3472/1

MATEMATIK TAMBAHAN

KERTAS 1

2 JAM

NAMA: ……..

TINGKATAN: ……..

MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
NEGERI PERAK

MODUL KECEMERLANGAN SPM 2023
SET 1

MATEMATIK TAMBAHAN

KERTAS 1

SKEMA JAWAPAN

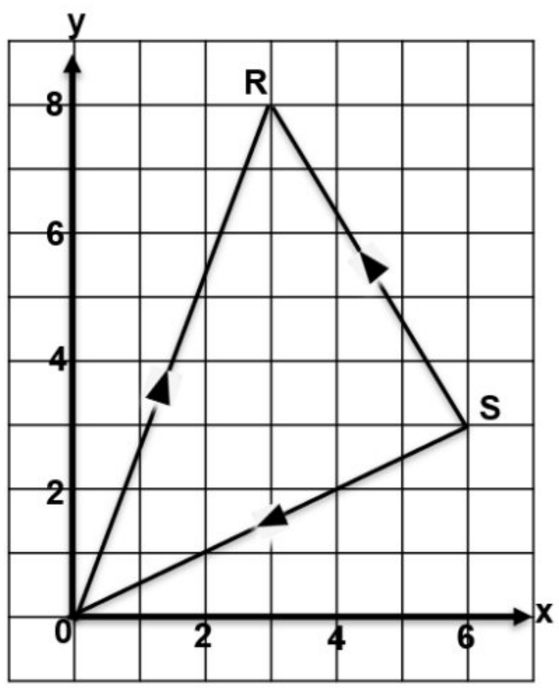
NO.	BUTIRAN	MARKAH	JUMLAH
1	$\underset{x\to -2}{had}\left(\frac{x+2}{\sqrt{5x+14}-2}\right)\left(\frac{\sqrt{5x+14}+2}{\sqrt{5x+14}+2}\right)$	1	4
	$\underset{x\to -2}{had}\frac{(x+2)\left(\sqrt{5x+14}+2\right)}{(5x+14)+2\sqrt{5x+14}-2\sqrt{5x+14}-4}$	1	
	$\underset{x\to -2}{had}\frac{(x+2)\left(\sqrt{5x+14}+2\right)}{5(x+2)}$		
	$\frac{\sqrt{5(-2)+14}+2}{5}$	1	
	$\frac{4}{5}$	1	

NO.	BUTIRAN	MARKAH	JUMLAH
2	${}^{n}C_{3} = 4 \times {}^{n-2}C_{2}$ $\frac{n!}{3!(n-3)!} = 4 \times \frac{(n-2)!}{2!(n-4)!}$ $\frac{n(n-1)(n-3)!}{3!(n-3)!} = 4 \times \frac{(n-2)(n-3)(n-4)!}{2!(n-4)!}$ $n^2 - 13n + 36 = 0$ (sekiranya ada langkah kerja ketiga) $n = 4 \quad atau \quad n = 9$	**1** **1** **1**	**3**

NO.	BUTIRAN			MARKAH	JUMLAH
3	(a)	(i)	<table><tr><td>x</td><td>-2</td><td>1</td><td>3</td></tr><tr><td>f(x)</td><td>3</td><td>0</td><td>2</td></tr></table>	**1**	**6**
		(ii)	f(x) = $\|x - 1\|$	**1**	
		(iii)	Julat/Range: $0 \leq f(x) \leq 3$	**1**	
	(b)		$h^2(\mathrm{x}) = \mathrm{hh}(\mathrm{x}) = \mathrm{h}\left(\frac{1}{2\mathrm{x}}\right) = \frac{1}{2\left(\frac{1}{2\mathrm{x}}\right)} = x$ $h^3(\mathrm{x}) = \mathrm{h}h^2\left(\frac{1}{2\mathrm{x}}\right) = \mathrm{h}(\mathrm{x}) = \frac{1}{2\mathrm{x}}$ $h^4(\mathrm{x}) = h^2h^2(\mathrm{x}) = h^2(\mathrm{x}) = x$	**1** **1** **1**	

NO.		BUTIRAN	MARKAH	JUMLAH
4	(a)	m=$-\frac{2}{4}$ atau m=-$\frac{2-0}{0-4}$ y= =$-\frac{1}{2}x+2$	**1** **1**	**4**
	(b)	$4=-\frac{1}{2}x+2$ $x=-4$	**1** **1**	

