

Answers for Analisis Bertopik 2025 will be updated soon!

Please check back later for the updated answers.

JAWAPAN

MATEMATIK TAMBAHAN

Dwibahasa

Bab 1

SUKATAN MEMBULAT

KERTAS 1

Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a) $\frac{120\pi}{180} = \frac{2}{3} \pi$	1	7
	(b) $\angle AOB = \frac{60(3.142)}{180}$ $= 1.047 \text{ rad}$ $h + h + 1.047h = 15.235$ $3.047h = 15.235$ $h = 5$	2	
	$\frac{1}{2}(5)^2(1.047) - \frac{1}{2}(k)^2(1.047) = 8.376$	1	
	$k^2 = 9$ $k = 3, k = -3 \text{ (abai / ignore)}$ $k = 3$	2	
		1	
2	$\frac{\text{Panjang lengkok}}{\text{Lilitan bulatan}} = \frac{\text{Sudut yang dicangkum di pusat}}{360^\circ}$ $\frac{s}{2\pi r} = \frac{\theta}{2\pi}$ $s = \frac{\theta}{2\pi} \times 2\pi r$ $s = r\theta$	1	2
	$\frac{\text{Length of arc}}{\text{Circumference}} = \frac{\text{Angle subtended at the centre}}{360^\circ}$ $\frac{s}{2\pi r} = \frac{\theta}{2\pi}$ $s = \frac{\theta}{2\pi} \times 2\pi r$ $s = r\theta$	1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
3	$\angle AOB \text{ major} = 2\pi - \frac{\pi}{3}$ $= \frac{5}{3}\pi$ $\text{Luas / Area} = \frac{1}{2}(2)^2 \left(\frac{5}{3}\pi \right)$ $= \frac{10}{3}\pi \text{ cm}^2$	1 1	2
4	(a) $\tan \theta = \frac{6}{8}$ $\theta = \tan^{-1} \left(\frac{6}{8} \right)$ $\theta = 0.6435 \text{ radian}$ (b) $BD = \sqrt{6^2 + 8^2}$ $= 10 \text{ cm}$ $\angle ABH = \frac{\pi}{3} \text{ rad}$ $\angle HBD = \pi - \frac{\pi}{3} - 0.6435$ $= 1.451 \text{ rad}$ $\angle GAH = \frac{\pi}{2} - \frac{\pi}{3}$ $= \frac{\pi}{6} \text{ rad}$ $EF = \sqrt{12^2 + 18^2}$ $= 21.63 \text{ cm}$ $S_{GH} = 10 \left(\frac{\pi}{6} \right)$ $= \frac{5\pi}{3} \text{ cm}$ $S_{HD} = 10(1.451)$ $= 14.51$ $\text{Perimeter} = 10 + \frac{5\pi}{3} + 14.51 + 2 + 21.63$ $= 53.38 \text{ cm}$	1 1 1 1 1 1 1	6

Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	$AB = 2 \times \text{Panjang lengkok} / \text{Length of the arc } PQ:$ $y = 2\left(\frac{3}{2} \pi x\right)$ $y = 3\pi x \dots\dots ①$ Luas kawasan tak berumput / Area of the non-grass region: $6xy - \frac{1}{4} (3x)^2 (\pi) = (90x + 27)\pi \dots\dots ②$ Ganti / Substitute ① ke dalam / into ②: $6x(3\pi x) - \frac{1}{4} (3x)^2 (\pi) = (90x + 27)\pi \dots\dots ③$ $③ \times \frac{1}{\pi}:$ $18x^2 - \frac{9x^2}{4} = 90x + 27$ $21x^2 - 120x - 36 = 0$ $7x^2 - 40x - 12 = 0$ $(x - 6)(7x + 2) = 0$ $x = 6, x = -\frac{2}{7} \text{ (Abai / Ignore)}$ Ganti / Substitute $x = 6$ ke dalam / into ①: $y = 3\pi(6)$ $= 18\pi \text{ atau / or } 56.55$	2 1 1 1 1 1	7
2			

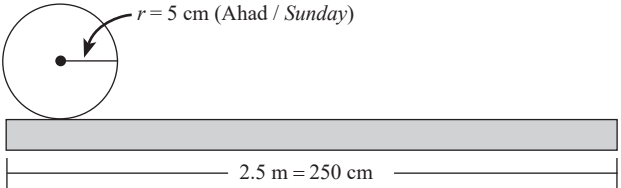
No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(a) $PM = MQ = \frac{1}{2}PQ = 11.5 \text{ cm}$ $BM = DM = \frac{1}{2}BD$ $= \frac{1}{2}(\sqrt{5^2 + 5^2})$ $= \frac{1}{2}(5\sqrt{2})$ $= \frac{5\sqrt{2}}{2}$ $\angle PBQ = 2 \times \angle QBM$ $= 2 \tan^{-1}\left(\frac{QM}{BM}\right)$ $= 2 \tan^{-1}\left(\frac{11.5}{\frac{5\sqrt{2}}{2}}\right)$ $= 2(72.91^\circ)$ $= 145.82^\circ$ $= 2.55 \text{ rad}$	1	
	(b) (i) $BQ = \sqrt{MQ^2 + BM^2}$ $= \sqrt{(11.5)^2 + \left(\frac{5\sqrt{2}}{2}\right)^2}$ $= \sqrt{\frac{579}{4}}$ $= 12.0312 \text{ cm}$ Perimeter luar / Outside perimeter = $2AB$ $= 2 \times r\theta$ $= 2(12.0312)(2.55)$ $= 61.3591 \text{ cm}$	1	
	(ii) Luas temberang PQ / Area of segment PQ $= \frac{1}{2}r^2\theta - \frac{1}{2}r^2 \sin \theta$ $= \frac{1}{2}(12.0312)^2(2.55) - \frac{1}{2}(12.0312)^2 \sin 145.82^\circ$ $= 184.5560 - 40.6598$ $= 143.8962 \text{ cm}^2$	1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	Luas seluruh rajah / <i>Area of whole diagram</i> = 2×143.8962 = 287.7924 cm^2 Luas sektor <i>BCD</i> / <i>Area of sector BCD</i> $= \frac{1}{2}(5)^2 \left(\frac{3\pi}{2} \right)$ $= 58.9125 \text{ cm}^2$ Luas kawasan berlorek / <i>Area of the shaded region</i> $= \text{Luas seluruh rajah} - \text{Luas sektor } BCD - \text{Luas sektor } BAD - \text{Luas } ABCD$ $= \text{Area of whole diagram} - \text{Area of sector } BCD - \text{Area of sector } BAD - \text{Area of } ABCD$ $= 287.7924 - 58.9125 - 58.9125 - (5 \times 5)$ $= 144.9674 \text{ cm}^2$	1 1 1	9
3	(a) (i) Luas / <i>Area</i> = $\frac{1}{2} r^2 \theta / \frac{1}{2} r^2 \theta$ $\frac{1}{2} (AC)^2 (2.8) = 113.4$ $(AC)^2 = \frac{113.4}{(2.8) \left(\frac{1}{2} \right)}$ $(AC)^2 = 81$ $AC = \sqrt{81}$ $AC = 9 \text{ cm}$ (ii) $OA = \frac{1}{2} AC = 4.5 \text{ cm}$ $\therefore OC = 4.5 \text{ cm} + 9 \text{ cm}$ $= 13.5 \text{ cm}$ $\sin \theta = \frac{CP}{OC}$ $\sin \theta = \frac{7.74}{13.5}$ $\theta = \sin^{-1} \left(\frac{7.74}{13.5} \right)$ $\theta = 34.98^\circ$ $\theta = 0.6106 \text{ rad}$ $\theta = 0.611 \text{ rad}$	1 1 1 1	
	(b) $S_{CD} = (13.5)(0.611)$ = 8.2485 cm $S_{BC} = (9)(2.8)$ = 25.2 cm Perimeter = $AB + BC + CD + DO + OA$ $= 9 + 25.2 + 8.2485 + 13.5 + 4.5$ $= 60.4485 \text{ cm}$	1 1 1	7

