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MODUL PINTAS
TINGKATAN 5

3472/2

MATEMATIK TAMBAHAN
Kertas 2

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

Dua jam tiga puluh minit

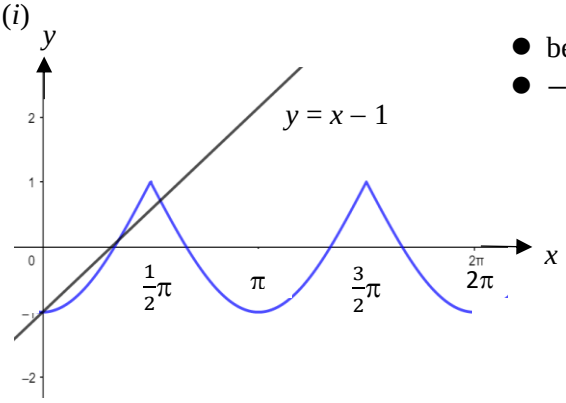
PERATURAN PEMARKAHAN MATEMATIK TAMBAHAN K2 3472/2

PERATURAN PEMARKAHAN PEPERIKSAAN PERCUBAAN SPM 2022
MODUL PINTAS SELANGOR (SET 2)

MATEMATIK TAMBAHAN KERTAS 2

NO.	PENYELESAIAN	MARKAH		
1.	(*a*) (*i*) $\overrightarrow{OQ} = \overrightarrow{OP} + \overrightarrow{PQ}$ atau $\overrightarrow{OP} = 2\underline{i} - \underline{j}$ atau $\overrightarrow{OP} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$			
	$= \left(2\underline{i} - \underline{j}\right) + \left(4\underline{i} + 3\underline{j}\right)$ atau $\begin{pmatrix} 2 \\ -1 \end{pmatrix} + \begin{pmatrix} 4 \\ 3 \end{pmatrix}$	K1		
	$(6, 2)$	N1	4	
	(*ii*) $\overrightarrow{OR} = \overrightarrow{OP} + 2\overrightarrow{TR}$			
	$= \left(2\underline{i} - \underline{j}\right) + 2\left(5\underline{i} + 2\underline{j}\right)$ atau $\begin{pmatrix} 2 \\ -1 \end{pmatrix} + 2\begin{pmatrix} 5 \\ 2 \end{pmatrix}$	K1		
	$(12, 3)$	N1		
	(*b*) $\overrightarrow{QT} = \left(6\underline{i} + \underline{j}\right) + \left(-5\underline{i} - 2\underline{j}\right)$ atau $\begin{pmatrix} 6 \\ 1 \end{pmatrix} + \begin{pmatrix} -5 \\ -2 \end{pmatrix}$ ATAU $\begin{pmatrix} -4 \\ -3 \end{pmatrix} + \begin{pmatrix} 5 \\ 2 \end{pmatrix}$	K1		**8**
	$= \underline{i} - \underline{j}$ atau $= \begin{pmatrix} 1 \\ -1 \end{pmatrix}$			
	$\left\|\overrightarrow{QT}\right\| = \sqrt{(1)^2 + (-1)^2}$	K1		
	$= \sqrt{2}$		4	
	$\frac{1}{\sqrt{2}}\left(\underline{i} - \underline{j}\right)$ ATAU $\frac{1}{\sqrt{2}}\begin{pmatrix} 1 \\ -1 \end{pmatrix}$	K1		
	$\frac{\sqrt{2}}{2}\underline{i} - \frac{\sqrt{2}}{2}\underline{j}$ ATAU $\begin{pmatrix} \frac{\sqrt{2}}{2} \\ -\frac{\sqrt{2}}{2} \end{pmatrix}$	N1		
2.	(*a*) $\frac{1}{2}\left(2 + \sqrt{3}\right)\left(4 + \sqrt{27}\right)$	K1		
	$\frac{1}{2}\left(8 + 2\sqrt{27} + 4\sqrt{3} + \sqrt{81}\right)$	K1	3	
	$\frac{17}{2} + 5\sqrt{3}$	N1		
	(*b*) $\frac{1}{3}\log_a \frac{24}{\frac{3}{8}\times 3^6}$ atau $\log_a \left(\frac{24}{\frac{3}{8}\times 3^6}\right)^{\frac{1}{3}}$	K1		**7**
	$\log_a P = \log_a \left(\frac{64}{729}\right)^{\frac{1}{3}}$ ATAU $\log_a P^3 = \log_a \frac{64}{729}$ atau setara	K1	4	
	$\frac{4}{9}$	N1		
	2	N1		