NO.			BUTIRAN			MARKAH	JUMLAH
5	(a)	(i)	$\int \frac{m}{x^n}dx$	y	y	**1**	**6**
			$\int \frac{m}{x^2}dx$	$-\frac{m}{x}+c$	$-\frac{m}{(2-1)x^{2-1}}+c$		
			$\int \frac{m}{x^3}dx$	$-\frac{m}{2x^2}+c$	$-\frac{m}{(3-1)x^{3-1}}+c$		
			$\int \frac{m}{x^4}dx$	$-\frac{m}{3x^3}+c$	$-\frac{m}{(4-1)x^{4-1}}+c$	**1**	
			$\int \frac{m}{x^5}dx$	$-\frac{m}{4x^4}+c$	$-\frac{m}{(5-1)x^{5-1}}+c$	**1**	
	(a)	(ii)	Jika y = $\frac{m}{x^n}$, maka $\int \frac{m}{x^n}dx=-\frac{m}{(n-1)x^{n-1}}+c$			**1**	
	(b)		$\int \frac{2}{x^2}\ dx=-\frac{2}{(2-1)x^{2-1}}+c$ $\int \frac{2}{x^2}\ dx=-\frac{2}{x}+c$			**1,1** **1**	

NO.		BUTIRAN	MARKAH	JUMLAH
6	(a)		**1,1**	**4**
	(b)	$\overrightarrow{SR} = \overrightarrow{S0} + \overrightarrow{0R}$ $\overrightarrow{SR} = -6\mathbf{i} - \mathbf{3j} + \mathbf{3i} + 8\mathbf{j}$ $\overrightarrow{SR} = -(6+3)\mathbf{i} + (-\mathbf{3} + \mathbf{8})\mathbf{j}$ $\overrightarrow{SR} = -3\mathbf{i} + \mathbf{5j}$ vektor unit dalam arah $\overrightarrow{SR} = \frac{1}{\sqrt{34}}(-3\boldsymbol{i} + 5\boldsymbol{j})$	**1** **1**	

NO.			BUTIRAN	MARKAH	JUMLAH
7	(a)	(i)	$S_n = a + ar + ar^2 + \ldots\ldots + ar^{n-2} + ar^{n-1}$ $rS_n = ar + ar^2 + ar^3 + \ldots\ldots + ar^{n-1} + ar^n$ $S_n - rS_n = a - ar^n$ $(1 - r)S_n = a - ar^n$ $S_n = \frac{a(1-r^n)}{1-r}$	**1** **1**	**7**
		(ii)	Hasil tambah $= \frac{64(1-(\frac{1}{2})^8)}{1-(\frac{1}{2})} - \frac{64(1-(\frac{1}{2})^5)}{1-(\frac{1}{2})}$ $= \frac{7}{2}$	**1** **1**	
	(b)		$ar^5 = (ar)(ar^3)$ $a = r$ $a(a^7) = 256$ $a^8 = 256$ $a = 2$	**1** **1** **1**	

NO.		BUTIRAN	MARKAH	JUMLAH
8	(a)	$p = \log_a x$		7
		$x^n = (a^p)^n$	**1**	
		$\log_a x^n = \log_a (a^{np})$		
		$\log_a x^n = np$	**1**	
		$\log_a x^n = n(\log_a x)$	**1**	
	(b)	$I_0 e^{-1.4x} = ½ I_0$	**1**	
		$\ln e^{-1.4x} = \ln(½)$	**1**	
		$-1.4x = \ln(½)$	**1**	
		$x = 0.4951$	**1**	

NO.		BUTIRAN	MARKAH	JUMLAH
9	(a)	$CD = 60.72 - 12 - 12 - 8 - 8$	**1**	**7**
		$AB = 20.72$		
		$20.72^2 = 12^2 + 12^2 - 2(12)(12)\cos\theta$	**1**	
		$\theta = 119.39°$		
		$\theta = 2.084$ rad	**1**	
	(b)	$S = (2.5)(3.928)$	**1**	
		$S = 9.82$		
		$9.82 = 4.8\theta$	**1**	
		$\theta = 2.046$ rad		
		Luas = $½ (4.8)^2(2.046)$	**1**	
		Luas = 23.57	**1**	

NO.		BUTIRAN	MARKAH	JUMLAH
10	(a)	$\alpha + \beta = -1$ dan $\alpha\beta = -\frac{3}{2}$	**1**	**6**
		$\frac{2}{\alpha} + \frac{2}{\beta} = \frac{4}{3}$ dan $\left(\frac{2}{\alpha}\right)\left(\frac{2}{\beta}\right) = -\frac{8}{3}$	**1**	
		$3x^2 - 4x - 8 = 0$	**1**	
	(b)	$\frac{30}{2} = 3b$	**1**	
		$b = 5$		
		$-\frac{a}{2} = 3 + b$	**1**	
		$a = -16$	**1**	

