KEMENTERIAN PENDIDIKAN
JABATAN PENDIDIKAN NEGERI TERENGGANU

MPP 3

SPM 2025

PERATURAN PEMARKAHAN

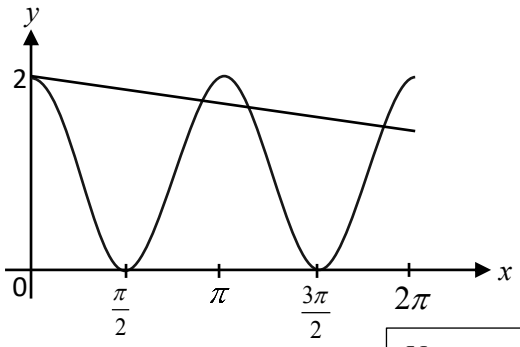
MATEMATIK TAMBAHAN

PERATURAN PEMARKAHAN MATEMATIK TAMBAHAN KERTAS 1

MPP3 TINGKATAN 5 2025

No	Skema Pemarkahan	Σ Markah
1	$x = \frac{5+3y}{2}$ atau $y = \frac{2x-5}{3}$ **P1** $2\left(\frac{5+3y}{2}\right)^2 + y^2 = 8$ *atau* $2x^2 + \left(\frac{2x-5}{3}\right)^2 = 8$ **K1** Selesaikan persamaan kuadratik menggunakan rumus kuadratik atau penyempurnaan kuasa dua. **K1** $y = -0.343$, $y = -2.38$ **N1** $x = 1.99$, $x = -1.08$ **N1**	**5**
2	$\frac{x}{y} = \frac{x^3}{2} - \frac{8}{2}$ **K1** $Y = \frac{x}{y}$ dan $X = x^3$ **N1**	**2**
3	(a) $m = 5$ **N1** (b) $f^{-1}(x) = x - 4$ **K1** $g(x) = \frac{x-8}{x-3}$, $x \neq 3$ **N1**	**3**

4	(*a*) (i) $\lambda = 3$	**K1**	**7**
	$n = \dfrac{10}{3}$	**N1**	
	(ii) $\sqrt{7^2 + 9^2} = \sqrt{(n-1)^2 + 3^2}$	**K1**	
	$n = -10, \quad n = 12$	**N1**	
	(*b*) $\dfrac{1}{m-1}$ or $\dfrac{8}{9}$ seen	**P1**	
	$\dfrac{1}{m-1} \times \dfrac{8}{9} = -1$	**K1**	
	$m = \dfrac{1}{9}$	**N1**	
5	60° @ $\dfrac{\pi}{3}$	**P1**	**3**
	$2(p)\sin\dfrac{60}{2}$ @ $(p)\left(\dfrac{60 \times \pi}{180}\right)$	**K1**	
	$p + \dfrac{p}{3}\pi$	**N1**	
6	$-p\log_3 3$ @ $-1\log_3 6$ @ $\log_3 6$	**K1**	**3**
	$\log_3 3 + \log_3 2$ (Guna hukum pendaraban logaritma)	**K1**	
	$1 + \log_3 2$	**N1**	

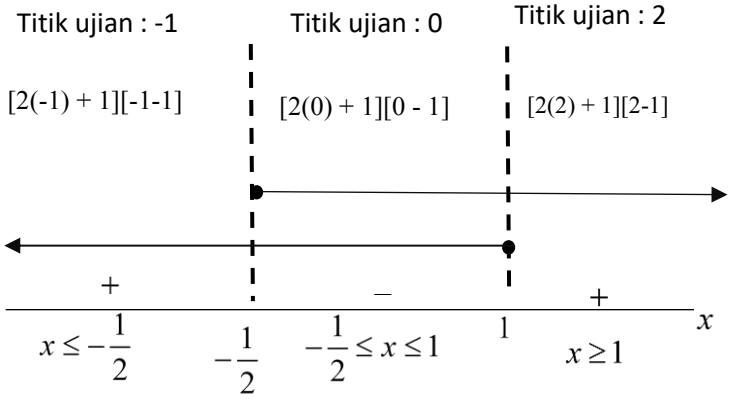
7	$(a)\ a = 30000\,, r = 1.025$	**K1**	
	$S_7 = \dfrac{30000(1.025^7 - 1)}{1.025 - 1}$	**K1**	
	$= 226422$	**N1**	
	$(b)\ S_7 - S_2 = \dfrac{30000(1.025^7 - 1)}{1.025 - 1} - \dfrac{30000(1.025^2 - 1)}{1.025 - 1}$	**K1**	**7**
	$= 165672$		
	$\dfrac{24}{100} \times *(165672) = 39761$ @ $\dfrac{15}{100} \times *(165672) = 24850$	**K1**	
	Jumlah = $39761 + 24850$	**K1**	
	$= 64611$	**N1**	
8	(a) 		
	Bentuk Kosinus	**P1**	**5**
	2 Kitaran untuk $0 \le x \le 2\pi$	**P1**	
	Anjakan 1 unit ke atas	**P1**	
	$(b)\ y = 2 - \dfrac{x}{4\pi}$	**P1**	
	4 penyelesaian	**N1**	

