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MODUL PINTAS
TINGKATAN 5

3472/2

MATEMATIK TAMBAHAN
Kertas 2

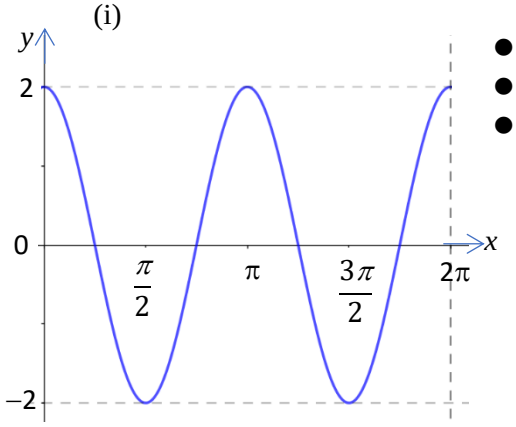
$2\frac{1}{2}$ jam

Dua jam tiga puluh minit

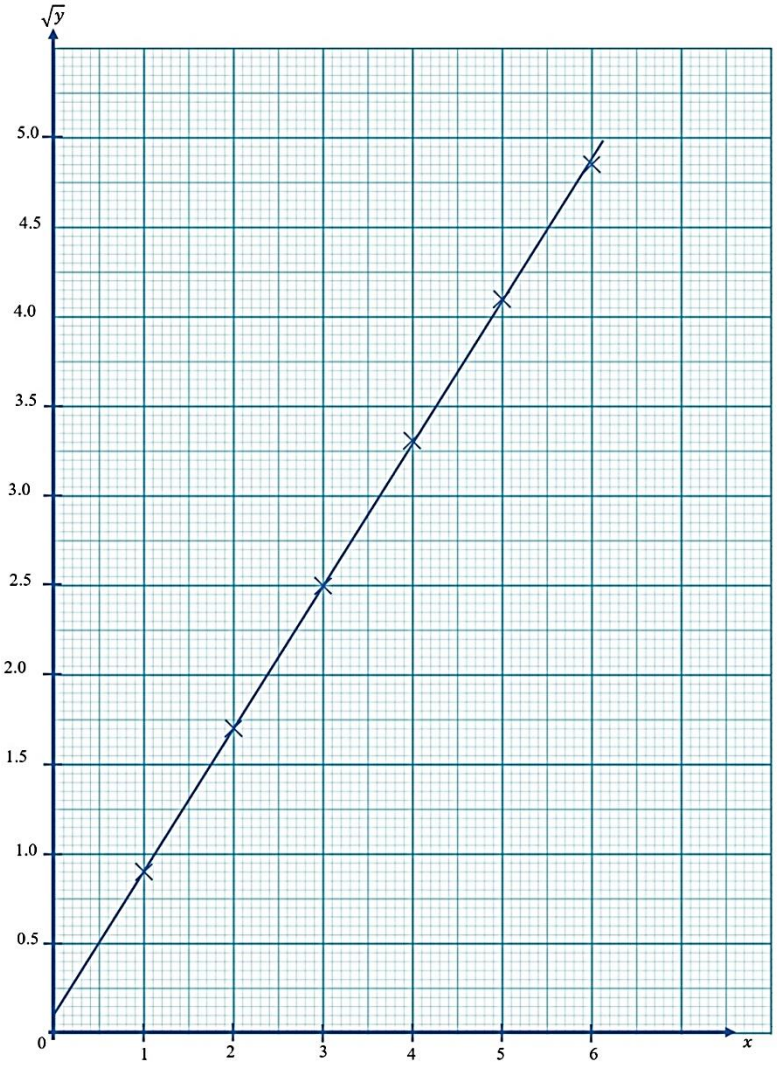
PERATURAN PEMARKAHAN MATEMATIK TAMBAHAN K2 3472/2

