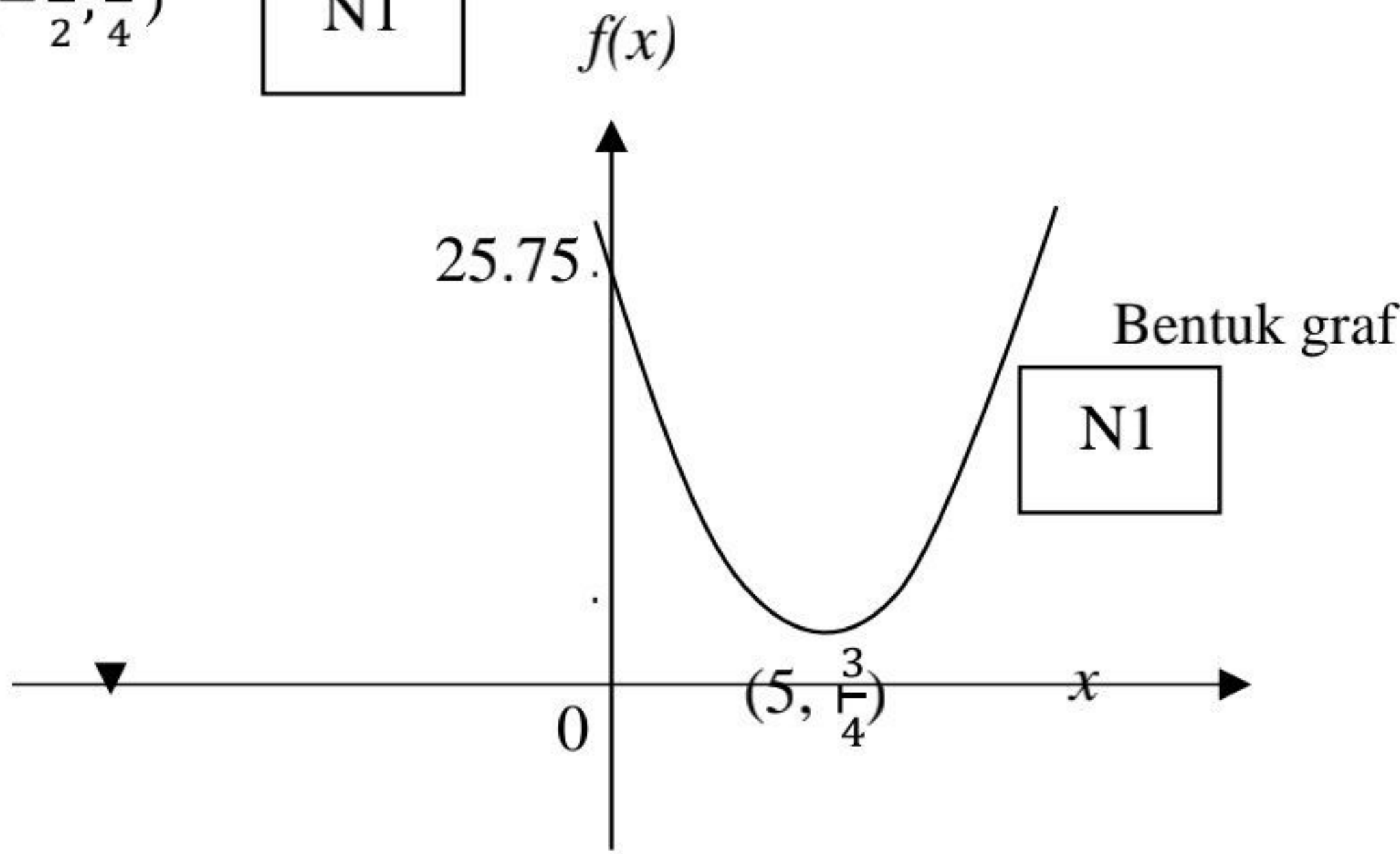


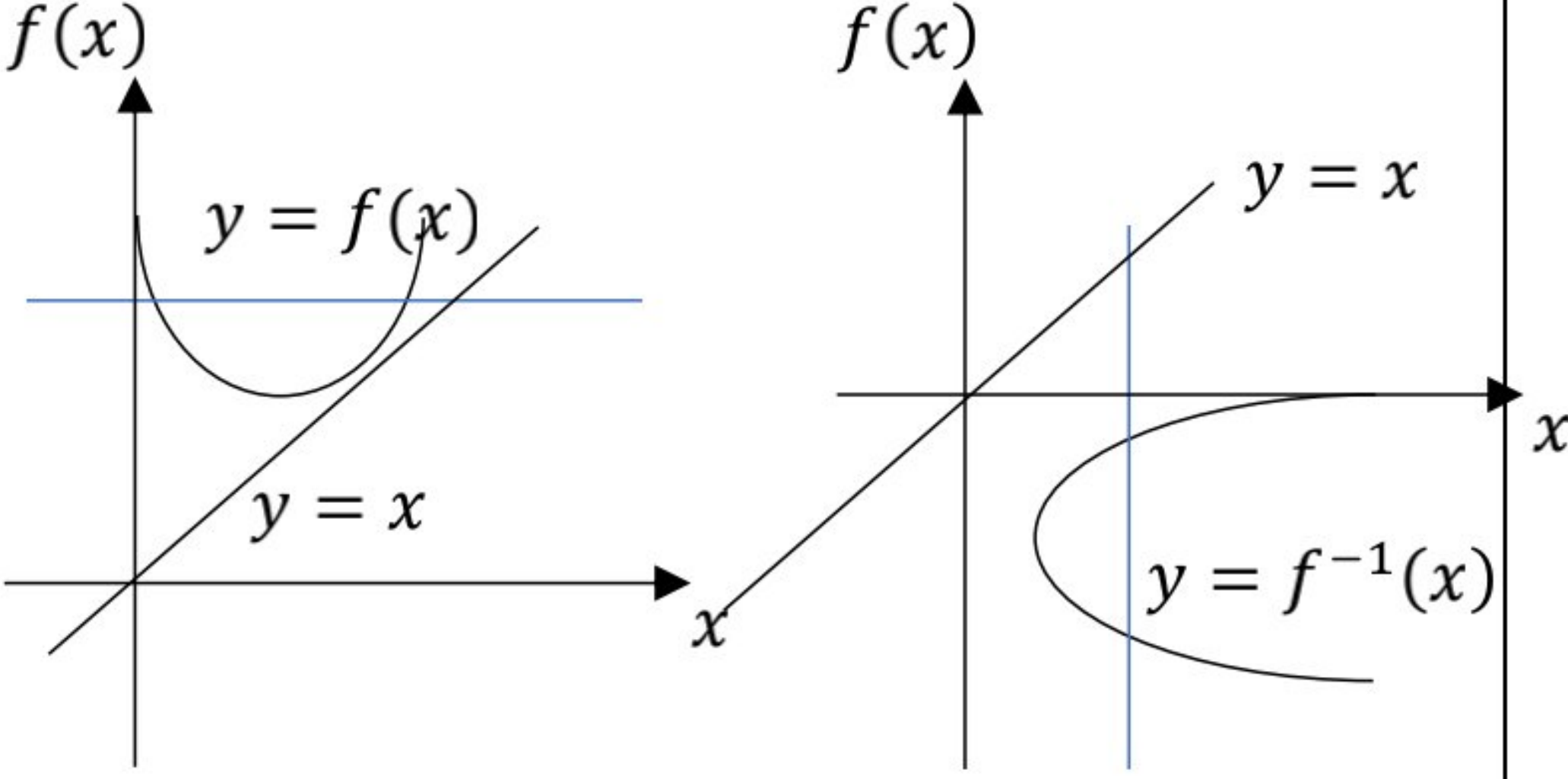
No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
1(a)	$(7)^2 - 4(1)(c) < 0$ K1 $c > \frac{49}{4} // c > 12.25$ N1	2	
(b) (i)	$f(x) = x^2 + 7x + (\frac{7}{2})^2 - (\frac{7}{2})^2 + 13$ K1 $x = -\frac{7}{2}$ N1		
(ii)	$(-\frac{7}{2}, \frac{3}{4})$ N1	3	
(c)	 Tunjukkan pada graf nilai pintasan-y = 25.75 dan titik minimum $(5, \frac{3}{4})$ K1	2	7
2 (a)	$3^x = 3^{3(7-2x)}$ K1 $x = 3(7 - 2x)$ K1 $x = 21 - 6x$ $x = 3$ N1	3	