Nota :
0 dan 2π mesti dilabel
Alat tepi lurus digunakan

9	(*a*) (i) $y+\delta y=u(x+\delta x).v(x+\delta x)$ atau $\delta y=u(x+\delta x).v(x+\delta x)-u(x).v(x)$	**K1**	**9**
	Apabila $\delta x\to 0$ dan $\delta v\to 0$ $\frac{dy}{dx}=u\,had_{\delta x\to 0}\frac{\delta v}{\delta x}+v\,had_{\delta x\to 0}\frac{\delta u}{\delta x}+had_{\delta x\to 0}\frac{\delta u}{\delta x}(0)$	**K1**	
	$\frac{dy}{dx}=u(x)v'(x)+v(x)u'(x)$	**N1**	
	(ii) $\frac{d}{dx}=(2x-3)^4(3)+(3x+2)[8(2x-3)^3]$	**K1**	
	$=(2x-3)^3(30x+7)$	**N1**	
	(*b*) $K'(n)=0$ DAN $0=4n-100$	**K1**	
	$n=25$	**N1**	
	$2(25)^2-100\,(25)+137\,5000$	**K1**	
	137 3750	**N1**	
10	(*a*) $2(-10)$ [panduan : dilihat – 10]	**K1**	**6**
	-20	**N1**	
	(*b*) $2\int_1^3 g(x)\,dx$ *atau* $\int_1^3 x\,dx$ *atau* $k\int_1^3 dx$ **(pisahkan)**	**P1**	
	$\left[\frac{x^2}{2}-kx\right]_1^3$ **(kamir)**	**K1**	
	$\left[\left(\frac{(3)^2}{2}-k(3)\right)-\left(\frac{(1)^2}{2}-k(1)\right)\right]$ (**ganti had**)	**K1**	
	$k=-\frac{2}{5}$	**N1**	

11	(*a*) (i) $\frac{(n-1)(n-2)(n-3)!}{(n-3)!}$ @ $\frac{x!}{a!(x-a)!} = \frac{x!}{b!(y-n)!}$	**K1**	**8**
	$n^2 - 3n + 2$	**N1**	
	(ii) $x = a + b$	**N1**	
	(*b*) (i) 462	**N1**	
	(ii) ${}^7C_3 \times {}^5C_3$	**K1**	
	350	**N1**	
	(iii) ${}^4C_1 \times {}^8C_5$ @ ${}^4C_2 \times {}^8C_4$ @ ${}^4C_3 \times {}^8C_3$ @ ${}^4C_0 \times {}^8C_6$	**K1**	
	896	**N1**	
12	$P\left(Z > \frac{136-\mu}{\sigma}\right) = 0.326$ atau $P\left(Z > \frac{88-\mu}{\sigma}\right) = 0.822$	**P1**	**6**
	0.451 @ 0.923 @ –0.923 (dilihat)	**P1**	
	$\frac{136-\mu}{\sigma} = 0.451$	**K1**	
	$\frac{88-\mu}{\sigma} = -0.923$	**K1**	
	Selesaikan persamaan linear serentak melibatkan μ dan σ	**K1**	
	$\mu = 120.24 / 120.25$ dan $\sigma = 34.93 / 34.94$	**N1**	