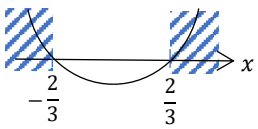
NO.	PENYELESAIAN	MARKAH		
1	(a) (i) $\frac{3}{2}\left(2\underline{i}+4\underline{j}\right)$ ATAU $\frac{3}{2}\begin{pmatrix}2\\4\end{pmatrix}$	K1		
	$3\underline{i}+6\underline{j}$ ATAU $\begin{pmatrix}3\\6\end{pmatrix}$			
	(3, 6)	N1		
	(ii) $\overrightarrow{OS}=\overrightarrow{OP}+\frac{1}{6}\overrightarrow{PQ}$ ATAU $\overrightarrow{OS}=\overrightarrow{OQ}+\frac{5}{6}\overrightarrow{QP}$	K1	4	
	$6\underline{i}+\frac{1}{6}\left(-6\underline{i}+\left(3\underline{i}+6\underline{j}\right)\right)$ ATAU $\begin{pmatrix}6\\0\end{pmatrix}+\frac{1}{6}\begin{pmatrix}-6+3\\6\end{pmatrix}$			
	$\left(3\underline{i}+6\underline{j}\right)+\frac{5}{6}\left(-3\underline{i}-6\underline{j}+6\underline{i}\right)$ ATAU $\begin{pmatrix}3\\6\end{pmatrix}+\frac{5}{6}\begin{pmatrix}-3+6\\-6\end{pmatrix}$			
	$\left(\frac{11}{2},1\right)$	N1		
	(b) $-2\underline{i}-4\underline{j}+\frac{11}{2}\underline{i}+\underline{j}$ ATAU $\begin{pmatrix}-2\\-4\end{pmatrix}+\begin{pmatrix}\frac{11}{2}\\1\end{pmatrix}$	K1		**8**
	$\frac{7}{2}\underline{i}-3\underline{j}$ ATAU $\begin{pmatrix}\frac{7}{2}\\-3\end{pmatrix}$			
	$\sqrt{\left(\frac{7}{2}\right)^2+(-3)^2}$	K1		
	$\frac{\sqrt{85}}{2}$		4	
	$\frac{1}{\frac{\sqrt{85}}{2}}\left(\frac{7}{2}\underline{i}-3\underline{j}\right)$ ATAU $\frac{1}{\frac{\sqrt{85}}{2}}\begin{pmatrix}\frac{7}{2}\\-3\end{pmatrix}$	K1		
	$\frac{7\sqrt{85}}{85}\underline{i}-\frac{6\sqrt{85}}{85}\underline{j}$ ATAU $\begin{pmatrix}\frac{7\sqrt{85}}{85}\\-\frac{6\sqrt{85}}{85}\end{pmatrix}$	N1		
2	(a) $\frac{1}{2}\left(2+\sqrt{3}\right)\left(3+\sqrt{48}\right)$	K1		
	$\frac{1}{2}\left(6+2\sqrt{48}+3\sqrt{3}+\sqrt{144}\right)$	K1	3	
	$9+\frac{11}{2}\sqrt{3}$	N1		
	(b) $\frac{1}{2}\log_a\frac{48\times0.25}{3^5}$ atau $\log_a\left(\frac{48\times0.25}{3^5}\right)^{\frac{1}{2}}$	K1		**7**
	$\log_a\left(\frac{4}{81}\right)^{\frac{1}{2}}$ ATAU $P^2=\frac{4}{81}$	K1	4	
	$\frac{2}{9}$	N1		
	2	N1		