(b)	$\log_2 x = \frac{\log_2(x+6)}{\log_2 4} \quad \text{K1}$ $\log_2 x = \frac{\log_2(x+6)}{\log_2 2^2} \quad \text{K1}$ $\log_2 x = \frac{\log_2(x+6)}{2 \log_2 2}$ $\log_2 x^2 = \log_2(x+6) \quad \text{K1}$ $x^2 = x + 6$ $x^2 - x - 6 = 0 \quad \text{K1}$ $(x-3)(x+2) = 0$ $x = 3 \quad \text{N1}$	5	8
3(a)	$\frac{ar^4}{ar} = \frac{k^5}{27k^3} \quad \text{K1}$ $r = \frac{k}{3} \quad \text{N1}$	2	
3(b) (i)	$a = 81k \quad \text{K1}$ $S_\infty = \frac{243k}{3-k} \quad \text{N1}$		
3(b) (ii)	$81 = \frac{243k}{3-k}$ $k = \frac{3}{4} \quad \text{N1}$	3	5
4	$m = \frac{3 - (-5)}{4 - 0} \quad \text{K1}$ $m = 2$ $y - 3x = 2x^2 - 5 \quad \text{K1}$ $m = 2 \quad \text{N1}$ $n = -1 \quad \text{N1}$	4	4

5	$\frac{1}{2} [x(4) + 2(2) + 5(0)] - [0(2) + 4(5) + 2(x)] $ K1 $\frac{1}{2} [x(4) + 2(2) + 5(0)] - [0(2) + 4(5) + 2(x)] = 11$ K1 $A(-3, 0)$ N1	3	3
6 (a)	Guna rumus $\underline{r} = \sqrt{x^2 + y^2}$ K1 $ \underline{v} = 2\sqrt{2}/2.828 \text{ ms}^{-1}$ N1 $\vec{OS} = \begin{pmatrix} 5 \\ -8 \end{pmatrix} + 2 \begin{pmatrix} 2 \\ 2 \end{pmatrix}$ K1 $(13, -4)$ N1	4	
(b)	$-8 + 2t = 0$ K1 $t = 4$ N1	2	6
7 (a)	$\text{Luas sektor OPR} = \frac{1}{2} j^2 \theta = 72 \text{ cm}^2$ K1 $\theta = \frac{144}{j^2}$ N1	2	
7 (b)	$OP = PQ = QR = OR = j$ $\text{Perimeter kawasan berlorek} = 2j + j \left(\frac{144}{j^2} \right)$ K1 $= \left(\frac{2j^2 + 144}{j} \right) \text{ cm}$ N1	2	4

8 (a)	(i)	4	N1	2	
	(ii)	2	N1		
(b)	(i)	3	N1	2	4
	(ii)	Tidak, $\lim_{x \rightarrow 0^-} f(x) \neq \lim_{x \rightarrow 0^+} f(x)$ N1			
9 (a)		$= 3(-5)$ $= -15$ P1		1	
(b)		$\int_2^5 4x \, dx - \int_2^5 f(x) \, dx$ $= \int_2^5 2x^2 \, dx - \int_2^5 f(x) \, dx$ K1 $= [2(5)^2 - 2(2)^2]_2^5 - 8$ K1 $= [50 - 8] - 8$ $= 34$ N1		3	
10 (a)	(i)	Bilangan cara $= (5 - 1)! \times 5!$ K1 $= 2880$ N1		2	
	(ii)	Jumlah susunan berlainan $= \frac{{}^4P_1 \times {}^{76}P_6 \times {}^3P_1}{3!}$ K1 K1 $= 1440$ N1		3	
(b)	(i)	Mana-mana dua titik sahaja diperlukan untuk melukis satu garisan Bilangan cara $= {}^{10}C_2$ $= 45$ N1		1	

(ii)	Mana-mana tiga titik sahaja diperlukan untuk melukis satu segi tiga Bilangan cara $= {}^{10}C_3$ $= 120$ K1 N1	2	8
11 (a) (i)	5 BAGUS N1	1	5
(a) (ii)	BENTUK GRAF 5 AZAM AKAN MENJADI LANDAI DAN LEBAR APABILA $\sigma_5 \text{ AZAM} < \sigma_5 \text{ BAGUS}$ N1	1	
11 (b) (i)	15 N1	1	
(b) (ii)	$P(X < 12)$ dan $P(X > 18)$ N1	1	
(b) (iii)	32 % N1	1	
12 (a)	$m = -1$ N1	1	6
(b)	$h(4) = 2(4) - 3 - 1$ $= 4$ N1	1	
(c)	$-3 \leq 2x - 3 \leq 3$ $-3 + 3 \leq 2x \leq 3 + 3$ $0 \leq 2x \leq 6$ $0 \leq x \leq 3$ K1 N1	2	
(d)	$ 2x - 3 - 1 = x$ K1 $x = 4, \quad x = \frac{2}{3}$ N1	2	