KERTAS 1

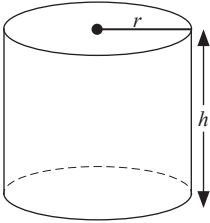
Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a) $\frac{dy}{dx} = 1 - \frac{4}{x^3}$	1	4
	(b) $y = -2x$ $m_1 = -2$ $m_2 = \frac{1}{2}$	1	
	$1 - \frac{4}{x^3} = \frac{1}{2}$ $\frac{1}{2} = \frac{4}{x^3}$ $x = 2$	1	
	Gantikan $x = 2$ ke dalam Substitute $x = 2$ into $y = x + \frac{2}{x^2}$ $= 2 + \frac{2}{x^2}$ $= 2 + \frac{2}{4}$ $= \frac{5}{2}$ $P\left(2, \frac{5}{2}\right)$	1	
2	$\frac{dV}{dt} = \frac{-5.5}{60} \text{ cm}^3 \text{ s}^{-1}$ $V = x^3$ $\frac{dV}{dx} = 3x^2$	1	3
	Bila / When $x = 15$, $\frac{dV}{dx} = 3(15)^2$ $= 675$		
	$\frac{dx}{dt} = \frac{dx}{dV} \times \frac{dV}{dt}$ $= \frac{1}{dV} \times \frac{dV}{dt}$ $= \frac{1}{675} \times \frac{-5.5}{60}$ $= \frac{-11}{81\,000}$	1	
		1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
3	(a)  Isi padu / $Volume_{sphere} = \frac{4}{3}\pi r^3$, $\delta v = 20\pi \text{ cm}^3$ $\frac{dv}{dr} = \left(\frac{4}{3}\right)(3)\pi r^2$ $= 4\pi r^2$ Apabila / <i>When</i> $r = 5 \text{ cm}$, $4\pi(5)^2 = 100\pi$ $\frac{\delta r}{\delta v} \approx \frac{dr}{dv}$ $\frac{\delta r}{-20\pi} \approx \frac{1}{100\pi}$ $\delta r \approx -0.2$ $r_{baru/new} = r_{lama/old} + \delta r$ $= 5 \text{ cm} + (-0.2)$ $= 4.8 \text{ cm}$ $d_{baru/new} = 2(4.8 \text{ cm})$ $= 9.6 \text{ cm}$ Bilangan bola / <i>Number of balls</i> $\approx \frac{250 \text{ cm}}{9.6 \text{ cm}}$ ≈ 26.04 $\approx 26 \text{ biji bola / balls}$	1	6
	(b) $h(x) = 3x^2 + 7x - 8$ $h'(x) = 6x + 7$ $h''(x) = 6 > 0$	1	
	$\therefore h''(x) > 0$, titik pusingan minimum / <i>minimum turning point</i> .	1	
	(a) Luas / <i>Area</i>, $A = 2x(5x - 1)$ $A = 10x^2 - 2x$ $\frac{dA}{dx} = 20x - 2$ Apabila / <i>When</i> $x = 3$, $\frac{dA}{dx} = 20(3) - 2$ $\frac{dA}{dx} = 58$ $\frac{\delta A}{\delta x} \approx \frac{dA}{dx}$ $\delta A = \frac{dA}{dx} \times \delta x$ $\delta A = (58)[(3 + p) - 3]$ $\delta A = (58)(p)$ $\delta A = 58p$	1	
		1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(b) (i) $A = \frac{1}{2}(3y + 5y)(38 - 8y)$ $= \frac{1}{2}(8y)(38 - 8y)$ $= 4y(38 - 8y)$ $= 152y - 32y^2$ $\frac{dA}{dy} : 152 - 64y = 0$ $-64y = -152$ $y = \frac{-152}{-64}$ $y = 2.375 \text{ m}$ $\frac{d^2A}{dy^2} = -64 < 0$ $\therefore A$ adalah maksimum apabila $y = 2.375 \text{ m}$. <i>A is maximum when $y = 2.375 \text{ m}$.</i> (ii) Luas Q / Area of $Q = 152y - 32y^2$ $= 152(2.375) - 32(2.375)^2$ $= 180.5 \text{ m}^2$ Perimeter, $P = 54 \text{ m}$ $2[(x - 1) + x] = 54$ $2(2x - 1) = 54$ $2x - 1 = 27$ $2x = 28$ $x = 14 \text{ m}$ Luas P / Area of $P = (x - 1)(x)$ $= (14 - 1)(14)$ $= 182 \text{ m}^2$ $\therefore$ Lot P yang akan ditanam dengan rumput yang paling banyak kerana luas P ialah 182 m^2, iaitu 1.5 m^2 lebih banyak daripada luas Q, iaitu 180.5 m^2. <i>Lot P will be planted with most grass because the area of P is 182 m^2, which 1.5 m^2 more than the area of Q, which is 180.5 m^2.</i>	1 1 1 1 1	9

Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a)  $I_{\text{silinder}} / V_{\text{cylinder}} = \frac{125}{4} \pi \text{ m}^3$ $\pi r^2 h = \frac{125}{4} \pi$ $r^2 h = \frac{125}{4}$ $h = \frac{125}{4r^2}$ Jumlah luas permukaan, A <i>Total surface area, A</i> $A = 2\pi r^2 + 2\pi r h$ $= 2\pi r^2 + 2\pi r \left(\frac{125}{4r^2} \right)$ $= 2\pi r^2 + \frac{125\pi}{2r}$	1	
	(b) $A = 2\pi r^2 + \frac{125\pi}{2r}$ $= 2\pi r^2 + \frac{125}{2} \pi r^{-1}$ $\frac{dA}{dr} = 4\pi r + (-1) \left(\frac{125}{2} \right) \pi r^{-1-1}$ $= 4\pi r - \frac{125}{2} \pi r^{-2}$ Apabila / When $\frac{dA}{dr} = 0$, $4\pi r - \frac{125\pi}{2r^2} = 0$ $4\pi r = \frac{125\pi}{2r^2}$ $8\pi r^3 = 125\pi$ $8r^3 = 125$ $r^3 = \frac{125}{8}$ $r = \sqrt[3]{\frac{125}{8}}$ $r = \frac{5}{2}$	1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	$\frac{d^2A}{dr^2} = 4\pi - (-2)\left(\frac{125}{2}\right)\pi r^{-3}$ $= 4\pi + \frac{125\pi}{r^3}; \quad \text{Apabila / When } r = \frac{5}{2}$ $= 4\pi + \frac{125\pi}{\left(\frac{5}{2}\right)^3}$ $= 12\pi > 0 \Rightarrow \text{minimum}$ Apabila / When $r = \frac{5}{2}$, $A = 2\pi\left(\frac{5}{2}\right)^2 + \frac{125\pi}{2\left(\frac{5}{2}\right)}$ $= \frac{25}{2}\pi + 25\pi$ $= 37.5\pi \text{ m}^2$ $= 117.825 \text{ m}^2$ Kos minimum / Minimum cost = $117.825 \text{ m}^2 \times \text{RM}720$ = RM84 834	1 1	7

Bahagian B

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
2	(a) (i) $A = (26 - 2x)(x)$ $= 26x - 2x^2$ (ii) $\frac{dA}{dx} = 0$ $26 - 4x = 0$ $x = 6.5 \text{ cm}$ $A_{\text{maksimum / maximum}} = 26(6.5) - 2(6.5)^2$ $= 84.5 \text{ cm}^2$	1 1 1 1	
	(b) $\frac{dA}{dt} = 36 \text{ cm}^2 \text{ s}^{-1}, x = \sqrt{5}$ $\frac{dA}{dt} = \frac{dA}{dx} \times \frac{dx}{dt}$ $36 = [26 - 4(\sqrt{5})] \times \frac{dx}{dt}$ $\frac{dx}{dt} = 2.11 \text{ cm s}^{-1}$ $x = \int \left(\frac{dx}{dt} \right) dt$ $= \int 2.11 dt$ $= 2.11t + c$ $t = 0, x = \sqrt{5}$ $\sqrt{5} = 2.11(0) + c$ $c = \sqrt{5}$ $x = 2.11t + \sqrt{5}$ $t = 3, x = 2.11(3) + \sqrt{5}$ $= 8.57 \text{ cm}$	2 1 1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(c) $\delta x = 1.98 - 2 = -0.02 \text{ cm}$ $\delta A \approx \frac{dA}{dx} \times \delta x$ $\approx [26 - 4(2)] \times (-0.02)$ $\approx -\frac{9}{25} \text{ cm}^2$	1 1	10
3	(a) $y = px^3$ $\frac{dy}{dx} = 3px^2$ $m_{\text{tangen} / \text{tangent}} :$ $\frac{dy}{dx}$ melalui / passes $A(1, p) = m_{AB} :$ $3p(1)^2 = \frac{4-p}{0-1}$ $3p = \frac{4-p}{-1}$ $-3p = 4 - p$ $-3p + p = 4$ $-2p = 4$ $p = \frac{4}{-2}$ $p = -2$	1 1 1 1	4

