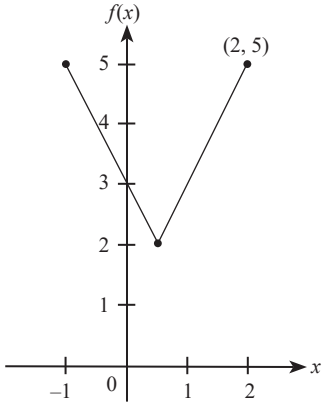
JAWAPAN

Tingkatan 4

BAB 1 **Fungsi**
Functions

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Kodomain/*Codomain* = {1, 2, 3, 4, 5} (b) Objek/*Object* = 3 dan/*and* 4	1 1	2
2	<table><tr><td>x</td><td>–1</td><td>0</td><td>$\frac{1}{2}$</td><td>1</td><td>2</td></tr><tr><td>$f(x)$</td><td>5</td><td>3</td><td>2</td><td>3</td><td>5</td></tr></table>  Graf bentuk ∨ dilakar. *The ∨-shaped graph sketched.* Titik-titik (–1, 5), $\left(\frac{1}{2}, 2\right)$ dan (2, 5) dilabel. *The points of* (–1, 5), $\left(\frac{1}{2}, 2\right)$ *and* (2, 5) *is labelled.* Julat yang sepadan/*The corresponding range*: $2 \leqslant f(x) \leqslant 5$	1 1 1	3
3	(a) $g(2) = 1$ $\frac{x+c}{3m} = 1$ $2 + c = 3m$ $c = 3m - 2$ ... ① $g(-2) = 3$ $\frac{-2+c}{3m} = 3$ $c = 9m + 2$ ... ② $3m - 2 = 9m + 2$ $6m = -4$ $m = -\frac{2}{3}$ Gantikan ① ke dalam ①/*Substitute* ① *into* ② $c = 3\left(-\frac{2}{3}\right) - 2$ $c = -4$	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $g(-4) = \dfrac{x-4}{3\left(\frac{2}{3}\right)}$ $= \dfrac{(-4)-4}{2}$ $= -4$ (c) $g(x) = x$ $\dfrac{x-4}{2} = x$ $2x - x = -4$ $x = -4$	1 1 1 1 1	4
4	$f(x) = y$ $\dfrac{2x+3}{x-4} = y$ $2x + 3 = xy - 4y$ $x(y-2) = 4y + 3$ $x = \dfrac{4y+3}{y-2}$ $f^{-1}(x) = \dfrac{4x+3}{x-2}, x \neq 2$	1 1, 1	3
5	$f^2(x) = f[f(x)]$ $= 5(5x-3) - 3$ $= 25x - 15 - 3$ $= 25x - 18$ $g^2(x) = g[g(x)]$ $= 2(2x+1) + 1$ $= 4x + 3$ $f^2 = g^2$ $25x - 18 = 4x + 3$ $21x = 21$ $x = 1$	1 1 1 1	4
6	Hubungan ini bukan fungsi/*This relation is not a function*. Ini kerana tidak memenuhi syarat fungsi iaitu setiap objek mesti mempunyai satu imej sahaja. *This is because it does not satisfy the condition of being a function, that is each object gas only one image.*	1 1	2
7	$f(x) = y$ $3x + 7 = y$ $x = \dfrac{y-7}{3}$ $f^{-1}(x) = \dfrac{x-7}{3}$ $g(x) = y$ $x^2 - 4 = y$ $x = \pm\sqrt{y+4}$ $g^{-1}(x) = \pm\sqrt{x+4}$ $fg(x) = f[g(x)]$ $= 3(x^2-4) + 7$ $= 3x^2 - 12 + 7$ $= 3x^2 - 5$ $fg(x) = y$ $3x^2 - 5 = y$ $x = \pm\sqrt{\dfrac{y+5}{3}}$ $(fg)^{-1}(x) = \pm\sqrt{\dfrac{x+5}{3}}$ $g^{-1}f^{-1}(x) = g^{-1}[f^{-1}(x)]$ $= \pm\sqrt{\dfrac{x-7}{3} + 4}$ $= \pm\sqrt{\dfrac{x-7+4(3)}{3}}$ $= \pm\sqrt{\dfrac{x+5}{3}}$ $(fg)^{-1}(x) = g^{-1}f^{-1}(x) = \pm\sqrt{\dfrac{x+5}{3}}$, terbukti/*proven*	1, 1 1, 1 1 1	6

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
8	(a) $f(x) = 0$ $2k - 1 = 0$ $k = \frac{1}{2}$ (b) $f(x) < 5$ $\lvert 2x - 1 \rvert < 5$ $-5 < 2x - 1 < 5$ $-2 < x < 3$	 1 1 1 1	4
9	(a) $\{(-3, 9), (1, 1), (3, 9)\}$ (b) $\{1, 9\}$	1 1	2
10	(a) $5x - 3 = x$ $4x = 3$ $x = \frac{3}{4}$ (b) $h(3 + m) = 9m$ $5(3 + m) - 3 = 9m$ $9m - 5m = 15 - 3$ $4m = 12$ $m = 124$ $m = 3$	1 1 1 1	4
11	$f(x) = y$ $f(x) = ax + b$ $f(5) = 10$ $a(5) + b = 10$ $b = 10 - 5a$ … ① atau/*or* $f(1) = -2$ $a(1) + b = -2$ … ② Gantikan ① ke dalam ② *Substitute ① into ②* $a + 10 - 5a = -2$ $-4a = -12$ $a = 3$ $b = 10 - 5(3)$ $= -5$	 1 1 1 1	4
12	$fg(x) = f[g(x)]$ $= 2\left(\frac{-3x}{x+1}\right) + 1$ $= \frac{-6x}{x+1} + 1$ $= \frac{-6x + (x+1)}{x+1}$ $= \frac{1 - 5x}{x+1}$ $gf(x) = g[f(x)]$ $= \frac{-3(2x+1)}{(2x+1)+1}$ $= \frac{-6x - 3}{2x+2}$ $= \frac{-3(2x+1)}{2(x+1)}$	 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$fg(x) = gf(x)$ $\frac{1-5x}{x+1} = \frac{-3(2x+1)}{2(x+1)}$ $2(1-5x) = -3(2x+1)$ $10x - 6x = 2 + 3$ $4x = 5$ $x = \frac{5}{4}$	1 1	5
13	$f(x) = x - 5$ $gf(x) = 3x + 12$ $f(x) = y$ $x - 5 = y$ $f^{-1}(x) = x + 5$ $gff^{-1}(x) = 3(x+5) + 12$ $g(x) = 3x + 15 + 12$ $= 3x + 27$ $g(2) = 3(2) + 27$ $= 33$	 1 1 1	3
14	(a) $h^2(x) = h[h(x)]$ $= \frac{1}{\left(\frac{1}{x}\right)}$ $= x$ $h^3(x) = h[h^2(x)]$ $= \frac{1}{x}$ $h^4(x) = h[h^3(x)]$ $= \frac{1}{\left(\frac{1}{x}\right)}$ $= x$ (b) $h^{22}(x) = x$ $h^{33}(x) = \frac{1}{x}$	1 1 1 1 1	5
15	$fg(x) = f[g(x)]$ $= \sqrt{x^2}$ $= x$ $gf(x) = g[f(x)]$ $= (\sqrt{x^2})^2$ $= x$ $fg(x) = gf(x) = x$, maka $g(x) = x^2$ ialah fungsi songsang bagi $f(x) = \sqrt{x}$. *$fg(x) = gf(x) = x$, thus $g(x) = x^2$ is the inverse function of $f(x) = \sqrt{x}$.*	1 1 1	3
16	(a) (i) Fungsi selanjar/*Continuous function* (ii) $-4 \leqslant f(x) \leqslant 11$ (b) Graf *f* tidak mempunyai fungsi songsang kerana garis mengufuk memotong lebih daripada satu titik pada graf. *Graph f has no inverse function because the horizontal line cuts the graph of function f at more than one point.*	1 1 1	3
17	(a) $g(3) = -\frac{5(3)}{3+2}$ $= -\frac{15}{5}$ $= -3$	1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $g(x) = y$ $-\dfrac{5x}{x+2} = y$ $-5x = y(x+2)$ $xy + 5x = -2y$ $x(y+5) = -2$ $x = -\dfrac{2}{y+5}$ $g^{-1}(x) = -\dfrac{2}{x+5}$ Maka/*Hence*, $x + 5 = 0$ $x = -5$	1 1	4
18	Penyebut tidak boleh sifar/*Denominator cannot be zero*. $x - 3 > 0$ $x > 3$ Punca kuasa dua mestilah nombor nyata. *Square root must be real number.* $x - 3 > 0$ $x > 3$ Maka, domain ialah $x > 3$. *Hence, the domain is* $x > 3$.	 1 1	2
19	$E(x, y) = f(x) + g(y)$ $E(100, 20) = f(100) + g(20)$ $= [5(100) + 50] + [8(20) + 100]$ $= 550 + 260$ $= 810$	 1 1 1	3

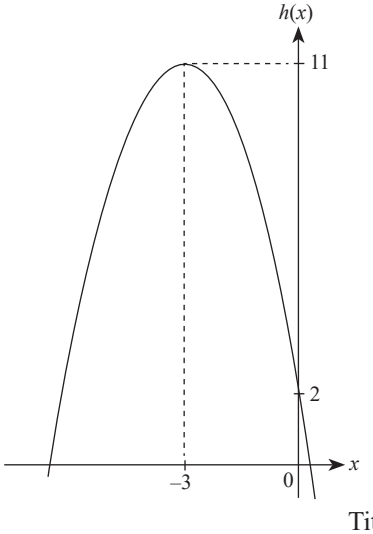
BAB 2 Fungsi Kuadratik
Quadratic Functions

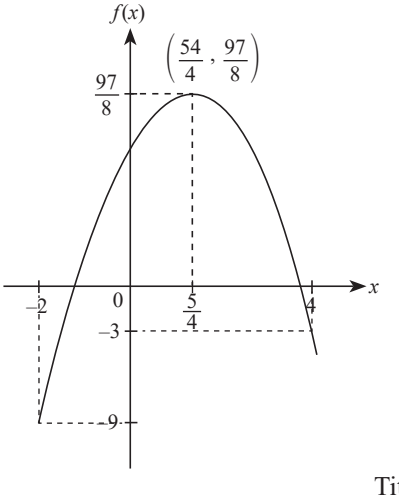
Imbas Kembali

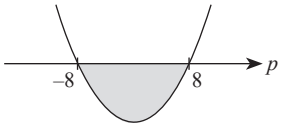
Soalan	Skema Pemarkahan
1	(a) $\begin{array}{rrr\|rl} & x & -5 & -5x & \\ \times & x & 3 & 3x & (+) \\ \hline & x^2 & -15 & -2x & \end{array}$ $(x - 5)(x + 3) = 0$ (b) $\begin{array}{rrr\|rl} & 2y & 9 & 9y & \\ \times & y & -5 & -10y & (+) \\ \hline & 2y^2 & -45 & -y & \end{array}$ $(2y + 9)(y - 5) = 0$ (c) $\begin{array}{rrr\|rl} & k & 9 & 36k & \\ \times & -4k & -7 & 7k & (+) \\ \hline & -4k^2 & -63 & 43k & \end{array}$ $(k - 9)(-4k + 7) = 0$
2	$x^2 + 8x = -6$ $x^2 + 8x + 6 = 0$ $\begin{array}{rrr\|rl} & x & 4 & 4x & \\ \times & x & 4 & 4x & (+) \\ \hline & x^2 & 16 & 8y & \end{array}$ $(x + 4)(x + 4) = 0$ Tinggi/*Height* = $(x + 4)$ cm

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Hasil tambah punca/*Sum of roots*: $\alpha + 2\alpha = -\frac{(-3)}{1}$ $3\alpha = 3$ $\alpha = 1$ Hasil darab punca/*Product of roots*: $(\alpha)(2\alpha) = k$ $2\alpha^2 = k$ $2(1)^2 = k$ $k = 2$ (b) $\alpha = 1$ $2(\alpha) = 1$ $= 2$ Nilai-nilai sepadan bagi punca-punca ialah 1 dan 2. *The corresponding values of the roots are* 1 *and* 2.	1 1 1	3
2	Hasil tambah punca/*Sum of roots*: $\alpha + \beta = -\frac{-3}{2}$ $= \frac{3}{2}$ Hasil darab punca/*Product of roots*: $\alpha\beta = \frac{-5}{2}$ Punca-punca baharu/*New roots*: Hasil tambah punca/*Sum of roots*: $\frac{2\alpha}{\beta} + \frac{2\beta}{\alpha} = \frac{2\alpha^2 + 2\beta^2}{\alpha\beta}$ $= \frac{2(\alpha^2 + \beta^2)}{\alpha\beta}$ $= \frac{2[(\alpha + \beta)^2 - 2\alpha\beta]}{\alpha\beta}$ $= \frac{2\left[\left(\frac{3}{2}\right)^2 - 2\left(-\frac{5}{2}\right)\right]}{-\frac{5}{2}}$ $= -\frac{29}{5}$ Hasil darab punca/*Product of roots*: $\left(\frac{2\alpha}{\beta}\right)\left(\frac{2\beta}{\alpha}\right) = \frac{4\alpha\beta}{\alpha\beta}$ $= 4$ $x^2 - \left(-\frac{29}{5}\right)x + 4 = 0$ $x^2 + \frac{29}{5}x + 4 = 0$	1 1 1 1	3
3	(a) $2x^2 - 3x + 4 = 0$ $m + n = -\frac{(-3)}{2}$, $mn = \frac{4}{2}$ $= \frac{3}{2}$ $= 2$ Punca-punca baharu/*New roots*: Hasil tambah punca/*Sum of roots* $= (m - n) + (n - m)$ $= 0$ Hasil darab punca/*Product of roots* $= (m - n)(n - m)$ $= mn - m^2 - n^2 + mn$ $= 2mn - m^2 - n^2$ $= 2mn - [(m + n)^2 - 2mn]$ $= 2(2) - \left[\left(\frac{3}{2}\right)^2 - 2(2)\right]$ $= \frac{23}{4}$ $x^2 + \frac{23}{4} = 0$	1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $m + n = \frac{3}{2}$ $mn = 2$ $n = \frac{2}{m}$ $\left(m + \frac{2}{m} = \frac{3}{2}\right)m$ $m^2 + 2 = \frac{3}{2}m$ $\left(m^2 - \frac{3}{2}m + 2 = 0\right)2$ $2m^2 - 3m + 4 = 0$	1 1	7
4	$y = q - x$ $x^2 - 2x + 2(q - x)^2 = 3$ $x^2 - 2x + 2(q^2 - 2qx + x^2) = 3$ $x^2 - 2x + 2q^2 - 4qx + 2x^2 - 3 = 0$ $3x^2 + (-2 - 4q)x + 2q^2 - 3 = 0$ $b^2 - 4ac > 0$ $(-2 - 4q)^2 - 4(3)(2q^2 - 3) > 0$ $4 + 16q + 16q^2 - 24q^2 + 36 > 0$ $-8q^2 + 16q + 40 > 0$ $q^2 - 2q - 5 < 0$ $q^2 < 2q + 5$	1 1 1 1	4
5	Jumlah punca-punca/*Sum of roots* $= \alpha + \beta$ $= 2$ Jumlah kuasa dua punca-punca/*Sum of squares of roots* $= \alpha^2 + \beta^2$ $= 18$ $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$ $18 = (2)4^2 - 2\alpha\beta$ $2\alpha\beta = 4 - 18$ $\alpha\beta = -\frac{14}{2}$ $= 7$ $x^2 - (\alpha + \beta)x + (\alpha\beta) = 0$ $x^2 - 2x - 7 = 0$	1 1 1 1	4
6	(a)  Apabila/*When* $x = 0$, $h(x) = 11 - (0 + 3)^2$ $= 2$ Bentuk graf/*Shape of graph* ∩ Titik maksimum/*Maximum points* (–3, 11) Pintasan-y/*y-intercept* (0, 2) (b) $g(x) = -(x - 3)^2 + 11$	1 1 1 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
7	(a) $f(x) = -2x^2 + mx + n$ $= -2\left(x^2 - \frac{m}{2}x - \frac{n}{2}\right)$ $= -2\left[x^2 - \frac{m}{2}x + \left(\frac{\left(-\frac{m}{2}\right)}{2}\right)^2 - \left(\frac{\left(-\frac{m}{2}\right)}{2}\right)^2 - \frac{n}{2}\right]$	1	
	$= -2\left[\left(x - \frac{m}{4}\right)^2 - \frac{m^2}{16} - \frac{n}{2}\right]$ $= -2\left(x - \frac{m}{4}\right)^2 + \frac{m^2}{8} + n$	1	
	$\frac{m}{4} = \frac{5}{4}$	1	
	$m = 5$	1	
	$\frac{m^2}{8} + n = \frac{97}{8}$ $\frac{5^2}{8} + n = \frac{97}{8}$ $n = 9$	1	
	(b) Apabila/*When* $x = -2$ $f(x) = -2(-2)^2 + 5(-2) + 9$ $= -9$ Apabila/*When* $x = 4$ $f(x) = -2(4)^2 + 5(4) + 9$ $= -3$		7
			
	Titik maksimum/*Maximum points* $\left(\frac{54}{4}, \frac{97}{8}\right)$	1	
	Parabola dari (–2, –9) hingga (4, –3)/*Parabola from* (–2, –9) *to* (4, –3)	1	
8	(a) $x^2 < -9x - 8$ $x^2 + 9x + 8 < 0$ $(x + 1)(x + 8) < 0$	1	
	Titik ujian –9: *Test point* –9: $(-9 + 1)(-9 + 8) > 0$ ⊕ Titik ujian –5: *Test point* –5: $(-5 + 1)(-5 + 8) < 0$ ⊖ Titik ujian 0: *Test point* 0: $(0 + 1)(0 + 8) > 0$ ⊕ x; –8; –1 $x < -8$; $-8 < x < -1$; $x > -1$	1	
	$\therefore -8 < x < -1$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $k(x) = 2x^2 - 5x + 3$ $= 2\left(x^2 - \frac{5}{2}x + \frac{3}{2}\right)$ $= 2\left[x^2 - \frac{5}{2}x + \left(\frac{\left(-\frac{5}{2}\right)}{2}\right)^2 - \left(\frac{\left(-\frac{5}{2}\right)}{2}\right)^2 + \frac{3}{2}\right]$ $= 2\left[\left(x - \frac{5}{4}\right)^2 - \frac{1}{16}\right]$ $= 2\left(x - \frac{5}{4}\right)^2 - \frac{1}{8}$ Titik minimum/*Minimum points* $\left(\frac{5}{4}, -\frac{1}{8}\right)$. Persamaan paksi simetri/*Equation of axis of symmetry*, $x = \frac{5}{4}$.	1 1 1	6
9	(a) $f(x) = x^2 - px + 16$ $x^2 - px + 16 = 0$ $b^2 - 4ac < 0$ $(-p)^2 - 4(1)(16) < 0$ $p^2 - 64 < 0$ $(p + 8)(p - 8) < 0$  $\therefore -8 < p < 8$ (b) $f(x) = x^2 - px + 16$ $= x^2 - px + \left(-\frac{p}{2}\right)^2 - \left(-\frac{p}{2}\right)^2 + 16$ $= \left(x - \frac{p}{2}\right)^2 - \frac{p^2}{4} + 16$ $g(x) = -x^2 + 4x + 2q$ $= -(x^2 - 4x - 2q)$ $= -\left[x^2 - 4x + \left(\frac{-4}{2}\right)^2 - \left(\frac{-4}{2}\right)^2 - 2q\right]$ $= -[(x - 2)^2 - 4 - 2q]$ $= -(x - 2)^2 + 4 + 2q$ $4 + 2q = -\frac{p^2}{4} + 16$ $8q = -p^2 + 48$ $q = -\frac{p^2}{8} + 6$	1 1 1 1 1 1 1	7

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
10	(a) Hasil tambah punca/*Sum of roots*: $m + n = -\dfrac{\left(n + \frac{9}{2}\right)}{2}$	1	
	$m + n = -\dfrac{n}{2} - \dfrac{9}{4}$		
	Hasil darab punca/*Product of roots*: $mn = \dfrac{-3}{2}$		
	$m = \dfrac{-3}{2n}$		
	$\dfrac{-3}{2n} + n = -\dfrac{n}{2} - \dfrac{9}{4}$	1	
	$\dfrac{-3}{2n} + \dfrac{3}{2}n = -\dfrac{9}{4}$		
	$\dfrac{-3}{2} + \dfrac{3}{2}n^2 = -\dfrac{9}{4}n$		
	$\dfrac{3}{2}n^2 + \dfrac{9}{4}n - \dfrac{3}{2} = 0$		
	$6n^2 + 9n - 6 = 0$		
	$2n^2 + 3n - 2 = 0$		
	$(n + 2)(2n - 1) = 0$	1	
	$n = -2$ (abaikan/*ignore*) , $n = \dfrac{1}{2}$	1	8
	$m\left(\dfrac{1}{2}\right) = \dfrac{-3}{2}$		
	$m = -3$	1	
	(b) $f(x) = 2x^2 + \left(\dfrac{1}{2} + \dfrac{9}{2}\right)x - 3$		
	$= 2x^2 + 5x - 3$		
	$= 2\left(x^2 + \dfrac{5}{2}x - \dfrac{3}{2}\right)$		
	$= 2\left[x^2 + \dfrac{5}{2}x + \left(\dfrac{\left(\frac{5}{2}\right)}{2}\right)^2 - \left(\dfrac{\left(\frac{5}{2}\right)}{2}\right)^2 - \dfrac{3}{2}\right]$	1	
	$= 2\left[\left(x + \dfrac{5}{4}\right)^2 - \dfrac{49}{16}\right]$		
	$= 2\left(x + \dfrac{5}{4}\right)^2 - \dfrac{49}{8}$	1	
	Persamaan paksi simetri ialah $x = \dfrac{5}{4}$.	1	
	The equation of the axis of symmetry is $x = \dfrac{5}{4}$.		
11	(a) Punca-punca/*The roots*:		
	$x = -\dfrac{3}{2}$ $\quad x = 2$		
	$2x + 3 = 0$ $\quad x - 2 = 0$		
	$a(2x + 3)(x - 2) = 0$		
	$f(0) = -3$		
	$f(x) = a(2x + 3)(x - 2)$	1	
	$-3 = a(2(0) + 3)(0 - 2)$		
	$-3 = a(3)(-2)$		
	$a = -\dfrac{3}{-6}$		
	$a = \dfrac{1}{2}$		
	$f(x) = \dfrac{1}{2}(2x + 3)(x - 2)$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $f(x) = \frac{1}{2}(2x + 3)(x - 2)$ $= \frac{1}{2}(2x^2 - 4x + 3x - 6)$ $= x^2 - \frac{1}{2}x - 3$ $= x^2 + \frac{1}{2}x + \left(\frac{\left(-\frac{1}{2}\right)}{2}\right)^2 - \left(\frac{\left(-\frac{1}{2}\right)}{2}\right)^2 - 3$ $= \left(x - \frac{1}{4}\right)^2 - \frac{49}{16}$ Titik minimum/*Minimum point* $= \left(\frac{1}{4}, -\frac{49}{16}\right)$.	1 1 1	5

BAB 3 Sistem Persamaan
Systems of Equations

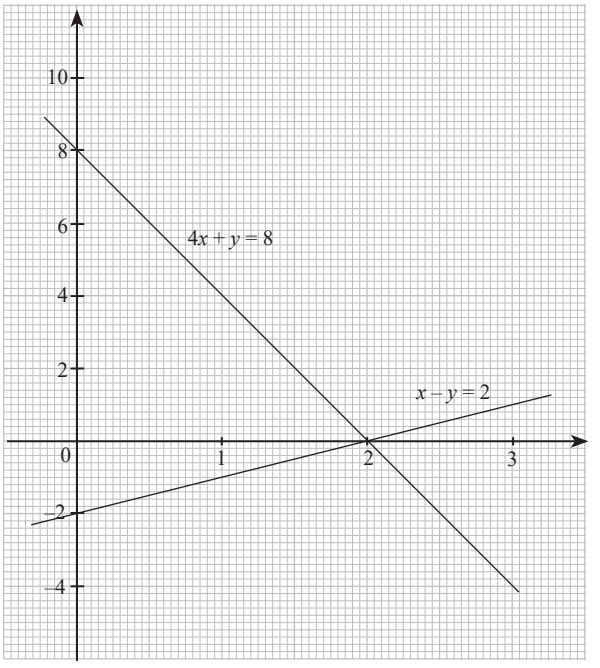
Imbas Kembali

Soalan	Skema Pemarkahan
1	$x + 2y = 8$ … ① $3x + 4y = 12$ … ② ① × 2: $2x + 4y = 16$ … ③ ② – ③: $3x + 4y = 12$ $(-)\ 2x + 4y = 16$ $x = -4$ Gantikan $x = -4$ ke dalam ① *Substitute* $x = -4$ *into* ① $-4 + 2y = 8$ $2y = 12$ $y = 6$
2	$4p - 3q = 10$ … ① $2p + 5q = -8$ … ② Daripada/*From* ①: $4p = 10 + 3q$ $p = \frac{10 + 3q}{4}$ … ③ Gantikan ③ ke dalam ② *Substitute* ③ *into* ② $2\left(\frac{10 + 3q}{4}\right) + 5q = -8$ $10 + 3q + 10q = -16$ $13q = -26$ $q = -2$ Gantikan $q = -2$ ke dalam ③ *Substitute* $q = -2$ *into* ③ $p = \frac{10 + 3(-2)}{4}$ $p = 1$

Soalan	Skema Pemarkahan
3	

x	0	1	2	3
$y = 8 - 4x$	8	4	0	–4
$y = x - 2$	–2	–1	0	1

Titik persilangan (2, 0) dengan keadaan $x = 2$, $y = 0$.
Intersection point is (2, 0) *such that* $x = 0$, $y = 0$.



Satu titik diplot dengan betul.
One point plotted correctly.
Semua titik diplot dengan betul.
All points plotted correctly.
Graf garis lurus sempurna.
Best straight line.
Satu titik persilangan.
One intersection point.