13(a)	$f(x) = 3\left(x^2 - 4x + \left(-\frac{4}{2}\right)^2 - \left(-\frac{4}{2}\right)^2 + \frac{11}{3}\right)$ K1 $f(x) = 3(x - 2)^2 - 1$ N1 *tidak terima $(-2)^2$	2	
(b)	$f(x) \geq -1$ N1	1	
(c)	Tidak mempunyai fungsi songsang. N1 kerana Hanya fungsi satu dengan satu mempunyai songsang atau Fungsi banyak dengan satu tidak mempunyai songsang dalam ujian garis mengufuk (mesti dilukis) atau Objek memetakan lebih daripada satu imej dalam ujian garis mencancang bagi f^{-1}. N1 	2	
(d)(i)	2 N1		

13 (d) (ii)	$f(x) = 3(x - 2)^2 - 1$ $3(x - 2)^2 - 1 = y$ $x = 2 \pm \sqrt{\frac{y + 1}{3}} \text{ atau } f^{-1}(x) = 2 \pm \sqrt{\frac{x + 1}{3}} \quad \text{K1}$ $f^{-1}(x) = 2 + \sqrt{\frac{x + 1}{3}}, x \geq -1 \quad \text{N1}$	3	8
14 (a)	$8\sqrt{9 \times 5} - 2\sqrt{4 \times 5} + 12\sqrt{5} \quad \text{K1}$ $8(3\sqrt{5}) - 2(2\sqrt{5}) + 12\sqrt{5}$ $32\sqrt{5} \quad \text{N1}$	2	
(b)	Luas segiempat = Panjang $\times$ Lebar $12 + 6\sqrt{3} = 10 + 4\sqrt{3} \times \text{Lebar} \quad \text{K1}$ $\text{Lebar} = \frac{12 + 6\sqrt{3}}{10 + 4\sqrt{3}} \quad \text{K1}$ $= \frac{12 + 6\sqrt{3}}{10 + 4\sqrt{3}} \times \frac{10 - 4\sqrt{3}}{10 - 4\sqrt{3}} \quad \text{K1}$ $= \frac{120 - 48\sqrt{3} + 60\sqrt{3} - 24\sqrt{3}\sqrt{3}}{100 - 40\sqrt{3} + 40\sqrt{3} - 16\sqrt{3}\sqrt{3}}$ $= \frac{120 - 24(3) + 12\sqrt{3}}{100 - 16(3)} \quad \text{K1}$ $= \frac{48 + 12\sqrt{3}}{52} \quad \text{K1}$ $\text{Lebar} = \frac{12 + 3\sqrt{3}}{13} \quad \text{N1}$	6	8

15 (a)	$2 \sin x \cos x + \cos x = 0$ $\cos x (2 \sin x + 1) = 0 \quad (\text{K1})$ $\cos x = 0, \sin x = -\frac{1}{2}$ Sudut rujukan = 90°, Sudut rujukan = 30° (N1) $x = 90^\circ, 270^\circ, 210^\circ, 330^\circ \quad (\text{N1})$	3	
(b) (i)	$\sec 2y = \frac{1}{\cos 2y} \quad (\text{K1})$ $= \frac{1}{1 - 2 \sin^2 y}$ $= \frac{1}{1 - \left(\frac{4}{5}\right)} \quad (\text{K1})$ $= \frac{1}{\frac{1}{5}}$ $= 5 \quad (\text{N1})$	3	
(b) (ii)	$\sin \frac{x}{2} = \sqrt{\frac{1 - \cos^2 x}{2}}$ $= \sqrt{\frac{1 - \left(-\frac{5}{13}\right)^2}{2}} \quad (\text{K1})$ $= \frac{6\sqrt{2}}{13} \quad (\text{N1})$	2	8

Bahagian A

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
1	$t + m + d = 200$ $1.5t + 5.75m + 2.6d = 589.5$ (P1) (P1) $d - m = 20$ P1 jika satu persamaan betul P1 jika ketiga-tiga persamaan betul Kaedah penggantian, $d = m + 20$ $\textcircled{3} \rightarrow \textcircled{1}$ $t + m + (m + 20) = 200$ $t = 180 - 2m$ (K1) Hapuskan salah satu pemboleh ubah $\textcircled{3} \ \& \ \textcircled{4} \rightarrow \textcircled{2}$ $1.5(180 - 2m) + 5.75m + 2.6(m + 20) = 589.5$ (K1) $m = 50$ (N1) $m = 50 \rightarrow \textcircled{3}$ $d = 50 + 20$ $d = 70$ (N1) $m = 50 \rightarrow \textcircled{4}$ $t = 180 - 2(50)$ $t = 80$ (N1) Restoran itu telah menempah 80 kuntum bunga teluki, 50 kuntum bunga mawar dan 70 kuntum bunga daisi.	7	7

