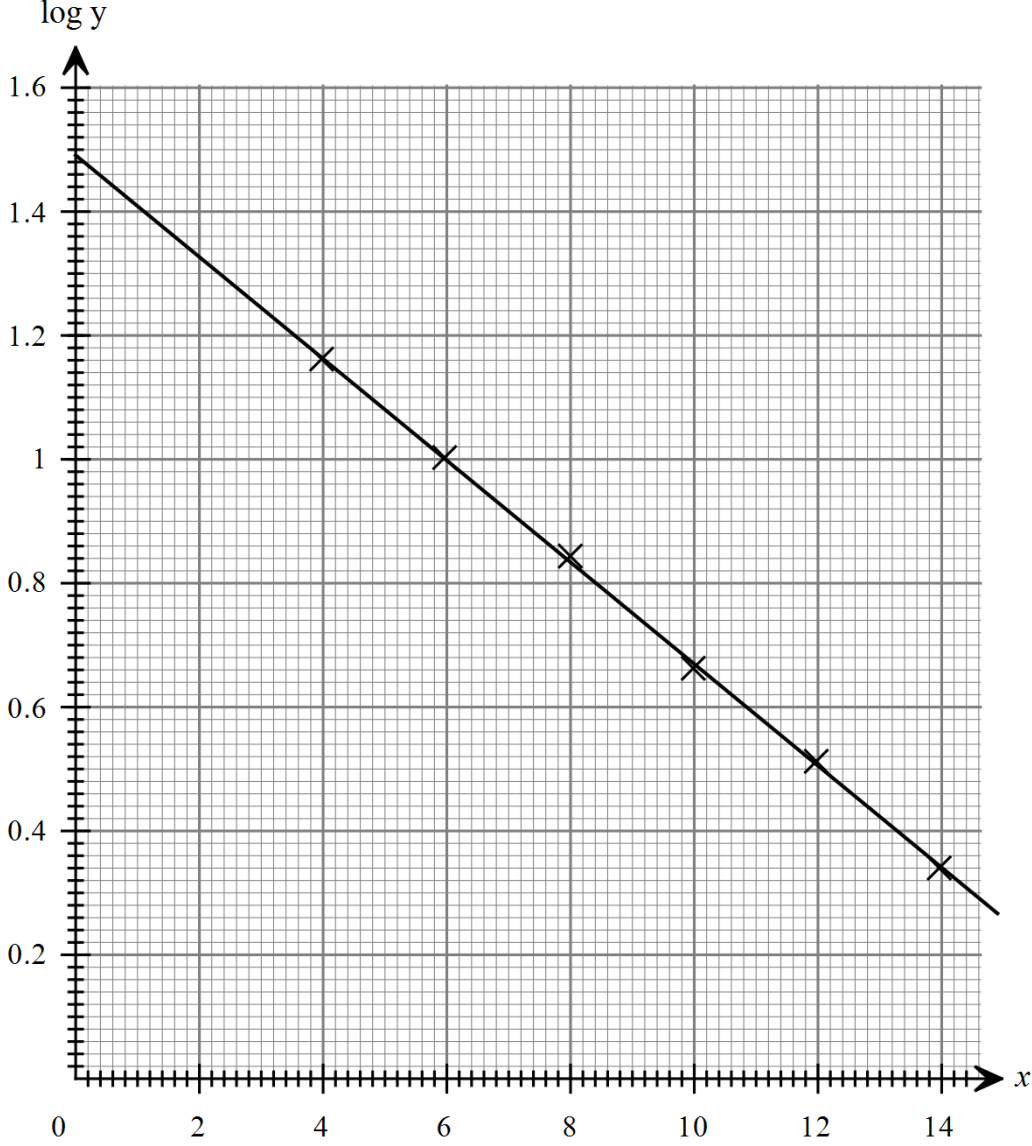
Kertas 2 Set 3

Soalan	Butiran	Markah						
1 (a)	 <p data-bbox="989 436 1133 593">bentuk sin negatif sin amplitud kitaran</p>	1 1 1 1						
1 (b)	$y = \frac{\pi}{x}$ <table border="1" data-bbox="422 795 651 918"> <tr> <td>x</td> <td>π</td> <td>2π</td> </tr> <tr> <td>y</td> <td>1</td> <td>$\frac{1}{2}$</td> </tr> </table>  <p data-bbox="359 1254 686 1288">bilangan penyelesaian =2</p>	x	π	2π	y	1	$\frac{1}{2}$	1
x	π	2π						
y	1	$\frac{1}{2}$						
		7 m						
2 (a)	$x^2 - 8x + 12 \geq 0$ $(x - 2)(x - 6) \geq 0$ $x \leq 2 \text{ dan } x \geq 6$	1 1						
2 (b)(i)	$f(x) = -(x^2 - 2x - 8)$ $= -\left[x^2 - 2x + \left(\frac{-2}{2}\right)^2 - \left(\frac{-2}{2}\right)^2 - 8\right]$ $= -[(x - 1)^2 - 9]$ $= -(x - 1)^2 + 9$ $a = 1 \text{ dan } b = 9$	1 1+1						
2 (b)(ii)	$f(x) = -(x + 1)^2 + 9$	1						
		6 m						
3 (a)	$SJ = SK$ $\sqrt{(x + 8)^2 + y^2} = \sqrt{x^2 + (y - 4)^2}$ $2x + y + 6 = 0$	1 1						

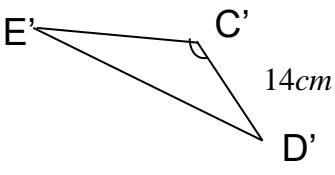
3 (b)	$\sqrt{(x-4)^2 + (y-6)^2} = 10$ $x^2 - 8x + 16 + y^2 - 12y + 36 = 100$ $x^2 + y^2 - 8x - 12y - 48 = 0$	1 1
3 (c)	$2x + y + 6 = 0$ $y = -2x - 6 \text{ -----(1)}$ $x^2 + y^2 - 8x - 12y - 48 = 0 \text{ -----(2)}$ <p><i>Gantikan (1) ke dalam (2)</i></p> $x^2 + (-2x - 6)^2 - 8x - 12(-2x - 6) - 48 = 0$ $x^2 + 8x + 12 = 0$ $(x + 6)(x + 2) = 0$ $x = -6, x = -2$ <p><i>Koordinat titik persilangan (-6,6) dan (-2,-2)</i></p>	1 1+1