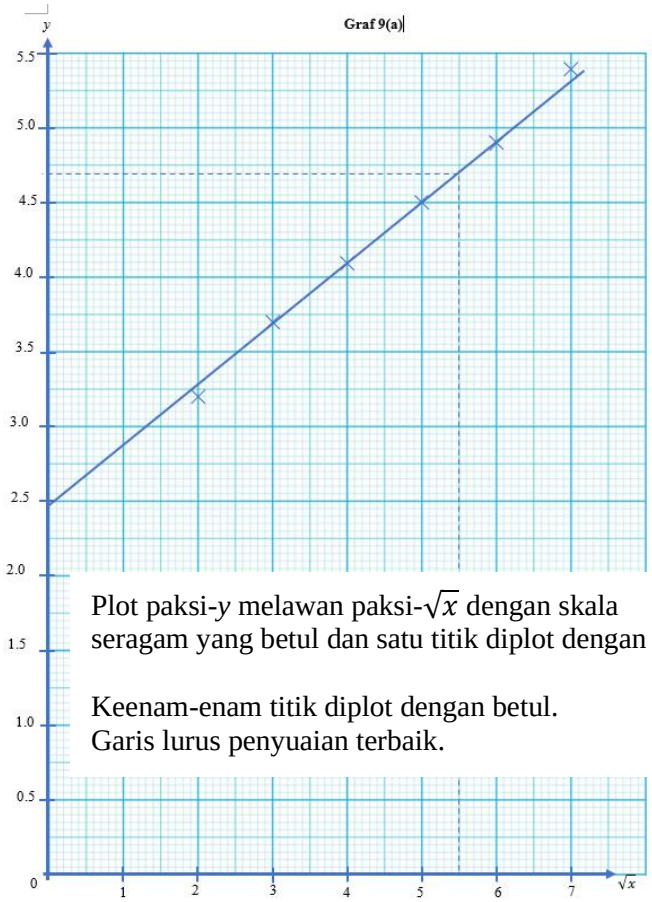
NO.		PENYELESAIAN	MARKAH		
3.		$x + y + z = 11$, $x + 2y = z$	P1		
		$100z + 10y + x = 5(100x + 10y + z) + 46$	P1		
		$95z = 499x + 40y + 46$ (tertunjuk)	K1		
		Hapus satu pemboleh ubah $x + y + (x + 2y) = 11$ atau cara lain yang setara $2x + 3y = 11$ ATAU $2z - y = 11$	K1		
		$x = \frac{11-3y}{2}$ atau $y = \frac{11-2x}{3}$ atau $z = \frac{y+11}{2}$		7	**7**
		Hapus dua pemboleh ubah $499\left(\frac{11-3y}{2}\right) + 40y - 95\left(\frac{11-3y}{2} + 2y\right) = -46$ atau $499x + 40\left(\frac{11-2x}{3}\right) - 95\left(x + 2\left(\frac{11-2x}{3}\right)\right) = -46$ atau setara	K1		
		$x = 1$ atau $y = 3$ atau $z = 7$	N1		
		137	N1		
4.	(*a*)	…, *a* + 2*d*, *a* + 5*d*, *a* + 11*d*, …	P1		
		$\frac{a+5d}{a+2d} = \frac{a+11d}{a+5d}$	K1	4	
		d= *a*	K1		
		r = 2	N1		
	(*b*)	$\frac{n}{2}[2(25) + (n-1)25] > 1000$	K1		**7**
		n = 9		3	
		$S_9 = \frac{9}{2}[2(25) + (9-1)25]$	K1		
		= 1125	N1		
5.	(*a*)	$\frac{360°}{5} \times \frac{3{\cdot}142}{180}$ 1·257	N1	1	
	(*b*)	$\angle AOC = 2\left(\frac{360}{5}\right)° = 144°$ // 2·514 rad.	P1		
		$(5)\sin\left(\frac{144°}{2}\right)$ atau $(5)(1{\cdot}257)$ ATAU $5^2 + 5^2 - 2(5)(5)\cos 144°$	K1		
		$5\left[2(5)\sin\left(\frac{144°}{2}\right)\right] + 2(5)(1{\cdot}257)$ ATAU $5 \times \sqrt{5^2 + 5^2 - 2(5)(5)\cos 144°} + 2(5)(1{\cdot}257)$	K1	4	**7**
		= 60·13 cm atau 60.12 cm 60·13 cm dan tidak cukup 60·13 cm *and not enough*	N1		
	(*c*)	$2\left[\frac{1}{2}(5)^2\left(1{\cdot}257 - \sin\left(\frac{360}{5}\right)°\right)\right]$	K1	2	
		7·649 cm^2	N1		