2(a)	$f(x) = x^2 + px + \left(\frac{p}{2}\right)^2 - \left(\frac{p}{2}\right)^2 + 4$ K1 $f(x) = \left(x + \frac{p}{2}\right)^2 - \frac{p^2}{4} + 4$ N1	2	
(b)	$p = 4$ N1 $q = -2$ N1 $f(x) = x^2 - 4x + 4$ N1	2	
(c)	Koordinat verteks (2, 0) N1	2	6
3 (a)(i)	Guna hukum segitiga K1 $\overrightarrow{BD} = \overrightarrow{BA} + \overrightarrow{AD}$ $\overrightarrow{BD} = -40 \underline{m} + 64 \underline{n}$ N1		
(a) (ii)	$\overrightarrow{EC} = \overrightarrow{ED} + \overrightarrow{DC}$ K1 $\overrightarrow{EC} = 50 \underline{m}$ N1	4	
(b)	Cari $\overrightarrow{DL}$, $\overrightarrow{LD}$, $\overrightarrow{BL}$ atau $\overrightarrow{LB}$ $\overrightarrow{LD} = \overrightarrow{DE} + \overrightarrow{EL}$ K1 $\overrightarrow{EL} = 30m$ N1 Tunjuk hubungan vektor selari melibatkan $\overrightarrow{DL}$, $\overrightarrow{LD}$, $\overrightarrow{BL}$ atau $\overrightarrow{LB}$ dengan $\overrightarrow{BD}$ $\overrightarrow{BD} = 8(-5m + 8n), \overrightarrow{LD} = 6(-5m + 8n)$ K1 $\overrightarrow{LD} = \frac{3}{4}\overrightarrow{BD}$ atau setara N1	4	8

4(a)	$y = 2x(1 - x)^4$. Pembezaan <i>Diffentiate</i> Katakan $u = 2x$, $v = (1 - x)^4$, <i>Let</i> $\frac{du}{dx} = 2 \qquad \frac{dv}{dx} = 4(1 - x)^3(-1)$ $= -4(1 - x)^3$ $\frac{dy}{dx} = 2x[-4(1 - x)^3] + 2(1 - x)^4 \quad (\text{K1})$ Ganti $x = 2$ <i>Substitute $x = 2$</i> $\frac{dy}{dx} = 2(2)[-4(1 - 2)^3] + 2(1 - 2)^4 \quad (\text{K1})$ $\frac{dy}{dx} = 18$ Ganti $x = 2$ <i>Substitute $x = 2$</i> Apabila $x = 2$, $y = 2(2)(1 - 2)^4 \quad (\text{K1})$ <i>When</i> $y = 4$ Persamaan tangen ialah <i>The equation of the tangent is</i> <u>Guna $y - y_1 = m(x - x_1)$</u> $y - 4 = 18(x - 2) \quad (\text{K1})$ Atau <i>Or</i> Guna $y = mx + c$ & Selesaikan untuk c		
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	<u>Use $y = mx + c$ & Solve c</u> $[4 = (18)(2) + c]$ $c = -14$ $y = 18x - 32$ N1	5	
(b)	<u>Guna $m_1 \times m_2 = -1$</u> $(18 \times m_2 = -1)$ Kecerunan garis normal = $-\frac{1}{18}$ <i>Gradient of normal</i> Persamaan garis normal ialah <i>The equation of the normal is</i> <u>Guna $y - y_1 = m(x - x_1)$</u> $y - 4 = -\frac{1}{18}(x - 2)$ Atau <i>Or</i> Guna $y = mx + c$ & Selesaikan untuk c <u>Use $y = mx + c$ & Solve c</u> $\left[4 = \left(-\frac{1}{18}\right)(2) + c\right]$ $c = \frac{37}{9}$ $y = -\frac{1}{18}x + \frac{37}{9}$ N1	5	8
		3	