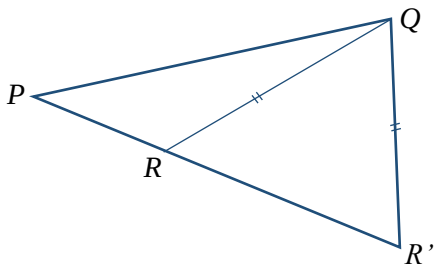
NO.	PENYELESAIAN	MARKAH		
3	$x + y + z = 17$, $x + 2y = 2z + 4$	P1, P1		
	$100z + 10y + x = 3(100x + 10y + z) - 79$	K1		
	$97z = 299x + 20y - 79$ (tertunjuk)			
	Hapus satu pemboleh ubah			
	$x + y + \left(\frac{x+2y-4}{2}\right) = 17$ ATAU cara lain yang setara	K1		
	$3x + 4y = 38$ atau $3z - y = 13$ atau $x + 4z = 30$		7	**7**
	$x = \frac{38-4y}{3}$ atau $y = 3z - 13$ atau $z = \frac{30-x}{4}$ ATAU			
	$y = \frac{38-3x}{4}$ atau $z = \frac{y+13}{3}$ atau $x = 30 - 4z$			
	Hapus dua pemboleh ubah			
	$299(30 - 4z) + 20(3z - 13) - 97z = 79$ atau setara	K1		
	$x = 2$ atau $y = 8$ atau $z = 7$	N1		
	Nombor asal ialah 287	N1		
4	(a) …, a, $a + d$, $a + 2d$, …, $a + 5d$, …	K1		
	$\frac{a + 2d}{a + d} = \frac{a + 5d}{a + 2d}$	K1		
	$d = -2a$	K1	4	**7**
	$r = 3$	N1		
	(b) $\frac{n}{2}[2(1) + (n - 1)3] = 925$	K1		
	$(n - 25)(3n + 74) = 0$	K1	3	
	$T_{25} = 1 + (25 - 1)(3) = 73$	N1		
5	(a) $\frac{360^\circ}{7} \times \frac{3.142}{180}$			
	0.8977	N1	1	
	(b) $\angle AOD = 3\left(\frac{360^\circ}{7}\right) = 154.29^\circ$ // 2.963 rad.	P1		
	$(5)\sin\left(\frac{154.29^\circ}{2}\right)$ atau $(5)(0.8977)$ ATAU	K1		
	$5^2 + 5^2 - 2(5)(5)\cos 154.29^\circ$			**7**
	$7\left[2(5)\sin\left(\frac{154.29^\circ}{2}\right)\right] + 3(5)(0.8977)$ ATAU	K1	4	
	$7 \times \sqrt{5^2 + 5^2 - 2(5)(5)\cos 154.29^\circ} + 3(5)(0.8977)$			
	= 81.71 cm			
	81.71 cm dan cukup	N1		
	81.71 cm and e*nough*			

