



PROGRAM TUISYEN RAKYAT SELANGOR



SPM

MATEMATIK TAMBAHAN

DWIBAHASA



KITASELANGOR



DIKUASAI OLEH:



PROGRAM TUISYEN RAKYAT SELANGOR SPM



MATEMATIK TAMBAHAN

DWIBAHASA

PANEL PENULIS

Somu a/l Pantinaidu
Guru Cemerlang
SMK Subang Jaya

Nurul Ilani binti Ilham
Guru Cemerlang
SMK Sungai Pusu

Mohd Tauhid bin Ikhsan
SMK Pengkalan Permatang

Noor Shazwani binti Ramli
SM Sains Kuala Selangor

Norazlina binti Abd Khair
SMK Seri Garing

Wong Jin Wen
SMJK Kwang Hua

Program Tuisyen Rakyat Selangor Matematik Tambahan SPM

CIRI-CIRI EKSKLUSIF

- Modul ini disediakan berdasarkan Dokumen Standard Kurikulum dan Pentaksiran (DSKP) dan buku teks Matematik Tambahan KSSM.
- Latihan topikal disusun secara ansur maju berformatkan peperiksaan SPM terkini.
- Latihan yang padat, lengkap dan merangkumi pelbagai aras rendah, sederhana dan tinggi serta terdiri daripada soalan rutin, bukan rutin dan KBAT.
- Guru boleh mempelbagaikan kaedah pengajaran dengan mempraktikkan kaedah latih tubi berperingkat menggunakan bahan yang diberikan.
- Modul mesra pengguna dan boleh dimanfaatkan oleh semua kumpulan murid sama ada cemerlang, harapan atau galus serta membolehkan murid-murid menggunakan modul secara sendiri sebelum berbincang dengan guru.
- Satu set Kertas Model SPM dibekalkan pada akhir modul untuk memberikan gambaran sebenar peperiksaan SPM.
- Skema jawapan yang disediakan adalah berpandukan peraturan pemarkahan terkini yang menepati piawaian Lembaga Peperiksaan Malaysia (LPM) dan boleh diakses melalui kod QR sebagai panduan kepada guru dan murid.
- Penggubal modul berpengalaman luas dalam mata pelajaran Matematik Tambahan SPM terdiri dalam kalangan Guru Cemerlang dan Jurulatih Utama Negeri.
- Video Ulasan Jawapan juga disediakan untuk soalan-soalan tertentu bagi memastikan pengajaran dan pembelajaran (PdP) yang berkesan.

KANDUNGAN

Format Instrumen Peperiksaan SPM Matematik Tambahan iv

Analisis Soalan SPM 2022-2024 Matematik Tambahan v

Senarai Rumus vi

Jadual Taburan Kebarangkalian Normal viii

Tingkatan 4

BAB 1 Fungsi
Functions 1–8

BAB 2 Fungsi Kuadratik
Quadratic Functions 9–16

BAB 3 Sistem Persamaan
Systems of Equations 17–23

BAB 4 Indeks, Surd dan Logaritma
Indices, Surds and Logarithms 24–29

BAB 5 Janjang
Progressions 30–36

BAB 6 Hukum Linear
Linear Law 37–44

BAB 7 Geometri Koordinat
Coordinate Geometry 45–52

BAB 8 Vektor
Vectors 53–59

BAB 9 Penyelesaian Segi Tiga
Solution of Triangles 60–63

BAB 10 Nombor Indeks
Index Number 64–69

Tingkatan 5

BAB 1 Sukatan Membulat
Circular Measure 70 – 74

BAB 2 Pembezaan
Differentiation 75 – 82

BAB 3 Pengamiran
Integration 83 – 89

BAB 4 Pilih Atur dan Gabungan
Permutation and Combination 90 – 95

BAB 5 Taburan Kebarangkalian
Probability Distribution 96–105

BAB 6 Fungsi Trigonometri
Trigonometric Functions 106–113

BAB 7 Pengaturcaraan Linear
Linear Programming 114–120

BAB 8 Kinematik Gerakan Linear
Kinematics of Linear Motion 121–125

Kertas Model SPM 126–152



FORMAT INSTRUMEN PEPERIKSAAN SPM MATEMATIK TAMBAHAN

Bil.	Perkara	Kertas 1 (3472/1)	Kertas 2 (3472/2)
1	Jenis instrumen	Ujian bertulis	
2	Jenis item	• Subjektif respons terhadap • Subjektif respons terhadap berstruktur	
3	Bilangan soalan	Bahagian A 12 soalan (64 markah) (Jawab semua soalan) Bahagian B 3 soalan (16 markah) (Jawab dua soalan)	Bahagian A 7 soalan (50 markah) (Jawab semua soalan) Bahagian B 4 soalan (30 markah) (Jawab tiga soalan) Bahagian C 4 soalan (20 markah) (Jawab dua soalan)
4	Jumlah markah	80	100
5	Konstruk	• Mengingat dan memahami • Mengaplikasi • Menganalisis • Menilai • Mencipta	• Mengingat dan memahami • Mengaplikasi • Menganalisis • Menilai • Mencipta
6	Tempoh ujian	2 jam	2 jam 30 minit
7	Cakupan konstruk	Standard kandungan dan standard pembelajaran dalam Dokumen Standard Kurikulum dan Pentaksiran (DSKP) KSSM (Tingkatan 4 dan Tingkatan 5)	
8	Aras kesukaran	Rendah : Sederhana : Tinggi 5 : 3 : 2	
9	Kaedah penskoran	Analitik	
10	Alatan tambahan	Kalkulator saintifik yang tidak boleh diprogram	

ANALISIS SOALAN SPM 2022-2024

MATEMATIK TAMBAHAN

Bab		Tajuk	2022		2023		2024	
			Kertas 1	Kertas 2	Kertas 1	Kertas 2	Kertas 1	Kertas 2
Tingkatan 4	1	Fungsi <i>Functions</i>	3	7	6, 8		3, 8	
	2	Fungsi Kuadratik <i>Quadratic Functions</i>	8	6	8	8	8	6
	3	Sistem Persamaan <i>Systems of Equations</i>		7		7	5	
	4	Indeks, Surd dan Logaritma <i>Indices, Surds and Logarithms</i>	4, 6, 5		7, 8		3	6
	5	Janjang <i>Progressions</i>	9	7	2, 7	8	8	10
	6	Hukum Linear <i>Linear Law</i>	4	10	4	10	2	10
	7	Geometri Koordinat <i>Coordinate Geometry</i>	8	7	3	6	5	10
	8	Vektor <i>Vectors</i>	4	10	5	5	2, 8	8
Tingkatan 5	1	Sukatan Membulat <i>Circular Measure</i>	7			9	2	7
	2	Pembezaan <i>Differentiation</i>	3	10	9	7	9	7
	3	Pengamiran <i>Integration</i>	3	10		10	6	10
	4	Pilih Atur dan Gabungan <i>Permutation and Combination</i>	8		7		8, 6	
	5	Taburan Kebarangkalian <i>Probability Distribution</i>	3, 5	10	4	10		6
	6	Fungsi Trigonometri <i>Trigonometric Functions</i>	8	6	2, 8	10	5	10
Bahagian C (Kertas 2)								
Tingkatan 4	Penyelesaian Segi Tiga <i>Solution of Triangles</i>		10	Nombor Indeks <i>Index Number</i>				10
Tingkatan 5	Pengaturcaraan Linear <i>Linear Programming</i>		10	Kinematik Gerakan Linear <i>Kinematics of Linear Motion</i>				10

SENARAI RUMUS

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.
The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

- 1 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- 2 $a^m \times a^n = a^{m+n}$
- 3 $a^m \div a^n = a^{m-n}$
- 4 $(a^m)^n = a^{mn}$
- 5 $\log_a mn = \log_a m + \log_a n$
- 6 $\log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$
- 7 $\log_a mn = n \log_a m$
- 8 $\log_a b = \frac{\log_c b}{\log_c a}$
- 9 $T_n = a + (n-1)d$
- 10 $S_n = \frac{n}{2}[2a + (n-1)d]$
- 11 $T_n = ar^{n-1}$
- 12 $S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$
- 13 $S_\infty = \frac{a}{1 - r}, |r| < 1$
- 14 $y = uv, \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$
- 15 $y = \frac{u}{v}, \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$
- 16 $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
- 17 Luas di bawah lengkung
Area under a curve
 $= \int_a^b y \, dx$ atau/or
 $= \int_a^b x \, dy$
- 18 Isi padu kisanan
Volume of revolution
 $= \int_a^b \pi y^2 \, dx$ atau/or
 $= \int_a^b \pi x^2 \, dy$
- 19 $I = \frac{Q_1}{Q_0} \times 100$
- 20 $\bar{I} = \frac{\sum W_i I_i}{\sum W_i}$
- 21 ${}_nP_r = \frac{n!}{(n-r)!}$
- 22 ${}_nC_r = \frac{n!}{(n-r)! r!}$
- 23 $P(X = r) = {}^nC_r p^r q^{n-r}, p + q = 1$
- 24 Min/Mean = np
- 25 $\sigma = \sqrt{npq}$
- 26 $Z = \frac{X - \mu}{\sigma}$
- 27 Panjang lengkok, $s = j \theta$
Arc length, $s = r\theta$
- 28 Luas sektor, $L = \frac{1}{2} j^2 \theta$
Area of sector, $A = \frac{1}{2} j^2 \theta$
- 29 $\sin^2 A + \cos^2 A = 1$
 $\sin^2 A + \cos^2 A = 1$
- 30 $\sec^2 A = 1 + \tan^2 A$
 $\sec^2 A = 1 + \tan^2 A$
- 31 $\operatorname{cosec}^2 A = 1 + \cot^2 A$
 $\operatorname{cosec}^2 A = 1 + \cot^2 A$
- 32 $\sin 2A = 2 \sin A \cos A$
 $\sin 2A = 2 \sin A \cos A$

$$\begin{aligned} 33 \quad \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

$$\begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

$$34 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$\begin{aligned} 35 \quad \sin (A \pm B) &= \sin A \cos B \pm \cos A \sin B \\ \sin (A \pm B) &= \sin A \cos B \pm \cos A \sin B \end{aligned}$$

$$\begin{aligned} 36 \quad \cos (A \pm B) &= \cos A \cos B \mp \sin A \sin B \\ \cos (A \pm B) &= \cos A \cos B \mp \sin A \sin B \end{aligned}$$

$$37 \quad \tan (A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$38 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\begin{aligned} 39 \quad a^2 &= b^2 + c^2 - 2bc \cos A \\ a^2 &= b^2 + c^2 - 2bc \cos A \end{aligned}$$

$$\begin{aligned} 40 \quad \text{Luas segi tiga / Area of triangle} \\ &= \frac{1}{2} ab \sin c \end{aligned}$$

$$\begin{aligned} 41 \quad \text{Titik yang membahagi suatu tembereng garis} \\ \text{A point dividing a segment of a line} \\ (x, y) &= \left(\frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right) \end{aligned}$$

$$\begin{aligned} 42 \quad \text{Luas segi tiga/ Area of triangle} \\ &= \frac{1}{2} |(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)| \end{aligned}$$

$$43 \quad |r| = \sqrt{x^2 + y^2}$$

$$44 \quad \hat{r} = \frac{x\hat{i} + y\hat{j}}{\sqrt{x^2 + y^2}}$$

JADUAL TABURAN KEBARANGKALIAN NORMAL

KEBARANGKALIAN Hujung Atas $Q(Z)$ BAGI TABURAN NORMAL $N(0, 1)$
THE UPPER TAIL PROBABILITY $Q(Z)$ FOR THE NORMAL DISTRIBUTION $N(0, 1)$

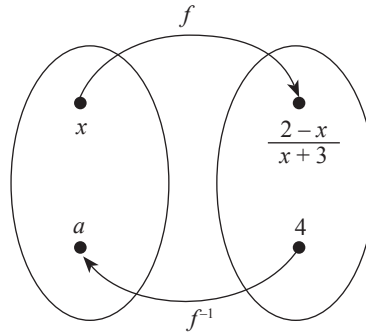
z	0	1	2	3	4	5	6	7	8	9	Tolak/Minus						7	8	9
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4

BAB
1

Fungsi
Functions



- 1 Rajah 1 menunjukkan perkaitan antara fungsi f dan fungsi songsangnya f^{-1} .
Diagram 1 shows a relation between function f and its inverse function f^{-1} .



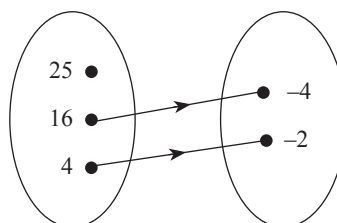
Rajah/Diagram 1

Menggunakan takrifan fungsi songsang, cari nilai pemalar a .
By using an inverse function definition, find the value of constant a .

[3 markah/marks]

Jawapan/Answer:

- 2 Adakah hubungan yang berikut suatu fungsi? Jelaskan.
Is the following relation a function? Explain.



[2 markah/marks]

Jawapan/Answer:

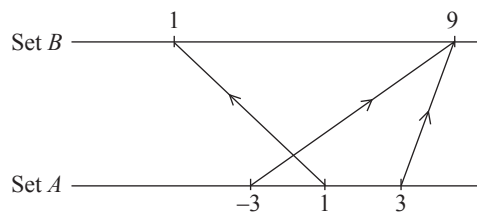
- 3 Fungsi f ditakrifkan oleh $f(x) = |2x - 1| + 2$. Lakarkan graf bagi f untuk domain $-1 \leq x \leq 2$. Seterusnya, nyatakan julat f yang sepadan untuk domain itu.
 Function f is defined as $f(x) = |2x - 1| + 2$. Sketch the graph of f for the domain $-1 \leq x \leq 2$. Hence, state the corresponding range of f for the given domain.

[3 markah/marks]

Jawapan/Answer:



- 4 Rajah 2 menunjukkan hubungan antara set A dan set B dalam bentuk rajah anak panah.
 Diagram 2 shows the relation between set A and set B in the form of arrow diagram.



Rajah/Diagram 2

- (a) Wakilkan hubungan itu dalam bentuk pasangan tertib.
 Represent the relation in the form of ordered pairs.

[1 markah/mark]

- (b) Nyatakan kodomain hubungan itu.
 State the codomain of the relation.

[1 markah/mark]

Jawapan/Answer:

- 5 Rajah 3 menunjukkan graf bagi fungsi $f: x \rightarrow |2x - 1|$ untuk domain $0 \leq x \leq 5$. Nyatakan

Diagram 3 shows the graph of the function $f: x \rightarrow |2x - 1|$ for the domain $0 \leq x \leq 5$. State

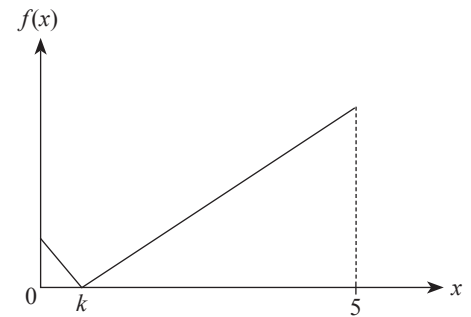
- (a) nilai k ,
the value of k ,

[2 markah/marks]

- (b) domain bagi $f(x) < 5$.
the domain of $f(x) < 5$.

[2 markah/marks]

Jawapan/Answer:



Rajah/Diagram 3

- 6 Rajah 4 menunjukkan graf yang mewakili satu hubungan. Nyatakan

Diagram 4 shows a graph that represents a relationship. State

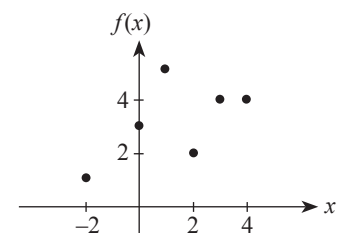
- (a) kodomain hubungan itu,
the codomain of the relation,

[1 markah/mark]

- (b) objek bagi 4.
the object of 4.

[1 markah/mark]

Jawapan/Answer:



Rajah/Diagram 4

- 7 Rajah 5 menunjukkan graf bagi fungsi $f: x \rightarrow |1 - 2x|$ untuk domain $-2 \leq x \leq 4$. Nyatakan

Diagram 5 shows the graph of the function $f: x \rightarrow |1 - 2x|$ for the domain $-2 \leq x \leq 4$. State

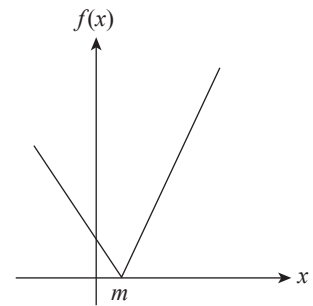
- (a) nilai m ,
the value of m ,

[2 markah/marks]

- (b) domain bagi $f(x) < 3$.
the domain of $f(x) < 3$.

[2 markah/marks]

Jawapan/Answer:



Rajah/Diagram 5

- 8 Fungsi g ditakrifkan oleh $g: x \rightarrow 3x - 5$. Cari

Function g is defined by $g: x \rightarrow 3x - 5$. Find

- (a) nilai x apabila $g(x)$ memetakan kepada diri sendiri,
the value of x when $g(x)$ maps to itself,

[2 markah/marks]

- (b) nilai h dengan keadaan $g(2 + h) = 4h$.
the value of h such that $g(2 + h) = 4h$.

[2 markah/marks]

Jawapan/Answer:

- 9 Diberi fungsi $f(x) = 2x + 1$ dan $g(x) = -\frac{3x}{x+1}$, $x \neq -1$. Cari nilai x apabila $fg = gf$.

Given function $f(x) = 2x + 1$ and $g(x) = -\frac{3x}{x+1}$, $x \neq -1$. Find the value of x when $fg = gf$.

[5 markah/marks]

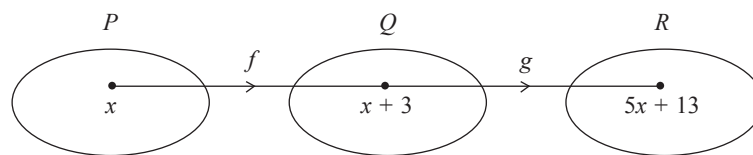
Jawapan/Answer:

- 10 Diberi bahawa $g(x) = \frac{2x-3}{2h}$, $h \neq 0$ dan $g^{-1}(x) = \frac{5x+3}{k}$, $k \neq 0$, dengan keadaan k dan h ialah pemalar. Cari nilai-nilai bagi k dan h .
It is given that $g(x) = \frac{2x-3}{2h}$, $h \neq 0$ and $g^{-1}(x) = \frac{5x+3}{k}$, $k \neq 0$, such that k and h are constants. Find the values of k and h .

[3 markah/marks]

Jawapan/Answer:

- 11 Rajah 6 menunjukkan fungsi f yang memetakan set P kepada set Q dan fungsi g yang memetakan set Q kepada set R .
Diagram 6 shows the function f that maps set P to set Q and the function g that maps set Q to set R .



Rajah/Diagram 6

Tentukan fungsi $g(-1)$.
Determine the function $g(-1)$.

[3 markah/marks]

Jawapan/Answer:

- 12 Sahkan kebenaran bahawa fungsi $p(x) = \sqrt{x}$ mempunyai fungsi songsang, $q(x) = x^2$.
Verify the function $p(x) = \sqrt{x}$ has an inverse function, $q(x) = x^2$.

[3 markah/marks]

Jawapan/Answer:

13 Fungsi h ditakrifkan oleh $h : x \rightarrow \frac{1}{x}, x \neq 0$.

Function h is defined by $h : x \rightarrow \frac{1}{x}, x \neq 0$.

(a) Ungkapkan $h^2(x)$, $h^3(x)$ dan $h^4(x)$ dalam bentuk termudah.
Express $h^2(x)$, $h^3(x)$ and $h^4(x)$ in the simplest form.

[3 markah/marks]

(b) Seterusnya, cari nilai $h^{22}(x)$ dan $h^{33}(x)$.
Hence, find $h^{22}(x)$ and $h^{33}(x)$.

[2 markah/marks]

Jawapan/Answer:

14 Rajah 7 menunjukkan fungsi $f(x) = -x^3 - 4x^2 - 2x + 3$ untuk domain $-4 \leq x \leq 1$.

Diagram 7 shows the function $f(x) = -x^3 - 4x^2 - 2x + 3$ for the domain $-4 \leq x \leq 1$.

(a) Nyatakan

State

- sama ada fungsi f itu diskret atau selanjar,
whether the function f is discrete or continuous,
- julat f yang sepadan dengan domain yang diberi.
the corresponding range of f to the domain given.

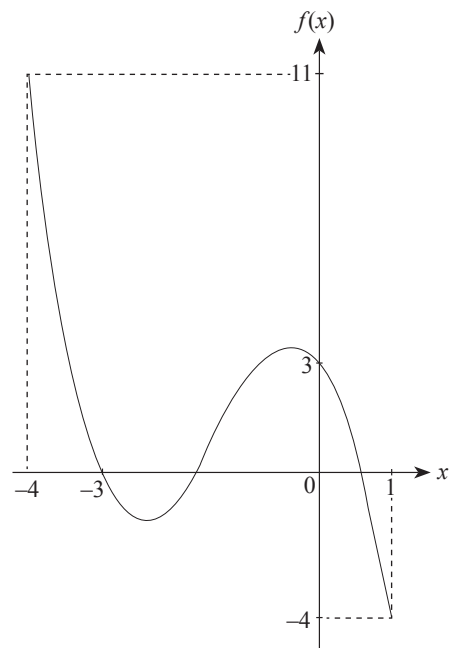
[2 markah/marks]

(b) Dengan menggunakan ujian garis mengufuk, tentukan sama ada f mempunyai fungsi songsang atau tidak. Beri alasan bagi jawapan anda.

By using the horizontal line test, determine whether function f has an inverse or not. Give a reason for your answer.

[1 markah/mark]

Jawapan/Answer:



Rajah/Diagram 7

- 15 Rajah 8 menunjukkan fungsi h yang memetakan x kepada y dan fungsi g yang memetakan y kepada z . Tentukan

Diagram 8 below shows the function h that maps x to y and the function g that maps y to z . Determine

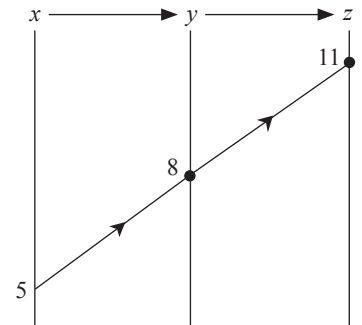
(a) $h^{-1}(8)$,

[1 markah/mark]

(b) $gh(5)$.

[1 markah/mark]

Jawapan/Answer:



Rajah/Diagram 8

- 16 Rajah 9 mewakili pemetaan y kepada x oleh fungsi $k(y) = py + q$ dan pemetaan y kepada z oleh fungsi $h(y) = \frac{6}{2y-q}, y \neq \frac{q}{2}$. Cari

Diagram 9 shows the mapping of y to x given by the function $k(y) = py + q$ and the mapping of y to z given by the function $h(y) = \frac{6}{2y-q}, y \neq \frac{q}{2}$. Find

- (a) nilai p dan nilai q ,
the values of p and q ,

[4 markah/marks]

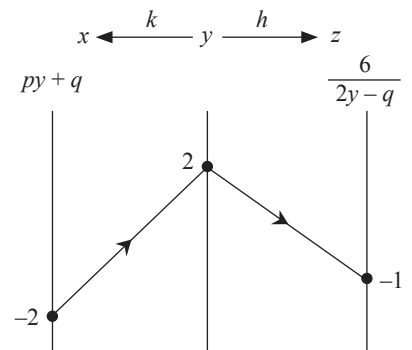
- (b) fungsi yang memetakan x kepada y ,
the function that maps x to y ,

[1 markah/mark]

- (c) fungsi yang memetakan x kepada z .
the function that maps x to z .

[2 markah/marks]

Jawapan/Answer:



Rajah/Diagram 9

17 Diberi $p(x) = \frac{x+1}{\sqrt{x-3}}$, tentukan domain $p(x)$.

Given $p(x) = \frac{x+1}{\sqrt{x-3}}$, determine domain $p(x)$.

[2 markah/marks]

Jawapan/Answer:

18 Pendapatan daripada jualan harian bagi sebuah bakeri bergantung kepada bilangan pembelian buku roti, x yang dimodelkan oleh fungsi $c(x) = 3x + 5$ dengan RM5 ialah caj penghantaran roti tersebut. Tentukan jumlah pendapatan kedai itu dalam masa sehari jika jumlah pembelian roti ialah sebanyak 50 buku.

The daily sales revenue of a bakery depends on the number of bread loaves purchased, x and is modelled by the function $c(x) = 3x + 5$, with RM5 being the delivery charge for the bread. Determine the total revenue of the bakery in a day if the number of bread loaves purchased is 50.

[2 markah/marks]

Jawapan/Answer:

BAB
2Fungsi Kuadratik
Quadratic Functions

- 1 Punca-punca bagi persamaan $x^2 - 3x + k = 0$ adalah dengan keadaan bahawa satu punca adalah dua kali punca yang satu lagi.

The roots of the equation $x^2 - 3x + k = 0$ are such that one root is twice the other.

- (a) Dengan menggunakan α sebagai salah satu puncanya, cari nilai yang mungkin bagi k .

Using α as one of the roots, find the possible value of k .

[2 markah/marks]

- (b) Seterusnya, nyatakan nilai-nilai yang sepadan bagi punca-punca itu.

Hence, state the corresponding values of the roots.

[1 markah/mark]

Jawapan/Answer:

-
- 2 Diberi bahawa m dan n adalah punca-punca bagi persamaan $2x^2 = 3x - 4$.

It is given that m and n are the roots of equation $2x^2 = 3x - 4$.

- (a) Bentukkan persamaan yang mempunyai punca-punca $m - n$ dan $n - m$.

Form an equation that has roots $m - n$ and $n - m$.

[5 markah/marks]

- (b) Tunjukkan bahawa $2m^2 - 3m + 4 = 0$.

Show that $2m^2 - 3m + 4 = 0$.

[2 markah/marks]

Jawapan/Answer:

- 3 Cari julat nilai x bagi $(2x - 1)(x + 4) \geq 4 + x$.
Find the range of values of x for $(2x - 1)(x + 4) \geq 4 + x$.

[2 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 4 Suatu garis lurus, $x + y = q$ bersilang dengan suatu lengkung, $x^2 - 2x + 2y^2 = 3$ pada dua titik berbeza. Tunjukkan bahawa $q^2 < 2q + 5$.
A straight line, $x + y = q$ intersects with a curve, $x^2 - 2x + 2y^2 = 3$ at two distinct points. Show that $q^2 < 2q + 5$.

[4 markah/marks]

Jawapan/Answer:

- 5 Cari julat nilai k jika lengkung $x(x + y) = k$ tidak menyilang dengan garis $y = 2x + 3$.
Find the range of values of k if the curve $x(x + y) = k$ does not intersect the line $y = 2x + 3$.

[2 markah/marks]

Jawapan/Answer:

- 6 Dengan menggunakan kaedah penyempurnaan kuasa dua, ungkapkan fungsi kuadratik $f(x) = 2x^2 + 7x - 2$ dalam bentuk $a(x + b)^2 + c$ dengan keadaan a , b dan c ialah pemalar. Nyatakan nilai-nilai bagi a , b , dan c .
By using completing the square method, express the quadratic function $f(x) = 2x^2 + 7x - 2$ in the form of $a(x + b)^2 + c$ where a , b and c are constants. State the values of a , b and c .

[3 markah/marks]

Jawapan/Answer:

- 7 Diberi fungsi kuadratik $h(x) = 11 - (x + 3)^2$.
Given a quadratic function $h(x) = 11 - (x + 3)^2$.
 (a) Lakarkan graf bagi fungsi kuadratik tersebut.
Sketch the graph of the quadratic function.

[3 markah/marks]

- (b) Tulis fungsi kuadratik $g(x)$ apabila graf itu dipantulkan pada paksi- $h(x)$.
Write the quadratic function $g(x)$ if the graph is reflected on the $h(x)$ -axis.

[1 markah/mark]

Jawapan/Answer:

8 Diberi bahawa fungsi $f(x) = -2x^2 + mx + n$ mempunyai titik maksimum pada $\left(\frac{5}{4}, \frac{97}{8}\right)$.

It is given that the function $f(x) = -2x^2 + mx + n$ has a maximum point at $\left(\frac{5}{4}, \frac{97}{8}\right)$.

(a) Dengan menggunakan kaedah penyempurnaan kuasa dua, cari nilai m dan n .

By using the completing the square method, find the value of m and of n .

[5 markah/marks]

(b) Seterusnya, lakar graf $f(x)$ bagi $-2 \leq x \leq 4$.

Hence, sketch the graph $f(x)$ for $-2 \leq x \leq 4$.

[2 markah/marks]

Jawapan/Answer:

9 (a) Dengan menggunakan kaedah garis nombor, cari julat nilai x jika $x^2 < -9x - 8$.

By using the method of number line, find the range of x if $x^2 < -9x - 8$.

[3 markah/marks]

(b) Dengan menggunakan kaedah penyempurnaan kuasa dua, cari titik maksimum atau minimum bagi $k(x) = 2x^2 - 5x + 3$. Seterusnya, nyatakan persamaan paksi simetri.

By using the completing the square method, find the maximum or minimum point of $k(x) = 2x^2 - 5x + 3$.

Hence, state the equation of the axis of symmetry.

[3 markah/marks]

Jawapan/Answer:



- 10 Rajah 1 menunjukkan suatu graf lengkung kuadratik.

Diagram 1 shows a graph of quadratic curve.

- (a) Bentukkan fungsi kuadratik dalam bentuk pintasan.

Form a quadratic function in the intercept form.

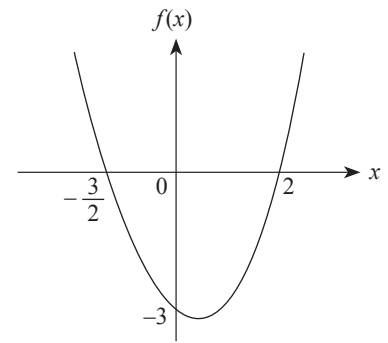
[2 markah/marks]

- (b) Seterusnya, dengan menggunakan kaedah penyempurnaan kuasa dua, tentukan titik minimum bagi fungsi itu.

Hence, by using completing the square method, find the minimum point of the function.

[3 markah/marks]

Jawapan/Answer:



Rajah/Diagram 1

- 11 Rajah 2 menunjukkan satu graf fungsi kuadratik $f(x) = -2(x - k)^2 + h$.

Diagram 2 shows the graph of quadratic function $f(x) = -2(x - k)^2 + h$.

- (a) Nyatakan kesan terhadap kedudukan graf $f(x)$ apabila

State the effect on the position of the graph $f(x)$ when

- (i) nilai h berkurang,
the value of h decreases,
(ii) nilai k bertambah.
the value of k increases.

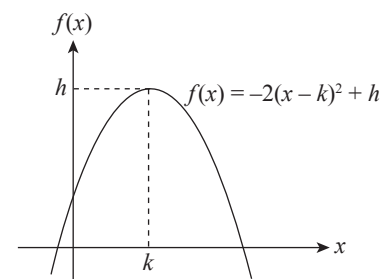
[2 markah/marks]

- (b) Nyatakan fungsi $f(x)$ apabila graf dipantulkan pada garis lurus $y = h$.

State the function $f(x)$ when the graph is reflected on the straight line $y = h$.

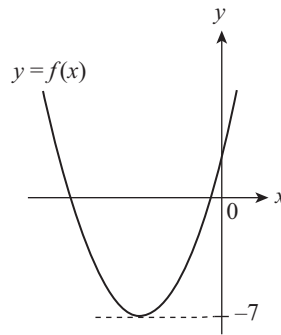
[1 markah/mark]

Jawapan/Answer:



Rajah/Diagram 2

- 12 Rajah 3 menunjukkan graf fungsi kuadratik $f(x) = (x + 3)^2 + 3k - 1$, dengan keadaan k ialah pemalar.
 Diagram 3 shows the graph of the quadratic function $f(x) = (x + 3)^2 + 3k - 1$, where k is a constant.



Rajah/Diagram 3

- (a) Nyatakan persamaan paksi simetri bagi lengkung itu.

State the equation of the axis of symmetry for the curve.

[1 markah/mark]

- (b) Diberi nilai minimum bagi lengkung itu ialah -7 , hitung nilai k . Seterusnya, nyatakan persamaan lengkung itu apabila dipantulkan pada paksi- x .

Given the minimum value of the curve is -7 , calculate the value of k . Hence, state the equation of the curve when reflected on the x -axis.

[3 markah/marks]

Jawapan/Answer:

- 13 Sebuah kilang lampu lekapan mempunyai kos pengeluaran harian $C = 0.25n^2 - 10n + 800$, dengan keadaan C ialah jumlah kos harian dalam RM dan n ialah bilangan lampu lekapan yang dihasilkan. Dengan menggunakan kaedah penyempurnaan kuasa dua, berapa banyakkah lampu lekapan perlu dihasilkan dengan menggunakan kos paling minimum?

A light fixture factory has daily production costs of $C = 0.25n^2 - 10n + 800$, such that C is the total daily cost in RM and n is the number of light fixtures produced. By using completing the square method, how many light fixtures should be produced by using the minimum cost?

[3 markah/marks]

Jawapan/Answer:

- 14 Diberi fungsi $f(x) = px^2 + 4x + q$, dengan keadaan p dan q ialah pemalar.
Given the function $f(x) = px^2 + 4x + q$, where p and q are constants.