5(a)	$1 + \frac{\cos^2 \frac{3}{2}x}{\sin^3 \frac{3}{2}x - 1}$ $= \frac{\sin^3 \frac{3}{2}x - 1 + \cos^2 \frac{3}{2}x}{\sin^3 \frac{3}{2}x - 1} \quad (\text{K1})$ $= \frac{\sin^3 \frac{3}{2}x - 1 + 1 - \sin^2 \frac{3}{2}x}{\sin^3 \frac{3}{2}x - 1}$ $= \frac{\sin^3 \frac{3}{2}x - 1 + 1 - \sin^2 \frac{3}{2}x}{\sin^3 \frac{3}{2}x - 1}$ $= \frac{-\sin^2 \frac{3}{2}x + \sin^3 \frac{3}{2}x}{\sin^3 \frac{3}{2}x - 1}$ $= \frac{-\sin^3 \frac{3}{2}x (\sin^3 \frac{3}{2}x - 1)}{\sin^3 \frac{3}{2}x - 1} \quad (\text{K1})$ $= -\sin^3 \frac{3}{2}x \quad (\text{N1})$	3	
5(b)(i)	Bentuk Sinus (terima ≥ 1 kitaran) P1 $1 \frac{1}{2}$ kitaran P1 Amplitud = 3 (Maks = 3 & min = -3) P1 *Jika bentuk sinus P0 terus semua P0 $0 \leq x \leq 2\pi$	3	
5b(ii)	$y = 3 - \frac{3x}{\pi} \quad \text{atau} \quad -3\sin \frac{3}{2}x = 3 - \frac{3x}{\pi} \quad (\text{N1})$ Garis lurus dilukis mengikut *m atau *c K1 Bilangan penyelesaian = 3 N1	3	9

6 (a)	Lengkok dalaman $Inner\ arc = S_1 = 25.5\theta\ cm$ P1 dan / and Lengkok luaran $Outer\ arc = S_2 = (37.5 + 25.5)\theta = 63\theta\ cm$ $25.5\theta + 63\theta + 37.5 + 37.5 = 100\pi - 47$ K1 $88.5\theta = 100\pi - 122$ $\theta = \frac{100(3.142) - 122}{88.5}$ $\theta = 2.1718\ rad$ $\theta = 2.1718 \times \frac{180^\circ}{3.142}$ $\theta = 124.42^\circ$ N1	3	
6 (b)	Luas cermin yang boleh dibersihkan oleh pengelap <i>The area of the mirror that can be cleaned by the wiper</i> $\frac{1}{2}(63^2)(2.1718)$ or $\frac{1}{2}(25.5^2)(2.1718)$ K1 $\frac{1}{2}(63^2)(2.1718) - \frac{1}{2}(25.5^2)(2.1718)$ K1 $= 4309.9371 - 706.1065$ $3603.83\ cm^2$ N1	3	6
7(a)	$S_1 = \frac{1}{2}[23 - 7(1)]$ K1 $S_1 = T_1 = 8$ N1 $d = -7$ N1	2	2

7(b)	$T_7 = 8 + (7-1)(-7) \quad \text{K1}$ $T_7 = -34 \quad \text{N1}$	2	2
7(c)	$\frac{10}{2}[23 - 7(10)] - \frac{4}{2}[23 - 7(4)] \quad \text{K1}$ $-225 \quad \text{N1}$	2	2

Bahagian B

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
8.a	$y = -\frac{2x^2}{3(2)} + c$ $y = -\frac{x^2}{3} + c \quad \text{P1}$ $B(6, 3), c = 15 \quad \text{K}$ $y = -\frac{x^2}{3} + 15 \quad \text{N1}$	3	
8.b.i	$y - 3 = -4(x - 6)$ $y = -4x + 27 \quad \text{N1}$	1	

8.b.ii	$\int_0^6 -\frac{x^2}{3} + 15 \, dx - (6x3) \quad \text{K1}$ $\left[-\frac{x^3}{3(3)} + 15x \right]_0^6 - 18$ $\left[-\frac{6^3}{3(3)} + 15(6) \right] - \left[-\frac{0^3}{3(3)} + 15(0) \right] - 18 \quad \text{K1}$ 48 N1	3	
8.c	$\pi \int_3^{15} x^2 \, dy$ $\pi \int_3^{15} 45 - 3y \, dy$ $\pi \left[45y - \frac{3y^2}{2} \right]_3^{15} \quad \text{K}$ $\pi \left[\left(45(15) - \frac{3(15)^2}{2} \right) - \left(45(3) - \frac{3(3)^2}{2} \right) \right] \quad \text{K}$ 216π N1	3	10
9(a) (i)	${}^{10}C_7 (0.65)^7 (0.35)^3 \quad \text{K1}$ 0.2522 N1 $P(X=0) + P(X=1) + P(X=2) \quad \text{K1}$ ${}^{10}C_0 (0.65)^0 (0.35)^{10} + {}^{10}C_1 (0.65)^1 (0.35)^9 +$		

