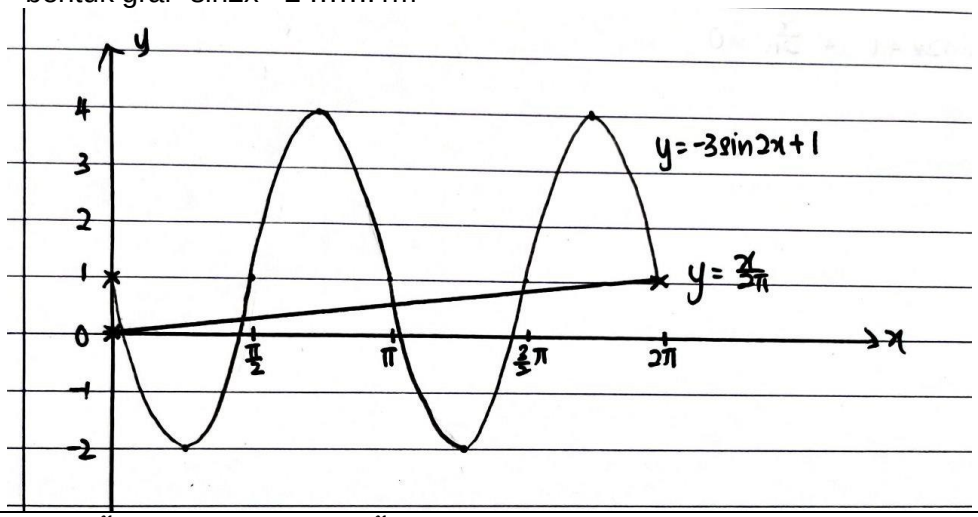
PERATURAN PERMAKAHAN
MATEMATIK TAMBAHAN
PEPERIKSAAN PERCUBAAN SPM 2022

NO. SOALAN	PEMARKAHAN	MARKAH
	BAHAGIAN A	
1.	**Nota**: K1 diberi pada salah satu persamaan yang tepat. K1 kedua diberi apabila KETIGA-TIGA persamaan betul. $x + y + z = 245$ … (1)	K1
	$20x + 30y + 40z = 7\,750$ atau $2x + 3y + 4z = 775$ … (2)	
	$(25 - 20)x + (35 - 30)y + (50 - 40)z = 1725$ $x + y + 2z = 345$ … (3)	K1
	(3) – (1) $\boldsymbol{z = 100}$ **(chocolate cake)** 2 x (3) $2x + 2y + 4z = 690$ (2) – (4) $\boldsymbol{y = 85}$ $(\boldsymbol{carrot\ cake})$	N1 K1 N1
	Dari (1), $x + 85 + 100 = 245$ $\boldsymbol{x = 60}$ **(banana cake)**	K1 N1
	JUMLAH	**7m**
2 (a)	$\frac{5 + \sqrt{7}}{5 - \sqrt{7}} \times \frac{5 + \sqrt{7}}{5 + \sqrt{7}}$ $\frac{32 + 10\sqrt{7}}{18}$ $\frac{16 + 5\sqrt{7}}{9}$	K1 K1 N1
2(b)	$(x - 4)\log 3 = (x - 3)log50$ $x(\log 3 - log50) = -3log50 + 4log3$ $x = 2.610$	K1 K1 N1
	JUMLAH	**6m**
3(a)	a = RM 28 000 , r = 1.035 $T_6 = ar^{n-1}$ $= RM\ 22\,800(1.035)^5$ $= RM\ 27\,079.25$	K1 N1
3(b)	$S_{12} = \frac{22\,800(1.035^6 - 1)}{1.035 - 1}$	K1