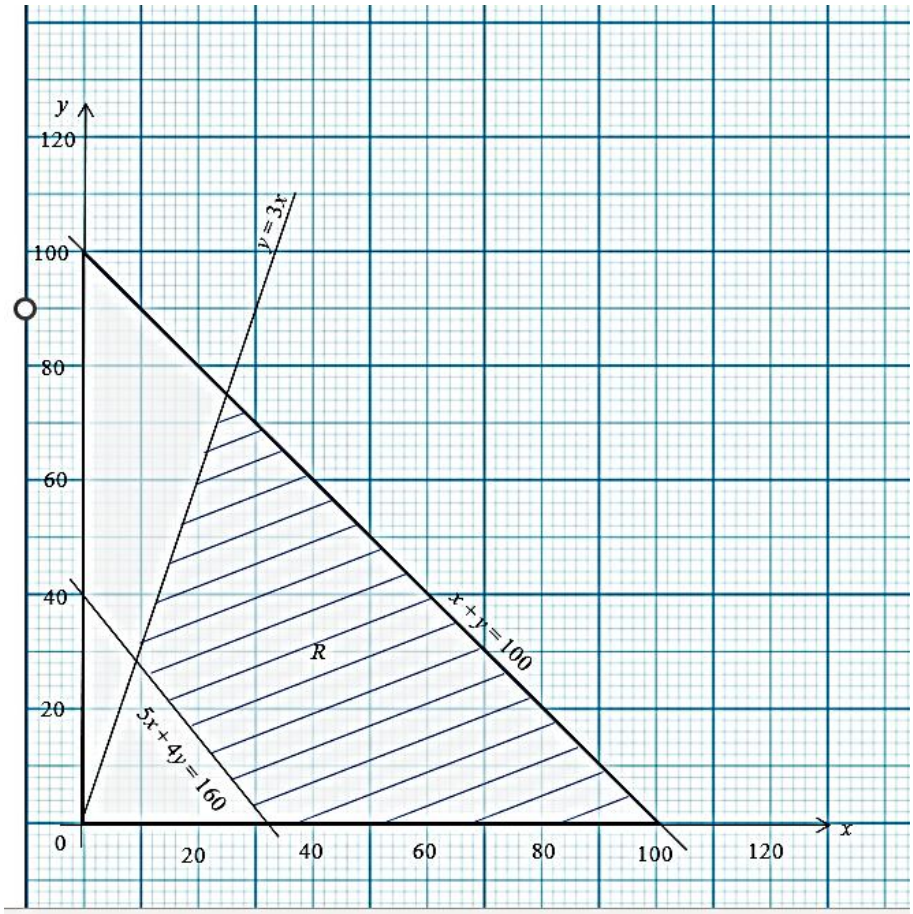
NO.	PENYELESAIAN	MARKAH		
	(c) $3\left[\frac{1}{2}(5)^2\left(0.8977-\sin\left(\frac{360}{7}\right)°\right)\right]$ $4{\cdot}345\ \text{cm}^3$	K1 N1	2	
6	(a) $x^2=-x^2+4$ $x=\sqrt{2}$	K1 N1	2	**8**
	(b) $\int_0^{\sqrt{2}}x^2\ dx+\int_{\sqrt{2}}^{2}-x^2+4\ dx$ $=\left[\frac{x^3}{3}\right]_0^{\sqrt{2}}+\left[\frac{-x^3}{3}+4x\right]_{\sqrt{2}}^{2}$ $=\left[\frac{\sqrt{2}^3}{3}-0\right]+\left[\left(-\frac{2^3}{3}+4(2)\right)-\left(-\frac{\sqrt{2}^3}{3}+4\sqrt{2}\right)\right]$ $=\frac{16-8\sqrt{2}}{3}\ \text{unit}^2$ or $1{\cdot}562\ \text{unit}^2$	K1 K1 N1	3	
	(c) $\pi\int_2^4 4-y\ dy\ +\pi\int_0^2 y\ dy$ $=\pi\left[4y-\frac{y^2}{2}\right]_2^4+\pi\left[\frac{y^2}{2}\right]_0^2$ $=\pi\left[\left(4(4)-\frac{4^2}{2}\right)-\left(4(2)-\frac{2^2}{2}\right)\right]+\pi\left[\frac{2^2}{2}-0\right]$ $=4\pi\ \text{unit}^3$	K1 K1 N1	3	
7	(a) $2\left[\frac{\frac{\cos x}{\sin x}-\frac{\sin x}{\cos x}}{\left(\frac{1}{\cos x}\right)\left(\frac{1}{\sin x}\right)}\right]$ $2(kos^2\,x-\sin^2 x)=2\cos 2x$	K1 N1	2	**6**
	(b) (i)  ● bentuk kos x ● ulang 2 kitaran ● $-2\le y\le 2$ (ii) $2\le n\le 4$	P1 P1 P1 N1	4	

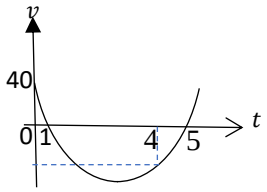
NO	PENYELESAIAN		MARKAH		
8	(a) (i)	$^5C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^1$	K1		
		$=\frac{80}{243}=0.3292$	N1		
	(ii)	$^5C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^2$ ATAU $^5C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^1$ ATAU $^5C_5\left(\frac{1}{3}\right)^5\left(\frac{2}{3}\right)^0$ ATAU $^5C_2\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^3$ ATAU $^5C_1\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^4$ ATAU $^5C_0\left(\frac{2}{3}\right)^0\left(\frac{1}{3}\right)^5$	K1	5	
		$^5C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^2+{}^5C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^1+{}^5C_5\left(\frac{1}{3}\right)^5\left(\frac{2}{3}\right)^0$ ATAU $^5C_2\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^3+{}^5C_1\left(\frac{2}{3}\right)^1\left(\frac{1}{3}\right)^4+{}^5C_0\left(\frac{2}{3}\right)^0\left(\frac{1}{3}\right)^5$	K1		**10**
		$=\frac{17}{81}=0.2099$	N1		
	(b) (i)	$P\left(Z>\frac{2.28-2}{0.3}\right)$	K1		
		= 0.1753 // 0.1754 (daripada Jadual)			
		= 17.53% // 17.54%	N1		
	(ii)	$P\left(Z<\frac{m-2}{0.3}\right)=0.15$ (terima ≤)	K1	5	
		$\frac{m-2}{0.3}=-1.036$	K1		
		m = 1.689	N1		