NO.	PENYELESAIAN	MARKAH		
6.	(*a*) $-x^2 = x^2 - 4$ $x = -\sqrt{2}$	K1 N1	2	
	(*b*) $-\int_{-2}^{-\sqrt{2}} x^2 - 4\,dx - \int_{-\sqrt{2}}^{0} -x^2\,dx$ $= -\left[\frac{x^3}{3} - 4x\right]_{-2}^{-\sqrt{2}} - \left[-\frac{x^3}{3}\right]_{-\sqrt{2}}^{0}$ $= -\left[\left(\frac{(-\sqrt{2})^3}{3} - 4(-\sqrt{2})\right) - \left(\frac{(-2)^3}{3} - 4(-2)\right)\right] - \left[0 - \left(-\frac{(-\sqrt{2})^3}{3}\right)\right]$ $= \frac{16 - 8\sqrt{2}}{3} = 1 \cdot 562$	K1 K1 N1	3	**8**
	(*c*) $= \pi\left[\frac{y^2}{2} + 4y\right]_{-4}^{-2} + \pi\left[-\frac{y^2}{2}\right]_{-2}^{0}$ $= \pi\left[\left(\frac{(-2)^2}{2} + 4(-2)\right) - \left(\frac{(-4)^2}{2} + 4(-4)\right)\right] + \pi\left[-0 - \left(-\frac{(=2)^2}{2}\right)\right]$ $= 4\pi$ unit^3	K1 K1 N1	3	
7.	(*a*) $\frac{\frac{2}{\sin x}}{\frac{\kos x}{\sin x} + \frac{\sin x}{\kos x}}$ $\frac{2}{\sin x} \times \frac{\sin x \kos x}{\kos^2 x + \sin^2 x} = 2 \kos x$	K1 N1	2	
	(*b*) (*i*)  ● bentuk |kos *x*| ● $-1 \le y \le 1$ (*ii*) garis $y = x - 1$ dilakar 3 penyelesaian	P1 P1 K1 N1	4	**6**