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	$x + y + z = 250$ … ① $15x + 10y + 8z = 2\,825$ … ② $y = 2x$ … ③ Gantikan ③ ke dalam ① *Substitute ③ into ①* $x + 2x + z = 250$ $3x + z = 250$ … ④ Gantikan ③ ke dalam ② *Substitute ② into ②* $15x + 10(2x) + 8z = 2\,825$ $15x + 20x + 8z = 2\,825$ $35x + 8z = 2\,825$ … ⑤	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Daripada/*From* ④ $z = 250 - 3x$ … ⑥ Gantikan ⑥ ke dalam ⑤ *Substitute* ⑥ *into* ⑤ $35x + 8(250 - 3x) = 2\ 825$ $35x + 2\ 000 - 24x = 2\ 825$ $11x = 825$ $x = 75$ $y = 2(75)$ $y = 150$ $z = 250 - 3(75)$ $z = 25$	 1 1 1 1	5
2	$3p + 6q + r = 500$ … ① $p + 3q + 7r = 400$ … ② $6p + q + 2r = 450$ … ③ Daripada/*From* ① $r = 500 - 3p - 6q$ … ④ Gantikan ④ ke dalam ② *Substitute* ④ *into* ② $p + 3q + 7(500 - 3p - 6q) = 400$ $p + 3q + 3\ 500 - 21p - 42q = 400$ $-20p - 39q = -3\ 100$ $20p + 39q = 3\ 100$ … ⑤ Gantikan ④ ke dalam ③ *Substitute* ④ *into* ③ $6p + q + 2(500 - 3p - 6q) = 450$ $6p + q + 1\ 000 - 6p - 12q = 450$ $-11q = -550$ $q = 50$ Gantikan $q = 50$ ke dalam ③ *Substitute* $q = 50$ *into* ③ $20p + 39(50) = 3\ 100$ $20p = 1\ 150$ $p = \frac{115}{2}$ Gantikan $q = 50$ dan $p = \frac{115}{2}$ ke dalam ④ *Substitute* $q = 50$ *and* $p = \frac{115}{2}$ *into* ④ $r = 500 - 3\left(\frac{115}{2}\right) - 6(50)$ $r = \frac{55}{2}$	 1 1 1 1 1	5
3	$3x + 2y + z = 90$ … ① $4x + 3y + z = 122$ … ② $6x + y + 4z = 140$ … ③ ② – ①: $x + y = 32$ … ④ ② × 4: $16x + 12y + 4z = 488$ … ⑤ ⑤ – ③: $10x + 11y = 348$ … ⑥ ④ × 10: $10x + 10y = 320$ … ⑦ ⑥ – ⑦: $y = 28$	 } atau/*or* 1 1, 1	

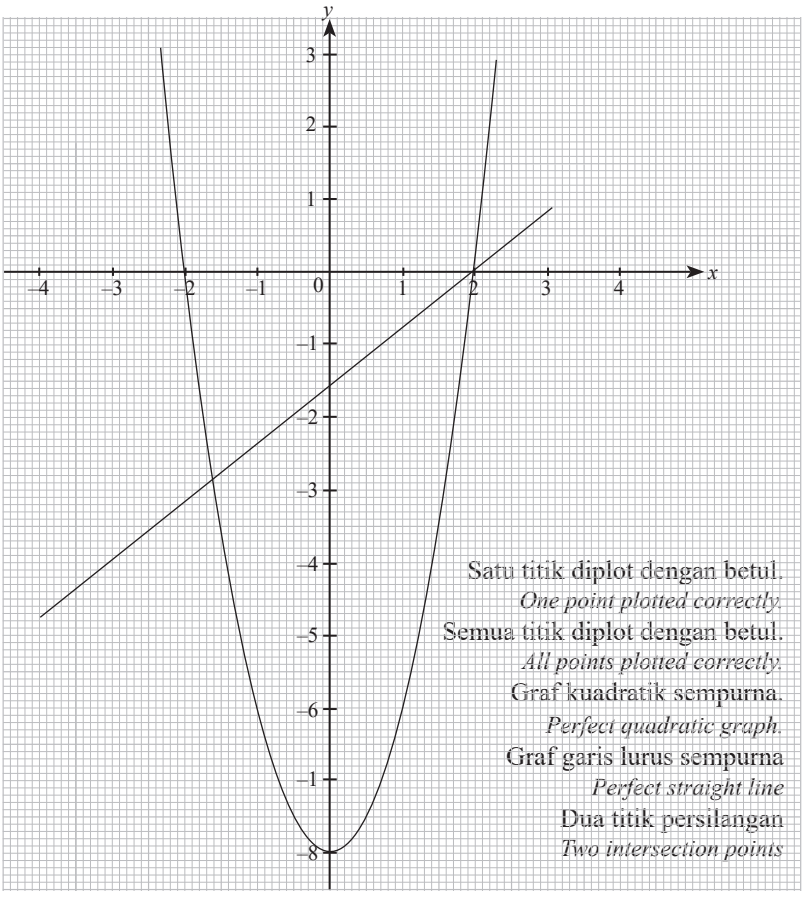
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Gantikan $y = 28$ ke dalam ④ *Substitute* $y = 28$ *into* ④ $x + 28 = 32$ $x = 4$ Gantikan $x = 4$ dan $y = 28$ ke dalam ① *Substitute* $x = 4$ *and* $y = 28$ *into* ① $3(4) + 2(28) + z = 90$ $68 + z = 90$ $z = 22$	 1 1	5
4	$2x - 3y + z = 16$ … ① $3x - y + 2z = 19$ … ② $4x + 3y + 3z = 18$ … ③ ③ + ①: $6x + 4z = 34$ … ④ ② × 3: $9x - 3y + 6z = 57$ … ⑤ ⑤ – ①: $7x + 5z = 41$ … ⑥ ④ × 5: $30x + 20z = 170$ … ⑦ ⑥ × 4: $28x + 20z = 164$ … ⑧ ⑦ – ⑧: $2x = 6$ $x = 3$ Gantikan $x = 3$ ke dalam ④ *Substitute* $x = 3$ *into* ④ $6(3) + 4z = 34$ $18 + 4z = 34$ $4z = 16$ $z = 4$ Gantikan $x = 3$ dan $z = 4$ ke dalam ④ *Substitute* $x = 3$ *and* $z = 4$ *into* ④ $3(3) - y + 2(4) = 19$ $17 - y = 19$ $y = -2$	 1 1 1 1 1	5
5	Andaikan/*Let* Nasi goreng = x Ayam bakar = y Jus oren = z $2x + y + z = 40.50$ … ① $3x + 2y + z = 65.50$ … ② $x + 3y + 2z = 66$ … ③ Daripada/*From* ① $z = 40.50 - 2x - y$ … ④ Gantikan ④ ke dalam ② *Substitute* ④ *into* ② $3x + 2y + 40.50 - 2x - y = 65.50$ $x + y = 25$ $x = 25 - y$ … ⑤ Gantikan ④ ke dalam ③ *Substitute* ④ *into* ③ $x + 3y + 2(40.50 - 2x - y) = 66$ $x + 3y + 81 - 4x - 2y = 66$ $-3x + y = -15$ … ⑥ Gantikan ⑤ ke dalam ⑥ *Substitute* ⑤ *into* ⑥ $-3(25 - y) + y = -15$ $-75 + 3y + y = -15$ $4y = 60$ $y = 15.00$	 1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Gantikan $y = 15$ ke dalam ⑤ *Substitute* $y = 15$ *into* ⑤ $x = 25 - 15$ $x = 10.00$	1	
	Gantikan $x = 10$ dan $y = 15$ ke dalam ① *Substitute* $x = 10$ *and* $y = 15$ *into* ① $2(10) + 15 + z = 40.50$ $35 + z = 40.50$ $z = 5.50$	1	7
	Harga satu hidangan nasi goreng, ayam bakar dan segelas jus oren masing-masing ialah RM10, RM15 dan RM5.50. *The price of a serving of fried rice, grilled chicken and a glass of orange juice are* RM10, RM15 *and* RM5.50 *respectively.*		
6	$p = 1 - m$ … ① $p^2 + 2m^2 + pm = 8$ … ②	1	
	Gantikan ① ke dalam ② *Substitute* ① *into* ② $(1 - m)^2 + 2m^2 + (1 - m)m = 8$ $1 - 2m + m^2 + 2m^2 + m - m^2 - 8 = 0$ $2m^2 - m - 7 = 0$	1	
	$m = \dfrac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-7)}}{2(2)}$	1	5
	$m = 2.14$ dan/*and* $m = -1.64$	1	
	Apabila/*When* $m = 2.14$ $p = 1 - 2.14$ $p = -1.14$ dan/*and* Apabila/*When* $m = -1.64$ $p = 1 - (-1.64)$ $p = 2.64$	1	
7	$4x + y = -3$ … ① $x^2 + x - y = -3$ … ②		
	② + ①: $x^2 + 5x = -6$ $x^2 + 5x + 6 = 0$	1, 1	
	$(x + 2)(x + 3) = 0$ $x = -2$ dan/*and* $x = -3$	1 1	5
	Apabila/*When* $x = -2$ $4(-2) + y = -3$ $-8 + y = -3$ $y = 5$ dan/*and* Apabila/*When* $x = -3$ $4(-3) + y = -3$ $-12 + y = -3$ $y = 9$	1	
8			

x	-2	-1	0	1	2
Nilai y *Value of* y $x - y = 2$	-4	-3	-2	-1	0
Nilai y *Value of* y $2x^2 - y = 8$	0	-6	-8	-6	0

1

1

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	 Satu titik diplot dengan betul. *One point plotted correctly.* Semua titik diplot dengan betul. *All points plotted correctly.* Graf kuadratik sempurna. *Perfect quadratic graph.* Graf garis lurus sempurna *Perfect straight line* Dua titik persilangan *Two intersection points* Maka, $x = 2$, $y = 0$ dan $x = -1.5$, $y = -3.5$ ialah penyelesaian bagi persamaan serentak ini. *Hence, $x = 2$, $y = 0$ and $x = -1.5$, $y = -3.5$ are the solutions for the simultaneous equations.*	1 1 1 1 1 1	8

BAB 4 Indeks, Surd dan Logaritma
Indices, Surds and Logarithms

Imbas Kembali

Soalan	Skema Pemarkahan
1	(a) $a^4b^{20} \div a^5b^6 = a^{4-5}b^{20-6}$ $= a^{-1}b^{14}$ $= \frac{b^{14}}{a}$ (b) $(mn)^{\frac{1}{4}} \times (mn^4) \times (mn^6)^{\frac{1}{2}}$ $= m^{\frac{1}{4}}n^{\frac{1}{4}} \times m^{\frac{1}{4}}n \times m^{\frac{1}{2}} \times n^3$ $= m^{\frac{1}{4}+\frac{1}{4}+\frac{1}{2}}\, n^{\frac{1}{4}+1+3}$ $= mn^{\frac{17}{4}}$
2	$(5^2)^{\frac{3}{2}} \times (5^3)^{-\frac{2}{3}} \times (5^4)^{-\frac{1}{4}} = 5^3 \times 5^{-2} \times 5^{-1}$ $= 5^{3-2-1}$ $= 5^0$ $= 1$
3	$2^1 \times 2^{2(2x+1)} = 2^{3(x+3)}$ $2^{1+4x+2} = 2^{3x+9}$ $4^x + 3 = 3x + 9$ $x = 6$

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	$\frac{6^{2(2y-5)}}{6^{3y}} = \frac{6^{2y-1}}{6^{3(y+6)}}$ $6^{2(2y-5)-3y} = 6^{2y-1-3(y+6)}$ $2(2y-5)-3y = 2y-1-3(y+6)$ $4y-10-3y = 2y-1-3y-18$ $y-10 = -y-19$ $2y = -9$ $y = -\frac{9}{2}$	1 1 1 1	4
2	$(a+3\sqrt{5})^2 + a = 51 + b\sqrt{5}$ $a^2 + 6a\sqrt{5} + 9(5) + a = 51 + b\sqrt{5}$ $a^2 + a + 6a\sqrt{5} = 6 + b\sqrt{5}$ $a^2 + a = 6$ $a^2 + a - 6 = 0$ $(a+3)(a-2) = 0$ $a = -3$ dan/*and* $a = 2$ $b = 6(-3)$ $b = 6(2)$ $= -18$ $= 12$	 1 1 1	3
3	$6(1+\sqrt{3})^{-2} = \frac{6}{(1+\sqrt{3})^2}$ $= \frac{6}{1+2\sqrt{3}+3}$ $= \frac{6}{4+2\sqrt{3}} \times \frac{4-2\sqrt{3}}{4-2\sqrt{3}}$ $= \frac{6(4-2\sqrt{3})}{16-4(3)}$ $= \frac{6(4-2\sqrt{3})}{4}$ $= \frac{3}{2}(4-2\sqrt{3})$ $= 6-3\sqrt{3}$ $a = 6$ $b = -3$	 1 1 1 1	4
4	$\frac{x}{1+3\sqrt{3}} = \frac{5-\sqrt{3}}{6+2\sqrt{3}}$ $x = \frac{(5-\sqrt{3})(1+3\sqrt{3})}{6+2\sqrt{3}}$ $= \frac{5+15\sqrt{3}-\sqrt{3}-3(3)}{6+2\sqrt{3}}$ $= \frac{-4+14\sqrt{3}}{6+2\sqrt{3}}$ $= \frac{-4+14\sqrt{3}}{6+2\sqrt{3}} \times \frac{6-2\sqrt{3}}{6-2\sqrt{3}}$ $= \frac{-24+8\sqrt{3}+84\sqrt{3}-28(3)}{36-4(3)}$ $= \frac{-108+92\sqrt{3}}{24}$ $= \frac{-27+23\sqrt{3}}{6}$ $p = -27$, $q = 23$	1 1 1 1 1	5

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
5	(a) $(2^3)^{q-1} \times 2^{2p+1} = (2^2)^7$ $2^{3(q-1)+2p+1} = 2^{14}$ $3(q-1) + 2p + 1 = 14$ $3q - 3 + 2p + 1 = 14$ $2p + 3q = 16 \ldots$ ① $9^{p-4} \times 3^q = 81$ $3^{2(p-4)+q} = 3^4$ $2(p-4) + q = 4$ $2p - 8 + q = 4$ $2p + q = 12 \ldots$ ② ① – ②: $2q = 4$ $q = 2$ Gantikan $q = 2$ ke dalam ② *Substitute* $q = 2$ *into* ② $2p + 2 = 12$ $p = 5$	1 1 1 1	8
	(b) $\log (3x-2)(x+1) + \log 2 = 2$ $\log 2(3x-2)(x+1) = 2$ $2(3x-2)(x+1) = 10^2$ $2(3x^2 + 3x - 2x - 2) - 100 = 0$ $6x^2 + 2x - 104 = 0$ $3x^2 + x - 52 = 0$ $(x-4)(3x+13) = 0$ $x = 4$, $x = -\frac{13}{3}$ (ditolak/*rejected*)	1 1 1 1	
6	(a) $V = 250\,000e^{a(0)}$ $V = 250\,000$	1	7
	(b) $V = 250\,000e^{an}$ $350\,000 = 250\,000e^{3a}$ $e^{3a} = 1.4$ $3a = \ln 1.4$ $a = 0.112$	1 1 1	
	(c) $V > 250\,000e^{0.112n}$ $500\,000 > 250\,000e^{0.112n}$ $e^{0.112n} < 2$ $0.112n < \ln 2$ $n < 6.19$ $n = 6$ tahun/*years*	1 1 1	

BAB 5 Janjang
Progressions

Imbas Kembali

Soalan	Skema Pemarkahan
1	–600 –600 –600 9 600 , 9 000 , 8 400 , 7 800 ... Menolak 600 daripada nombor sebelumnya. *Subtract* 600 *from the previous number.*

Soalan	Skema Pemarkahan
2	$T_1 = 0.8$ $T_2 = 0.8 + 1.6 = 2.4$ $T_3 = 2.4 + 1.6 = 4.0$ $T_4 = 4.0 + 1.6 = 5.6$ $T_5 = 5.6 + 1.6 = 7.2$ $T_6 = 7.2 + 1.6 = 8.8$ $T_7 = 8.8 + 1.6 = 10.4$ $T_8 = 10.4 + 1.6 = 12.0$ $T_9 = 12.0 + 1.6 = 13.6$ $T_{10} = 13.6 + 1.6 = 15.2$ $n = 10$
3	$64 + 16(1) = 80$ $64 + 16(2) = 96$ $64 + 16(3) = 112$ $64 + 16(4) = 128$ Maka, jujukan tersebut boleh ditulis sebagai $64 + 16n$, dengan keadaan $n = 1, 2, 3, 4, \ldots$ *Therefore, the sequence can be written as* $64 + 16n$, *such that* $n = 1, 2, 3, 4, \ldots$
4	$\frac{7}{8} \xrightarrow{\times\frac{1}{2}} x \xrightarrow{\times\frac{1}{2}} y \xrightarrow{\times\frac{1}{2}} \frac{7}{64} \xrightarrow{\times\frac{1}{2}} \frac{7}{128}, \ldots$ $x = \frac{7}{8} \times \frac{1}{2}$ $\quad y = \frac{7}{16} \times \frac{1}{2}$ $x = \frac{7}{16}$ $\quad y = \frac{7}{32}$ Maka/*Therefore* $x + y = \frac{7}{16} + \frac{7}{32}$ $= \frac{21}{32}$

LATIHAN INTENSIF

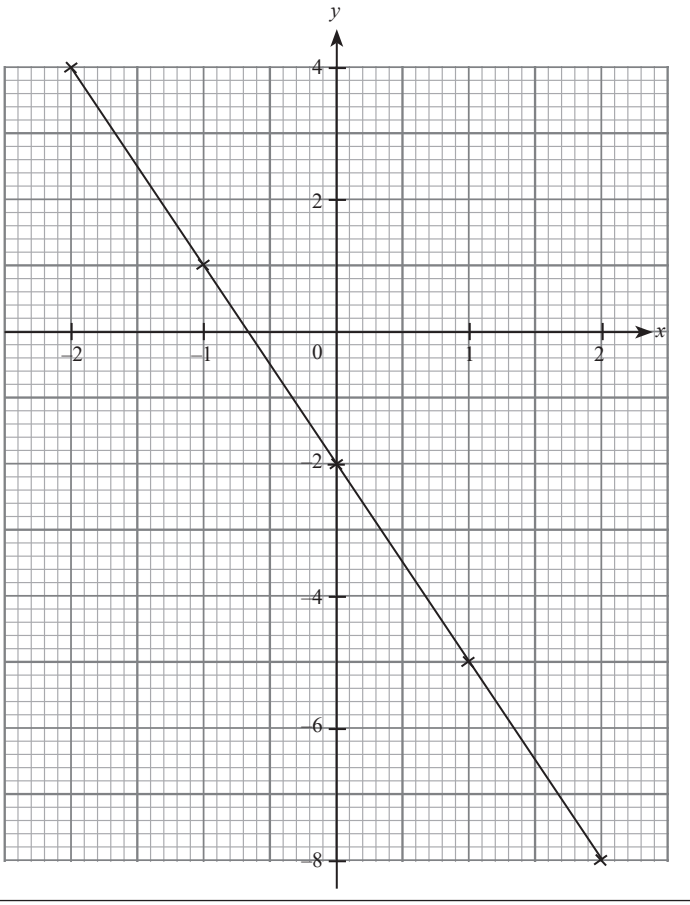
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $T_3 = 3T_1$ $a + 2d = 3a$ $2d = 2a$ $d = a$ $S_n = \frac{n}{2}[2a + (n-1)(a)]$ $= \frac{n}{2}(2a + an - a)$ $= \frac{n}{2}(a + an)$ $= \frac{an}{2}(1 + n)$	1 1 1	7
	(b) $S_5 = 45$ $\frac{5a}{2}(1 + 5) = 45$ $5a(6) = 90$ $30a = 90$ $a = 3$ $T_5 = 3 + (5 - 1)(3)$ $= 15$	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
2	Andaikan luas sektor terbesar = T_4 dan luas sektor terkecil = T_1. *Let the area of largest sector = T_4 and the area of smallest sector = T_1.*		
	$T_4 = 8T_1$ $ar^3 = 8a$	1	
	$r^3 = 8$ $r = 2$	1	
	Jumlah luas bulatan/*The total area of the circle*: $S_4 = \frac{a(2^4 - 1)}{2 - 1}$ $\quad L = \pi(10)^2$ $= 15a$ $\quad = 100\pi$	1 1	8
	$15a = 100\pi$ $a = \frac{100}{15}\pi$	1	
	$a = \frac{20}{3}\pi$	1	
	$T_4 = \left(\frac{20}{3}\pi\right)(2)^3$ atau/*or* $T_4 = 8\left(\frac{20}{3}\pi\right)$	1	
	$= \frac{160}{3}\pi$ $\quad = \frac{160}{3}\pi$	1	
3	(a) $1 + 8(1) = 9$ $1 + 8(2) = 17$ $1 + 8(3) = 25$		
	9, 17, 25, ...	1	
	$a = 9$, $d = 8$	1	
	$S_7 = S_{12} - S_5$ $= \left[\frac{12}{2}(2(9) + (12 - 1)(8))\right] - \left[\frac{5}{2}(2(9) + (5 - 1)(8))\right]$	1	
	$= 636 - 125$ $= 511$	1	
	(b) $S_2 = 17\frac{1}{2}$ $\quad T_3 = 4\frac{2}{3}$ $\frac{a(r^2 - 1)}{r - 1} = 17\frac{1}{2}$ atau/*or* $a + ar = 17\frac{1}{2}$ $\quad ar^2 = 4\frac{2}{3}$	1	
	$\frac{a(r - 1)(r + 1)}{r - 1} = 17\frac{1}{2}$ $\quad a = \frac{14}{3r^2}$ $a(r + 1) = 17\frac{1}{2}$		8
	$\frac{14}{3r^2}(r + 1) = 17\frac{1}{2}$	1	
	$28r + 28 = 105r^2$ $15r^2 - 4r - 4 = 0$ $(3r - 2)(5r + 2) = 0$	1	
	$r = \frac{2}{3}$, $r = -\frac{2}{5}$ (ditolak/*rejected*)	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
4	(a) $d_1 = 2 \text{ kos } \theta - \sin \theta$ $d_2 = 2 \sin \theta - 2 \text{ kos } \theta$ $d_1 = d_2$ $2 \text{ kos } \theta - \sin \theta = 2 \sin \theta - 2 \text{ kos } \theta$ $2 \text{ kos } \theta + 2 \text{ kos } \theta = 2 \sin \theta + \sin \theta$ $4 \text{ kos } \theta = 3 \sin \theta$ $\frac{\sin \theta}{\text{kos } \theta} = \frac{4}{3}$ $\tan \theta = \frac{4}{3}$ $\theta = 53.13°$ $a = \sin \theta$ $= \sin 53.13°$ $= 0.8$ (b) $d = 2 \text{ kos } 53.13° - 0.8$ $= 1.2 - 0.8$ $= 0.4$ $S_{12} = \frac{12}{2}[2(0.8) + (12 - 1)(0.4)]$ $= 36$	1 1 1 1 1 1 1	6
5	$d_1 = \ln (x + 2) - \ln x$ atau/*or* $d_2 = \ln (x + 12) - \ln (x + 2)$ $= \ln \left(\frac{x+2}{x}\right)$ $= \ln \left(\frac{x+12}{x+2}\right)$ $d_1 = d_2$ $\ln \left(\frac{x+2}{x}\right) = \ln \left(\frac{x+12}{x+2}\right)$ $\frac{x+2}{x} = \frac{x+12}{x+2}$ $(x + 2)(x + 2) = x(x + 12)$ $x^2 + 4x + 4 = x^2 + 12x$ $12x - 4x = 4$ $8x = 4$ $x = \frac{1}{2}$	1 1 1	3
6	$6 + 0.6666 \ldots = 6 + S_\infty$ $= 6 + \left(\frac{0.6}{1 - \frac{0.06}{0.6}}\right)$ $= 6 + \left(\frac{0.6}{1 - 0.1}\right)$ $= 6 + \frac{2}{3}$ $= \frac{20}{3}$	1 1	2
7	Tapak/*Base* $= 6, 4, \frac{8}{3}, \ldots$ $r = \frac{2}{3}$ $S_\infty = \frac{6}{1 - \frac{2}{3}}$ $= 18$	1 1	2

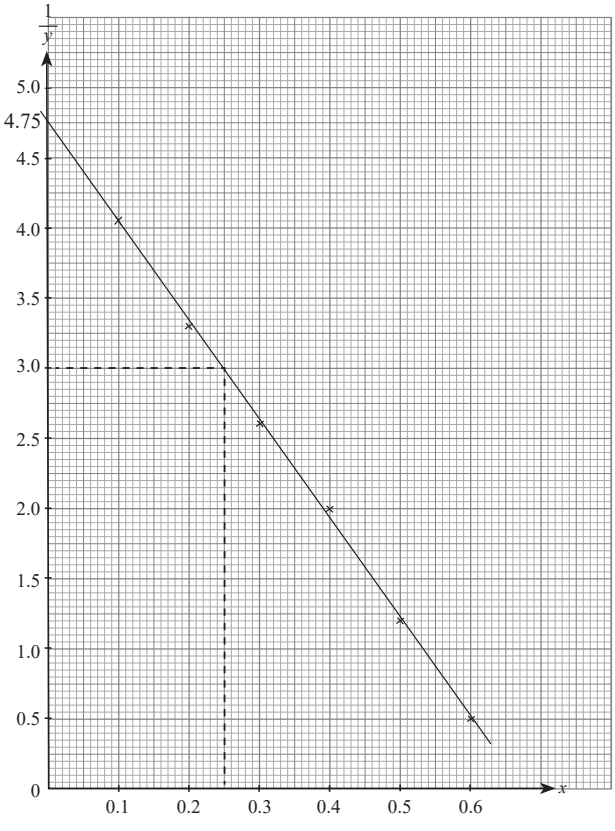
BAB 6 Hukum Linear
Linear Law

Imbas Kembali

Soalan	Skema Pemarkahan
1	Kecerunan/*Gradient*, $m = \frac{7-4}{11-3}$ $m = \frac{3}{8}$
2	$6 = -4(-5) + c$ $c = -14$ $y = -4x - 14$
3	<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>4</td><td>1</td><td>–2</td><td>–5</td><td>–8</td></tr></table> 

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Kecerunan/*Gradient*, $m = \frac{25-16}{5-2}$		
	$m = 3$	1	
	$16 = 3(2) + c$		
	$c = 10$	1	4
	$\ln y = 3(2x) + 10$	1	
	(b) $\ln y = 3(2^2) + 10$		
	$\ln y = 22$		
	$y = e^{22}$	1	

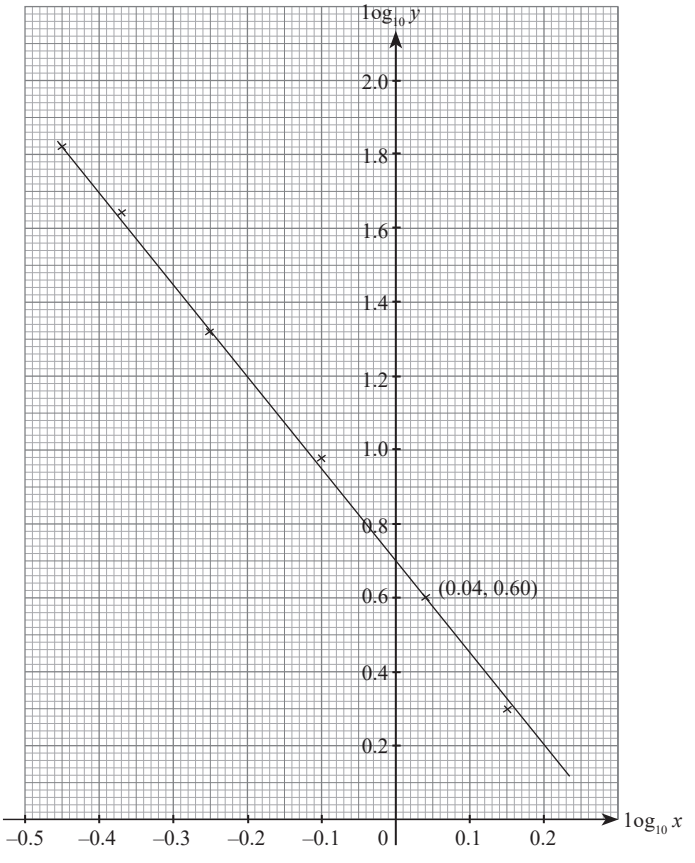
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
2	(a) $AB = 3\sqrt{10}$ $\sqrt{(x-7)^2 + (0-3)^2} = 3\sqrt{10}$ $(x-7)^2 + 9 = 90$ $(x-7)^2 = 81$ $x - 7 = \pm\sqrt{81}$ $x = 7 \pm 9$ $x = 7 + 9$ $x = 16$ $A(16, 0)$ (b) Kecerunan/*Gradient*, $m = \frac{0-3}{16-7}$ $m = -\frac{1}{3}$ $3 = -\frac{1}{3}(7) + c$ $c = \frac{16}{3}$ $\log_3 y = -\frac{1}{3}\log_3 x + \frac{16}{3}$	1 1 1 1 1 1 1	6
3	(a) <table><tr><td>x</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td></tr><tr><td>$\frac{1}{y}$</td><td>4.05</td><td>3.30</td><td>2.60</td><td>2.00</td><td>1.20</td><td>0.50</td></tr></table> (b)  Paksi betul, skala seragam dengan satu titik diplot dengan betul *Correct axes, uniform scales and one point plotted correctly* Semua titik ditanda dengan betul *All points are plotted correctly* Garis lurus penyuaian terbaik *Line of best fit*	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) (i) Apabila/*When* $x = 0.25$, $\frac{1}{y} = 3$ $y = \frac{1}{3}$	1	
	(ii) $\frac{b}{y} = cx - 2$ $\frac{1}{y} = \frac{c}{b}x - \frac{2}{b}$		10
	Pintasan-y/y-*intercept*, $-\frac{2}{b} = 4.75$	1	
	$b = -0.4211$	1	
	(iii) Kecerunan/*Gradient*, $\frac{c}{b} = \frac{4.75 - 0.5}{0 - 0.6}$	1	
	$\frac{c}{-0.4211} = -7.0833$ $c = 2.983$	1	
4	(a)		

$\log_{10} x$	–0.45	–0.37	–0.25	–0.10	0.04	0.15
$\log_{10} y$	1.82	1.64	1.32	0.98	0.60	0.30

1
1

(b)