Bab 3

PENGAMIRAN

KERTAS 1

Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	$\int [2g(x) + 3] \, dx$ $= \int 2g(x) \, dx + \int 3 \, dx$ $= 2\left(\frac{5}{1-x^2}\right) + 3x + c$	2 1	3
2	$\frac{dy}{dx} = (2x+1)^3$ $\int dy = \int (2x+1)^3 dx$ $y = \frac{(2x+1)^4}{(4)(2)} + c$ $y = \frac{1}{8}(2x+1)^4 + c$, pada / at $\left(\frac{1}{2}, 5\right)$ $5 = \frac{1}{8}\left[2\left(\frac{1}{2}\right) + 1\right]^4 + c$ $5 = 2 + c$ $c = 3$ $\therefore y = \frac{1}{8}(2x+1)^4 + 3$	1 1 1	3

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
3	$\int [3g(x) + 1] dx = 3\left(\frac{1}{x^2 + 1}\right) + \int 1 dx$	2	3
	$= \frac{3}{x^2 + 1} + x + c$	1	
4	(a) $g(x) = -3x^2 + 8x - 4$	1	5
	(b) Kawasan berlorek / Shaded area	2	
	$= \int_1^2 (x^3 - 6x^2 + 12x - 6) dx - [-x^3 + 4x^2 - 4x]_1^2$	1	
	$= \left[\frac{x^4}{4} - \frac{6x^3}{3} + \frac{12x^2}{2} - 6x + x^3 - 4x^2 + 4x \right]_1^2$		
5	$= \left[\frac{x^4}{4} - x^3 + 2x^2 - 2x \right]_1^2$		
	$= \left[\frac{2^4}{4} - 2^3 + 2(2)^2 - 2(2) \right] - \left[\frac{1}{4} - 1^3 + 2(1)^2 - 2(1) \right]$		
	$= \left(\frac{16}{4} - 8 + 8 - 4 \right) - \left(\frac{1}{4} - 1 + 2 - 2 \right)$		
	$= 0 - \left(-\frac{3}{4} \right)$		
	$= \frac{3}{4} \text{ unit}^2$	1	
	(b) (i) $\int_0^h f(y) dy + \left \int_h^k f(y) dy \right + \int_k^m f(y) dy = \frac{9}{2}$		
	$\frac{3}{2} + \left \int_h^k f(y) dy \right + \frac{3}{2} = \frac{9}{2}$		
	$\left \int_h^k f(y) dy \right = \frac{9}{2} - \frac{3}{2} - \frac{3}{2}$		
	$\left \int_h^k f(y) dy \right = \frac{3}{2}$		
	$\int_h^k f(y) dy = -\frac{3}{2}$	1	
	$\int_0^k f(y) dy = \int_0^h f(y) dy + \int_h^k f(y) dy$		
	$= \frac{3}{2} + \left(-\frac{3}{2} \right)$		
	$= 0$	1	
	(ii) $\int_h^k x dy + \int_k^m \frac{5}{4} f(y) dy = \int_h^k f(y) dy + \frac{5}{4} \int_k^m f(y) dy$		
	$= -\frac{3}{2} + \frac{5}{4} \left(\frac{3}{2} \right)$		
	$= -\frac{3}{2} + \frac{15}{8}$		
	$= \frac{3}{8}$	1	

Bahagian A

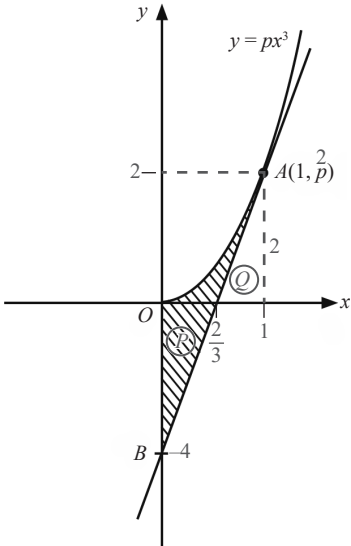
No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a) $y = \int (4x - 6) dx$ $y = \frac{4x^2}{2} - 6x + c$ $y = 2x^2 - 6x + c$, melalui / pass through (1, 4) $4 = 2(1)^2 - (6)1 + c$ $4 = -4 + c$ $c = 4 + 4$ $c = 8$ $\therefore y = 2x^2 - 6x + 8$	1 1 1	7
	(b) $m_{\text{tangen/tangent}} : \frac{dy}{dx} = 4x - 6$ pada / at (1, 4) $\frac{dy}{dx} = 4(1) - 6$ $= -2$ $m_{\text{normal}} \times m_{\text{tangen/tangent}} = -1$ $m_{\text{normal}} \times -2 = -1$ $m_{\text{normal}} = \frac{1}{2}$ Persamaan normal melalui P(1, 4): Equation of normal passes through P(1, 4): $y - y_1 = m(x - x_1)$ $y - 4 = \frac{1}{2}(x - 1)$ $y = \frac{1}{2}x - \frac{1}{2} + 4$ $y = \frac{1}{2}x + \frac{7}{2}$ $y = 2x^2 - 6x + 8 \dots \textcircled{1}$ $y = \frac{1}{2}x + \frac{7}{2} \dots \textcircled{2}$ $\textcircled{1} = \textcircled{2};$ $2x^2 - 6x + 8 = \frac{1}{2}x + \frac{7}{2}$ $2x^2 - 6x - \frac{1}{2}x + 8 - \frac{7}{2} = 0$ $2x^2 - \frac{13}{2}x + \frac{9}{2} = 0$ $4x^2 - 13x + 9 = 0$ $(4x - 9)(x - 1) = 0$ $4x - 9 = 0, x - 1 = 0$ $x = \frac{9}{4}, \quad x = 1 \text{ (abaikan / ignore)}$ Dari / From $\textcircled{2}$, $y = \frac{1}{2}x + \frac{7}{2}$ $y = \frac{1}{2}\left(\frac{9}{4}\right) + \frac{7}{2}$ $y = \frac{37}{8}$ $\therefore Q\left(\frac{9}{4}, \frac{37}{8}\right)$	1 1 1	
		1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(b) Luas maksimum / <i>Maximum area</i>: $\frac{dL}{dp} = 0$ $16 - 6p^2 = 0$ $p^2 = \pm \sqrt{\frac{8}{3}}$ $p = 1.633$ Jumlah kos / <i>Total cost</i> = $40 \times [16(1.633) - 2(1.633)^3]$ = RM697	1 1 1 1	10

Bahagian B

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
4	(a) $y = x^2 - 9 \dots \textcircled{1}$ $\frac{y}{5} - \frac{y}{10} = 1$ $2x - y = 10$ $2x - 10 = y \dots \textcircled{2}$ $\textcircled{1} = \textcircled{2},$ $x^2 - 9 = 2x - 10$ $x^2 - 2x - 9 + 10 = 0$ $x^2 - 2x + 1 = 0$ $(x-1)(x-1) = 0$ $x-1 = 0$ $x = 1$ $\therefore p = 1$	1	
	(b) $y = x^2 - 9$ $y = (x+3)(x-3)$ Apabila / When $y = 0,$ $(x+3)(x-3) = 0$ $x+3=0, \quad x-3=0$ $x=-3, \quad x=3$ Luas / Area = $\left \int_1^3 (x^2 - 9) dx \right$ $= \left \left[\frac{1}{3}x^3 - 9x \right]_1^3 \right $ $= \left \left[\frac{1}{3}(3)^3 - 9(3) \right] - \left[\frac{1}{3}(1)^3 - 9(1) \right] \right $ $= \left -18 - \left(-\frac{26}{3} \right) \right $ $= \left -\frac{28}{3} \right $ $= \frac{28}{3} \text{ unit}^2$	1 1 1 1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(c) Dari / From ②, $y = 2x - 10$ apabila / when $x = 0$ $y = 2(0) - 10$ $y = -10$ $y = 2x - 10$ apabila / when $y = 0$ $0 = 2x - 10$ $-2x = -10$ $x = 5$ Isi padu kon / Volume of cone $= \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi(5)^2(10)$ $= 83\frac{1}{3}\pi \text{ unit}^3$ Dari / From ①, $y = x^2 - 9$ apabila / when $x = 0$ $y = (0)^2 - 9$ $y = -9$ Luas lengkung / Volume of the curve $= \pi \int_{-9}^0 x^2 dy = \pi \int_{-9}^0 (y + 9) dy$ $= \pi \left[\frac{1}{2}y^2 + 9y \right]_{-9}^0$ $= \pi \left[\frac{1}{2}(0)^2 + 9(0) \right] - \pi \left[\frac{1}{2}(-9)^2 + 9(-9) \right]$ $= 0 - \left(-\frac{81}{2}\pi \right)$ $= 40\frac{1}{2}\pi \text{ unit}^3$ $I_{\text{lorekan dikisar } 180^\circ} = \frac{1}{2}(\text{Isi padu kon} - \text{Isi padu lengkung})$ $V_{\text{shaded revolved } 180^\circ} = \frac{1}{2}(\text{Volume of cone} - \text{Volume of curve})$ $= \frac{1}{2} \left(83\frac{1}{3}\pi - 40\frac{1}{2}\pi \right)$ $= \frac{1}{2} \left(42\frac{5}{6}\pi \right) \text{ unit}^3$ $= 21\frac{5}{12}\pi \text{ unit}^3$	1 1 1 1	10