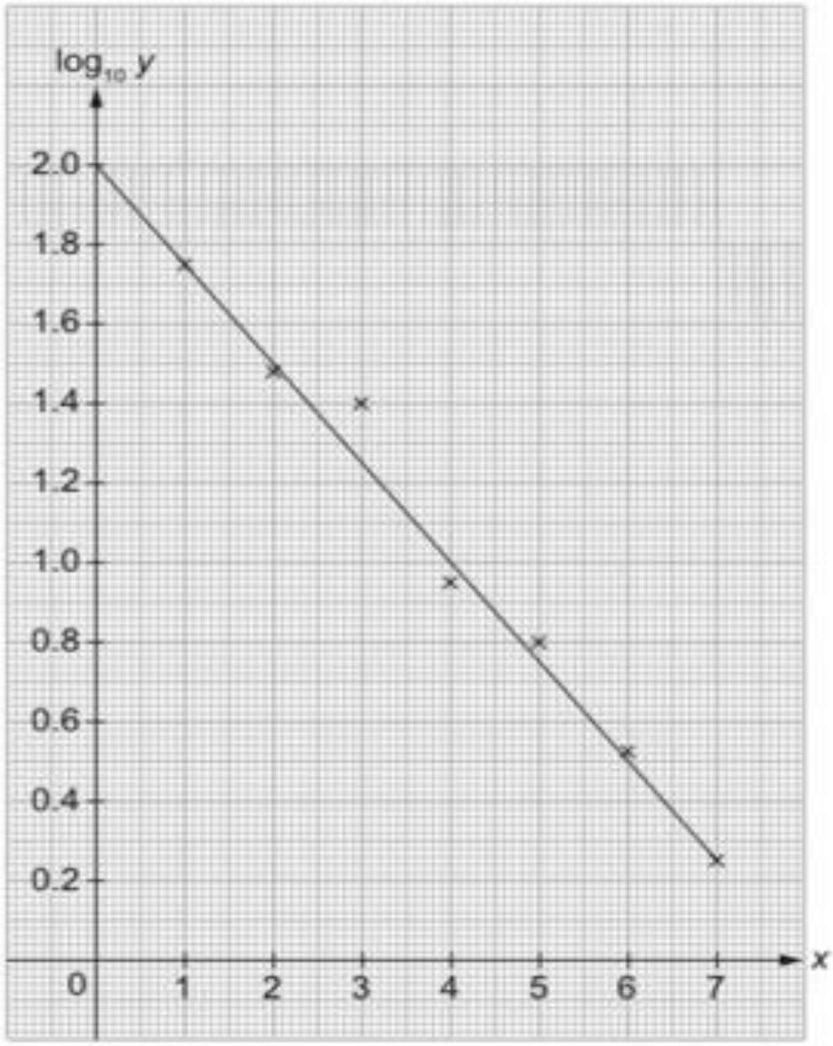
	$= RM\ 149\ 343.47$	N1
3(c)	T_n > RM40 000 $22\ 800\ (1.035)^{n-1} > 40\ 000$ $n - 1 > \dfrac{\log 1.7544}{\log 1.035}$ n = 18	 K1 K1 N1
	JUMLAH	**7m**
4(a)	HTP = $\frac{5}{3}$ HDP = $-\frac{2}{3}$	N1 N1
4(b)	(3x + 1)(x -2) = 0 $\alpha = 2\ dan\ \beta = \frac{1}{3}$ $HTP\ baru = \quad (\alpha - 1) + (\beta + \frac{3}{4}) \quad = \frac{17}{12} \quad @$ $HDP\ baru = (\alpha - 1 \text{ x } (\beta + \frac{3}{4}) = \frac{5}{12}$ $Persamaan\ baru\ \ x^2 - \frac{17}{12}x + \frac{5}{12} = 0$ $12x^2 - 17x + 5 = 0$	K1 N1 K1 N1
	JUMLAH	**6m**
5(a)	$1 - 2sin^2\theta = 1 - 2\ [kos^2\theta - 1\ ]$ $1 - 2sin^2\theta = 1 - 2\ kos^2\theta - 2]$ $1 - 2sin^2\theta = 2kos^2\theta - 1$	 K1 N1
5(b)	i) lakarkan graf $y = -3\sin 2x + 1$ - amplitud 3 ……1m - bentuk graf – sin 2x ….. 1m - bentuk graf -sin2x **+1** …….1m  	 P1 P1 P1
	ii) $y = \frac{x}{2\pi}$ dan graf $y = \frac{x}{2\pi}$ ……2m bilangan penyelesaian = 5 ……1m	K1,K1 N1
	JUMLAH	**8m**