(a) Tunjukkan bahawa

Show that

$$f(x) = p\left(x + \frac{2}{p}\right)^2 + \frac{pq - 4}{p}$$

[2 markah/marks]

- (b) Jika titik minimum bagi $f(x)$ ialah $(-4, 2)$, cari nilai p dan q .

If the minimum point of $f(x)$ is $(-4, 2)$, find the values of p and q .

[2 markah/marks]

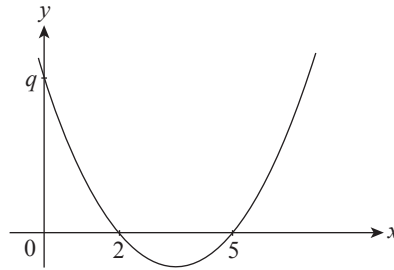
- (c) Seterusnya, lakar graf $f(x)$ tersebut.

Hence, sketch the graph of $f(x)$.

[3 markah/marks]

Jawapan/Answer:

- 15 (a) Rajah 4 menunjukkan graf bagi $y = 2x^2 + px + q$.
 Diagram 4 shows a graph $y = 2x^2 + px + q$.



Rajah/Diagram 4

Jika m dan n ialah punca-punca persamaan kuadratik $2x^2 + px + q = 0$, nyatakan

If m and n are the roots of the quadratic equation $2x^2 + px + q = 0$, state

- (i) $m + n$
- (ii) mn

[2 markah/marks]

- (b) Diberi punca-punca persamaan $3x^2 + 2x = 6$ ialah α dan β . Bentukkan persamaan kuadratik yang mempunyai punca-punca $\frac{\alpha}{\beta}$ dan $\frac{\beta}{\alpha}$.

Given the roots of equation $3x^2 + 2x = 6$ are α and β . Form a quadratic equation that has roots of $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$.

[3 markah/marks]

- (c) Diberi persamaan kuadratik $x^2 + (3h - 1)x = -2h - 10$ mempunyai dua punca nyata dan berbeza, dengan keadaan h ialah pemalar. Cari julat nilai h .

Given the quadratic equation $x^2 + (3h - 1)x = -2h - 10$ has two real and different roots, such that h is a constant. Find the range of values of h .

[3 markah/marks]

Jawapan/Answer:

BAB
3Sistem Persamaan
Systems of Equations

- 1 Selesaikan persamaan serentak berikut dengan menggunakan kaedah penghapusan.
Solve the following simultaneous equation by using the elimination method.

$$\begin{aligned}x + 2y &= 8 \\ 3x + 4y &= 12\end{aligned}$$

[3 markah/marks]

Jawapan/Answer:

-
- 2 Selesaikan persamaan serentak yang berikut dengan menggunakan kaedah penggantian.
Solve the following simultaneous equation by using the substitution method.

$$\begin{aligned}4p - 3q &= 10 \\ 2p + 5q &= -8\end{aligned}$$

[3 markah/marks]

Jawapan/Answer:

- 3 Selesaikan sistem persamaan linear berikut dengan menggunakan kaedah penggantian.
Solve the following system of linear equations using the substitution method.

$$\begin{aligned}4q - 2p - r &= -8 \\3p + 6r - q &= 2 \\9p - 2q &= 6\end{aligned}$$

[5 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 4 Selesaikan sistem persamaan linear berikut dengan menggunakan kaedah penghapusan.
Solve the following system of linear equations using the elimination method.

$$\begin{aligned}3x - 3y - z &= -4 \\2x - y + z &= -3 \\2x + 2y + 3z &= 2\end{aligned}$$

[5 markah/marks]

Jawapan/Answer:

- 5 Selesaikan persamaan serentak berikut.
Solve the following simultaneous equations.

$$\begin{aligned}x - y &= 4 \\ 2x^2 + y &= 17\end{aligned}$$

[4 markah/marks]

Jawapan/Answer:

Tingkatan 4

-
- 6 Selesaikan sistem persamaan linear yang berikut.
Solve the following system of linear equations.

$$\begin{aligned}0.3p + 0.6q + 0.1r &= 50 \\ 0.1p + 0.3q + 0.7r &= 40 \\ 0.6p + 0.1q + 0.2r &= 45\end{aligned}$$

[5 markah/marks]

Jawapan/Answer:

- 7 Selesaikan persamaan serentak $p + m = 1$ dan $p^2 + 2m^2 + pm = 8$. Berikan jawapan anda betul kepada tiga angka bererti.
Solve the simultaneous equations $p + m = 1$ and $p^2 + 2m^2 + pm = 8$. Give your answers correct to three significant figures.

[5 markah/marks]

Jawapan/Answer:

- 8 Selesaikan sistem persamaan linear yang berikut dengan menggunakan kaedah penghapusan.
Solve the following system of linear equations using the elimination method.

$$4x + y = x^2 + x - y = -3$$

[5 markah/marks]

Jawapan/Answer:

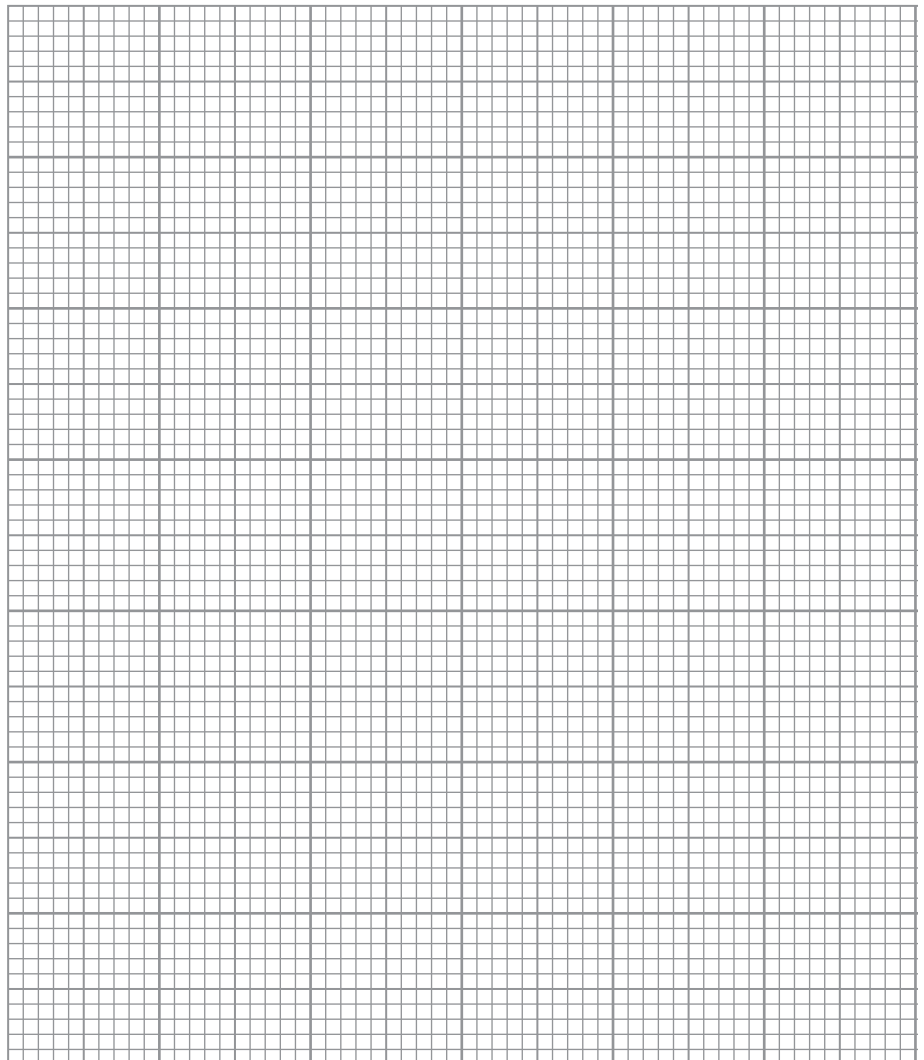
- 9 Selesaikan persamaan serentak berikut menggunakan kaedah perwakilan graf.
Solve the following simultaneous equations using the graphical representation method.

$$2x + y = 2$$

$$2x^2 - y = 10$$

[8 markah/marks]

Jawapan/Answer:



- 10** Tiga orang sahabat, Ashriyn, Deviyna dan Karisha pergi ke sebuah restoran dan memesan makanan. Ashriyn memesan dua hidangan nasi goreng, satu hidangan ayam bakar dan segelas jus oren. Deviyna memesan tiga hidangan nasi goreng, dua hidangan ayam bakar dan segelas jus oren. Karisha pula memesan satu hidangan nasi goreng, tiga hidangan ayam bakar dan dua gelas jus oren. Jumlah kos yang dibayar oleh Ashriyn, Deviyna dan Karisha masing-masing adalah RM40.50, RM65.50 dan RM66. Tentukan harga bagi satu hidangan nasi goreng, satu hidangan ayam bakar dan segelas jus oren.

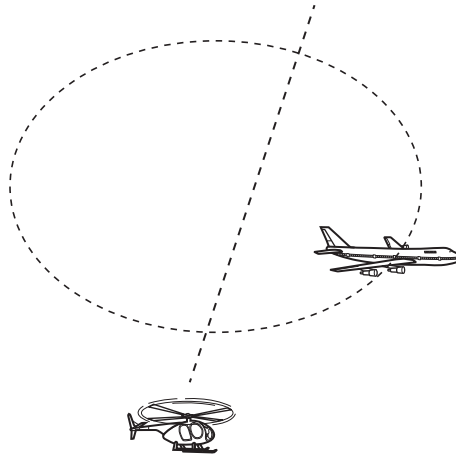
Three friends, Ashriyn, Deviyna dan Karisha went to a restaurant and ordered some food. Ashriyn ordered two servings of fried rice, one serving of grilled chicken and one glass of orange juice. Deviyna ordered three servings of fried rice, two servings of grilled chicken and one glass of orange juice. Karisha ordered one serving of fried rice, three servings of grilled chicken and two glasses of orange juice. The total cost paid by Ashriyn, Deviyna and Karisha were RM40.50, RM65.50 and RM66 respectively. Determine the price of one serving of fried rice, one serving of grilled chicken and a glass of orange juice.

[7 markah/marks]

Jawapan/Answer:

- 11 Rajah 1 menunjukkan pergerakan sebuah kapal terbang dan sebuah helikopter.

Diagram 1 shows the movement of an aeroplane and a helicopter.



Rajah/Diagram 1

Kapal terbang itu bergerak secara membulat dengan keadaan persamaan lokusnya ialah $x^2 + 2y^2 + x - y = 25$. Helikopter itu pula bergerak sepanjang garis lurus dengan persamaan $y - 3x + 1 = 0$ dan bersilang dengan lokus kapal terbang itu. Cari titik-titik persilangan antara lokus kapal terbang dan pergerakan helikopter tersebut.

The aeroplane is moving in a circular manner with the equation of its locus being $x^2 + 2y^2 + x - y = 25$. Meanwhile, the helicopter is moving along a straight line of equation $y - 3x + 1 = 0$ and intersects with the locus of the aeroplane. Find the points of intersection between the locus of the aeroplane and the movement of the helicopter.

[5 markah/marks]

Jawapan/Answer:

VIDEO ULASAN
JAWAPAN



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

- 1 Ringkaskan yang berikut.
Simplify the following.

(a) $(x^2y)^2 \div x^3y^2$

[1 markah/mark]

(b) ${}^4\sqrt{pq} \times {}^4\sqrt{pq^4} \times {}^4\sqrt{pq^2}$

[2 markah/marks]

Jawapan/Answer:

-
- 2 Hitung nilai yang berikut.
Calculate the value of the following.

$$(25)^{\frac{3}{2}} \times (125)^{-\frac{2}{3}} \times (625)^{-\frac{1}{4}}$$

[2 markah/marks]

Jawapan/Answer:

- 3 Selesaikan persamaan berikut.
Solve the following equation.

$$3 \times 9^{2x+1} = 27^{x+3}$$

[3 markah/marks]

Jawapan/Answer:

- 4 (a) Diberi $2^n 3^n 12^m = 2^{3n-m} 3^{3n-2m}$, cari $m : n$.
Given $2^n 3^n 12^m = 2^{3n-m} 3^{3n-2m}$, find $m : n$.

[2 markah/marks]

- (b) Persamaan garis lurus $y = mx + 3$, melalui titik $(1 + \sqrt{5}, 7)$. Tentukan kecerunan garis lurus dalam bentuk $a + \sqrt{b}$.

The equation of a straight of the line $y = mx + 3$, through the point $(1 + \sqrt{5}, 7)$. Determine the gradient of the straight line in the form of $a + \sqrt{b}$.

[3 markah/marks]

- (c) Diberi $\log_3 h - 3 \log_{27} k = 1$, ungkapkan h dalam sebutan k .
Given that $\log_3 h - 3 \log_{27} k = 1$, express h in terms of k .

[4 markah/marks]

Jawapan/Answer:

5 (a) Tunjukkan $\sqrt{\frac{27^n \times 3^7}{3^{-2n}}} = 3^{2n+3} \times \sqrt{3^{n+1}}.$

Show that $\sqrt{\frac{27^n \times 3^7}{3^{-2n}}} = 3^{2n+3} \times \sqrt{3^{n+1}}.$

[2 markah/marks]

(b) Diberi $3^{\log_3 a} = x^2$ dan $5^{\log_5 b} = y^{\frac{3}{2}}$. Cari

Given that $3^{\log_3 a} = x^2$ and $5^{\log_5 b} = y^{\frac{3}{2}}$. Find

(i) $\frac{2x^2 + 3}{4y^3}$ dalam sebutan a dan b ,

$\frac{2x^2 + 3}{4y^3}$ in terms of a and b ,

(ii) nilai bagi $\log_a x^2 + \log_b y$.
the value of $\log_a x^2 + \log_b y$.

[5 markah/marks]

Jawapan/Answer:

6 Tanpa menggunakan kalkulator, ungkapkan $6(1 + \sqrt{3})^{-2}$ dalam bentuk $a + b\sqrt{3}$, dengan keadaan a dan b ialah integer. Seterusnya, tentukan nilai a dan b .

Without using a calculator, express $6(1 + \sqrt{3})^{-2}$ in the form of $a + b\sqrt{3}$, such that a and b are integers. Hence, determine the values of a and b .

[4 markah/marks]

Jawapan/Answer:

7 (a) Selesaikan $\ln \frac{3}{2} x = 4$.

Solve $\ln \frac{3}{2} x = 4$.

[2 markah/marks]

(b) Diberi $\log_{p+q} 625 = 4$ dan $\log_{2p-q} 1\,024 = 5$, cari nilai p dan q .
Given that $\log_{p+q} 625 = 4$ and $\log_{2p-q} 1\,024 = 5$, find the values of p and q .

[4 markah/marks]

Jawapan/Answer:



8 (a) (i) Permudahkan $(\log_a b^n)(\log_b c)$.

Simplify $(\log_a b^n)(\log_b c)$.

(ii) Seterusnya, cari nilai $(\log_2 b^3)(\log_b 64) - 1$.

Hence, find the value of $(\log_2 b^3)(\log_b 64) - 1$.

[3 markah/marks]

(b) Diberi panjang seutas tali pada mulanya ialah $22 + \sqrt{5}$ cm. Apabila dibahagikan kepada tiga bahagian yang sama, panjang setiap bahagian menjadi $\frac{x}{3}(1 + \sqrt{20})$ cm. Terdapat lebih tali sebanyak $3 + \sqrt{5}$ cm. Cari nilai x , dalam bentuk $(a + b\sqrt{c})$ dengan a , b dan c ialah integer.

Given the initial length of a string is $22 + \sqrt{5}$ cm. When divided into three equal parts, the length of each part becomes $\frac{x}{3}(1 + \sqrt{20})$ cm. There is a remaining string of $3 + \sqrt{5}$ cm. Find the value of x , in the form of $(a + b\sqrt{c})$ such that a , b and c are integers.

[3 markah/marks]

Jawapan/Answer:

- 9 (a) Jika $\log_2 p = q$, ungkapkan $16^q - 4^{-q}$ dalam sebutan p .
If $\log_2 p = q$, express $16^q - 4^{-q}$ in terms of p .

[3 markah/marks]

- (b) Diberi bahawa $\log_x 81 = \log_3 x$, cari nilai-nilai x .
It is given that $\log_x 81 = \log_3 x$, find the values of x .

[3 markah/marks]

Jawapan/Answer:

- 10 Nilai sebuah rumah meningkat daripada nilai asalnya setiap tahun. Selepas n tahun, nilainya, RMV , diberi oleh $V = 250\,000e^{an}$. Diberi bahawa apabila $n = 3$, $V = 350\,000$. Cari
The value of the house increases of its initial value every year. After n years, the value, RMV , is given by $V = 250\,000e^{an}$. When $n = 3$, $V = 350\,000$. Find

- (a) nilai awal rumah itu,
the initial value of the house,

[1 markah/mark]

- (b) nilai a ,
the value of a ,

[3 markah/marks]

- (c) anggaran bilangan tahun yang diperlukan untuk rumah itu meningkat dua kali ganda nilainya.
the estimation number of years it takes for the house to double in value.

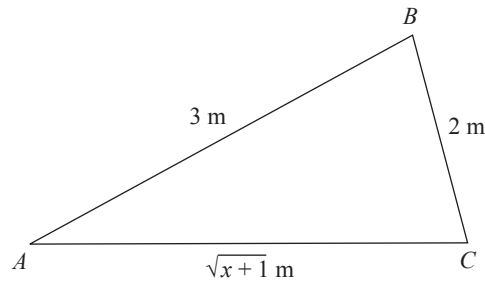
[3 markah/marks]

Jawapan/Answer:

- 11 (a) Buktikan $\sqrt[3]{x} = x^{\frac{1}{3}}$.
 Prove $\sqrt[3]{x} = x^{\frac{1}{3}}$.

[2 markah/marks]

- (b) Rajah 1 menunjukkan sebuah segi tiga ABC dengan keadaan $AC \neq BC$.
 Diagram 1 shows a triangle ABC such that $AC \neq BC$.



Rajah/Diagram 1

Diberi panjang AB , BC dan AC masing-masing, dalam meter, ialah 3, 2 dan $\sqrt{x+1}$. Jika perimeter segi tiga ABC ialah x m, cari panjang AC .

Given the lengths of AB , BC and AC , in meter, is 3, 2 and $\sqrt{x+1}$ respectively. If the perimeter of triangle ABC is x m, find the length of AC .

[5 markah/marks]

Jawapan/Answer:

BAB
5Janjang
Progressions

- 1 Tiga sebutan pertama suatu janjang aritmetik ialah $2x - 3$, $x + 2$ dan 7. Cari, dalam sebutan x ,
The first three terms of an arithmetic progression are $2x - 3$, $x + 2$ and 7. Find, in terms of x ,

(a) beza sepunya janjang itu,
the common difference of the progression,

[1 markah/mark]

(b) hasil tambah 12 sebutan pertama janjang itu.
the sum of the first 12 terms of the progressions.

[2 markah/marks]

Jawapan/Answer:

-
- 2 Hasil tambah n sebutan pertama bagi suatu janjang aritmetik diberi oleh $S_n = \frac{n}{2}(5n - 3)$. Cari
The sum of the first n terms of an arithmetic progression is given by $S_n = \frac{n}{2}(5n - 3)$. Find

(a) hasil tambah 10 sebutan pertama,
the sum of the first 10 terms,

[2 markah/marks]

(b) sebutan ke-10.
the 10th term.

[2 markah/marks]

Jawapan/Answer:

- 3 Diberi bahawa q , $p - 3$ dan $4p + 3q$ ialah tiga sebutan berturutan bagi suatu janjang aritmetik.

It is given that q , $p - 3$ and $4p + 3q$ are three consecutive terms of an arithmetic progression.

- (a) Ungkapkan p dalam sebutan q .

Express p in terms of q .

[2 markah/marks]

- (b) Cari beza sepunya janjang itu jika $q = 2$.

Find the common difference of the progression if $q = 2$.

[2 markah/marks]

Jawapan/Answer:

-
- 4 $\ln x$, $\ln (x + 2)$ dan $\ln (x + 12)$ ialah tiga sebutan pertama yang berturutan dalam suatu janjang aritmetik.

Cari nilai x .

$\ln x$, $\ln (x + 2)$ and $\ln (x + 12)$ are the first three consecutive terms in an arithmetic progression. Find the value of x .

[3 markah/marks]

Jawapan/Answer:

- 5 Lima sebutan pertama bagi suatu janjang geometri ialah $\frac{7}{8}, x, y, \frac{7}{64}, \frac{7}{128}, \dots$. Hitung jumlah x dan y .

The first five terms of a geometric progression are $\frac{7}{8}, x, y, \frac{7}{64}, \frac{7}{128}, \dots$. Calculate the sum of x and y .

[3 markah/marks]

Jawapan/Answer:

- 6 Hasil tambah n sebutan pertama bagi janjang geometri $512x, 256x, 128x, \dots$ ialah $1\,016x$. Cari
The sum of the first n terms of geometric progression $512x, 256x, 128x, \dots$ is $1\,016x$. Find

- (a) nisbah sepunya janjang itu,
the common ratio of the progression,

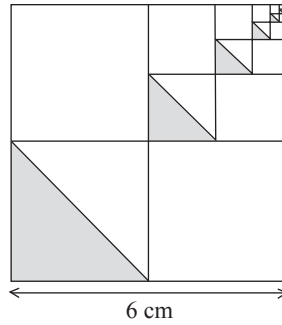
[1 markah/mark]

- (b) nilai n .
the value of n .

[2 markah/marks]

Jawapan/Answer:

- 7 Rajah 1 menunjukkan satu corak yang berulang sehingga ketakterhinggaan yang terdiri daripada segi empat sama dan segi tiga berlorek. Diberi panjang sisi segi empat sama yang terbesar ialah 6 cm.
Diagram 1 shows a pattern that repeats itself to infinity consisting squares and shaded triangles. Given the length of a side of the biggest square is 6 cm.



Rajah/Diagram 1

Cari

Find

- (a) panjang tapak bagi segi tiga yang ke-7,
the base length of the 7th triangle,
- (b) luas kawasan berlorek, dalam cm².
the area of shaded region, in cm².

[2 markah/marks]

[4 markah/marks]

Jawapan/Answer:

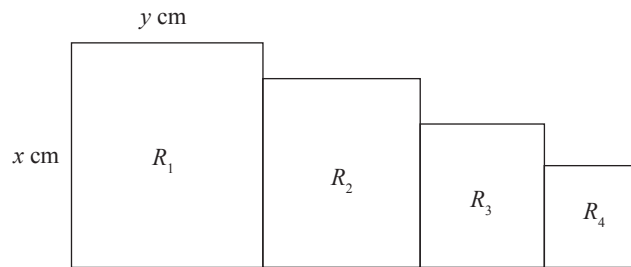
- 8 Diberi bahawa ... , 1 365, k , 12 285, ... ialah tiga sebutan berturut-turut daripada suatu janjang geometri. Hasil tambah empat sebutan pertama bagi janjang ini ialah 18 200 dan $r > 0$. Cari
It is given that ..., 1 365, k , 12 285, ... are three consecutive terms of a geometric progression. The sum of the first four terms for this progression is 18 200 and $r > 0$. Find
- (a) nisbah sepunya,
the common ratio, [2 markah/marks]
- (b) sebutan pertama,
the first term, [2 markah/marks]
- (c) nilai n yang paling besar supaya sebutan ke- n kurang daripada 500 000.
the largest value of n such that the n^{th} term is less than 500 000. [2 markah/marks]

Jawapan/Answer:

- 9 (a) Sebuah bulatan dibahagikan kepada 15 sektor dengan keadaan setiap sudut sektor yang dicakupi pada pusat bulatan membentuk suatu janjang aritmetik. Diberi sudut sektor yang terbesar ialah 38° . Cari
- A circle is divided into 15 sectors such that each angle subtended at the centre of the circle forming an arithmetic progression. Given the angle of the biggest sector is 38° . Find*
- sudut sektor yang terkecil dan beza sepunya, d , dengan keadaan $d > 0$,
the angle of the smallest sector and the common difference, d , where $d > 0$,
 - jumlah nilai sudut bagi 12 sektor terkecil.
the total of the angles of the 12 smallest sectors.

[6 markah/marks]

- (b) Rajah 2 menunjukkan empat segi empat tepat yang pertama yang dilukis secara berturutan.
Diagram 2 shows four of the first rectangles drawn in consecutive order.



Rajah/Diagram 2

Segi empat tepat pertama, R_1 , dengan sisi x cm dan y cm, segi empat tepat kedua, R_2 , dengan sisi $0.8x$ cm dan $0.8y$ cm, segi empat tepat ketiga, R_3 , dengan sisi 0.8 daripada sisi-sisi segi empat kedua, R_2 , segi empat tepat keempat, R_4 , dengan sisi 0.8 daripada sisi-sisi segi empat ketiga, R_3 , dan seterusnya bagi segi empat-segi empat tepat yang berikutnya. Cari

The first rectangle, R_1 , has sides of x cm by y cm, the second rectangle, R_2 , has sides of $0.8x$ cm and $0.8y$ cm, the third rectangle, R_3 , has sides which are 0.8 of the sides of the second rectangle, R_2 , the fourth rectangle, R_4 , has sides which are 0.8 of the sides of the third rectangle, R_3 , and hence for the sides of the subsequent rectangles. Find

- nisbah sepunya bagi luas segi empat tepat kedua kepada segi empat tepat pertama,
the common ratio of the area of the second rectangle to that of the first rectangle,
- jumlah luas, dalam sebutan x dan y , dalam cm^2 , bagi semua segi empat tepat itu.
the total area, in terms of x and y , in cm^2 , of all the rectangles.

[4 markah/marks]

Jawapan/Answer:

VIDEO ULASAN
JAWAPAN

10 Sebutan ke-2 dan ke-5 suatu janjang geometri masing-masing ialah $64k^2$ dan k^5 . Nisbah sepunya, r adalah dengan keadaan $0 < r < 1$.

The 2nd and the 5th terms of a geometric progression are $64k^2$ and k^5 respectively. The common ratio, r is such that $0 < r < 1$.

(a) Ungkapkan r dalam sebutan k .

Express r in terms of k .

[2 markah/marks]

(b) Diberi bahawa hasil tambah ketakterhinggaan janjang itu ialah 256.

Given that the sum to infinity of the progression is 256.

(i) Cari hasil tambah ketakterhinggaan dalam sebutan k .

Find the sum to infinity in terms of k .

(ii) Seterusnya, cari nilai k .

Hence, find the value of k .

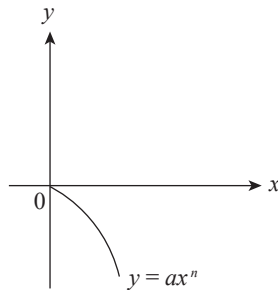
[5 markah/marks]

Jawapan/Answer:

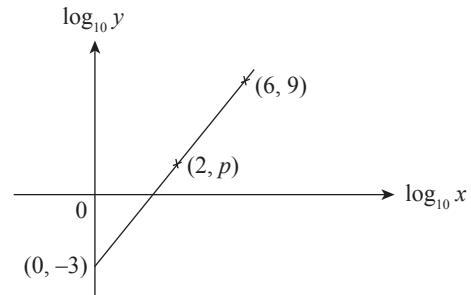
BAB
6Hukum Linear
Linear Law

- 1 Rajah 1.1 menunjukkan sebahagian daripada lengkung $y = ax^n$ dengan keadaan a dan n ialah pemalar. Rajah 1.2 menunjukkan graf garis lurus yang diperoleh dengan memplot $\log_{10} y$ melawan $\log_{10} x$, apabila $y = ax^n$ diungkapkan dalam bentuk linear.

Diagram 1.1 shows part of the curve $y = ax^n$ such that a and n are constants. Diagram 1.2 shows a straight line graph obtained by plotting $\log_{10} y$ against $\log_{10} x$ when $y = ax^n$ is expressed in the linear form.



Rajah/Diagram 1.1



Rajah/Diagram 1.2

Cari
Find

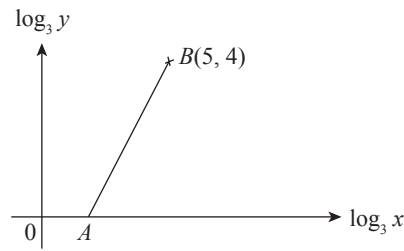
- (a) nilai a dan n ,
the values of a and n ,
- (b) nilai p .
the value of p .

[4 markah/marks]

[2 markah/marks]

Jawapan/Answer:

- 2 Rajah 2 menunjukkan graf garis lurus yang diperoleh apabila $\log_3 y$ diplotkan melawan $\log_3 x$. Diberi panjang AB ialah 5 unit dan titik A terletak pada paksi- $\log_3 x$.
Diagram 2 shows the graph of straight line obtained when $\log_3 y$ is plotted against $\log_3 x$. Given the length of AB is 5 units and point A is on the $\log_3 x$ -axis.



Rajah/Diagram 2

Cari

Find

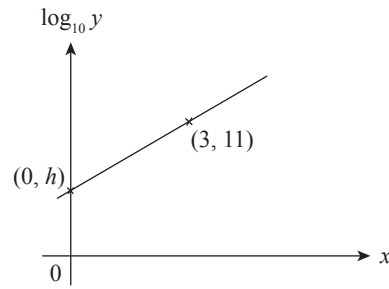
- (a) koordinat titik A ,
the coordinates of point A ,
- (b) persamaan garis lurus AB .
the equation of the straight line AB .

[3 markah/marks]

[3 markah/marks]

Jawapan/Answer:

- 3 Rajah 3 menunjukkan graf garis lurus yang diperoleh dengan memplot $\log_{10} y$ melawan x . Pemboleh ubah x dan y dihubungkan oleh persamaan $y = 100p^{2x}$, dengan keadaan p ialah pemalar.
 Diagram 3 shows the straight line graph obtained by plotting $\log_{10} y$ against x . The variables x and y are related by the equation $y = 100p^{2x}$, such that p is a constant.



Rajah/Diagram 3

- (a) Ungkapkan persamaan $y = 100p^{2x}$ dalam bentuk linear yang digunakan untuk memperoleh graf garis lurus seperti yang ditunjukkan dalam Rajah 3.
 Express the equation $y = 100p^{2x}$ in linear form used to obtain the straight line graph as shown in Diagram 3.
 [1 markah/mark]
- (b) Cari nilai h dan p .
 Find the values of h and p .
 [3 markah/marks]

Jawapan/Answer:

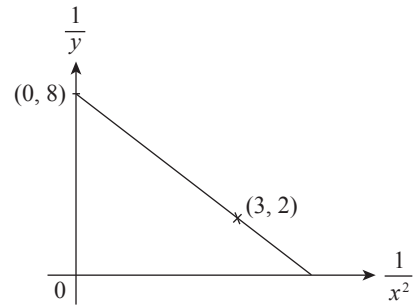
- 4 Rajah 4 menunjukkan graf garis lurus yang diperoleh dengan memplot $\frac{1}{y}$ melawan $\frac{1}{x^2}$. Pemboleh ubah x dan y dihubungkan oleh persamaan $\frac{p}{y} = 2 - \frac{q}{x^2}$ dengan keadaan p dan q ialah pemalar. Cari nilai p dan q .

Diagram 4 shows the straight line graph obtained by plotting $\frac{1}{y}$ against $\frac{1}{x^2}$.

The variables x and y are related by the equation $\frac{p}{y} = 2 - \frac{q}{x^2}$ such that p and q are constants. Find the values of p and q .

[5 markah/marks]

Jawapan/Answer:



Rajah/Diagram 4

- 5 Rajah 5 menunjukkan graf garis lurus yang diperoleh dengan memplot $\ln y$ melawan 2^x yang melalui titik $(2, 16)$ dan titik $(5, 25)$.

Diagram 5 shows a straight line graph obtained by plotting $\ln y$ against 2^x that passing through the points of $(2, 16)$ and $(5, 25)$.

- (a) Ungkapkan persamaan garis lurus dalam bentuk $\ln y = m2^x + c$, dengan keadaan m dan c ialah pemalar.

Express the equation of the straight line in the form of $\ln y = m2^x + c$, such that m and c are constants.

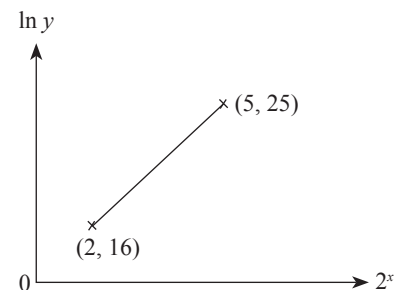
[3 markah/marks]

- (b) Seterusnya, cari nilai y dalam bentuk e^a apabila $x = 2$.

Hence, find the value of y in the form of e^a when $x = 2$.

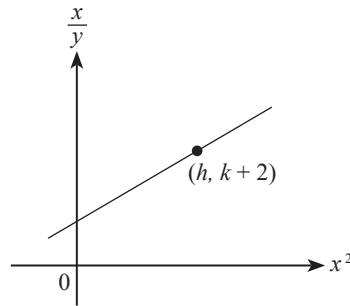
[1 markah/mark]

Jawapan/Answer:



Rajah/Diagram 5

- 6 Rajah 6 menunjukkan graf garis lurus yang diperoleh apabila persamaan $y = \frac{2x}{3x^2 + n}$, dengan keadaan n ialah pemalar, ditukarkan kepada bentuk linear.
 Diagram 6 shows a straight line graph obtained when the equation $y = \frac{2x}{3x^2 + n}$, such that n is a constant, is converted to the linear form.



