



KEMENTERIAN PENDIDIKAN
JABATAN PENDIDIKAN NEGERI PULAU PINANG

MODUL GERAK GEMPUR SPM 2024 (SET 1)

3472/2(PP)

MATEMATIK TAMBAHAN

Kertas 2

Peraturan Pemarkahan

UNTUK KEGUNAAN PEMERIKSA SAHAJA

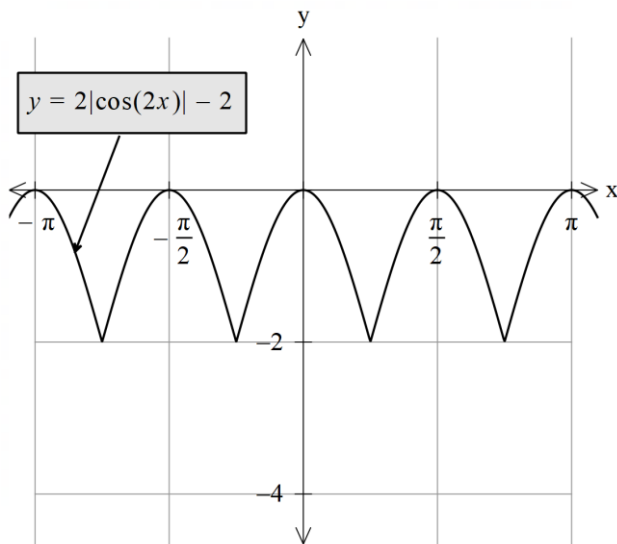
Peraturan Pemarkahan ini mengandungi 19 halaman bercetak.

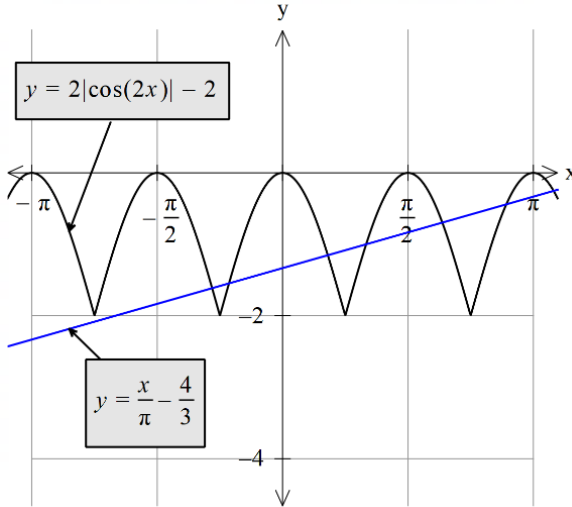
No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
1	$4x + 4y = 100$ ATAU $x^2 + y^2 = 425$ $x = 25 - y$ $(25 - y)^2 + y^2 = 425$ $y^2 - 25y + 100 = 0$ $(y - 5)(y - 20) = 0$ $y = 5$ atau 20 $x = 20$ atau 5 Panjang keratan pertama $4x = 4(5) = 20$ cm DAN Panjang keratan kedua $4y = 4(20) = 80$ cm	P1 P1 K1 K1 N1 N1 N1		7

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
2(a)	$\log_3 3 + \log_3 (x - 3) = \log_3 x$ $\log_3 3 (x - 3) = \log_3 x$ $3(x - 3) = x$ $x = \frac{9}{2}$	K1 N1	2	
(b)	$\sqrt{2s + 5} = 2 + \sqrt{s - 1}$ $(\sqrt{2s + 5})^2 = (2 + \sqrt{s - 1})^2$ $2s + 5 = 4 + 4\sqrt{s - 1} + (\sqrt{s - 1})^2$ $2s + 5 = 4 + 4\sqrt{s - 1} + s - 1$ $s + 2 = 4\sqrt{s - 1}$ $(s + 2)^2 = (4\sqrt{s - 1})^2$ $s^2 - 12s + 20 = 0$ $(s - 10)(s - 2) = 0$ $s = 10, s = 2$	K1 N1 K1 N1	4	6