NO	PENYELESAIAN	MARKAH		
9	(a) $\sqrt{y}$ | 0.91 | 1.69 | 2.5 | 3.3 | 4.1 | 4.85	N1	4	**10**
	Plot paksi-$\sqrt{y}$ melawan paksi-x dengan skala seragam yang betul dan satu titik diplot dengan betul.	K1		
	Keenam-enam titik diplot dengan betul.	N1		
	Garis lurus penyuaian terbaik.	N1		
				
	(b) (i) $\sqrt{y} = \frac{4}{p}x - \frac{4q}{p}$	P1	6	
	$\frac{4}{p} = \frac{4.1^* - 0.1^*}{5^* - 0^*}$ * bagi mana-mana dua pasangan titik di atas garis lurus penyuaian terbaik	K1		
	p =5 ~ 5.11	N1		
	$-\frac{4q}{p} = 0.10^*$ * merujuk pintasan-y dalam graf	K1		
	$q = -0.19 \sim -0.13$	N1		
	(ii) 2.03 ~ 2.18	N1		

NO	PENYELESAIAN	MARKAH		
10	(a) $\frac{2-(-7)}{8-p} = -\frac{1}{\frac{10-2}{2-8}}$	K1	2	**10**
	$p = -4$	N1		
	(b) $y-(-7) = -\frac{4}{3}(x-(-4))$	K1	3	
	$y = -\frac{4}{3}x - \frac{37}{3}$	N1		
	$q = 1$	N1		
	(c) $\frac{1}{2}\|(-10)(-7)+(-4)2+8(10)+2(1)-1(-4)-(-7)(8)-(2)(2)-10(-10)\|$	K1	2	
	ATAU $\sqrt{(8-2)^2+(2-10)^2} \times \sqrt{\left(8-(-4)\right)^2+\left(2-(-7)\right)^2}$			
	150	N1		
	(d) $\sqrt{(x-(-10))^2+(y-1)^2}$ atau $\sqrt{(x-8)^2+(y-2)^2}$	P1	3	
	$2\sqrt{(x-(-10))^2+(y-1)^2} = 3\sqrt{(x-8)^2+(y-2)^2}$	K1		
	$5x^2+5y^2-224x-28y+208=0$	N1		
11	(a) (i) tidak tertakrif // tiada jawapan *undefined // no solution*	N1	4	**10**
	(ii)			
	x | −0.1 | −0.01 | −0.001 | −0.0001 | 0 $f(x)$ | −11.9666 | −11.9967 | −11.9997 | −12.0000 | -	N1		
	x | 0.1 | 0.01 | 0.001 | 0.0001 | 0 $f(x)$ | −12.0332 | −12.0033 | −12.0003 | −12.0000 | -	N1		
	SS-1 jika nilai dalam jadual tidak tepat kepada 4 tempat perpuluhan			
	(iii) −12	N1		
	(b) $\frac{dy}{dx} = (1)(x^2-4)+x(2x)$	K1	6	
	$= 3x^2-4$	N1		
	$\frac{d^2y}{dx^2} = 6x$	N1		
	$x\frac{d^2y}{dx^2}+\frac{dy}{dx} = x(6x)+3x^2-4$			
	$x\frac{d^2y}{dx^2}+\frac{dy}{dx} = 9x^2-4$	N1		
	$9x^2-4>0$			
	$(3x+2)(3x-2)>0$ dan $x < -\frac{2}{3}$ atau / *or* $x > \frac{2}{3}$ 	K1 N1		