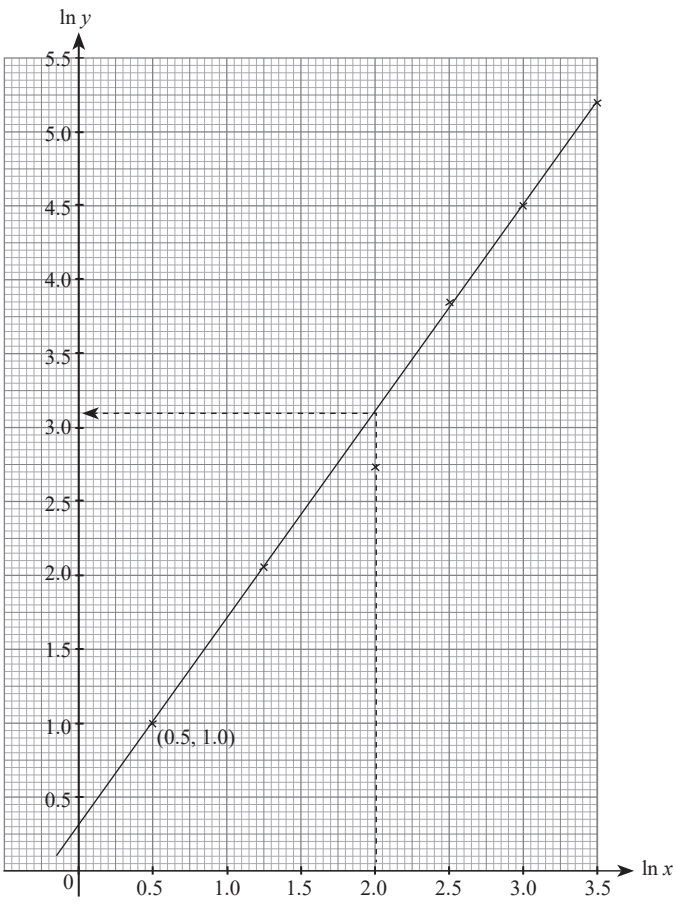


Paksi betul, skala seragam dengan satu titik diplot dengan betul *Correct axes, uniform scales and one point plotted correctly*	1	10
Semua titik ditanda dengan betul *All points are plotted correctly*	1	
Garis lurus penyuaian terbaik *Line of best fit*	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) $y = \dfrac{m+1}{x^{\frac{1}{n}}}$		
	$\log_{10} y = \log_{10} \dfrac{m+1}{x^{\frac{1}{n}}}$		
	$\log_{10} y = \log_{10} (m+1) - \log_{10} x^{\frac{1}{n}}$		
	$\log_{10} y = \left(-\dfrac{1}{n}\right) \log_{10} x + \log_{10} (m+1)$	1	10
	(i) Pintasan-*y*/*y-intercept*, $\log_{10} (m+1) = 0.7$	1	
	$m + 1 = 10^{0.7}$		
	$m = 4.012$	1	
	(ii) Kecerunan/*Gradient*, $-\dfrac{1}{n} = \dfrac{1.82 - 0.60}{-0.45 - 0.04}$	1	
	$n = 0.4016$	1	
5	(a)		

ln x	0.50	1.25	2.00	2.50	3.00	3.50
ln y	1.00	2.05	2.75	3.85	4.50	5.20

(a)	1	
	1	
(b)		10



Paksi betul, skala seragam dengan satu titik diplot dengan betul *Correct axes, uniform scales and one point plotted correctly*	1	
Semua titik ditanda dengan betul *All points are plotted correctly*	1	
Garis lurus penyuaian terbaik *Line of best fit*	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) $y = ax^{b+2}$ $\ln y = \ln ax^{b+2}$ $\ln y = \ln a + \ln x^{b+2}$ $\ln y = (b + 2) \ln x + \ln a$	1	10
	(i) Pintasan-y/*y-intercept*, $\ln a = 0.3$ $a = 1.350$	1	
	(ii) Kecerunan/*Gradient*, $b + 2 = \frac{5.20 - 1.0}{3.50 - 0.5}$	1	
	$b = -0.6$	1	
	(d) $\ln y = 3.1$ $y = 22.20$	1	

BAB 7

Geometri Koordinat
Coordinates Geometry

Imbas Kembali

Soalan	Skema Pemarkahan
1	Jarak/*Distance* $AB = \sqrt{(8-3)^2 + (0-8)^2}$ $= 9.434$
2	$B(1, 1) = \left(\frac{x + (-1)}{2}, \frac{y + 5}{2}\right)$ $\frac{x-1}{2} = 1$, $\frac{y+5}{2} = 1$ $x = 3$ $y = -3$ $A(3, -3)$
3	Kecerunan/*Gradient*, $m = \frac{17 - (-7)}{4 - (-3)}$ $= \frac{24}{7}$ $-7 = \frac{24}{7}(-3) + c$ $c = \frac{23}{7}$ $y = \frac{24}{7}x + \frac{23}{7}$ $7y = 24x + 23$

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $RS : ST = m : n$ $15 : 45 = 1 : 3$	1	4
	(b) S membahagi riben RT dengan nisbah 1 : 3. *S divides ribbon RT with the ratio* 1 : 3.	1	
	(c) $S(x, y) = \left(\frac{0(3) + 28(1)}{1 + 3}, \frac{0(3) + 0(1)}{1 + 3}\right)$	1	
	$S(7, 0)$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
2	(a) 3 : 5 A — C — B $AC : CB = 3 : 5$ (b) Titik/*Point A*	1 1 1	3
3	2 : 5 Sekolah/*School* $(-3, -7)$ Papan tanda/*Sign* (x, y) Kedai/*Shop* $(5, 9)$ $(x, y) = \left(\frac{(-3)(5) + (5)(2)}{2 + 5}, \frac{(-7)(5) + (9)(2)}{2 + 5}\right)$ $(x, y) = \left(-\frac{5}{7}, -\frac{17}{7}\right)$	1 1	2
4	1 : 2 R — T — S $(3h, 5h)$ (p, q) $(2p, q + 2)$ $RS : ST = 1 : 2$ Koordinat x bagi S: / *x-coordinates of S*: $p = \frac{3h(2) + p(1)}{2 + 1}$ $p = \frac{6h + p}{3}$ $3p = 6h + 2p$ $p = 6h$ $p = 6\left(\frac{q - 1}{5}\right)$ $= \frac{6q - 6}{5}$ Koordinat y bagi S: / *y-coordinates of S*: $q = \frac{5h(2) + 1(q + 2)}{2 + 1}$ $q = \frac{10h + q + 2}{3}$ $3q = 10h + q + 2$ $10h = 2q - 2$ $h = \frac{2q - 2}{10}$ $= \frac{q - 1}{5}$	1 1, 1	3
5	(a) Kecerunan/*Gradient*, $m = \frac{0.80 - 0.40}{0.30 - 0.10}$ $= 2$ $y - y_1 = m(x - x_1)$ $y - 0.40 = 2(x - 0.10)$ $y = 2x - 0.20 + 0.40$ $y = 2x + 0.20$ atau/*or* $y = 2x + \frac{1}{5}$ (b) Berserenjang dengan persamaan garis lurus di (a) *Perpendicular to straight line in* (a) $m_1 \times m_2 = -1$ $2 \times m_2 = -1$ $m_2 = -\frac{1}{2}$ Pintasan-y/*y-intercept*, $c = (0, 0.20)$ $y - y_1 = m(x - x_1)$ $y - 0.20 = -\frac{1}{2}(x - 0)$ $y = -\frac{1}{2}x + 0.20$ atau/or $y = -\frac{1}{2}x + \frac{1}{5}$	1 1 1 1 1 1	6

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
6	(a) $m_{AB} = m_{BC}$ $\frac{-2-0}{-6-k} = \frac{2-0}{-4-k}$ $-2(-4-k) = 2(-6-k)$ $4k = -20$ $k = -5$	1 1	
	(b) $m_{AB} \times m_{BC} = -1$ $\frac{-2-0}{-6-k} \times \frac{2-(-2)}{-4-(-6)} = 1$ $\frac{-2}{-6-k} \times 2 = -1$ $-4 = 6 + k$ $k = -10$	 1 1	4
7	(a) $PA = PB$ $\sqrt{(x-5)^2 + (y-7)^2} = \sqrt{(x-9)^2 + (y-3)^2}$ $x^2 + 10x + 25 + y^2 - 14y + 49 = x^2 - 2x + 81 + y^2 - 6y + 9$ $8x - 8y - 16 = 0$ $x - y - 2 = 0$	 1 1	
	(b) $SP = 3$ $\sqrt{(x-2)^2 + (y-5)^2} = 3$ $x^2 - 4x + 4 + y^2 - 10y + 25 - 9 = 0$ $x^2 + y^2 - 4x - 10y + 20 = 0$	 1 1	
	(c) $x - y - 2 = 0$ $x = y + 2$	 1	
	$(y+2)^2 + y^2 - 4(y+2) - 10y + 20 = 0$ $y^2 + 4y + 4 + y^2 - 4y - 8 - 10y + 20 = 0$ $2y^2 - 10y + 16 = 0$ $y^2 - 5y + 8 = 0$ $y = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(8)}}{2(1)}$ $y = \frac{5 \pm \sqrt{-7}}{2(1)}$ $y = \frac{5 + \sqrt{7(-1)}}{2}$, $y = \frac{5 - \sqrt{7(-1)}}{2}$ $y = \frac{5 + \sqrt{7}\,i}{2}$, $y = \frac{5 - \sqrt{7}\,i}{2}$	1 1 1	9
	Kedua-dua lokus tidak bersilang. *Both loci do not intersect.*	1	
8	$\frac{1}{2}\begin{vmatrix} -k & 4 & 1 & 5 & -k \\ 1 & 4 & -1 & -2 & 1 \end{vmatrix} = 20\frac{1}{2}$ $\frac{1}{2}\left\lvert[(-k)(4) + 4(-1) + 1(-2) + 5(1)] - [1(4) + 4(1) + (-1)(5) + (-2)(-k)]\right\rvert = 20\frac{1}{2}$ $\lvert(-4k - 4 - 2 + 5) - (4 + 4 - 5 + 2k)\rvert = 41$ $\lvert-4k - 3 - 3 - 2k\rvert = 20.5(2)$ $k = \frac{47}{6}$ dan/*and* $k = -\frac{35}{6}$	 1 1 1, 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
9	Koordinat titik $P(-a, 0)$ dan $(0, 0.5b)$ *The coordinates of points* $P(-a, 0)$ *and* $(0, 0.5b)$	1	
	Luas/*Area of* $\Delta OPQ = \frac{1}{2}(a)(0.5b)$	1	3
	$= \frac{1}{4}ab$	1	
10	(a) $PQ = QR$ $\sqrt{(0-5)^2 + (m-5)^2} = \sqrt{(5-8)^2 + (5-9)^2}$ $25 + m^2 - 10m + 25 = 9 + 16$ $m^2 - 10m + 25 = 0$ $(m-5)^2 = 0$	1	
	$m = 5$	1	
	(b) (i) $S(x, 11)$ $PS = SR$ $\sqrt{(0-x)^2 + (5-11)^2} = \sqrt{(x-8)^2 + (11-9)^2}$ $x^2 + 36 = x^2 - 16x + 64 + 4$ $16x = 32$	1	
	$x = \frac{32}{16}$	1	
	$x = 2$ $S(2, 11)$	1	
	(ii) Luas/*Area of* $PQR = \frac{1}{2}\begin{vmatrix} 0 & 5 & 8 & 0 \\ 5 & 5 & 9 & 5 \end{vmatrix}$ $= \frac{1}{2}\lvert[0(5) + 5(9) + 8(5) - [5(5) + 5(8) + 9(0)]\rvert$	1	
	$= \frac{1}{2}\lvert 0 + 45 + 40 - 25 - 40 - 0\rvert$ $= \frac{1}{2}\lvert 20\rvert$ $= 10 \text{ unit}^2$	1	10
	Luas/*Area of* $PQRS = \frac{1}{2}\begin{vmatrix} 0 & 5 & 8 & 2 & 0 \\ 5 & 5 & 9 & 11 & 5 \end{vmatrix}$ $= \frac{1}{2}\lvert[0(5) + 5(9) + 8(11) + 2(5)] - [5(5) + 5(8) + 9(2) + 11(0)]\rvert$	1	
	$= \frac{1}{2}\lvert 143 - 83\rvert$ $= \frac{1}{2}\lvert 60\rvert$ $= 30 \text{ unit}^2$	1	
	$PQR : PQRS = 10 : 30$ $PQR : PQRS = 1 : 3$	1	

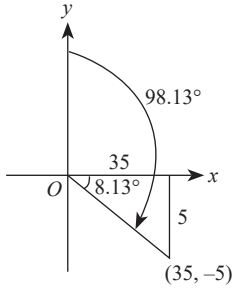
BAB 8 **Vektor**
Vectors

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $m\begin{pmatrix}1\\-2\end{pmatrix} - r\begin{pmatrix}-1\\3\end{pmatrix} = \lambda\begin{pmatrix}2\\3\end{pmatrix}$	1	
	$\begin{pmatrix}m+r\\-2m-3r\end{pmatrix} = \begin{pmatrix}2\lambda\\3\lambda\end{pmatrix}$		
	$m + r = 2\lambda$		
	$\lambda = \frac{m+r}{2} \ldots$ ①		
	$-2m - 3r = 3\lambda \ldots$ ②		
	Gantikan ① ke dalam ② *Substitute ① into ②*		
	$-2m - 3r = 3\left(\frac{m+r}{2}\right)$	1	
	$-4m - 6r = 3m + 3r$		
	$-7m = 9r$		
	$m = -\frac{9}{7}r$	1	
	(b) $\overrightarrow{OD} = 3\begin{pmatrix}1\\-2\end{pmatrix} - \begin{pmatrix}-1\\3\end{pmatrix}$	1	8
	$= \begin{pmatrix}4\\-9\end{pmatrix}$		
	$D(4, -9)$	1	
	(c) $\overrightarrow{DC} = \overrightarrow{DO} + \overrightarrow{OC}$	1	
	$= \begin{pmatrix}-4\\9\end{pmatrix} + \begin{pmatrix}2\\3\end{pmatrix}$		
	$= \begin{pmatrix}-2\\12\end{pmatrix}$		
	$\widehat{\overrightarrow{DC}} = \frac{1}{\sqrt{(-2)^2 + (12)^2}}\begin{pmatrix}-2\\12\end{pmatrix}$	1	
	$= \frac{1}{\sqrt{37}}\begin{pmatrix}-2\\12\end{pmatrix}$	1	
2	(a) $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$	1	
	$= \begin{pmatrix}-1\\-7\end{pmatrix} + \begin{pmatrix}5\\5\end{pmatrix}$		
	$= \begin{pmatrix}4\\-2\end{pmatrix}$	1	
	$\overrightarrow{BC} = \overrightarrow{BO} + \overrightarrow{OC}$		
	$= \begin{pmatrix}-5\\-5\end{pmatrix} + \begin{pmatrix}p\\q\end{pmatrix}$		
	$= \begin{pmatrix}p-5\\q-5\end{pmatrix}$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$2\overrightarrow{AB} - \overrightarrow{BC} = \begin{pmatrix} 14 \\ -3 \end{pmatrix}$ $2\begin{pmatrix} 4 \\ -2 \end{pmatrix} - \begin{pmatrix} p-5 \\ q-5 \end{pmatrix} = \begin{pmatrix} 14 \\ -3 \end{pmatrix}$ $\begin{pmatrix} 8-p+5 \\ -4-q+5 \end{pmatrix} = \begin{pmatrix} 14 \\ -3 \end{pmatrix}$ $\begin{pmatrix} 13-p \\ 1-q \end{pmatrix} = \begin{pmatrix} 14 \\ -3 \end{pmatrix}$ $13 - p = 14 \qquad 1 - q = -3$ $p = -1 \qquad q = 4$	1 1, 1	9
	(b) $\sqrt{(r-2)^2 + r^2} = \sqrt{74}$ $r^2 - 4r + 4 + r^2 = 74$ $2r^2 - 4r + 4 = 74$ $2r^2 - 4r - 70 = 0$ $r^2 - 2r - 35 = 0$ $(r-7)(r+5) = 0$ $r = 7$ atau/*or* $r = -5$	1 1, 1	
3	(a) $\begin{pmatrix} 9 \\ 7 \end{pmatrix} = \lambda\begin{pmatrix} x-3 \\ 11 \end{pmatrix}$ $\begin{pmatrix} 9 \\ 7 \end{pmatrix} = \begin{pmatrix} x\lambda - 3\lambda \\ 11\lambda \end{pmatrix}$ $11\lambda = 7$ $\lambda = \frac{7}{11}$ $x\lambda - 3\lambda = 9$ $x\left(\frac{7}{11}\right) - 3\left(\frac{7}{11}\right) = 9$ $7x - 21 = 99$ $7x = 120$ $x = \frac{120}{7}$	1 1	5
	(b) $\sqrt{9^2 + 7^2} = \sqrt{(x-3)^2 + 11^2}$ $130 = x^2 - 6x + 9 + 121$ $x^2 - 6x = 0$ $x(x-6) = 0$ $x = 0 \quad , \quad x - 6 = 0$ $x = 0 \qquad x = 6$	1 1, 1	
4	(a) (i) $\overrightarrow{PQ} = \lambda\overrightarrow{QR}$ $3\underset{\sim}{x} + 6\underset{\sim}{y} = \lambda(5\underset{\sim}{x} + m\underset{\sim}{y})$ $3\underset{\sim}{x} + 6\underset{\sim}{y} = 5\lambda\underset{\sim}{x} + m\lambda\underset{\sim}{y}$ $5\lambda = 3 \quad , \quad m\lambda = 6$ $\lambda = \frac{3}{5} \qquad m\left(\frac{3}{5}\right) = 6$ $m = 10$ (ii) $PQ = \frac{3}{5}QR$ $\frac{PQ}{QR} = \frac{3}{5}$ $PQ : QR = 3 : 5$	1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
4	(b) $\overrightarrow{MK} = \overrightarrow{MJ} + \overrightarrow{JK}$ $= 4\underset{\sim}{a} - \underset{\sim}{b} - \underset{\sim}{a} + 5\underset{\sim}{b}$ $= 3\underset{\sim}{a} + 4\underset{\sim}{b}$	1	
	$\overrightarrow{RK} = \frac{1}{2}\overrightarrow{MK}$		7
	$= \frac{1}{2}(3\underset{\sim}{a} + 4\underset{\sim}{b})$	1	
	$= \frac{3}{2}\underset{\sim}{a} + 2\underset{\sim}{b}$	1	
5	(a) (i) $\overrightarrow{PR} = \overrightarrow{PQ} + \overrightarrow{QR}$	1	
	$= \underset{\sim}{m} + \underset{\sim}{n}$	1	
	(ii) $\overrightarrow{QS} = \overrightarrow{QP} + \overrightarrow{PS}$ $= \overrightarrow{QP} + \left(\frac{3}{3+h}\right)\overrightarrow{PR}$		
	$= -\underset{\sim}{m} + \left(\frac{3}{3+h}\right)(\underset{\sim}{m} + \underset{\sim}{n})$	1	
	$= -\underset{\sim}{m} + \left(\frac{3}{3+h}\right)\underset{\sim}{m} + \left(\frac{3}{3+h}\right)\underset{\sim}{n}$ $= \left(\frac{-3-h+3}{3+h}\right)\underset{\sim}{m} + \left(\frac{3}{3+h}\right)\underset{\sim}{n}$ $= \left(\frac{-h}{3+h}\right)\underset{\sim}{m} + \left(\frac{3}{3+h}\right)\underset{\sim}{n}$	1	
	(b) $\overrightarrow{QS} = \lambda\overrightarrow{QT}$ $\left(\frac{-h}{3+h}\right)\underset{\sim}{m} + \left(\frac{3}{3+h}\right)\underset{\sim}{n} = \lambda(8\underset{\sim}{m} + 6\underset{\sim}{n})$ $\left(\frac{-h}{3+h}\right)\underset{\sim}{m} + \left(\frac{3}{3+h}\right)\underset{\sim}{n} = 8\lambda\underset{\sim}{m} + 6\lambda\underset{\sim}{n}$	1	7
	Bandingkan pekali/*Comparing the coefficients* $8\lambda = \frac{-h}{3+h}$ $\quad 6\lambda = \frac{3}{3+h}$ … ② $\lambda = \frac{-h}{24+8h}$ … ①		
	Gantikan ① ke dalam ② *Substitute ① into ②* $6\left(\frac{-h}{24+8h}\right) = \frac{3}{3+h}$ $-6h(3+h) = 3(24+8h)$ $-18h - 6h^2 = 72 + 24h$	1	
	$6h^2 + 42h + 72 = 0$ $h^2 + 7h + 12 = 0$ $(h+4)(h+3) = 0$ $h = -4$ atau/*or* $h = -3$	1, 1	
6	(a) (i) $\overrightarrow{SQ} = \overrightarrow{SP} + \overrightarrow{PQ}$ $= -\underset{\sim}{b} + \underset{\sim}{a}$ $= \underset{\sim}{a} - \underset{\sim}{b}$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(ii) $\overrightarrow{PR} = \overrightarrow{PS} + \overrightarrow{SR}$ $= \overrightarrow{PS} + \frac{1}{2}\overrightarrow{PQ}$ $= \underset{\sim}{b} + \frac{1}{2}\underset{\sim}{a}$	1	
	(iii) $\overrightarrow{RQ} = \overrightarrow{RS} + \overrightarrow{SQ}$ $= -\frac{1}{2}\underset{\sim}{a} + \underset{\sim}{a} - \underset{\sim}{b}$ $= \frac{1}{2}\underset{\sim}{a} - \underset{\sim}{b}$	1	
	(b) $\overrightarrow{SQ} = \lambda\overrightarrow{ST}$ $\underset{\sim}{a} - \underset{\sim}{b} = \lambda(\overrightarrow{SP} + \overrightarrow{PT})$ $= \lambda\left(\overrightarrow{SP} + \frac{3}{5}\overrightarrow{PR}\right)$ $= \lambda\left(-\underset{\sim}{b} + \frac{3}{5}\left(\underset{\sim}{b} + \frac{1}{2}\underset{\sim}{a}\right)\right)$ $= \lambda\left(-\underset{\sim}{b} + \frac{3}{5}\underset{\sim}{b} + \frac{3}{10}\underset{\sim}{a}\right)$ $= \frac{3}{10}\lambda\underset{\sim}{a} - \frac{2}{5}\lambda\underset{\sim}{b}$	1 1	
	Bandingkan pekali/*Comparing the coefficients* $\frac{3}{10}\lambda_1 = 1$ $\quad -\frac{2}{5}\lambda_2 = -1$ $\lambda_1 = \frac{10}{3}$ $\quad \lambda_2 = \frac{5}{2}$	1, 1	
	$\lambda_1 \neq \lambda_2$ Maka, *STQ* tidak segaris. *Hence, STQ is not collinear.*	1	
7	(a) Kedudukan sampan/*The position of the boat* $\begin{pmatrix}17\\15\end{pmatrix} + \begin{pmatrix}8\\-20\end{pmatrix} = \begin{pmatrix}35\\-5\end{pmatrix}$ Magnitud/*Magnitude* $= \sqrt{(35)^2 + (-5)^2}$ $= 35.36$ unit $\tan\theta = \frac{5}{35}$ $\theta = 8.13°$  Arah pergerakan sampan/*The direction of the boat* $\theta = 90° + 8.13°$ $= 98.13°$	1 1 1 1 1	
	(b) (i) $\underset{\sim}{a} = \begin{pmatrix}1\\4\end{pmatrix}$, $\underset{\sim}{b} = \begin{pmatrix}-3\\2\end{pmatrix}$, $\overrightarrow{OP} = \begin{pmatrix}2\\-5\end{pmatrix}$ dan/*and* $\overrightarrow{OQ} = \begin{pmatrix}9\\37\end{pmatrix}$ $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$ $= \begin{pmatrix}-2\\5\end{pmatrix} + \begin{pmatrix}9\\37\end{pmatrix}$ $= \begin{pmatrix}7\\42\end{pmatrix}$	1	

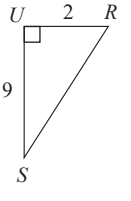
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$\overrightarrow{PQ} = m\underset{\sim}{a} + \underset{\sim}{b}$ $\begin{pmatrix}7\\42\end{pmatrix} = m\begin{pmatrix}1\\4\end{pmatrix} + \begin{pmatrix}-3\\2\end{pmatrix}$ $\begin{pmatrix}7\\42\end{pmatrix} = \begin{pmatrix}m-3\\4m+2\end{pmatrix}$ $m - 3 = 7$ $m = 10$ (ii) Vektor unit/*Unit vector of* $\overrightarrow{PQ} = \frac{1}{\sqrt{7^2+42^2}}\begin{pmatrix}7\\42\end{pmatrix}$ $= \frac{1}{\sqrt{1\,813}}\begin{pmatrix}7\\42\end{pmatrix}$ atau/*or* $\frac{\sqrt{1\,813}}{1\,813}\begin{pmatrix}7\\42\end{pmatrix}$	1 1 1 1	10
8	(a) (i) $\overrightarrow{PQ} = \overrightarrow{PR} + \overrightarrow{RQ}$ $= -\underset{\sim}{x} + 2\underset{\sim}{y}$ (ii) $\overrightarrow{KT} = \overrightarrow{KR} + \frac{1}{2}\overrightarrow{RQ}$ $= -\frac{1}{3}\underset{\sim}{x} + \underset{\sim}{y}$ (b) $\overrightarrow{KJ} = m\left(-\frac{1}{3}\underset{\sim}{x} + \underset{\sim}{y}\right)$ $\overrightarrow{PJ} = n(-\underset{\sim}{x} + 2\underset{\sim}{y})$ $= -\frac{1}{3}m\underset{\sim}{x} + m\underset{\sim}{y}$ $= -n\underset{\sim}{x} + 2n\underset{\sim}{y}$ $\overrightarrow{KP} = \overrightarrow{KJ} + \overrightarrow{JP}$ $\frac{2}{3}\underset{\sim}{x} = -\frac{1}{3}m\underset{\sim}{x} + m\underset{\sim}{y} - (-n\underset{\sim}{x} + 2n\underset{\sim}{y})$ $\frac{2}{3}\underset{\sim}{x} = -\frac{1}{3}m\underset{\sim}{x} + m\underset{\sim}{y} + n\underset{\sim}{x} - 2n\underset{\sim}{y}$ $\frac{2}{3}\underset{\sim}{x} = \left(-\frac{1}{3}m + n\right)\underset{\sim}{x} + (m-2n)\underset{\sim}{y}$ Bandingkan pekali/*Comparing the coefficients* $-\frac{1}{3}m + n = \frac{2}{3}$ ...① $m - 2n = 0$ $m = 2n$ ...② Gantikan ② ke dalam ① *Substitute ② into ①* $-\frac{1}{3}(2n) + n = \frac{2}{3}$ $-\frac{2}{3}n + n = \frac{2}{3}$ $\frac{1}{3}n = \frac{2}{3}$ $n = 2$ Apabila/*When* $n = 2$ $m = 2(2)$ $m = 4$	1 1 1, 1 1 1 1 1	7
9	(a) (i) $\overrightarrow{PR} = \overrightarrow{PQ} + \overrightarrow{QR}$ $= 3\underset{\sim}{x} + 6\underset{\sim}{y}$ (ii) $\overrightarrow{SQ} = \overrightarrow{SR} + \overrightarrow{RQ}$ $= 3\overrightarrow{PQ} + \overrightarrow{RQ}$ $= 3(3\underset{\sim}{x}) + 6\underset{\sim}{y}$ $= 9\underset{\sim}{x} - 6\underset{\sim}{y}$	1 1 1	

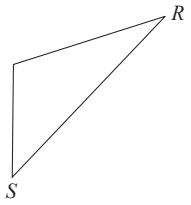
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) (i) $\overrightarrow{RT} = h\overrightarrow{RP}$ $= h(-3\underset{\sim}{x} - 6\underset{\sim}{y})$ $= -3h\underset{\sim}{x} - 6h\underset{\sim}{y}$	1	
	(ii) $\overrightarrow{ST} = k\overrightarrow{SQ}$	1	
	$\overrightarrow{SR} + \overrightarrow{RT} = k\overrightarrow{SQ}$	1	
	$\overrightarrow{RT} = k\overrightarrow{SQ} - \overrightarrow{SR}$ $= k(9\underset{\sim}{x} - 6\underset{\sim}{y}) - 9\underset{\sim}{x}$ $= 9k\underset{\sim}{x} - 6k\underset{\sim}{y} - 9\underset{\sim}{x}$ $= (9k - 9)\underset{\sim}{x} - 6k\underset{\sim}{y}$	1	
	Bandingkan pekali/*Comparing the coefficients* $9k - 9 = -3h$ $\quad -6k = -6h$ $9k + 3h = 9$ $\quad k = h \ldots$ ② $3k + h = 3 \ldots$ ①		8
	Gantikan ① ke dalam ② *Substitute ① into ②* $3k + k = 3$ $4k = 3$	1	
	$k = \frac{3}{4}$	1	
	$h = \frac{3}{4}$	1	
10	(a) $\overrightarrow{OP} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$, $\overrightarrow{OQ} = \begin{pmatrix} 4 \\ 6 \end{pmatrix}$ $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$ $= \begin{pmatrix} -2 \\ -1 \end{pmatrix} + \begin{pmatrix} 4 \\ 6 \end{pmatrix}$ $= \begin{pmatrix} 2 \\ 5 \end{pmatrix}$	1	
	$\widehat{\overrightarrow{PQ}} = \frac{1}{\sqrt{2^2 + 5^2}}\begin{pmatrix} 2 \\ 5 \end{pmatrix}$	1	
	$= \frac{1}{\sqrt{29}}\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ atau/*or* $\frac{\sqrt{29}}{29}\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ atau/*or* $\begin{pmatrix} \frac{2\sqrt{29}}{29} \\ \frac{5\sqrt{29}}{29} \end{pmatrix}$	1	
	(b) (i) $\overrightarrow{PS} = 3\underset{\sim}{x} + \left(\frac{-k-1}{5}\right)\underset{\sim}{y}$ $\overrightarrow{PQ} + \overrightarrow{QR} + \overrightarrow{RS} = 3\underset{\sim}{x} + \left(\frac{-k-1}{5}\right)\underset{\sim}{y}$ $h\underset{\sim}{x} + h\underset{\sim}{y} - k\underset{\sim}{x} = 3\underset{\sim}{x} + \left(\frac{-k-1}{5}\right)\underset{\sim}{y}$ $(h - k)\underset{\sim}{x} + h\underset{\sim}{y} = 3\underset{\sim}{x} + \left(\frac{-k-1}{5}\right)\underset{\sim}{y}$ $h - k = 3 \ldots$ ① , $h = \frac{-k-1}{5} \ldots$ ②	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
10	Gantikan ② ke dalam ① *Substitute ② into ①* $\frac{-k-1}{5} - k = 3$ $-k - 1 - 5k = 15$ $6k = 16$ $k = -\frac{8}{3}$	1	
	Gantikan $k = -\frac{8}{3}$ ke dalam ② *Substitute* $k = -\frac{8}{3}$ *into ②* $h = \frac{-\left(-\frac{8}{3}\right) - 1}{5}$ $h = \frac{1}{3}$	1	10
	(ii) $\overrightarrow{PR} = \overrightarrow{PQ} + \overrightarrow{QR}$ $\overrightarrow{PR} = \frac{1}{3}\underset{\sim}{x} + \frac{1}{3}\underset{\sim}{y}$ $\lvert\overrightarrow{PR}\rvert = \sqrt{\left(\frac{1}{3}\right)^2 + \left(\frac{1}{3}\right)^2}$ $= \frac{\sqrt{2}}{3}$ unit	1 1	
	(iii) $\frac{1}{2} \times \left(\frac{8}{3}\right)(3) \times t = 63$ $4t = 63$ $t = 15.75$ unit	1	
	Jarak serenjang dari P ke SR = 15.75 unit. *The perpendicular distance from P to SR = 15.75 units.*	1	