Rajah/Diagram 6

- (a) (i) Tukarkan persamaan $y = \frac{2x}{3x^2 + n}$ kepada bentuk linear.

Convert the equation $y = \frac{2x}{3x^2 + n}$ to the linear form.

- (ii) Seterusnya, nyatakan pintasan- $\frac{x}{y}$ dalam sebutan n .

Hence, state the $\frac{x}{y}$ -intercept in terms of n .

[2 markah/marks]

- (b) Ungkapkan n dalam sebutan h dan k .

Express n in terms of h and k .

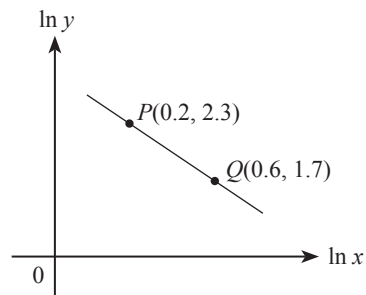
[2 markah/marks]

Jawapan/Answer:



- 7 Rajah 7 menunjukkan graf bagi $\ln y$ melawan $\ln x$, iaitu graf garis lurus yang melalui titik $P(0.2, 2.3)$ dan titik $Q(0.6, 1.7)$.

Diagram 7 shows the graph of $\ln y$ against $\ln x$, which is a straight line passing through the points $P(0.2, 2.3)$ and $Q(0.6, 1.7)$.



Rajah/Diagram 7

- (a) Ungkapkan y dalam sebutan x .

Express y in terms of x .

[3 markah/marks]

- (b) Seterusnya, cari nilai y apabila $x = 4$.

Hence, find the value of y when $x = 4$.

[2 markah/marks]

Jawapan/Answer:

- 8 Jadual 1 menunjukkan nilai-nilai bagi dua pemboleh ubah, x dan y , yang diperoleh daripada satu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan $\frac{n}{y} = px + 1$, dengan keadaan n dan p ialah pemalar.

Table 1 shows the values of two variables, x and y , obtained from an experiment. Variables x and y are related by the equation $\frac{n}{y} = px + 1$, where n and p are constants.

x	0.1	0.2	0.3	0.4	0.5	0.6
y	0.303	0.364	0.455	0.606	0.909	1.818

Jadual/Table 1

- (a) Berdasarkan jadual, bina satu jadual bagi nilai-nilai $\frac{1}{y}$.

Based on the table, construct a table for the values of $\frac{1}{y}$.

[1 markah/mark]

- (b) Plot $\frac{1}{y}$ melawan x , dengan menggunakan skala 2 cm kepada 0.1 unit pada paksi- x dan 2 cm kepada 0.5 unit pada paksi- $\frac{1}{y}$. Seterusnya, lukis garis lurus penyuaiian terbaik.

Plot $\frac{1}{y}$ against x , using a scale of 2 cm to 0.1 unit on the x -axis and 2 cm to 0.5 unit on the $\frac{1}{y}$ -axis. Hence, draw the line of best fit.

[3 markah/marks]

- (c) Gunakan graf di (b) untuk mencari nilai

Use the graph in (b) to find the value of

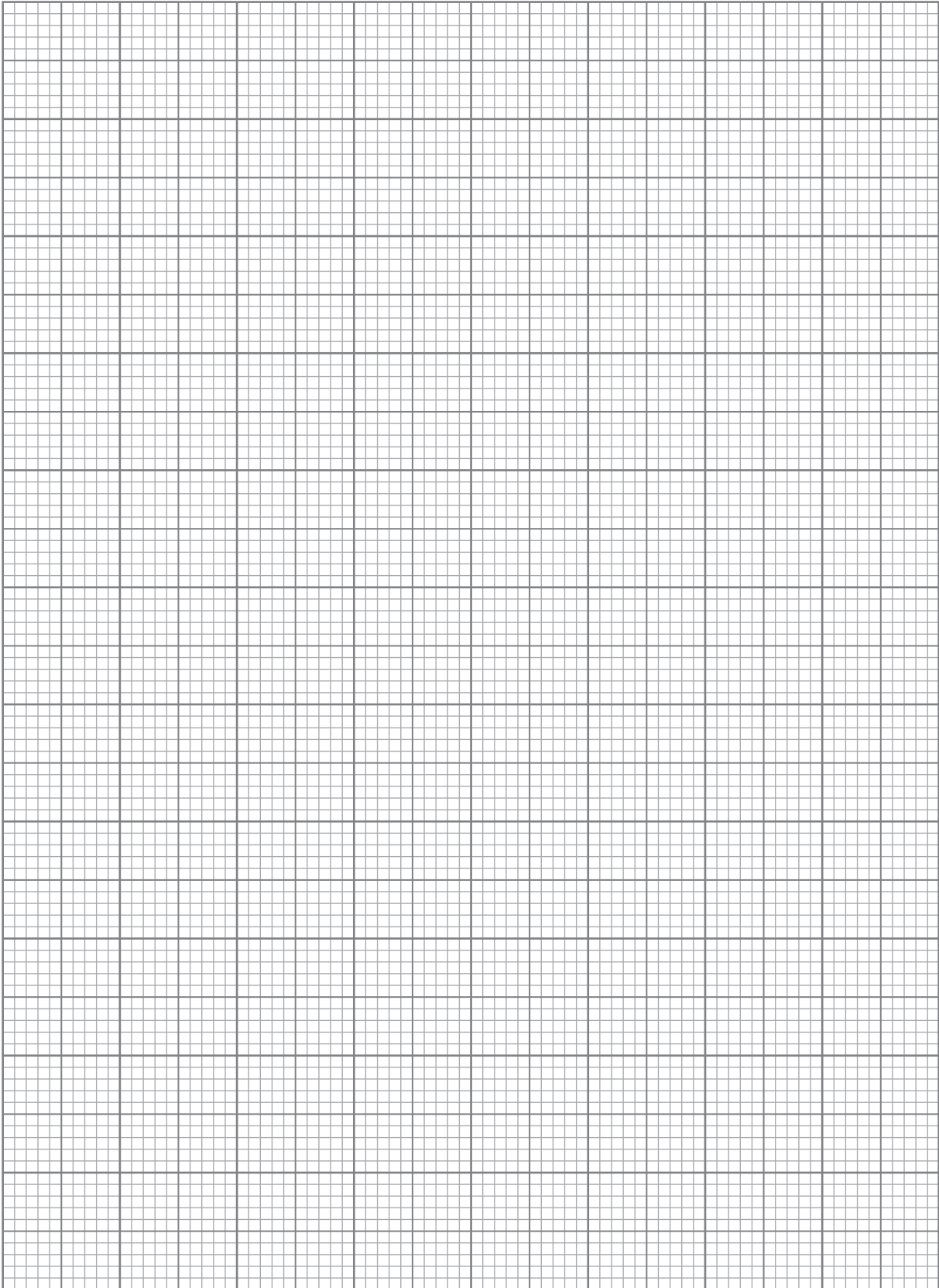
- (i) y apabila $x = 0.38$,
 y when $x = 0.38$,
- (ii) n ,
- (iii) p .

[6 markah/marks]

Jawapan/Answer:

Kertas graf untuk Soalan 8
Graph paper for Question 8

Tingkatan 4

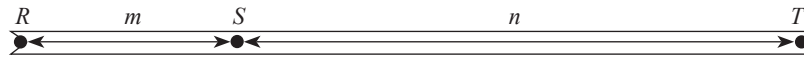


BAB
7

Geometri Koordinat
Coordinate Geometry



- 1 Rajah 1 menunjukkan titik S yang membahagi seutas reben RT dengan nisbah $m : n$.
Diagram 1 shows point S that divides a ribbon RT with ratio of $m : n$.



Rajah/Diagram 1

Diberi $RS = 15$ cm dan $RT = 60$ cm.

Given $RS = 15$ cm and $RT = 60$ cm.

- (a) Cari nilai m dan n .

Find the values of m and n .

[1 markah/mark]

- (b) Huraikan kedudukan S di atas reben itu berhubung dengan nisbahnya.

Describe the position of S on the ribbon in the relation to its ratio.

[1 markah/mark]

- (c) Jika reben itu diletakkan pada paksi- x pada satah Cartes dengan keadaan R ialah asalan dan koordinat T ialah $(28, 0)$, tentukan koordinat bagi S .

If the ribbon is placed on the x -axis of the Cartesian plane such that R is the origin and the coordinates of T is $(28, 0)$, determine the coordinates of S .

[2 markah/marks]

Jawapan/Answer:

- 2 Diberi bahawa luas segi tiga $A(-k, 3)$, $B(2, 5)$ dan $C(2k, 1)$ ialah 18 unit². Cari nilai-nilai yang mungkin bagi k .

Given that the area of a triangle $A(-k, 3)$, $B(2, 5)$ and $C(2k, 1)$ is 18 units². Find the possible values of k .

[4 markah/marks]

Jawapan/Answer:

- 3 Sebuah papan tanda had laju kenderaan terletak di sepanjang jalan lurus di antara sekolah dan kedai pada suatu satah Cartes. Diberi nisbah kedudukan papan tanda kepada sekolah dan kedai ialah $2 : 5$ dan koordinat titik bagi sekolah dan kedai masing-masing ialah $(-3, -7)$ dan $(5, 9)$. Tentukan koordinat kedudukan papan tanda had laju kenderaan.

A speed limit sign is located along a straight road between a school and a shop on a Cartesian plane. Given that the ratio of the position of the sign to the school and shop is $2 : 5$ and the coordinates of the points for the school and shop are $(-3, -7)$ and $(5, 9)$ respectively. Determine the coordinates of the position of the speed limit sign.

[2 markah/marks]

Jawapan/Answer:

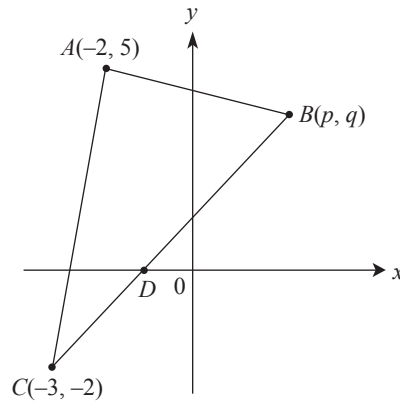
- 4 Diberi R , S dan T ialah tiga titik pada suatu garis lurus dengan koordinat titik masing-masing ialah $(3h, 5h)$, $(2p, q + 2)$ dan (p, q) . Titik T berada $\frac{1}{3}$ sepanjang tembereng garis dari titik R dengan keadaan koordinat titik T membahagi tembereng garis tersebut. Ungkapkan p dalam sebutan q .
- Given R , S and T are three points on a straight line with the coordinates of the points are $(3h, 5h)$, $(2p, q + 2)$ and (p, q) respectively. Point T is $\frac{1}{3}$ along the line segment from point R such that the coordinates of point T bisects the line segment. Express p in terms of q .*

[3 markah/marks]

Jawapan/Answer:

- 5 Rajah 2 menunjukkan sebuah segi tiga ABC dengan luas 18 unit². Persamaan garis lurus CB diberikan oleh $y = x + 1$. Diberi koordinat titik $A(-2, 5)$, $B(p, q)$, $C(-3, -2)$ dan koordinat titik D berada pada paksi- x dan membahagi garis lurus CB dengan nisbah $m : n$.

Diagram 2 shows a triangle ABC with an area of 18 units². The equation of the line CB is given by $y = x + 1$. Given the coordinates of point $A(-2, 5)$, $B(p, q)$, $C(-3, -2)$ and coordinates of point D lies on the x -axis and divides the line CB with the ratio of $m : n$.



Rajah/Diagram 2

Cari

Find

- (a) nilai-nilai p dan q ,
the value of p and of q ,
- (b) nisbah $m : n$.
the ratio of $m : n$.

[5 markah/marks]

[3 markah/marks]

- 6 Diberi bahawa koordinat bagi titik A , B dan C masing-masing ialah $(-6, -2)$, $(k, 0)$ dan $(-4, 2)$. Cari nilai pemalar k jika
- It is given that the coordinates of points A , B and C are $(-6, -2)$, $(k, 0)$ and $(-4, 2)$ respectively. Find the value of constant k if*
- (a) A , B dan C adalah segaris,
 A , B and C are collinear; [2 markah/marks]
- (b) AB adalah berserenjang dengan AC .
 AB is perpendicular to AC . [2 markah/marks]

Jawapan/Answer:

- 7 Titik P bergerak dengan keadaan jaraknya sentiasa sama dari titik $A(5, 7)$ dan titik $B(9, 3)$. Titik S pula bergerak dengan jaraknya dari titik $P(2, 5)$ adalah sentiasa 3 unit. Lokus titik P dan lokus titik S bersilang pada dua titik.

Point P moves such that its distance always the same from point $A(5, 7)$ and point $B(9, 3)$. Point S moves such that its distance from point $P(2, 5)$ is always 3 units. The locus of point P and the locus of point S intersect at two points.

- (a) Cari persamaan lokus bagi titik P .

Find the equation of the locus of point P .

[2 markah/marks]

- (b) Tunjukkan bahawa lokus titik S ialah $x^2 + y^2 - 4x - 10y + 20 = 0$.

Show that the locus of point S is $x^2 + y^2 - 4x - 10y + 20 = 0$.

[2 markah/marks]

- (c) Tentukan sama ada kedua-dua lokus itu bersilang atau tidak.

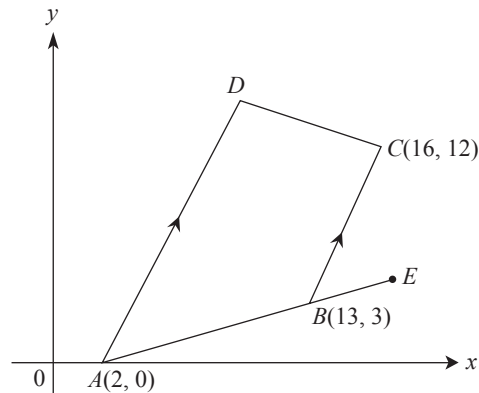
Determine whether both loci intersect or not.

[5 markah/marks]

Jawapan/Answer:

- 8 Rajah 3 menunjukkan trapezium $ABCD$ dengan keadaan garis lurus BC selari dengan garis lurus AD . Garis lurus CD berserenjang dengan garis lurus AD dan BC . Koordinat titik A , B dan C masing-masing ialah $(2, 0)$, $(13, 3)$ dan $(16, 12)$.

Diagram 3 shows trapezium $ABCD$ such that the straight line BC is parallel to straight line AD . Straight line CD is perpendicular with straight lines AD and BC . The coordinates of points A , B and C are $(2, 0)$, $(13, 3)$ and $(16, 12)$ respectively.



Rajah/Diagram 3

Cari

Find

- (a) persamaan garis lurus pembahagi dua sama seranjang AC ,
the equation of the perpendicular bisector of AC ,

[3 markah/marks]

- (b) koordinat titik D ,
the coordinates of point D ,

[3 markah/marks]

- (c) koordinat titik E apabila garis lurus AB dipanjangkan ke titik E dengan keadaan $AB : BE = 4 : 1$,
the coordinates of point E when the straight line AB is extended to point E such that $AB : BE = 4 : 1$,

[2 markah/marks]

- (d) luas sisi empat $ADCE$.
the area of the quadrilateral $ADCE$.

[2 markah/marks]

Jawapan/Answer:



- 9 Sebuah titik P bergerak sepanjang lengkung sebuah bulatan dengan pusat $A(1, 2)$. Lengkung tersebut melalui $Q(0, -3)$ dan $R(6, m)$.

A point P moves along the arc of a circle with centre $A(1, 2)$. The arc passes through $Q(0, -3)$ and $R(6, m)$.

(a) Cari

Find

- (i) persamaan lokus bagi Q ,
the equation of locus of Q ,
- (ii) nilai-nilai bagi m .
the values of m .

[4 markah/marks]

- (b) Tangen pada bulatan di titik Q bersilang dengan paksi- x pada titik K . Cari luas $\triangle OQK$.

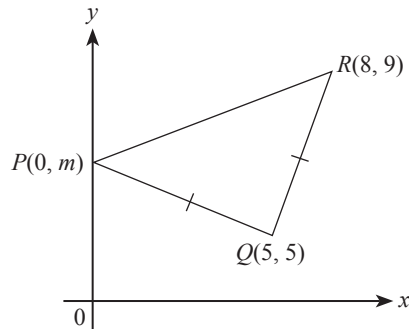
The tangent to the circle at point Q intersects the x -axis at point K . Find the area of $\triangle OQK$.

[6 markah/marks]

Jawapan/Answer:

- 10 Rajah 4 menunjukkan sebuah segi tiga sama kaki PQR dengan bucu-bucu $P(0, m)$, $Q(5, 5)$ dan $R(8, 9)$. PQ dan QR adalah sama panjang.

Diagram 4 shows an isosceles triangle PQR with vertices $P(0, m)$, $Q(5, 5)$ and $R(8, 9)$. PQ and QR have the same length.



Rajah/Diagram 4

- (a) Cari nilai m .
Find the value of m .
- (b) S ialah titik pada garis $y = 11$ dengan keadaan $PS = SR$. Cari
 S is a point on the line $y = 11$ such that $PS = SR$. Find
- koordinat S ,
the coordinates of S ,
 - nisbah luas ΔPQR kepada luas sisi empat $PQRS$.
the ratio of area of ΔPQR to area of quadrilateral $PQRS$.

[2 markah/marks]

[8 markah/marks]

Jawapan/Answer:

BAB
8

Vektor
Vectors



- 1 Diberi bahawa $O(0, 0)$, $A(2, 5)$ dan $B(4, -7)$.
Given that $O(0, 0)$, $A(2, 5)$ and $B(4, -7)$.

(a) Nyatakan $\vec{AB}$ dalam sebutan $\underline{i}$ dan $\underline{j}$.
State $\vec{AB}$ in terms of $\underline{i}$ and $\underline{j}$.

[2 markah/marks]

(b) Cari koordinat C jika $\vec{OC} = \vec{BA}$.
Find the coordinates of C if $\vec{OC} = \vec{BA}$.

[2 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 2 Rajah 1 menunjukkan vektor-vektor $\vec{OA}$, $\vec{OB}$ dan $\vec{OC}$.
Diagram 1 shows the vectors $\vec{OA}$, $\vec{OB}$ and $\vec{OC}$.

(a) Diberi $\vec{OA} = \begin{pmatrix} 3 \\ 14 \end{pmatrix}$, $\vec{OB} = \begin{pmatrix} 5 \\ 10 \end{pmatrix}$ dan $\vec{OC} = \begin{pmatrix} m \\ 8 \end{pmatrix}$. Jika A , B dan C adalah segaris, cari nilai m .

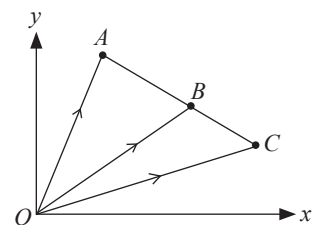
Given $\vec{OA} = \begin{pmatrix} 3 \\ 14 \end{pmatrix}$, $\vec{OB} = \begin{pmatrix} 5 \\ 10 \end{pmatrix}$ and $\vec{OC} = \begin{pmatrix} m \\ 8 \end{pmatrix}$. If A , B and C are collinear, find the value of m .

[3 markah/marks]

(b) Ungkapkan $\vec{CA}$ dalam sebutan $\underline{i}$ dan $\underline{j}$.
Express $\vec{CA}$ in terms of $\underline{i}$ and $\underline{j}$.

[2 markah/marks]

Jawapan/Answer:



Rajah/Diagram 1

- 3 Diberi $\vec{PT} = 2\vec{a} + 9\vec{b}$, $\vec{PR} = 12\vec{b}$, $\vec{PS} = h\vec{PT}$ dan $\vec{RS} = k(2\vec{a} - 7\vec{b})$, dengan keadaan h dan k ialah pemalar. Cari nilai h dan k .

Given $\vec{PT} = 2\vec{a} + 9\vec{b}$, $\vec{PR} = 12\vec{b}$, $\vec{PS} = h\vec{PT}$ and $\vec{RS} = k(2\vec{a} - 7\vec{b})$, such that h and k are constants. Find the values of h and k .

[5 markah/marks]

Jawapan/Answer:

- 4 Diberi bahawa segi tiga KLM , $\vec{LM} = 5\vec{x}$, $\vec{MK} = 15\vec{y}$ dan $\vec{LN} = 4\vec{x} + 12\vec{y}$. N berada pada KL dengan keadaan $p\vec{KN} = q\vec{KL}$. Cari

Given that triangle KLM , $\vec{LM} = 5\vec{x}$, $\vec{MK} = 15\vec{y}$ and $\vec{LN} = 4\vec{x} + 12\vec{y}$. N lies on KL such that $p\vec{KN} = q\vec{KL}$. Find

- (a) $\vec{KL}$ dan $\vec{MN}$ dalam sebutan $\vec{x}$ dan $\vec{y}$,
 $\vec{KL}$ and $\vec{MN}$ in terms of $\vec{x}$ and $\vec{y}$,

[3 markah/marks]

- (b) nilai-nilai bagi p dan q .
 the values of p and q .

[4 markah/marks]

Jawapan/Answer:

- 5 (a) Diberi bahawa $\underline{a} = \underline{i} + 3\underline{j}$ dan $\underline{b} = 2\underline{i} - 9\underline{j}$.

It is given that $\underline{a} = \underline{i} + 3\underline{j}$ and $\underline{b} = 2\underline{i} - 9\underline{j}$.

- (i) Nyatakan $\underline{a} - k\underline{b}$, dalam sebutan k .

State $\underline{a} - k\underline{b}$, in terms of k .

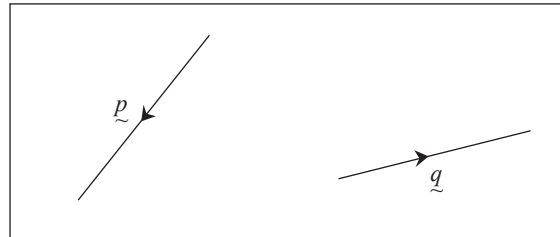
- (ii) Seterusnya, cari nilai k jika $\underline{a} - k\underline{b}$ selari dengan paksi- x .

Hence, find the value of k if $\underline{a} - k\underline{b}$ is parallel to the x -axis.

[3 markah/marks]

- (b) Rajah 2 menunjukkan dua vektor pada suatu satah.

Diagram 2 shows two vectors on a plane.



Rajah/Diagram 2

Diberi bahawa $(2m + 3)\underline{p} = (4 - 2n)\underline{q}$, dengan keadaan m dan n ialah pemalar. Cari nilai m dan n .

It is given that $(2m + 3)\underline{p} = (4 - 2n)\underline{q}$, such that m and n are constants. Find the values of m and n .

[2 markah/marks]

Jawapan/Answer:

6 Diberi koordinat bagi titik A , B dan C masing-masing ialah $(1, -2)$, $(-1, 3)$ dan $(2, 3)$.

Given the coordinates of points A , B and C are $(1, -2)$, $(-1, 3)$ and $(2, 3)$ respectively.

(a) Jika $m\vec{OA} - r\vec{OB}$ adalah selari dengan $\vec{OC}$, ungkapkan m dalam sebutan r .

If $m\vec{OA} - r\vec{OB}$ is parallel to $\vec{OC}$, express m in terms of r .

[3 markah/marks]

(b) Diberi $\vec{OD} = 3\vec{OA} - \vec{OB}$, cari koordinat titik D .

Given $\vec{OD} = 3\vec{OA} - \vec{OB}$, find the coordinates of point D .

[2 markah/marks]

(c) Cari vektor unit dalam arah $\vec{DC}$.

Find the unit vector in the direction of $\vec{DC}$.

[3 markah/marks]

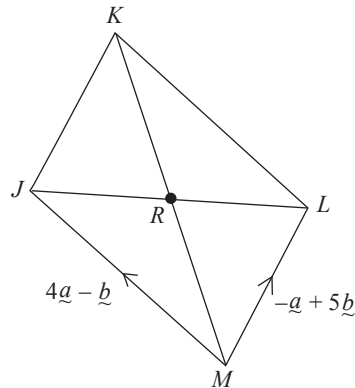
Jawapan/Answer:

- 7 (a) Titik P , Q dan R adalah segaris. Diberi $\vec{PQ} = 3\vec{x} + 6\vec{y}$ dan $\vec{QR} = 5\vec{x} + m\vec{y}$, cari
The points P , Q and R are collinear. Given that $\vec{PQ} = 3\vec{x} + 6\vec{y}$ and $\vec{QR} = 5\vec{x} + m\vec{y}$, find

- nilai m ,
the value of m ,
- nisbah $PQ : QR$.
the ratio $PQ : QR$.

[4 markah/marks]

- (b) Rajah 3 menunjukkan sebuah parallelogram $JKLM$. Pepenjuru JL dan KM bersilang pada titik R .
Diagram 3 shows a parallelogram $JKLM$. The diagonals JL and KM intersect at point R .



Rajah/Diagram 3

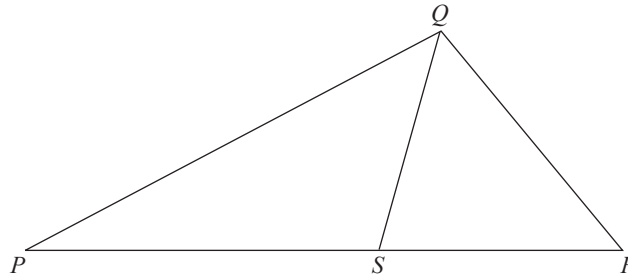
Cari $\vec{RK}$.Find $\vec{RK}$.

[3 markah/marks]

Jawapan/Answer:

VIDEO ULASAN
JAWAPAN

- 8 Rajah 4 menunjukkan sebuah segi tiga PQR dan titik S terletak pada PR .
Diagram 4 shows a triangle PQR and point S lies on PR .



Rajah/Diagram 4

Diberi bahawa $\vec{PQ} = \underline{m}$, $\vec{QR} = \underline{n}$ dan $hPS = 3SR$.

It is given that $\vec{PQ} = \underline{m}$, $\vec{QR} = \underline{n}$ and $hPS = 3SR$.

- (a) Ungkapkan

Express

- (i) $\vec{PR}$ dalam sebutan $\underline{m}$ dan $\underline{n}$,

$\vec{PR}$ in terms of $\underline{m}$ and $\underline{n}$,

- (ii) $\vec{QS}$ dalam sebutan h , $\underline{m}$ dan $\underline{n}$,

$\vec{QS}$ in terms of h , $\underline{m}$ and $\underline{n}$,

[4 markah/marks]

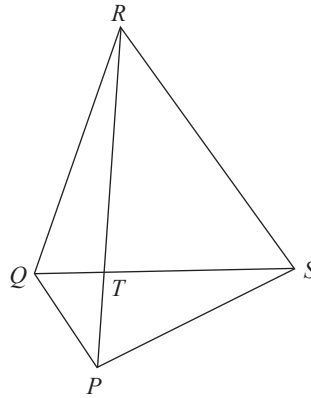
- (b) Jika T terletak pada QS yang dipanjangkan dengan keadaan $\vec{QT} = 8\underline{m} + 6\underline{n}$, cari nilai bagi h .

If T lies on QS which is extended such that $\vec{QT} = 8\underline{m} + 6\underline{n}$, find the value of h .

[4 markah/marks]

Jawapan/Answer:

- 9 Rajah 5 menunjukkan sebuah sisi empat $PQRS$. Garis lurus PR dan QS bersilang pada titik T .
 Diagram 5 shows a quadrilateral $PQRS$. The straight lines PR and QS intersect at point T .



Rajah/Diagram 5

Diberi $\vec{PQ} = 3\mathbf{x}$, $\vec{QR} = 6\mathbf{y}$ dan $PQ = \frac{1}{3}SR$.

Given $\vec{PQ} = 3\mathbf{x}$, $\vec{QR} = 6\mathbf{y}$ and $PQ = \frac{1}{3}SR$.

- (a) Ungkapkan setiap yang berikut dalam sebutan $\mathbf{x}$ dan $\mathbf{y}$.

Express each of the following in terms of $\mathbf{x}$ and $\mathbf{y}$.

- (i) $\vec{PR}$
- (ii) $\vec{SQ}$

[3 markah/marks]

- (b) Diberi bahawa $\vec{RT} = h\vec{RP}$ dan $\vec{ST} = k\vec{SQ}$, dengan keadaan h dan k ialah pemalar. Ungkapkan $\vec{RT}$

It is given that $\vec{RT} = h\vec{RP}$ and $\vec{ST} = k\vec{SQ}$, such that h and k are constants. Express $\vec{RT}$

- (i) dalam sebutan h , $\mathbf{x}$ dan $\mathbf{y}$,
in terms of h , $\mathbf{x}$ and $\mathbf{y}$,
- (ii) dalam sebutan k , $\mathbf{x}$ dan $\mathbf{y}$.
in terms of k , $\mathbf{x}$ and $\mathbf{y}$.

Seterusnya, cari nilai h dan nilai k .

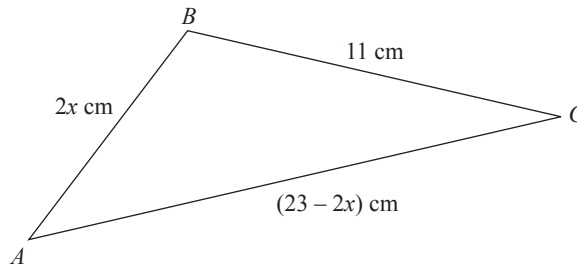
Hence, find the value of h and of k .

[5 markah/marks]

Jawapan/Answer:

BAB
9Penyelesaian Segi Tiga
Solution of Triangles

- 1 Rajah 1 menunjukkan sebuah segi tiga ABC .
Diagram 1 shows a triangle ABC .



Rajah/Diagram 1

- (a) Diberi luas segi tiga ABC ialah $6\sqrt{51}$ cm² dan $\angle ABC$ ialah sudut cakah. Cari
Given the area of triangle ABC is $6\sqrt{51}$ cm² and $\angle ABC$ is an obtuse angle. Find
(i) nilai x dan wajarkan nilai x yang dipilih,
the value of x and justify the chosen value of x ,
(ii) $\angle ACB$

[7 markah/marks]

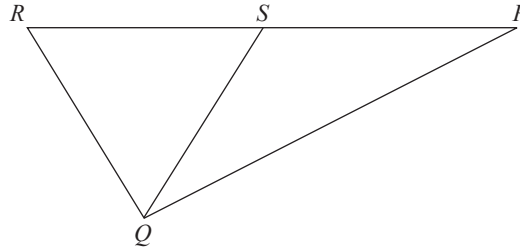
- (b) Jika garis AC dipanjangkan ke titik D dengan keadaan $\angle CDB = 15^\circ$, cari panjang, dalam cm, garis BD .
If the line AC is extended to point D such that $\angle CDB = 15^\circ$, find the length, in cm, of line BD .

[3 markah/marks]

Jawapan/Answer:



- 2 Rajah 2 menunjukkan $\triangle PQR$ dan $\triangle PQS$.
 Diagram 2 shows $\triangle PQR$ and $\triangle PQS$.



Rajah/Diagram 2

Diberi $\angle PQR = 72^\circ$, $PQ = 11$ cm dan $QR = QS = 6$ cm. Hitung
 Given $\angle PQR = 72^\circ$, $PQ = 11$ cm and $QR = QS = 6$ cm. Calculate

- (a) $\angle QRP$, [3 markah/marks]
 (b) panjang RS , dalam cm,
 the length of RS , in cm, [3 markah/marks]
 (c) luas $\triangle PQS$, dalam cm^2 ,
 the area of $\triangle PQS$, in cm^2 , [2 markah/marks]
 (d) jarak terpendek, dalam cm, dari titik S ke PQ .
 the shortest distance, in cm, from point S to PQ . [2 markah/marks]

Jawapan/Answer:

- 3 Sebuah segi tiga PQR mempunyai keluasan 32 cm^2 . Diberi bahawa $PQ = 8.5 \text{ cm}$, $\angle PQR = 38^\circ$ dan $\angle QPR$ merupakan sudut terbesar dalam segi tiga PQR .

A triangle PQR has an area of 32 cm^2 . It is given that $PQ = 8.5 \text{ cm}$, $\angle PQR = 38^\circ$ dan $\angle QPR$ is the largest angle in the triangle PQR .

- (a) Lakar segi tiga PQR .

Sketch the triangle PQR .

[1 markah/mark]

- (b) Hitung

Calculate

- (i) panjang, dalam cm, bagi QR ,
the length, in cm, of QR ,
- (ii) panjang, dalam cm, bagi PR ,
the length, in cm, of PR ,
- (iii) $\angle PRQ$.

[6 markah/marks]

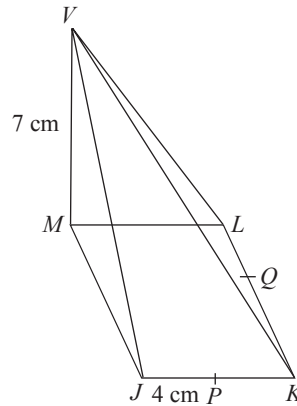
- (c) Titik R' terletak pada garis QR dengan keadaan $PR' = PR$. Hitung luas, dalam cm^2 , segi tiga PQR' .

The point R' lies on the line QR where $PR' = PR$. Calculate the area, in cm^2 , of the triangle PQR' .