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
3(a)	(i) $\overrightarrow{BD} = \overrightarrow{BA} + \overrightarrow{AD}$ $= -2\tilde{x} + 4\tilde{y}$ (ii) $\overrightarrow{AE} = 2\tilde{x} + 3\tilde{y}$	K1 N1 N1	3	
(b)	$\overrightarrow{AF} = h(2\tilde{x} + 3\tilde{y})$ $\overrightarrow{BF} = k\overrightarrow{BD}$ $= k(-2\tilde{x} + 4\tilde{y})$ <i>Selesaikan persamaan</i> $h = \frac{1}{4} \quad k = \frac{3}{4}$	K1 K1 K1 N1N1	5	8

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
4(a)	$\alpha : \beta = 4:5$ $9tx - x^2 = 80$ SOR : $4\alpha + 5\alpha = -\frac{-9t}{1}$ $\alpha = t$ POR = $(4\alpha)(5\alpha) = \frac{80}{1}$ $\alpha^2 = 4$ $\alpha = \pm 2$ $t = 2 \text{ atau } t = -2$	K1 N1 K1 N1	 4	
(b)	$t = 2 (t > 0)$ $x^2 - 9(2)x + 80 = 0$ $x^2 - 18x + 80 = 0$ $(x - 8)(x - 10) = 0$ $x = 8, x = 10$ $\alpha = 8, \alpha = 10$ SOR baharu: $\alpha^2 + \beta^2 = 8^2 + 10^2$ $= 164$ POR baharu : $\alpha^2 (\beta^2) = 8^2 (10^2)$ $= 6400$ Persamaan kuadratik ialah $x^2 - 164x + 6400 = 0$	 K1 K1 K1 N1	 4	8

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
5(a)	$LHS = (2 - \sec^2 x)(1 - \sin^2 x)$ $= \left(2 - \frac{1}{\cos^2 x}\right)(1 - \sin^2 x)$ $= \left(\frac{2\cos^2 x - 1}{\cos^2 x}\right)(\cos^2 x)$ $= 2\cos^2 x - 1$ $= \cos 2x (\text{terbukti})$	K1 N1	2	
(b)	(i)  Shape Modulus and Shifted down 2 units	P1 P1	2	

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
(b)	(ii) $6\pi (2 - \sec^2 x)(1 - \sin^2 x) = 3x + 2\pi$ $6\pi \cos 2x = 3x + 2\pi$ $2 \cos 2x - 2 = \frac{x}{\pi} - \frac{4}{3}$ $y = \frac{x}{\pi} - \frac{4}{3}$  The graph shows two functions plotted on a Cartesian coordinate system. The x-axis ranges from $-\pi$ to π with major ticks at $-\pi, -\frac{\pi}{2}, \frac{\pi}{2}, \pi$. The y-axis has ticks at -4 and -2. The function $y = 2 \cos(2x) - 2$ is a periodic wave with peaks at $y = 0$ (when $x = 0, \pm\pi$) and troughs at $y = -2$ (when $x = \pm\frac{\pi}{2}$). The function $y = \frac{x}{\pi} - \frac{4}{3}$ is a straight line with a positive slope, passing through $(0, -\frac{4}{3})$ and $(\pi, -\frac{1}{3})$. The two functions intersect at six points within the interval $[-\pi, \pi]$. Garis lurus dengan kecerunan +ve dilukis Bilangan penyelesaian = 6	P1		
		K1 N1	3	7

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
6(a)	$a = 80, d = -4$ $0 = 80 + (n - 1)(-4)$ $n = 20$	K1 K1 N1	3	
(b)	(i) $v = \pi(80)^2(30)$ $v = 192000\pi$ (ii) $s_{20} = \frac{20}{2}(2(30) + (20 - 1)(-1))$ $= 410$	K1 N1 K1 N1	4	7