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
5	(b) Persamaan tangen melalui / Equation tangent passes A(1, 2): $y - 2 = \frac{-4 - 2}{0 - 1}(x - 1)$ $y - 2 = 6(x - 1)$ $y = 6x - 6 + 2$ $y = 6x - 4$ Apabila / When $y = 0$, $6x - 4 = 0$ $6x = 4$ $x = \frac{2}{3}$  Luas / Area, $\Delta P = \frac{1}{2} \times \frac{2}{3} \times 4$ $= \frac{4}{3}$ Luas / Area, $\Delta Q = \frac{1}{2} \times \left(1 - \frac{2}{3}\right) \times 2$ $= \frac{1}{3}$ Luas lorekan / Shaded area = $\int_0^1 2x^3 \, dx - \frac{1}{3} + \frac{4}{3}$ $= \left[\frac{2x^4}{4} \right]_0^1 - \frac{1}{3} + \frac{4}{3}$ $= \left[\left(\frac{2(1)^4}{4} \right) \right] - \left(\frac{2(0)^4}{4} \right) + 1$ $= \left(\frac{1}{2} - 0 \right) + 1$ $= \frac{1}{2} + 1$ $= \frac{3}{2}$	1	
		1	
		1	
		1	

KERTAS 1

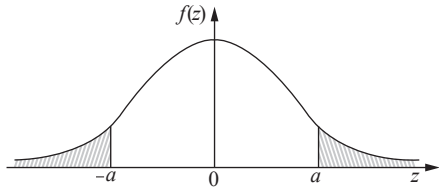
Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a) (i) $6! = 720$ (ii) $\frac{1 \text{ kad / card}}{3 \text{ kad / cards}}$ atau / or $\frac{2 \text{ kad / cards}}{2 \text{ kad / cards}}$ $\frac{1 \text{ kad / card}}{3 \text{ kad / cards}} = 4 \times 2! \times 2! \times 3$ $= 48 \text{ cara / ways}$ $\frac{2 \text{ kad / cards}}{2 \text{ kad / cards}}$ $: \frac{15 \text{ atau / or } 17 \text{ atau / or } 19}{26 \text{ atau / or } 62} = 6 \text{ cara / ways}$ $: \frac{51 \text{ atau / or } 57 \text{ atau / or } 59}{62} = 3 \text{ cara / ways}$ $: \frac{26}{51 \text{ atau / or } 57 \text{ atau / or } 29} + \frac{26}{71 \text{ atau / or } 75 \text{ atau / or } 79} +$ $\frac{26}{91 \text{ atau / or } 95 \text{ atau / or } 97} = 9 \text{ cara / ways}$ $: \frac{62}{71 \text{ atau / or } 75 \text{ atau / or } 79} = 3 \text{ cara / ways}$ $: \frac{62}{91 \text{ atau / or } 95 \text{ atau / or } 97} = 3 \text{ cara / ways}$ ATAU / OR ${}^1P_1 \times {}^1P_1 \times {}^3P_1 \times {}^3P_1$ atau / or ${}^1P_1 \times {}^1P_1 \times {}^2P_1 \times {}^3P_1$ atau / or ${}^1P_1 \times {}^3P_1 \times {}^1P_1 \times {}^1P_1$ atau / or ${}^2P_1 \times {}^3P_1 \times {}^1P_1 \times {}^1P_1$ atau / or ${}^4P_2 \times 1 \times 1$ Jumlah bilangan cara / Total number of ways: $= 48 + 6 + 3 + 9 + 3 + 3$ $= 72$	1	7
		2	
		1	
		1	
2	(b) (i) $n = 0$ (ii) ${}^pC_3 = 26(p-2)$ $\frac{p!}{(p-3)!3!} = 26(p-2)$ $\frac{p(p-1)(p-2)(p-3)!}{(p-3)!(6)} = 26(p-2)$ $p(p-1) = 26(6)$ $p(p-1) = 13(12)$ $p = 13$	1	7
		1	
		1	
		1	
2	(a) (i) $\frac{RM24}{4} = 6$ ${}^{10}C_6 = 210 \text{ cara / ways}$ (ii) $({}^8C_4 \times {}^{10}C_4) + ({}^8C_6 \times {}^{10}C_3) + ({}^8C_8 \times {}^{10}C_2)$ $= 18\ 105 \text{ cara / ways}$	1	7
		2	
		1	

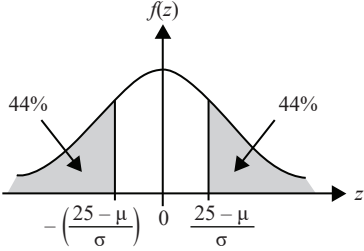
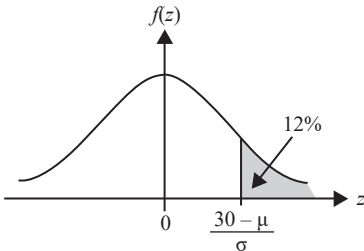
KERTAS 1

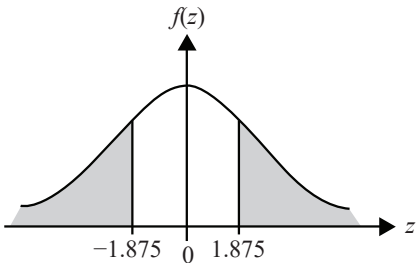
Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a) Benar. Saiz kasut boleh dibilang. <i>True. Shoe sizes can be counted.</i>	1	5
	(b) (i) $P(X \leq 1) = 11P(X = 0)$ ${}^nC_0(p^0)(q^n) + {}^nC_1(p^1)(q^{n-1}) = 11{}^nC_0(p^0)(q^n)$ $q^n + npq^{n-1} = 11q^n$ $npq^{n-1} = 10q^n$ $\frac{npq^n}{q} = 10q^n$ Banding / Compare, $\frac{np}{q} = 10$ $n(1 - q) = 10q$	1	
	(ii) $n(1 - q) = 10q$ $np = 10q$ $6 = 10q$	1	
	$q = \frac{3}{5}, p = \frac{2}{5}$	1	
2	(a) $P(X = 2) + P(X = 3) = 1 - \frac{81}{128} - \frac{1}{64}$ $= \frac{45}{128}$	1	4
	(b) ${}^5C_2(p)^2(q)^3 + {}^5C_3(p)^3(q)^2 = \frac{45}{128}$ $10p^2q^3 + 10p^3q^2 = \frac{45}{128}$ $10p^2q^2(q + p) = \frac{45}{128}$ $p^2q^2(q + p) = \frac{9}{256}$ $p^2q^2(1) = \frac{9}{256}$ $pq = \frac{3}{16}$ $p = \frac{3}{16q}$	1	
		1	
		1	
3	(a) Katakan X = peristiwa di mana produk boleh dijual <i>Let X = event that a product can be sold</i> $n = 820, p = \frac{19}{20}, q = \frac{1}{20}$ Min / Mean = $(820)\left(\frac{19}{20}\right)$ $= 779$	1	