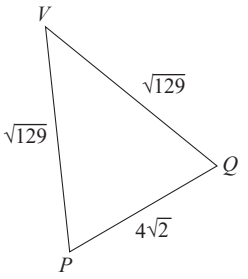
BAB 9 Penyelesaian Segi Tiga
Solution of Triangles

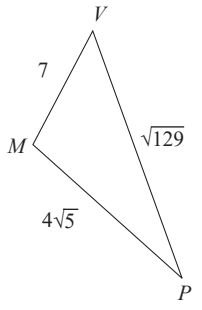
LATIHAN INTENSIF

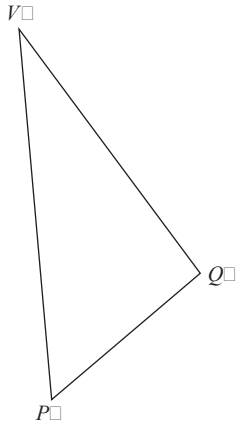
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\frac{1}{2}(9)(PS) = 67.5$ $PS = 15$ $QS = \sqrt{306}$ $QS = 17.49$ cm  $US = 17 - 15$ $= 2$ cm $SR = \sqrt{9^2 + 2^2}$ $= \sqrt{85}$	1 1	
	(b) $17^2 = 306 + 85 - 2(\sqrt{306})(\sqrt{85})$ kos $\angle QSR$ $\angle QSR = 71.57°$	1 1	
	(c) $\angle PRQ = \tan^{-1}\left(\frac{9}{17}\right)$ $\angle PRQ = 27.90°$ $\angle RPT = \angle PRQ$ $= 27.90°$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$PR = \sqrt{9^2 + 17^2}$ $PR = 19.24$ $PT = 15 - 2$ $= 13$	1	
	Luas segi tiga/*Area of triangle PTR* $= \frac{1}{2}(13)(19.24)\sin 27.9°$	1	
	$= 58.52\ \text{cm}^2$	1	
	(d) 	1	10
	$\angle SP\square R = 180° - 27.90°$ $\angle SP\square R = 152.10°$	1	
2	(a) $\dfrac{\frac{1}{2}(x)(16)\sin 30°}{\frac{1}{2}(y)(25)\sin 150°} = \dfrac{3}{2}$	1	
	$\dfrac{4x}{\frac{25y}{4}} = \dfrac{3}{2}$	1	
	$4x(2) = 3\left(\dfrac{25y}{4}\right)$	1	
	$32x = 75y$		
	$x = \dfrac{75}{32}y$	1	10
	(b) $\dfrac{x}{\sin 81.86°} = \dfrac{16}{\sin 68.14°}$	1	
	$x = 17.065$ cm	1	
	$y = \dfrac{32(17.065)}{75}$	1	
	$= 7.281$ cm	1	
	(c) $RQ^2 = 25^2 + 6.4^2 - 2(25)(6.4)\text{ kos } 150°$	1	
	$RQ = 30.71$ cm	1	
3	(a) (i) Menggunakan rumus Heron/*Using Heron's formulae:*		
	Semiperimeter, $s = \dfrac{2x + 11 + 23 - 2x}{2}$		
	$= 17$	1	
	Luas/*Area* $= 6\sqrt{51}$		
	$\sqrt{(17)(17 - 2x)(17 - 11)(17 - 23 + 2x)} = 6\sqrt{51}$	1	
	$(17)(17 - 2x)(6)(2x - 6) = 1\ 836$		
	$102(17 - 2x)(2x - 6) = 1\ 836$		
	$34x - 102 - 4x^2 + 12x = 18$		
	$-4x^2 + 46x - 120 = 0$		
	$2x^2 - 23x + 60 = 0$		
	$(2x - 15)(x - 4) = 0$	1	
	$x = \dfrac{15}{2}$ atau/*or* $x = 4$	1	
	Maka/*Hence,* $x = 4$ Kewajaran/*Justification* $= AB < AC$.	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(ii) $8^2 = 11^2 + 15^2 - 2(11)(15)\text{ kos } \angle ACB$	1	
	$\text{kos } \angle ACB = \dfrac{11^2 + 15^2 - 8^2}{2(11)(15)}$		
	$\angle ACB = 31.29°$	1	
	(b) (i) $\angle BCD = 180° - 31.29°$		
	$= 148.71°$	1	10
	$\dfrac{BD}{\sin 148.71°} = \dfrac{11}{\sin 15°}$	1	
	$BD = \dfrac{11}{\sin 15°} \times \sin 148.71°$		
	$= 22.07$ cm	1	
4	(a) Panjang/*Length of PQ* $= \sqrt{4^2 + 4^2}$		
	$= 4\sqrt{2}$	1	
	Panjang/*Length of MP* $= \sqrt{4^2 + 8^2}$		
	$= 4\sqrt{5}$	1	
	Panjang/*Length of VP* $= \sqrt{7^2 + (4\sqrt{5})^2}$		
	$= \sqrt{129}$	1	
	(i) Panjang/*Length of VQ* $= VP = \sqrt{129}$		
	$(4\sqrt{2})^2 = (\sqrt{129})^2 + \sqrt{129})^2 - 2(\sqrt{129})(\sqrt{129})\text{ kos } \angle QVP$	1	
	$\text{kos } \angle QVP = \dfrac{(\sqrt{129})^2 + (\sqrt{129})^2 - (4\sqrt{2})^2}{2(\sqrt{129})(\sqrt{129})}$	1	
	$\angle QVP = 28.84°$	1	
	(ii) Luas segi tiga/*Triangle of QVP* $= \dfrac{1}{2} \times \sqrt{129} \times \sqrt{129} \times \sin 28.84°$		
	$= 31.11\text{ cm}^2$	1	
	(b) $(\sqrt{129})^2 = (7)^2 + (4\sqrt{5})^2 - 2(7)(4\sqrt{5})\text{ kos } \angle VMP$		
	$\text{kos } \angle VMP = \dfrac{(7)^2 + (4\sqrt{5})^2 - (\sqrt{129})^2}{2(7)(4\sqrt{5})}$		
	$\angle VMP = 90°$		
	(c)		







BAB 10 **Nombor Indeks**
Index Numbers

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\frac{13.5}{x} \times 100 = 150$	1	
	$x = 9$	1	
	$\frac{y}{8} \times 100 = 125$		
	$y = 10$		
	$z = \frac{5.8}{4} \times 100$		
	$z = 145$	1	
	(b) $\frac{150(2) + 125(4) + 150(k) + 145(8)}{2 + 4 + k + 8} = 142$	1, 1	10
	$8k = 28$		
	$k = 3.5$	1	
	(c) $\frac{P_{2023}}{35} \times 100 = 142$	1	
	$P_{2023} = \text{RM}49.70$	1	
	(d) $\bar{I}_{\frac{2025}{2021}} = 145 \times \frac{142}{100}$	1	
	$= 205.9$	1	
2	(a) $p = \frac{4.60}{3.20} \times 100$	1	
	$= 143.75$	1	
	$\frac{q}{4.70} \times 100 = 125$		
	$q = \text{RM}5.88$		
	$\frac{6.10}{r} \times 100 = 95$		
	$r = \text{RM}6.42$	1	
	(b) (i) $\bar{I}_{2022/2020} = \frac{143.75(2.2) + 125(1.6) + 150(0.7) + 95(1.8)}{2.2 + 1.6 + 0.7 + 1.8}$	1, 1	
	$= 125.75$	1	10
	(ii) $\frac{7\,086}{Q_{2020}} \times 100 = 125.75$	1	
	$Q_{2020} = \text{RM}5\,634.99$	1	
	(c) $\bar{I}_{2026/2022} = \frac{100(2.2) + 106(1.6) + 100(0.7) + 118(1.8)}{2.2 + 1.6 + 0.7 + 1.8}$	1	
	$= 106.67$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	(a) $\frac{23}{P_{2019}} \times 100 = 115$	1	
	$P_{2019} = \text{RM}20$	1	
	(b) $\bar{I} = \frac{120 \times 145}{100}$	1	
	$= 174$	1	
	(c) $\frac{106(5) + 120(3m) + 115(3) + 130(m)}{5 + 3m + 3 + m} = 117.25$	1, 1	10
	$21m = 63$		
	$m = 3$	1	
	(d) $\bar{I}_{2023/2021} = \frac{120(5) + 145(9) + 132(3) + 154(3)}{5 + 9 + 3 + 3}$	1	
	$= 138.15$		
	$\frac{345}{P_{2021}} \times 100 = 138.15$	1	
	$P_{2021} = \text{RM}249.73$	1	
4	(a) $\frac{x}{40} \times 100 = 120$	1	
	$x = 48$	1	
	(b) $z = y + 20$ … ①		
	$\frac{z}{y} \times 100 = 140$ … ②	1	
	Gantikan ① ke dalam ② *Substitute ① into ②*		
	$\frac{y + 20}{y} \times 100 = 140$		
	$0.4y = 20$		
	$y = 50$	1	
	Apabila/*When* $y = 50$ $z = 50 + 20$ $z = 70$	1	10
	(c) $I_J = 120$ $\quad I_K = \frac{35}{25} \times 100$ $\quad I_L = 140$		
	$= 140$		
	$I_M = \frac{48}{40} \times 100$		
	$= 120$		
	$\bar{I}_{2023/2021} = \frac{120(7) + 140(3) + 140(4) + 120(2)}{7 + 3 + 4 + 2}$	1	
	$= 128.75$	1	
	(d) $\frac{128.75 \times 130}{100} = 167.375$	1	
	Harga sepasang kasut/*Price of a pair of shoes* $= 150 \times \frac{167.375}{100}$	1	
	$= \text{RM}251.06$	1	
5	(a) (i) $k = \frac{3.60}{2.50} \times 100$		
	$= 144$	1	
	(ii) $\frac{P_{2021}}{2.50} \times 100 = 112.5$	1	
	$P_{2021} = \text{RM}2.81$	1	

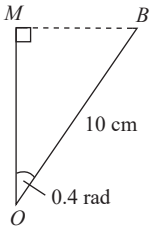
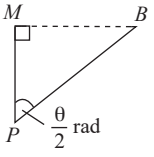
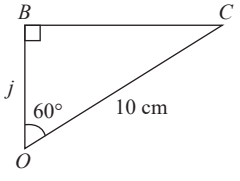
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) (i) $H = \dfrac{105(240) + 112.5(90) + 108(30)}{30 + 90 + 240}$	1	
	$= 107.125$	1	
	(ii) $\bar{I}_{2022/2020} = \dfrac{118(240) + 144(90) + 128(30)}{30 + 90 + 240}$		
	$= 125.33$		
	$\bar{I}_{2022/2021} = \dfrac{125.33}{107.125} \times 100$	1	
	$= 117$		10
	$\dfrac{4.60}{P_{2021}} \times 100 = 117$	1	
	$P_{2021} = \text{RM}3.93$	1	
	(c) $\bar{I}_{2022/2021} = \dfrac{128}{108} \times 100$	1	
	$= 118.52$	1	
6	(a) $p = \dfrac{70}{50} \times 100$	1	
	$= 140$	1	
	$\dfrac{q}{15} \times 100 = 120$		
	$q = 18$		
	$\dfrac{42}{r} \times 100 = 105$		
	$r = 40$	1	
	(b) $\bar{I}_{2023/2021} = \dfrac{140(20) + 120(30) + 112(40) + 105(10) + 125(50)}{20 + 30 + 40 + 10 + 50}$	1, 1	10
	$= 121.2$	1	
	(c) $\dfrac{P_{2023}}{5\,500} \times 100 = 121.2$	1	
	$P_{2025} = \text{RM}6\,666.00$	1	
	(d) $121.2 \times \dfrac{115}{100}$	1	
	$= 139.38$	1	

Tingkatan 5

BAB 1 Sukatan Membulat
Circular Measures

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	Perimeter $= 12 + 12 + 12\left(2\pi - \frac{\pi}{2}\right)$ $= 24 + 12\left(\frac{3}{2}\pi\right)$ $= 24 + 18\pi$	1 1	2
2	Andaikan/*Let* $\angle COD = j\theta$ $55 = j\theta$ $\theta = \frac{55}{j}$ rad $\theta = \frac{55}{20}$ rad $\angle COD = 2.75$ rad Perimeter $= 95$ $j + j + 55 = 95$ $2j = 40$ $j = \frac{40}{2}$ $j = 20$	1 1 1	3
3	$s_{CD} = 6\alpha$, $s_{AB} = 10\beta$ $BC = 10 - 6$ $= 4$ cm Perimeter $= 40$ $6 + 6\alpha + 4 + 10\beta + 10 = 40$ $20 + 6\alpha + 10\beta = 40$ $10\beta = 40 - 20 - 6\alpha$ $10\beta = 20 - 6\alpha$ $\beta = \frac{20 - 6\alpha}{10}$ $\beta = 2 - \frac{3}{5}\alpha$ atau setara/*or equivalent*	1 1	2
4	$\angle TOR = 2\angle TOS$ $= 2\left(\frac{\pi}{2} - \theta\right)$ $= \pi - 2\theta$ $\angle TOR$ major $= 2\pi - (\pi - 2\theta)$ $= 2\pi - \pi + 2\theta$ $= \pi + 2\theta$ Perimeter sektor major *TOR*/*Perimeter of major sector TOR* $= 10 + 10 + 10(\pi + 2\theta)$ $= 20 + 10\pi + 20\theta$ atau/*or* $10(2 + \pi + 2\theta)$	1 1 1 1	4

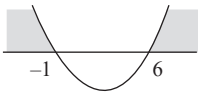
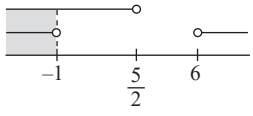
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
5	(a) $\frac{MB}{10} = \frac{0.8}{2}$ rad $= 22.92°$  $\sin 0.4 \text{ rad} = \frac{MB}{10}$ $MB = 3.894$ cm $AB = 3.894 \text{ cm} \times 2$ $= 7.788$ cm (b) $\sin \frac{\theta}{2} \text{ rad} = \frac{3.894}{5}$  $\frac{\theta}{2} \text{ rad} = 51.15°$ $\theta \text{ rad} = 51.15° \times 2$ $= 102.30° \times \frac{3.142}{180°}$ $= 1.786$ rad (c) $s_{AyB} = 5(1.786 \text{ rad})$ $= 8.929$ cm $s_{AxB} = 10(0.8 \text{ rad})$ $= 8$ cm $s_{AyB} - s_{AxB} = 8.929 \text{ cm} - 8 \text{ cm}$ $= 0.929$ cm	1 1 1 1 1 1 1 1 1 1	8
6	(a) $\text{kos } 60° = \frac{j}{10}$ $j = 5$ cm  (b) $s_{DBE} = 5\left(120° \times \frac{3.142}{180°}\right)$ $= 5(2.095)$ $= 10.475$ cm (c) Luas kawasan perentas/*Area of segment ABC* $= \frac{1}{2} \times 10^2 \times 2.095 - \frac{1}{2} \times 10^2 \times \sin 120°$ $= 104.75 - 43.30$ $= 61.45 \text{ cm}^2$ Luas sektor major/*Area of major sector DOE* $= \frac{1}{2} \times 5^2 \times (2\pi - 2.095)$ $= \frac{1}{2} \times 5^2 \times 4.188$ $= 52.35 \text{ cm}^2$ Luas kawasan berlorek/*Area of shaded region* $= 61.45 \text{ cm}^2 + 52.35 \text{ cm}^2$ $= 113.80 \text{ cm}^2$	1 1 1 1 1 1 1 1 1 1	8

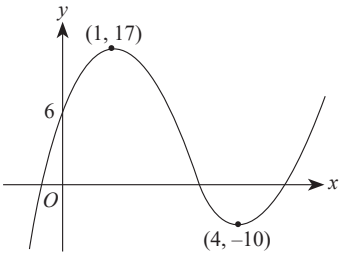
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
7	(a) Apabila/*When* $y = 0$ $x^2 + 0^2 = 100$ $x^2 = 100$ $x = \pm 10$	1	
	Maka, jejari bulatan ialah 10 cm. *Hence, the radius the circle is* 10 cm.		
	Luas sektor major/*Area of major sector PQRS* $= \frac{1}{2} \times 10^2 \times \left(270° \times \frac{\pi}{180}\right)$	1	
	$= \frac{1}{2} \times 10^2 \times \frac{3\pi}{2}$ $= 75\pi$	1	
	(b) $PQ^2 = 10^2 + 10^2$ $PQ = 10\sqrt{2}$ unit		
	Jejari semibulatan/*The radius of semicircle* $= \frac{10\sqrt{2}}{2}$ $= 5\sqrt{2}$ unit		7
	Luas semibulatan/*Area of semicircle* $= \frac{(5\sqrt{2})^2}{2}\pi$ $= 25\pi$ unit^2	1	
	Luas/*Area of* $\Delta OPQ = \frac{1}{2} \times 10 \times 10$ $= 50$ unit^2		
	Luas perentas *OP* dan *OQ*/*Area of segment OP and OQ* $= (25\pi - 50)$ unit^2	1	
	Luas kawasan berlorek/*Area of shaded region* $= 75\pi - (25\pi - 50)$ $= 75\pi - 25\pi + 50$ $= 50\pi + 50$	1	
	$= 50(\pi + 1)$ unit^2	1	

BAB 2 Pembezaan
Differentiation

LATIHAN INTENSIF

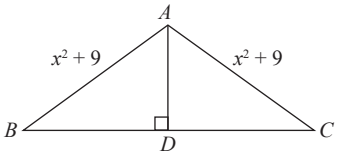
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Penggantian langsung menghasilkan bentuk tak tertakrif, $\frac{0}{0}$. *Direct substitution obtains the undefined form,* $\frac{0}{0}$.		
	Maka/*Hence*, $3^2 - k = 0$ $9 - k = 0$	1	
	$k = 9$	1	
	(b) $(-2)^2 - 2(-2) - h = 0$ $8 - h = 0$ $h = 8$	1	5
	$-2k + 4 = 0$ $k = 2$	1	
	$h - k = 8 - 2$ $= 6$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
2	$\delta s = (t + \delta t)^2 - 4(t + \delta t) - (t^2 - 4t)$ $= t^2 + 2t(\delta t) + (\delta t)^2 - 4t - 4\delta t - t^2 + 4t$ $= (\delta t)^2 + (2t - 4)\delta t$ $\frac{\delta s}{\delta t} = \delta t + 2t - 4$ $\frac{\delta s}{\delta t} = \underset{\delta s \to 0}{\text{had}}\ \delta t + 2t - 4$ $= 0 + 2t - 4$ $= 2t - 4$ Apabila/*When* $t = 7$, $\frac{\delta s}{\delta t} = 2(7) - 4$ $= 10$ Maka, halaju atlet pada masa t = 7 s ialah 10 m/s. *Hence, the velocity of the athlete at* $t = 7$ s *is* 10 m/s.	1 1 1 1 1	5
3	$\frac{3(h+4) - 1(3h-5)}{(h+4)^2} = \frac{3h + 12 - 3h + 5}{(h+4)^2}$ $= \frac{17}{(h+4)^2}$ Secara perbandingan, nilai pemalar h ialah 17. *By comparing, the constant h is* 17.	1 1 1	3
4	$y = \frac{2x - 5}{x^2 + 6}$ $\frac{dy}{dx} = \frac{2(x^2+6) - 2x(2x-5)}{(x^2+6)^2}$ $= \frac{-2x^2 + 10x + 12}{(x^2+6)^2}$ Untuk/*For* $\frac{dy}{dx} < 0$, $-2x^2 + 10x + 12 < 0$ $x^2 - 5x - 6 > 0$ $(x+1)(x-6) > 0$ $x < -1$, $x > 6$  Untuk/*For* $y < 0$, $2x - 5 < 0$ $x < \frac{5}{2}$  Maka, julat nilai x ialah $x < -1$. *Hence, the range value of x is* $x < -1$.	1 1 1 1 1 1	6
5	(a) $y = 5x(2 + 6x)$ $y = 10x + 30x^2$ $\frac{dy}{dx} = 10 + 60x$ Apabila y adalah minimum/*When y is minimum*, $\frac{dy}{dx} = 0$, $60x + 10 = 0$ (b) $x = -\frac{1}{6}$ $y = 10\left(-\frac{1}{6}\right) + 30\left(-\frac{1}{6}\right)^2$ $= -\frac{5}{6}$	1 1 1 1 1	5
6	(a) $y = 2x^2 - 15x^2 + 24x + 6$ $\frac{dy}{dx} = 6x^2 - 30x + 24$ Untuk titik-titik pegun/*For stationary points*, $\frac{dy}{dx} = 0$, $6x^2 - 30x + 24 = 0$ $x^2 - 5x + 4 = 0$ $(x-1)(x-4) = 0$ $x = 1$ atau/*or* $x = 4$	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Apabila/*When* $x = 1$, $y = 2(1)^3 - 15(1)^3 + 24(1)$ $= 17$ Apabila/*When* $x = 4$, $y = 2(4)^3 - 15(4)^2 + 24(4)$ $= -10$ Maka, titik-titik pegun ialah (1, 17) dan (4, –10). *Hence, the stationary points are* (1, 17) *and* (4, –10).	1	
	(b) $\frac{d^2y}{dx^2} = 12x - 30$ Apabila/*When* $x = 1$, $\frac{d^2y}{dx^2} = 12(1) - 30 = -18\ (< 0)$. Apabila/*When* $x = 4$, $\frac{d^2y}{dx^2} = 12(4) - 30 = 18\ (> 0)$.	1	10
	Maka, (1, 17) adalah titik maksimum dan (4, –10) adalah titik minimum. *Hence,* (1, 17) *is the maximum point and* (4, –10) *is a minimum point.*	1	
	(c)  Bentuk graf kubik *Cubic shape graph* Titik maksimum dan minimum dilabel *Maximum and minimum points labelled* Pintasan-y dilabel *y-intercept labelled*	1 1 1	
7	(a) Luas kawasan berlorek/*Area of shaded region* $= 5$ Luas sektor ABC / *Area of sector ABC* $- \left(\text{Luas sektor } DCE \text{ / Area of sector } DCE + \text{Luas sektor } FCG \text{ / Area of sector } FCG\right) = 5$ $\frac{1}{2}(2r)^2(3\theta) - \left(\frac{1}{2}r^2\theta + \frac{1}{2}r^2\theta\right) = 5$ $6r^2\theta - r^2\theta = 5$ $5r^2\theta = 5$ $\theta = \frac{1}{r^2}$	1 1	
	$P = CE + ED + DA + AB + BG + GF + FC$ $= r + r\theta + r + (2r)(3\theta) + r + r\theta + r$ $= 4r + 8r\theta$ $= 4r + 8r \times \frac{1}{r^2}$ $= 4r + \frac{8}{r}$	1 1	11
	(b) $P = 4r + 8r^{-1}$ $\frac{dP}{dr} = 4 - 8r^{-2}$ Nilai pegun berlaku apabila/*Stationary value occur when* $\frac{dP}{dr} = 0$. $4 - \frac{8}{r^2} = 0$ $r^2 = 2$ $r = \sqrt{2}$	1 1	
	Apabila/*When* $r = \sqrt{2}$, $P = 4(\sqrt{2}) + \frac{8}{\sqrt{2}}$ $= 8\sqrt{2}$ Nilai pegun P ialah/*Stationary value of P is* $8\sqrt{2}$.	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) Apabila/*When* $r = \sqrt{2}$, $\theta = \frac{1}{(\sqrt{2})^2} = \frac{1}{2}$ $\frac{dP}{dr} = 4 - 8r^{-2}$ $\frac{d^2P}{dr^2} = 16r^{-3}$ Apabila/*When* $r = \sqrt{2}$, $\frac{d^2P}{dr^2} = \frac{16}{(\sqrt{2})^3}$, positif/*positive*. Nilai pegun ialah minimum dan berlaku apabila $\theta = \frac{1}{2}$. *The stationary value is a minimum and occurs when* $\theta = \frac{1}{2}$.	1 1 1 1	
8	$V = \frac{1}{3}h^3 + 6h$, $\frac{dV}{dt} = 12$ $\frac{dV}{dh} = h^2 + 6$ $\frac{dV}{dt} = \frac{dV}{dh} \times \frac{dh}{dt}$ $12 = (h^2 + 6) \times \frac{dh}{dt}$ $\frac{dh}{dt} = \frac{12}{h^2 + 6}$ Apabila/*When* $h = 2$, $\frac{dh}{dt} = \frac{12}{2^2 + 6}$ $= 1.2$ cm/s	1 1 1 1	4
9	$A = \pi r^2$ $\frac{dA}{dr} = 2\pi r$ Apabila/*When* $A = 4\pi$, $\pi r^2 = 4\pi$ $r = 2\ (> 0)$ $\delta A = 4.05\pi - 4\pi$ $= 0.05\pi$ $\frac{dA}{dr} = 2\pi(2)$ $= 4\pi$ $\delta A = \frac{dA}{dr} \times \delta r$ $0.05\pi = 4\pi \times \delta r$ $\delta r = 0.0125$	1 1 1 1 1	5
10	(a) $A = 2\pi r^2 + 2\pi rh$ $= 2\pi r^2 + 2\pi r(18)$ $= 2\pi r^2 + 36\pi r$ $\frac{dA}{dr} = 4\pi r + 36\pi$ $= 4\pi(r + 9)$ (b) Apabila/*When* $r = 5$, $\frac{dA}{dr} = 4\pi(5 + 9)$ $= 56\pi$ $\delta r = 5.04 - 5$ $= 0.04$ $\delta A = \frac{dA}{dr} \times \delta r$ $= 56\pi \times 0.04$ $= 2.24\pi$	1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Anggaran luas permukaan/*Approximate surface area* $= A + \delta A$ $= [2\pi(5)^2 + 36\pi(5)] + 2.24\pi$ $= 230\pi + 2.24\pi$ $= 232.24\pi$	 1 1	7
11	$y = \frac{1}{3}x^3 + \frac{1}{2}x^2$ $\frac{dy}{dx} = x^2 + x$ $\frac{dy}{dx} \times m_{normal} = -1$ $\frac{dy}{dx} \times \left(-\frac{1}{6}\right) = -1$ $\frac{dy}{dx} = 6$ $x^2 + x = 6$ $x^2 + x - 6 = 0$ $(x-2)(x+3) = 0$ $x = 2$, $x = -3$ $y = \frac{1}{3}(2)^3 + \frac{1}{2}(2)^2$; $y = \frac{1}{3}(-3)^3 + \frac{1}{2}(-3)^2$ $= 4\frac{2}{3}$; $= -\frac{9}{2}$ Koordinat/*Coordinates* $= \left(2, 4\frac{2}{3}\right)$ dan/*and* $\left(-3, -\frac{9}{2}\right)$.	 1 1 1 1 1	5
12	(a) $y = \sqrt{4x - x^2 + 1}$ $y = (4x - x^2 + 1)^{\frac{1}{2}}$ Andaikan/*Let* $u = 4x - x^2 + 1$ $\frac{du}{dx} = 4 - 2x$ $y = u^{\frac{1}{2}}$ $\frac{dy}{du} = \left(\frac{u}{2}\right)^{-\frac{1}{2}}$ $= \frac{1}{2\sqrt{u}}$ $= \frac{1}{2\sqrt{4x - x^2 + 1}}$ $\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}$ $= (4 - 2x)\left(\frac{1}{2\sqrt{4x - x^2 + 1}}\right)$ $= \frac{2 - x}{\sqrt{4x - x^2 + 1}}$ Pada titik/*At point* $P(1, 2)$, $\frac{dy}{dx} = \frac{2 - 1}{\sqrt{4(1) - (1)^2 + 1}}$ $= \frac{1}{2}$ $y - 2 = \frac{1}{2}(x - 1)$ $y = \frac{1}{2}x + \frac{3}{2}$	 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $\frac{1}{2} \times m_{normal} = -1$ $m_{normal} = -2$ Pada titik/*At point* $P(1, 2)$, $y - 2 = -2(x - 1)$ $y - 2 = -2x + 2$ $y = -2x + 4$	1 1 1	7
13	$BD = \frac{18 - 2x^2}{2}$ $= 9 - x^2$ Dalam/*In* ΔABC, $AD = \sqrt{(x^2 + 9)^2 - (9 - x^2)^2}$ $= \sqrt{x^4 + 18x^2 + 81 - (81 - 18x^4 + x^4)}$ $= \sqrt{36x^2}$ $= 6x$  Luas/*Area of* ΔABC, $L = \frac{1}{2}(18 - 2x^2)(6x)$ $= 3x(18 - 2x^2)$ $= 54x - 6x^3$ $\frac{dL}{dx} = 54 - 18x^2$ $\frac{d^2L}{dx^2} = -36x$ Untuk nilai maksimum L/*For maximum value* L, $\frac{dL}{dx} = 0$ $54 - 18x^2 = 0$ $18x^2 = 54$ $x^2 = 3$ $x = \pm 1.732$ Oleh kerana/*Since* $x \geqslant 0$, $x = 1.732$ $\frac{d^2L}{dx^2} = -36(1.732)$ $= -62.352\ (< 0)$ Maka, untuk nilai luas maksimum, $x = 1.732$ cm. *Hence, for the value of maximum area,* $x = 1.732$ cm.	1 1 1 1 1 1 1 1	8