		8 m
4 (a)	$T_2 = a + d = 12 \text{ atau } T_{10} = a + 9d = 52$ $a = 12 - d$ $(12 - d) + 9d = 52$ $d = 5$ $a = 7$	1 1 1
4 (b)	$\frac{2m + 2}{m + 2} = \frac{5m + 4}{2m + 4}$ $m^2 - 2m - 8 = 0$ $(m + 2)(m - 4) = 0$ $m = -2, m = 4$	1 1 1+1
		7 m
5	<p>$x = \text{kek coklat}, y = \text{kek marble}, z = \text{kek red velvet}$</p> $x + y + z = 250 \text{ (1)}$ $30x + 20y + 40z = 8050 \text{ or } 3x + 2y + 4z = 805 \text{ (2)}$ $5x + 5y + 10z = 1780 \text{ or } x + y + 2z = 356 \text{ (3)}$ <p><u>Kaedah penghapusan</u></p> $(3) - (1)$ $x + y + 2z = 356$ $(-) x + y + z = 250$ $z = 106$ $(3) \times 2 \rightarrow 2x + 2y + 4z = 712 \text{ (4)}$ $(2) - (4)$ $3x + 2y + 4z = 805$ $(-) 2x + 2y + 4z = 712$ $x = 93$	1 1 1 1

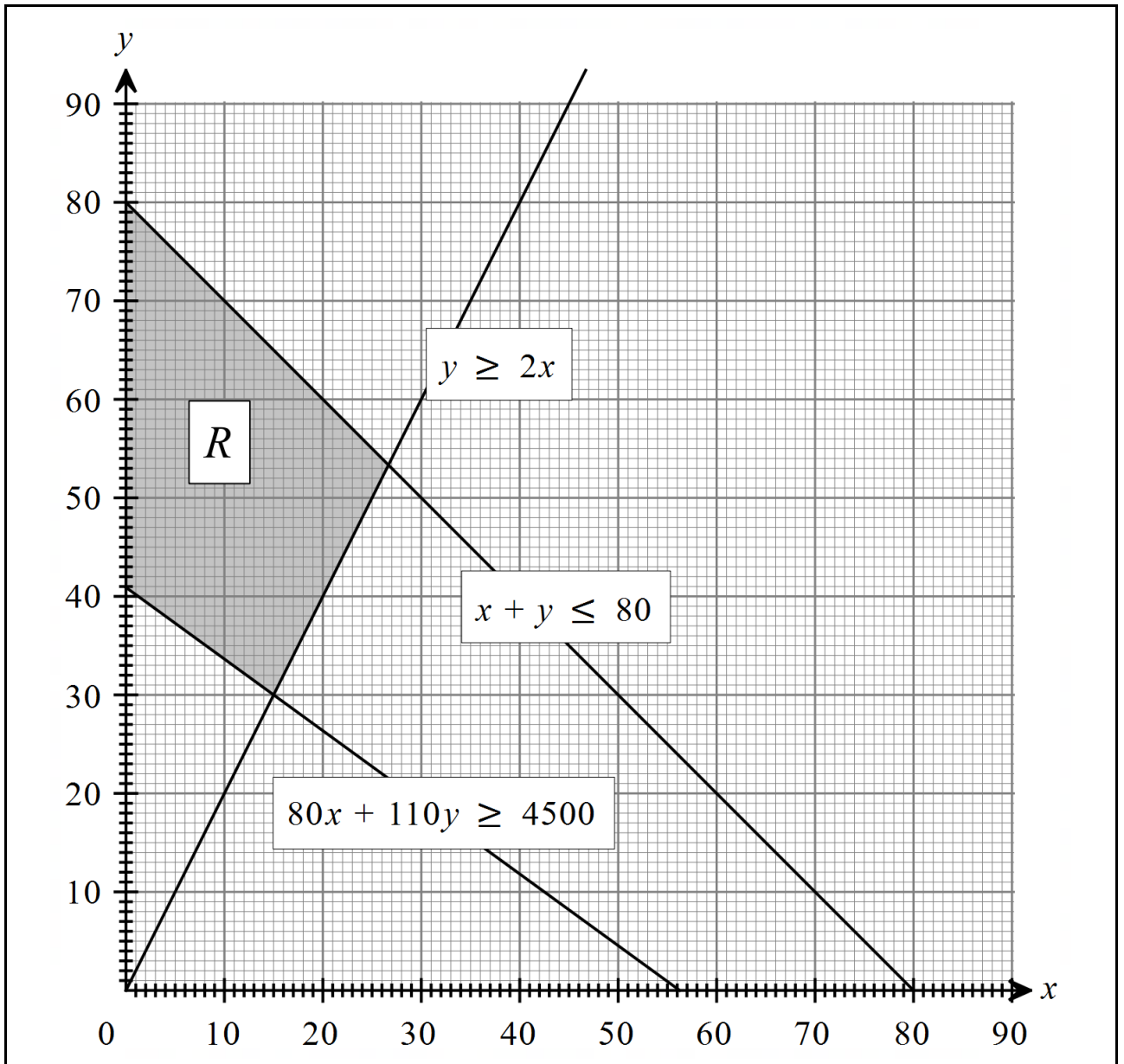
	$93 + y + 106 = 250$ $y = 51$ <p>kek coklat=93 biji, kek marble = 51 biji , kek red velvet = 106 biji</p>	1+1+1
		7 m
6 (a)	$\frac{3\sqrt{5}}{\sqrt{5} + \sqrt{3}} \times \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} - \sqrt{3}}$ $= \frac{15 - 3\sqrt{15}}{2}$	1 1
6 (b)	$4^{\log_2 x} = 64$ $4^{\log_2 x} = 4^3$ $\log_2 x = 3$ $x = 8$	1 1
6 (c)	$1500(1+0.08)^n > 20\,000$ $n > \frac{\log \frac{40}{3}}{\log 1.08}$ $n > 33.66$ $n = 34$	1 1 1
		7 m