13	(*a*) $\frac{x-a}{c-x}=\frac{m}{n}$ dan selesaikan	**K1**	**8**
	Tertunjuk $x=\frac{an+cm}{m+n}$	**N1**	
	(*b*) $x=\frac{1(-3)+2(3)}{2+1}$ @ $y=\frac{2(-2)+1(7)}{2+1}$	**K1**	
	$P(1,1)$	**N1**	
	(*c*) $m=\frac{7-(-2)}{-3-3}$	**P1**	
	Guna $m_1m_2=-1$	**K1**	
	$y-1={}^{*}m(x-1)$ atau $y=*mx+c$ sehingga c	**K1**	
	$y=\frac{2}{3}x+\frac{1}{3}$ atau setara	**N1**	
14	(*a*) (i) $f(x)=\sqrt{2x-4}$		**8**
	$x=\frac{y^2+4}{2}$	**K1**	
	$f^{-1}(x)=\frac{x^2+4}{2}$	**N1**	
	(ii) domain $=0\le x\le 2$	**N1**	
	Julat $=2\le f^{-1}(x)\le 10$	**N1**	
	(iii) $f^{-1}f(3)=3$	**N1**	
	(*b*) $\frac{4}{3}+c=4$	**K1**	
	Selesaikan persamaan linear: $\left[c=4-\frac{4}{3}\right]$	**K1**	
	$c=\frac{8}{3}$	**N1**	

15	$(a)\ \left(-7q\right)^2-4(p)(16p)=0$	**K1**	**8**
	$7:8$	**N1**	
	15	**N1**	
	$(b)\ (2x+1)(x-1)\le 0$ **DAN**		
		**K1**	
	$-\frac{1}{2}\le x\le 1$	**N1**	
	(c) (i) $a<0$	**N1**	
	(ii) $b=4$	**N1**	
	(iii) $c=10$	**N1**	