6(a)	$Kecerunan, m_{AM} = -\frac{3}{2}$ $\therefore kecerunan, m_{BM} = \frac{2}{3}$ $\because y - 3 = \frac{2}{3}(x + 5)$ $y = \frac{2}{3}x + \frac{19}{3}$ $3y = 2x + 19$	 K1 N1
6(b)	$Koordinat\ C\ (-1, -3)$ $3k = 2(-8) + 19$ $k = 1$ $\therefore B(-8,1)$ $Luas = \frac{1}{2}\begin{vmatrix} -9 & 1 & -1 & -8 & -9 \\ 9 & 9 & -3 & 1 & 9 \end{vmatrix}$ $= \frac{1}{2}\left\lvert\left((-81) + (-3) + (-1) + (-72)\right) - \left(9 + (-9) + 24 + (-9)\right)\right\rvert$ $= \frac{1}{2}\lvert -157 - 33\rvert$ $= \frac{1}{2}\lvert -190\rvert$ $= 95\ unit^2$	P1 @P1 K1 N1
6(c)	$\sqrt{\left(x - (-9)\right)^2 + (y - 9)^2} = 10$ $\left(x - (-9)\right)^2 + (y - 9)^2 = 10^2$ $x^2 + y^2 + 18x - 18y + 62 = 0$ $B(-8,1)$ $(-8)^2 + (1)^2 + 18(-8) - 18(1) + 62 = -35$ $-35 \neq 0$ $\therefore Titik\ B\ tidak\ berada\ di\ atas\ Bulatan\ Z$	K1 N1 N1
	JUMLAH	**8m**
7(a)	$\frac{dy}{dx} = x[3(x-2)^2(1)] + (x-2)^3(1)$ $= 2(2x-1)(x-2)^2$	K1 N1
7(b)	$\frac{dy}{dx} = 0$ $2(2x-1)(x-2)^2 = 0$ $(2x-1) = 0\ \ atau\ (x-2)^2 = 0$ $x = \frac{1}{2}, x = 2$ $Apabila\ x = \frac{1}{2}, \quad y = \frac{1}{2}(\frac{1}{2} - 2)^3 = -\frac{27}{16}$ $Apabila\ x = 2, \quad y = 2(2-2)^3 = 0$	 K1 N1 K1 @K1