[3 markah/marks]

Jawapan/Answer:

- 4 Rajah 3 menunjukkan sebuah piramid $VJKLM$ dengan tapak mengufuk segi empat sama $JKLM$. P dan Q masing-masing adalah titik tengah JK dan KL manakala V adalah mencancang di atas M .
 Diagram 3 shows a pyramid $VJKLM$ with a horizontal square base $JKLM$. P and Q are the midpoints of JK and KL respectively while V is vertically above M .



Rajah/Diagram 3

- (a) Hitung
 Calculate
 (i) $\angle QVP$,
 (ii) luas segi tiga QVP .
 the area of triangle QVP .
 [7 markah/marks]
- (b) Tunjukkan MPV adalah bersudut tegak.
 Show that MPV is right-angled.
 [2 markah/marks]
- (c) Lakarkan segi tiga yang berbeza bagi $V'P'Q'$ jika $VP = V'P'$, $PQ = P'Q'$ dan $\angle PVQ = \angle P'V'Q'$
 Sketch a different triangle $V'P'Q'$ if $VP = V'P'$, $PQ = P'Q'$ and $\angle PVQ = \angle P'V'Q'$.
 [1 markah/mark]

Jawapan/Answer:

BAB
10Nombor Indeks
Index Number

- 1 Jadual 1 menunjukkan harga dan indeks harga bagi empat bahan utama untuk membuat kek coklat di Kedai Roti Mahir.

Table 1 shows the price indices of four main ingredients to bake chocolate cakes in Mahir Bakery Shop.

Bahan Ingredients	Harga bahan (RM) Price of ingredients (RM)		Indeks harga pada tahun 2025 berasaskan tahun 2022 Price indices in the year 2025 based on the year 2022
	2022	2025	
Tepung Flour	2.00	p	125
Serbuk koko Cocoa powder	5.00	6.00	Q
Telur Eggs	r	9.00	$25r$
Gula Sugar	2.00	2.60	130

Jadual/Table 1

- (a) Hitung nilai p , Q dan r .

Calculate the values of p , Q and r .

[5 markah/marks]

- (b) Indeks gubahan bagi kos membuat kek coklat pada tahun 2025 berasaskan tahun 2022 ialah 131.

The composite index of the cost baking chocolate cakes in the year 2025 based on the year 2022 is 131.

- (i) Jika kos untuk membuat kek coklat pada tahun 2025 ialah RM36, cari kos untuk membuat kek coklat pada tahun 2022.

If the cost of baking cakes in the year 2025 is RM36, find the cost of baking chocolate cakes in the year 2022.

- (ii) Bahan-bahan utama yang digunakan untuk membuat kek coklat itu ialah dalam nisbah 4 : 1 : 2 : x . Hitung nilai x .

The main ingredients used to bake the chocolate cakes are in the ratio of 4 : 1 : 2 : x . Calculate the value x .

[5 markah/marks]

Jawapan/Answer:

- 2 Jadual 2 menunjukkan harga dan indeks harga bagi empat jenis makanan pada tahun 2022 berasaskan tahun 2021.

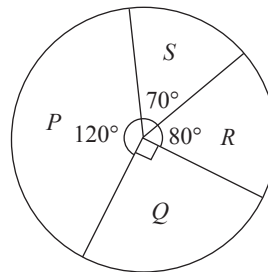
Table 2 shows the prices and price indices of four types of food in the year 2022 based on the year 2021.

Jenis makanan Types of food	Harga Price		Indeks harga pada tahun 2022 berasaskan tahun 2021 Price indices in the year 2022 based on the year 2021
	2021	2022	
P	x	RM7.20	120
Q	RM5.00	y	110
R	RM4.00	RM5.20	130
S	RM7.00	RM9.10	z

Jadual/Table 2

Rajah 1 menunjukkan perbelanjaan Puan Siti pada tahun 2021 dan 2022.

Diagram 1 shows the breakdown of Puan Siti's expenses in the year 2021 and 2022.



Rajah/Diagram 1

- (a) Cari nilai x , y dan z .

Find the values of x , y and z .

[5 markah/marks]

- (b) Hitung indeks harga bagi P pada tahun 2021 berasaskan tahun 2020 jika harganya pada tahun 2020 ialah RM5.45.

Calculate the price index of P in the year 2021 based on the year 2020 if the price of P in the year 2020 is RM5.45.

[2 markah/marks]

- (c) Cari indeks gubahan bagi empat jenis makanan itu pada tahun 2022 berasaskan tahun 2021.

Find the composite index for the four types of food in the year 2022 based on the year 2021.

[3 markah/marks]

Jawapan/Answer:

- 3 Sebuah beg diperbuat menggunakan empat komponen, P , Q , R dan S . Jadual 3 menunjukkan harga dan indeks harga bagi komponen-komponen itu dan pemberat masing-masing.

A bag is made using four components, P , Q , R and S . Table 3 shows the prices and the price indices of the components and their respective weightages.

Komponen <i>Component</i>	Harga (RM) <i>Price (RM)</i>		Indeks harga pada tahun 2023 berasaskan tahun 2021 <i>Price indices in the year 2023 based on the year 2021</i>	Pemberat <i>Weightage</i>
	Tahun <i>Year</i> 2021	Tahun <i>Year</i> 2023		
P	x	13.50	150	2
Q	8.00	y	125	4
R	6.00	9.00	150	k
S	4.00	5.80	z	8

Jadual/Table 3

- (a) Hitung nilai bagi x , y dan z .

Calculate the values of x , y and z .

[3 markah/marks]

- (b) Diberi indeks gubahan bagi beg itu pada tahun 2023 berasaskan tahun 2021 ialah 143, cari nilai k .

Given that the composite index of the bag in the year 2023 based on the year 2021 is 143, find the value of k .

[3 markah/marks]

- (c) Jika harga beg itu pada tahun 2021 ialah RM35.00, hitung harga yang sepadan pada tahun 2023.

If the price of the bag in the year 2021 is RM35.00, calculate the corresponding price in the year 2023.

[2 markah/marks]

- (d) Jika harga bagi semua komponen beg itu meningkat sebanyak 45% dari tahun 2023 ke tahun 2025, cari indeks gubahan bagi bag itu pada tahun 2025 berasaskan tahun 2021.

If the prices of all components of the bag increases by 45% from the year 2023 to the year 2025, find the composite index of the bag in the year 2025 based on the year 2021.

[2 markah/marks]

Jawapan/Answer:

- 4 Jadual 4 menunjukkan harga dan indeks harga bagi tiga jenis bahan, A , B dan C yang digunakan dalam penghasilan sejenis bebola ketam.

Table 4 shows the prices and the price indices of three types of ingredients, A , B and C used in the production of a type of crab balls.

Bahan Ingredient	Harga (RM) per kg pada tahun Price (RM) per kg for the year		Indeks harga pada tahun 2025 berasaskan tahun 2023 Price index for the year 2025 based on the year 2023	Pemberat Weightage
	2023	2025		
A	y	3.60	x	20
B	4.80	6.00	125	60
C	1.20	1.80	150	20

Jadual/Table 4

- (a) Harga bahan A meningkat sebanyak 20% dari tahun 2023 hingga tahun 2025.
The price of ingredient A is increased by 20% from the year 2023 to the year 2025.
- Nyatakan nilai x .
State the value of x .
 - Cari nilai y .
Find the value of y .
- [3 markah/marks]
- (b) Hitung indeks gubahan bagi kos membuat bebola ketam pada tahun 2025 berasaskan tahun 2023.
Calculate the composite index for the cost of making the crab balls for the year 2025 based on the year 2023.
- [2 markah/marks]
- (c) Diberi bahawa indeks gubahan bagi kos membuat bebola ketam meningkat sebanyak 49% dari tahun 2020 hingga tahun 2025.
It is given that the composite index for the cost of making the crab balls increased by 49% from the year 2020 to the year 2025.
- Hitung indeks gubahan bagi kos membuat bebola ketam pada tahun 2023 berasaskan tahun 2020.
Calculate the composite index for the cost of making the crab balls in the year 2023 based on the year 2020.
 - Kos membuat sebiji bebola ketam ialah 50 sen dalam tahun 2020. Cari bilangan maksimum bebola ketam yang boleh dihasilkan menggunakan peruntukan sebanyak RM300 pada tahun 2025.
The cost of making a crab ball is 50 sen in the year 2020. Find the maximum number of crab balls that can be produced using an allocation of RM300 in the year 2025.
- [5 markah/marks]

Jawapan/Answer:

5 Jadual 5 menunjukkan indeks harga, perubahan indeks harga dan pemberat bagi empat bahan, P , Q , R dan S yang digunakan untuk membuat sejenis beg.
Table 5 shows the price indices, the change in price indices and the weightages of four items, P , Q , R and S used in making a type of bag.

Bahan Item	Indeks harga pada tahun 2024 berasaskan tahun 2022 <i>Price index for the year 2024 based on the year 2022</i>	Perubahan indeks harga dari tahun 2024 ke tahun 2025 <i>Change in price index from the year 2024 to the year 2025</i>	Pemberat Weightage
P	125	Menokok 8% <i>8% increase</i>	4
Q	k	Tidak berubah <i>No change</i>	9
R	140	Menyusut 15% <i>Decrease 15%</i>	2
S	108	Tidak berubah <i>No change</i>	5

Jadual/Table 5

- (a) Hitung
Calculate
- (i) harga bahan P pada tahun 2024 jika harganya pada tahun 2022 ialah RM16.20.
the price of item P in the year 2024 if its price in the year 2022 is RM16.20.
 - (ii) harga bahan R pada tahun 2024 jika harganya pada tahun 2025 ialah RM12.92.
the price of item R in the year 2024 if its price in the year 2025 is RM12.92.
- [3 markah/marks]
- (b) Indeks gubahan bagi kos membuat sebuah beg pada tahun 2024 berasaskan tahun 2022 ialah 125.4.
Hitung nilai k .
The composite index for the cost of making a bag in the year 2024 based on the year 2022 is 125.4. Calculate the value of k .
- [2 markah/marks]
- (c) Seterusnya, hitung indeks gubahan bagi kos membuat sebuah beg pada tahun 2025 berasaskan tahun 2022.
Hence, calculate the composite index for the cost of making a bag in the year 2025 based on the year 2022.
- [3 markah/marks]
- (d) Hitung kos membuat sebuah beg tersebut pada tahun 2025 jika kos sepadannya pada tahun 2022 ialah RM50.00.
Calculate the cost of making a bag in the year 2025 if its corresponding cost in the year 2022 is RM50.00.
- [2 markah/marks]

Jawapan/Answer:



- 6 Jadual 6 menunjukkan indeks harga bagi tiga bahan, P , Q dan R yang digunakan dalam penghasilan sejenis beg.

Table 6 shows the price indices for three materials, P , Q and R used in the production of a type of bag.

Bahan Material	Indeks harga pada tahun 2017 berasaskan tahun 2015 Price indices in the year 2017 based on the year 2015	Indeks harga pada tahun 2020 berasaskan tahun 2015 Price indices in the year 2020 based on the year 2015
P	108	120
Q	125	135
R	117	x

Jadual/Table 6

- (a) Cari indeks harga bagi bahan P pada tahun 2020 berasaskan tahun 2017.
Find the price index for material P in the year 2020 based on the year 2017. [2 markah/marks]
- (b) Harga bahan R pada tahun 2015 ialah RM22 dan harganya pada tahun 2020 ialah RM28.60. Cari
The price of material R in the year 2015 is RM22 and the price in the year 2020 is RM28.60. Find
(i) nilai x ,
the value of x ,
(ii) harga bahan R pada tahun 2017.
the price of material R in the year 2017. [4 markah/marks]
- (c) Indeks gubahan untuk kos pengeluaran beg itu pada tahun 2017 berasaskan tahun 2015 ialah 119.2.
Kos bahan-bahan P , Q dan R yang digunakan adalah mengikut nisbah $2 : k : 3$. Cari nilai k .
The composite index for the production cost of the bag in the year 2017 based on the year 2015 is 119.2. The cost of materials P , Q and R used is by the ratio $2 : k : 3$. Find the value of k . [2 markah/marks]
- (d) Diberi harga beg itu pada tahun 2017 ialah RM59.60. Cari harga yang sepadan bagi beg itu pada tahun 2015.
Given the price of the bag in the year 2017 is RM59.60. Find the corresponding price of the bag in the year 2015. [2 markah/marks]

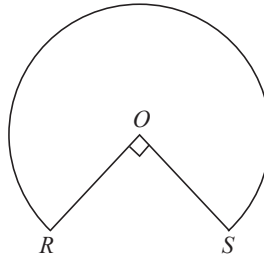
Jawapan/Answer:

BAB
1

Sukatan Membulat
Circular Measure



- 1 Rajah 1 menunjukkan sektor major ROS dengan pusat O . Jejari bulatan itu ialah 12 cm.
Diagram 1 shows the major sector ROS with centre O . The radius of the circle is 12 cm.



Rajah/Diagram 1

Cari perimeter, dalam cm, bagi seluruh rajah dalam sebutan π .
Find the perimeter, in cm, of the entire diagram in terms of π .

[2 markah/marks]

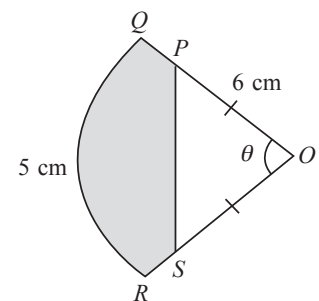
Jawapan/Answer:

- 2 Rajah 2 menunjukkan satu sektor bulatan OQR dan satu segi tiga sama kaki OPS . Panjang lengkok QR ialah 5 cm dan jejari OQ ialah 10 cm. Cari
Diagram 2 shows a sector of a circle OQR and an isosceles triangle OPS . The arc of QR is 5 cm and radius OQ is 10 cm. Find

- (a) sudut θ , dalam radian,
the angle θ , in radian,
(b) perimeter rantau berlorek, $PQRS$.
the perimeter of the shaded region, $PQRS$.

[1 markah/mark]

[3 markah/marks]



Rajah/Diagram 2

Jawapan/Answer:

- 3 Cari jejari suatu sektor jika sudut yang dicakupi pada pusat bulatan ialah 5 radian dan luas sektor ialah 160 cm^2 .

Find the radius of a sector if the angle subtended at the centre of the circle is 5 radians and its area is 160 cm^2 .

[2 markah/marks]

Jawapan/Answer:

- 4 Rajah 3 menunjukkan sektor AOB bagi satu bulatan yang berpusat O . D dan C masing-masing adalah titik tengah bagi OA dan OB . Cari
Diagram 3 shows the sector AOB of a circle with centre O . D and C is the midpoint of OA and OB respectively. Find

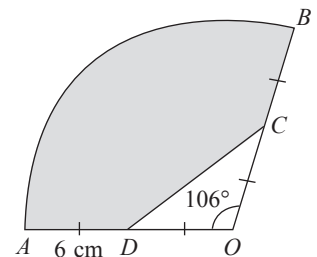
- (a) panjang, dalam cm, lengkok AB ,
the length, in cm, of the arc AB ,

[2 markah/marks]

- (b) luas, dalam cm^2 , kawasan berlorek.
the area, in cm^2 , of the shaded region.

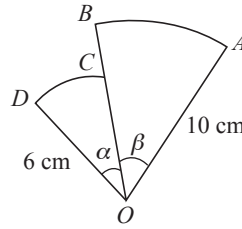
[4 markah/marks]

Jawapan/Answer:



Rajah/Diagram 3

- 5 Rajah 4 menunjukkan sektor AOB dan COD yang berpusat di O . Diberi perimeter bagi seluruh rajah ialah 40 cm, $\angle COD$ dan $\angle AOB$ masing-masing ialah α radian dan β radian, $OD = 6$ cm dan $OA = 10$ cm. Diagram 4 shows sectors AOB and COD centred at O . Given that the perimeter of the entire diagram is 40 cm, $\angle COD$ and $\angle AOB$ are α radians and β radians respectively, with $OD = 6$ cm and $OA = 10$ cm.



Rajah/Diagram 4

Ungkapkan β dalam sebutan α .

Express β in terms of α .

[2 markah/marks]

Jawapan/Answer:

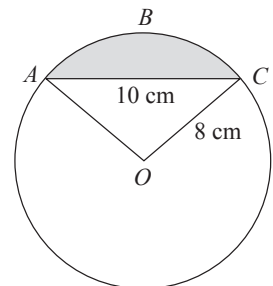
- 6 Rajah 5 menunjukkan sebuah bulatan dengan sektor $AOCB$ yang berpusat O dan berjari 8 cm. Diberi panjang perentas AC ialah 10 cm. Cari Diagram 5 shows a circle with sector $AOCB$ with centre O and radius 8 cm. Given the length of the chord AC is 10 cm. Find

- (a) $\angle AOC$, dalam radian,
 $\angle AOC$, in radians,

[3 markah/marks]

- (b) luas rantau berlerek, dalam cm^2 .
the area of the shaded region, in cm^2 .

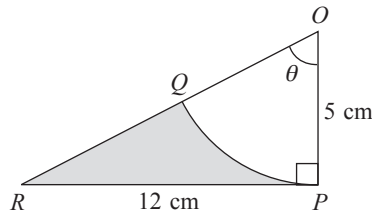
[4 markah/marks]



Rajah/Diagram 5

Jawapan/Answer:

- 7 Rajah 6 menunjukkan sektor POQ bagi sebuah bulatan berpusat O .
Diagram 6 shows a sector POQ of a circle with centre O .



Rajah/Diagram 6

Diberi bahawa $PR = 12$ cm dan $OP = 5$ cm. Cari

It is given that $PR = 12$ cm and $OP = 5$ cm. Find

[Guna/Use $\pi = 3.142$]

- (a) nilai θ , dalam radian,
the value of θ , in radians,

[3 markah/marks]

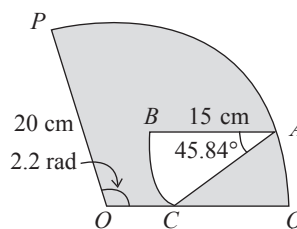
- (b) perimeter, dalam cm, kawasan berlorek.
the perimeter, in cm, of the shaded region.

[3 markah/marks]

Jawapan/Answer:

- 8 Rajah 7 menunjukkan sektor POQ bagi sebuah bulatan berpusat O dan sektor BAC bagi sebuah bulatan berpusat A .

Diagram 7 shows a sector POQ of a circle with centre O and a sector BAC of a circle with centre A .



Rajah/Diagram 7

Cari luas, dalam cm^2 , bagi kawasan berlorek.

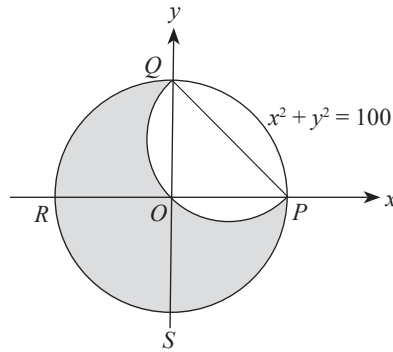
Find the area, in cm^2 , of the shaded region.

[5 markah/marks]

Jawapan/Answer:

- 9 Rajah 8 menunjukkan sebuah bulatan berpusat O dengan persamaan $x^2 + y^2 = 100$. Bulatan itu bersilang dengan paksi- x di titik P dan titik R , dan paksi- y di titik Q dan titik S . POQ ialah sebuah semibulatan dengan PQ sebagai diameternya.

Diagram 8 shows a circle centred at O with the equation $x^2 + y^2 = 100$. The circle intersects the x -axis at points P and R , and the y -axis at points Q and S . POQ is a semicircle with PQ as its diameter.



Rajah/Diagram 8

- (a) Cari luas, dalam unit^2 , sektor major $PQRS$.

Calculate the area, in units^2 , of the major sector $PQRS$.

[3 markah/marks]

- (b) Seterusnya, tunjukkan bahawa luas kawasan berlorek ialah $50(\pi + 1) \text{ unit}^2$.

Hence, show that the area of the shaded region is $50(\pi + 1) \text{ units}^2$.

[4 markah/marks]

Jawapan/Answer:



BAB
2Pembezaan
Differentiation

- 1 (a) Diberi bahawa had $\lim_{x \rightarrow 3} \frac{x^2 - k}{2x - 6} = 3$, cari nilai k .

It is given that $\lim_{x \rightarrow 3} \frac{x^2 - k}{2x - 6} = 3$, find the value of k .

[2 markah/marks]

- (b) Jika had $\lim_{x \rightarrow -2} \frac{x^2 - 2x - h}{kx + 4} = -3$, cari nilai bagi $h - k$.

If $\lim_{x \rightarrow -2} \frac{x^2 - 2x - h}{kx + 4} = -3$, find the value of $h - k$.

[3 markah/marks]

Jawapan/Answer:

- 2 Diberi $y = 3x(10 - x)$, cari

Given $y = 3x(10 - x)$, find

- (a) nilai x apabila y adalah maksimum,
the value of x when y is a maximum,

[2 markah/marks]

- (b) nilai maksimum bagi y .
the maximum value of y .

[2 markah/marks]

Jawapan/Answer:

- 3 Cari nilai pemalar h dengan keadaan $\frac{d}{dh}\left(\frac{3h-5}{h+4}\right) = \frac{h}{(h+4)^2}$.

Find the value of constant h such that $\frac{d}{dh}\left(\frac{3h-5}{h+4}\right) = \frac{h}{(h+4)^2}$.

[3 markah/marks]

Jawapan/Answer:

- 4 Dua pemboleh ubah, x dan y , dihubungkan oleh persamaan $y = \frac{64}{x^2}$. Ungkapkan, dalam sebutan h , perubahan kecil bagi y apabila x berubah daripada 8 kepada $8 + h$, dengan keadaan h ialah satu nilai kecil.

Two variables, x and y , are related by the equation $y = \frac{64}{x^2}$. Express, in terms of h , the approximate change in y when x changes from 8 to $8 + h$, such that h is a small value.

[4 markah/marks]

Jawapan/Answer:

- 5 Diberi $y = \frac{2x-5}{x^2+6}$, cari julat nilai x dengan keadaan y dan $\frac{dy}{dx}$ adalah negatif.

Given $y = \frac{2x-5}{x^2+6}$, find the range of the values of x such that y and $\frac{dy}{dx}$ are negative.

[6 markah/marks]

Jawapan/Answer:

- 6 Luas permukaan sebuah sfera bertambah dengan kadar tetap $19.2\pi \text{ cm}^2 \text{ s}^{-1}$. Cari jejari, dalam cm, sfera itu apabila jejari bertambah dengan kadar 0.4 cm s^{-1} .

The surface area of a sphere is increasing at a constant rate of $19.2\pi \text{ cm}^2 \text{ s}^{-1}$. Find the radius, in cm, of the sphere when the radius is increasing at a rate of 0.4 cm s^{-1} .

[Luas permukaan sfera/Surface area of a sphere = $4\pi r^2$]

[3 markah/marks]

Jawapan/Answer:

7 Diberi $y = 5x(2 + 6x)$, cari

Given $y = 5x(2 + 6x)$, find

(a) nilai x apabila y adalah minimum,
the value of x when y is minimum,

[3 markah/marks]

(b) nilai minimum bagi y .
the minimum value of y .

[2 markah/marks]

Jawapan/Answer:

8 Titik $P(2, 10)$ terletak pada lengkung $y = x(13 - 4x)$. Cari

The point $P(2, 10)$ lies on the curve $y = x(13 - 4x)$. Find

(a) kecerunan normal kepada lengkung itu di titik P ,
the gradient of the normal to the curve at point P ,

[3 markah/marks]

(b) persamaan tangen kepada lengkung itu di titik P .
the equation of the tangent to the curve at point P .

[2 markah/marks]

Jawapan/Answer:

9 Diberi persamaan lengkung ialah $y = 2x^3 - 15x^2 + 24x + 6$.

Given the equation of curve is $y = 2x^3 - 15x^2 + 24x + 6$.

(a) Cari koordinat titik-titik pegun pada lengkung.

Find the coordinates of the stationary points of the curve.

[5 markah/marks]

(b) Tentukan sifat titik-titik tersebut.

Determine the nature of the points.

[2 markah/marks]

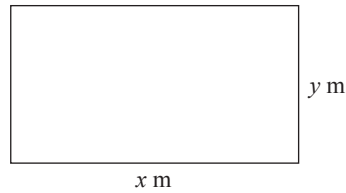
(c) Lakarkan graf $y = 2x^3 - 15x^2 + 24x + 6$.

Sketch the graph of $y = 2x^3 - 15x^2 + 24x + 6$.

[3 markah/marks]

Jawapan/Answer:

- 10** Kavisha mempunyai dawai pagar dengan panjang 120 m dan dia ingin memagar sebidang tanah berbentuk segi empat tepat seperti yang ditunjukkan dalam Rajah 1.
Kavisha has a fence wire with a length of 120 m and she wants to fence a rectangular piece of land as shown in Diagram 1.



Rajah/Diagram 1

Cari nilai x supaya luas tanah adalah maksimum.
Find the value of x so that the area of the land is maximum.

[5 markah/marks]

Jawapan/Answer:

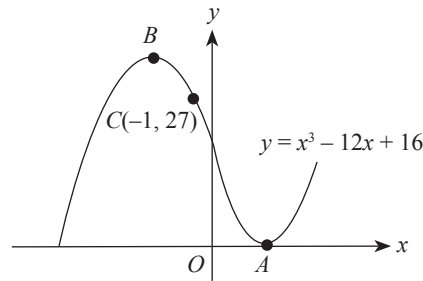
- 11** Isi padu air, $v \text{ cm}^3$, di dalam suatu bekas diberi oleh $V = \frac{1}{3}h^3 + 6h$, dengan keadaan h ialah tinggi air di dalam bekas itu. Air dituang ke dalam bekas itu dengan kadar $12 \text{ cm}^3 \text{ s}^{-1}$. Cari kadar perubahan ketinggian air apabila tingginya ialah 2 cm.

The volume of water, $v \text{ cm}^3$, in a container is given by $V = \frac{1}{3}h^3 + 6h$, such that h is height of the water in the container. Water is poured into the container at the rate of $12 \text{ cm}^3 \text{ s}^{-1}$. Find the rate of change of the height of water if its height is 2 cm.

[4 markah/marks]

Jawapan/Answer:

- 12 Rajah 2 menunjukkan sebahagian daripada lengkung $y = x^3 - 12x + 16$.
 Diagram 2 shows a part of the curve $y = x^3 - 12x + 16$.



Rajah/Diagram 2

Diberi bahawa lengkung itu mempunyai titik minimum A pada paksi- x dan titik maksimum B . Cari
 It is given that the curve has a minimum point A on the x -axis and the maximum point B . Find

- (a) koordinat bagi titik A dan B ,
 the coordinates of points A and B ,
 (b) persamaan normal kepada lengkung pada titik $C(-1, 27)$.
 the equation of the normal to the curve at point $C(-1, 27)$.

[4 markah/marks]

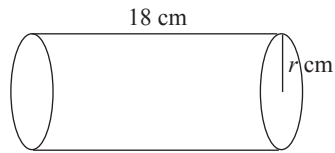
[3 markah/marks]

Jawapan/Answer:



13 Rajah 3 menunjukkan sebuah silinder pepejal dengan tinggi 18 cm dan berjajari r cm.

Diagram 3 shows a solid cylinder with height 18 cm and a radius r cm.



Rajah/Diagram 3

- (a) Luas permukaan silinder ialah A cm². Tunjukkan bahawa $\frac{dA}{dr} = 4\pi(r + 9)$.

The surface area of the cylinder is A cm². Show that $\frac{dA}{dr} = 4\pi(r + 9)$.

[3 markah/marks]

- (b) Seterusnya, hitung nilai anggaran bagi luas permukaan silinder apabila jejari bertambah daripada 5 cm kepada 5.04 cm dengan keadaan tingginya adalah tetap.

Hence, calculate the approximate value of the surface area of the cylinder when the radius increases from 5 cm to 5.04 cm such that the height remains the same.

[4 markah/marks]

Jawapan/Answer:

BAB
3Pengamiran
IntegrationVIDEO
PEMBELAJARAN

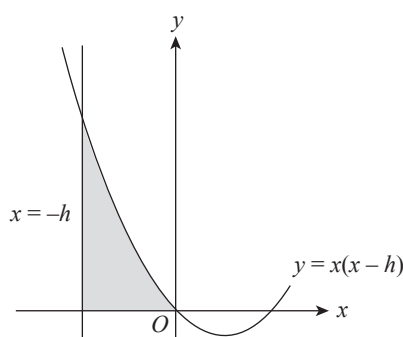
- 1 (a) Diberi bahawa $\frac{d}{dx}\left(\frac{x-3}{(2-3x)^3}\right) = 5 - h(x)$, cari $\int_0^3 h(x) dx$.

It is given that $\frac{d}{dx}\left(\frac{x-3}{(2-3x)^3}\right) = 5 - h(x)$, find $\int_0^3 h(x) dx$.

[3 markah/marks]

- (b) Rajah 1 menunjukkan suatu lengkung $y = x(x - h)$ yang bersilang dengan garis lurus $x = -h$ dengan keadaan h ialah pemalar.

Diagram 1 shows a curve $y = x(x - h)$ which intersects with the straight line $x = -h$ such that h is a constant.



Rajah/Diagram 1

Jika luas kawasan berlorek ialah $\frac{20}{3}$ unit², cari nilai h .

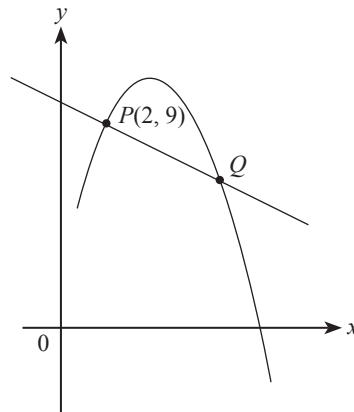
If the area of the shaded region is $\frac{20}{3}$ units², find the value of h .

[3 markah/marks]

Jawapan/Answer:

- 2 Rajah 2 menunjukkan suatu lengkung dengan keadaan $\frac{dy}{dx} = 4 - x$ dan titik P terletak di atas lengkung itu.

Diagram 2 shows a curve such that $\frac{dy}{dx} = 4 - x$ and the point P lies on the curve.



Rajah/Diagram 2

Normal kepada lengkung di titik P bertemu lengkung sekali lagi di titik Q . Cari

The normal to the curve at point P meets the curve again at point Q . Find

- (a) persamaan lengkung itu,
the equation of the curve,

[3 markah/marks]

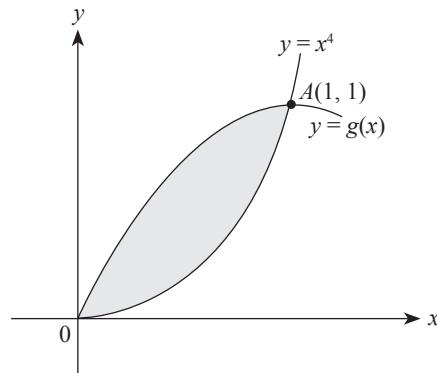
- (b) koordinat Q .
the coordinates of Q .

[5 markah/marks]

Jawapan/Answer:

- 3 Rajah 3 menunjukkan rantau berlorek yang dibatasi oleh lengkung $y = g(x)$ dan $y = x^4$. Kedua-dua lengkung itu bersilang di titik $A(1, 1)$.

Diagram 3 shows the shaded region bounded by the curves $y = g(x)$ and $y = x^4$. Both curves intersect at the point $A(1, 1)$.



Rajah/Diagram 3

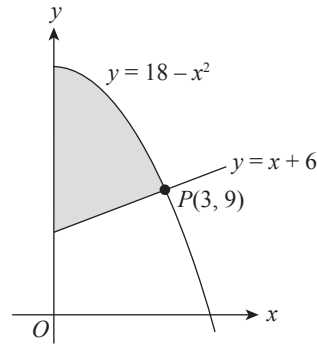
Diberi bahawa luas di bawah lengkung $y = g(x)$ diwakili oleh $\left[x^2 - \frac{1}{3}x^3\right]_0^1$. Cari luas rantau berlorek, dalam unit².

It is given that the area under the curve $y = g(x)$ is represented by $\left[x^2 - \frac{1}{3}x^3\right]_0^1$. Find the area of the shaded region, in units².

[4 markah/marks]

Jawapan/Answer:

- 4 Rajah 4 menunjukkan garis lurus $y = x + 6$ menyilang sebahagian lengkung $y = 18 - x^2$ pada titik $P(3, 9)$.
 Diagram 4 shows the straight line $y = x + 6$ intersecting the part of the curve $y = 18 - x^2$ at point $P(3, 9)$.



Rajah/Diagram 4

Cari

Find

- (a) luas kawasan berlorek,
 the area of the shaded region,

[4 markah/marks]

- (b) isi padu janaan, dalam sebutan π , apabila rantau yang dibatasi oleh lengkung, paksi- y dan garis lurus $y = 3$ dikisarkan 360° pada paksi- y .
 the volume generated, in terms of π , when the region bounded by the curve, the y -axis and the straight line $y = 3$ is revolved through 360° about the y -axis.

[3 markah/marks]

Jawapan/Answer:

- 5 (a) Diberi $\int_1^p (x+2) dx = 3.5$. Cari nilai p .

Given $\int_1^p (x+2) dx = 3.5$. Find the value of p .

[4 markah/marks]

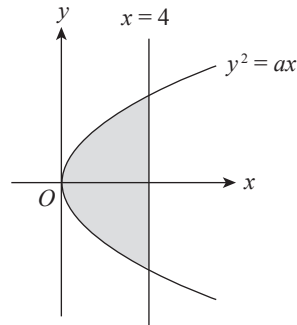
- (b) Fungsi kecerunan suatu lengkung ialah $\sqrt{3x-2}$. Diberi titik $M(1, 8)$ terletak pada lengkung itu. Cari persamaan lengkung itu.