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
7(a)	$\int_3^1 2f(y)dy = (-2) \times (-5)$ $= 10$	P1 N1	2	
(b)	$y = \int px^2 - 2x dx$ $y = \frac{px^3}{3} - \frac{2x^2}{2} + c$ $6 = \frac{p(1)^3}{3} - (1)^2 + c \quad \text{ATAU} \quad -15 = \frac{p(-2)^3}{3} - (-2)^2 + c$ selesaikan persamaan serentak $p = 6 \quad \text{DAN} \quad c = 5$ $y = 2x^3 - x^2 + 5$	K1 K1 K1 K1 N1	5	7

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
8(a)	$m = 1 \text{ dan } n = 1$	P1P1	2	10
(b)	$\left(\frac{2k+7k}{2}, \frac{4k+k}{2}\right)$ atau $\left(\frac{(2k)(1)+(7k)(1)}{1+1}, \frac{(4k)(1)+(k)(1)}{1+1}\right)$	K1K1	4	
	$h+k=\frac{4k+k}{2}$	K1		
	$h=\frac{3}{2}k$	N1		
(c)	$h=3 \text{ atau } k=2$	P1		
	$\frac{1}{2}\left \left[(4)(2)+(14)(L-2)+(8)(2)+(0)(8)\right]-\left[(4)(2)+(0)(L-2)+(8)(2)+(14)(8)\right]\right =105$	K1	4	
	$14L-140=\pm 210$	K1		
	$L=25, L=-5$	N1		
	$S(8,-7)$			

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah							
9(a)	<table border="1"><tr><td>$\sqrt{y}$</td><td>0.39</td><td>0.71</td><td>1.00</td><td>1.30</td><td>1.58</td><td>1.90</td></tr></table>	$\sqrt{y}$	0.39	0.71	1.00	1.30	1.58	1.90	N1	1	
	$\sqrt{y}$	0.39	0.71	1.00	1.30	1.58	1.90				
	(b)	Paksi betul, skala seragam, satu titik plot betul dan graf garis lurus	K1	3							
	Semua titik ditanda betul	K1									
	Garis lurus penyuaian terbaik	N1									
	(c)	(i) $\sqrt{y} = ax + \frac{1}{b}$ $x = 2.45$	P1 N1	6							
		(ii) $\frac{1}{b} = 0.08$ $b = 12.5$	K1 N1								
		$a = \frac{1 - 0.39}{3 - 1}$ $a = 0.305$	K1 N1								

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah																								
10(a)	$6x - 2x^2 = 0$ $2x(3 - x) = 0$ $\left(0, \frac{1}{2}\right), \left(3, \frac{19}{2}\right)$	K1 K1 N1 N1	4																									
(b)	$\frac{d^2y}{dx^2} = 6 - 4x$ dan 6 atau $\frac{d^2y}{dx^2} = 6 - 4x$ dan -6 <u>ATAU</u> <table><tr><td>x</td><td>-1</td><td>0</td><td>1</td></tr><tr><td>$\frac{dy}{dx}$</td><td>-</td><td>0</td><td>+</td></tr><tr><td>tangen</td><td>\</td><td>—</td><td>/</td></tr></table> atau <table><tr><td>x</td><td>2</td><td>3</td><td>4</td></tr><tr><td>$\frac{dy}{dx}$</td><td>+</td><td>0</td><td>-</td></tr><tr><td>tangen</td><td>/</td><td>—</td><td>\</td></tr></table>	x	-1	0	1	$\frac{dy}{dx}$	-	0	+	tangen	\	—	/	x	2	3	4	$\frac{dy}{dx}$	+	0	-	tangen	/	—	\	K1 N1 N1	3	
x	-1	0	1																									
$\frac{dy}{dx}$	-	0	+																									
tangen	\	—	/																									
x	2	3	4																									
$\frac{dy}{dx}$	+	0	-																									
tangen	/	—	\																									
(c)	$\frac{dy}{dx} = 6(2) - 2(2)^2$ $\delta y = \left[6(2) - 2(2)^2\right] \times 0.01$ $\frac{43}{6} + 0.04 = \frac{1081}{150}$	P1 K1 N1	3	10																								