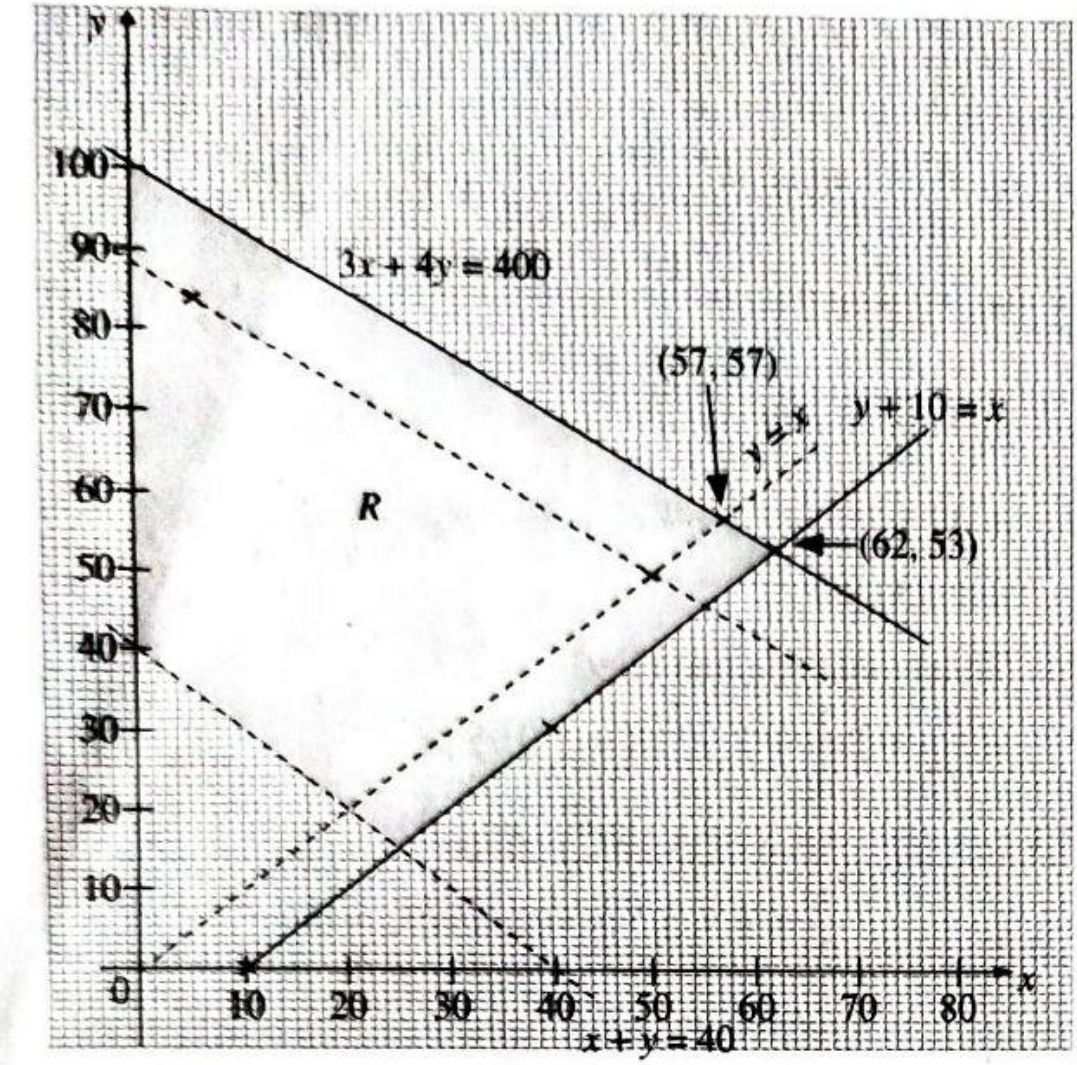
	$\therefore P\left(\frac{1}{2}, -\frac{27}{16}\right), Q(2,0)$	N1,N1
7(c)	Q ialah titik lengkok balas	N1
	JUMLAH	**8m**
	BAHAGIAN B	
8(a)	$batas\ rantau\ y = -1\ dan\ y = 3$ $luas = \int_{-1}^{3} -(y+1)(y-3)dy$ $= \int_{-1}^{3}(-y^2 + 2y + 3)\ dy$ $= [-\frac{y^3}{3} + \frac{2y^2}{2} + 3y]_{-1}^{3}$ $= [-\frac{3^3}{3} + 3^2 + 3(3)] - [-\frac{(-1)^3}{3} + (-1)^2 + 3(-1)]$ $= \frac{32}{3} unit^2$	K1 K1 K1 N1
8(b)	i) $x = 5 - 7, y = \frac{4}{5-y}$ $y^2 - 5y + 4 = 0$ $(y-4)(y-1) = 0$ y = 4, y = 1 A (1, 4) dan B (4, 1)	K1 N1
	ii) Isipadu $= \pi \int_1^4 (5-x)^2 dx - \pi \int_1^4 (\frac{4}{x})^2\ dx$ $= \pi \left[25x - 5x^2 + \frac{x^3}{3}\right]_1^4 - \pi \left[\frac{16x^{-1}}{-1}\right]_1^4$ $= \{\pi \left[25(4) - 5(4)^2 + \frac{(4)^3}{3}\right] - \left[25(1) - 5(1)^2 + \frac{(1)^3}{3}\right]\} - \pi \left[\frac{16}{(4)} - \left(-\frac{16}{(1)}\right)\right]$ $= 9\pi\ unit^3$	K1 K1 K1 N1
	JUMLAH	**10m**
9(a)		