PERATURAN PEMARKAHAN TAMAT

PERATURAN PERMARKAHAN MATEMATIK TAMBAHAN KERTAS 2
PEPERIKSAAN PERCUBAAN SPM 2025

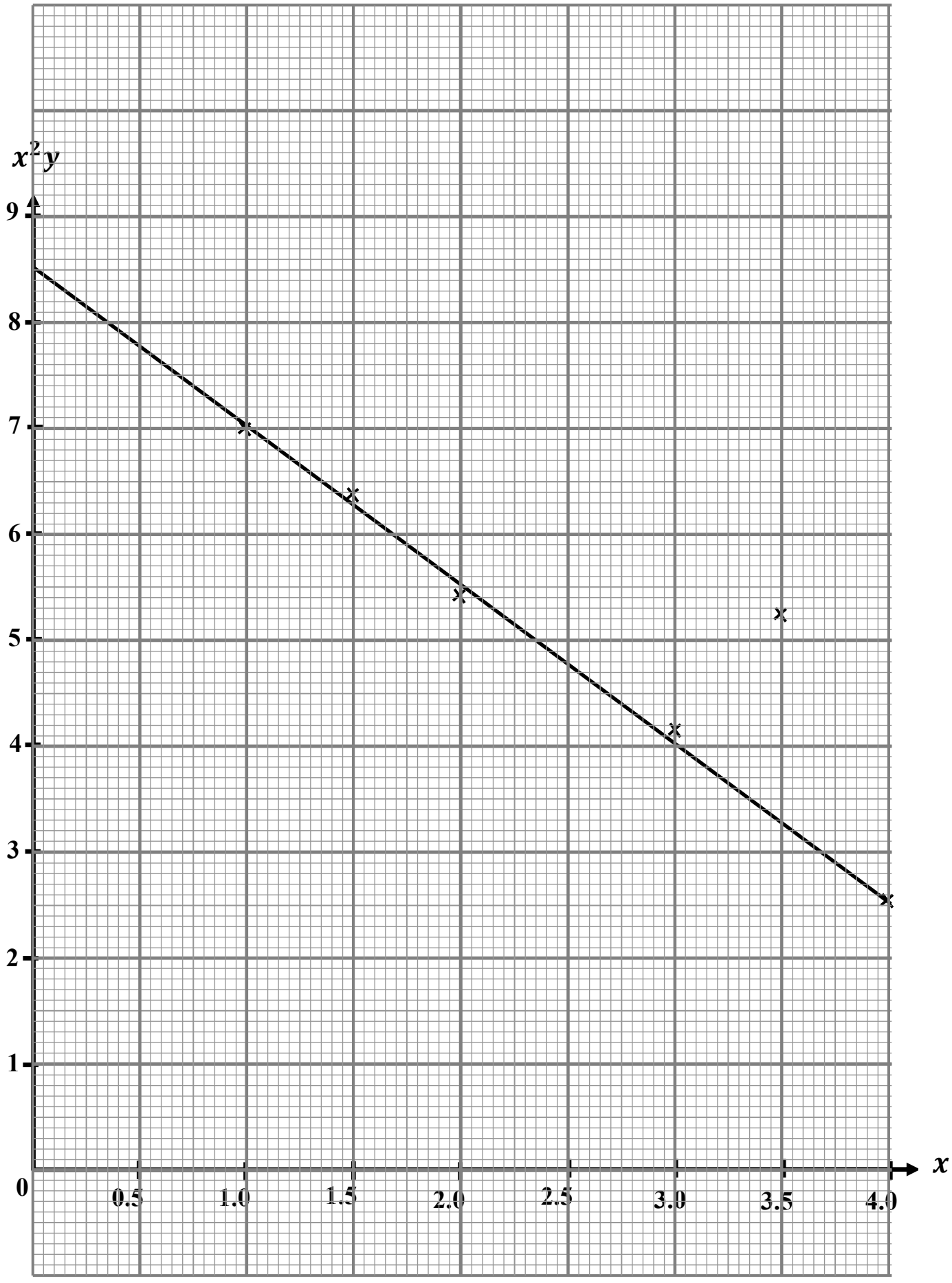
No		Peraturan Pemarkahan		Jumlah
1	(*a*)	$\frac{dy}{dx} = -2x + 2$	**K1**	5
		Ganti x=1 dalam $\frac{dy}{dx}$	**K1**	
		0	**N1**	
	(*b*)	$3(17+3x)^2(3)$	**K1**	
		$9(17+3x)^2$	**K1**	
2	(*a*)	$\frac{3}{2}[2a+(3-1)d] = 96$	**K1**	**9**
		$a+(20-1)d = 284$	**K1**	
		Selesaikan persamaan serentak melibatkan a dan d	**K1**	
		a = 18 cm **atau** d = 14 cm	**N1**	
		Guna rumus S_n	**K1**	
		3020	**N1**	
	(*b*)	$T_4 = *18 + (4-1)(*14)$	**K1**	
		$6x^2 \le (*60)(50)$ **dan** selesaikan ketaksamaan kuadratik	**K1**	
		$x \le 22.36$	**N1**	
3	(*a*)	$m = 3(3) - 6\sqrt{3} - 6\sqrt{3} + 4(3)$	**K1**	**5**
		$m = 21 - 12\sqrt{3}$	**N1**	
	(*b*)	Guna $\log_a \frac{m}{n} = \log_a m - \log_a n$	**K1**	
		Guna $\log_a m^n = n \log_a m$	**K1**	
		$y + 2x - 3$	**N1**	

4	(*a*)	Guna $\text{kosek}^2 A = 1 + \text{kot}^2 A$ **P1** $3(2\text{kos}\, x \sin x)$ **K1** $3\sin 2x$ **N1**	**7**
	(*b*)	$\sin 2x = \frac{\sqrt{3}}{2}$ **P1** $\frac{\pi}{3}$ @ $60°$ (dilihat) **N1** $2x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{7\pi}{3}, \frac{8\pi}{3}$ [untuk $0 \le 2x \le 4\pi$] **N1** $x = \frac{\pi}{6}, \frac{\pi}{3}, \frac{7\pi}{6}, \frac{4\pi}{3}$ **N1**	
5	(*a*)	Guna $P(x = r) = {}^nC_r p^r q^{n-r}$ **P1** ${}^7C_0(0.15)^0(0.85)^7 + {}^7C_1(0.15)^1(0.85)^6 + {}^7C_2(0.15)^5(0.85)^5$ **K1** 0.9262 **N1**	**7**
	(*b*)	$\mu = 150(0.15)$ **P1** $\sigma = \sqrt{150(0.15)(0.85)}$ **P1** $P\left(Z > \frac{35 - 22.5}{4.3732}\right)$ **K1** 0.00213 **N1**	
6	(*a*)	Guna $\frac{1}{2}\lvert(\quad)-(\quad)\rvert$ **K1** $\frac{37}{4}$ **N1**	**7**
	(*b*)	$m_{OE} = \frac{-2-0}{2-0}$ @ $m_{CD} = \frac{1-0}{\frac{1}{2}-3}$ **K1** $m_1 \neq m_2$, *OE* dan *CD* tidak selari **N1**	