BAB 3 Pengamiran
Integrations

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\int_0^1 \left(\frac{x^2}{x^{\frac{1}{2}}} + \frac{3}{x^{\frac{1}{2}}}\right) dx = \int_0^1 \left(x^{\frac{3}{2}} + 3x^{-\frac{1}{2}}\right) dx$ $= \left[\frac{2}{5}x^{\frac{5}{2}} + 6x^{\frac{1}{2}}\right]_0^1$ $= \left[\left(\frac{2}{5}(1)^{\frac{5}{2}} + 6(1)^{\frac{1}{2}}\right) - \left(\frac{2}{5}(0)^{\frac{5}{2}} + 6(0)^{\frac{1}{2}}\right)\right]$ $= \frac{32}{5}$	1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $\int_m^2 \left[(x^2-2)+\frac{32}{5}\right] dx = -\frac{m^3}{3}$	1	
	$\int_m^2 \left(x^2+\frac{22}{5}\right) dx = -\frac{m^3}{3}$		
	$\left[\frac{x^3}{3}+\frac{22}{5}x\right]_m^2 = -\frac{m^3}{3}$	1	
	$\left(\frac{2^3}{3}+\frac{22}{5}(2)\right)-\left(\frac{m^3}{3}+\frac{22}{5}(m)\right) = -\frac{m^3}{3}$	1	7
	$\frac{172}{15}-\frac{m^3}{3}-\frac{22m}{5} = -\frac{m^3}{3}$		
	$-\frac{22}{5}m = -\frac{172}{15}$		
	$m = \frac{86}{33}$	1	
2	(a) $\int_0^2 x\,dx + \int_0^2 f(x)\,dx = \left[\frac{x^2}{2}\right]_0^2 + \left[\frac{x^2}{3x+1}\right]_0^2$	1	
	$= \left[\left(\frac{2^2}{2}-\frac{0^2}{2}\right)\right] + \left[\left(\frac{2^2}{3(2)+1}-\frac{0^2}{3(0)+1}\right)\right]$	1	
	$= \frac{18}{7}$	1	
	(b) (i) $\int_2^7 [2g(x)-2]\,dx = 2\int_2^7 g(x)\,dx - \int_2^7 2\,dx$		
	$= 2\left[\int_2^3 g(x)\,dx + \int_3^7 g(x)\,dx\right] - \left[2x\right]_2^7$	1	8
	$= 2(a+b) - [2(7)-2(2)]$	1	
	$= 2a + 2b - 10$	1	
	(ii) $\frac{\int_3^2 g(x)\,dx}{\int_3^7 3g(x)\,dx} = \frac{-\int_2^3 g(x)\,dx}{3\int_3^7 g(x)\,dx}$	1	
	$= \frac{-a}{3b}$	1	
3	(a) $y = x^2 - 9$ …① $y = 2x - 6$ …② Gantikan ① ke dalam ② *Substitute ① into ②* $x^2 - 9 = 2x - 6$ $x^2 - 2x - 3 = 0$ $(x-3)(x+1) = 0$ $x = 3$ dan/*and* $x = -1$	1	
	Apabila/*When* $x = -1$ $y = 2(-1) - 6$ $y = -8$ $P(-1, -8)$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) Luas/*Area* $= \left\lvert \int_{-1}^{3} (x^2 - 9)\, dx \right\rvert - \frac{1}{2}(8)(4)$	1	
	$= \left\lvert \left[\frac{x^3}{3} - 9x\right]_{-1}^{3} \right\rvert - 16$	1	
	$= \left\lvert \left(\frac{3^3}{3} - 9(3)\right) - \left(\frac{(-1)^3}{3} - 9(-1)\right) \right\rvert - 16$	1	
	$= \left\lvert -\frac{80}{3} \right\rvert - 16$		
	$= \frac{80}{3} - 16$		
	$= 10\frac{2}{3}$ unit^2	1	10
	(c) $x^2 = y + 9$		
	Isi padu/*Volume* $= \pi \int_{-6}^{0} (y + 9)\, dy - \frac{1}{3}\pi(3)^2(6)$	1	
	$= \pi\left[\frac{y^2}{2} + 9y\right]_{-6}^{0} - 18\pi$	1	
	$= \pi\left[\left(\frac{0^2}{2} + 9(0)\right) - \left(\frac{(-6)^2}{2} + 9(-6)\right)\right] - 18\pi$	1	
	$= 36\pi - 18\pi$		
	$= 18\pi$ unit^3	1	
4	(a) $y = x + 3$ …①		
	$y = (x - 3)^2$ …②		
	Gantikan ② ke dalam ①		
	Substitute ② *into* ①		
	$(x - 3)^2 = x + 3$		
	$x^2 - 6x + 9 = x + 3$	1	
	$(x - 6)(x - 1) = 0$		
	$x = 6$ dan/*and* $x = 1$		
	Apabila/*When* $x = 6$		
	$y = 6 + 3$		
	$y = 9$		
	$B(6, 9)$	1	
	(b) Luas/*Area* $= \frac{1}{2}(4 + 9)(5) - \int_{1}^{6} (x - 3)^2\, dx$	1	
	$= \frac{65}{2} - \left[\frac{(x - 3)^3}{3}\right]_{1}^{6}$	1	10
	$= \frac{65}{2} - \left[\left(\frac{(6 - 3)^3}{3}\right) - \left(\frac{(1 - 3)^3}{3}\right)\right]$	1	
	$= \frac{65}{2} - \frac{35}{3}$		
	$= 20\frac{5}{6}$ unit^2	1	
	(c) Isi padu/*Volume* $= \pi \int_{0}^{1} (x + 3)^2\, dx + \pi \int_{1}^{3} (x - 3)^4\, dx$	1	
	$= \pi\left[\frac{(x + 3)^3}{3}\right]_{1}^{0} + \pi\left[\frac{(x - 3)^5}{5}\right]_{1}^{3}$	1	
	$= \pi\left[\left(\frac{(1 + 3)^3}{3}\right) - \left(\frac{(0 + 3)^3}{3}\right)\right] + \pi\left[\left(\frac{(3 - 3)^5}{3}\right) - \left(\frac{(1 - 3)^5}{3}\right)\right]$	1	
	$= \frac{37}{3}\pi + \frac{32}{5}\pi$		
	$= \frac{281}{15}\pi$ unit^3	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
5	(a) Luas kawasan/*Area of region A* $= \frac{1}{2}(3)(7)$	1	
	$= \frac{21}{2}$ unit^2		
	Luas kawasan/*Area of region B* $= \int_3^4 (16 - x^2)\, dx$		
	$= \left[16x - \frac{x^3}{3}\right]_3^4$	1	
	$= \left[\left(16(4) - \frac{4^3}{3}\right) - \left(16(3) - \frac{3^3}{3}\right)\right]$	1	
	$= \frac{11}{3}$ unit^2		
	Jumlah luas/*Total area* $= \frac{21}{2} + \frac{11}{3}$	1	8
	$= 14\frac{1}{6}$ unit^2	1	
	(b) Isi padu/*Volume* $= \pi\int_3^4 (16 - x^2)^2\, dx$		
	$= \pi\int_3^4 (256 - 32x^2 + x^4)\, dx$		
	$= \pi\left[256x - \frac{32}{3}x^3 + \frac{x^5}{5}\right]_3^4$	1	
	$= \pi\left[\left(256(4) - \frac{32}{3}(4^3) + \frac{4^5}{5}\right) - \left(256(3) - \frac{32}{3}(3^3) + \frac{3^5}{5}\right)\right]$	1	
	$= \frac{263}{15}\pi$ unit^3	1	
6	(a) $x^2 + 1 = 3x + 1$		
	$x^2 - 3x = 0$	1	
	$x(x - 3) = 0$		
	$x = 0$ atau/*or* $x = 3$,		
	$\therefore h = 3$	1	
	(b) Apabila/*When* $x = 3$,		
	$y = 3(3) + 1$		
	$y = 10$		
	Luas/*Area* $= 2\left[\frac{1}{2}(3)(1 + 10) - \int_0^3 (x^2 + 1)\, dx\right]$	1	
	$= 2\left[\frac{33}{2} - \left[\frac{x^3}{3} + x\right]_0^3\right]$	1	
	$= 2\left[\frac{33}{2} - \left[\left(\frac{3^3}{3} + 3\right) - \left(\frac{0^3}{3} + 0\right)\right]\right]$	1	
	$= 2\left(\frac{33}{2} - 12\right)$	1	10
	$= 9$ unit^2	1	
	(c) $y = x^2 + 1$		
	$x^2 = y - 1$		
	Isi padu/*Volume* $= \frac{\pi}{2}\int_1^8 (y - 1)\, dy$		
	$= \frac{\pi}{2}\left[\frac{y^2}{2} - y\right]_1^8$	1	
	$= \frac{\pi}{2}\left[\left(\frac{8^2}{2} - 8\right)\right] - \left(\frac{1^2}{2} - 1\right)\right]$	1	
	$= \frac{\pi}{2}\left(\frac{49}{2}\right)$		
	$= \frac{49}{4}\pi$ unit^3	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
7	(a) Gantikan $y = 3$ ke dalam persamaan $y = \frac{x}{3}$ *Substitute $y = 3$ into equation $y = \frac{x}{3}$* $3 = \frac{x}{3}$ $x = 9$	1	
	Gantikan $y = \frac{x}{3}$ ke dalam persamaan $y = \frac{9}{x^2}$ *Substitute $y = \frac{x}{3}$ into equation $y = \frac{9}{x^2}$* $\frac{x}{3} = \frac{9}{x^2}$ $x^3 = 27$ $x = 3$	1	
	Apabila/*When* $x = 3$, $y = \frac{3}{3}$ $= 1$	1	
	$y = \frac{9}{x^2}$ $x = \sqrt{\frac{9}{y}}$ $= 3y^{-\frac{1}{2}}$		10
	Luas kawasan berlorek/*Area of shaded region* $= \frac{1}{2}(3+9)(2) - \int_1^3 (3y^{-\frac{1}{2}})\,dy$	1	
	$= 12 - \left[6y^{\frac{1}{2}}\right]_1^3$	1	
	$= 12 - \left[\left(6(3)^{\frac{1}{2}}\right) - \left(6(1)^{\frac{1}{2}}\right)\right]$	1	
	$= 7.608$ unit^2	1	
	(b) Isi padu/*Volume* $= \pi\int_3^5 \left(\frac{9}{x^2}\right)^2 dx$ $= \pi\int_3^5 (81x^{-4})\,dx$		
	$= \pi\left[-\frac{27}{x^3}\right]_3^5$	1	
	$= \pi\left[\left(-\frac{27}{5^3}\right) - \left(-\frac{27}{3^3}\right)\right]$	1	
	$= \frac{98}{125}$ unit^2	1	
8	(a) Gantikan $x = h$ dan $y = 5$ ke dalam persamaan $y = \frac{x^2}{3} + 2$ *Substitute $x = h$ and $y = 5$ into equation $y = \frac{x^2}{3} + 2$* $5 = \frac{h^2}{3} + 2$	1	
	$h^2 = 9$ $h = -3$	1	
	(b) Luas/*Area* $= \int_{-3}^{1} \left(\frac{x^2}{3} + 2\right) dx$ $= \left[\frac{x^3}{9} + 2x\right]_{-3}^{1}$	1	
	$= \left[\left(\frac{(1)^3}{9} + 2(1)\right) - \left(\frac{(-3)^3}{9} + 2(-3)\right)\right]$	1	
	$= \frac{100}{9}$ unit^2	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) $y = \frac{x^2}{3} + 2$ $y - 2 = \frac{x^2}{3}$ $x^2 = 3y - 6$ Isi padu/*Volume* $= \pi\int_2^5 (3y - 6)\, dy$ $= \pi\left[\frac{3y^2}{2} - 6y\right]_2^5$ $= \pi\left[\left(\frac{3(5)^2}{2} - 6(5)\right) - \left(\frac{3(2)^2}{2} - 6(2)\right)\right]$ $= \frac{27}{2}\pi$ unit^2	 1 1 1	10

BAB 4 Pilih Atur dan Gabungan
Combination and Permutation

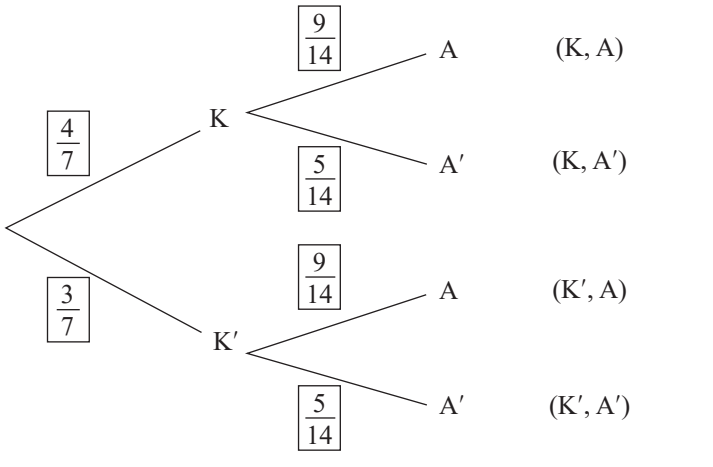
LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) ${}^7P_4$ $= 840$ (b) $7 \times 7 \times 7 \times 7$ $= 2\ 401$	1 1 1 1	4
2	(a) ${}^{10}C_8$ $= 45$ (b) $({}^{11}C_6 \times {}^{10}C_2) + ({}^{11}C_7 \times {}^{10}C_1) + ({}^{11}C_8 \times {}^{10}C_0)$ $= 20\ 790 + 3\ 300 + 165$ $= 24\ 255$	1 1 1, 1 1	5
3	(a) $7!$ $= 5\ 040$ (b) $4! \times 3!$ $= 144$ (c) $4! \times 4!$ $= 576$ (d) $(4! \times 3!) + (3! \times 4!)$ $= 288$	1 1 1 1 1 1 1 1	8
4	(a) $\frac{10!}{2!}$ $= 1\ 814\ 400$ (b) $\frac{{}^4P_1}{2!} \times {}^9P_4$ $= 6\ 048$	1 1 1 1	4
5	(a) $3! \times 2!$ $= 12$ (b) ${}^3P_2 \times 3!$ $= 36$ (c) $2! \times 3! \times 2!$ $= 24$	1 1 1 1 1 1	6

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
6	(a) ${}^{6}P_{4}$ $= 360$ (b) ${}^{3}P_{1} \times {}^{4}P_{2} \times {}^{3}P_{1}$ $= 108$	1 1 1 1	4
7	(a) ${}^{5}P_{4}$ $= 120$ (b) ${}^{4}P_{3} \times 3$ $= 72$ (c) ${}^{3}P_{2} \times 6$ $= 36$	1 1 1 1 1 1	6
8	${}^{7}C_{3}$ atau/*or* ${}^{7}C_{4}$ $= 35$ $= 35$	1 1	2
9	(a) ${}^{6}P_{4}$ $= 36$ (b) $1 \times {}^{5}P_{3} = 1 \times \frac{5!}{(5-3)!}$ $= \frac{5!}{2!}$ $= 60$ (c) $1 \times {}^{4}P_{2} \times 3 = 1 \times \frac{4!}{(4-2)!} \times 3$ $= 3 \times \frac{4!}{2!}$ $= 36$	1 1 1 1 1 1 1	6
10	(a) ${}^{8}C_{5} \times {}^{12}C_{5} = 56 \times 792$ $= 44\ 352$ (b) ${}^{16}C_{6}$ $= 8\ 008$	1 1 1 1	4
11	(a) $(7-1)!$ $= 721$ (b) $(6-1)! \times 2!$ $= 240$	1 1 1 1	4
12	(a) ${}^{10}C_{2}$ $= 45$ (b) ${}^{10}C_{3}$ $= 120$ (c) ${}^{10}C_{4}$ $= 210$	1 1 1 1 1 1	6
13	$\frac{{}^{10}P_{7}}{2(7)} = \frac{{}^{10}P_{7}}{14}$ $= 43\ 200$	1 1	2

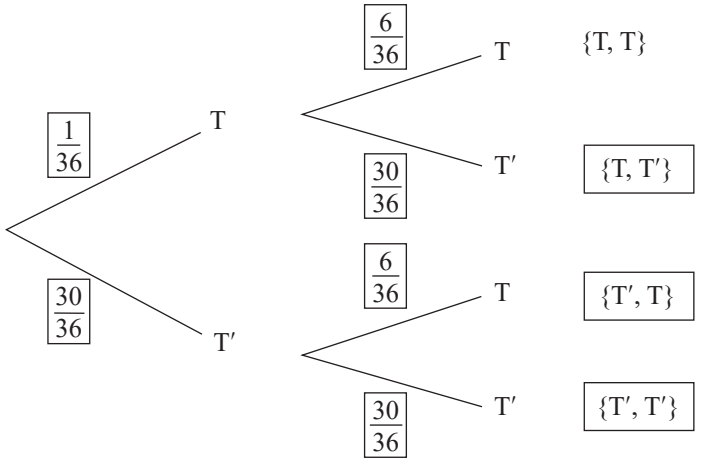
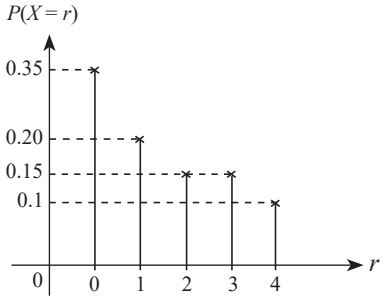
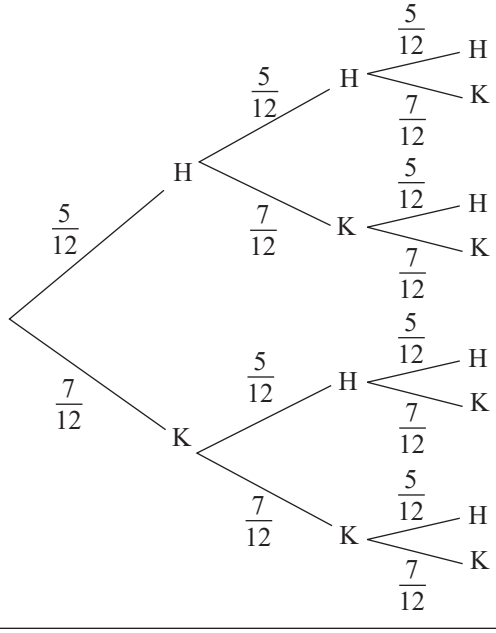
BAB 5 Taburan Kebarangkalian
Probability Distribution

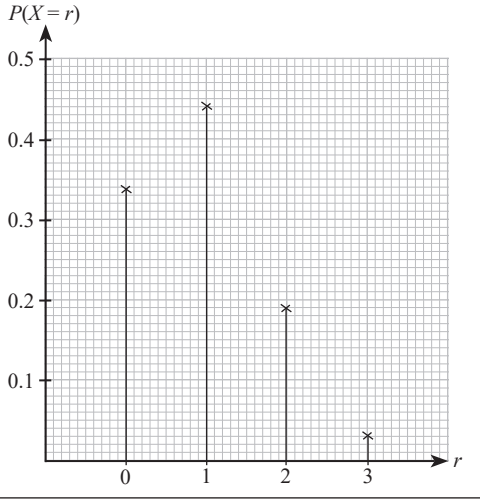
Imbas Kembali

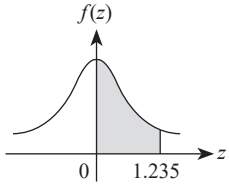
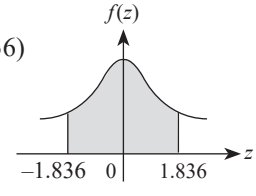
Soalan	Skema Pemarkahan
1	(a) $S = \{1, 2, 3, 4, 5, 6\}$ (b) (i) $A = \{1, 3, 5\}$ $P(A) = \frac{3}{6}$ $= \frac{1}{2}$ (b) (ii) $B = \{2, 4, 6\}$ $P(B) = \frac{3}{6}$ $= \frac{1}{2}$ (iii) $C = \{5, 6\}$ $P(C) = \frac{2}{6}$ $= \frac{1}{3}$
2	S = Sampel K = Konsonan/*Consonant* V = Vokal/*Vocal* $n(S) = 6$ $n(K) = 4$ $n(V) = 2$ Kebarangkalian/*Probability* $= \frac{4}{6} \times \frac{2}{5}$ $= \frac{4}{15}$
3	

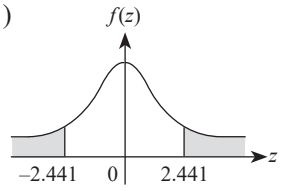
LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Pemboleh ubah rawak diskret/*Discrete random variables* $X = \{0, 1, 2, 3, 4, 5\}$ (b) Pemboleh ubah rawak selanjar/*Continuous random variables* $X = \{x : x$ ialah isi padu air dalam mililiter, $245 \leqslant X \leqslant 255\}$ $X = \{x : x$ *is the volume of the water in millilitre,* $245 \leqslant X \leqslant 255\}$	1 1 1 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
2	Lambungan pertama *First roll* / Lambungan pertama *First roll* / Kesudahan *Outcomes* / $X = r$  {T, T} 2 {T, T′} 1 {T′, T} 1 {T′, T′} 0 $\frac{6}{36}$ ditulis/*is written* $\frac{30}{36}$ ditulis/*is written* Senarai kesudahan/*List of outcomes*	1 1 1	3
3	(a) $r = 0.175$, $s = 0.175$ (b) $\sum_{i=5}^{4} P(X = r_i) = 0.35 + 0.20 + 0.175 + 0.175 + 0.10$ $= 1$ (c)  	1 1 2	3
4	(a) $X = \{0, 1, 2, 5\}$ (b)  Kesudahan / $X = r$ {HHH} 3 {HHK} 2 {HKH} 2 {HKK} 1 {KHH} 2 {KHK} 1 {KKH} 1 {KKK} 0	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Lukis sekurang-kurangnya 1 dahan betul. *At least one stem is correct.* Lukis semua dengan betul. *All are drawn correcctly.* Senarai semua kesudahan betul. *List all the correct outcomes.* Senarai semua $X = r$. *List all $X = r$.*	1 1 1 1	5
5	STEM A STEM B STEM C Ada tiga jenis kesudahan/*There are three outcomes*. Bukan taburan binomial kerana taburan binomial hanya mempunyai dua kesudahan yang mewakili 'kejayaan' dan 'kegagalan'. *Not a binomial distribution because binomial distribution only has two outcomes which are 'success' and 'failure'.*	1 1	2
6	(a) $X = \{0, 1, 2, 3, 4\}$ (b) $P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3) + P(X = 4) = 1$ $\frac{1}{4}h + \frac{1}{2}h + \frac{3}{4} + \frac{1}{2}h + \frac{1}{4}h = 1$ $\frac{3}{2}h = \frac{1}{4}$ $h = \frac{1}{6}$ (c) $P(X < 2) = [P(X = 0) + P(X = 1)]$ $= \frac{1}{4}\left(\frac{1}{6}\right) + \frac{1}{2}\left(\frac{1}{6}\right)$ $= \frac{1}{8}$	1 1 1 1 1	5
7	(a) $X = r$ | $P(X = r)$ 0 | ${}^3C_0(0.30)^0(0.70)^3 = 0.3430$ 1 | ${}^3C_1(0.30)^1(0.70)^2 = 0.4410$ 2 | ${}^3C_2(0.30)^2(0.70)^1 = 0.1890$ 3 | ${}^3C_3(0.30)^3(0.70)^0 = 0.0270$ Senaraikan $X = r$ dengan betul. *List one of the outcomes correctly.* Senaraikan semua $P(X = r)$ dengan betul. *List all $P(X = r)$ correctly.* (b)  	1 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Lukis sekurang-kurangnya satu kesudahan dengan betul. *Draw at least one outcome correctly.* Lukis semua titik dengan betul. *Draw all points correctly.*	1 1	4
8	$P(X = 5) = {}^{10}C_5(0.4)^5(0.6)^5$ $= 0.2007$	1 1	2
9	${}^{n}C_{n}(0.65)^{n}(0.35)^{0} > \frac{2}{35}$ $(1)(0.65)^{n}(1) > \frac{2}{35}$ $\log_{10}(0.65)^{n} > \log_{10}\left(\frac{2}{35}\right)$ $n\log_{10}(0.65) > \log_{10}\left(\frac{2}{35}\right)$ $n < \frac{\log_{10}\left(\frac{2}{35}\right)}{\log_{10}0.65}$ $n < 6.644$ Bilangan maksimum jaringan gol ialah 6. *The maximum goals is* 6.	1 1 1	3
10	(a) 9 (b) $P(X < 7)$ (c) $P(X < 7) = \frac{1 - 0.2122}{2}$ $= 0.3939$ $P(X > 7) = 1 - 0.3939$ $= 0.6061$	1 1 1 1 1	5
11	(a) ${}^{100}C_{100}(p)^{100}(1-p)^{0} = 0.3$ $p^{100} = 0.3$ $p = 0.9880$ (b) Min/*Mean*, $\mu = np$ $= 100(0.9880)$ $= 98.80$ Varians/*Variance*, $\sigma^2 = npq$ $= 100(0.9880)(0.0120)$ $= 1.186$ Sisihan piawai/*Standard deviation*, $\sigma = \sqrt{npq}$ $= \sqrt{1.186}$ $= 1.089$	1 1 1 1 1 1 1	7
12	(a) $P(0 \leqslant Z \leqslant 1.235) = 0.5 - P(Z > 1.235)$ $= 0.5 - 0.1084$ $= 0.3916$  (b) $P(\|Z\| \leqslant 1.836) = P(-1.836) \leqslant Z \leqslant 1.836)$ $= 1 - P(Z < -1.836) - P(Z > 1.836)$ $= 1 - 2P(Z > 1.836)$ $= 1 - 2(0.0332)$ $= 0.9336$  	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) $P(\|Z\| > 2.441) = P(Z < -2.441) + P(Z > 2.441)$ $= 2P(Z > 2.441)$ $= 2(0.007320)$ $= 0.01464$ 	1 1	6
13	$P\left(Z < \frac{19.7 - 15}{\sigma}\right) = 0.7327$ $P\left(Z < \frac{19.7 - 15}{\sigma}\right) = 0.2673$ $\frac{4.7}{\sigma} = 0.621$ $\sigma = 7.568$	1 1 1	3
14	$\mu = 200$, $\sigma = 10$ $P(k < X < 221.5) = 0.3708$ $P\left(\frac{k-200}{10} < Z < \frac{221.5-200}{10}\right) = 0.3708$ $P\left(\frac{k-200}{10} < Z < \frac{21.5}{10}\right) = 0.3708$ $P\left(Z > \frac{k-200}{10}\right) = 0.3708 + P\left(Z > \frac{21.5}{10}\right)$ $P\left(Z > \frac{k-200}{10}\right) = 0.3708 + 0.0158$ $P\left(Z > \frac{k-200}{10}\right) = 0.3866$ $\frac{k-200}{10} = 0.288$ $k = 202.88$	1 1 1 1 1	5
15	(a) $X \sim N(70, 10)$, $Y \sim N(85, 8)$ $\frac{75-70}{10} = \frac{Y-85}{8}$ $Y = 89$ (b) $z = \frac{90-70}{10}$ $= 2$ (c) $\frac{82-85}{8} = \frac{X-70}{10}$ $X = 66.25$	 1 1 1 1 1 1	6
16	(a) (i) $\frac{1}{4} \times 40$ $= 10$ (ii) $\sigma = \sqrt{40(0.25)(0.75)}$ $= 2.739$ (b) (i) $P(X = 3)$ $= {}^5C_3(0.25)^3(0.75)^2$ $= 0.08789$ (ii) $P(X = 0)$ $= {}^5C_0(0.25)^0(0.75)^5$ $= 0.2373$	1 1 1 1 1 1 1 1 1 1	10