7 (a)	$\vec{AB} = \vec{AO} + \vec{OB}$ $= \begin{pmatrix} -2k - 4 \\ 10k - 6 \end{pmatrix}$ $ \vec{AB} = \sqrt{(-2k - 4)^2 + (10k - 6)^2}$ $= \sqrt{104k^2 - 104k + 52}$	1 1 1 1
7 (b)(i)	$\vec{BC} = \begin{pmatrix} 8 \\ 14 \end{pmatrix}$ $ \vec{AB} = \vec{BC} $ $\sqrt{104k^2 - 104k + 52} = \sqrt{8^2 + 14^2}$ $k^2 - k - 2 = 0$	1 1
7 (b)(ii)	$k = -1, k = 2$ $\begin{pmatrix} -2 \\ -16 \end{pmatrix}, \begin{pmatrix} -8 \\ 14 \end{pmatrix}$	1+1
		8 m

8 (a)	$\text{Min} = np = 100(0.20) = 20$ $\text{varians} = npq = 100(0.20)(0.80) = 16$ Oleh kerana, saiz sampel besar, maka taburan binomial bagi X menghampiri taburan normal dengan min 20 dan varians=16 Penggunaan taburan normal $P(15 \leq X \leq 30)$ $P\left(\frac{15 - 20}{4} \leq Z \leq \frac{30 - 20}{4}\right)$ $P(-1.25 \leq Z \leq 2.5)$ 0.88819	1+1 1+1 1+1 1
8 (b)	$P(X \leq 12) = P\left(Z \leq \frac{12 - 20}{4}\right)$ $= P(Z \leq -2)$ $= 0.0227$ $= 2.27\%$	1 1 1
		10 m
9 (a)	$y = \frac{x^2}{2} + 1$ $\frac{dy}{dx} = 2$ $m_2 = -\frac{1}{2}$ $\frac{-1}{2} = \frac{3 - 0}{2 - p}$ $p = 8$	1 1 1
9 (b)	$A_1 = \int_0^2 \left(\frac{x^2}{2} + 1\right) dx$ $= \left[\frac{x^3}{3} + x\right]_0^2$ $= \left(\frac{2^3}{3} + 2\right) - \left(\frac{0^3}{3} + 0\right)$ $= \frac{10}{3}$ $A_2 = \frac{1}{2}(8 - 2)(3) = 9$ $A_1 + A_2 = \frac{37}{3}$	1 1 1 1
9 (c)	$v = \pi \int_1^3 2y - 2 dy$ $= \pi[y^2 - 2y]_1^3$ $= \pi[(9 - 6) - (1 - 2)]$ $= 4\pi$	1 1 1 1