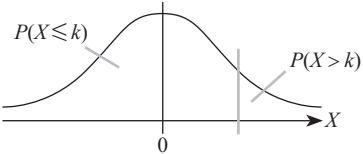
No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	Sisihan piawai / <i>Standard deviation</i> , $= \sqrt{(820) \left(\frac{19}{20} \right) \left(\frac{1}{20} \right)}$ $= \sqrt{\frac{779}{20}}$ $= 6.241$	1 1	3
4	(a) Konsonan / <i>Consonant</i> = C, R, D, K Vokal / <i>Vowel</i> = E, I $P(\text{Konsonan} / \text{Consonant}) = \frac{4}{6}$ $= \frac{2}{3}$ Jangkaan bilangan / <i>Expected value</i> = $(120) \left(\frac{2}{3} \right)$ $= 80$	1 1	6
	(b) Katakan / <i>Let</i> $X = \text{Konsonan} / \text{Consonant}$ $P(X > 2) = P(X = 3) + P(X = 4) + P(X = 5)$ $= {}^5C_3 \left(\frac{2}{3} \right)^3 \left(\frac{1}{3} \right)^2 + {}^5C_4 \left(\frac{2}{3} \right)^4 \left(\frac{1}{3} \right)^1 + {}^5C_5 \left(\frac{2}{3} \right)^5 \left(\frac{1}{3} \right)^0$ $= 0.3292 + 0.3292 + 0.1317$ $= 0.7901$	1 1 1 1	
5	(a) 	1	3
	(b) (i) $k = 0.431$ (ii) Mod bahagian A / <i>Mode for part A</i> $k = -0.431$	1 1	
6	(a) $X \sim N(20, 0.5^2)$ Min / <i>Mean</i> = 20 Varians / <i>Variance</i> = $(0.5)^2 = 0.25$	1	4
	(b) (i) $P(Z < m) = P(Z > k)$ $\frac{(-\alpha + 40) - 20}{0.5} = m$ $-\alpha + 40 - 20 = 0.5m$ $-\alpha + 20 = 0.5m$ $40 - 2\alpha = m$ (ii) $P(Z < k) = 0.2662$ $2[0.5 - P(Z > k)] = 0.2662$ $1 - 2P(Z > k) = 0.2662$ $2P(Z > k) = 0.7338$ $P(Z > k) = 0.3669$ $\frac{\alpha - 20}{0.5} = 0.34$ $\alpha - 20 = 0.17$ $\alpha = 20.17$	1 1 1	

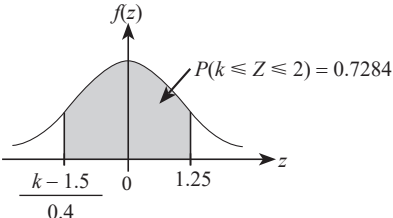
Bahagian A

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	$P(x < 25) = 44\%$ $P\left(Z < \frac{25 - \mu}{\sigma}\right) = 0.44$ $\frac{25 - \mu}{\sigma} = -0.151$ $25 - \mu = -0.151\sigma \dots \textcircled{1}$  $P(x \geq 30) = 12\%$ $P\left(Z > \frac{30 - \mu}{\sigma}\right) = 0.12$ $\frac{30 - \mu}{\sigma} = 1.175$ $30 - \mu = 1.175\sigma \dots \textcircled{2}$  $\textcircled{2} - \textcircled{1};$ $(30 - \mu) - (25 - \mu) = 1.175\sigma - (-0.151\sigma)$ $30 - \mu - 25 + \mu = 1.175\sigma + 0.151\sigma$ $5 = 1.326\sigma$ $\frac{5}{1.326} = \sigma$ $\sigma = 3.7707$ Dari / From $\textcircled{1}$, $25 - \mu = -0.151\sigma$ $25 - \mu = -0.151(3.7707)$ $-\mu = -0.5694 - 25$ $-\mu = -25.5694$ $\mu = 25.5694$	1	
		1	
		1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	 $P(X < 18.5) = \frac{1}{n}$ $P\left(Z < \frac{18.5 - 25.57}{3.77}\right) = \frac{1}{n}$ $P(Z < -1.875) = \frac{1}{n}$ $0.0303 = \frac{1}{n}$ $n = \frac{1}{0.0303}$ $n = 33$	1 1 1	6

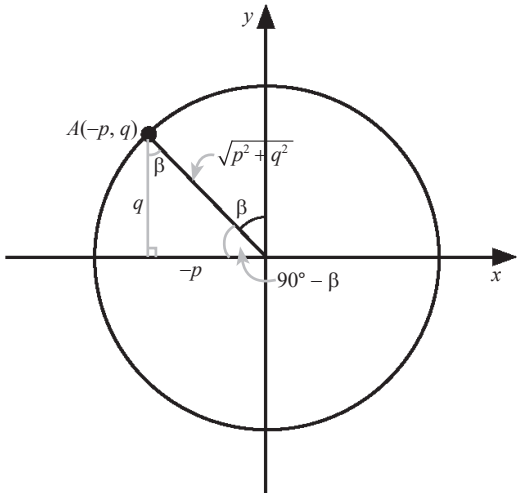
Bahagian B

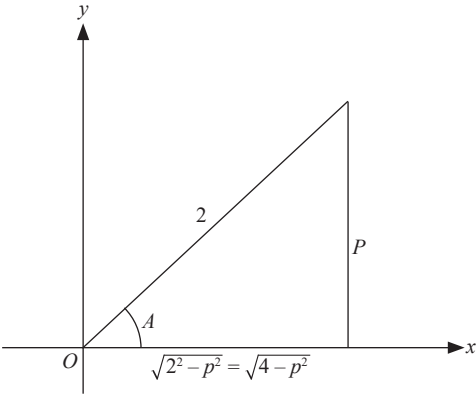
No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
2	(a) (i) $n = 5\,000, p = \frac{97}{1 + 97 + 2} = 0.97$ $\mu = np$ $= (5\,000)(0.97)$ $= 4\,850$ (ii) $p = 0.03, q = 0.97, n = 6, r = 2$ $P(X = 2) = {}^6C_2(0.03)^2(0.97)^4$ $= 0.01195$ (iii) $n = 10, p = \frac{1}{3}, q = \frac{2}{3}, r > 2$ $P(X > 2) = 1 - P(X \leq 2)$ $= 1 - P(X = 0) - P(X = 1) - P(X = 2)$ $= 1 - {}^{10}C_0\left(\frac{1}{3}\right)^0\left(\frac{2}{3}\right)^{10} - {}^{10}C_1\left(\frac{1}{3}\right)^1\left(\frac{2}{3}\right)^9 - {}^{10}C_2\left(\frac{1}{3}\right)^2\left(\frac{2}{3}\right)^8$ $= 1 - 0.0173 - 0.0867 - 0.1951$ $= 0.7009$	1 1 1 1 1 1	
	(b) $P(X > k) = \frac{1}{4} [P(X \leq k)]$  $P(X \leq k) + P(X > k) = 1$ $4P(X > k) + P(X > k) = 1$ $P(X > k) = 0.2$ $\frac{k - 12}{\sqrt{25}} = 0.842$ $k = 16.21$	1 2 1	10

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
3	(a) (i) ${}^8C_8(0.9772^8)(0.0228^0)$ $= 0.8315$	1 1	10
	(ii) $P(X \leq 6)$ $= 1 - {}^8C_8(0.9772^8)(0.0228^0) - {}^8C_7(0.9772^7)(0.0228^1)$ $= 0.0133$	2 1	
	(b) $\frac{61 - 60}{\sigma} = 1.999$ $\sigma = 0.5$	2 1	
	$P(X < 60.5)$ $= P\left(Z < \frac{60.5 - 60}{0.5}\right)$ $= P(Z < 1)$ $= 1 - P(Z \geq 1)$ $= 0.8413$	1 1	
4	(a) Katakan X = Murid tidak menaiki bas Let X = Student not go by bus $n = 8, q = 0.75, p = 1 - 0.75$ $= 0.25$	1	10
	$P(x \leq 2) = P(X = 0) + P(X = 1) + P(X = 2)$ $= {}^8C_0(0.25)^0(0.75)^8 + {}^8C_1(0.25)^1(0.75)^7 + {}^8C_2(0.25)^2(0.75)^6$ $= 0.1001 + 0.2670 + 0.3115$ $= 0.6786$	1 1	
	(b) (i) $X \sim N(1.5, 0.4^2)$	1	
	$P(X > 2) = P\left(Z > \frac{2 - 1.5}{0.4}\right)$ $= P(Z > 1.25)$ $= 0.1056$	1 1	
	(ii)	1	10
		1	
	$P(k \leq X \leq 2) = 72.84\%$	1	
	$P\left(\frac{k - 1.5}{0.4} \leq Z \leq \frac{2 - 1.5}{0.4}\right) = 0.7284$ $P\left(\frac{k - 1.5}{0.4} \leq Z \leq 1.25\right) = 0.7284$ $P\left(Z \geq \frac{k - 1.5}{0.4}\right) - P(Z \geq 1.25) = 0.7284$ $P\left(Z \geq \frac{k - 1.5}{0.4}\right) - 0.1056 = 0.7284$ $P\left(Z \geq \frac{k - 1.5}{0.4}\right) = 0.8340$ $1 - P\left(Z < \frac{k - 1.5}{0.4}\right) = 0.8340$ $P\left(Z < \frac{k - 1.5}{0.4}\right) = 0.1660$ $\frac{k - 1.5}{0.4} = -0.97$ $k - 1.5 = -0.388$ $k = 1.112$	1 1 1 1 1 1 1 1 1	