NO	PENYELESAIAN	MARKAH		
8.	(*a*) (*i*) $^4C_1\left(\frac{1}{6}\right)^1\left(\frac{5}{6}\right)^3$	K1		
	$= \frac{125}{324} = 0{\cdot}3858$	N1		
	(*ii*) $^4C_3\left(\frac{1}{2}\right)^3\left(\frac{1}{2}\right)^1$ ATAU $^4C_4\left(\frac{1}{2}\right)^4\left(\frac{1}{2}\right)^0$	K1	5	
	$^4C_3\left(\frac{1}{2}\right)^3\left(\frac{1}{2}\right)^1 + {}^4C_4\left(\frac{1}{2}\right)^4\left(\frac{1}{2}\right)^0$	K1		
	$= \frac{5}{16} = 0{\cdot}3125$	N1		**10**
	(*b*) (*i*) $P\left(Z > \frac{350-340}{30}\right)$	K1		
	$= 0{\cdot}3696$	N1		
	$= 36{\cdot}96\%$	N1	5	
	(ii) $P\left(Z < \frac{280-340}{30}\right)$	K1		
	$= 0{\cdot}0228$	N1`		
9.	(*a*)			

$\sqrt{x}$	2	3	4	5	6	7

N1



4

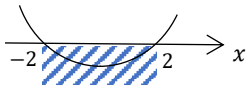
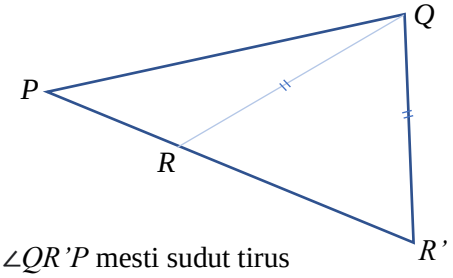
Plot paksi-*y* melawan paksi-$\sqrt{x}$ dengan skala seragam yang betul dan satu titik diplot dengan betul. K1

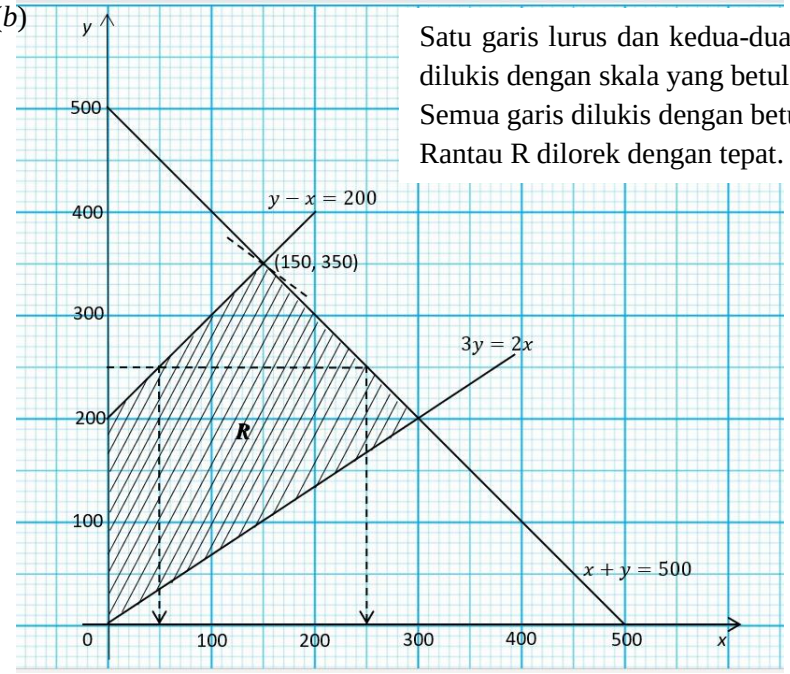
Keenam-enam titik diplot dengan betul. N1