The gradient function of the curve is $\sqrt{3x-2}$. Given the point $M(1, 8)$ lies on the curve. Find the equation of the curve.

[3 markah/marks]

- (c) Rajah 5 menunjukkan garis lurus $x = 4$ menyilang pada lengkung $y^2 = ax$.

Diagram 5 shows the straight line $x = 4$ intersecting the curve $y^2 = ax$.



Rajah/Diagram 5

Jika luas rantau yang dibatasi oleh lengkung $y^2 = ax$ dan garis lurus $x = 4$ ialah $\frac{64}{3}$ unit², cari nilai a .

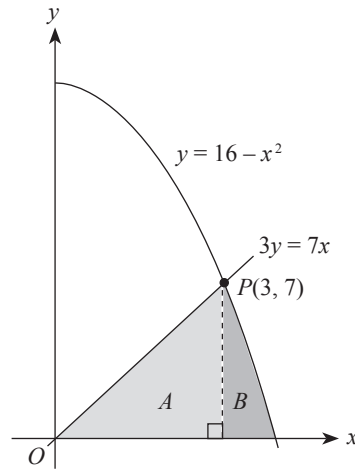
If the area of the region bounded by the curve $y^2 = ax$ and the straight line $x = 4$ is $\frac{64}{3}$ units², find the value of a .

[3 markah/marks]

Jawapan/Answer:

- 6 Rajah 6 menunjukkan dua kawasan berlorek, A dan B yang dibatasi oleh garis $3y = 7x$, lengkung $y = 16 - x^2$ dan paksi- x .

Diagram 6 shows two shaded regions, A and B which are bounded by the line $3y = 7x$, the curve $y = 16 - x^2$ and the x -axis.



Rajah/Diagram 6

Hitung

Calculate

- (a) jumlah luas kawasan berlorek,
the total area of shaded regions,

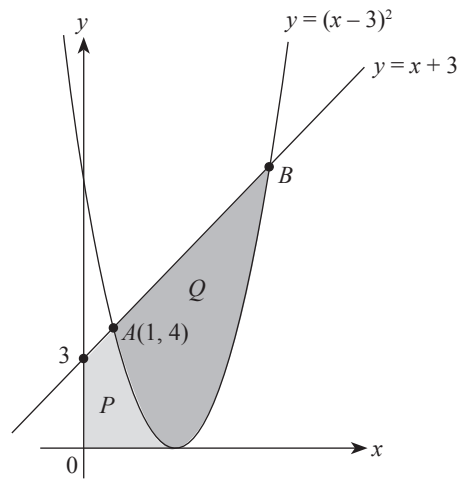
[5 markah/marks]

- (b) isi padu kisaran, dalam sebutan π , apabila kawasan berlorek B diputarkan melalui 360° pada paksi- x .
the volume of revolution, in terms of π , when the shaded region B is rotated through 360° about the x -axis.

[3 markah/marks]

Jawapan/Answer:

- 7 Rajah 7 menunjukkan garis lurus $y = x + 3$ bersilang dengan lengkung $y = (x - 3)^2$ pada titik A dan B .
 Diagram 7 shows the straight line $y = x + 3$ intersecting the curve $y = (x - 3)^2$ at points A and B .



Rajah/Diagram 7

Cari

Find

- (a) koordinat B ,
 the coordinates of B , [2 markah/marks]
- (b) luas kawasan berlorek Q ,
 the area of the shaded region Q , [4 markah/marks]
- (c) isi padu yang dijanakan, dalam sebutan π , apabila rantau P dikisarkan melalui 360° pada paksi- x .
 the volume generated, in terms of π , when the region P is revolved through 360° about the x -axis. [4 markah/marks]

Jawapan/Answer:



BAB
4Pilih Atur dan Gabungan
Permutation and Combination

- 1 Seorang jurulatih hendak memilih 8 orang pemain untuk membentuk satu pasukan daripada sekumpulan 11 orang murid lelaki dan 12 orang murid perempuan. Cari bilangan cara berlainan untuk membentuk pasukan itu yang mengandungi

A coach wants to choose 8 players to form a team from a group of 11 boys and 12 girls. Find the number of different ways to form the team which consists of

- (a) murid lelaki sahaja,
boys only,

[2 markah/marks]

- (b) sekurang-kurangnya 6 orang murid perempuan.
at least 6 girls.

[3 markah/marks]

Jawapan/Answer:

-
- 2 Rajah 1 menunjukkan 7 keping kad huruf.

Diagram 1 shows 7 letter cards.



Rajah/Diagram 1

Hitung

Calculate

- (a) bilangan cara menyusun huruf-huruf tersebut tanpa sebarang syarat,
the number of ways to arrange the letters without any restrictions.

[2 markah/marks]

- (b) bilangan kod empat huruf yang berlainan bermula dengan huruf vokal.
the number of different four letter codes which start with a vowel.

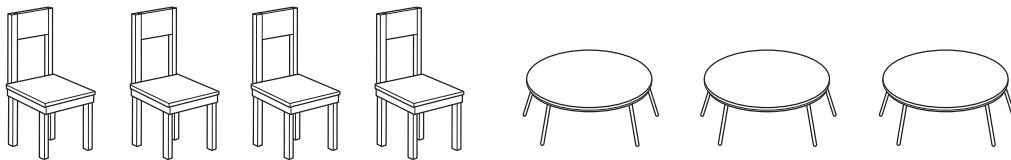
[2 markah/marks]

Jawapan/Answer:

- 3 Berapakah bilangan nombor 3-digit yang boleh dibentuk menggunakan digit-digit 1, 4, 5, 7, 8 dan 9 jika
How many 3-digit numbers can be formed using the digits 1, 4, 5, 7, 8 and 9 if
- (a) digit tidak boleh diulangi?
no repetition of digits is allowed? [2 markah/marks]
- (b) digit boleh diulangi?
repetition of digits is allowed? [2 markah/marks]

Jawapan/Answer:

- 4 Rajah 2 menunjukkan beberapa buah kerusi dan meja bulat.
Diagram 2 shows a number of chairs and round tables.



Rajah/Diagram 2

Cari bilangan susunan objek-objek di atas jika
Find the number of arrangements of the objects above if

- (a) tiada syarat dikenakan,
there are no restrictions, [2 markah/marks]
- (b) setiap kerusi dan meja bulat perlu disusun secara berselang-seli,
each chair and round table must be arranged alternatively, [2 markah/marks]
- (c) semua kerusi perlu disusun dalam kelompok yang sama,
all the chairs are always together, [2 markah/marks]
- (d) kerusi dan meja bulat perlu disusun dalam kelompok masing-masing.
chairs and round tables have to be arranged in their respective groups. [2 markah/marks]

Jawapan/Answer:

- 5 Cari bilangan cara sebuah keluarga yang terdiri daripada Allysa, Luqman, Raja, Fatin, Arisa, Aliyah dan Fazilah boleh duduk di sebuah meja bulat jika
Find the number of ways a family that consists of Allysa, Luqman, Raja, Fatin, Arisa, Aliyah and Fazilah can sit at a round table if
- (a) tiada syarat dikenakan,
there are no conditions, [2 markah/marks]
- (b) Fatin dan Arisa mesti duduk bersebelahan.
Fatin and Arisa must sit side by side. [2 markah/marks]

Jawapan/Answer:

-
- 6 Menggunakan bucu-bucu sebuah pentagon, cari bilangan
Using the vertices of pentagon, find the number of
- (a) garis lurus yang dapat dibentuk,
the straight line that can be formed, [2 markah/marks]
- (b) segi tiga yang dapat dibentuk,
the triangles that can be formed, [2 markah/marks]
- (c) segi empat yang dapat dibentuk,
the rectangles that can be formed, [2 markah/marks]
- (d) pepenjuru yang dapat dibentuk.
the diagonals that can be formed. [2 markah/marks]

Jawapan/Answer:

-
- 7 Berapakah bilangan nombor dari 1 000 hingga 9 999 yang tidak mempunyai empat digit berlainan?
How many numbers from 1 000 to 9 999 which do not contain four different digits? [4 markah/marks]

Jawapan/Answer:

- 8 Kavisha membeli 10 butir manik pelbagai warna di Pasar Kraftangan Anggerik dan bercadang untuk membuat seutas gelang. Kavisha mendapati bahawa gelang itu hanya memerlukan 7 butir manik sahaja. Berapakah bilangan cara untuk menghasilkan gelang tersebut?

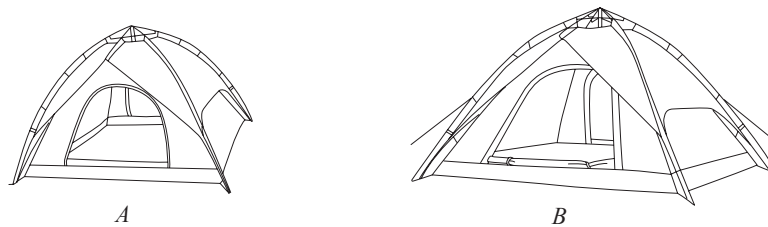
Kavisha bought 10 beads of different colours from Anggerik Handicraft Market and she intends to make a bracelet. Kavisha realises that the bracelet requires only 7 beads. How many ways to make the bracelet?

[2 markah/marks]

Jawapan/Answer:

- 9 Rajah 3 menunjukkan dua buah khemah yang berbeza, *A* dan *B*. Khemah *A* boleh menampung 3 orang manakala khemah *B* boleh menampung 4 orang.

Diagram 3 shows two different tents, A and B. Tent A can hold 3 people while tent B can hold 4 people.



Rajah/Diagram 3

Cari bilangan cara 7 orang boleh ditempatkan di dalam dua khemah tersebut.

Find the number of ways in which 7 people can be assigned to both tents.

[2 markah/marks]

Jawapan/Answer:

- 10** (a) Cari bilangan nombor 4-digit yang berbeza yang boleh dibentuk dengan menggunakan digit 1, 2, 3, 4, 5 dan 6 jika tiada digit yang berulang.
Find how many different 4-digit numbers can be formed using the digits 1, 2, 3, 4, 5 and 6 if no digit is repeated.
 [2 markah/marks]
- (b) Berapakah bilangan nombor 4-digit di (a) lebih besar daripada 6 000?
How many of the 4-digit numbers in (a) are greater than 6 000?
 [2 markah/marks]
- (c) Berapakah bilangan nombor 4-digit di (a) lebih besar daripada 6 000 dan adalah ganjil?
How many of the 4-digit numbers in (a) are greater than 6 000 and are odd?
 [2 markah/marks]

Jawapan/Answer:

- 11** Sebuah pasukan kuiz yang terdiri daripada 10 pemain akan dipilih daripada sebuah kelas yang mempunyai 8 orang lelaki dan 12 orang perempuan.
A quiz team of 10 players will be selected from a class of 8 boys and 12 girls.
- (a) Cari bilangan pasukan yang berbeza yang boleh dibentuk jika bilangan lelaki dan perempuan adalah sama.
Find the number of different teams that can be chosen if the team has to have equal numbers of girls and boys.
 [2 markah/marks]
- (b) Cari bilangan pasukan yang berbeza yang boleh dipilih jika pasukan itu mesti termasuk lelaki dan perempuan yang paling muda dan paling tua.
Find the number of different teams that can be chosen if the team has to include the youngest and oldest boy and the youngest and oldest girl.
 [2 markah/marks]

Jawapan/Answer:

12 Menggunakan digit-digit 2, 3, 4, 5 dan 6 tanpa ulangan, hitung

Using the digits 2, 3, 4, 5 and 6 without repetition, calculate

(a) bilangan nombor empat digit yang dapat dibentuk,
the number of four-digit numbers that can be formed,

[2 markah/marks]

(b) bilangan nombor empat digit yang kurang daripada 5 000 yang dapat dibentuk,
the number of four-digit numbers which is less than 5 000 that can be formed,

[2 markah/marks]

(c) bilangan nombor genap empat digit yang lebih daripada 6 000 dapat dibentuk.
the number of four-digit even numbers which is more than 6 000 that can be formed.

[2 markah/marks]

Jawapan/Answer:



13 Cari susunan yang mungkin menggunakan semua huruf dalam perkataan PENTAKOTA jika P ialah huruf pertama dan N ialah huruf terakhir.

Find the possible arrangements of using all the letters in the word PENTAKOTA if P is the first letter and N is the last letter.

[2 markah/marks]

Jawapan/Answer:

14 15 kuntum bunga yang terdiri daripada 4 kuntum bunga berwarna merah, 5 kuntum bunga berwarna biru dan 6 kuntum bunga berwarna putih akan dilekatkan pada seutas tali untuk membuat kalungan bunga. Hitung bilangan cara untuk menyusun bunga-bunga itu dalam kalungan tersebut.

15 stalks of flowers consisting of 4 red flowers, 5 blue flowers and 6 white flowers will be attached onto a string to make a wreath of flowers. Calculate the number of ways to arrange the flowers to make the wreath.

[2 markah/marks]

Jawapan/Answer:

BAB
5Taburan Kebarangkalian
Probability Distribution

1 Nyatakan jenis dan pemboleh ubah rawak bagi setiap situasi berikut.

State the type and random variable for each of the following situations.

- (a) Lima orang murid dipilih secara rawak daripada murid-murid Tingkatan 5. Diberi X mewakili bilangan murid yang memakai cermin mata.

Five pupils are chosen at random from Form 5 pupils. X is given to represent the number of pupils who wear glasses.

[2 markah/marks]

- (b) Sebuah kilang mengeluarkan sejenis minuman botol tertentu. Bagi memastikan kualiti, jabatan kawalan kualiti memeriksa dan menerima isi padu antara 245 hingga 255 mililiter. Isi padu minuman yang berada di luar julat ini dianggap rosak dan dikeluarkan dari barisan pengeluaran. Diberi X mewakili isi padu air dalam mililiter yang diterima.

A factory produces a certain type of bottled drink. To ensure quality, the quality control department checks and accepts the volume between 245 and 255 milliliters. The volume of the drink that falls outside this range is considered defective and removed from the production line. Given that X represents the volume of water in milliliter that is accepted.

[2 markah/marks]

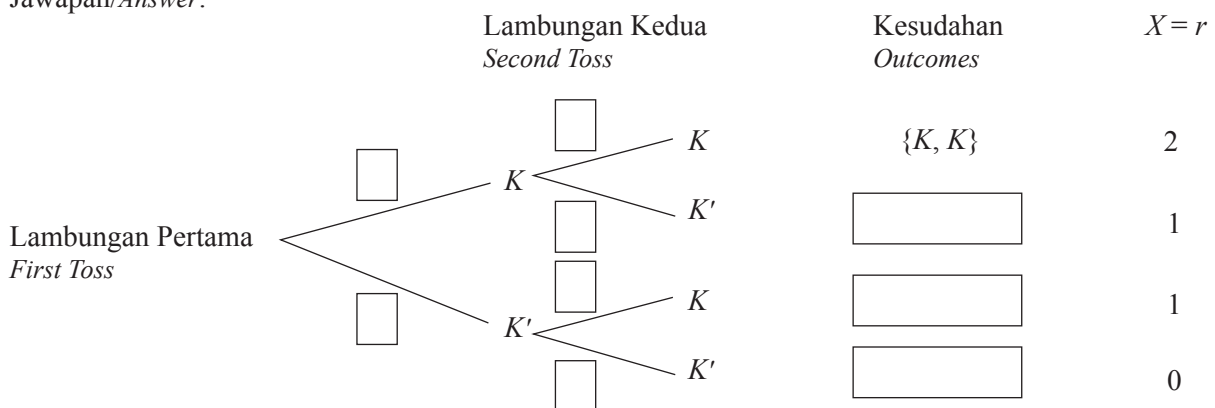
Jawapan/Answer:

2 Gambar rajah pokok di Rajah 1 mewakili semua kesudahan bagi dua biji dadu adil yang dilambung sebanyak dua kali. Katakan X ialah pemboleh ubah rawak diskret bagi peristiwa mendapat 5 daripada hasil tambah dadu pertama dan kedua. Lengkapkan gambar rajah pokok dengan kebarangkalian yang betul.

The tree diagram in Diagram 1 represents all the possible outcomes when two fair dice are rolled twice. Let X be a discrete random variable for getting 5 from the sum of the numbers on the two dice. Complete the following tree diagram with the correct probability.

[3 markah/marks]

Jawapan/Answer:



Rajah/Diagram 1

Petunjuk: Katakan K ialah mendapat hasil tambah 5 dan K' ialah mendapat hasil tambah bukan 5.

Hint: Let K be the results of getting 5 and K' be those result not getting 5.

- 3 Zharif mempunyai beg yang mengandungi 4 bola merah dan 5 bola biru. Semasa eksperimen, satu bola dipilih secara rawak dari beg, warnanya direkodkan dan kemudian bola tersebut dikembalikan ke dalam beg. Proses ini diulangi sebanyak tiga kali. Katakan X mewakili bilangan bola biru yang direkodkan.
- Zharif has a bag containing 4 red balls and 5 blue balls. During an experiment, a ball is randomly selected from the bag, its color is recorded and then the ball is returned to the bag. This process is repeated three times. Let X represents the number of blue balls recorded.*

(a) Senaraikan X dalam bentuk tatatanda set.

List X in set notation form.

[1 markah/mark]

(b) Lukis gambar rajah pokok untuk mewakili semua kesudahan yang mungkin bagi X .

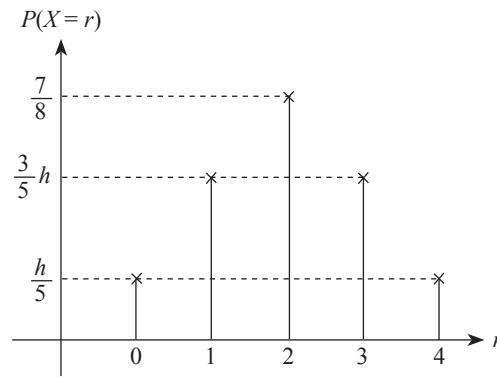
Draw a tree diagram to represent all the possible outcomes for X .

[4 markah/marks]

Jawapan/Answer:

4 Rajah 2 menunjukkan graf bagi suatu taburan binomial.

Diagram 2 shows a binomial distribution table.



Rajah/Diagram 2

Nyatakan

State

(a) semua kesudahan bagi X ,
all the possible outcomes of X ,

[1 markah/mark]

(b) nilai h ,
the value of h ,

[2 markah/marks]

(c) $P(X \geq 1)$.

[2 markah/marks]

Jawapan/Answer:

5 Muiz sedang berlatih kemahiran melontar damak. Kebarangkalian lontarannya mengenai pusat sasaran (tengah papan damak) bagi setiap lontaran ialah 0.4. Jika Muiz melontar damak sebanyak 10 kali, berapakah kebarangkalian bahawa lontarannya mengenai pusat sasaran tepat 5 kali?

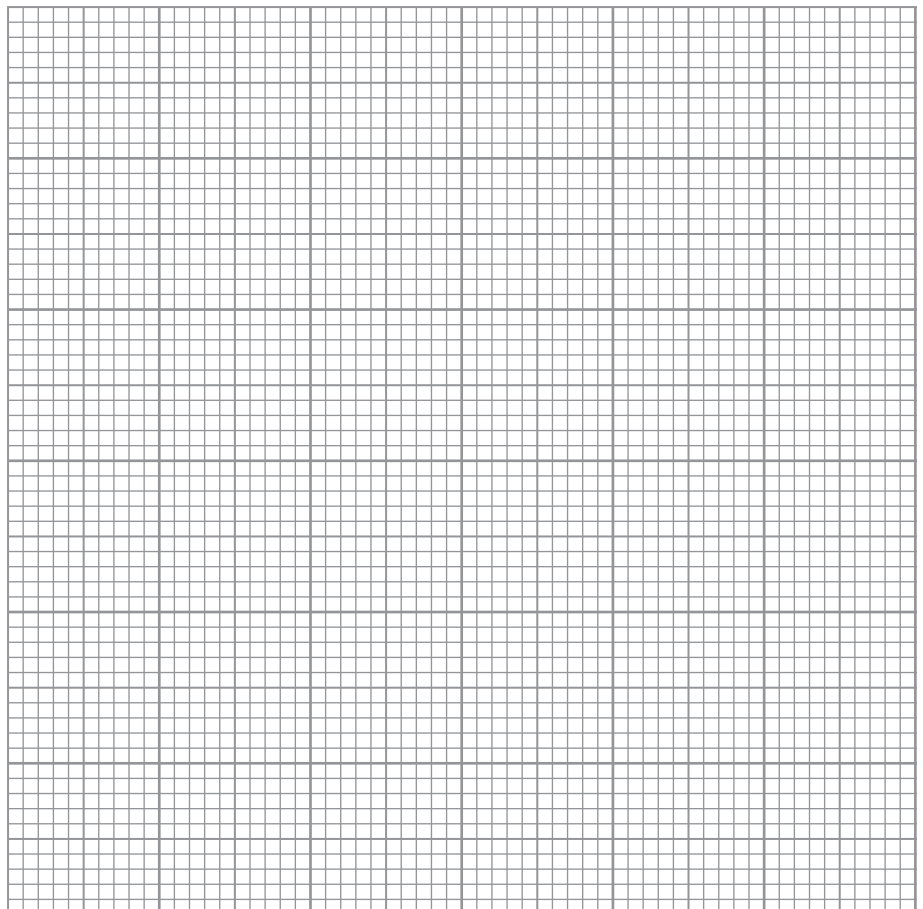
Muiz is practising his dart throwing skills. The probability that his throw hits the bullseye (the center of the dartboard) in each throw is 0.4. If Muiz throws a dart 10 times, what is the probability that he hits the bullseye exactly 5 times?

[2 markah/marks]

Jawapan/Answer:

- 6 Dalam suatu kajian lapangan, didapati bahawa 30% daripada murid di SMK Putra berjalan kaki ke sekolah. Satu sampel yang terdiri daripada 3 orang murid dipilih secara rawak dari sekolah itu.
In a field research, it is found that 30% of the pupils of SMK Putra walk to school. A sample of 3 pupils is chosen at random.
- (a) Bina jadual taburan kebarangkalian binomial bagi bilangan murid yang berjalan kaki ke sekolah.
Construct a binomial probability distribution table for the number of pupils who walks to school. [2 markah/marks]
- (b) Lukis graf bagi taburan itu di ruangan graf yang disediakan.
Draw a graph for the distribution in the graph space provided. [2 markah/marks]

Jawapan/Answer:



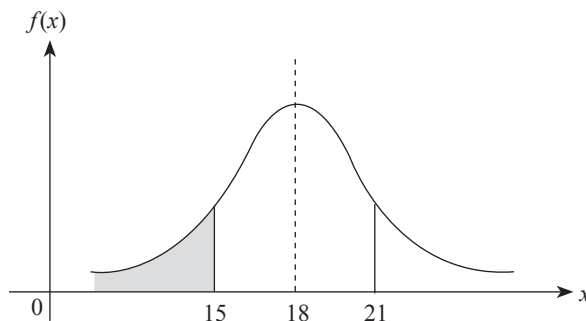
- 7 Dalam pertandingan lemparan bebas bola keranjang, Sarah mempunyai peluang 70% untuk membuat setiap lemparan bebas. Jika Sarah cuba membuat minimum n lemparan bebas, berapakah bilangan lemparan bebas dijangka berjaya jika kebarangkalian lemparan bebas adalah $\frac{1}{64}$?

In a basketball free throw competition, Sarah has a 70% chance of making each free throw. If Sarah attempts minimum n free throws, how many free throws are expected to succeed if the probability of the free throw is $\frac{1}{64}$?

[3 markah/marks]

Jawapan/Answer:

- 8 Rajah 3 menunjukkan sebuah graf taburan normal bagi pemboleh ubah rawak selangar X .
Diagram 3 shows a normal distribution graph for a continuous random variable X .



Rajah/Diagram 3

- (a) Nyatakan nilai min, μ .
State the value of mean, μ . [1 markah/mark]
- (b) Ungkapkan rantau berlerek dalam tatatanda kebarangkalian.
Express the shaded region in probability notation. [1 markah/mark]
- (c) Jika $P(15 < X < 21) = 0.2122$, cari $P(X > 15)$.
If $P(15 < X < 21) = 0.2122$, find $P(X > 15)$. [3 markah/marks]

Jawapan/Answer:

- 9 Dalam satu pertandingan bola sepak, Somu mempunyai 65% peluang untuk menjaringkan gol. Berapakah bilangan gol yang dapat dijaringkan oleh Somu jika kebarangkalian maksimum kejayaan menjaringkan gol lebih besar daripada $\frac{2}{35}$?

In a football match, Somu has a 65% chance of scoring a goal. How many goals can Somu score if the maximum probability of successfully scoring is greater than $\frac{2}{35}$?

[3 markah/marks]

Jawapan/Answer:

- 10 Diberi Z ialah pemboleh ubah rawak selanjar yang bertaburan secara normal, cari

Given that Z is a continuous random variable with a standard normal distribution, find

(a) $P(0.5 \leq Z \leq 1.235)$,

[1 markah/mark]

(b) $P(|Z| > 2.231)$,

[2 markah/marks]

(c) $P(|Z| \leq 0.727)$.

[3 markah/marks]

Jawapan/Answer:

- 11 Diberi $P(X < 19.7) = 0.7327$ dengan keadaan $X \sim N(15, \sigma^2)$. Cari nilai σ .
 Given $P(X < 19.7) = 0.7327$ such that $X \sim N(15, \sigma^2)$. Find the value of σ .

[3 markah/marks]

Jawapan/Answer:

- 12 Dalam satu ujian, markah X mempunyai taburan normal dengan min 70 markah dan sisihan piawai 10 markah. Markah X itu diskalakan kepada markah Y dengan min 85 markah dan sisihan piawai 8 markah.
In a test, the X scores has a normal distribution with a mean of 70 marks and a standard deviation of 10 marks. The X scores are scaled to Y scores with a mean of 85 marks and a standard deviation of 8 marks.

- (a) Jika seorang murid mendapat 75 markah dalam ujian tersebut, cari markah yang diskalakan, Y untuk murid itu.

If a pupil scores 75 marks in the test, find the scaled score, Y for the pupil.

[2 markah/marks]

- (b) Cari skor- z bagi seorang murid yang mendapat 90 markah dalam ujian sebelum diskalakan kepada markah Y .

Find the z -score for a pupil who scored 90 marks in the test before scaling to Y scores.

[2 markah/marks]

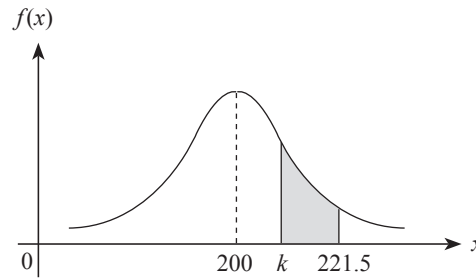
- (c) Jika markah Y seorang murid ialah 82 markah, cari markah X yang sepadan sebelum diskalakan.

If the Y scores of a pupil is 82 marks, find the corresponding X score before scaling.

[2 markah/marks]

Jawapan/Answer:

- 13 Jisim epal yang dipetik dari sebuah ladang bertaburan secara normal dengan min 200 g dan sisihan piawai 10 g. Rajah 4 menunjukkan graf taburan normal bagi jisim, dalam g, epal itu.
The mass of apples picked from a farm is normally distributed with mean of 200 g and standard deviation of 10 g. Diagram 4 shows the graph of the normal distribution of the mass, in g, of the apples.



Rajah/Diagram 4

Diberi luas rantau berlorek ialah 0.3708. Cari nilai k .

Given that the area of the shaded region is 0.3708. Find the value of k .

[5 markah/marks]

Jawapan/Answer:

- 14 Dalam sebuah kejiranan, kebarangkalian bahawa sebuah isi rumah yang dipilih secara rawak memiliki sebuah kereta ialah p . Sebuah sampel 100 isi rumah dipilih dan didapati 30 daripadanya memiliki sebuah kereta. Cari
In a neighbourhood, the probability that a household chosen at random owns a car is p . A sample of 100 households is selected and it is found that 30 of them own a car. Find

(a) nilai p ,
the value of p ,

[1 markah/mark]

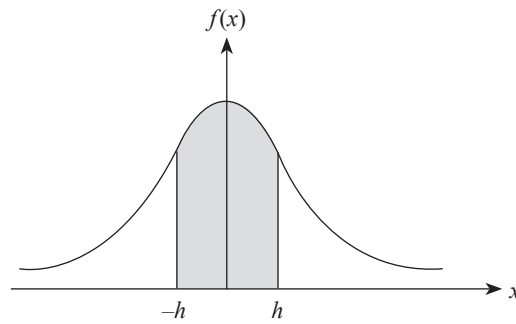
(b) min, varians dan sisihan piawai.
the mean, variance and standard deviation.

[5 markah/marks]

Jawapan/Answer:

15 Rajah 5 menunjukkan sebuah graf taburan normal.

Diagram 5 shows a normal distribution graph.



Rajah/Diagram 5

Diberi bahawa min dan varians data tersebut masing-masing ialah 37 dan 289 dan peratus data yang melebihi h ialah 72.7%. Cari

It is given that the mean and variance of the data are 37 and 289 respectively and the percentage of the data more than h is 72.7%. Find

- (a) nilai h dan berikan jawapan kepada integer terhampir,
the value of h and give the answer to the nearest integer;

[2 markah/marks]

- (b) peratus antara 20 dan 40.4.
the percentage between 20 and 40.4.

[3 markah/marks]

Jawapan/Answer:

16 $P(X > 48) = 0.1993$ dengan keadaan $X \sim N(31, \sigma^2)$. Cari nilai σ .

$P(X > 48) = 0.1993$ such that $X \sim N(31, \sigma^2)$. Find the value of σ .

[3 markah/marks]

Jawapan/Answer:

- 17 Kertas peperiksaan Matematik terdiri daripada 40 soalan. Setiap soalan diberikan empat pilihan jawapan, dengan hanya satu jawapan yang betul.

The Mathematics examination paper consists of 40 questions. Each question is given by four options of answer, with only one correct answer.

- (a) Adam menjawab semua soalan dengan memilih jawapan secara rawak untuk setiap soalan.

Adam answered to all the questions by choosing one answer randomly for each.

- (i) Anggarkan bilangan soalan yang dijawab dengan betul.

Estimate the number of questions answered correctly.

- (ii) Tentukan sisihan piawai bagi bilangan soalan yang dijawab dengan betul.

Determine the standard deviation for the number of correctly answered questions.

[4 markah/marks]

- (b) Hawa menjawab 35 soalan dengan betul dan memilih satu jawapan secara rawak untuk 5 soalan yang berbaki. Hitung kebarangkalian dia menjawab

Hawa answered 35 questions correctly and chose one answer randomly for each remaining 5 questions. Calculate the probability of her answering

- (i) 38 soalan dengan betul,

38 questions correctly,

- (ii) kelima-lima soalan yang berbaki dengan salah.

the remaining five questions incorrectly.

[6 markah/marks]

Jawapan/Answer:



BAB
6Fungsi Trigonometri
Trigonometric Functions

1 (a) Diberi bahawa $\cos \theta = \frac{3}{5}$, cari

It is given that $\cos \theta = \frac{3}{5}$, find

- (i) nilai-nilai yang mungkin bagi $\sin \theta$,
the possible values of $\sin \theta$,
- (ii) nilai $\cos 4\theta$, jika θ ialah sudut tirus.
the value of $\cos 4\theta$, if θ is an acute angle.

[5 markah/marks]

- (b) (i) Tunjukkan bahawa $\sin \theta \left(\frac{2}{1 - \cos \theta} - \frac{2}{1 + \cos \theta} \right)$ boleh diungkapkan sebagai $k \cot \theta$, dengan keadaan k ialah pemalar.

Show that $\sin \theta \left(\frac{2}{1 - \cos \theta} - \frac{2}{1 + \cos \theta} \right)$ can be expressed as $k \cot \theta$, such that k is a constant.

- (ii) Seterusnya, nyatakan nilai k .
Hence, state the value of k .

[3 markah/marks]

Jawapan/Answer:

- 2 (a) Diberi bahawa $\tan x = m$, dengan keadaan x ialah sudut tirus, ungkapkan $\sin 2x$ dalam sebutan m .
Given that $\tan x = m$, such that x is an acute angle, express $\sin 2x$ in terms of m . [2 markah/marks]
- (b) Diberi bahawa $\cos \theta = t$ untuk $270^\circ < \theta < 360^\circ$, ungkapkan $\cos \frac{1}{2} \theta$ dalam sebutan t .
Given that $\cos \theta = t$ for $270^\circ < \theta < 360^\circ$, express $\cos \frac{1}{2} \theta$ in terms of t . [2 markah/marks]
- (c) Cari nilai $\tan 67.5^\circ$ dalam bentuk surd.
Find the value of $\tan 67.5^\circ$ in surd form. [4 markah/marks]

Jawapan/Answer:



- 3 (a) (i) Tunjukkan bahawa persamaan $3 \sin \theta \tan \theta = 8$ boleh ditulis sebagai $3 \cos^2 \theta + 8 \cos \theta - 3 = 0$.
Show that the equation $3 \sin \theta \tan \theta = 8$ can be written as $3 \cos^2 \theta + 8 \cos \theta - 3 = 0$.
- (ii) Seterusnya, selesaikan persamaan untuk $3 \sin \theta \tan \theta = 8$ untuk $0^\circ < \theta < 360^\circ$.
Hence, solve the equation $3 \sin \theta \tan \theta = 8$ for $0^\circ < \theta < 360^\circ$.