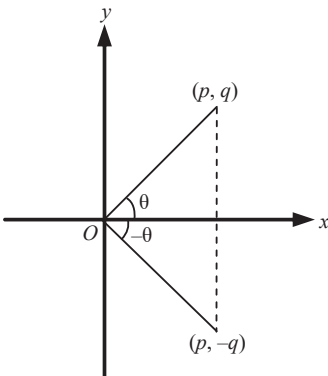
KERTAS 1

Bahagian A

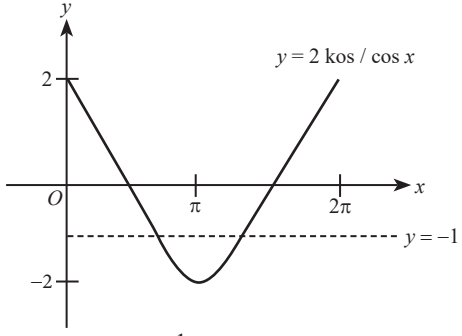
No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	 (a) $\tan \beta = -\frac{p}{q}$	1	2
	(b) $\tan (180^\circ + \beta) = -\tan \beta$ $= -\left(-\frac{p}{q}\right)$ $= \frac{p}{q}$ $\cot / \cot (180^\circ + \beta) = \frac{1}{\tan (180^\circ + \beta)}$ $= \frac{1}{\frac{p}{q}}$ $= \frac{q}{p}$	1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
2	(a)  $\cos A = \frac{\sqrt{4-p^2}}{2}$	1	5
	(b) $\sin(A+B) - \sin(A-B) = 2p$ $(\sin A \cos B + \cos A \sin B) - (\sin A \cos B - \cos A \sin B) = 2p$ $\sin A \cos B + \cos A \sin B - \sin A \cos B + \cos A \sin B = 2p$ $2 \cos A \sin B = 2p$ $2 \left(\frac{\sqrt{4-p^2}}{2} \right) \sin B = 2p$ $\sqrt{4-p^2} \sin B = 2p$ $\sin B = \frac{2p}{\sqrt{4-p^2}}$	1	
	$\sin(A+B) - \sin(A-B) = 2p$ $(\sin A \cos B + \cos A \sin B) - (\sin A \cos B - \cos A \sin B) = 2p$ $\sin A \cos B + \cos A \sin B - \sin A \cos B + \cos A \sin B = 2p$ $2 \cos A \sin B = 2p$ $2 \left(\frac{\sqrt{4-p^2}}{2} \right) \sin B = 2p$ $\sqrt{4-p^2} \sin B = 2p$ $\sin B = \frac{2p}{\sqrt{4-p^2}}$	1	

Bahagian B

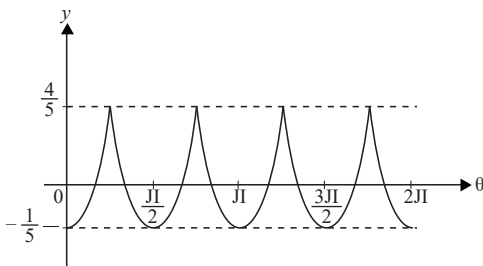
No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks																												
3	(a) (i) 	1																													
	(ii) $\tan (-\theta) = -\tan \theta$ $= -\frac{p}{q}$	1																													
	(b) $2 \cos x = \sqrt{3} \cot x$ $2 \cos x = \sqrt{3} \frac{\cos x}{\sin x}$ $2 \cos x \sin x - \sqrt{3} \cos x = 0$ $\cos x(2 \sin x - \sqrt{3}) = 0$ $\cos x = 0, \quad \sin x = \frac{\sqrt{3}}{2}$ $x = 90^\circ, 270^\circ \quad x = 60^\circ, 120^\circ$ $x = 60^\circ, 90^\circ, 120^\circ, 270^\circ$	1 2																													
	(c) $\tan m = \frac{p}{1}$ dalam sukuan 3 / in quadrant 3 $\cos m = -\frac{1}{\sqrt{1+p^2}}, \quad \sin m = -\frac{p}{\sqrt{1+p^2}}$ $\cos \left(\frac{\pi}{3} - m\right) = \cos \frac{\pi}{3} \cos m + \sin \frac{\pi}{3} \sin m$ $= \frac{1}{2} \cos m + \frac{\sqrt{3}}{2} \sin m$ $= -\frac{1}{2\sqrt{1+p^2}} - \frac{\sqrt{3}p}{2\sqrt{1+p^2}}$ $= \frac{-\sqrt{3}p - 1}{2\sqrt{1+p^2}}$	1 1 1																													
4	(a) <table><tr><td>x</td><td>0</td><td>$\frac{\pi}{6}$</td><td>$\frac{\pi}{3}$</td><td>$\frac{\pi}{2}$</td><td>$\frac{2}{3}\pi$</td><td>$\frac{5}{6}\pi$</td><td>π</td><td>$\frac{7}{6}\pi$</td><td>$\frac{4}{3}\pi$</td><td>$\frac{3}{2}\pi$</td><td>$\frac{5}{3}\pi$</td><td>$\frac{11}{6}\pi$</td><td>2π</td></tr><tr><td>y</td><td>1</td><td>-1.12</td><td>-2</td><td>-1.12</td><td>1</td><td>3.12</td><td>4</td><td>3.12</td><td>1</td><td>-1.12</td><td>-2</td><td>-1.12</td><td>1</td></tr></table>	x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2}{3}\pi$	$\frac{5}{6}\pi$	π	$\frac{7}{6}\pi$	$\frac{4}{3}\pi$	$\frac{3}{2}\pi$	$\frac{5}{3}\pi$	$\frac{11}{6}\pi$	2π	y	1	-1.12	-2	-1.12	1	3.12	4	3.12	1	-1.12	-2	-1.12	1	2	8
x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2}{3}\pi$	$\frac{5}{6}\pi$	π	$\frac{7}{6}\pi$	$\frac{4}{3}\pi$	$\frac{3}{2}\pi$	$\frac{5}{3}\pi$	$\frac{11}{6}\pi$	2π																		
y	1	-1.12	-2	-1.12	1	3.12	4	3.12	1	-1.12	-2	-1.12	1																		

Analisis Bertopik SPM • Matematik Tambahan

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(b) (i) $2 \cos / \cos x = -1; \pi \leq x \leq 3\pi$ $\cos / \cos x = -\frac{1}{2} \text{ (II, III)}$ Sudut rujukan / Reference angle $= \cos / \cos^{-1} \left(\frac{1}{2} \right)$ $= 60^\circ$ $= \frac{\pi}{3}$	1	
	$x = \pi - \frac{\pi}{3}, \pi + \frac{\pi}{3}, 3\pi - \frac{\pi}{3}$ $x = \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{8\pi}{3}$ $\therefore x = \frac{4\pi}{3}, \frac{8\pi}{3}$	1	
		1	
	(ii) 	2	
	$\cos / \cos x < -\frac{1}{2}$ $2 \cos / \cos x < -1$ $y < -1$ $\therefore \frac{2\pi}{3} \leq x \leq \frac{4\pi}{3}$	1	
			8

Bahagian B

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
4	(a) (i) $\cos / \cos 2\theta = \cos / \cos (\theta + \theta)$ $\cos / \cos 2\theta = \cos / \cos \theta \cos / \cos \theta - \sin \theta \sin \theta$ $\cos / \cos 2\theta = \cos^2 / \cos^2 \theta - \sin^2 \theta$ (Terbukti / Proven)	1 1	
	(ii) $3 \cos^2 / \cos^2 \theta = 2 + 3 \sin^2 \theta$ $3 \cos^2 / \cos^2 \theta - 3 \sin^2 \theta = 2$ $3(\cos^2 / \cos^2 \theta - \sin^2 \theta) = 2$ $3 \cos / \cos 2\theta = 2$ $\cos / \cos 2\theta = \frac{2}{3}$ (I, IV)	1	
	Sudut rujukan / Reference angle: $\cos^{-1} / \cos^{-1} \left(\frac{2}{3} \right) = 48.19^\circ$; $180^\circ \leq \theta \leq 360^\circ$, $360^\circ \leq 2\theta \leq 720^\circ$	1	
	$2\theta = 48.19^\circ, 360^\circ - 48.19^\circ, 360^\circ + 48.19^\circ, 360^\circ + 311.81^\circ$ $= 48.19^\circ, 311.81^\circ, 408.19^\circ, 671.81^\circ$ $\theta = 24.10^\circ, 155.91^\circ, 204.10^\circ, 335.91^\circ$ $\therefore \theta = 204.10^\circ, 335.91^\circ$	1	