		10 m

10 (a)	<table border="1"> <tr> <td>x</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>14</td> </tr> <tr> <td>$\log_{10} y$</td> <td>1.16</td> <td>1.0</td> <td>0.84</td> <td>0.66</td> <td>0.51</td> <td>0.34</td> </tr> </table>	x	4	6	8	10	12	14	$\log_{10} y$	1.16	1.0	0.84	0.66	0.51	0.34	1 1 1 1
x	4	6	8	10	12	14										
$\log_{10} y$	1.16	1.0	0.84	0.66	0.51	0.34										
<p>Paksi, skala serta 1 titik diplot betul Semua titik diplot betul Garis lurus penyuaian terbaik</p> 																
10 (b)($\log_{10} y = \log_{10} p - 2x \log_{10} q$ $c = \log_{10} p = 1.5$ $p = 31.62$ $\log_{10} y = 0.78$ $y = 6.03$	$m = \frac{1.5 - 1.0}{0 - 6}$ $-2 \log_{10} q = -0.08333$ $q = 1.101$	1 1+1 1+1 1													
10 m																

11 (a)	$\angle SOT = 60^\circ$	1+1
11 (b)	Luas tembereng STU = $\frac{1}{2} \times 9^2 (1.0472 - \sin 60^\circ)$ = 7.338	1+1 1
11 (c)	$PQ^2 = 9^2 + 9^2 - 2(9)(9) \cos 120$ $PQ = \sqrt{243} = 9\sqrt{3}$ PS+TQ = Panjang lengkok PQ – Panjang lengkok ST = $9 \left(\frac{2}{3} \pi\right) - 9 \left(\frac{\pi}{3}\right)$ = 3π perimeter luas berlorek = PQ+ST+PS+TQ = $9\sqrt{3} + 9 + 3\pi$	1 1 1 1 1
		10 m
12 (a)	$a = 8 - 2t$ $v = 8t - t^2 + c$ $12 = 8(5) - (5)^2 + c$ $c = -3$ $t = 0, v = -3ms^{-1}$	1 1 1 1
12 (b)	$8 - 2t = 0, t = 4$ $v = 8(4) - 16 - 3,$ $v = 13 ms^{-1},$	1 1