[4 markah/marks]

- (b) Diberi bahawa $\tan 2A = -\frac{24}{7}$ untuk $90^\circ < A < 180^\circ$, cari nilai bagi $\cos A$.

Given that for $\tan 2A = -\frac{24}{7}$ for $90^\circ < A < 180^\circ$, find the value of $\cos A$.

[3 markah/marks]

- (c) Jika $\cos x = \frac{3}{5}$ dan $\frac{3}{2}\pi < x < 2\pi$, cari $\tan \frac{1}{2}x$.

If $\cos x = \frac{3}{5}$ and $\frac{3}{2}\pi < x < 2\pi$, find $\tan \frac{1}{2}x$.

[1 markah/mark]

Jawapan/Answer:

- 4 (a) Pada paksi yang sama, lakarkan graf bagi $y = 3 \sin 3x$ dan $y = 2 \cos \frac{3}{2}x - 1$ untuk $0 \leq x \leq \frac{4}{3}\pi$.

On the same axes, sketch the graphs of $y = 3 \sin 3x$ and $y = 2 \cos \frac{3}{2}x - 1$ for $0 \leq x \leq \frac{4}{3}\pi$.

[6 markah/marks]

- (b) Seterusnya, nyatakan bilangan penyelesaian bagi persamaan $2 \cos \frac{3}{2}x - 3 \sin 3x = 1$ untuk $0 \leq x \leq \frac{4}{3}\pi$.

Hence, state the number of solutions of the equation $2 \cos \frac{3}{2}x - 3 \sin 3x = 1$ for $0 \leq x \leq \frac{4}{3}\pi$.

[1 markah/mark]

Jawapan/Answer:

5 Fungsi f ditakrifkan oleh $f(x) = 3 \cos 2x + 5$ untuk $0 \leq x \leq \pi$.

The function f is defined by $f(x) = 3 \cos 2x + 5$ for $0 \leq x \leq \pi$.

(a) Nyatakan amplitud dan kala bagi f .

State the amplitude and period of f .

[2 markah/marks]

(b) Lakarkan graf bagi $y = f(x)$.

Sketch the graph of $y = f(x)$.

[3 markah/marks]

(c) Cari nilai maksimum dan minimum bagi $f(x)$.

Find the maximum and minimum values of $f(x)$.

[2 markah/marks]

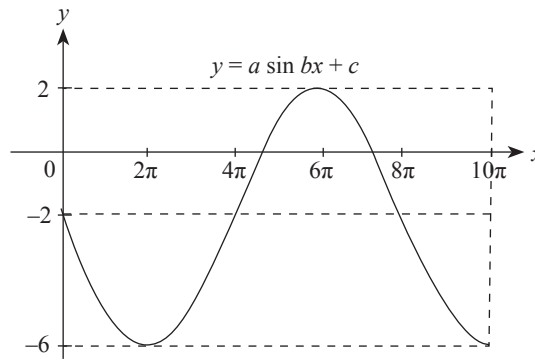
(d) Pada paksi yang sama di (b), lakarkan graf bagi $y = -3 \cos 2x + 5$. Seterusnya, cari nilai-nilai x dalam sebutan π apabila kedua-dua graf itu bertemu.

On the same axes in (b), sketch the graph of $y = -3 \cos 2x + 5$. Hence, find the values of x in terms of π when both graphs meet.

[3 markah/marks]

Jawapan/Answer:

- 6 Rajah 1 menunjukkan sebahagian daripada graf $y = a \sin bx + c$, dengan keadaan a , b dan c ialah pemalar.
Diagram 1 shows part of the graph of $y = a \sin bx + c$, where a , b and c are constants.



Rajah/Diagram 1

- (a) Cari nilai-nilai a , b dan c .
Find the values of a , b and c .

[3 markah/marks]

- (b) (i) Selesaikan persamaan $\sec 2x = -2$ untuk $0 \leq x \leq 2\pi$.
Solve the equation $\sec 2x = -2$ for $0 \leq x \leq 2\pi$.

- (ii) Lakarkan graf bagi $y = \cos 2x$ untuk $0 \leq x \leq \pi$. Seterusnya, dengan melukis satu garis lurus yang sesuai pada lakaran anda, cari julat nilai x dengan keadaan $\cos 2x \leq -\frac{1}{2}$ untuk $0 \leq x \leq \pi$.
Sketch the graph of $y = \cos 2x$ for $0 \leq x \leq \pi$. Hence, by drawing a suitable straight line on your sketch, find the range of values of x for which $\cos 2x \leq -\frac{1}{2}$ for $0 \leq x \leq \pi$.

[7 markah/marks]

Jawapan/Answer:

7 (a) Diberi $\sin x = \frac{4}{5}$ dengan x berada pada sukuan $\frac{\pi}{2} < x < \pi$. Buktikan $\sin\left(x + \frac{\pi}{4}\right) - \cos\left(x - \frac{\pi}{4}\right) = 0$.

Given $\sin x = \frac{4}{5}$ where x lies in the quadrant $\frac{\pi}{2} < x < \pi$. Prove that $\sin\left(x + \frac{\pi}{4}\right) - \cos\left(x - \frac{\pi}{4}\right) = 0$.

[4 markah/marks]

(b) (i) Lengkapkan Jadual 1 bagi persamaan $y = 3 \cos 2x$ untuk $0 \leq x \leq \pi$.

Complete Table 1 for the equation $y = 3 \cos 2x$ for $0 \leq x \leq \pi$.

x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π
y					

Jadual/Table 1

Lukis graf bagi $y = 3 \cos 2x$ dengan menggunakan skala 3 cm kepada $\frac{\pi}{4}$ unit pada paksi- x dan 2 cm kepada 1 unit pada paksi- y . Gunakan kertas graf pada halaman 113.

Draw a graph of $y = 3 \cos 2x$ by using a scale of 3 cm to $\frac{\pi}{4}$ unit on the x -axis and 2 cm to 1 unit on the y -axis. Use the graph paper on page 113.

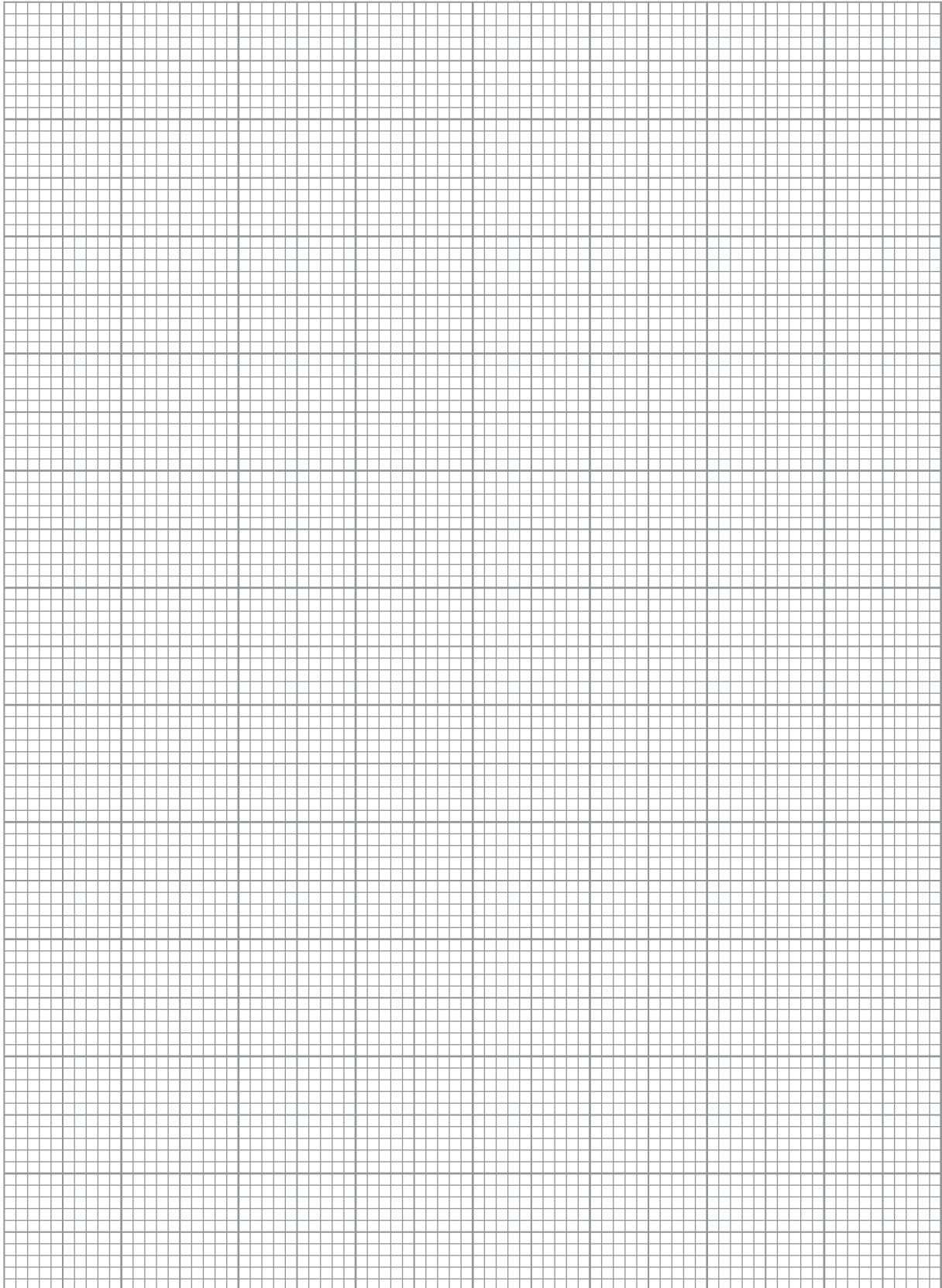
(ii) Seterusnya pada paksi yang sama, lukis garis lurus $y = \frac{2x}{\pi} - 1$ untuk mencari bilangan penyelesaian bagi $3 \cos 2x = \frac{2x}{\pi} - 1$.

Hence, on the same axes, draw a straight line $y = \frac{2x}{\pi} - 1$ to find the number of solutions for $3 \cos 2x = \frac{2x}{\pi} - 1$.

[6 markah/marks]

Jawapan/Answer:

Kertas graf untuk Soalan 7
Graph paper for Question 7



Tingkatan 5

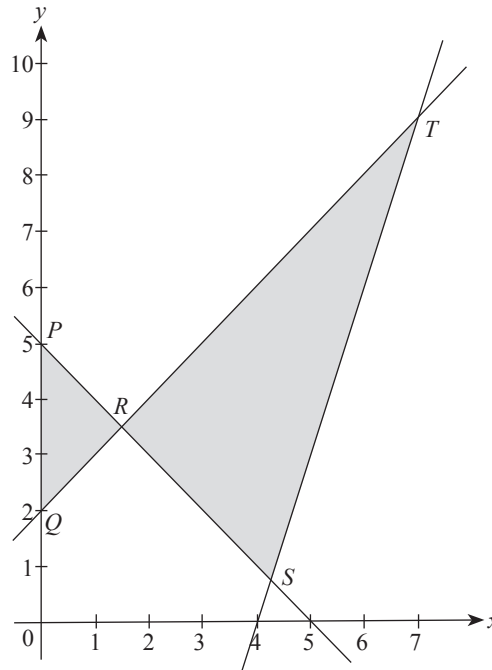
BAB
7

Pengaturcaraan Linear

Linear Programming



- 1 Rajah 1 menunjukkan dua rantau berlorek, PQR dan RST .
Diagram 1 shows two shaded regions, PQR and RST .



Rajah/Diagram 1

- (a) Nyatakan tiga ketaksamaan yang mentakrifkan kawasan RST .
State three inequalities that define the region RST .
- (b) Cari nilai maksimum bagi $2x + 3y$ jika titik (x, y) terletak di
Find the maximum value of $2x + 3y$ if point (x, y) is on
- rantau berlorek PQR ,
the shaded region of PQR ,
 - rantau berlorek RST .
the shaded region of RST .

[6 markah/marks]

[4 markah/marks]

Jawapan/Answer:

- 2 Seorang petani ingin menanam jagung dan gandum. Kos bagi setiap pokok jagung dan gandum masing-masing berharga RM50 dan RM25. Bilangan pokok jagung, x , dan bilangan pokok gandum, y , yang ditanam adalah berdasarkan kekangan-kekangan berikut:

A farmer wants to plant corn and wheat. The cost of each corn plant and wheat plant is RM50 and RM25, respectively. The number of corn plants, x , and the number of wheat plants, y , planted are based on the following constraints:

- I Kapasiti maksimum tanaman bagi tanah yang tersedia ialah 400 pokok.
The maximum capacity of plants for the available land is 400 plants.
 - II Jumlah pokok gandum yang ditanam tidak melebihi 3 kali jumlah pokok jagung.
The number of wheat plants planted does not exceed 3 times the number of corn plants.
 - III Petani itu mempunyai modal RM15 000.
The farmer has a capital of RM15 000.
- (a) Tulis tiga ketaksamaan, selain $x \geq 0$ dan $y \geq 0$, yang memenuhi semua kekangan itu.
Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the constraints.

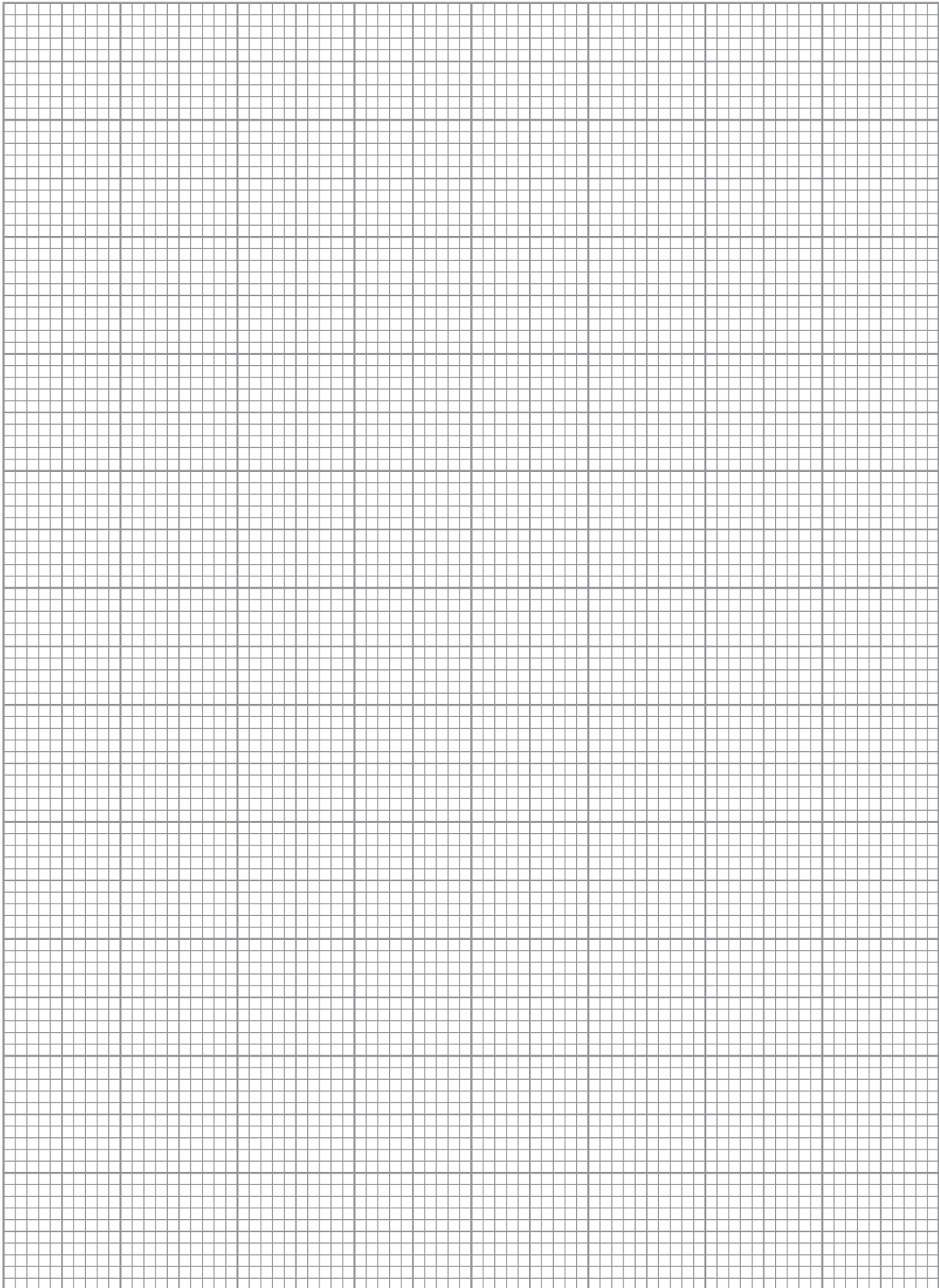
[3 markah/marks]

- (b) Dengan menggunakan skala 2 cm kepada 50 pokok pada kedua-dua paksi, bina dan lorekkan rantau **R** yang memenuhi semua kekangan itu.
Gunakan kertas graf di halaman 116.
*Using a scale of 2 cm to 50 plants on both axes, construct and shade the region **R** that satisfies all the constraints. Use the graph paper on page 116.*

[3 markah/marks]

Jawapan/Answer:

Kertas graf untuk Soalan 2
Graph paper for Question 2

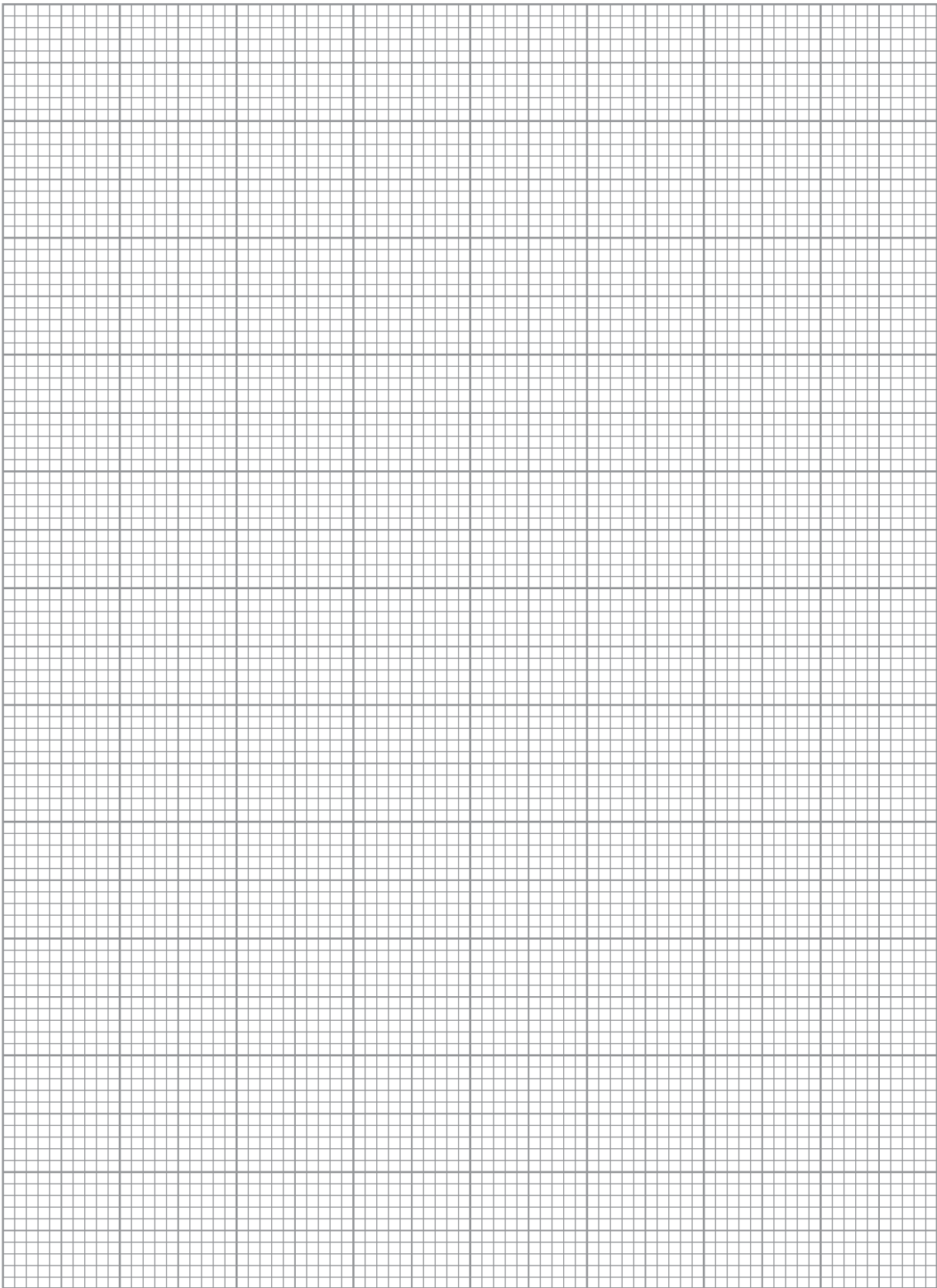


Tingkatan 5

- 3 Sebuah syarikat menghasilkan dua jenis telefon pintar, Model *A* dan Model *B*. Syarikat tersebut menghasilkan x Model *A* dan y Model *B* setiap hari. Kos pengeluaran setiap unit Model *A* dan Model *B* masing-masing ialah RM1 200 dan RM800. Pengeluaran telefon pintar adalah berdasarkan kekangan-kekangan berikut:
A company produces two types of smartphones, Model A and Model B. The company produces x Model A and y Model B daily. The cost of producing each unit of Model A and Model B is RM1 200 and RM800 respectively. The production of the smartphones is based on the following constraints:
- I Jumlah minimum telefon pintar yang boleh dihasilkan sehari ialah 300 unit.
The minimum number of smartphones that can be produced daily is 300 units.
 - II Bilangan unit Model *A* tidak boleh melebihi 3 kali bilangan unit Model *B*.
The number of units of Model A cannot exceed 3 times the number of units of Model B.
 - III Kos pengeluaran harian maksimum ialah RM480 000.
The maximum daily production cost is RM480 000.
- (a) Tulis tiga ketaksamaan linear, selain $x \geq 0$ dan $y \geq 0$, yang memenuhi semua kekangan di atas.
Write three linear inequalities, other than $x \geq 0$ and $y \geq 0$, that satisfy all the above constraints. [3 markah/marks]
- (b) Dengan menggunakan skala 2 cm kepada 50 unit pada kedua-dua paksi, bina dan lorek rantau **R** yang memenuhi semua kekangan itu. Gunakan kertas graf di halaman 118.
*Using a scale of 2 cm to 50 units on both axes, construct and label the region **R** that satisfies all the constraints. Use the graph paper on page 118.* [3 markah/marks]
- (c) Berdasarkan graf yang dibina di (b), cari
Based on the graph drawn in (b), find
- (i) bilangan maksimum unit Model *A* yang perlu dihasilkan jika bilangan unit Model *B* yang dihasilkan dalam sehari ialah 300 unit,
the maximum number of units of Model A that must be produced if the number of units of Model B produced in a day is 300 units,
 - (ii) keuntungan minimum harian jika harga jualan setiap unit Model *A* dan Model *B* masing-masing ialah RM1 500 dan RM1 200.
the minimum daily profit if the sales price of each unit of Model A and Model B are RM1 500 and RM1 200 respectively. [4 markah/marks]

Jawapan/Answer:

Kertas graf untuk Soalan 3
Graph paper for Question 3



Tingkatan 5

- 4 Puan Rosnah mempunyai modal sebanyak RM10 000. Dia bercadang untuk mengeluarkan dua jenis produk kecantikan iaitu serum pemutih x dan serum jerawat y . Kos untuk membuat serum pemutih ialah RM20 manakala serum jerawat ialah RM30. Sebagai permulaan, Puan Rosnah menghasilkan 200 botol serum dengan keadaan bilangan serum pemutih sama banyak atau akan melebihi bilangan serum jerawat. *Puan Rosnah has a capital of RM10 000. She plans to produce two types of beauty products which are whitening serum x and acne serum y . The cost for producing whitening serum is RM20 while acne serum is RM30. As a start, Puan Rosnah produces 200 bottles of serum where the number of whitening serums is equal or will exceed the number of acne serums.*

(a) Tulis tiga ketaksamaan, selain $x \geq 0$ dan $y \geq 0$, yang memenuhi semua kekangan di atas.

Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints.

[3 markah/marks]

- (b) Dengan menggunakan skala 2 cm kepada 50 botol serum jerawat pada paksi- y dan 2 cm kepada 100 botol serum pemutih pada paksi- x , bina dan lorekkan rantau R yang memenuhi semua kekangan di atas. Gunakan kertas graf di halaman 120.

Using a scale of 2 cm to 50 bottles of acne serum on the y -axis and 2 cm to 100 bottles of whitening serum on the x -axis, construct and shade the region R that satisfies all the above constraints. Use the graph paper on page 120.

[3 markah/marks]

- (c) Daripada graf yang diperoleh di (b), cari

From the graph obtained in (b), find

- julat bilangan serum pemutih jika 50 serum jerawat dihasilkan,
the range of the number of whitening serums if 50 acne serums are produced,
- peratus keuntungan maksimum sekiranya harga jualan serum pemutih ialah RM32 dan serum jerawat ialah RM50.

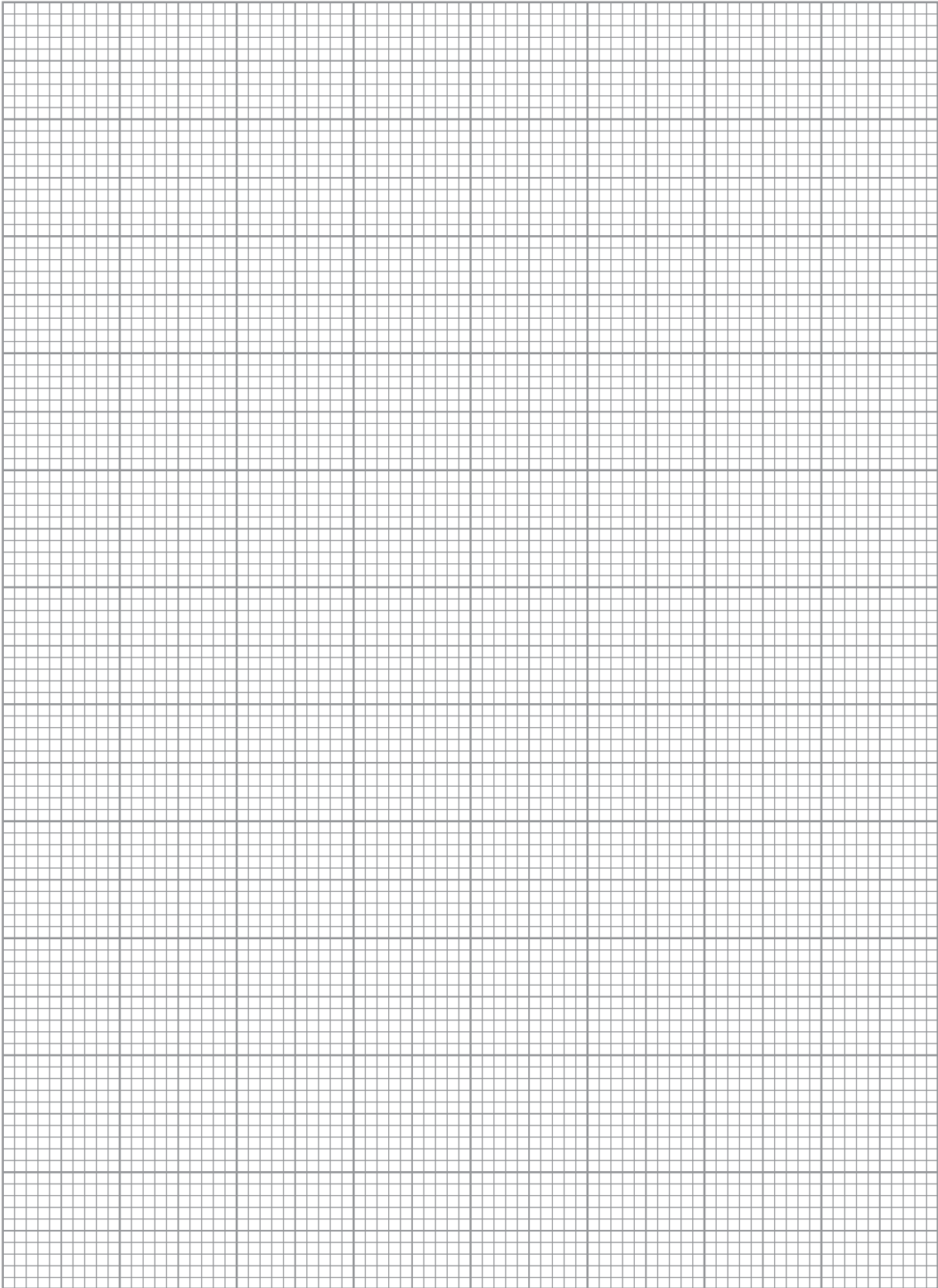
the percentage of maximum profit if the selling price of whitening serum is RM32 and acne serum is RM50.

[4 markah/marks]

Jawapan/Answer:



Kertas graf untuk Soalan 4
Graph paper for Question 4



Tingkatan 5

BAB
8Kinematik Gerakan Linear
Kinematic Linear Motion

- 1 Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O . Sesaran zarah, s m, diberi $s = t^2 - 4t - 5$, dengan keadaan t ialah masa dalam saat. Tentukan
A particle moves along a straight line and passes through a fixed point O . The displacement, s m, is given by $s = t^2 - 4t - 5$, such that t is the time in seconds. Determine
- (a) masa, dalam saat, ketika zarah itu melalui titik O ,
the time, in seconds, when the particle passing through point O , [2 markah/marks]
- (b) masa, dalam saat, zarah itu berhenti seketika,
the time, in seconds, the particle stops instantaneously, [3 markah/marks]
- (c) jumlah jarak, dalam m, yang dilalui oleh zarah itu
the total distance, in m, that the particle travelled
- (i) sehingga zarah itu berhenti seketika,
to the time it stops instantaneously,
- (ii) sehingga zarah itu ke titik O .
to the time it returns to point O . [5 markah/marks]

Jawapan/Answer:

- 2 Suatu zarah bergerak di sepanjang suatu garis lurus bermula dari satu titik tetap O . Halajunya, $v \text{ m s}^{-1}$, diberi oleh $v = (t + 2)(t - 4)$, dengan keadaan t ialah masa, dalam saat, selepas meninggalkan titik O . Cari
A particle moves along a straight line starting from a fixed point O . The velocity, $v \text{ m s}^{-1}$, given by $v = (t + 2)(t - 4)$, where t is the time, in seconds, after leaving the point O . Find

[Anggap gerakan ke arah kanan sebagai positif]

[Assume motion to the right is positive]

- (a) pecutan awal, dalam m s^{-2} , bagi zarah itu,
the initial acceleration, in m s^{-2} , of the particle,

[2 markah/marks]

- (b) halaju minimum, dalam m s^{-1} , zarah itu,
the minimum velocity, in m s^{-1} , of the particle,

[4 markah/marks]

- (c) jarak, dalam m, yang dilalui pada saat ketiga.
the distance, in m, travelled at the third second.

[4 markah/marks]

Jawapan/Answer:

- 3 Suatu zarah bergerak di sepanjang suatu garis lurus dengan pecutan, $a \text{ m s}^{-2}$. Diberi bahawa $a = 3 - 2t$, dengan keadaan t ialah masa, dalam saat, selepas melalui satu titik tetap O . Halaju awal zarah itu ialah 28 m s^{-1} .

A particle moves along a straight line with acceleration, $a \text{ m s}^{-2}$. It is given that $a = 3 - 2t$, such that t is time, in seconds, after passing through a fixed point O . The initial velocity of the particle is 28 m s^{-1} .

[Anggapkan gerakan ke arah kanan sebagai positif]

[Assume motion to the right is positive]

(a) Cari

Find

- (i) halaju maksimum, dalam m s^{-1} , zarah itu.
maximum velocity, in m s^{-1} , of the particle.
- (ii) jarak terjauh, dalam m, dari titik O yang dicapai oleh zarah itu.
the furthest distance, in m, from point O that can be reached by the particle.

[8 markah/marks]

- (b) Lakarkan graf halaju melawan masa bagi 7 saat pertama bagi zarah itu.

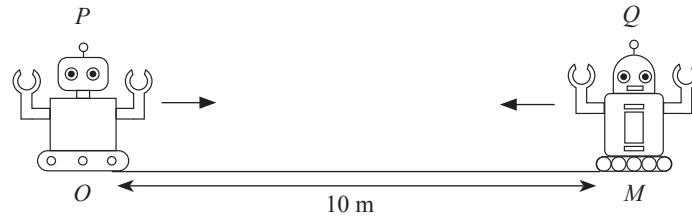
Sketch the velocity against time graph for the first 7 seconds of the particle.

[2 markah/marks]

Jawapan/Answer:

- 4 Rajah 1 menunjukkan kedudukan awal dan arah pergerakan dua buah robot, P dan Q . Kedua-dua robot mula bergerak serentak.

Diagram 1 shows the initial position and direction of motion of two robots, P and Q . Both robots start moving simultaneously.



Rajah/Diagram 1

Robot P bergerak dengan pecutan seragam 2 m s^{-2} dan halaju awalnya ialah 5 m s^{-1} manakala halaju, dalam m s^{-1} , bagi robot Q diberi bahawa $v_Q = 3t^2 - 5$ dengan keadaan t ialah masa, dalam saat, selepas kedua-dua robot mula bergerak masing-masing dari titik O dan M .