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah	
11(a)	(i) $\frac{400 - 420}{50}$	K1	5		
	0.3446	N1			
	(ii) $z = (-)0.524$	P1			
	$-0.524 = \frac{m - 420}{50}$	K1			
	393.8 // 394	N1			
	(b)	(i) ${}^{40}C_{15} (0.25)^{15} (0.75)^{25}$	K1		5
		0.0282	N1		
		(ii) 24 or $n = 25$ or $r = 9$	P1		
		${}^{25}C_9 (0.25)^9 (0.75)^{16}$	K1		
		0.0781	N1		

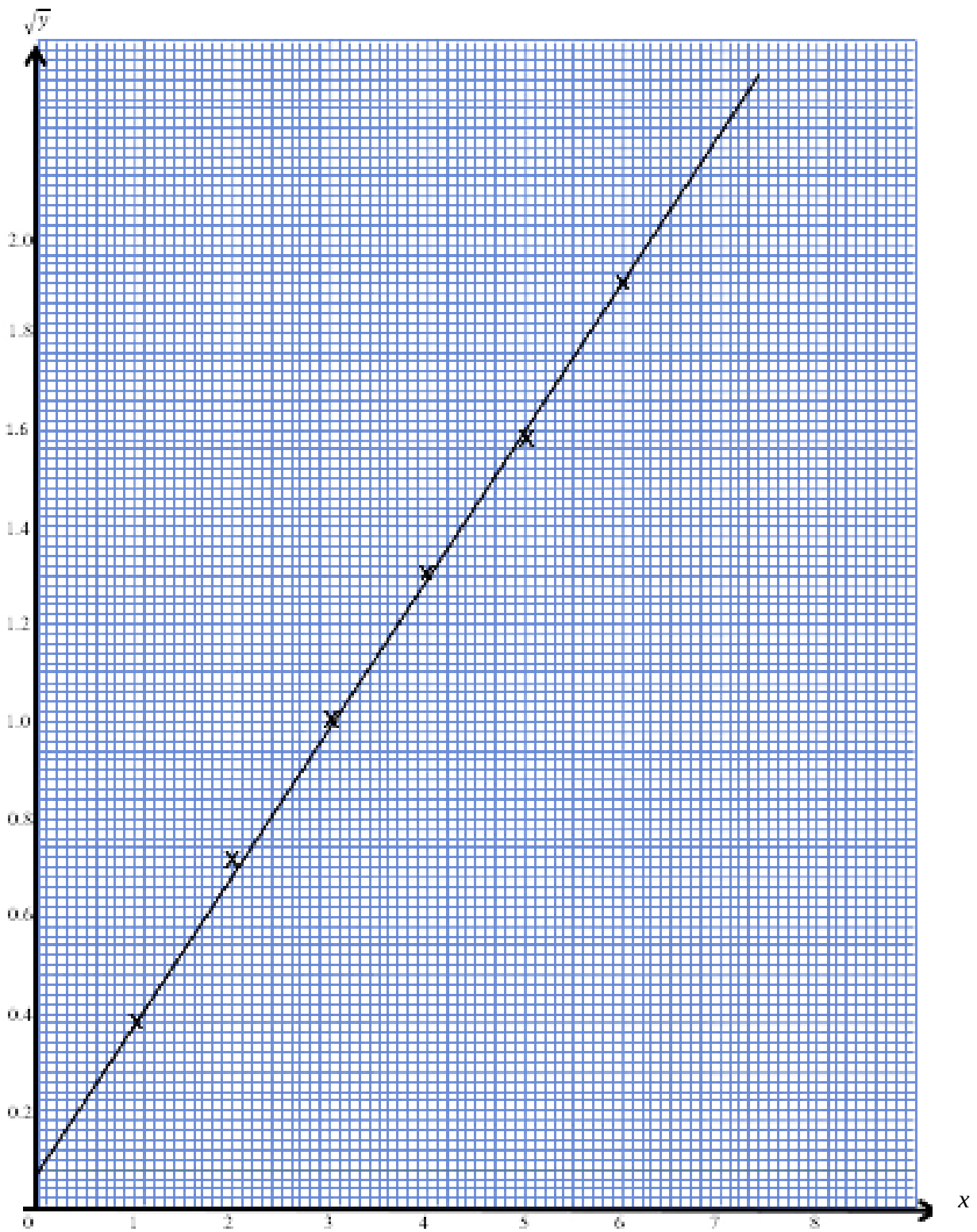
No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
12(a)	$p = \frac{16.20}{15.00} \times 100$ $p = 108$ $\frac{34}{q} \times 100 = 136$ $q = 25$	K1 N1 N1	3	
(b)	(i) $\frac{6(110) + 4(108) + 3(136) + r(120)}{6 + 4 + 3 + r} = 117$ $r = 7$ (ii) $\bar{I}_{\frac{2026}{2022}} = \frac{117}{100} \times \frac{140}{100} \times 100$ $\bar{I}_{\frac{2026}{2022}} = 163.8$ (iii) $\frac{P_{2026}}{35} \times 100 = 163.8$ $P_{2026} = RM57.33$ (iv) $\frac{6(I) + 4(108) + 3(136) + 7(120)}{6 + 4 + 3 + 7} = 163.8$ $I = 266$ 166%	K1 N1 K1 N1 N1 K1 N1	7	10