	(*c*)	$\sqrt{(x-0)^2-(y-0)^2}$ **atau** $\sqrt{(x-3)^2-(y-0)^2}$ **P1** $3\sqrt{(x-0)^2-(y-0)^2}=\sqrt{(x-3)^2-(y-0)^2}$ **K1** $8x^2+8y^2+6x-9=0$ **N1**	
7		$x-2$ dilihat **P1** $x^2-6x+8+\frac{1}{2}r^2\theta=50$ **P1** $x^2-6x+8+\frac{1}{2}*(x-2)^2(\pi)-50=0$ **K1** Selesaikan * persamaan kuadratik **K1** $x=6.816$, $x=-2.038$ $x=6.82$ **N1** $r=4.82$ **N1** $A_1=(*6.82)^2-6(*6.82)+8$ **K1** $13.56-13.59$ (julat jawapan) **N1** $A_2=\frac{1}{2}(*4.82)^2(3.142)$ **K1** $36.44-36.50$ (julat jawapan) **N1**	**10**
8	(*a*)	<table><tr><td>x^2y</td><td>6.98</td><td>6.35</td><td>5.44</td><td>4.14</td><td>5.27</td><td>2.56</td></tr></table> **N1**	**10**
	(*b*)	Graf garis lurus x^2y melawan x dilukis **DAN** sekurang-kurangnya satu *titik diplot dengan betul **K1** 6 *titik diplot dengan betul **N1** Garis lurus penyuaian terbaik. **N1**	

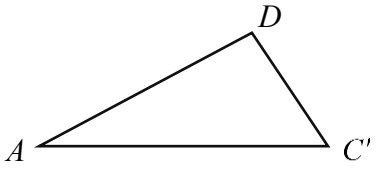
	(c)	(i) $x^2y = -hx + 2k$ **P1** $h = \frac{3}{2}$ **N1** $k = 4.250$ **N1** (ii) $x^2y = 3.30$ **P1** Julat $3.15 \le x^2y \le 3.45$ $(3.5)^2 y = {}^{*}3.30$ **K1** $y = 0.27$ **N1**	