Robot P has a constant acceleration of 2 m s^{-2} and its initial velocity is 5 m s^{-1} such that the velocity, in m s^{-1} , of robot Q is given by $v_Q = 3t^2 - 5$ such that t is the time, in seconds, after both robots start moving from point O and M respectively.

- (a) Tentukan halaju, dalam m s^{-1} , robot P pada $t = 2 \text{ s}$.

Determine the velocity, in m s^{-1} , of robot P at $t = 2 \text{ s}$.

[2 markah/marks]

- (b) Cari halaju minimum, dalam m s^{-1} , bagi robot Q .

Find the minimum velocity, in m s^{-1} , of robot Q .

[3 markah/marks]

- (c) (i) Tunjukkan bahawa kedua-dua robot itu berselisih pada $t = \sqrt{10} \text{ s}$.

Show that the two robots meet each other at $t = \sqrt{10} \text{ s}$.

- (ii) Seterusnya, cari jarak, dalam m, bagi kedua-dua robot itu dari titik M apabila mereka berselisih.

Hence, find the distance, in m, of the robots from point M when they meet.

[5 markah/marks]

Jawapan/Answer:

- 5 Dua zarah P dan Q , meninggalkan satu titik tetap O pada masa yang sama dan bergerak di sepanjang suatu garis lurus. Jadual 1 menunjukkan maklumat berkenaan pergerakan kedua-dua zarah itu.
Two particles P and Q , leave the fixed point O at the same time and move along a straight line. Table 1 shows information regarding the movements of both particles.

Zarah P Particle P	Bermula dengan halaju 10 m s^{-1} dan bergerak ke arah kanan dengan pecutan malar $\frac{2}{3} \text{ m s}^{-2}$. <i>Starts with a velocity of 10 m s^{-1} and moves to the right at constant acceleration of $\frac{2}{3} \text{ m s}^{-2}$.</i>
Zarah Q Particle Q	Bermula bergerak ke arah kanan dari rehat dan pecutannya pada masa, $t \text{ s}$ ialah $\left(\frac{1}{3}t + 1\right) \text{ m s}^{-2}$. <i>Starts moving to the right from rest and its acceleration at time, $t \text{ s}$ is $\left(\frac{1}{3}t + 1\right) \text{ m s}^{-2}$.</i>

Jadual/Table 1

- (a) Ungkapkan

Express

- (i) halaju, $v_P \text{ m s}^{-1}$ dan $v_Q \text{ m s}^{-1}$, masing-masing bagi zarah P dan Q , pada masa $t \text{ s}$, dalam sebutan t .
the velocities, $v_P \text{ m s}^{-1}$ and $v_Q \text{ m s}^{-1}$, of particles P and Q respectively, at time $t \text{ s}$, in terms of t .
- (ii) sesaran, $s_P \text{ m}$ dan $s_Q \text{ m}$, masing-masing bagi zarah P dan Q , pada masa $t \text{ s}$, dalam sebutan t .
the displacements, $s_P \text{ m}$ and $s_Q \text{ m}$, of particles P and Q respectively, at time $t \text{ s}$, in terms of t .

[6 markah/marks]

- (b) Hitung jarak dari titik tetap O dengan keadaan zarah P dan Q bertemu sekali lagi.

Calculate the distance from the fixed point O at which the particles P and Q meet again.

[4 markah/marks]

Jawapan/Answer:



Kertas Model SPM

KERTAS 1

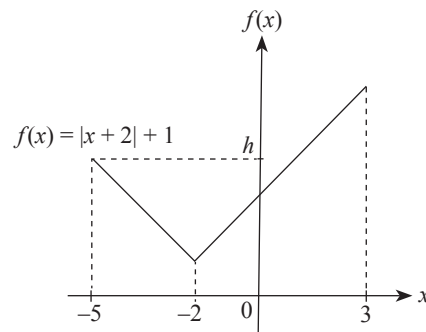
Masa: 2 jam

Bahagian A Section A

[64 markah]
[64 marks]

Jawab **semua** soalan.
Answer **all** questions.

- 1 Rajah 1 menunjukkan graf bagi fungsi $f(x) = |x + 2| + 1$ untuk domain $-5 \leq x \leq 3$.
Diagram 1 shows the graph of the function $f(x) = |x + 2| + 1$ for domain $-5 \leq x \leq 3$.



Rajah/Diagram 1

- (a) Cari nilai objek yang satu lagi bagi h .
Find the value of the other object of h .

[2 markah/marks]

- (b) Diberi bahawa fungsi $f: x \rightarrow 3x + 7$ dan $g: x \rightarrow 4x - 5$, cari nilai x jika $fg(x) = 3f(2)$.
Given the functions $f: x \rightarrow 3x + 7$ and $g: x \rightarrow 4x - 5$, find the value of x such that $fg(x) = 3f(2)$.

[2 markah/marks]

Jawapan/Answer:

- 2 Ammar membaling sebuah bola ke atas. Ketinggian bola dari permukaan tanah ialah h , dalam m dan jarak mengufuk bola dari Ammar ialah x , dalam m. Tinggi bola tersebut diwakili oleh $h(x) = -x^2 + 4x + 5$.
Ammar throws a ball upwards. The height of the ball from the ground is h , in m, and the horizontal distance of the ball from Ammar is x , in m. The height of the ball is represented by $h(x) = -x^2 + 4x + 5$.
- (a) (i) Dengan menggunakan kaedah penyempurnaan kuasa dua, cari tinggi maksimum, dalam m, bola itu.
By using the method of completing the square, find the maximum height, in m, of the ball.
- (ii) Seterusnya, nyatakan jarak mengufuk bola dari kedudukan Ammar semasa bola mencapai tinggi maksimum.
Hence, state the horizontal distance of the ball from Ammar when the ball reaches the maximum height. [4 markah/marks]
- (b) Cari jarak mengufuk di antara Ammar dan bola, dalam m, apabila bola itu menyentuh permukaan tanah.
Find the horizontal distance between Ammar and the ball, in m, when the ball touches the ground. [2 markah/marks]

Jawapan/Answer:

- 3 Rajah 2 menunjukkan tiga titik pada suatu satah Cartes.

Diagram 2 shows three point on a Cartesian plane.

- (a) Nyatakan $\vec{PR}$ dalam bentuk $\begin{pmatrix} x \\ y \end{pmatrix}$.

State $\vec{PR}$ in the form of $\begin{pmatrix} x \\ y \end{pmatrix}$.

[1 markah/mark]

- (b) Diberi $\vec{QR} = 2k\hat{i} + 5\hat{j}$.

It is given that $\vec{QR} = 2k\hat{i} + 5\hat{j}$.

- (i) Jika $3\vec{PR} - \vec{QR} = 2\hat{i} + 16\hat{j}$, cari nilai k .

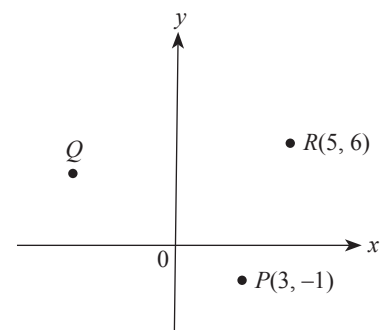
If $3\vec{PR} - \vec{QR} = 2\hat{i} + 16\hat{j}$, find the value of k .

- (ii) Seterusnya, tentukan vektor unit dalam arah $\vec{QR}$.

Hence, determine the unit vector in the direction of $\vec{QR}$.

[4 markah/marks]

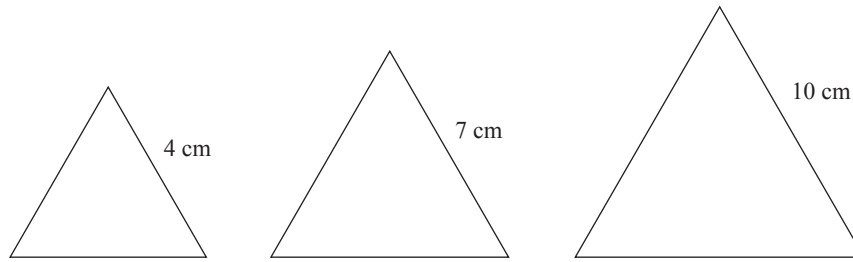
Jawapan/Answer:



Rajah/Diagram 2

- 4 Rajah 3 menunjukkan tiga segi tiga sama sisi yang pertama yang dibentuk daripada seutas dawai. Panjang dawai tersebut ialah 12.72 m dan dipotong kepada beberapa bahagian untuk membentuk segi tiga sama sisi berikut.

Diagram 3 shows the first three equilateral triangles that were formed from a piece of wire. The length of the wire is 12.72 m and it was cut into several parts to form the following equilateral triangles.



Rajah/Diagram 3

Tentukan bilangan segi tiga yang dapat dibentuk.

Determine the number of triangular can be formed.

[4 markah/marks]

Jawapan/Answer:

- 5 (a) Diberi $y = 3x(3x + 4)^4$ dan $\frac{dy}{dx} = 3f(x)$ dengan keadaan $f(x)$ ialah fungsi dalam sebutan x . Cari nilai bagi $\int_{-2}^3 f(x) dx$.

Given that $y = 3x(3x + 4)^4$ and $\frac{dy}{dx} = 3f(x)$ such that $f(x)$ is a function in terms of x . Find the value of $\int_{-2}^3 f(x) dx$.

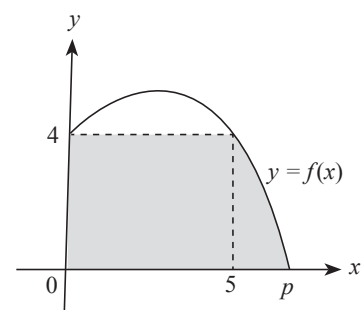
[3 markah/marks]

- (b) Rajah 4 menunjukkan lengkung $y = f(x)$ yang memotong paksi- x di $x = p$. Diberi luas kawasan berlorek ialah 30 unit². Cari $\int_5^p [3 + f(x)] dx$ dalam sebutan p .

Diagram 4 shows the curve $y = f(x)$ that intersects the x -axis at $x = p$.

Given that the area of the shaded region is 30 units². Find $\int_5^p [3 + f(x)] dx$ in terms of p .

[3 markah/marks]

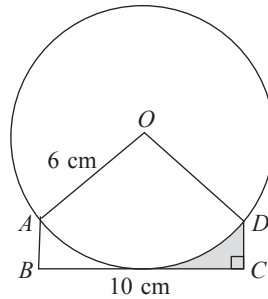


Rajah/Diagram 4

Jawapan/Answer:

- 6 Rajah 5 menunjukkan sebuah bulatan berjejari 6 cm berpusat di O . Garis lurus BC sepanjang 10 cm merupakan tangen kepada bulatan. Diberi bahawa $AB = DC$ dan panjang lengkok major AD ialah 27.528 cm.

Diagram 5 shows a circle of radius 6 cm with centre O . A straight line BC of length 10 cm is tangent to the circle. Given that $AB = DC$ and the length of the major arc AD is 27.528 cm.



Rajah/Diagram 5

Cari

Find

- (a) sudut minor AOD , dalam radian,
the minor angle of AOD , in radians,
- (b) luas, dalam cm^2 , rantau berlorek.
the area, in cm^2 , of the shaded region.

[2 markah/marks]

[4 markah/marks]

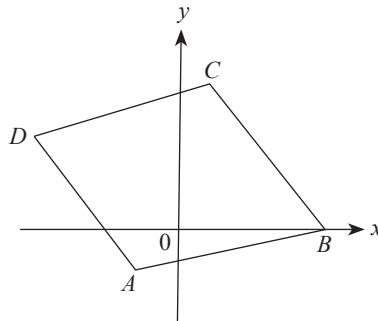
Jawapan/Answer:

7 Penyelesaian secara lukisan berskala **tidak** diterima.

*Solution by scale drawing are **not** accepted.*

Rajah 6 menunjukkan sebuah rombus $ABCD$. Diberi persamaan garis lurus AB ialah $3y - x + 4 = 0$. Koordinat titik A dan C masing-masing ialah $(-2, -2)$ dan $(2, 6)$.

Diagram 6 shows a rhombus $ABCD$. Given the equation of the straight line AB is $3y - x + 4 = 0$. The coordinates of points A and C are $(-2, -2)$ and $(2, 6)$ respectively.



Rajah/Diagram 6

(a) Cari

Find

- (i) koordinat titik B ,
the coordinate of point B ,
- (ii) persamaan BD .
the equation of BD .

[4 markah/marks]

(b) Garis lurus AB dipanjangkan ke titik E dengan keadaan $2AB = 3BE$. Tentukan koordinat titik E .

The straight line AB is extended to point E such that $2AB = 3BE$. Determine the coordinates of point E .

[3 markah/marks]

Jawapan/Answer:

- 8 (a) Hitung nilai bagi had $\frac{\sqrt{x-3}}{2-\sqrt{x+1}}$. Berikan jawapan dalam bentuk $a + \sqrt{5}$.

Calculate the value of $\lim_{x \rightarrow 4} \frac{\sqrt{x-3}}{2-\sqrt{x+1}}$. Give the answer in the form of $a + \sqrt{5}$.

[3 markah/marks]

- (b) (i) Diberi kecerunan tangen kepada lengkung $y = x^2(4 + qx)$ ialah -5 apabila $x = -2$. Cari nilai q .
 Given the gradient of the tangent to the curve $y = x^2(4 + qx)$ is -5 when $x = -2$. Find the value of q .
- (ii) Seterusnya, cari persamaan normal yang melalui titik $(-1, 0)$.
 Hence, find the normal equation that passes through the point $(-1, 0)$.

[4 markah/marks]

Jawapan/Answer:

- 9 Rajah 7 menunjukkan satu garis lurus $\frac{1}{y}$ melawan x , melalui titik $A(9, 1)$, $B(0, -2)$ dan $C(4, r)$. Pemboleh ubah x dan y dihubungkan oleh persamaan $y = \frac{3h}{x+2k}$, dengan keadaan h dan k ialah pemalar. Cari

Diagram 7 shows the straight line graph of $\frac{1}{y}$ against x , passing through the points $A(9, 1)$, $B(0, -2)$ and $C(4, r)$. The variables x and y are related by the equation $y = \frac{3h}{x+2k}$, such that h and k are constants. Find

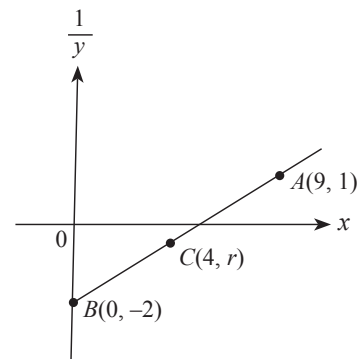
- (a) nilai h dan nilai k ,
 the value of h and of k ,

[3 markah/marks]

- (b) nilai r .
 the value of r .

[2 markah/marks]

Jawapan/Answer:



Rajah/Diagram 7

- 10 (a) Diberi ${}^{25}C_r = {}^{25}C_{r+3}$, cari nilai r .
 Given ${}^{25}C_r = {}^{25}C_{r+3}$, find the value of r .

[2 markah/marks]

- (b) Rajah 8 menunjukkan sembilan kad dengan huruf yang berbeza.
 Diagram 8 shows nine cards of different letters.



Rajah/Diagram 8

Hitung bilangan cara untuk menyusun semua kad dalam satu barisan jika
 Calculate the number of different ways to arrange all the cards in a row if

- (i) tiada syarat dikenakan,
 there is no restriction,
 (ii) huruf konsonan sentiasa berasingan.
 the consonants are always separated.

[3 markah/marks]

Jawapan/Answer:

- 11 Rajah 9 menunjukkan keputusan suatu tinjauan, dengan keadaan X mewakili kamera yang mempunyai jangka hayat kurang daripada 3 tahun. Satu sampel yang terdiri daripada dua buah kamera dipilih secara rawak. Cari

Diagram 9 shows the result of a survey, where X represents the number of cameras with a life span of less than 3 years. A sample consists of two cameras is selected at random. Find

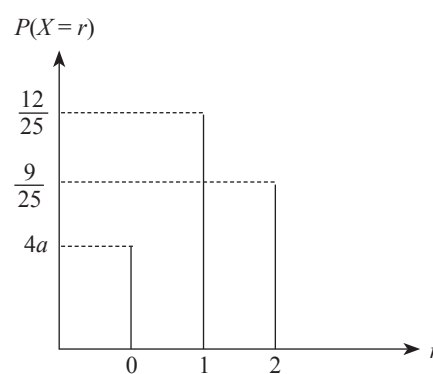
- (a) $P(X < 1)$,

[2 markah/marks]

- (b) nilai a .
 the value of a .

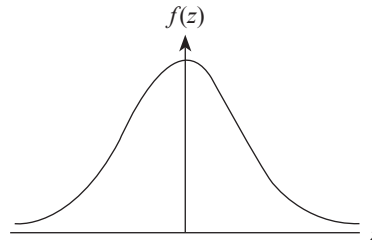
[1 markah/mark]

Jawapan/Answer:



Rajah/Diagram 9

- 12 (a) (i) Pada Rajah 10, lorekkan kebarangkalian $1 - P(|Z| \leq k)$.
In Diagram 10, shade the probability of $1 - P(|Z| \leq k)$.



Rajah/Diagram 10

- (ii) Seterusnya, jika $P(Z \geq k) = 0.0196$, cari nilai $1 - P(|Z| \leq k)$.
Hence, if $P(Z \geq k) = 0.0196$, find the value of $1 - P(|Z| \leq k)$.

[3 markah/marks]

- (b) Diberi $X \sim N(a, b)$. Jika $X = a + 3$,
Given that $X \sim N(a, b)$. If $X = a + 3$,
 (i) ungkapkan, dalam sebutan b , skor- z ,
express, in terms of b , z-score,
 (ii) cari nilai skor- z , jika $b = 25$.
find the value of z-score, if $b = 25$.

[3 markah/marks]

Jawapan/Answer:

Bahagian B
Section B

[16 markah]

[16 marks]

Jawab mana-mana **dua** soalan.

*Answer any **two** questions.*

- 13 (a) Diberi $y = mx + \frac{3}{2}$ ialah tangen kepada lengkung $y = \frac{3x+2}{x^2-3}$ pada titik $R(1, k)$ dengan keadaan m dan k ialah pemalar.

Given that $y = mx + \frac{3}{2}$ is the tangent to the curve $y = \frac{3x+2}{x^2-3}$ at point $R(1, k)$ such that m and k are constants.

- (i) Cari nilai m .

Find the value of m .

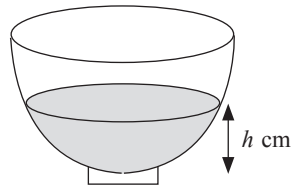
- (ii) Seterusnya, cari persamaan normal pada titik R .

Hence, find the equation of normal at point R .

[5 markah/marks]

- (b) Rajah 11 menunjukkan sebuah mangkuk berbentuk hemisfera yang mengandungi air sedalam h cm.

Diagram 11 shows a bowl in the shape of hemisphere which contains water with a depth of h cm.



Rajah/Diagram 11

Isi padu, $V \text{ cm}^3$, bagi air di dalam mangkuk diberikan oleh $V = \frac{1}{3} \pi h^2(24 - h)$. Air dituangkan ke dalam mangkuk itu dengan kadar $6 \text{ cm}^3 \text{ s}^{-1}$. Hitung kadar kenaikan aras air itu apabila kedalamannya ialah 2 cm. Berikan jawapan anda dalam bentuk π .

The volume, $V \text{ cm}^3$, of water in the bowl is given by $V = \frac{1}{3} \pi h^2(24 - h)$. The water is poured into the bowl at a rate of $6 \text{ cm}^3 \text{ s}^{-1}$. Calculate the rate of increase of the depth of water when the depth is 2 cm. Give your answer in term of π .

[3 markah/marks]

Jawapan/Answer:

14 Diberi bahawa $f(x) = 3x - 2$ dan $gf(x) = \frac{5}{3x-2}$, $x \neq h$.

It is given that $f(x) = 3x - 2$ and $gf(x) = \frac{5}{3x-2}$, $x \neq h$.

(a) Nyatakan nilai h .

State the value of h .

[1 markah/mark]

(b) Hitung nilai x apabila $f(x)$ memeta kepada diri sendiri.

Calculate the value of x when $f(x)$ maps onto itself.

[2 markah/marks]

(c) Cari

Find

(i) fungsi $g(x)$,

the function $g(x)$,

(ii) fungsi berulang g^{2n-1} , dengan keadaan n ialah integer positif.

the repeated function g^{2n-1} , such that n is positive integer.

[5 markah/marks]

Jawapan/Answer:

- 15 (a) (i) Tunjukkan bahawa persamaan $3 \sin \theta \tan \theta = 8$ boleh ditulis sebagai $3 \cos^2 \theta + 8 \cos \theta - 3 = 0$.
Show that the equation $3 \sin \theta \tan \theta = 8$ can be written as $3 \cos^2 \theta + 8 \cos \theta - 3 = 0$.
- (ii) Seterusnya, selesaikan persamaan $3 \sin \theta \tan \theta = 8$ untuk $0^\circ < \theta < 360^\circ$.
Hence, solve the equation $3 \sin \theta \tan \theta = 8$ for $0^\circ < \theta < 360^\circ$.

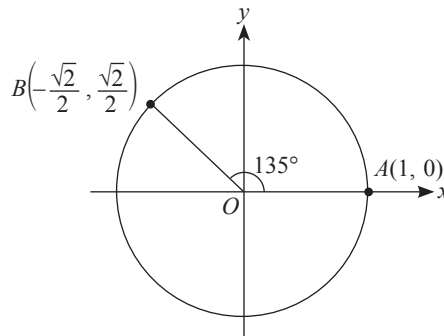
[4 markah/marks]

- (b) Diberi bahawa $\tan 2A = -\frac{24}{7}$ untuk $90^\circ < A < 180^\circ$, cari nilai bagi $\cos A$.

It is given that for $\tan 2A = -\frac{24}{7}$ for $90^\circ < A < 180^\circ$, find the value of $\cos A$.

[2 markah/marks]

- (c) Rajah 12 menunjukkan sebuah bulatan unit yang mewakili sudut 135° .
Diagram 12 shows a unit circle that represents an angle of 135° .



Rajah/Diagram 12

Cari nilai kosek (-45°) . Beri jawapan dalam bentuk $\sqrt{a}$.

Find the value of cosec (-45°) . Give your answer in the form of $\sqrt{a}$.

[2 markah/marks]

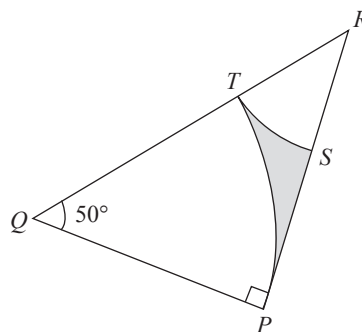
Jawapan/Answer:

Bahagian A
Section A

[50 markah]
[50 marks]

Jawab **semua** soalan.
Answer **all** questions.

- 1 Rajah 1 menunjukkan sebuah segi tiga bersudut tegak PQR dengan $PQ = 6$ cm dan $\angle PQT = 50^\circ$.
Diagram 1 shows a right-angled triangle PQR with $PQ = 6$ cm and $\angle PQT = 50^\circ$.



Rajah/Diagram 1

PQT dan SRT masing-masing ialah sektor bagi dua buah bulatan berpusat Q dan R . Cari
 PQT and SRT are sectors of the two circles with centre Q and R respectively. Find
[Guna/Use $\pi = 3.142$]

- (a) panjang, dalam cm, lengkok TS ,
the length, in cm, of the arc TS ,
- (b) luas, dalam cm^2 , kawasan berlorek.
the area, in cm^2 , of the shaded region.

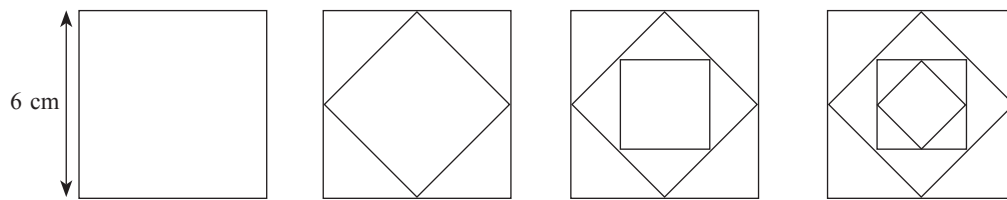
[3 markah/marks]

[4 markah/marks]

Jawapan/Answer:

- 2 Rajah 2 menunjukkan proses berulang yang menyambungkan antara titik tengah sisi segi empat sama untuk membentuk segi empat sama yang baru.

Diagram 2 shows the iterative process of connecting the middle points of the sides of the square to form a new square.



Rajah/Diagram 2

- (a) Tentukan panjang, dalam cm, sisi segi empat sama yang ketujuh.

Determine the length, in cm, of the side of the seventh square.

[3 markah/marks]

- (b) Cari hasil tambah luas, dalam cm^2 , segi empat sama apabila luas segi empat sama terakhir ialah $\frac{9}{64} \text{ cm}^2$.

Find the sum of the area, in cm^2 , of the squares when the area of last square is $\frac{9}{64} \text{ cm}^2$.

[6 markah/marks]

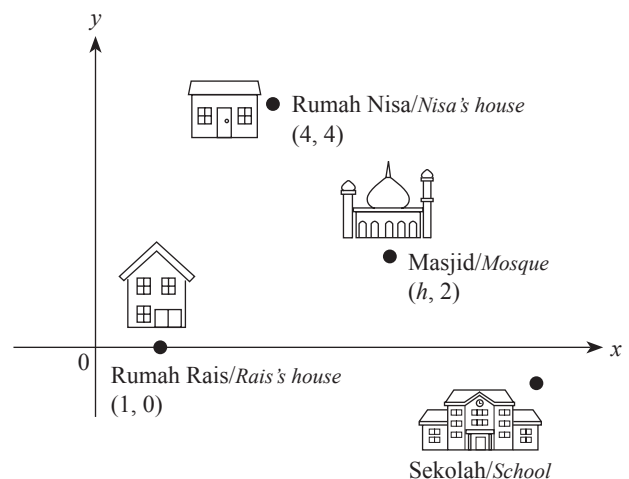
Jawapan/Answer:

- 3 (a) Fungsi kuadratik $f(x) = 2x^2 - 8x - 10$ ditakrifkan dalam domain $-1 \leq x \leq 7$. Ungkapkan $f(x)$ dalam bentuk vertex dan nyatakan koordinat titik pusingan bagi $f(x)$.
The quadratic function $f(x) = 2x^2 - 8x - 10$ is defined in the domain of $-1 \leq x \leq 7$. Express $f(x)$ in the vertex form and state the turning point of $f(x)$. [3 markah/marks]
- (b) Ungkapkan $f(x)$ dalam bentuk pintasan. Seterusnya, lakarkan graf bagi $f(x)$.
Express $f(x)$ in the intercept form. Hence, sketch graph of $f(x)$. [3 markah/marks]

Jawapan/Answer:

- 4 Rajah 3 menunjukkan kedudukan rumah Nisa, rumah Rais, masjid dan sekolah yang dilukis pada suatu satah Cartes. Rumah Nisa, masjid dan sekolah adalah sebaris dengan keadaan masjid berada di kedudukan $\frac{1}{3}$ dari rumah Nisa ke sekolah.

Diagram 3 shows the positions of Nisa's house, Rais's house, mosque and school drawn on a Cartesian plane. Nisa's house, mosque and school are in a line with the mosque being at a position $\frac{1}{3}$ from Nisa's house to the school.



Rajah/Diagram 3

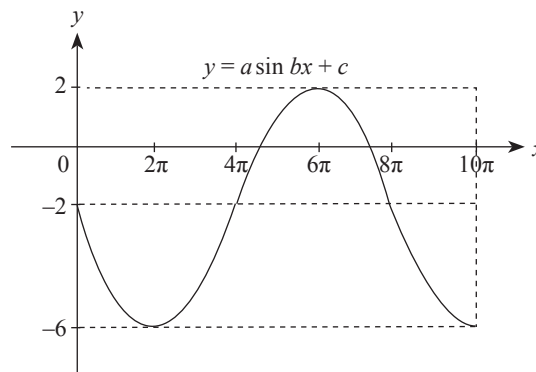
- (a) (i) Tentukan titik bagi kedudukan sekolah dalam sebutan h .
Determine the point for the position of school in term of h .
- (ii) Seterusnya, cari nilai h jika luas kawasan di antara masjid, rumah Rais dan sekolah ialah 14 unit².
Hence, find the value of h if the area between the mosque, Rais's house and school is 14 units². [4 markah/marks]
- (b) Satu jalan raya yang baru akan dibina dengan keadaan jaraknya dari rumah Nisa dan sekolah adalah sentiasa sama. Cari persamaan bagi kedudukan jalan raya itu.
A new road will be built such that the distance from Nisa's house and the school is always the same. Find the equation for the position of the road.

[2 markah/marks]

Jawapan/Answer:

- 5 (a) Rajah 4 menunjukkan sebahagian daripada graf $y = a \sin bx + c$ dengan keadaan a , b dan c ialah pemalar.

Diagram 4 shows part of the graph of $y = a \sin bx + c$, such that a , b and c are constants.



Rajah/Diagram 4

Cari nilai a , b dan c .

Find the values of a , b and c .

[3 markah/marks]

- (b) Pada paksi yang sama, lakarkan graf bagi $y = 3 \sin 3x$ dan $y = 2 \cos \frac{3}{2}x - 1$ untuk $0 \leq x \leq \frac{4}{3}\pi$.

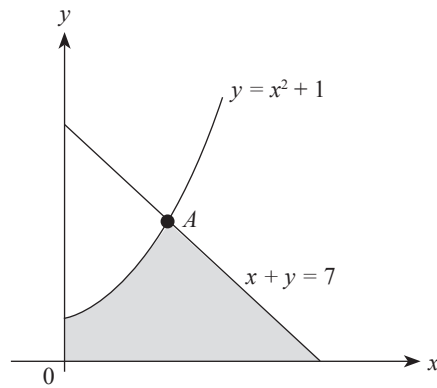
Seterusnya, nyatakan bilangan penyelesaian bagi persamaan $2 \cos \frac{3}{2}x - 3 \sin 3x = 1$ untuk $0 \leq x \leq \frac{4}{3}\pi$.

On the same axis, sketch the graphs of $y = 3 \sin 3x$ and $y = 2 \cos \frac{3}{2}x - 1$ for $0 \leq x \leq \frac{4}{3}\pi$. Hence, state the number of solution $2 \cos \frac{3}{2}x - 3 \sin 3x = 1$ for $0 \leq x \leq \frac{4}{3}\pi$.

[5 markah/marks]

Jawapan/Answer:

- 6 Rajah 5 menunjukkan suatu garis lurus $x + y = 7$ yang menyilang lengkung $y = x^2 + 1$ pada titik A .
 Diagram 5 shows a straight line $x + y = 7$ that intersects the curve $y = x^2 + 1$ at point A .



Rajah/Diagram 5

Cari

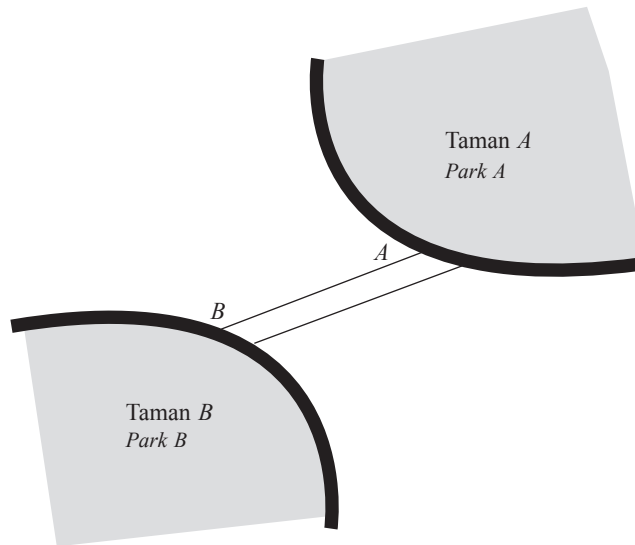
Find

- (a) koordinat bagi titik A ,
 the coordinates of point A , [1 markah/mark]
- (b) luas kawasan berlorek,
 the area of the shaded region, [3 markah/marks]
- (c) isi padu kisaran, dalam sebutan π , apabila rantau yang dibatasi oleh lengkung, paksi- y dan garis lurus $y = 5$ diputar melalui 180° pada paksi- y .
 the volume of revolution, in terms of π when the region bounded by the curve, the y -axis and the straight line $y = 5$ is revolved through 180° about the y -axis. [3 markah/marks]

Jawapan/Answer:

- 7 Rajah 6 menunjukkan kedudukan bagi Taman A dan Taman B yang dilukis pada satah Cartes. Diberi bahawa persamaan lengkung bagi Taman A dan Taman B ialah $x(y - 2) = 9y$ dan laluan pejalan kaki menghubungkan kedua-dua bahagian taman itu dengan garis $2y = x - 5$ pada titik A dan titik B.

Diagram 6 shows the position for Park A and Park B drawn on Cartesian plane. It is given the equation of the curve for Park A and Park B is $x(y - 2) = 9y$ and the walkway connects the two parts of the park with line $2y = x - 5$ at point A and point B.