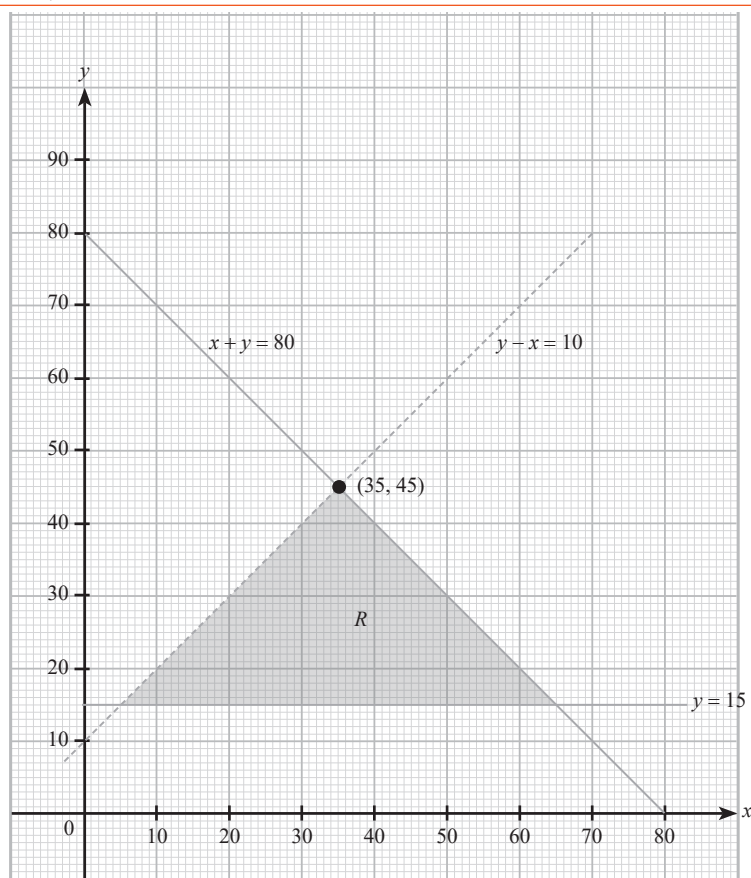
No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
(b)	(i) $y = -\left \cos^2/\cos^2 \theta - \sin^2 \theta\right + \frac{4}{5}$ $y = -\left \cos/\cos 2\theta\right + \frac{4}{5}, 0 \leq \theta \leq 2\pi$ 	1	10
	(ii) $-\frac{1}{5} < h < \frac{4}{5}$	1	

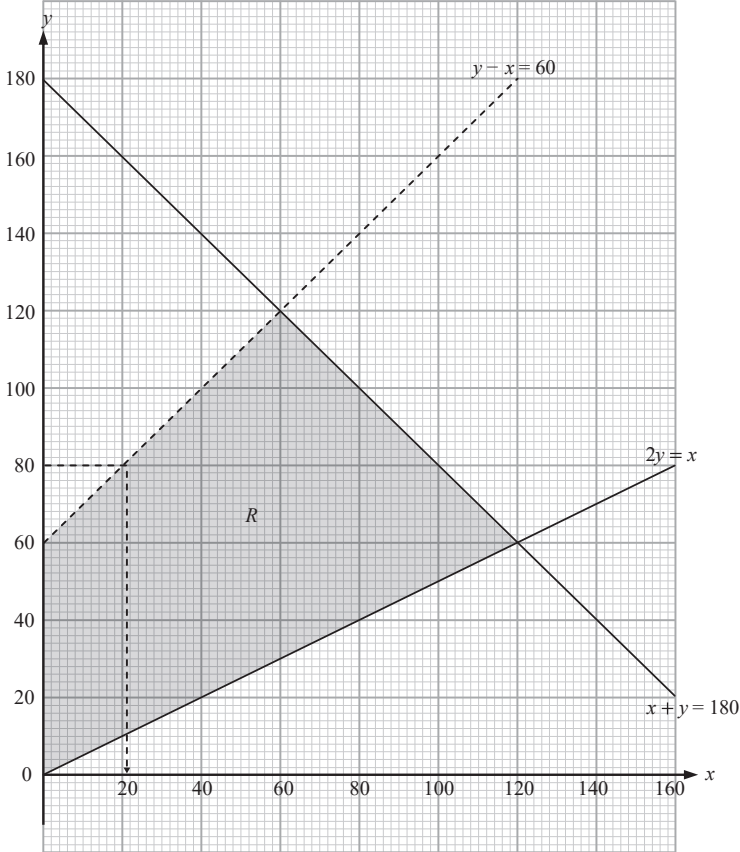
Bab 7

PENGATURCARAAN LINEAR

KERTAS 2

Bahagian C

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a) I : $x + y \leq 80$ II : $y - x < 10$ III : $y \geq 15$	1 1 1	
	(b) 	3	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks						
	(c) (i) 44 (ii) Titik maksimum / <i>Maximum point</i> = (36, 44) $a(36) + 4(36) + a(44) = 400$ $80a = 400 - 144$ $a = 3.2$ Baki bayaran murid kelas B <i>The balance of payment by a student of class B</i> = RM3.20	1 1 1 1	10						
2	(a) $x + y \leq 180$ $y - x < 60$ $y \geq \frac{1}{2}x$ (b) 	1 1 1 3							
	(c) (i) 120 (ii) (21, 80) Untung maksimum / <i>Maximum profit</i> $= -5.5(21) + 40(80)$ = RM3 084.50	1 1 1 1	10						
3	(a) $p = 16$ $q = 4$ (b) $y \leq 2x$ <table border="1" data-bbox="234 1720 769 1799"><tr><td>x</td><td>0</td><td>4</td></tr><tr><td>y</td><td>0</td><td>8</td></tr></table>	x	0	4	y	0	8	1 1	
x	0	4							
y	0	8							

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks																		
	(c) (i) Kaedah 1 = Kaedah algebra Method 1 = Algebraic method <table><tr><td>y</td><td>:</td><td>x</td></tr><tr><td>3</td><td>:</td><td>2</td></tr><tr><td>6</td><td>:</td><td>4</td></tr><tr><td>9</td><td>:</td><td>6</td></tr></table> } Koordinat (4, 6) dan (6, 9) berada dalam rantau R. The coordinates (4, 6) and (6, 9) are in R region. Kaedah 2 = Kaedah graf Method 2 = Graphical method $\frac{y}{x} = \frac{3}{2}$ $y = \frac{3}{2}x$ <table><tr><td>x</td><td>0</td><td>6</td></tr><tr><td>y</td><td>0</td><td>9</td></tr></table> $\therefore$ Bilangan yang mungkin bagi anak patung Mal ialah 4 dan 6. Possible number of Mal's dolls are 4 and 6.	y	:	x	3	:	2	6	:	4	9	:	6	x	0	6	y	0	9	2	
y	:	x																			
3	:	2																			
6	:	4																			
9	:	6																			
x	0	6																			
y	0	9																			
		1																			

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(d) (i) 17 bungkus / packets	1	10
	(ii) Untung / Profit, $P = (10 - 4)x + (7 - 2.5)y$ $= 6x + 4.5y$	1	
	Katakan / Let $6x + 4.5y = 27$ Titik optimum / Optimal point: (0, 50)		
	$P = 6(0) + 4.5(50)$ $= \text{RM}225$	1	
	Simpanan / Saving = $50\% \times \text{RM}225$ $= \text{RM}112.50$		
	Baki / Remaining = $\text{RM}112.50 - \text{RM}40$ $= \text{RM}72.50$	1	
	$\therefore$ Ya, harga jualan adalah sesuai kerana Mus boleh menyimpan duit dan membayar upah pekerja dan masih mempunyai baki sebanyak RM72.50 untuk modal seterusnya. <i>Yes, the selling price is suitable because he is able to save money and pay for the wages and still have a balance of RM72.50 for his capital rolling.</i>	1	

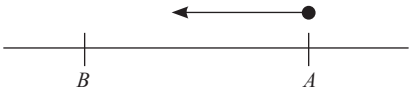
Bab 8

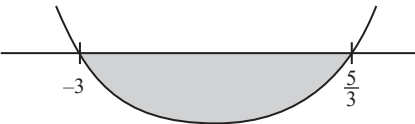
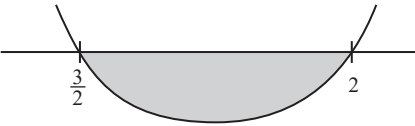
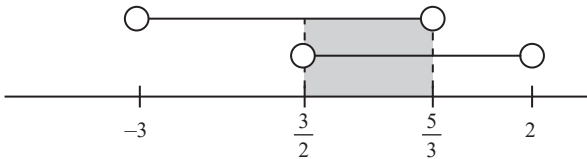
KINEMATIK GERAKAN LINEAR