Graf No 8



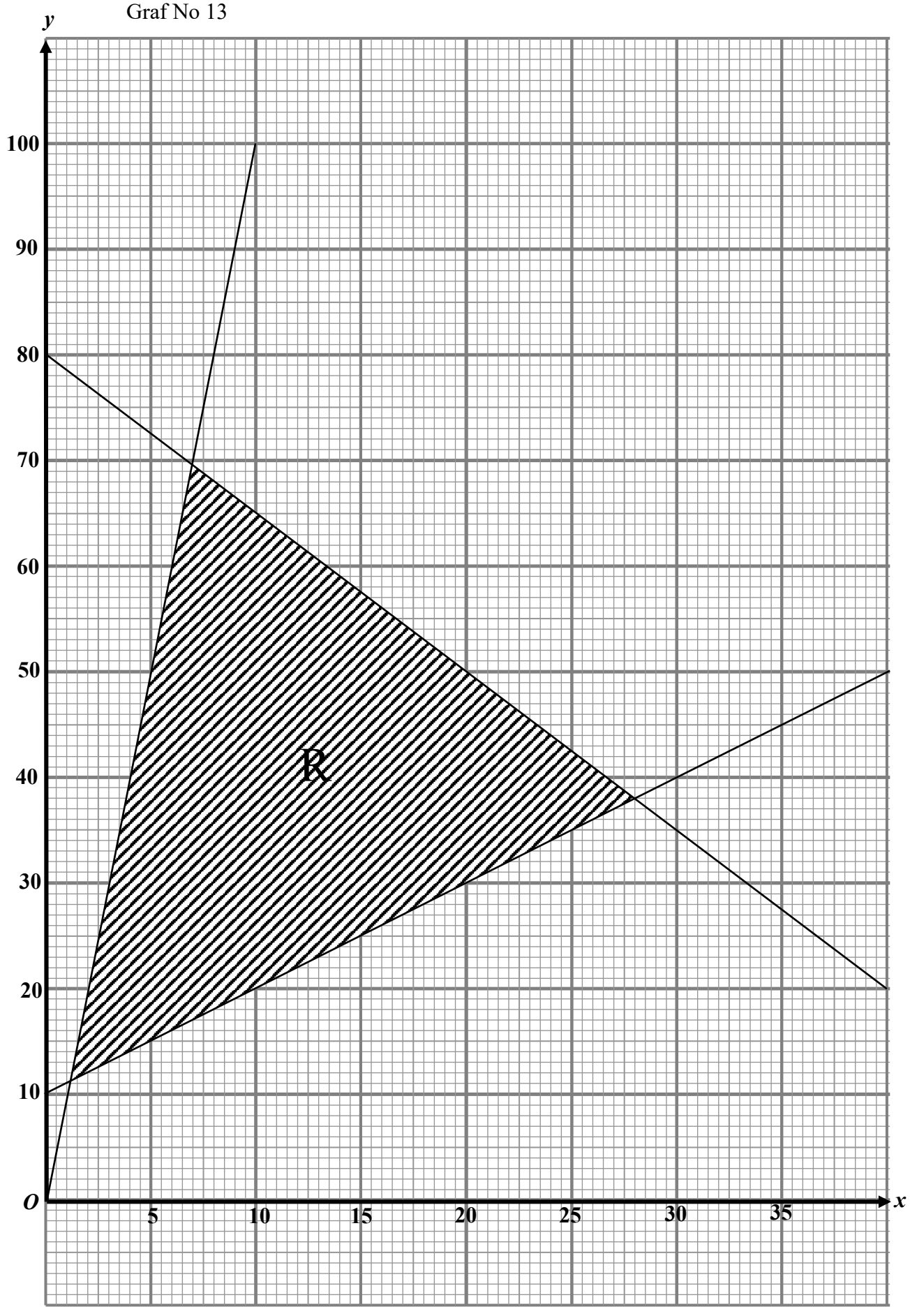
9	(*a*)	Beza $y = x^2$ terhadap x **dan** ganti $x = 3$ dalam $\frac{dy}{dx}$ **K1** Ganti kecerunan tangen dan titik $P(3,9)$ dalam $y = mx + c$ **dan** selesaikan untuk mencari c **K1** $y = 6x - 9$ **N1**		**10**
	(*b*)	**<u>Alternatif A</u>** Kamir $\int x^2\, dx$ $[A_1 = \frac{x^3}{3}]$ **K1** Guna had $\int_0^3$ ke dalam A_1 **atau** $A_2 = \frac{1}{2}\left(\frac{3}{2}\right)(9)$ **atau** $A_3 = \frac{1}{2}\left(\frac{3}{2}\right)(9)$ **K1** $A_1 - A_2 + A_3$ **K1** 9 **N1**	**<u>Alternatif B</u>** Kamir $\int y^{\frac{1}{2}}\, dx$ $[A_1 = \frac{y^{\frac{3}{2}}}{\frac{3}{2}}]$ **K1** Guna had $\int_0^9$ ke dalam A_1 **atau** $A_2 = \frac{1}{2} \times 3 \times 18$ **K1** $A_2 - A_1$ **K1** 9 **N1**	
	(*c*)	Kamir $\frac{\pi}{4}\int \left(x^2\right)^2\, dx$ [Panduan **:** $\frac{\pi}{4}\left[\frac{x^5}{5}\right]$**]** ($\frac{\pi}{4}$ mesti ada) **K1** $\frac{\pi}{4}\left[\frac{(3)^5}{5} - \frac{(0)^5}{5}\right]$ (ganti had, $\frac{\pi}{4}$ mesti ada) **K1** $\frac{243}{20}\pi$ **N1**		