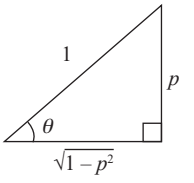
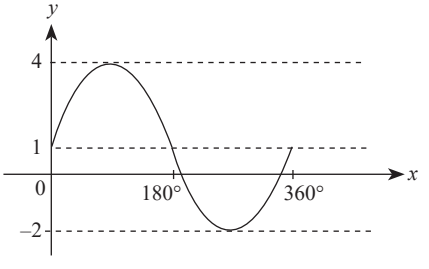
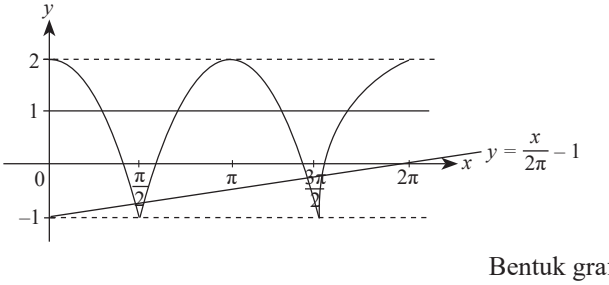
BAB 6

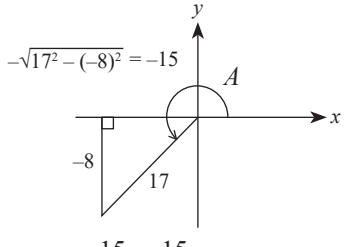
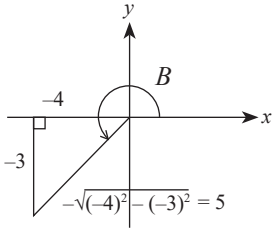
Fungsi Trigonometri
Trigonometry Functions

Imbas Kembali

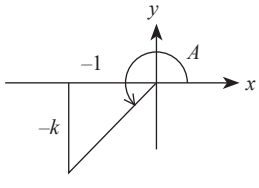
Soalan	Skema Pemarkahan
1	(a) $\sin \angle QPR = \frac{4}{5}$ $\frac{QR}{PR} = \frac{4}{5}$ $\frac{QR}{25} = \frac{4}{5}$ $QR = \frac{4}{5} \times 25$ $= 20$ cm (b) $PQ = \sqrt{PR^2 - QR^2}$ $= \sqrt{25^2 - 20^2}$ $= \sqrt{225}$ $= 15$ cm $\text{kos} \angle QPR = \frac{PQ}{PR}$ $= \frac{15}{25}$ $= \frac{3}{5}$
2	$\sin 60° = \text{kos } 30° = \frac{\sqrt{3}}{2}$ $\quad$ $\text{kos } 45° = \sin 45° = \frac{\sqrt{2}}{2}$ $\quad$ $\tan 60° = \sqrt{3}$ (a) $\sin 60° + \text{kos } 30° = \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2}$ $= \sqrt{3}$ (b) $2 \text{ kos } 45° - \sin 30° = 2\left(\frac{\sqrt{2}}{2}\right) - \frac{1}{2}$ $= \sqrt{2} - \frac{1}{2}$ $= \frac{2\sqrt{2} - 1}{2}$ (c) $3 \tan 60° - 2 \sin 45° = 3(\sqrt{3}) - 2\left(\frac{\sqrt{2}}{2}\right)$ $= 3\sqrt{3} - \sqrt{2}$
3	(a) $\tan x = 0.2162$ $x = \tan^{-1} 0.2162$ $= 12.20°$ (b) $\text{kos } x = 0.5878$ $x = \text{kos}^{-1} 0.5878$ $= 54°$ $\sin x = 0.4062$ $x = \sin^{-1} 0.4062$ $= 23.97°$

LATIHAN INTENSIF

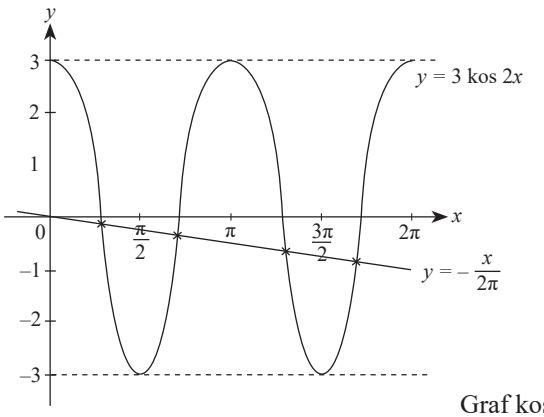
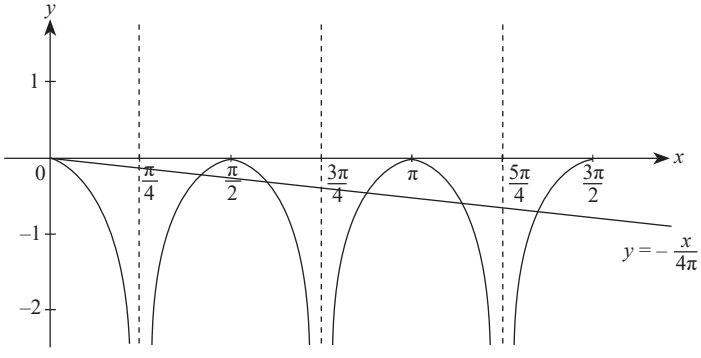
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $k\theta = 2\pi - \frac{\pi}{6}$ $= \frac{11}{6}\pi$ radian (b) $\tan\theta = -\tan\frac{\pi}{6}$ $= -\sqrt{3}$	1 1	2
2	(a) $p^2 + \text{kos}^2\,\theta = 1$ $\text{kos}^2\,\theta = 1 - p^2$ $\text{kos}\,\theta = \sqrt{1-p^2}$  (b) $\text{kot}\,(180° - \theta) = \frac{\text{kos}\,(180° - \theta)}{\sin\,(180° - \theta)}$ $= -\frac{\text{kos}\,\theta}{\sin\theta}$ $= -\frac{\sqrt{1-p^2}}{p}$	1 1 1	3
3	(a) $\frac{p+q}{2} = -\frac{1}{2}$ $p = -1 - q$ (b) $2r = \frac{2}{3}\pi$ $r = \frac{\pi}{3}$	1 1 1	3
4	 Graf lurus/*Straight line* 1 kitaran dalam/*cycle in* 360° $-2 \leqslant y \leqslant 4$ $b = -2$	1 1 1 1	4
5	(a)  Bentuk graf kosinus mutlak *Absolute cosinus shaped graph*	1 1 1	5

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $6\pi\lvert\text{kos } x\rvert = x$ $2\pi(3\lvert\text{kos } x\rvert) = x$ $3\lvert\text{kos } x\rvert = \frac{x}{2\pi}$ $3\lvert\text{kos } x\rvert - 1 = \frac{x}{2\pi} - 1$ $y = \frac{x}{2\pi} - 1$ 4 penyelesaian/*solutions*.	1 1	5
6	(a) $\text{kosek } B = \frac{1}{\sin B}$ $= \frac{1}{\left(\frac{3}{4}\right)}$ $= \frac{4}{3}$ (b) $1 + \text{kot}^2 B = \text{kosek}^2 B$ $1 + \text{kot}^2 B = \left(\frac{4}{3}\right)^2$ $1 + \text{kot}^2 B = \frac{16}{9}$ $\text{kot}^2 B = \pm\sqrt{\frac{7}{9}}$ $= \pm\frac{\sqrt{7}}{3}$ $\sin B = \frac{3}{4}$ dan $90° \leqslant B \leqslant 270°$, maka B dalam sukuan II, kot $B < 0$. Oleh itu, kot $B = -\frac{\sqrt{7}}{3}$. $\sin B = \frac{3}{4}$ *and* $90° \leqslant B \leqslant 270°$, *hence B in the* II *quadrant,* $\cot B < 0$. *Therefore,* $\cot B = -\frac{\sqrt{7}}{3}$.	1 1 1	3
7	(a)  atau/*or*  $\text{kot } A = \frac{-15}{-8} = \frac{15}{8}$ (b) $\text{kot } (A + B) = \frac{1}{\tan (A + B)}$ $= \frac{1}{\frac{\tan A + \tan B}{1 - \tan A \tan B}}$ $= \frac{1 - \tan A \tan B}{\tan A + \tan B}$ $= \frac{1 - \left(\frac{-8}{-15}\right)\left(\frac{3}{4}\right)}{\left(\frac{-8}{-15}\right) + \left(\frac{3}{4}\right)}$ $= \frac{36}{77}$	1 1 1 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
8	$2(1 + \text{kot}^2\,\theta) - \text{kot}\,\theta = 3$ $2 + 2\,\text{kot}^2\,\theta - \text{kot}\,\theta = 3$ $2\,\text{kot}^2\,\theta - \text{kot}\,\theta - 1 = 0$ $(2\,\text{kot}\,\theta + 1)(\text{kot}\,\theta - 1) = 0$ $\text{kot}\,\theta = -\frac{1}{2}$, $\text{kot}\,\theta = 1$ $\tan\theta = -2$ $\tan\theta = 1$ $\theta = 63.43°$ $\theta = 45°$ Sudut rujukan/*Reference angle* $\theta = 63.43°$ atau/*or* Sudut rujukan/*Reference angle* $\theta = 45°$ $\theta = 45°, 116.57°, 225°, 296.57°, 236.31°$	1 1 1 1	4
9	$3\,\text{kot}\,\theta + 2\tan\theta = 5$ $\frac{3}{\tan\theta} + 2\tan\theta = 5$ $3 + 2\tan^2\theta = 5\tan\theta$ $2\tan^2\theta - 5\tan\theta + 3 = 0$ $(2\tan\theta - 3)(\tan\theta - 1) = 0$ $\tan\theta = \frac{3}{2}$, $\tan\theta = 1$ $\theta = 56.31°$ $\theta = 45°$ Sudut rujukan/*Reference angle* $\theta = 56.31°$, Sudut rujukan/*Reference angle* $\theta = 45°$ $\theta = 45°, 56.31°, 225°, 236.31°$	1 1 1	3
10	$\tan^2\theta + \text{sek}^2\,\theta = 4$ $\tan^2\theta + (1 + \tan^2\theta) = 4$ $2\tan^2\theta = 3$ $\tan^2\theta = \frac{3}{2}$ $\tan^2\theta = \pm\sqrt{\frac{3}{2}}$ $\theta = 50.77°$ Sudut rujukan/*Reference angle* $\theta = 50.77°$ $\theta = 50.77°, 129.23°, 230.77°, 309.23°$	1 1 1	3
11	$\sin(\theta - 30°) = \text{kos}\,\theta$ $\sin\theta\,\text{kos}\,30° - \sin 30°\,\text{kos}\,\theta = \text{kos}\,\theta$ $\frac{\sqrt{3}}{2}\sin\theta - \frac{1}{2}\,\text{kos}\,\theta = \text{kos}\,\theta$ $\frac{\sqrt{3}}{2}\sin\theta = \frac{3}{2}\,\text{kos}\,\theta$ $\tan\theta = \sqrt{3}$ $\theta = 60°$ Sudut rujukan/*Reference angle* $\theta = 60°$ $\theta = 60°, 240°$	1 1 1	3

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
12	$\tan 2x = \text{kot } x$ $\tan 2x = \dfrac{1}{\tan x}$ $\tan 2x \tan x = 1$ $\dfrac{2\tan x}{1-\tan^2 x} \times \tan x = 1$ $2\tan^2 x = 1 - \tan^2 x$ $3\tan^2 x = 1$ $\tan^2 x = \dfrac{1}{3}$ $\tan x = \pm\dfrac{1}{\sqrt{3}}$ $x = \dfrac{\pi}{6}$	1	3
	Sudut rujukan/*Reference angle* $x = \dfrac{\pi}{6}$	1	
	Maka/*Hence*, $x = \dfrac{\pi}{6}, \dfrac{5\pi}{6}, \dfrac{7\pi}{6}, \dfrac{11\pi}{6}$	1	
13	$1 - 2\sin^2 x = 1 - 2\tan^2 x$ $2\sin^2 x = 2\tan^2 x$ $\sin^2 x = \tan^2 x$ $\sin^2 x = \dfrac{\sin^2 x}{\text{kos}^2 x}$	1	4
	$\sin^2 x\,\text{kos}^2 x = \sin^2 x$ $\sin^2 x\,\text{kos}^2 x - \sin^2 x = 0$ $\sin^2 x(\text{kos}^2 x - 1) = 0$	1	
	$\sin^2 x = 0$ atau/*or* $\text{kos}^2 x = 1$ $\sin x = 0$ atau/*or* $\text{kos } x = \pm 1$	1	
	$x = 0, \pi, 2\pi$	1	
14	(a) $\text{kos } A = -\dfrac{1}{\sqrt{(-1)^2 + (-k)^2}}$ $= -\dfrac{1}{\sqrt{1+k^2}}$  	1	3
	(b) $\sin\dfrac{A}{2} = \sqrt{\dfrac{1-\text{kos } A}{2}}$ $= \dfrac{1 - \left(-\dfrac{1}{\sqrt{k^2+1}}\right)}{2}$	1	
	$= \dfrac{\sqrt{k^2+1} + 1}{2\sqrt{k^2+1}}$	1	
15	Sudut rujukan/*Reference angle* $= (x - 30°) = 53.13°$	1	3
	$x - 30° = 53.13°$ atau/*or* $x - 30° = 360° - 53.13°$ $x = 53.13° + 30°$ $= 306.87°$ $= 83.13°$ $x = 306.87° + 30°$ $= 336.87°$	1	
	$x = 83.13°, 336.87°$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
16	kosek $\left(x+\frac{\pi}{4}\right)=-2$ $\sin\left(x+\frac{\pi}{4}\right)=-\frac{1}{2}$ Sudut rujukan/*Reference angle* $=\frac{\pi}{6}$ $x+\frac{\pi}{4}=\pi+\frac{\pi}{6}$ atau/*or* $x+\frac{\pi}{4}=2\pi-\frac{\pi}{6}$ $=\frac{5\pi}{6}$ $\quad$ $=\frac{11\pi}{6}$ $x=\frac{5\pi}{6}-\frac{\pi}{4}$ $\quad$ $x=\frac{11\pi}{6}-\frac{\pi}{4}$ $=\frac{7\pi}{12}$ $\quad$ $=\frac{19\pi}{12}$ $x=\frac{7\pi}{12}, \frac{19\pi}{12}$	1 1 1	3
17	(a) $\frac{1-\text{kos}\,x}{\sin x}=\frac{1-\left(1-2\sin^2\frac{x}{2}\right)}{2\sin\frac{x}{2}\,\text{kos}\,\frac{x}{2}}$ $=\frac{2\sin^2\frac{x}{2}}{2\sin\frac{x}{2}\,\text{kos}\,\frac{x}{2}}$ $=\frac{\sin\frac{x}{2}}{\text{kos}\,\frac{x}{2}}$ $=\tan\frac{x}{2}$ (terbukti/*proven*) (b) $\tan 22.5° = \tan\frac{45°}{2}$ $=\frac{1-\text{kos}\,45°}{\sin 45°}$ $=\frac{1-\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $=\frac{\frac{\sqrt{2}-1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$ $=\sqrt{2}-1$	1 1 1 1 1	5
18	(a) $2+3\,\text{kos}\,2x = 2+3(1-2\sin^2 x)$ $=5-6\sin^2 x$ $=(5-6\sin^2 x)\times\frac{\text{kos}^2 x}{\text{kos}^2 x}$ $=\left(\frac{5}{\text{kos}^2 x}-\frac{6\sin^2 x}{\text{kos}^2 x}\right)\times\text{kos}^2 x$ $=(1-\sin^2 x)(5\,\text{sek}^2 x-6\tan^2 x)$ (terbukti/*proven*)		

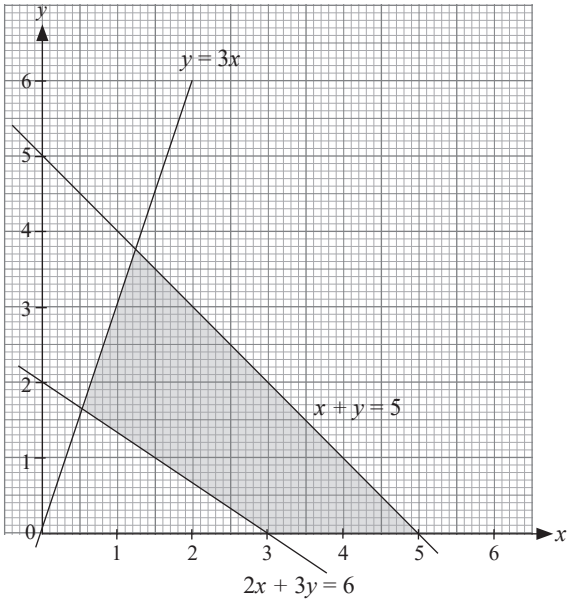
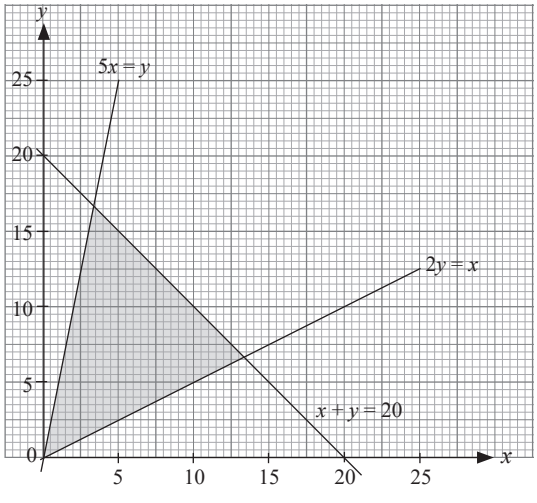
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) (i) 		
	Graf kosinus/*Cosinus graph*	1	
	2 kitaran dalam/*cycles in* 2π	1	
	$-3 \leqslant y \leqslant 3$	1	8
	(ii) $2 + 3 \text{ kos } 2x = (1 - \sin 2x)(5 \text{ sek}^2 x - 6 \tan^2 x)$ $2 + y = (1 - \sin^2 x)(5 \text{ sek}^2 x - 6 \tan^2 x)$ $y = (1 - \sin^2 x)(5 \text{ sek}^2 x - 6 \tan^2 x) - 2$		
	Daripada/*From* $(1 - \sin^2 x)(5 \text{ sek}^2 x - 6 \tan^2 x) = 2 - \frac{x}{2\pi}$ $(1 - \sin^2 x)(5 \text{ sek}^2 x - 6 \tan^2 x) - 2 = -\frac{x}{2\pi}$		
	Maka/*Hence*, $y = -\frac{x}{2\pi}$	1	
	x: 0, 2π y: 0, –1		
	4 penyelesaian/*solutions*.	1	
19	(a) $\tan 2x = \frac{\sin 2x}{\text{kos } 2x}$		
	$= \frac{2 \sin x \text{ kos } x}{\text{kos}^2 x - \sin^2 x}$	1	
	$= \frac{\frac{2 \sin x \text{ kos } x}{\text{kos } x}}{\frac{\text{kos}^2 x - \sin^2 x}{\text{kos } x}}$	1	
	$= \frac{2 \sin x}{\text{kos } x - \sin x\left(\frac{\sin x}{\text{kos } x}\right)}$		
	$= \frac{2 \sin x}{\text{kos } x - \sin x \tan x}$, terbukti/*proven*	1	
	(b) (i) 		

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Graf tangen/*Tangent graph*	1	
	3 kitaran dalam/*cycles in* $\frac{3\pi}{2}$	1	
	$y \leqslant 0$	1	
	(ii) $y = -\lvert \tan 2x \rvert$		
	$= -\left\lvert \frac{2 \sin x}{\text{kos } x - \sin x \tan x} \right\rvert$		
	$4\pi \left\lvert \frac{2 \sin x}{\text{kos } x - \sin x \tan x} \right\rvert = x$		
	$\left\lvert \frac{2 \sin x}{\text{kos } x - \sin x \tan x} \right\rvert = \frac{x}{4\pi}$		8
	$-\left\lvert \frac{2 \sin x}{\text{kos } x - \sin x \tan x} \right\rvert = -\frac{x}{4\pi}$		
	$-\lvert \tan 2x \rvert = -\frac{x}{4\pi}$		
	$y = -\frac{x}{4\pi}$	1	
	x: 0, 2π; y: 0, -1		
	6 penyelesaian/*solutions*.	1	

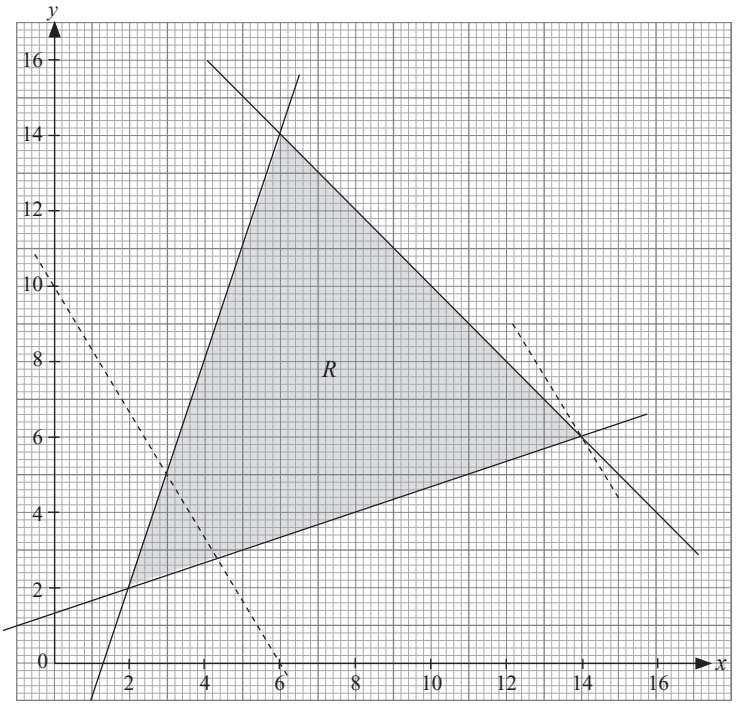
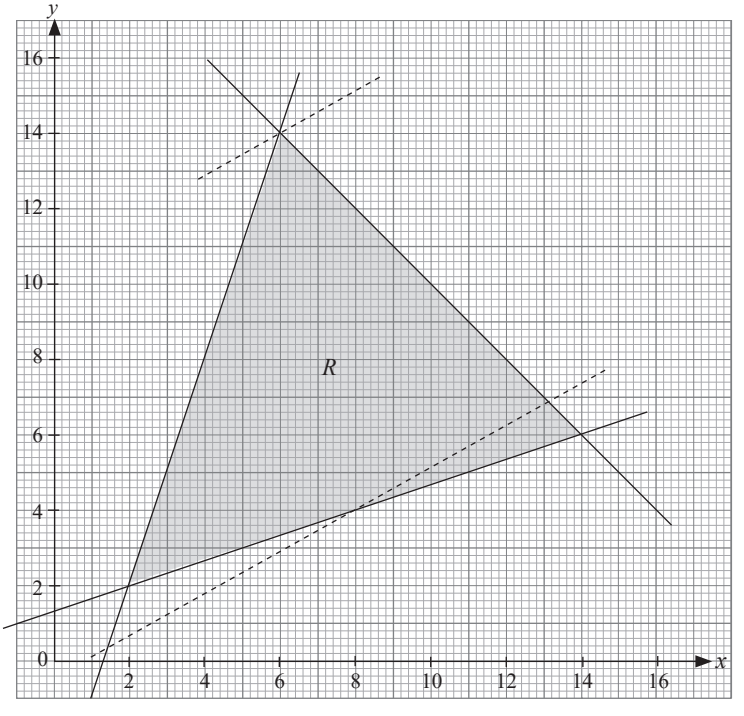
BAB 7

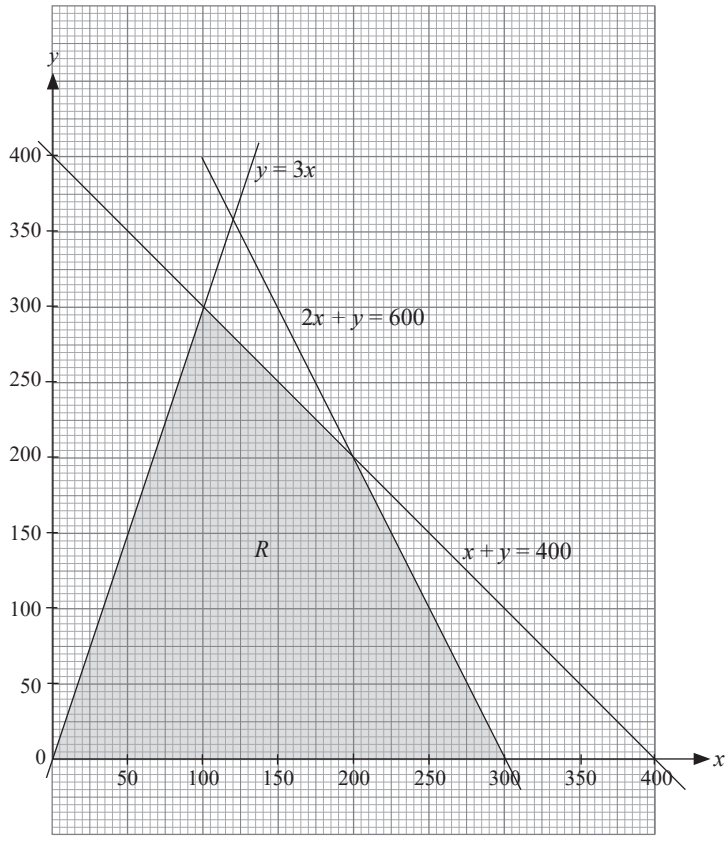
Pengaturcaraan Linear
Linear Programming