12 (c)	$-12 = 8t - t^2 - 3$ $t^2 - 8t - 9 = 0$ $(t - 9)(t + 1) = 0$ $t = 9, \quad a = 8 - 2(9)$ $a = -10ms^{-2}$	1 1 1 1
		10 m
13 (a)	$\frac{\sin B}{10} = \frac{\sin 50}{8}$ $B = 73.25^\circ$ $\angle EBC = 180^\circ - 73.25^\circ = 106.75^\circ$	1 1 1
13 (b)(i)	$CE^2 = 8^2 + 12^2 - 2(8)(12)\cos 106.75^\circ$ $CE = 16.23 \text{ cm}$	1 1
13 (b)(ii)	$\frac{1}{2} (14)(16.23) \sin \angle DCE = 60$ $\angle DCE = 31.88^\circ$	1 1

13 (c)	 <p>$\angle D'C'E' = 148.12^\circ$</p>	1+1 1
		10 m
14 (a)	$130 = \frac{35}{k} \times 100$ $k = RM26.92$ $m = \frac{65}{50} \times 100 = 130$ $125 = \frac{1}{60} \times 100$ $l = RM75.00$	1 1 1
14 (b)	$\bar{I} = \frac{130(25)+150(17)+130(23)+125(5)+120(30)}{100}$ $= 130.15$	1 1
14 (c)(i)	$130.15 = \frac{800}{Q_{18}} \times 100 = RM614.68$	1
14 (c)(ii)	$Kasut = 144.00 /seen 140.40/ seen 135.00/ seen 129.6$ $\bar{I} = \frac{140.40(25)+144(17)+140.40(23)+135(5)+129.6(30)}{100}$ $=137.50$ $I_{21/18} = \frac{130.15 \times 137.50}{100}$ $= 178.96$	1 1 1 1
		10 m
15 (a)	$x + y \leq 80$ $80x + 110y \geq 4500$ $\frac{y}{x} \geq \frac{2}{1} \text{ atau } y \geq 2x$	1 1 1
15 (b)	<p>1 garis dilukis betul Semua garis dilukis betul Kawasan R betul</p>	1 1 1



15 (c)(i)	30	1
15 (c)(ii)	Keuntungan maksimum titik $(0,80)$ $80(0) + 110(80) = RM\ 8800$ Keuntungan maksimum $8800 \times \frac{20}{100} = RM\ 1760$	1 1 1
		10 m
		100 m