10	(*a*)	(i) $\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB}$ (tulis mana-mana hukum segi tiga) **P1** $15\underset{\sim}{i} + 9\underset{\sim}{j}$ **N1** (ii) Guna $\hat{r} = \dfrac{x\underset{\sim}{i} + y\underset{\sim}{j}}{\sqrt{x^2 + y^2}}$ **K1** $\dfrac{5}{\sqrt{34}}\underset{\sim}{i} + \dfrac{3}{\sqrt{34}}\underset{\sim}{j}$ **N1** (iii) $\left\|\overrightarrow{OA}\right\| = \sqrt{3^2 + 4^2} = 5$ atau $\left\|\overrightarrow{AB}\right\| = \sqrt{12^2 + 5^2} = 13$ atau $\left\|\overrightarrow{OB}\right\| = 3\sqrt{34}$ **K1** $13^2 = 5^2 + \left(3\sqrt{34}\right)^2 - 2(5)\left(3\sqrt{34}\right) kos\angle AOB$ **K1** 22.17° **N1**	**10**
	(*b*)	(i) $\overrightarrow{AR} = 12\underset{\sim}{i} + 8\underset{\sim}{j}$ **N1** (ii) Tulis $\overrightarrow{OA} = \lambda \overrightarrow{AR}$ dan selesaikan untuk λ (λ_1 & λ_2) **K1** $\lambda_1 \neq \lambda_2$ **dan** O, A dan R tidak segaris **N1**	
11	(*a*)	3.394 (dilihat) $10(^*3.394)$ **K1** 33.94 **N1**	**10**
	(*b*)	$\dfrac{^*33.94}{2}$ @ $10(2.89)$ **K1** $15 + {}^*S_{KN} + {}^*S_{LMN}$ **K1** 60.87 **N1**	

	(*c*)	1.445 @ 82.78 (dilihat) **P1** $A_1 = \frac{1}{2}(10)^2(2\pi)$ **K1** $A_2 = \frac{1}{2}(15)(15)\sin {}^{*}82.78$ **K1** $A = A_1 - A_2$ (syarat: $A_1 > A_2$) **K1** 202.59 **N1** ---------- @ ---------- 1.445 @ 82.78 (dilihat) **P1** $A_1 = \frac{1}{2}(10)^2(2\pi)$ **K1** $A_2 = \frac{1}{2}\left[2(10)\sin 82.78\right]\left[\sqrt{(15)^2 - \left(\frac{2(10)\sin 82.78}{2}\right)^2}\right]$ ** $A_2 = \frac{1}{2}bh$ **K1** $A = A_1 - A_2$ (syarat: $A_1 > A_2$) **K1** 202.58 **N1**	
12	(*a*)	(i) $\frac{BC}{\sin 48^\circ} = \frac{12}{\sin 63^\circ}$ **K1** 10.01 **N1** (ii) $DE^2 = 5^2 + 7^2 - 2(5)(7)kos\,69^\circ$ **K1** 6.994 **N1**	**10**
	(*b*)	(i)  **N1** (ii) 69° **N1** (iii) $\frac{CD'}{\sin 42^\circ} = \frac{5}{\sin 69^\circ}$ **K1** $CD' = 3.584$ **N1** Luas segi tiga $AC'D = \frac{1}{2} \times (15.584)(5)\sin 69^\circ$ **K1** 36.37 **N1**	
13	(*a*)	$y \geq x + 10$ **N1**	**10**
	(*b*)	$3x + 6y \leq 160$ **N1** $10x \geq y$ **N1**	
	(*c*)	Satu garis lurus dilukis dengan betul **N1** Semua garis lurus dilukis dengan betul **N1** Rantau dilorek dengan betul **N1**	

	(*d*)	(i) 76 orang	**N1**	
		(ii) Titik maksimum $(28,37)$ dan		
		garis fungsi objektif $k=16x+8y$ dilukis	**N1**	
		$k=16(28)+8(37)$	**K1**	
		744	**N1**	

Graf No 13



14	(*a*)	(i) $a = -2\,ms^{-2}$ **N1** (ii) $8 - 2t = 0$ **K1** $t = 4$ **N1** (iii) $-20 = 8t - t^2$ **K1** $t^2 - 8t - 20 = 0$ $(t-10)(t+2) = 0$ **K1** $t = 10$ **N1** -12 **N1**	**10**
	(*b*)	$OQ = 8(^*4) - {}^*4^2$ **K1** $20 - {}^*16$ **K1** 4 **N1**	
15	(*a*)	$\frac{100}{x} \times 258 = 120$ @ $\frac{y}{180} \times 100 = 105$ @ $\frac{100}{200} \times 216 = z$ **K1** $x = 215,\ y = 189$ *dan* $z = 108$ N2,**N1,N0**	**10**
	(*b*)	(i) $\frac{105(5) + 120(7) + 108(3)}{5 + 7 + 3}$ **K1** 112.60 **N1** (ii) $112.6 = \frac{p}{55} \times 100$ **K1** 61.93 **N1**	
	(*c*)	$\frac{150 \times 100}{112.6}$ **K1** $133.21 = \frac{p}{60.50} \times 100$ **K1** 80.59 **N1**	

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