NO	PENYELESAIAN	MARKAH		
12	(a) $\frac{1}{2}(7.2+3.646+4.992)$ $\sqrt{(7.919)(7.919-7.2)(7.919-3.646)(7.919-4.992)}$ 8.439 SS-1 jika mencari luas dengan sudut *P*, *Q* atau *R*.	P1 K1 N1	3	**10**
	(b) Rumus Kosinus diguna dengan betul $kosP = \frac{7.2^2+4.992^2-3.646^2}{2(7.2)(4.992)}$ ATAU $\frac{1}{2}(7.2)(4.992)\sin P = 8.439$ atau setara 28.01°	K1 N1	2	
	(c) (i)  $\angle QR'P$ mesti sudut tirus	 N1	5	
	(ii) $\frac{sinR'}{7.2} = \frac{sin28.01^\circ}{3.646}$ atau setara 68.03°	K1 N1		
	(iii) $sin28.01^\circ = \frac{t}{7.2}$ atau $sin68.03^\circ = \frac{t}{3.646}$ (*t* boleh diganti oleh mana-mana simbol atau huruf) 3.381	K1 N1		

NO	PENYELESAIAN	MARKAH		
13	(a) I : $y \leq 3x$ II : $5x + 4y \geq 160$	N1 N1	2	**10**
	(b) Jumlah jisim udang dan ikan pari yang dibeli tidak lebih daripada 100 kg. *Total mass of prawn and stingray bought is not more than* 100 kg.	N1	1	
	(c) Satu garis lurus dan kedua-dua paksi dilukis dengan skala yang betul. Semua garis dilukis dengan betul. Rantau R dilorek dengan tepat.  	K1 N1 N1	3	
	(d) (i) Bila y = 20 kg, minimum x = 16 kg 16 kg (ii) Fungsi objektif kos, $K = 25x + 20y$ Titik optimum (100, 0) Amaun maksimum wang yang dibayar = RM [25(100) + 20(0)] = RM2500	 N1 P1 K1 N1	4	

NO	PENYELESAIAN	MARKAH		
14	(a) $v = 8t^2 - 48t + 40$ $s = \frac{8t^3}{3} - 24t^2 + 40t$ $16t - 48 = 0 \Rightarrow t = 3$ $s = \frac{8(3)^3}{3} - 24(3)^2 + 40(3)$ $= -24$	K1 K1 K1 N1	4	**10**
	(b) Bila bola snuker bertukar arah, $v = 0$ $8t^2 - 48t + 40 = 0$ $8(t-1)(t-5) = 0$ $t = 1$ or $t = 5$	 K1 K1 N1	3	
	(c) Bila $a = 16$ ms^{-2}, $16t - 48 = 16$ ATAU ◡ dengan pintsan-y = 40 $t = 4$ Bila $t = 4$, $v = 8(4)^2 - 48(4) + 40$ ATAU garis $x = 4$ dilukis kepada graf dan menuju ke nilai v negatif $v = -24$  Halaju negatif menunjukkan bola snuker bergerak ke arah kiri apabila pecutannya ialah 16 ms^{-2}.	K1 K1 N1	3	
15	(a) $\frac{P_{2021}}{75} \times 100 = 145$ RM108.75	K1 N1	2	**10**
	(b) $\frac{(138\times10)+(30\times h)+(145\times40)+(108\times20)}{100}$ $\frac{(138\times10)+(30\times h)+(145\times40)+(108\times20)}{100} = 130$ $h = 122$	P1 K1 N1	3	
	(c) (i) $122 \times \frac{115}{100}$ atau $108 \times \frac{90}{100}$ ATAU $\frac{(100\times10)+(115\times30)+(100\times40)+(90\times20)}{100}$ $\frac{(138\times10)+(140.3\times30)+(145\times40)+(97.2\times20)}{100}$ ATAU $130 \times \frac{102.5}{100}$ 133.33 ATAU 133.25	K1 K1 N1	5	
	(ii) $\frac{P_{2025}}{128} \times 100 = 133.33^*$ (*Jawapan daripada (c)(i)) 170.66 ATAU 170.56	K1 N1		