NO.		BUTIRAN	MARKAH	JUMLAH
11.	(a)	$m = 1 - \frac{1}{27} - \frac{8}{27} - \frac{13}{27}$	**1**	
		$m = \frac{5}{27}$		
		$P(X=0) = \frac{1}{27}$		
		${}^3C_0\ (p)^0(q)^{3-0} = \frac{1}{27}$		
		$q^3 = \frac{1}{27}$	**1**	**5**
		$q = \frac{1}{3}$		
		$p + q = 1$		
		$p + \frac{1}{3} = 1$		
		$p = \frac{2}{3}$	**1**	
	(b)	$P(X< 3) = P(X=0) + P(X=1) + P(X=2)$		
		$P(X< 3) = \frac{1}{27} + \frac{8}{27} + \frac{13}{27}$	**1**	
		$= \mathbf{\frac{22}{27}}$	**1**	

NO.	BUTIRAN	MARKAH	JUMLAH
12	Use the formula V = $\pi\int y^2 dx$ V = $\int_0^h (\frac{R^2x^2}{h^2})dx$ V = $[\frac{R^2x^3}{3h^2}]_0^h$	**1**	**5**
	V = $[\frac{R^2(h)^3}{3h^2} - \frac{R^2(0)^3}{3h^2}]$	**1**	
	V = $\frac{1}{3}\pi R^2 h$ Sub h = R and Volume = 9 π		
	$\frac{1}{3}\pi R^2(R) = 9\pi$ $\frac{1}{3}R^3 = 9$ $R^3 = 27$	**1**	
	$R = \sqrt[3]{27}$	**1**	
	R = 3	**1**	

NO.			BUTIRAN			MARKAH	JUMLAH
13	(a)	(i)	Persamaan *BC*	atau	Persamaan *AC*		
			$4 = \frac{1}{2}(-1) + c$		$1 = \frac{3}{2}(1) + c$	**1**	
			$\frac{1}{2}x + \frac{9}{2} = \frac{3}{2}x - \frac{1}{2}$			**1**	
			$C(5,7)$			**1**	**8**

		(ii)	**Tidak boleh.** (*Layak mendapat markah sekiranya ada justifikasi yang betul diberi*). Gantikan $(3,4)$ dalam persamaan *AC* $4=\frac{3}{2}(3)-\frac{1}{2}$ $4=4$ (mesti berjaya tunjukkan) Kerana pondok rehat itu akan berada di atas garisan tanah sempadan.	**1** **1**	
	(b)		**Bulatan.** $\sqrt{(x-1)^2+(y-3)^2}=1$ $x^2+y^2-2x-6y+9=0$	**1** **1** **1**	

NO.		BUTIRAN	MARKAH	JUMLAH
14	(a)	$216\pi = (½)4\pi r^2 + 2\pi rh$ $h=\frac{108-r^2}{r}$ $V=\left(\frac{1}{2}\right)\left(\frac{4}{3}\pi r^3\right)+\pi r^2\left(\frac{108-r^2}{r}\right)$ $V=108\pi r-\frac{1}{3}\pi r^3$	**1** **1**	**8**
	(b)	$\frac{dV}{dr}=108\pi-\pi r^2$ $108\pi - \pi\, r^2 = 0$ $r = 10.39$	**1** **1** **1**	
	(c)	$A = 2\,(3.142)(10.39)^2$ $A = 678.37$ Kos = 678.37 x RM15 Kos = RM10176	**1** **1** **1**	

NO.		BUTIRAN	MARKAH	JUMLAH
15	(a)	$\frac{tan\theta + tan\frac{\pi}{4}}{1 - tan\theta tan\frac{\pi}{4}}$ $\frac{tan\theta + (1)}{1 - tan\theta(1)}$	**1** **1**	
	(b)	$tan\frac{11\pi}{12} = tan\left(\frac{2\pi}{3} + \frac{\pi}{4}\right)$ $\frac{1 + tan\frac{2\pi}{3}}{1 - tan\frac{2\pi}{3}}$ $\frac{1 - \sqrt{3}}{1 + \sqrt{3}}$ $\frac{1-\sqrt{3}}{1+\sqrt{3}} \times \frac{1-\sqrt{3}}{1-\sqrt{3}}$ $\frac{1 - \sqrt{3} - \sqrt{3} + 3}{1 + \sqrt{3} - \sqrt{3} - 3}$ $-2 + \sqrt{3}$	**1** **1** **1** **1** **1**	**8**

Selamat mengulangkaji dari telegram@soalanpercubaanspm