x	1	2	3	4	5	6	7
$\log_{10} y$	1.75	1.48	1.40	0.95	0.80	0.53	0.25

N1

	Kesemua titik bagi $\log_{10} y$ betul *All points for* $\log_{10} y$ *are correct*  satu titik betul/*one point correct* semua titik betul/*all points correct* garis penyuaian terbaik/*line of best fit*	K1 K1 K1
9(b)	(i) $y_{\text{salah/wrong}} = 25.1$; $y_{\text{betul/correct}} = 17.78$ Kedua-dua nilai/*Both values* (ii) $\log_{10} y = -(\log_{10} n)x + \log_{10} m$ $-\log n$ = kecerunan/*gradient* $n = 1.778$ $\log_{10} m = 2.0$ $m = 100$	N1 P1 K1 N1 K1 N1
	JUMLAH	**10m**
10(a)	(i) n(0.2) = 50 n = 250	K1 N1

	(ii) ${}^{10}C_4 (0.2)^4 (0.8)^6$ $= 0.08808$	K1 N1
10(b)	$\mu = 3.1 \quad \sigma^2 = 0.09 \rightarrow \sigma = 0.3$ (i) $P(2.9 < Z < 3.1) = P(\frac{2.9-3.1}{0.3} < Z < \frac{3.3-3.1}{0.3})$ $= P(-\frac{2}{3} < Z < \frac{2}{3})$ $= 0.4950$ (ii) $P(X < m) = 0.25$ $P\left(Z < \frac{m-3.1}{0.3}\right) = 0.25$ $\frac{m-3.1}{0.3} = -0.674$ $m = 3.1 - 0.674(0.3)$ $m = 2.898\ kg$	 K1 K1 N1 K1 K1 N1
	JUMLAH	**10m**
11(a)	i) $\overrightarrow{OR} = \frac{1}{3}\overrightarrow{OA} + m\overrightarrow{PB}$ $\overrightarrow{OR} = (6-6m)\underset{\sim}{x} + 16m\underset{\sim}{y}$	K1 N1
	ii) $\overrightarrow{OR} = \frac{3}{4}\overrightarrow{OB} + n\overrightarrow{QA}$ $\overrightarrow{OR} = 18n\underset{\sim}{x} + (12-12n)\underset{\sim}{y}$	K1 N1
11(b)	$6-6m = 18n \ or \ 16m = 12-12n$ $m = 1-3n \ masukkan \ dalam \ 4(1-3n) = 3-3n$ $m = \frac{2}{3}$ $n = \frac{1}{9}$	P1 K1 N1 N1
11(c)	$\overrightarrow{PR} = -4\underset{\sim}{x} - \frac{32}{3}\underset{\sim}{y}$ $\left\|\overrightarrow{PR}\right\| = \sqrt{[-4(2)]^2 + [\frac{32}{3}(1)]^2}$ $\left\|\overrightarrow{PR}\right\| = \frac{40}{3}$units	 K1 N1
	JUMLAH	**10m**
BAHAGIAN C		
12(a)	$x + y > 40$ $3x + 4y \leq 400$ $x - y \leq 10$	N1 N1 N1

12(b)	Graf - Lukis 3 garis lurus - Lorekkan rantau R  	K1,K1 N1
12(c)	i) $y = x$ titik maksimum $= (57,57)$ kos maksimum $= 3(57) + 4(57) =$ RM399 peruntukan minimum $=$ RM 400 $-$ RM 399 $=$ RM 1 ii) $3x + 4y = 350$ Titik maksimum= (62, 53) $x_{maksimum} = 62$	K1 N1 K1 N1
	JUMLAH	**10m**
13(a) i)	$AC^2 = 7^2 + 8^2 - 2(7)(8)kos\ 80^o$ $AC = 9.6722\ cm$	K1 N1
13(a) ii)	$9.6722^2 = 3^2 + AD^2 - 2(3)(AD)kos\ 100^o$ $AD = 8.68899\ cm$	P1

	$\frac{\sin \angle C}{8.68899} = \frac{\sin 100^o}{9.6722}$ *OR/ATAU* $8.68899^2 = 9.6722^2 + 3^2 - 2(9.6722)(3)kos\ \angle C$ $\angle C = 62.2145^o$	K1 @K1 N1
13(b) i)	$s = \frac{9.6722 + 7 + 8}{2} = 12.3361$ $luas = \sqrt{12.3361(12.3361 - 9.6722)(12.3361 - 7)(12.3361 - 8)}$ $luas = 27.5746\ cm^2$	K1 K1 N1
13(b) ii)	$\frac{1}{2}(9.6722)BX = 27.5746$ $Jarak\ terdekat\ BX = 5.7018\ cm$	K1 N1
	JUMLAH	**10m**
14(a)	$\frac{P_{2019}}{8.50} \times 100 = 140$ $P_{2019} = RM11.90$	K1 N1
14(b)	$B = 30$ $\bar{I} = \frac{90(50)+160(30)+140(10)+120(10)}{50+30+10+10}$ $= 119$ $\frac{61\,750}{Q2016} \times 100 = 119$ $Q2016 = RM51\,890.76$	P1 K1 N1 K1 N1
14(c)	$x = \frac{165 \times 119}{100}$ $= 196.35$ Kenaikan sebanyak 96.35% dari tahun 2016 ke tahun 2021	K1 N1 N1
15(a)	$= \int (8 - 2t)dt$ $= 8t - t^2 + c$ $t = 2, v = 16,$ $16 = 8(2) - (2)^2 + c$ $16 = 16 - 4 + c$ $c = 4$ $8(0) - (0)^2 + 4$ $4ms^{-1}$	 K1 K1 K1 N1
15(b)	$\frac{dv}{dt} = a = 0$ $8 - 2t = 0$	

	$t = 4$ $8(4) - (4)^2 + 4$ $20ms^{-1}$	K1 K1 N1
15(c)	Jarak dilalui dalam saat ke-3, *Distance travelled in the 3rd second,* $s = \int_2^3 (8t - t^2 + 4)\, dt$ $= \left[4t^2 - \frac{1}{3}t^3 + 4t\right]_2^3$ $= \left[4(3)^2 - \frac{1}{3}(3)^3 + 4(3)\right]$ $- \left[4(2)^2 - \frac{1}{3}(2)^3 + 4(2)\right]$ $= 17\frac{2}{3}$ m	K1 K1 N1
	JUMLAH	**10m**