Garis lurus penyuaian terbaik. N1

10

<table>
<tr><th>NO</th><th>PENYELESAIAN</th><th colspan="3">MARKAH</th></tr>
<tr><td></td><td>(b) (i) $y = 2a\sqrt{x} + b$
$2a = \frac{4\cdot 9^{*} - 2\cdot 5^{*}}{6 - 0^{*}}$ * bagi mana-mana dua pasangan titik di atas garis penyuaian terbaik
$a = 0\cdot 2$
$b = 2\cdot 475^{*}$ * merujuk pintasan-y dalam graf
(ii) garis $\sqrt{x} = 5\cdot 5$ dilukis pada graf
4·7* *Rujuk kepada nilai y apabila $\sqrt{x} = 5\cdot 5$</td><td>P1
K1
N1
N1
K1
N1</td><td>6</td><td></td></tr>
<tr><td>10.</td><td>(a) $\frac{(-16)-(-10)}{p-(-5)} = -\frac{1}{\frac{0-(-10)}{0-(-5)}}$
$p = 7$</td><td>K1
N1</td><td>2</td><td rowspan="4">10</td></tr>
<tr><td>(b) $y - (-16) = 2(x - 7)$
$y = 2x - 30$
$q = 20$</td><td>K1
N1
N1</td><td>3</td></tr>
<tr><td>(c) $\frac{1}{2}\lvert 0(-10) + (-5)(-16) + 7(10) + 20(0) - 0(-5) - (-10)(7) - (-16)(20) - 10(0)\rvert$
270</td><td>K1
N1</td><td>2</td></tr>
<tr><td>(d) $\sqrt{(x-(-5))^2 + (y-(-10))^2}$ atau $\sqrt{(x-20)^2 + (y-10)^2}$
$3\sqrt{(x-(-5))^2 + (y-(-10))^2} = 2\sqrt{(x-20)^2 + (y-10)^2}$
$x^2 + y^2 + 50x + 52y - 175 = 0$</td><td>P1
K1
N1</td><td>3</td></tr>
<tr><td>11.</td><td>(a) (i) tidak tertakrif // tiada jawapan
undefined // no solution
(ii)
<table>
<tr><td>x</td><td>– 0·1</td><td>– 0·01</td><td>– 0·001</td><td>– 0·0001</td><td>0</td></tr>
<tr><td>f(x)</td><td>–11·9245</td><td>–11·9925</td><td>–11·9992</td><td>–11·9999</td><td>-</td></tr>
</table>
<table>
<tr><td>x</td><td>0·1</td><td>0·01</td><td>0·001</td><td>0·0001</td><td>0</td></tr>
<tr><td>f(x)</td><td>–12·0745</td><td>–12·0075</td><td>–12·0007</td><td>–12·0001</td><td>-</td></tr>
</table>
SS-1 jika nilai dalam jadual tidak tepat kepada 4 tempat perpuluhan
(iii) –12</td><td>N1
N1
N1</td><td>4</td><td></td></tr>
</table>

NO	PENYELESAIAN	MARKAH		
	(b) $\frac{dy}{dx}=\frac{2x(x)-(x^2-4)}{x^2}$ ATAU $\frac{dy}{dx}=1-4(-1)(x^{-1-1})$ $\frac{d^2y}{dx^2}=\frac{2x(x^2)-2x(x^2+4)}{(x^2)^2}$ ATAU $\frac{d^2y}{dx^2}=4(-2)x^{-2-1}$ $\frac{dy}{dx}=\frac{x^2+4}{x^2}$ dan $\frac{d^2y}{dx^2}=-\frac{8}{x^3}$ $x^3\left(\frac{d^2y}{dx^2}\right)+x^2\left(\frac{dy}{dx}\right)=x^3\left(-\frac{8}{x^3}\right)+x^2\left(\frac{x^2+4}{x^2}\right)$ $x^3\left(\frac{d^2y}{dx^2}\right)+x^2\left(\frac{dy}{dx}\right)=x^2-4$ $(x+2)(x-2)<0$ dan $-2<x<2$ 	K1 N1 K1 N1 K1 N1	6	**10**
12.	(*a*) $\frac{1}{2}(6{\cdot}8+3{\cdot}786+4{\cdot}916)$ $\sqrt{(7{\cdot}751)(7{\cdot}751-6{\cdot}8)(7{\cdot}751-3{\cdot}786)(7{\cdot}751-4{\cdot}916)}$ 9·103 SS-1 jika mencari luas dengan sudut *P*, *Q* atau *R*.	P1 K1 N1	3	
	(*b*) Rumus Kosinus diguna dengan betul $kos\ P=\frac{6{\cdot}8^2+4{\cdot}916^2-3{\cdot}786^2}{2(6{\cdot}8)(4{\cdot}916)}$ ATAU $\frac{1}{2}(6{\cdot}8)(4{\cdot}916)\sin P=9{\cdot}103$ atau setara 33°	K1 N1	2	
	(*c*) (*i*)  $\angle QR'P$ mesti sudut tirus (*ii*) $\frac{sinR'}{6{\cdot}8}=\frac{sin33^\circ}{3{\cdot}786}$ atau setara $78{\cdot}02^\circ$ (*iii*) $sin33^\circ=\frac{t}{6{\cdot}8}$ (*t* boleh diganti oleh mana-mana simbol atau huruf) 3·704	N1 K1 N1 K1 N1	5	**10**