(ii)	${}^{10}C_2 (0.65)^2 (0.35)^8$ 0.004821 N1 K1	5	
(b) (i)	$P\left(\frac{40-40}{12} < Z < \frac{55-40}{12}\right)$ 0.39435 N1 K1		
(ii)	$P\left(Z > \frac{m-40}{12}\right) = 0.58$ K1 $\frac{m-40}{12} = -0.202$ K1 37.58 N1	5	10
10(a)	$\sqrt{(x-2)^2 + (y-0)^2} = 4$ K1 $x^2 + y^2 - 4x - 12 = 0$ N1 $\sqrt{[(x-(-3))]^2 + (y-2)^2} = \sqrt{[(x-(-2))]^2 + (y-1)^2}$ K1 N1 $x - y + 4 = 0$	4	

10(b)	$x^2 - 4x - 12 = 0$ K1 N1 (6, 0) N1 (-2, 0) N1 $F(0, 4)$		
10(c)	$\frac{1}{2} [6(0) + 4(-2) + 0(0)] - [0(-2) + 0(0) + 4(6)] $ Terima: susunan titik D, E, F berlainan tetapi dengan langkah kerja yang tepat K1 16 N1		
		4	
		2	10

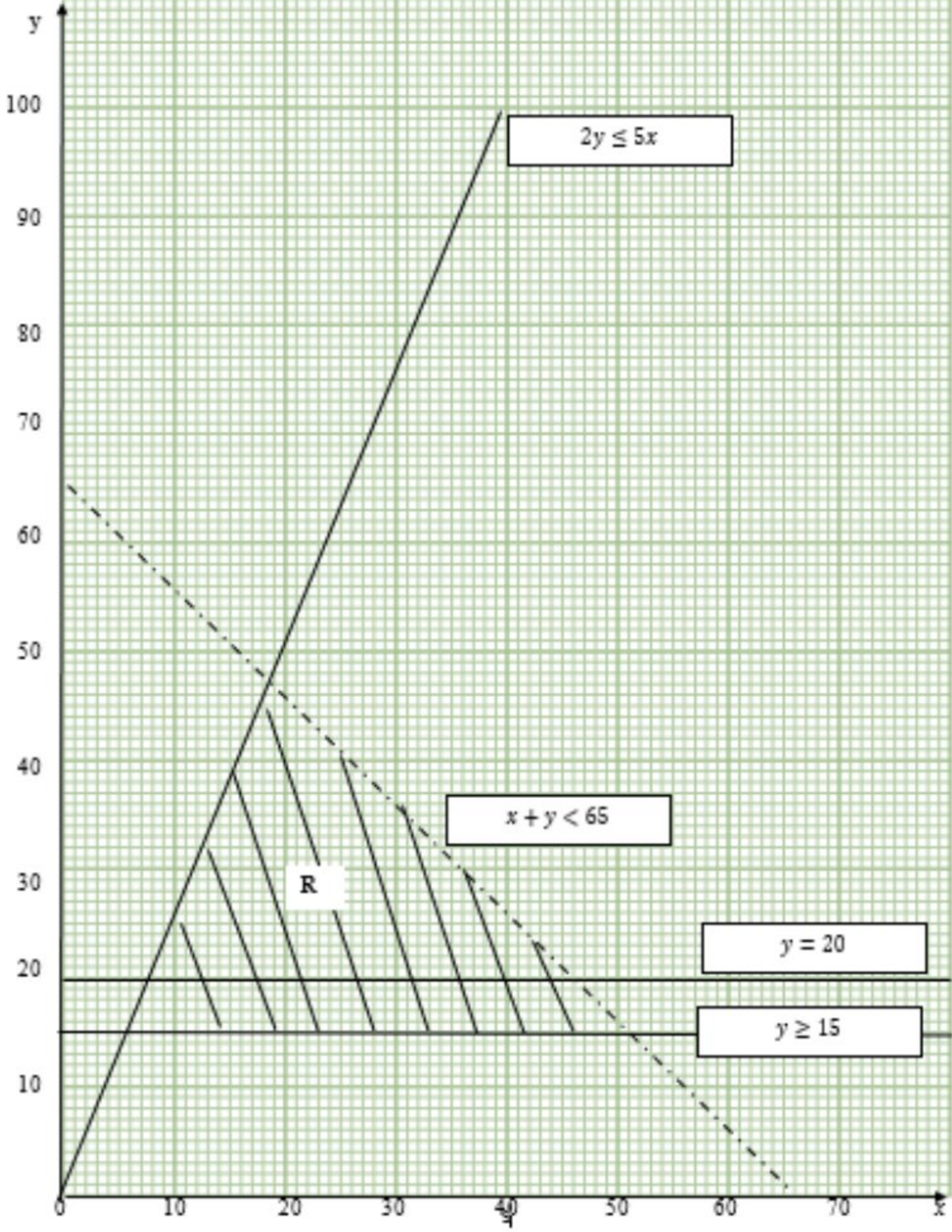
No.	Skema Pemarkahan	Sub Markah	Jumlah Markah														
11 (a)	<table border="1"><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>x^2y</td><td>1.36</td><td>1.52</td><td>1.66</td><td>1.92</td><td>2.00</td><td>2.16</td></tr></table> N1 Graf garis lurus x^2y melawan x dilukis - Paksi-paksi betul dan skala seragam dari titik pertama hingga titik terakhir - Sekurang-kurangnya satu titik diplot betul 6 titik diplot dengan betul Garis penyuaian terbaik	x	1	2	3	4	5	6	x^2y	1.36	1.52	1.66	1.92	2.00	2.16	4	
x	1	2	3	4	5	6											
x^2y	1.36	1.52	1.66	1.92	2.00	2.16											