KERTAS 2

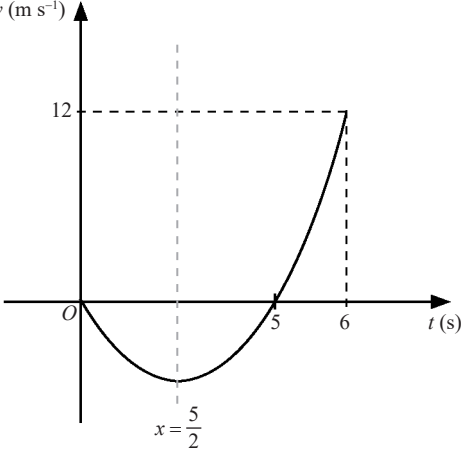
Bahagian C

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
1	(a) Zarah A / Particle A $V_0 = 3(0)^2 + 8(0) + 5$ $= 5 \text{ m s}^{-1}$	1	
	Zarah B / Particle B $V_0 = 3(0)^2 - 2(0) + 4$ $= 4 \text{ m s}^{-1}$	2	
	(b) $S_A = S_B$ $t^3 + 4t^2 + 5t = t^3 - t^2 + 4t + 18$ $5t^2 + t - 18 = 0$ $(5t - 9)(t + 2) = 0$	1	
	$t = -\frac{9}{5}$ dan / and $t = -2$ (Abai / Ignore)	1	
	Jarak dilalui A ketika berlanggar / Distance travelled by A when colliding $= \left(\frac{9}{5}\right)^3 + 4\left(\frac{9}{5}\right)^2 + 5\left(\frac{9}{5}\right)$ $= 27.79$	1	
	Jarak dilalui B ketika berlanggar / Distance travelled by B when colliding $= 27.79 - 18$ $= 9.79$	1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(c) $t = \frac{9}{5}$ $a_A = 6t + 8$ $6\left(\frac{9}{5}\right) + 8 = 18.8$ $a_B = 6t - 2$ $6\left(\frac{9}{5}\right) - 2 = 8.8$	1 1 1	10
2	(a) Apabila / When $t = 0$, $v = 3(0)^2 + 4(0) - 15$ $v = -15 \text{ m s}^{-1}$ (zarah bergerak ke kiri / particle is moving to the left)  $\therefore$ Titik A berada di kanan titik B. / Point A is to the right of point B.	1	
	(b) $a = \frac{dv}{dt}$ $a = 6t + 4$; apabila / when $t = 1.3 \text{ s}$ $a = 6(1.3) + 4$ $a = 11.8 \text{ m s}^{-2}$	1 1	
	(c) Maksimum / Maximum, s; $v = 0 \Rightarrow 3t^2 + 4t - 15 = 0$ $(3t - 5)(t + 3) = 0$ $3t - 5 = 0$, $t + 3 = 0$ $t = \frac{5}{3}$, $t = -3$ (abaikan / ignore) $s = \int (3t^2 + 4t - 15) dt$ $s = \frac{3t^3}{3} + \frac{4t^2}{2} - 15t + c$ $s = t^3 + 2t^2 - 15t + c$ Apabila / when $t = 0$, $s = 0$; $0 = (0)^3 + 2(0)^2 - 15(0) + c$ $0 = c$ $\therefore s = t^3 + 2t^2 - 15t$ Apabila / when $t = \frac{5}{3}$; $s = \left(\frac{5}{3}\right)^3 + 2\left(\frac{5}{3}\right)^2 - 15\left(\frac{5}{3}\right)$ $s = -14\frac{22}{27} \text{ m}$ $\therefore$ Zarah P tidak akan melalui titik B kerana ia hanya boleh bergerak dengan jarak maksimum sejauh $14\frac{22}{27} \text{ m}$ dari titik A, sedangkan titik B berada sejauh 15 m dari titik A. Particle P will not pass through point B because it can only travel a maximum distance of $14\frac{22}{27} \text{ m}$ from point A, whereas point B is 15 m away from A.	1 1 1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(d) Zarah bergerak ke kiri / Particles move to the left, $v < 0$ $v_p < 0$ $3t^2 + 4t - 15 < 0$ $(3t - 5)(t + 3) < 0$  $3 < t < \frac{5}{3}$ $v_q < 0$ $2t^2 - 7t + 6 < 0$ $(2t - 3)(t - 2) < 0$  $\frac{3}{2} < t < 2$  Kedua-dua zarah bergerak ke kiri apabila $\frac{3}{2} < t < \frac{5}{3}$. Both particles were move to the left when $\frac{3}{2} < t < \frac{5}{3}$.	1 1 1	10
3	(a) $v_A = 24t - 4t^2 - 20$ $\frac{dv}{dt} = 0$ $24 - 8t = 0$ $t = 3 \text{ s}$ $v_{\text{maksimum / maximum}} = 24(3) - 4(3)^2 - 20$ $= 16 \text{ m s}^{-1}$	1 1 1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
	(b) (i) $s_A = \int (24t - 4t^2 - 20) dt$ $= \frac{24t^2}{2} - \frac{4t^3}{3} - 20t + c$ $t = 0, s_A = 0$ $0 = 12(0)^2 - \frac{4}{3}(0)^3 - 20(0) + c$ $c = 0$ $s_A = 12t^2 - \frac{4}{3}t^3 - 20t$ $s_B = \int (24t - 25) dt$ $= \frac{24t^2}{2} - 25t + c$ $t = 0, s_B = 0$ $0 = 12(0)^2 - 25(0) + c$ $c = 0$ $s_B = 12t^2 - 25t$ $s_A = s_B$ $12t^2 - \frac{4}{3}t^3 - 20t = 12t^2 - 25t$ $-\frac{4}{3}t^3 + 5t = 0$ $-t\left(\frac{4}{3}t^2 - 5\right) = 0$ $\frac{4}{3}t^2 = 5$ $t = \sqrt{\frac{15}{4}}$ $t = 1.936 \text{ s}$	1	10
		1	
		1	
		1	
		1	
		1	
		1	
		1	
		1	
		1	
	(ii) $v_A = 0$ $24t - 4t^2 - 20 = 0$ $t^2 - 6t + 5 = 0$ $(t - 1)(t - 5) = 0$ $t = 1 \text{ s}, 5 \text{ s}$ $s = \left \int_0^1 (24t - 4t^2 - 20) dt \right + \int_1^5 (24t - 4t^2 - 20) dt$ $= \left \left[12t^2 - \frac{4}{3}t^3 - 20t \right]_0^1 \right + \left[12t^2 - \frac{4}{3}t^3 - 20t \right]_1^5$ $= \left \left[12(1)^2 - \frac{4}{3}(1)^3 - 20(1) \right] - \left[12(0)^2 - \frac{4}{3}(0)^3 - 20(0) \right] \right +$ $\left[\left[12(5)^2 - \frac{4}{3}(5)^3 - 20(5) \right] - \left[12(1)^2 - \frac{4}{3}(1)^3 - 20(1) \right] \right $ $= \frac{28}{3} + \frac{128}{3}$ $= 52 \text{ m}$	1	
		1	
		1	
		1	

No	Skema Pemarkahan Marking Scheme	Markah Marks	Jumlah Markah Total Marks
4	(a) (i) $t = 5 \text{ s}$	1	
	(ii) Bergerak ke kiri / Moves to left: $v < 0$ $0 < t < 5$	1	
	(b) (i) $v \text{ (m s}^{-1}\text{)}$ 		
	$v = at^2 + bt + c$ pada / at $(0, 0)$ $0 = a(0)^2 + b(0) + c$ $0 = c$		
	$v = at^2 + bt + c$ pada / at $(5, 0)$ $0 = a(5)^2 + b(5) + c$ $0 = 25a + 5b$ $-25a = 5b$ $-5a = b \dots \textcircled{1}$	1	
	$v = at^2 + bt + c$ pada / at $(6, 12)$ $12 = a(6)^2 + b(6)$ $12 = 36a + 6(-5a)$ $12 = 36a - 30a$ $12 = 6a$ $2 = a$	1	
	Dari / From $\textcircled{1}$, $b = -5(2)$ $= -10$		
	$\therefore v = 2t^2 - 10$ (Tertunjuk / Shown)	1	
(ii) $v = 2t^2 - 10$ $a = \frac{dv}{dt}$ $a = 4t - 10$ apabila / when $t = 2 \text{ s}$ $a = 4(2) - 10$ $a = -2 \text{ m s}^{-2}$	1 1 1		