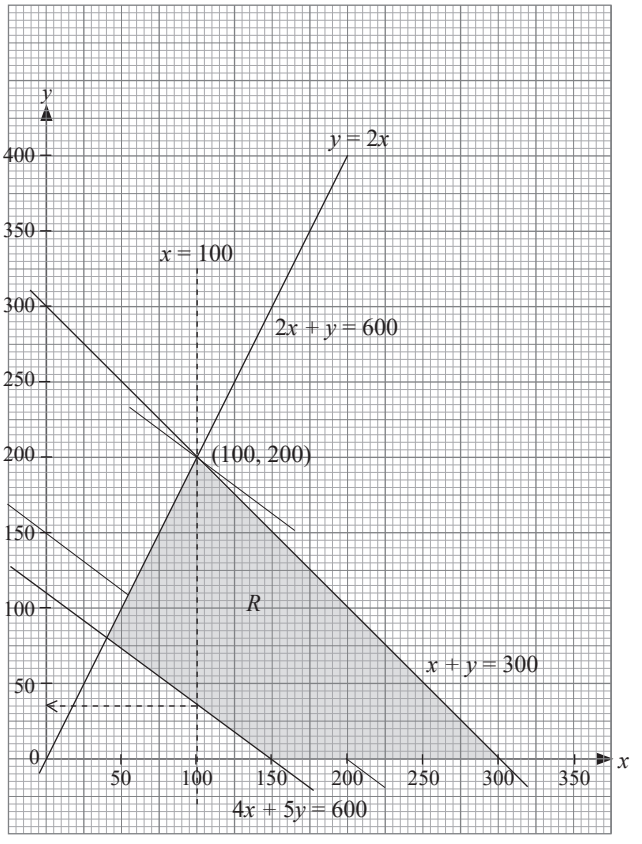
Imbas Kembali

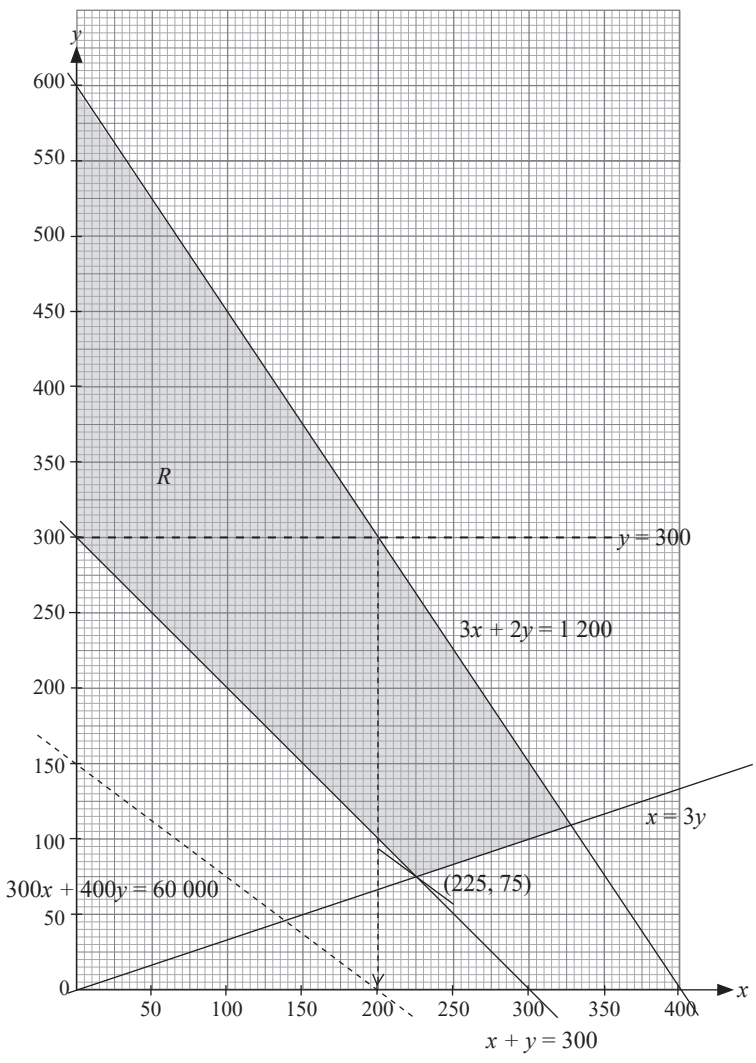
Soalan	Skema Pemarkahan
1	$y \leqslant 3x$ $y \geqslant x + 100$ $x + y \leqslant \frac{1}{4}(4\ 000)$ $x + y \leqslant 1\ 000$
2	(a)  (b) 
3	(a) $y \leqslant 3x + 1$ $4x + 3y \leqslant 12$ $y > 1$ (b) $4x + 5y \leqslant 80$ $y \leqslant 2x$ $y \leqslant \frac{1}{3}x$

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Katakan/*Let* $k = 30$, $30 = 5x + 3y$		
			
	Garis lurus yang betul dilihat dalam graf *v* *Correct straight line seen in the graph v*	1	
	Titik optimum/*Optimum point* = (14, 6) Nilai maksimum/*Maximum value* $k = 5(14) + 3(6)$ $= 88$	1 1	
	(b) Katakan/*Let* $k = 0$, $0 = 2y - x$		
			

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Garis lurus yang betul dilihat dalam graf *Correct straight line seen in the graph v*	1	
	Titik optimum/*Optimum point* = (6, 14) Nilai maksimum/*Maximum value* $k = 2(14) - 6$ $= 22$	 1 1	6
2	(a) $x + y \leqslant 400$ $y \leqslant 3x$ $50x + 25y \leqslant 15\ 000 \Rightarrow 2x + y \leqslant 600$	1 1	
	(b)  	1	6
	Kedua-dua paksi dilabel dengan skala seragam antara $0 \leqslant x \leqslant 300$ dan $0 \leqslant y \leqslant 300$. *Both of the axes are labelled with uniform scale within* $0 \leqslant x \leqslant 300$ *and* $0 \leqslant y \leqslant 300$.	1	
	Sekurang-kurangnya dua garis lurus dilukis dengan betul. *At least two straight lines are drawn correctly.*	1	
	Semua garis lurus dilukis dan rantau **R** dilorek dengan betul *All the straight lines are drawn and region* **R** *is shaded correctly.*	1	
3	(a) $x + y \leqslant 300$ $y \leqslant 2x$ $8x + 10y \leqslant 1\ 200$ $4x + 5y \geqslant 600$	1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) 		10
	Kedua-dua paksi dilabel dengan skala seragam antara $0 \leqslant x \leqslant 300$ dan $0 \leqslant y \leqslant 300$. *Both of the axes are labelled with uniform scale within* $0 \leqslant x \leqslant 300$ *and* $0 \leqslant y \leqslant 300$.	1	
	Sekurang-kurangnya dua garis lurus dilukis dengan betul. *At least two straight lines are drawn correctly.*	1	
	Semua garis lurus dilukis dan rantau **R** dilorek dengan betul. *All the straight lines are drawn and region* **R** *is shaded correctly.*	1	
	(c) (i) Apabila/*When* $x = 100$, Nilai minimum/*minimum value* $y = 40$. Maka, minimum 40 kek pandan dihasilkan. *Hence, minimum of* 40 *pandan cakes produced.*	1	
	(ii) $k = 80x + 10y$ Katakan/*Let* $k = 1\ 600$, $1\ 600 = 8x + 10y$		
	Garis lurus yang betul dilihat dalam graf *Correct straight line seen in the graph*	1	
	Titik optimum pada/*Optimum point at* (100, 200), Keuntungan maksimum/*maximum profit* = 8(100) + 10(200) = RM2 800	1 1	
4	(a) $x + y \geqslant 300$ $x \leqslant 3y$ $1\ 200x + 800y \leqslant 48\ 000 \Rightarrow 3x + 2y \leqslant 1\ 200$	1 1 1	

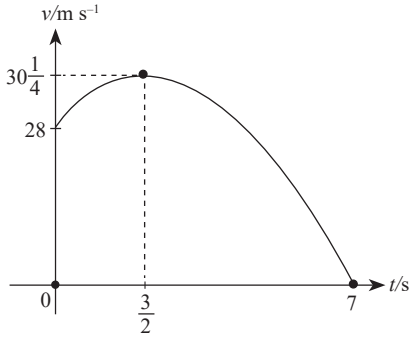
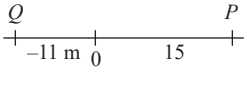
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) 	1 1 1	
	Kedua-dua paksi dilabel dengan skala seragam antara $0 \leqslant x \leqslant 400$ dan $0 \leqslant y \leqslant 600$. *Both of the axes are labelled with uniform scale within* $0 \leqslant x \leqslant 300$ *and* $0 \leqslant y \leqslant 200$.	1	
	Sekurang-kurangnya dua garis lurus dilukis dengan betul. *At least two straight lines are drawn correctly.*	1	
	Semua garis lurus dilukis dan rantau **R** dilorek dengan betul. *All the straight lines are drawn and region* **R** *is shaded correctly.*	1	
	(c) (i) Apabila/*When* $y = 300$, Nilai maksimum/*Maximum value* $x = 200$ Maka, maksimum 200 unit Model *A* perlu dihasilkan. *Hence, maximum* 200 *units of Model A should be produced.*	1	
	(ii) Keuntungan/*Profit*, $k = (1\,500 - 1200)x + (1\,200 - 800)y$ $k = 300x + 400y$ Katakan/*Let* $k = 60\,000$, $60\,000 = 300x + 400y$		
	Garis lurus yang betul dilihat dalam graf *Correct straight line seen in the graph*	1	
	Titik optimum pada/*Optimum point at* (225, 75), Keuntungan minimum/*Minimum point* = 300(225) + 400(75) = RM97 500	1 1	10

BAB 8

Kinematik Gerakan Linear
Kinematic Linear Motion

LATIHAN INTENSIF

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $s = 0$ $0 = t^2 - 4t - 5$ $0 = (t - 5)(t + 1)$ $t = 5$ s	 1 1	
	(b) $v = \frac{d}{dt}(t^2 - 4t - 5)$ $= 2t - 4$	 1	
	$v = 0$ $0 = 2t - 4$ $2t = 4$ $t = 2$ s	 1 1	10
	(c) (i) Jumlah jarak/*Total distance* $= \lvert [t^2 - 4t - 5]_0^2 \rvert$ $= \lvert [2^2 - 4(2) - 5] - [(0)^2 - 4(0) - 5] \rvert$ $= 4$ m	 1 1	
	(ii) Jumlah jarak/*Total distance* $= [t^2 - 4t - 5]_0^2 + [t^2 - 4t - 5]_2^5$ $= 4 + \lvert [(5)^2 - 4(5) - 5] - [(2)^2 - 4(2) - 5] \rvert$ $= 4 + 5 + 4$ $= 13$ m	1 1 1	
2	(a) $v > 0$ $-t^2 + 11t - 18 > 0$ $t^2 - 11t + 18 < 0$ $(t - 2)(t - 9) < 0$ $\therefore 2 < t < 9$	 1 1	
	(b) $a = \frac{d}{dt}(-t^2 + 11t - 18)$ $= -2t + 11$		
	Apabila zarah itu berhenti seketika *When the particle stops continuously* $v = 0$ $-t^2 + 11t - 18 = 0$ $t^2 - 11t + 18 = 0$ $(t - 2)(t - 9) = 0$ $t = 2$, $t = 9$	 1 1	10
	Di titik/*At point P*, $t = 2$ s, $a = -2(2) + 11$ $= 7$ m s^{-2}	 1 1	
	(c) $s = \int_2^9 -t^2 + 11t - 18\, dt$ $= \left[-\frac{t^3}{3} + \frac{11t^2}{2} - 18t\right]_2^9$ $= \left[-\frac{(9)^3}{3} + \frac{11(9)^2}{2} - 18(9)\right] - \left[-\frac{(2)^3}{3} + \frac{11(2)^2}{2} - 18(2)\right]$ $= 57\frac{1}{6}$ m	 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	(a) (i) $a = 3 - 2t$ $v = \int 3 - 2t\, dt$ $= 3t - t^2 + c$		
	Apabila/*When* $t = 0$, $v = 28$, $c = 28$ $v = -t^2 + 3t + 28$	1	
	Halaju adalah maksimum apabila $a = 0$, *Volume is maximum when a = 0,* $3 - 2t = 0$ $t = \frac{3}{2}$ s	1	
	Halaju maksimum/*Maximum velocity* $= -\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right) + 28$	1	
	$= 30\frac{1}{4}$ m s^{-1}	1	
	(ii) $s = \int -t^2 + 3t + 28\, dt$ $= -\frac{t^3}{3} + \frac{3t^2}{2} + 28t + c$		
	Apabila/*When* $t = 0$, $s = 0$, $c = 0$ $s = -\frac{t^3}{3} + \frac{3t^2}{2} + 28t$	1	
	Jarak terjauh apabila/*Farthest distance when* $v = 0$ $-t^2 + 3t + 28 = 0$ $t^2 - 3t - 28 = 0$ $(t - 7)(t + 4) = 0$ $t = 7$ s	1	10
	Jarak terjauh/*Farthest distance* $= -\frac{(7)^3}{3} + \frac{3(7)^2}{2} + 28(7)$	1	
	$= 155\frac{1}{6}$ m	1	
	(b)  $v = -t^2 + 3t + 28$ Pada/*At* $t = 0$ s, $v = 28$ ms^{-1} Pada/*At* $t = \frac{3}{2}$ s, $v = 30\frac{1}{4}$ ms^{-1} Pada/*At* $t = 7$ s , $v = 0$ ms^{-1} Graf bentuk/*Graph shape* ∩ bermula dengan/*starts with* (0, 28) Graf bentuk/*Graph shape* ∩ bermula dengan/*starts with* (0, 28) serta melalui titik/*and through point* $\left(\frac{3}{2}, 30\frac{1}{4}\right)$ dan/*and* (7,0)	1 1	
4	$s_A = 15 + 12t - 12t^2$, $v_B = 4t - 3$ $t = 0$ s, $s_A = 15$ m ; $t = 0$ s, $s_B = 15 - 26$ $= -11$		
	(a) $v_B = 0$ $4t - 3 = 0$ $t = \frac{3}{4}$ s 	1	
	$v_A = -24t + 12$ Apabila/*When* $t = \frac{3}{4}$ s, $v_A = -24\left(\frac{3}{4}\right) + 12$	1	
	$= -6$ m s^{-1}	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $s_B = \int 4t - 3\ dt$ $= 2t^2 - 3t + c$ Apabila/*When* $t = 0$ s, $s_B = -11$ m, $c = -11$ $s_B = 2t^2 - 3t - 11$	1	
	$s_A = s_B$ $15 + 12t - 12t^2 = 2t^2 - 3t - 11$ $0 = 14t^2 - 15t - 26$ $0 = (14t + 13)(t - 2)$ $t = -\frac{13}{14}$ s (abaikan/*ignored*), $t = 2$ s	1	
	(c) $0 \leqslant t \leqslant \frac{3}{4}$ Jarak/*Distance* $B_1 = \left\|\left[2t^2 - 3t - 11\right]_0^{\frac{3}{4}}\right\|$ $= \left\|\left[2\left(\frac{3}{4}\right)^2 - 3\left(\frac{3}{4}\right) - 11\right] - [2(0)^2 - 3(0) - 11]\right\|$ $= 1\frac{1}{8}$ m	1	10
	$\frac{3}{4} \leqslant t \leqslant 2$ Jarak/*Distance* $B_2 = \left\|\left[2t^2 - 3t - 11\right]_{\frac{3}{4}}^{2}\right\|$ $= \left\|[2(2)^2 - 3(2) - 11] - \left[2\left(\frac{3}{4}\right)^2 - 3\left(\frac{3}{4}\right) - 11\right]\right\|$ $= -9 - \left(-12\frac{1}{8}\right)$ $= 3\frac{1}{8}$ m	1 1	
	Jumlah jarak/*Total distance* $= 3\frac{1}{8} - \left(-1\frac{1}{8}\right)$ $= 4\frac{1}{4}$ m	1 1	
5	(a) $a_P = 2\ \text{ms}^{-2}$ $v_P = \int 2\ dt$ $= 2t + c$ Apabila/*When* $t = 0$, $v_P = 5$, $c = 5$ $v_P = 2t + 5$	1	
	Apabila/*When* $t = 2$, $v_P = 2(2) + 5$ $= 9\ \text{m s}^{-1}$	1	
	(b) $v_Q = 3t^2 - 5$ Halaju maksimum apabila/*Maximum velocity when* $a_Q = 0$ $a_Q = 6t$ $0 = 6t$ $t = 0$ s	1	10
	$v_Q = 3(0)^2 - 5$ $= -5\ \text{m s}^{-1}$	1 1	
	(c) (i) $s_P = \int 2t + 5\ dt$, $s_Q = \int 3t^2 - 5\ dt$ $= t^2 + 5t + c$ $= t^3 - 5t + c$ $t = 0$ s, $s_P = 0$ m , $c = 0$ atau/*or* $t = 0$ s, $s_Q = 10$ m, $c = 10$ $s_P = t^2 + 5t$ $s_Q = t^3 - 5t + c$ $t = \sqrt{10}$ s $t = \sqrt{10}$ s	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$s_P = (\sqrt{10})^2 + 5(\sqrt{10})$ dan/*and* $s_Q = (\sqrt{10})^3 - 5\sqrt{10} + 10$ $= 10 + 5\sqrt{10}$ $= 10 + 5\sqrt{10}$ Oleh kerana/*Since* $s_P = s_Q$ maka, robot P dan robot Q berselisih pada $t = \sqrt{10}$ s. *hence, robot P and robot Q side to side* $t = \sqrt{10}$ s. (ii) Jarak dari/*Distance from* $M = (10 + 5\sqrt{10}) - 10$ $= 5\sqrt{10}$ m	1 1 1 1	10

Kertas Model SPM

Kertas 1

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $f(-5) = \lvert -5 + 2\rvert + 1$ $= 4$ $f(x) = 4$ $\lvert x + 2\rvert + 1 = 4$ $\lvert x + 2\rvert = 3$ $x + 2 = \pm 3$ $x + 2 = 3$ dan/*and* $x + 2 = -3$ $x = 1$ $x = -5$ Nilai objek yang satu lagi ialah 1. *The value of the object is* 1. (b) $fg(x) = 3f(2)$ $3(4x - 5) + 7 = 3(3(2) + 7)$ $12x - 15 + 7 = 3(13)$ $2x = 47$ $x = \frac{47}{12}$	1 1 1 1	4
2	(a) $b^2 - 4ac = 0$ $(-10q)^2 - 4(2)(2q) = 0$ $100q^2 - 16q = 0$ $4q(25q - 4) = 0$ $q = 0$ dan/*and* $q = \frac{4}{25}$ (b) (i) $HTP = -\frac{b}{a}$ $HDP = \frac{c}{a}$ $p + q = -\frac{9}{4}$ dan/*and* $pq = -2$ (ii) $\frac{p}{3} + \frac{q}{3} = \frac{p+q}{3}$ $= \frac{-\frac{9}{4}}{3}$ atau/*or* $\frac{p}{3} \times \frac{q}{3} = \frac{pq}{9}$ $= -\frac{3}{4}$ $= -\frac{2}{9}$ $x^2 - \left(-\frac{3}{4}\right)x + \left(-\frac{2}{9}\right) = 0$ $36x^2 + 27x - 8 = 0$	1 1 1 1 1 1	4

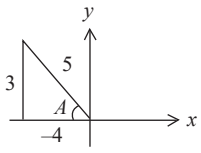
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	(a) $\overrightarrow{OP} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$, $\overrightarrow{OR} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$		
	$\overrightarrow{PR} = \overrightarrow{PO} + \overrightarrow{OR}$	1	
	$= \begin{pmatrix} 3 \\ -1 \end{pmatrix} + \begin{pmatrix} 5 \\ 6 \end{pmatrix}$ atau/*or* $\overrightarrow{PR} = \overrightarrow{PO} + \overrightarrow{OR}$		
	$= -3\underset{\sim}{i} + 5\underset{\sim}{i} + 6\underset{\sim}{j}$		
	$= \begin{pmatrix} 2 \\ 7 \end{pmatrix}$ $= 2\underset{\sim}{i} + 7\underset{\sim}{j}$	1	
	(b) (i) $3\begin{pmatrix} 2 \\ 7 \end{pmatrix} - \begin{pmatrix} 2k \\ 5 \end{pmatrix} = \begin{pmatrix} 2 \\ 16 \end{pmatrix}$		
	$\begin{pmatrix} 6 \\ 21 \end{pmatrix} - \begin{pmatrix} 2k \\ 5 \end{pmatrix} = \begin{pmatrix} 2 \\ 16 \end{pmatrix}$ atau/*or* $3(2\underset{\sim}{i} + 7\underset{\sim}{j}) - (2k\underset{\sim}{i} + 5\underset{\sim}{j}) = 2\underset{\sim}{i} + 16\underset{\sim}{j}$		
	$6\underset{\sim}{i} + 21\underset{\sim}{j} - (2ki + 5\underset{\sim}{j}) = 2\underset{\sim}{i} + 16\underset{\sim}{j}$		5
	$\begin{pmatrix} 6-2k \\ 16 \end{pmatrix} = \begin{pmatrix} 2 \\ 16 \end{pmatrix}$ $(6\underset{\sim}{i} - 2k)\underset{\sim}{i} + 16\underset{\sim}{j} = 2\underset{\sim}{i}$		
	Bandingkan pekali/*Comparing coefficient*	1	
	$6 - 2k = 2$		
	$2k = 4$	1	
	$k = 2$		
	(ii) $\overrightarrow{QR} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ atau/*or* $\overrightarrow{QR} = 4\underset{\sim}{i} + 5\underset{\sim}{j}$	1	
	$\lvert\overrightarrow{QR}\rvert = \sqrt{4^2 + 5^2}$		
	$= \sqrt{41}$		
	Vektor unit dalam arah/*Unit vector in the diretion of* $\widehat{\overrightarrow{QR}} = \frac{1}{\sqrt{41}}\begin{pmatrix} 4 \\ 5 \end{pmatrix}$	1	
4	(a) $6 + x - x = 3x - 4 - (6 + x)$	1	
	$6 = 2x - 10$		
	$2x = 16$		
	$x = 8$	1	4
	(b) $S_{24} - S_{15} = \left[\frac{24}{2}(2(8) + (24 - 1)(6)\right] - \left[\frac{15}{2}(2(8) + (15 - 1)(6)\right]$	1	
	$= 1\ 848 - 750$		
	$= 1\ 098$	1	
5	(a) $\frac{dy}{dx} = 3f(x)$		
	$y = 3\int f(x)\,dx$		
	$\int f(x)\,dx = \frac{1}{3}y$		
	$\int_{-2}^{3} f(x)\,dx = \left[\frac{1}{3}(3x(3x + 4)^4)\right]_{-2}^{3}$	1	
	$= \left[x(3x + 4)^4\right]_{-2}^{3}$		6
	$= [3(3(3) + 4)^4] - [(-2)(3(-2) + 4)^4]$	1	
	$= 85\ 683 - (-32)$		
	$= 85\ 715$	1	
	(b) $\int_5^p 3\,dx + \int_5^p f(x)\,dx = \left[3x\right]_5^p + (30 - 20)$	1	
	$= [3p - 3(5)] + 10$	1	
	$= 3p - 5$	1	
6	(a) $\sin\theta = \frac{5}{12}$	1	
	$\theta = 24.62 \times \frac{3.142}{180°}$		
	$= 0.4298$ radian/*radians*	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $OR = \sqrt{12^2 - 5^2}$ $= 10.91$ cm Luas sektor/*Area of sector POQ* $= \frac{1}{2} \times (12)^2 \times (0.4298)$ $= 30.95$ cm^2 Luas segi tiga/*Area of triangle QOR* $= \frac{1}{2} \times 10.91 \times 5$ $= 27.275$ cm^2 Luas kawasan berlorek/*Area of shaded region* $= 30.95 - 27.275$ $= 3.675$ cm^2	 1 1 1	5
7	(a) (i) $y = 0,\ \ 3(0) - x + 4 = 0$ $x = 4$ $B(4, 0)$ (ii) $m_{AC} = \frac{6-(-2)}{2-(-2)}$ $= 2$ $2 \times m_{BD} = -1$ $m_{BD} = -\frac{1}{2}$ Persamaan/*Equation of BD*: $y - 0 = -\frac{1}{2}(x - 4)$ $y = -\frac{1}{2}x + 2$ (b) $(4, 0) = \left(\frac{x(3) + (-2)(2)}{3+2}, \frac{y(3) + (2)(-2)}{3+2}\right)$ $\frac{3x + 2(-2)}{3+2} = 4$ atau/*or* $\frac{3y + 2(-2)}{3+2} = 0$ $3x - 4 = 20$ $\quad$ $3y - 4 = 0$ $3x = 24$ $\quad$ $3y = 4$ $x = 8$ atau/*or* $y = \frac{4}{3}$ $E\left(8, \frac{4}{3}\right)$	 1 1 1 1 1 1 1	8
8	(a) $\underset{x \to 4}{\text{had}} \frac{\sqrt{x-3}}{2-\sqrt{x+1}} = \frac{\sqrt{4-3}}{2-\sqrt{4+1}} = \frac{\sqrt{1}}{2-\sqrt{5}}$ $= \left(\frac{1}{2-\sqrt{5}}\right)\left(\frac{2+\sqrt{5}}{2+\sqrt{5}}\right)$ $= \frac{2+\sqrt{5}}{4 + 2\sqrt{5} - 2\sqrt{5} - 5}$ $= \frac{2+\sqrt{5}}{-1}$ $= -2 - \sqrt{5}$ $= -(2 + \sqrt{5})$ (b) (i) $y = 4x^2 + qx^3$ $\frac{dy}{dx} = -5$ $8x + 3qx^2 = -5$ $8(-2) + 3q(-2)^2 = -5$ $-16 + 12q = -5$ $12q = 11$ $q = \frac{11}{12}$	1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(ii) $m_T \times m_N = -1$ $-5 \times m_N = -1$ $m_N = \frac{1}{5}$ Persamaan/*Equation of MN*: $y - 0 = \frac{1}{5}(x - (-1))$ $y = -\frac{1}{5}x + \frac{1}{5}$	1 1	7
9	(a) $y = \frac{3h}{x + 2k}$ $\frac{1}{y} = \frac{x + 2k}{3h}$ $\frac{1}{y} = \frac{1}{3h}x + \frac{2k}{3h}$ $\frac{1}{3h} = m$ $\qquad$ $\frac{2k}{3h} = c$ $\frac{1}{3h} = \frac{1 - (-2)}{9 - 0}$ atau/*or* $\frac{2k}{3h} = -2$ $\frac{1}{3h} = \frac{1}{3}$ $\qquad$ $\frac{2k}{3(1)} = -2$ $3h = 3$ $\qquad$ $2k = -6$ $h = 1$ dan/*and* $k = -3$ (b) $\frac{1}{y} = \frac{1}{3}x - 2$ $r = \frac{1}{3}(4) - 2$ $r = -\frac{2}{3}$	1 1 1 1 1 1	5
10	(a) Bilangan cara masuk/*Number of entry ways* = 4 cara/*ways* Bilangan cara keluar/*Number of exit ways* = ${}^4C_2 = 6$ Bilangan cara/*Number of ways* = 4 × 6 = 2 (b) (i) ${}^nC_6 = {}^nC_8$ $\frac{n!}{(n-6)!6!} = \frac{n!}{(n-8)!8!}$ $(n-6)(n-7)(n-8)!6! = (n-8)!(8)(7)(6!)$ $(n-6)(n-7) = 56$ $n^2 - 6n - 7n + 42 = 56$ $n^2 - 13n - 14 = 0$ $(n-14)(n+1) = 0$ $n = 14$, $n = -1$ (abaikan/*ignored*) (ii) $6! \times {}^7P_4$ = 604 800	1 1 1 1 1 1 1 1	7
11	$\sin x + 4\,\text{kos}^2 x = 1$ $\sin x + 4(1 - \sin^2 x) = 1$ $4\sin^2 x - \sin x - 3 = 0$ $(4\sin x + 3)(\sin x - 1) = 0$ $\sin x = -\frac{3}{4}$ $\qquad$ $\sin x = 1$ Sudut rujukan/*Reference angle* = 90° atau/*or* 48.59° $x = 90°, 228.59°, 311.41°$	1 1 1	3

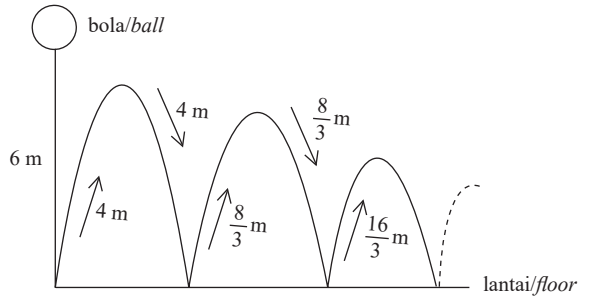
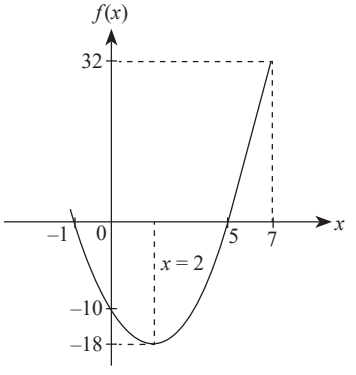
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
12	(a) $\sqrt{npq} = \sqrt{\frac{48}{25}}$		
	$8(p)(1-p) = \frac{48}{25}$	1	
	$8p - 8p^2 = \frac{48}{25}$		
	$200p - 200p^2 = 48$		
	$25p^2 - 25p + 6 = 0$		
	$(5p-2)(5p-3) = 0$	1	
	$p = \frac{2}{5}$, $p = \frac{3}{5}$ (abaikan/*ignored*)		
	Min/*Mean*, $\mu = 8\left(\frac{2}{5}\right)$	1	6
	$= \frac{16}{5}$	1	
	(b) $P(X \geqslant 150) = 0.154$ $\quad$ $P(X \geqslant 135) = 0.695$		
	$P\left(Z \geqslant \frac{150-\mu}{\sigma}\right) = 0.154$ $\quad$ $P\left(Z \geqslant \frac{135-\mu}{\sigma}\right) = 0.695$		
	$\frac{150-\mu}{\sigma} = 1.019$ atau/*or* $\frac{135-\mu}{\sigma} = -0.510$		
	$150 - \mu = 1.019\sigma$ … ① $\quad$ $135 - \mu = -0.510\sigma$ … ②	1	
	① – ②: $15 = 1.529\sigma$		
	$\sigma = 9.810$	1	
	$\mu = 140.00$	1	
13	(a) $5(3^{2x}) = 75$		
	$3^{2x} = 15$		
	$2x \log_{10} 3 = \log_{10} 15$	1	
	$2x = 2.465$		
	$x = 1.23$	1	
	(b) Perimeter $= 26\sqrt{3}$		
	$2(5\sqrt{3} + 2) + x + x = 26\sqrt{3}$		
	$10\sqrt{3} + 4 + 2x = 26\sqrt{3}$		
	$2x = 16\sqrt{3} - 4$		
	$x = 8\sqrt{3} - 2$	1	
	$AD = BC = 8\sqrt{3} - 2$		
	Jejari/*Radius*, $r = DE = \frac{8\sqrt{3} - 2}{2}$	1	
	$= 4\sqrt{3} - 1$		
	Luas bulatan/*Area of circle* $= (4\sqrt{3} - 1)^2\pi$		8
	$= (48 - 8\sqrt{3} + 1)\pi$		
	$= (49 - 8\sqrt{3})\pi \text{ cm}^2$	1	
	(c) $s(t) > 2\,200$		
	$e^{0.8t} + 1\,200 > 2\,200$	1	
	$e^{0.8t} > 1\,000$		
	$\ln e^{0.8t} > \ln 1\,000$		
	$0.8t \ln e > \ln 1\,000$	1	
	$0.8t > 6.908$		
	$t > 8.635$		
	$t = 9$	1	