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
13(a)	$\frac{ED}{\sin 45^\circ} = \frac{12}{\sin 37^\circ}$ $ED = 14.10$	K1 N1	2	
(b)	$\frac{AD}{\sin 98^\circ} = \frac{12}{\sin 37^\circ}$ $AD = 19.75$ ATAU $AD^2 = 12^2 + 14.10^2 - 2(12)(14.10) \cos 98^\circ$ $AD = 19.75$ $(\sqrt{288})^2 = 14.10^2 + 23.11^2 - 2(14.10)(23.11) \cos \angle EDB$ $\angle EDB = 46.95^\circ$ $\text{Luas} = \frac{1}{2}(14.10)(23.11) \sin 46.95^\circ$ $= 119.06$ ATAU $\sqrt{27.09(27.09 - 16.97)(27.09 - 14.10)(27.09 - 23.11)}$	K1 N1 K1 N1	6	
(c)	$\frac{1}{2}(23.11)(h) = 119.06$ $h = 10.30$	K1 N1	2	10

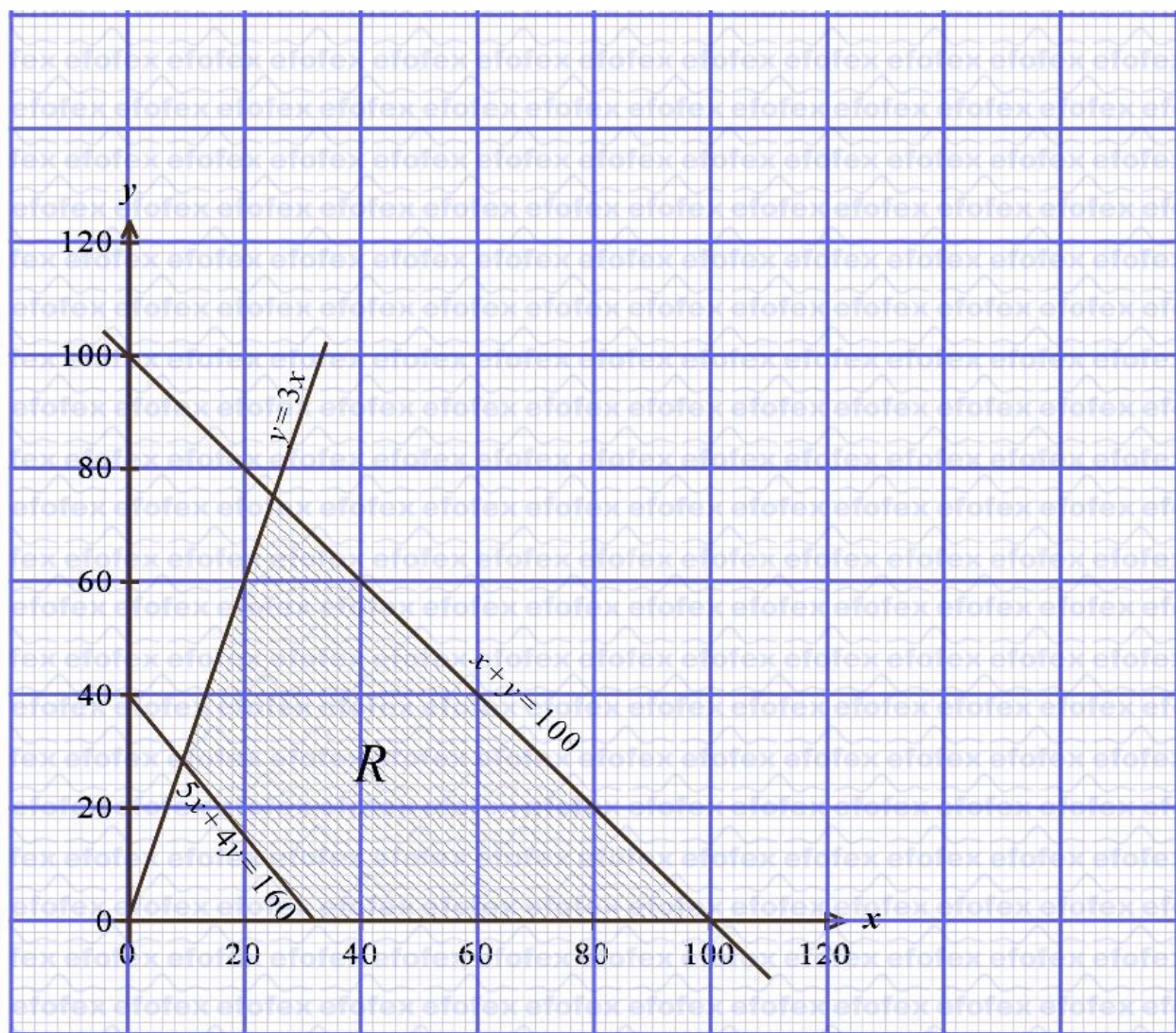
No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
14(a)	(i) 6	N1	2	10
	(ii) $0 < t < 6$	N1		
	(b) (i) Ganti $t = 0, 6, 8$ dan $v = 16$	K1		
	$v = t^2 - 6t$	N1		
	(ii) $a = 2t - 6$	K1	8	
	$a = -2ms^{-2}$	N1		
	(iii) $s = \frac{t^3}{3} - \frac{6t^2}{2}$	K1		
	Ganti $t = 3@6@8$ ke dalam s	K1		
	$\left \int_3^6 v dt \right + \int_6^8 v dt$	K1		
	$\frac{98}{3} @ 32.67$	N1		

No	Peraturan Pemarkahan	Sub Markah	Markah	Jumlah Markah
15(a)	I: $y \leq 3x$ II: $5x+4y \geq 160$	N1 N1	2	
(b)	Jumlah jisim udang dan ikan pari yang dibeli tidak lebih daripada 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	7
(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	10

GRAF SOALAN 9



GRAF SOALAN 15



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