NO	PENYELESAIAN	MARKAH		
13.	(*a*) I : $y - x \leq 200$ II : $3y \geq 2x$ III : $x + y \leq 500$	N1 N1 N1	3	**10**
	(*b*)  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	
	(*c*) (*i*) Fungsi objektif kos, $K = 30x + 40y$ Titik optimum (150, 350) Amaun maksimum = RM [30(150) + 40(350)] = RM18 500 (*ii*) Minimum = 30(50) + 40(250) = RM11 500 Maksimum = 30(250) + 40(250) = RM17 500	 K1 N1 N1 N1	4	
14.	(*a*) $s_A = pt - t^2 = t\,(p - t)$ $\therefore p = 6$	 N1	1	
	(*b*) $6t - t^2 = 2t$ $t^2 - 4t = 0$ $t(t - 4) = 0$ $t = 4$	K1 K1 N1	3	
	(*c*) $s_A = 6t - t^2$ $\frac{ds}{dt} = 0$ $6 - 2t = 0$ $t = 3$ $s_3 = 6(3) - (3)^2$ $s_3 = 9$	 K1 K1 N1	3	

NO.	PENYELESAIAN	MARKAH		
14.	(*d*) When $t = 4$, Bagi $A : s_4 = 6(4) - (4)^2 = 8$ $\therefore$ Jarak yang dilalui oleh $A = 9 + 1 = 10$ $\therefore$ *Distance travelled by A* $= 9 + 1 = 10$ Bagi $B : s_4 = 2(4) = 8$ $\therefore$ Jarak yang dilalui oleh $B = 8$ $\therefore$ *Distance travelled by B* $= 8$	K1 N1 N1	3	**10**
15.	(*a*) $\frac{55}{P_{2019}} \times 100 = 120$ RM45.83	K1 N1	2	
	(*b*) $\frac{(147 \times 20) + (10 \times h) + (125 \times 40) + (120 \times 30)}{100}$ $\frac{(147 \times 20) + (10 \times h) + (125 \times 40) + (120 \times 30)}{100} = 130{\cdot}4$ $h = 150$	K1 K1 N1	3	
	(*c*) (i) $147 \times \frac{120}{100}$ atau $150 \times \frac{95}{100}$ ATAU $\frac{(120 \times 20) + (95 \times 10) + (100 \times 40) + (100 \times 30)}{100}$ $\frac{(176{\cdot}4 \times 20) + (142{\cdot}5 \times 10) + (125 \times 40) + (120 \times 30)}{100}$ ATAU $130{\cdot}4 \times \frac{103{\cdot}5}{100}$ 135·53 ATAU 134·96 (*ii*) $\frac{P_{2025}}{170} \times 100 = 135{\cdot}53^*$ (*Jawapan daripada (b)(i)) RM230.40 ATAU RM229.43	K1 K1 N1 K1 N1	5	**10**