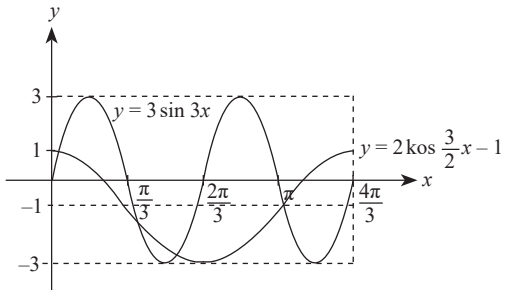
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
14	(a) $3x - 2 \neq 0$ $3x \neq 2$ $x \neq \frac{2}{3}$ $h = \frac{2}{3}$	1	
	(b) $f(x) = x$ $3x - 2 = x$	1	
	$2x = 2$ $x = 1$	1	
	(c) (i) $f(x) = y$ $y = 3x - 2$ $3x = y + 2$ $x = \frac{y+2}{3}$ $f^{-1}(x) = \frac{x+2}{3}$	1	8
	$gff^{-1}(x) = \frac{5}{3\left(\frac{x+2}{3}\right) - 2}$	1	
	$g(x) = \frac{5}{x}, x \neq 0$ $g^4(x) = x$	1	
	(ii) $g(x) = \frac{5}{x}, x \neq 0$ $g^2(x) = x$ $g^3(x) = \frac{5}{x}, x \neq 0$	1	
	Maka, $g^{2n-1}(x) = \frac{5}{x}, x \neq 0$ dengan keadaan $2n - 1$ adalah sentiasa ganjil. *Hence,* $g^{2n-1}(x) = \frac{5}{x}, x \neq 0$ *such that* $2n - 1$ *is always odd.*	1	
15	(a) (i) $3 \sin \theta \tan \theta = 8$ $3 \sin \theta \left(\frac{\sin \theta}{\text{kos } \theta}\right) = 8$ $3\left(\frac{\sin^2 \theta}{\text{kos } \theta}\right) = 8$ $3(1 - \text{kos}^2 \theta) = 8 \text{ kos } \theta$	1	
	$3 - 3 \text{ kos}^2 \theta = 8 \text{ kos } \theta$ $3 \text{ kos}^2 \theta + 8 \text{ kos } \theta - 3 = 0$	1	
	(ii) $3 \text{ kos}^2 \theta + 8 \text{ kos } \theta - 3 = 0$ $(3 \text{ kos } \theta - 1)(\text{kos } \theta + 3) = 0$	1	
	$\text{kos } \theta = \frac{1}{3}$ $\quad$ $\text{kos } \theta = -\frac{1}{3}$ (abaikan/*ignored*) Sudut rujukan/*Reference angle* = 70.53°		8
	$\theta = 70.53°, 289.47°$	1	
	(b) $\tan 2A = -\frac{24}{7}$ $\frac{2 \tan A}{1 - \tan^2 A} = -\frac{24}{7}$	1	
	$14 \tan A = -24 + 24 \tan^2 A$ $24 \tan^2 A - 14 \tan A - 24 = 0$ $12 \tan^2 A - 7 \tan A - 12 = 0$ $(4 \tan A + 3)(3 \tan A - 4) = 0$	1	
	$\tan A = -\frac{3}{4}$ $\quad$ $\tan A = \frac{4}{3}$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$(90° < A < 180°)$  kos $A = -\frac{4}{5}$		

Kertas 2

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\angle TRS = 40°$ kos $50° = \frac{6}{QR}$ $QR = 9.334$ cm $TR = 9.334 - 6$ $= 3.334$ cm Panjang lengkok/*The arc length of TS* $= 3.334 \times \left(40° \times \frac{3.142}{180°}\right)$ $= 2.328$ cm (b) $PR = \sqrt{(9.334)^2 - (6)^2}$ $= 7.150$ cm Luas/*Area of* $\Delta PQR = \frac{1}{2} \times 6 \times 7.150$ $= 21.45$ cm^2 atau/*or* Luas sektor/*Area of sector PQT* $= \frac{1}{2} \times (6)^2 \times 0.8728$ $= 15.71$ cm^2 atau/*or* Luas sektor/*Area of sector TRS* $= \frac{1}{2} \times (3.334)^2 \times 0.6982$ $= 3.880$ cm^2 Luas kawasan berlorek/*Area of shaded region* $= 21.45 - 15.721 - 3.880$ $= 1.860$ cm^2	1 1 1 1 1 1 1	6
2	(a) $x = a + d$ … ① $y = a + 3d$ … ② $z = a + 5d$ … ③ ② – ①: $2d = y - x$ ③ – ②: $2d = z - y$ $y - x = z - y$ $x = 2y - z$ … ④ Gantikan ④ ke dalam $\frac{x+y+z}{y+2} = 5$. *Substitute* ④ *into* $\frac{x+y+z}{y+2} = 5$. $\frac{2y - z + y + z}{y+2} = 5$ $3y = 5y + 10$ $-2y = 10$ $y = -5$ (b) (i) $a = 5$, $r = 5$ $\frac{5(5^{n-1})}{5-1} = 3\ 905$ $5(5^n - 1) = 15\ 620$ $5^n - 1 = 3\ 124$ $5^n = 3\ 125$ $5^n = 5^5$ $n = 5$	1 1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(ii) 		
	Laluan bola jatuh/*The path of the ball drops*:		
	$6, 4, \frac{8}{3}, \ldots$		
	$S_\infty = \dfrac{6}{1 - \frac{2}{3}}$		9
	$= 18$ m	1	
	Laluan bola melantun ke atas $4, \frac{8}{3}, \frac{16}{9}, \ldots$		
	The path of the ball bounces upwards $4, \frac{8}{3}, \frac{16}{9}, \ldots$		
	$S_\infty = \dfrac{4}{1 - \frac{2}{3}}$		
	$= 12$ m	1	
	Panjang laluan bola/*The distance of ball pathways* $= 18 + 12$		
	$= 30$ m	1	
3	(a) $f(x) = 2x^2 - 8x - 10$		
	$= 2(x^2 - 4x - 5)$		
	$= 2\left[x^2 - 4x + \left(\frac{-4}{2}\right)^2 - \left(\frac{-4}{2}\right)^2 - 5\right]$	1	
	$= 2[(x - 2)^2 - 9]$		
	$= 2(x - 2)^2 - 18$	1	
	Koordinat titik pusingan/*Coordinates of turning point*: $(2, -18)$	1	
	(b) $f(x) = 2(x^2 - 4x - 5)$		
	$= 2(x + 1)(x - 5)$	1	
			6
	Bentuk graf *Shape of the graph*	1	
	Julat/*Range* $-1 \leqslant x \leqslant 7$ dan paksi simetri/*and axis of symmetry* $x = 2$	1	
4	(a) (i) $m(h, 2) = \left(\dfrac{2(4) + 1(x)}{1 + 2}, \dfrac{2(4) + 1(y)}{1 + 2}\right)$		
	$\dfrac{2(4) + 1(x)}{1 + 2} = h$ atau/*or* $\dfrac{2(4) + 1(y)}{1 + 2} = 2$	1	
	$8 + x = 3h$ $\quad$ $8 + y = 6$		
	$x = 3h - 8$ $\quad$ $y = -2$		
	$S(3h - 8, -2)$	1	

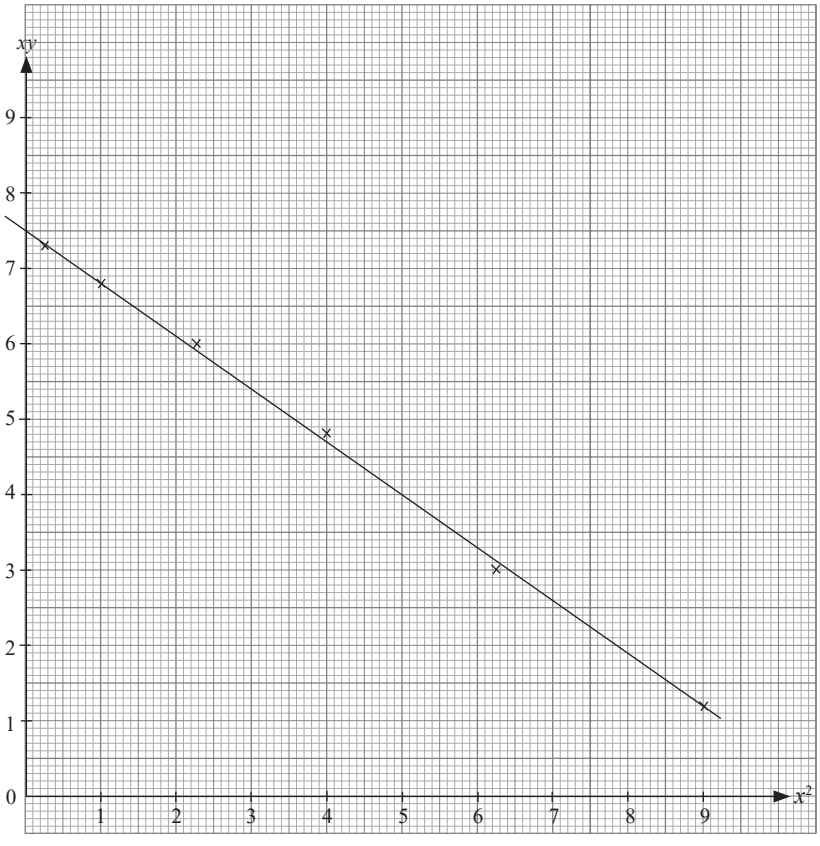
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(ii) $\frac{1}{2}\begin{vmatrix} 1 & h & 3h-8 & 1 \\ 0 & 2 & -2 & 0 \end{vmatrix} = 14$ $\frac{1}{2}\left\| [1(2) + h(-2) + (3h-8)(0)] - [0(h) + 2(3h-8) + (-2)(1)] \right\| = 14$ $\frac{1}{2}\|(2 - 2h + 0) - (0 + 6h - 16 - 2)\| = 14$ $\|20 - 8h\| = 28$ $20 - 8h = 28$ atau/*or* $20 - 8h = -28$ $-8h = 8$ $\quad -8h = -48$ $h = -1$ (abaikan/*ignore*) $\quad h = 6$ $\therefore h = 6$ (c) $JN = JS$ $\sqrt{(x-4)^2 + (y-4)^2} = \sqrt{(x-10)^2 + (y-(-2))^2}$ $x^2 - 8x + 16 + y^2 - 8y + 16 = x^2 - 20x + 100 + y^2 + 4y + 4$ $12x - 12y - 72 = 0$ $x - y - 6 = 0$	1 1 1 1	6
5	(a) $a = -4$ Daripada graf, kala = 8π *From the graph, period* = 8π $\frac{2\pi}{b} = 8\pi$ $b = \frac{2\pi}{8\pi}$ $b = \frac{1}{4}$ $c = -2$ (b)  Bentuk sinus atau bentuk kosinus *Shape of sinus or shape of cosinus* Graf sinus/*Graph of sinus* Amplitud/*Amplitude* = 3 Bilangan kitaran/*Number of cycles* = 2 Graf kosinus/*Graph of cosinus* Amplitud/*Amplitude* = 2 Bilangan kitaran/*Number of cycles* = 1 Translasi/*Translation* Bilangan penyelesaian/*Number of solutions* = 4	1 1 1 1 1 1 1 1	8
6	(a) $x^2 + 1 = -x + 7$ $x^2 + x - 6 = 0$ $(x-2)(x+3) = 0$ $x = 2$, $x = -3$ (abaikan/*ignore*) $y = -2 + 7$ $= 5$ $A(2, 5)$	1	

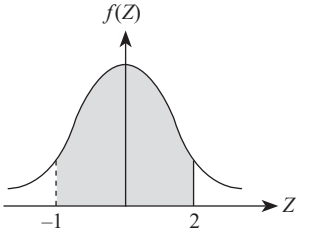
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $A_1 = \int_0^2 (x^2 + 1)\, dx$		
	$= \left[\frac{x^3}{3} + x\right]_0^2$	1	
	$= \left[\left(\frac{(2)^3}{3} + (2)\right) - 0\right]_0^2$		
	$= \frac{14}{3}$ unit/*units*	1	
	$A_2 = \frac{1}{2} \times 5 \times 5$ atau/*or* $\left[-\frac{x^2}{2} + 7x\right]_2^7$		
	$= \left(-\frac{(7)^2}{2} + 7(7)\right) - \left(-\frac{(2)^2}{2} + 7(2)\right)$		
	$= \frac{25}{2}$ unit/*units*		8
	Luas kawasan berloreke/*Area of shaded region* $= \frac{14}{3} + \frac{25}{2}$	1	
	$= \frac{103}{6}$ unit/*units*	1	
	(c) $V = \int_a^b \pi x^2\, dy$		
	$= \pi \int_1^5 (y - 1)\, dy$		
	$= \pi \left[\frac{y^2}{2} - y\right]_1^5$	1	
	$= \pi \left[\left(\frac{(5)^2}{2} - 5\right) - \left(\frac{(1)^2}{2} - 1\right)\right]$	1	
	$= 8\pi$ unit^2/*units*^{2}	1	
7	(a) $3x + 2y + 2z = 178$ … ①		
	$2x + y + 2z = 135$ … ②	1	
	$x + z = 55$ … ③		
	② × 2: $4x + 2y + 4z = 270$ … ④	1	
	④ – ①: $x + 2z = 92$ … ⑤	1	
	⑤ – ③: $z = 37$	1	
	Gantikan $z = 37$ ke dalam ③		
	Substitute $z = 37$ *into* ③		
	$x + z = 55$	1	
	$x + 37 = 55$		7
	$x = 18$		
	Gantikan $x = 18$ dan $z = 37$ ke dalam ②		
	Substitute $x = 18$ *and* $z = 37$ *into* ②		
	$2(18) + y + 2(37) = 135$		
	$y + 110 = 135$		
	$y = 25$		
	Harga tiket kanak-kanak/*Price of child's ticket* = RM18.00	1	
	Harga tiket remaja/*Price of teenager's ticket* = RM25.00	1	
	Harga tiket dewasa/*Price of adult's ticket* = RM37.00	1	
8	(a)		

x^2	0.25	1.00	2.25	4.00	6.25	9.00
xy	7.30	6.80	6.00	4.80	3.00	1.20

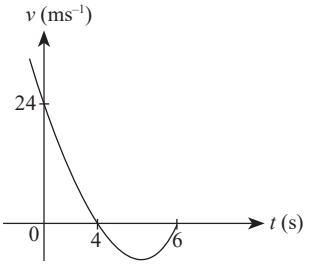
1

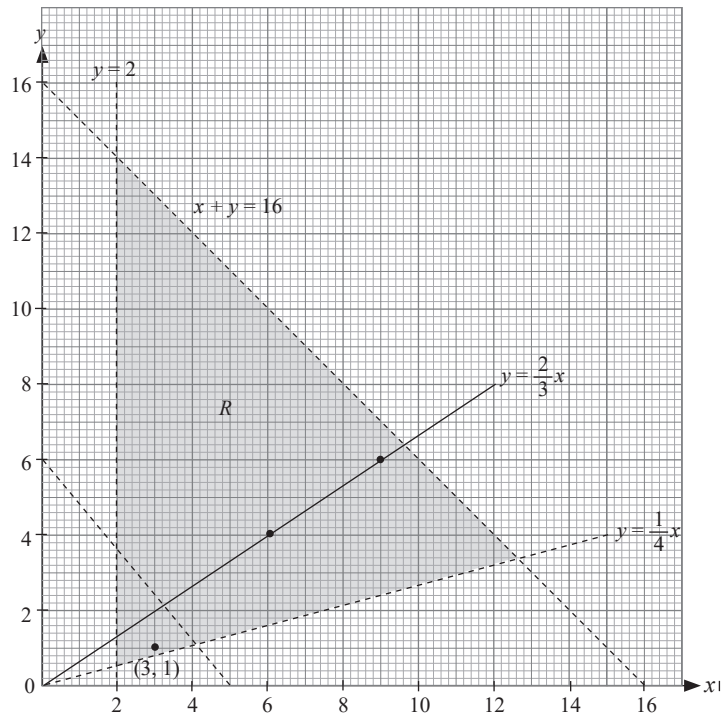
1

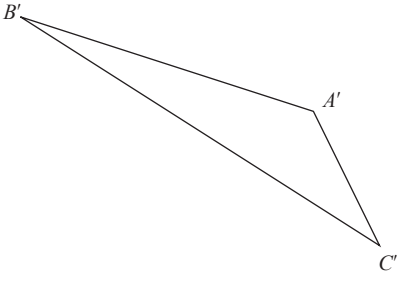
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
			10
	Garis lurus xy melawan x^2 dilukis		
	1. Paksi-paksi betul dan skala seragam – *The axes are correct and uniform scales* dan/*and* – Sekurang-kurangnya 1 titik diplot dengan betul *At least* 1 *point plotted correctly*	1	
	2. 5 titik diplot dengan betul 5 *points plotted correctly*	1	
	3. Garis lurus penyuaian terbaik *Line of best fit*	1	
	(b) (i) $y = ax + \frac{b}{x}$		
	$xy = ax^2 + b$	1	
	$a = m$ $\quad b = c$		
	$a = \frac{75 - 4}{0 - 5}$ $\quad b = 7.5$	1, 1	
	$a = -0.7$	1	
	(ii) $xy = 4$ $\sqrt{5}y = 4$ $y = 1.789$	1	
9	(a) $p = \frac{3}{7}$ $\quad q = \frac{4}{7}$ $\quad n = 12$		
	(i) $P(X = 2) = {}^{12}C_2 \times \left(\frac{3}{7}\right)^2 \times \left(\frac{4}{7}\right)^{10}$	1	
	$= 0.04500$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(ii) $P(X \geqslant 3) = 1 - P(X = 0) - P(X = 1) - P(X = 2)$	1	
	$= 1 - \left[{}^{12}C_0 \times \left(\frac{4}{7}\right)^0 \times \left(\frac{3}{7}\right)^{12}\right] - \left[{}^{12}C_1 \times \left(\frac{4}{7}\right)^1 \times \left(\frac{4}{7}\right)^{11}\right]$		
	$- \left[{}^{12}C_2 \times \left(\frac{3}{7}\right)^2 \times \left(\frac{3}{7}\right)^{10}\right]$	1	
	$= 0.9948$	1	
	(b) (i) $P(2.5 < X \leqslant 4.5)$ 		
	$= P\left(\frac{2.5 - 3.0}{0.5} < Z \leqslant \frac{4.0 - 3.0}{0.5}\right)$		
	$= P(-1 < Z \leqslant 2)$		
	$= 1 - P(Z < -1) - P(Z > 2)$		10
	$= 1 - 0.1587 - 0.0228$		
	$= 0.8185$	1	
	(ii) $P(X < m) = 0.05$ atau/*or* $P(X > m) = 0.95$		
	$P\left(Z < \frac{m - 3.0}{0.5}\right) = 0.05$	1	
	$Z = 1.645$		
	$\frac{m - 3.0}{0.5} = -1.645$	1	
	$m - 3.0 = 0.8225$		
	$m = 2.1775$ kg	1	
10	(a) (i) $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$	1	
	$= 6\underset{\sim}{a} + \underset{\sim}{b}$	1	
	(ii) $\overrightarrow{BR} = \overrightarrow{BA} + \overrightarrow{AR}$		
	$= -3\underset{\sim}{b} - 2\underset{\sim}{a}$	1	
	(b) $\overrightarrow{OQ} = \lambda\overrightarrow{OP}$	1	
	$\overrightarrow{OR} + \overrightarrow{RQ} = \lambda(6\underset{\sim}{a} + \underset{\sim}{b})$		
	$4\underset{\sim}{a} + \frac{1}{2}\underset{\sim}{a} + \frac{3}{4}\underset{\sim}{b} = 6\lambda\underset{\sim}{a} + \lambda\underset{\sim}{b}$		
	$\frac{9}{2}\underset{\sim}{a} + \frac{3}{4}\underset{\sim}{b} = 6\lambda\underset{\sim}{a} + \lambda\underset{\sim}{b}$		
	Bandingkan pekali/*Compare the coefficient*		
	$\frac{9}{2} = 6\lambda$ dan/*and* $\lambda = \frac{3}{4}$	1, 1	10
	$\lambda = \frac{3}{4}$	1	
	Titik P, R dan O segaris kerana $\lambda_1 = \lambda_2 = \frac{3}{4}$.		
	Points P, R and O are collinear because $\lambda_1 = \lambda_2 = \frac{3}{4}$.	1	
	(c) Luas/*Area of* $\Delta ABR = \frac{1}{3} \times 45$	1	
	$= 15\ \text{cm}^2$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
11	(a) $\underset{x\to 2}{\text{had}}\left(\dfrac{3-\sqrt{4x+1}}{x-2}\right)\left(\dfrac{3+\sqrt{4x+1}}{3+\sqrt{4x+1}}\right)$		
	$=\underset{x\to 2}{\text{had}}\ \dfrac{9+3\sqrt{4x+1}-3\sqrt{4x+1}-(4x+1)}{(x-2)(3+\sqrt{4x+1})}$		
	$=\underset{x\to 2}{\text{had}}\ \dfrac{8-4x}{(x-2)(3+\sqrt{4x+1})}$		6
	$=\underset{x\to 2}{\text{had}}\ \dfrac{-4(x-2)}{(x-2)(3+\sqrt{4x+1})}$		
	$=\underset{x\to 2}{\text{had}}\ \dfrac{-4}{(3+\sqrt{4x+1})}$	1	
	$=\dfrac{-4}{(3+\sqrt{4(2)+1})}$		
	$=-\dfrac{2}{3}$	1	
	(b) (i) Persamaan garis lurus/*Equation of straight line*: $y=-\dfrac{5}{4}x+5$		
	Luas segi empat tepat berlorek/*Area of shaded rectangle*		
	$A=xy$		
	$=x\left(-\dfrac{5}{4}x+5\right)$	1	
	$=5x-\dfrac{5}{4}x^2$	1	
	(ii) $\dfrac{dA}{dx}=0$		
	$5-\dfrac{5}{2}x=0$	1	
	$\dfrac{5}{2}x=5$		
	$x=2$		
	$y=-\dfrac{5}{4}(2)+5$		
	$=\dfrac{5}{2}$		
	$A\left(2,\dfrac{5}{2}\right)$	1	10
	(c) $\delta v=-64\pi$	1	
	$v=\dfrac{4}{3}\pi r^3$		
	$\dfrac{dv}{dr}=4\pi r^2$		
	$=4\pi(8)^2$		
	$=256\pi$		
	$\delta v=\dfrac{dv}{dr}\times\delta r$		
	$-64\pi=256\pi\times\delta r$	1	
	$\delta r=-0.25$		
	Bilangan maksimum bola yang boleh disusun		
	Maximum number of the ball can be arranged		
	$=\dfrac{217}{2(8-0.25)}$	1	
	$=14$ biji/*balls*	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
12	(a) (i) $a = 0$ $2t - 10 = 0$ $2t = 10$ $t = 5$		
	(ii) $v = \int (2t - 10)\, dt$ $v = \frac{2t^2}{2} - 10t + c$		
	Halaju awal/*Initial velocity,* $v = 24\ \text{ms}^{-1}$, $t = 0$ $24 = (0)^2 - 10(0) + c$ $c = 24$ $v = t^2 - 10t + 24$ $v_{min} = (5)^2 - 10(5) + 24$ $= -1$	1 1 1	
	(iii) $v = 0$ $t^2 - 10t + 24 = 0$ $(t - 4)(t - 6) = 0$ $t = 4\ ,\ t = 6$	1 1	
	(b) (i) 	1	10
	(ii) $s = \int (t^2 - 10t + 24)\, dt$ $s = \frac{t^3}{3} - \frac{10}{2}t^2 + 24t + c$ $t = 0\ ,\ s = 0$ $s = \frac{t^3}{3} - 5t^2 + 24t$		
	Jumlah jarak/*Total distance* $= \int_0^4 v\, dt + \int_4^5 v\, dt$ $= \left[\frac{t^3}{3} - 5t^2 + 24t\right]_0^4 + \left\|\left[\frac{t^3}{3} - 5t^2 + 24t\right]_4^5\right\|$ $= \left[\frac{(4)^3}{3} - 5(4)^2 + 24(4) - 0\right] + \left\|\frac{(5)^3}{3} - 5(5)^2 + 24(5) - \frac{(4)^3}{3} - 5(4)^2 + 24(4)\right\|$ $= \frac{112}{3} + \frac{2}{3}$ $= 38$ m	1 1 1	
13	(a) $m = 16$ dan/*and* $n = 2$	1	
	(b) III $y > \frac{1}{4}x$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) 		10
	Garis lurus $y = \frac{1}{4}x$ dilukis betul	1	
	Correct straight line of $y = \frac{1}{4}x$		
	Rantau R dilorek *Region R is shaded*	1	
	(c) (i) Garis lurus $y = \frac{2}{3}x$ dilukis betul/*Straight line* $y = \frac{2}{3}x$ *is drawn correctly*	1	
	Bilangan jam tangan jenis A yang mungkin dihasilkan ialah 3, 6 atau 9 utas. *The possible number of watch type A is produced is* 3, 6 *or* 9 *units*.	1	
	(ii) $K = 15x + 12.5y$		
	Garis fungsi objektif/*Line of objective function*	1	
	Titik optimum/*Optimum point* (3, 1)	1	
	Kos minimum ialah/*Minimum cost is*		
	$K = 15(3) + 12.5(1)$	1	
	$= \text{RM}57.50$	1	
14	(a) $\frac{1.35}{x} \times 100 = 15$ $\quad y = \frac{3.00}{2.50} \times 100$ $\quad \frac{z}{1.25} \times 100 = 140$	1	
	$x = \text{RM}0.90$ $\quad y = 120$ $\quad z = \text{RM}1.75$	1, 1	
	(b) $\frac{(150 \times 3) + (120 \times 5) + (125 \times 8) + (140 \times m)}{3 + 5 + 8 + m} = 130.5$	1	
	$140m + 2\,050 = 130.5m + 2\,088$		
	$9.5m = 38$		
	$m = 4$	1	
	(c) (i) $I_{2025/2021} = \frac{130.5 \times 90}{100}$	1	
	$= 117.45$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
14	(ii) $\frac{P_{2025}}{98} \times 100 = 117.45$	1	
	$P_{2025} = \frac{117.45 \times 98}{100}$		
	$= \text{RM}115.10$	1	
	(iii) $I_{2025/2021} = 117.45$		
	$\frac{(150 \times 3) + (120 \times 5) + (125 \times 8) + (n \times 4)}{3 + 5 + 8 + 4} = 117.45$		10
	$4n + 2\,050 = 2349$		
	$4n = 299$		
	$n = 74.75$		
	Maka, peratus penurunan harga bahan D ialah sebanyak 25.25%. *Hence, the percentage decrease of ingredient D is* 25.25%.	1	
15	(a) (i) $AC^2 = (12.7)^2 + (10.5)^2 - (2)(12.7)(10.5)(\text{kos } 35°)$	1	
	$AC = 7.285$ cm	1	
	(ii) $\frac{\sin\theta}{7.285} = \frac{\sin 15}{3}$	1	
	$\theta = 38.94°$		
	$\angle ABC = 180° - 38.94°$		
	$= 141.06°$	1	
	(iii) Luas/*Area of* $\Delta ABC = \frac{1}{2} \times 3 \times 7.285 \times \sin 23.94°$		
	$= 4.434 \text{ cm}^2$		
	atau/*or*		
	Luas/*Area* $\Delta ACD = \frac{1}{2} \times 10.5 \times 12.7 \times \sin 35°$	1	
	$= 38.24 \text{ cm}^2$		
	Luas sisi empat/*Area of quadrilateral ABCD* $= 4.434 + 38.24$		
	$= 42.674 \text{ cm}^2$	1	
	(b) $\sin 35° = \frac{x}{10.5}$	1	
	$x = 6.023$		
	Jarak terpendek dari titik C ke garis AD ialah 6.023 cm. *The shortest distance from point C to line AD is* 6.023 cm.	1	10
	(c) 	1	
	$\angle B'A'C' = 180° - 23.94°$		
	$= 156.06°$	1	