11 (b)(i)(ii)	$x^2y = p^2x + \sqrt{p}$ P1 $p^2 = \frac{1.36 - 1.2}{1 - 0} = 0.16$ K1 $p^2 = 0.16$ $p = \pm 0.4$ N1 $\sqrt{q} = 1.2$ $q = 1.44$ N1 $\sqrt{y} = \frac{1.44}{x}$ $y = \frac{1.96}{x^2}$ $x^2y = 1.96$ K1 Daripada graf / From the graph, $x = 4.75$ N1	6	10
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Bahagian C

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
12(a) (i)	$AC^2 = 7^2 + 8^2 - 2(7)(8)\cos 80^\circ$ (K1)		
	$AC = 9.672$ (N1)		
(ii)	$\angle ADC + 80 = 180$		
	$\angle ADC = 100^\circ$ (P1)		
	$\frac{\sin \angle CAD}{3} = \frac{\sin \angle 100^\circ}{9.672}$ (K1)		
	$\angle CAD = 17^\circ 47' @ 17.79^\circ$ (N1)		
	$\angle ACD = 180^\circ - 100^\circ - 17^\circ 47' = 62^\circ 13'$		
	$62^\circ 13' @ 62.21^\circ$ (N1)	6	
(b)(i)	$\text{Luas } \triangle ABC = \frac{1}{2} \times 7 \times 8 \times \sin 80^\circ$ (K1)		
	$= 27.57 \text{ cm}^2$ (N1)		
(ii)	Jarak terdekat = h		
	$\frac{1}{2} \times 9.672 \times h = 27.57$ (K1)		
	$h = 5.701$ (N1)	4	10

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
1(a)	$\frac{w}{4.00} \times 100 = 120$ N1 $w = 4.80$ K1	2	
(b)	$\frac{x+2}{x} \times 100 = 140$ $x = 5$ N1 K1 $y = 7$ N1	3	
(c)	$\tilde{I} = \frac{120(7)+140(3)+140(4)+120(2)}{7+3+4+2}$ 128.75 N1 K1	2	
(d)	$\tilde{I} = \frac{128.75 \times 130}{100}$ $= 167.375 \text{ atau } 167.38$ P1 $P = \frac{15 \times 167.375}{100}$ $= 25.11$ N1 K1	3	
			10

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
14(a)	$2y \leq 5x$ N1 $x + y < 65$ N1 $y \geq 15$ N1	3	
14(b)	 Draw correctly at least one straight line from inequalities K1 Draw correctly all the straight lines from inequalities N1 Region R shaded / labeled correctly N1	3	

14(c)	(i) $x = 34$ N1 NMA Bilangan maksimum resume daripada A $= 34 \times 2 = 68$ N1 (ii) Straight line $y = 20$ is drawn K1 $8 \leq x < 44$ N1 NMA	4	10
15(a)	22 P1 $-8t^2 + 8t + 10 = 0$ atau $6t^2 - 9t - 12 = 0$ K1 $t = 1.7247$ atau $t = -0.7247$ (diabaikan kerana $t > 0$) atau K1 $t = 2.3508$ atau $t = -0.8508$ (diabaikan kerana $t > 0$) Zarah Y N1	1 1 1 1	4
(b)	$6t^2 - 9t - 12 = (-8t^2 + 8t + 10)$ K1 $n = 2$ atau -0.7857 (diabaikan kerana $t > 0$) N1	1 1	2
(c)	$(8t - 8t^2 + 10) - (6t^2 - 9t - 12)$ atau K1 $17t - 14t^2 + 22$ $17 - 28t = 0$ K1 $17(0.6071) - 14(0.6071)^2 + 22$ or equivalent K1	1 1 1	

	27.16 m N1	1	4
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