Rajah/Diagram 6

Jika 1 unit mewakili 1 meter, cari jarak bagi AB.
If 1 unit represents to 1 meter, find the distance of AB.

[7 markah/marks]

Jawapan/Answer:

Bahagian B**Section B**

[30 markah]

[30 marks]

Jawab mana-mana **tiga** soalan.*Answer any **three** questions.*

- 8 Jadual 1 menunjukkan nilai-nilai bagi dua pemboleh ubah, x dan y , yang diperolehi daripada suatu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan $y^2 = ax(b - x)$, dengan keadaan a dan b ialah pemalar. Table 1 shows the values of two variables, x and y , obtained from an experiment. The variables x and y are related by the equation $y^2 = ax(b - x)$, where a and b are constants.

x	1	2	3.5	4	5	6
y	3.35	4.17	4.75	4.67	4.43	2.96

Jadual/Table 1

- (a) Plotkan graf $\frac{y^2}{x}$ melawan x , menggunakan skala 2 cm kepada 1 unit pada paksi- x dan 2 cm kepada 2 unit pada paksi- $\frac{y^2}{x}$. Seterusnya, lukis garis lurus penyesuaian terbaik.

Plot the graph $\frac{y^2}{x}$ against x , using a scale of 2 cm to 1 unit on the x -axis and 2 cm to 2 units on the $\frac{y^2}{x}$ -axis.

Hence, draw the line of best fit.

[4 markah/marks]

- (b) Dengan menggunakan graf di 8(a),

By using the graph in 8(a),

- (i) cari nilai y bila $x = 1.38$,

find the value of y when $x = 1.38$,

- (ii) cari nilai x bila $\frac{y^2}{x} = 8.65$,

find the value of x when $\frac{y^2}{x} = 8.65$,

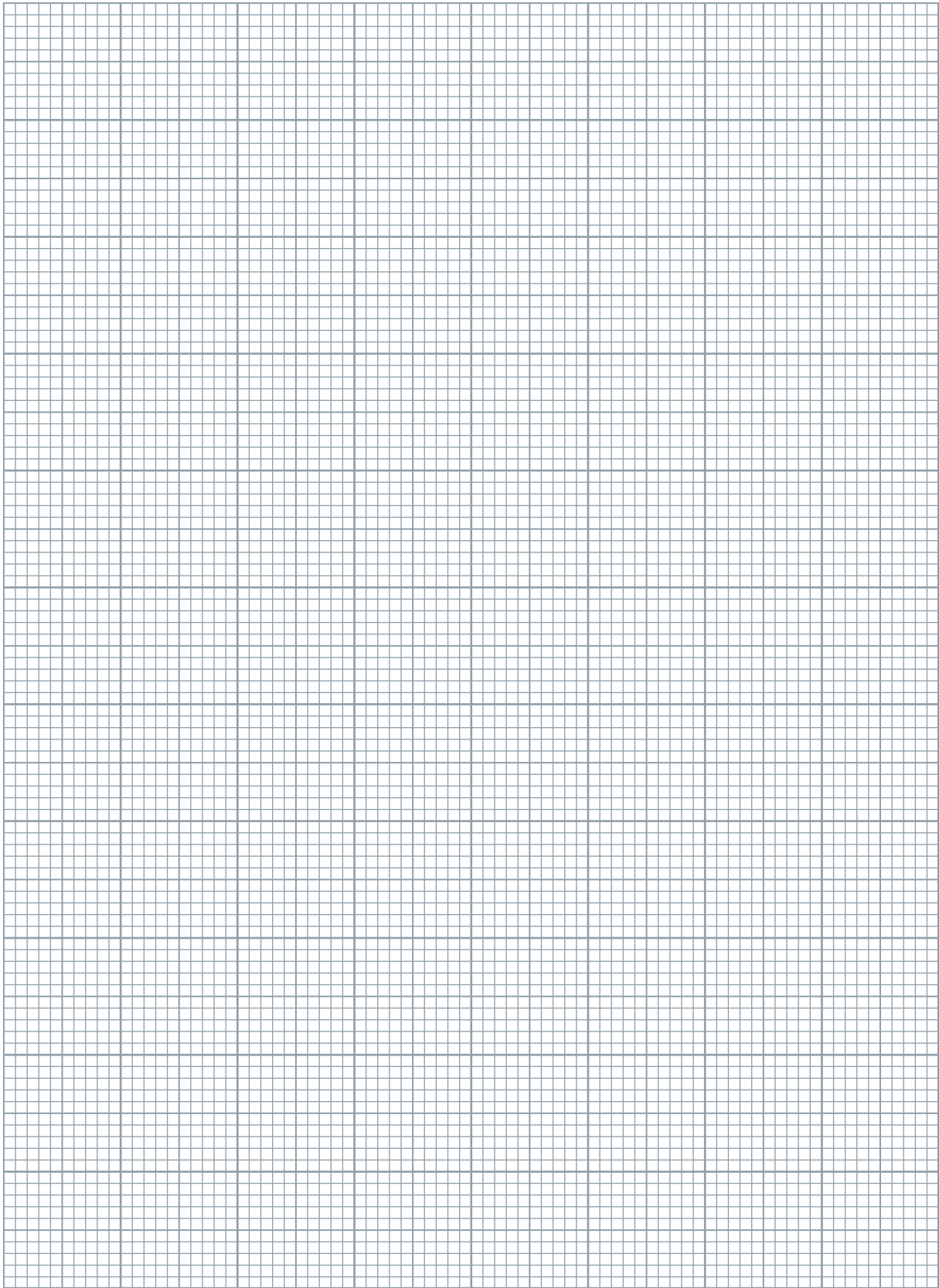
- (iii) tulis $y^2 = ax(b - x)$ dalam bentuk linear, seterusnya cari nilai a dan b .

write $y^2 = ax(b - x)$ in the linear form, hence find the values of a and b .

[6 markah/marks]

Jawapan/Answer:

Kertas graf untuk Soalan 8
Graph paper for Question 8



- 9 (a) Di sebuah kedai runcit, 3 daripada 7 pembeli telah membeli susu pada hari tertentu. Jika 12 orang pembeli dari kedai tersebut dipilih secara rawak pada hari itu, cari kebarangkalian bahawa
- In a grocery store, 3 out of 7 customers bought milk on a certain day. If 12 customers from the store are selected at random on that day, find the probability that*
- tepat 2 orang membeli susu,
exactly 2 of them bought milk,
 - sekurang-kurangnya 3 orang tidak membeli susu.
at least 3 of them did not buy milk.

[5 markah/marks]

- (b) Sebuah ladang menghasilkan buah tembikai susu. Ladang tersebut menggredkan tembikai susu yang dihasilkan berdasarkan jisimnya. Jadual 2 menunjukkan pengredan buah tembikai susu tersebut.
- An orchard produces honeydew melons. The orchard grades the honeydew melons based on their masses. Table 2 shows the grading of the honeydew melons.*

Gred Grade	A	B	C
Jisim, X (kg) Mass, X (kg)	$X > 4.0$	$2.5 < X \leq 4.0$	$m < X \leq 2.5$

Jadual/Table 2

Diberi bahawa jisim buah tembikai susu yang dihasilkan adalah bertaburan secara normal dengan min 3.0 kg dan varians 0.25 kg².

It is given that the masses of honeydew melon produced in the orchard are normally distributed with a mean of 3.0 kg and a variance of 0.25 kg².

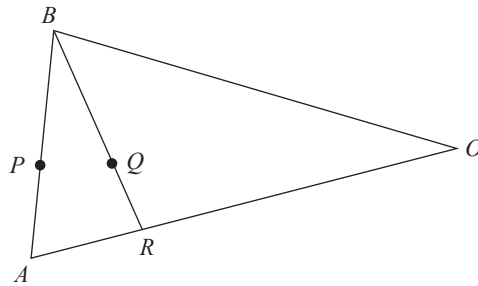
- Jika buah tembikai susu dipilih secara rawak, cari kebarangkalian bahawa tembikai susu itu ialah gred B.
If a honeydew melon is chosen at random, find the probability that it is from the grade B.
- Ladang tersebut telah menghasilkan 300 biji buah tembikai susu. Jika 285 biji daripada tembikai susu itu boleh digredkan, cari nilai m .
The orchard has produced 300 honeydew melons. If 285 of the melons can be graded, find the value of m .

[5 markah/marks]

Jawapan/Answer:

10 Rajah 7 menunjukkan sebuah segi tiga AOB .

Diagram 7 shows a triangle AOB .



Rajah/Diagram 7

Diberi bahawa $\vec{OA} = 6\vec{a}$, $\vec{AP} = \vec{b}$, $AB = 3AP$, $OR = \frac{2}{3}OA$ dan $BQ = \frac{3}{4}BR$.

It is given that $\vec{OA} = 6\vec{a}$, $\vec{AP} = \vec{b}$, $AB = 3AP$, $OR = \frac{2}{3}OA$ and $BQ = \frac{3}{4}BR$.

(a) Ungkapkan yang berikut dalam sebutan $\vec{a}$ dan $\vec{b}$.

Express the following in terms of $\vec{a}$ and $\vec{b}$.

(i) $\vec{OP}$

(ii) $\vec{BR}$

[3 markah/marks]

(b) Seterusnya, buktikan titik-titik P , Q dan O adalah segaris.

Hence, prove that points P , Q and O are collinear.

[5 markah/marks]

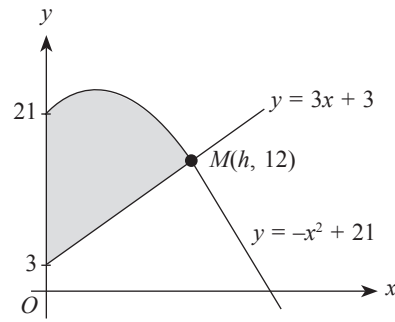
(c) Diberi luas $\triangle AOB$ ialah 45 cm^2 . Cari luas $\triangle ABR$.

Given that area of $\triangle AOB$ is 45 cm^2 . Find the area of $\triangle ABR$.

[2 markah/marks]

Jawapan/Answer:

- 11 Rajah 8 menunjukkan lengkung $y = -x^2 + 21$ dan bersilang dengan garis lurus $y = 3x + 3$ pada titik M .
 Diagram 8 shows a curve $y = -x^2 + 21$ which intersects the straight line $y = 3x + 3$ at point M .



Rajah/Diagram 8

Cari

Find

- (a) nilai h ,
 the value of h ,

[1 markah/mark]

- (b) luas rantau berlorek,
 the area of the shaded region,

[4 markah/marks]

- (c) isi padu janaan apabila rantau berlorek diputar 360° pada paksi- y .
 the volume generated when the shaded region is rotated through 360° about the y -axis.

[5 markah/marks]

Jawapan/Answer:

Bahagian C**Section C**

[20 markah]

[20 marks]

Jawab mana-mana **dua** soalan.*Answer any **two** questions.*

- 12** Satu zarah bergerak di sepanjang garis lurus dengan keadaan pecutannya, $a \text{ m s}^{-2}$ diberi oleh $a = 2t - 10$ dengan keadaan t ialah masa, dalam saat, selepas melalui satu titik tetap O . Halaju awal zarah itu ialah 24 m s^{-1} .

A particle moves along a straight line where its acceleration $a \text{ m s}^{-2}$ is given by $a = 2t - 10$, such that t is the time, in seconds, after passing through a fixed point O . The initial velocity of the particle is 24 m s^{-1} .

[Anggap gerakan ke arah kanan sebagai positif]

[Assume the motion to the right is positive]

(a) Cari

Find

- (i) masa, dalam saat, ketika pecutannya sifar,
the time, in seconds, when its acceleration is zero,
- (ii) halaju minimum, dalam m s^{-1} , zarah itu,
the minimum velocity, in m s^{-1} , of the particle,
- (iii) masa, dalam saat, apabila zarah itu berhenti seketika.
the time, in seconds, when the particle stops instantaneously.

[6 markah/marks]

- (b) (i) Lakar graf halaju-masa bagi gerakan zarah itu dalam tempoh $0 \leq t \leq 6$.

Sketch a velocity-time graph for the motion of a particle for a time period $0 \leq t \leq 6$.

- (ii) Seterusnya, cari jumlah jarak, dalam m, yang dilalui oleh zarah itu dalam 5 saat yang pertama.

Hence, find the total distance, in m, travelled by the particle in the first 5 seconds.

[4 markah/marks]

Jawapan/Answer:

- 13 Sebuah kilang menghasilkan dua jenis jam tangan, A dan B . Jadual 3 menunjukkan maklumat berkaitan jam tangan yang dihasilkan.

A factory produces two types of watches, A and B . Table 3 shows information regarding the watches produced.

Jenis jam tangan <i>Type of watch</i>	Bilangan jam tangan (unit) <i>Number of watches (unit)</i>	Kos seunit (RM) <i>Cost per unit (RM)</i>
A	x	15.00
B	y	12.50

Jadual/Table 3

Jam tangan yang dihasilkan oleh kilang itu memenuhi kekangan yang berikut:

The watches produced by the factory satisfy the following constraints:

- I Jumlah bilangan jam tangan A dan B yang dihasilkan adalah kurang daripada m unit.

The total number of watches A and B produced is less than m units.

- II Bilangan jam tangan A yang dihasilkan adalah lebih daripada n unit.

The number of watches A produced is more than n units.

- III Bilangan jam tangan B yang dihasilkan adalah melebihi $\frac{1}{4}$ kali bilangan jam tangan A .

The number of watches B produced is more than $\frac{1}{4}$ times the number of watches A .

- (a) Kekangan I dan kekangan II ditunjukkan pada graf pada halaman 150. Rantau berlorek mewakili titik-titik yang memenuhi kedua-dua kekangan itu. Nyatakan nilai m dan nilai n .

Constraints I and II are shown on the graph on page 150. The shaded region represents the points which satisfy both constraints. State the value of m and of n .

[1 markah/mark]

- (b) Tulis satu ketaksamaan bagi kekangan III, selain daripada $x \geq 0$ dan $y \geq 0$. Seterusnya, pada halaman 150, bina dan lorek rantau R yang memenuhi semua kekangan itu.

Write an equality for constraint III, other than $x \geq 0$ and $y \geq 0$. Hence, on page 150, construct and label the region R which satisfies all the constraints.

[3 markah/marks]

- (c) Gunakan graf yang dibina di (b) untuk menjawab soalan-soalan yang berikut:

Use the graph constructed in (b) to answer the following questions:

- (i) Pada suatu hari tertentu, nisbah bilangan jam tangan B kepada bilangan jam tangan A yang dihasilkan ialah $2 : 3$. Tentukan bilangan yang mungkin bagi jam tangan A yang dihasilkan pada hari itu.

On a particular day, the ratio of the number of watches B to the number of watches A produced is $2 : 3$. Determine the possible numbers of watches A produced on that day.

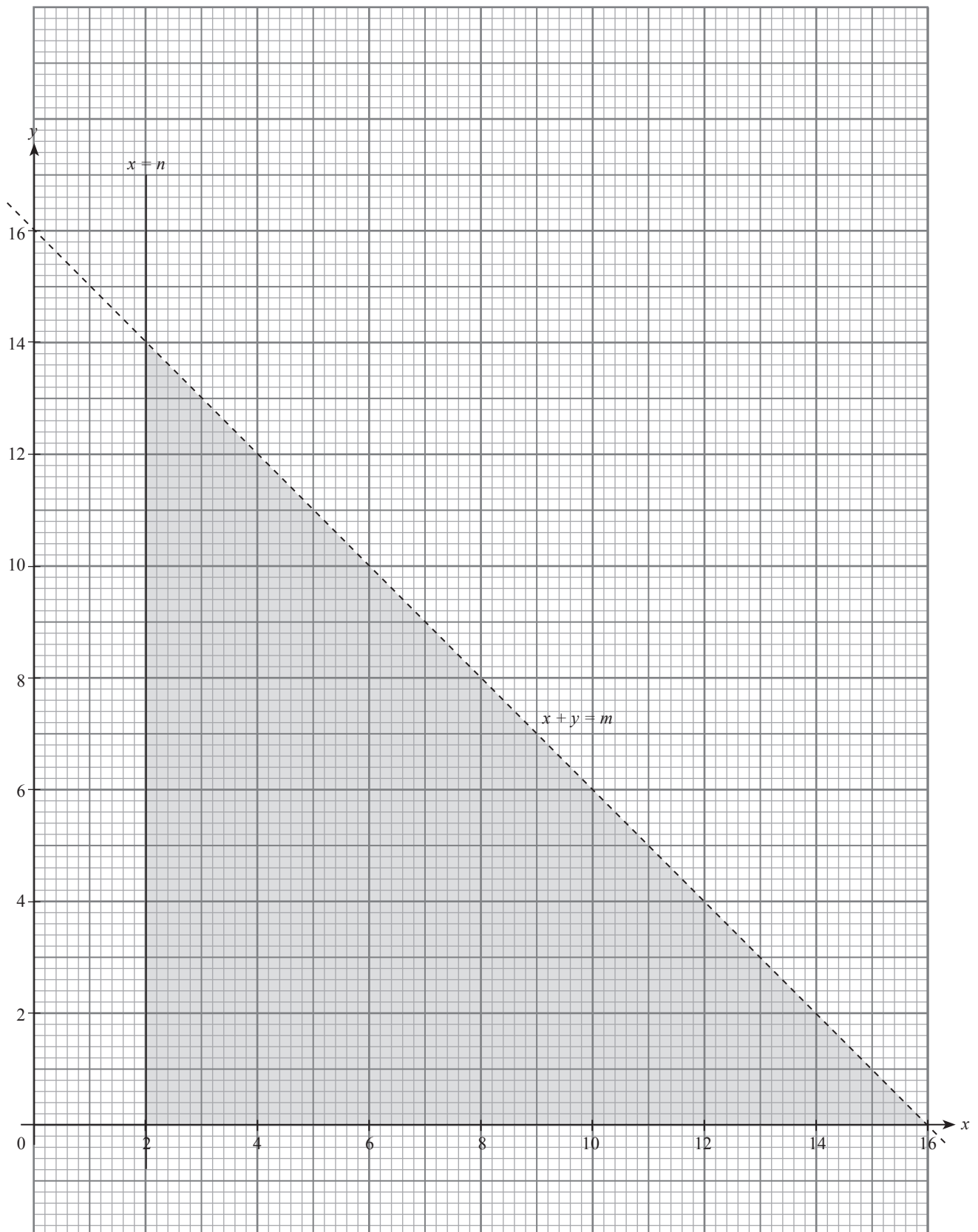
- (ii) Diberi bahawa jumlah kos bagi menghasilkan jam tangan A dan B ialah RM k , ungkapkan k dalam sebutan x dan y . Seterusnya, lukis fungsi objektif dan cari kos minimum.

It is given that the total cost to produce the watches A and B is RM k , express k in terms of x and y . Hence, draw the objective function and find the minimum cost.

[6 markah/marks]

Jawapan/Answer:

Kertas graf untuk Soalan 13
Graph paper for Question 13



- 14 Jadual 4 menunjukkan indeks harga pada tahun 2020 berasaskan tahun 2017 bagi empat jenis bahan, P , Q , R dan S yang digunakan dalam penghasilan sebuah beg serta pemberat masing-masing.
Table 4 shows the price index in the year 2020 based on the year 2017 of the four materials, P , Q , R and S used in the production of a bag and their weightages.

Bahan Material	Indeks harga pada tahun 2020 berasaskan pada tahun 2017 <i>The price index in the year 2020 based on the year 2017</i>	Pemberat Weightage
P	110	0.2m
Q	148	0.3
R	110	0.1
S	120	m

Jadual/Table 4

- (a) Diberi bahawa harga barang Q ialah RM4.00 pada tahun 2017, hitung harganya pada tahun 2020.
It is given that the price of material Q is RM4.00 in the year 2017, calculate its price in the year 2020.
 [2 markah/marks]
- (b) Diberi bahawa indeks gubahan pada tahun 2020 berasaskan tahun 2017 ialah 128.95, cari nilai m .
It is given that the composite index for the year 2020 based on the year 2017 is 128.95, find the value of m .
 [2 markah/marks]
- (c) Cari harga sebuah beg pada tahun 2017 jika harganya yang sepadan pada tahun 2020 ialah RM48.00.
Find the price of a bag in the year 2017 if corresponding price in the year 2020 is RM48.00.
 [2 markah/marks]
- (d) Diberi bahawa bahan R meningkat sebanyak 18% dari tahun 2020 ke tahun 2023, manakala harga bagi bahan lain tidak berubah. Hitung indeks gubahan sebuah beg itu pada tahun 2023 berasaskan tahun 2017.
It is given that the price of material R is increase by 18% from the year 2020 to the year 2023, while the other materials remain unchanged. Calculate the composite index of a bag for the year 2023 based on the year 2017.
 [4 markah/marks]

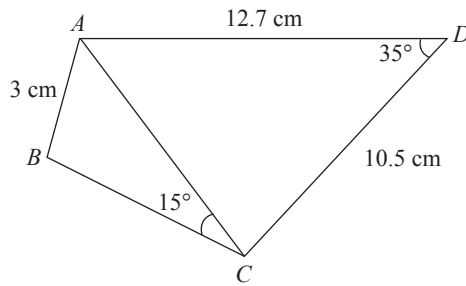
Jawapan/Answer:

15 Penyelesaian secara lukisan berskala **tidak** diterima.

*Solution by scale drawing is **not** accepted.*

Rajah 9 menunjukkan sebuah sisi empat $ABCD$ dengan keadaan $\angle ABC$ adalah sudut cakah.

Diagram 9 shows a quadrilateral $ABCD$ such that $\angle ABC$ is an obtuse angle.



Rajah/Diagram 9

(a) Cari

Find

- (i) panjang, dalam cm, AC ,
the length, in cm, of AC ,
- (ii) $\angle ABC$,
- (iii) luas, dalam cm^2 , sisi empat $ABCD$.
the area, in cm^2 of quadrilateral $ABCD$.

[6 markah/marks]

(b) Cari jarak terdekat dari titik C ke garis AD .

Find the shortest distance from the point C to the line AD .

[2 markah/marks]

(c) Lakar sebuah segi tiga $A'B'C'$ yang mempunyai bentuk berbeza daripada segi tiga ABC dengan keadaan $AB = A'B'$, $BC = B'C'$ dan $\angle ACB = \angle A'C'B'$. Seterusnya, nyatakan saiz $\angle B'A'C'$.

Sketch a triangle $A'B'C'$ which has a different shape from triangle ABC such that $AB = A'B'$, $BC = B'C'$ and $\angle ACB = \angle A'C'B'$. Hence, state the size of $\angle B'A'C'$.

[2 markah/marks]

Jawapan/Answer:

JAWAPAN

Tingkatan 4



Fungsi Functions

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	Didapati/<i>It is found that</i> $f(x) = \frac{2-x}{x+3}$, jadi/<i>so</i>, $f^{-1}\left(\frac{2-x}{x+3}\right) = x$. Katakan/<i>Let</i> $\left(\frac{2-x}{x+3}\right) = y$ $2-x = y(x+3)$ $2-x = xy + 3y$ $x(1+y) = 2-3y$ $x = \frac{2-3y}{1+y}$ Maka/<i>Thus</i>, $f^{-1}(x) = \frac{2-3x}{1+x}$ $f^{-1}(4) = a$ $\frac{2-3(4)}{1+4} = a$ $a = -\frac{10}{5}$ $= -2$	1 	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
4	(a) $\{(-3, 9), (1, 1), (3, 9)\}$ (b) $\{1, 9\}$	1 1	2
5	(a) $f(k) = 0$ $2k - 1 = 0$ $k = \frac{1}{2}$ (b) $f(x) < 5$ $ 2x - 1 < 5$ $-5 < 2x - 1 < 5$ $-2 < x < 3$	1 1 1 1	4
6	(a) Kodomain/Codomain = $\{1, 2, 3, 4, 5\}$ (b) Objek/Object = 3 dan/and 4	1 1	2
7	(a) $f(m) = 0$ $1 - 2m = 0$ $-2m = -1$ $m = \frac{-1}{-2}$ $m = \frac{1}{2}$ (b) $f(x) < 3$ $ 1 - 2x < 3$ $-3 < 1 - 2x < 3$ $-1 < x < 2$	1 1 1 1	4
8	(a) $g(x) = x$ $3x - 5 = x$ $3x - x = 5$ $2x = 5$ $x = \frac{5}{2}$ (b) $g(2 + h) = 4h$ $3(2 + h) - 5 = 4h$ $6 + 3h - 5 = 4h$ $3h - 4h = -6 + 5$ $-h = -1$ $h = 1$	1 1 1 1	4
9	$fg(x) = f[g(x)]$ $= 2\left(\frac{-3x}{x+1}\right) + 1$ $= \frac{-6x}{x+1} + 1$ $= \frac{-6x + (x+1)}{x+1}$ $= \frac{1-5x}{x+1}$ $gf(x) = g[f(x)]$ $= \frac{-3(2x+1)}{(2x+1)+1}$ $= \frac{-6x-3}{2x+2}$ $= \frac{-3(2x+1)}{2(x+1)}$	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
10	$g^{-1}(x) = \frac{5x+3}{k}$ $y = \frac{5x+3}{k}$ $ky = 5x+3$ $5x = ky-3$ $x = \frac{ky-3}{5}$ $g(x) = \frac{kx-3}{5}$ $g(x) = \frac{2x-3}{2h}$ $y = \frac{2x-3}{2h}$ $x = \frac{2y-3}{2h}$ $2hx = 2y-3$ $2y = 2hx+3$ $y = \frac{2hx+3}{2}$ $g^{-1}(x) = \frac{2hx+3}{2}$ Dengan membandingkan/By comparing $\frac{kx-3}{5} \leftrightarrow \frac{2x-3}{2h}$ atau/or $\frac{2hx+3}{2} \leftrightarrow \frac{5x+3}{k}$ $k=2$ $2h=5$ $h = \frac{5}{2}$	1 1 1	3
11	$g(x+3) = 5x+13$ Katakan/Suppose $y = x+3$ $x = y-3$ $g(y) = 5(y-3)+13$ $= 5y-15+13$ $g(x) = 5x-2$ $g(-1) = 5(-1)-2$ $= -7$	1 1 1	3
12	$pq(x) = p[q(x)]$ $= p(x^2)$ $= \sqrt{x^2}$ $= x$ $qp(x) = q[p(x)]$ $= q(\sqrt{x})$ $= (\sqrt{x})^2$ $= x$ Oleh sebab $pq(x) = qp(x) = x$, maka $q(x) = x^2$ ialah fungsi songsang bagi $p(x) = \sqrt{x}$. Since $pq(x) = qp(x) = x$, thus $q(x) = x^2$ is the inverse function of $p(x) = \sqrt{x}$.	1 1 1	3
13	(a) $h^2(x) = h[h(x)]$ $= \frac{1}{\left(\frac{1}{x}\right)}$ $= x$ $h^3(x) = h[h^2(x)]$ $= \frac{1}{x}$	1 1	

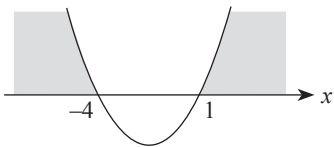
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$h^4(x) = h[h^3(x)]$ $= \frac{1}{\left(\frac{1}{x}\right)}$ $= x$ (b) $h^{22}(x) = x$ $h^{33}(x) = \frac{1}{x}$	1 1 1	5
14	(a) (i) Fungsi selanjar/<i>Continuous function</i> (ii) $-4 \leq f(x) \leq 11$ (b) Graf f tidak mempunyai fungsi songsang kerana garis mengufuk memotong lebih daripada satu titik pada graf. <i>Graph f has no inverse function because the horizontal line cuts the graph of function f at more than one point.</i>	1 1 1	3
15	(a) 5 (b) 11	1 1	2
16	(a) $h(y) = \frac{6}{2y - q}$ $h(2) = -1$ $\frac{6}{2(2) - q} = -1$ $\frac{6}{4 - q} = -1$ $6 = -1(4 - q)$ $6 = -4 + q$ $q = 6 + 4$ $= 10$ $k(y) = py + 10$ $k(2) = -2$ $p(2) + 10 = -2$ $2p = -2 - 10$ $p = -\frac{12}{2}$ $= -6$ (b) $k(y) = -6y + 10$ $x = -6y + 10$ $y = -6x + 10$ $6x = 10 - y$ $x = \frac{10 - y}{6}$ $k(x) = \frac{10 - x}{6}$	1 1 1 1	

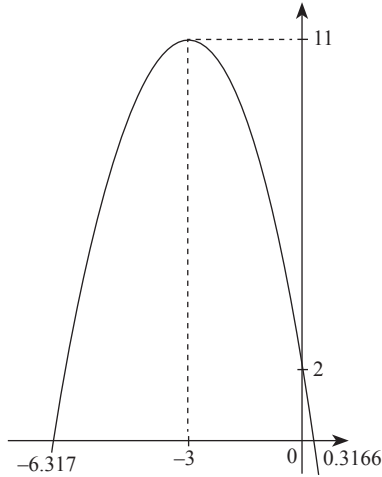
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) $hk^{-1}(x) = h[k^{-1}(x)]$ $= h\left(\frac{10-x}{6}\right)$ $= \frac{6}{2\left(\frac{10-x}{6}\right) - 10}$ $= \frac{6}{\frac{10-x}{3} - 10}$ $= \frac{6}{\frac{10-x-30}{3}}$ $= \frac{6}{\frac{-20-x}{3}}$ $= \frac{6 \times 3}{-20-x}$ $= \frac{18}{-20-x}$ $= -\frac{18}{20+x}, x \neq -20$	1 1	7
17	Penyebut tidak boleh sifar/<i>Denominator cannot be zero.</i> Punca kuasa dua mestilah nombor nyata. <i>Square root must be real number:</i> $x - 3 > 0$ $x > 3$ Maka, domain ialah $x > 3$. <i>Hence, the domain is $x > 3$.</i>	1 1	2
18	$c(x) = 3x + 5$ $c(50) = 3(50) + 5$ $= 150 + 5$ $= \text{RM}155$	1 1	2

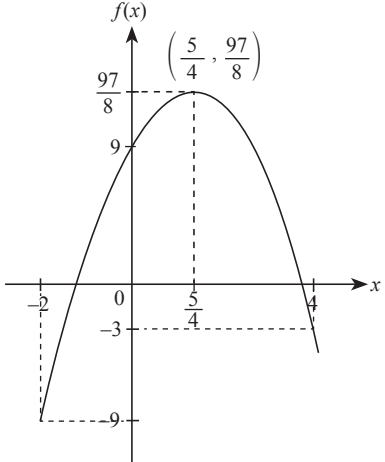
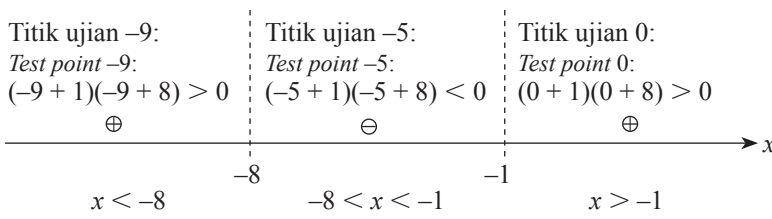


Fungsi Kuadrat

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Hasil tambah punca/<i>Sum of roots</i>: $\alpha + 2\alpha = -\frac{(-3)}{1}$ $3\alpha = 3$ $\alpha = 1$ dan/<i>and</i> Hasil darab punca/<i>Product of roots</i>: $(\alpha)(2\alpha) = k$ $2\alpha^2 = k$ $2(1)^2 = k$ $k = 2$ (b) $\alpha = 1$ $2(\alpha) = 2(1)$ $= 2$ Nilai-nilai sepadan bagi punca-punca ialah 1 dan 2. <i>The corresponding values of the roots are 1 and 2.</i>	1 1 1	3

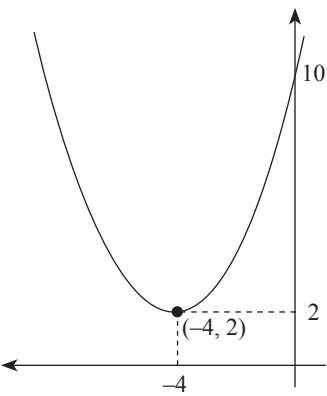
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
2	(a) $2x^2 - 3x + 4 = 0$ $m + n = -\frac{(-3)}{2}$ dan/and $mn = \frac{4}{2}$ $= \frac{3}{2}$ $= 2$ Punca-punca baharu/New roots: Hasil tambah punca/Sum of roots $= (m - n) + (n - m)$ $= 0$ Hasil darab punca/Product of roots $= (m - n)(n - m)$ $= mn - m^2 - n^2 + mn$ $= 2mn - m^2 - n^2$ $= 2mn - [(m + n)^2 - 2mn]$ $= 2(2) - \left[\left(\frac{3}{2}\right)^2 - 2(2)\right]$ $= \frac{23}{4}$ $4x^2 + 23 = 0$ (b) $m + n = \frac{3}{2}$ $mn = 2$ $n = \frac{2}{m}$ $\left(m + \frac{2}{m} = \frac{3}{2}\right)m$ $m^2 + 2 = \frac{3}{2}m$ $\left(m^2 - \frac{3}{2}m + 2 = 0\right)2$ $2m^2 - 3m + 4 = 0$ (Tertunjuk/Shown)	1 1 1 1 1 1 1	7
3	$(2x - 1)(x + 4) \geq 4 + x$ $2x^2 + 8x - x - 4 - 4 - x \geq 0$ $2x^2 + 6x - 8 \geq 0$ $x^2 + 3x - 4 \geq 0$ $(x + 4)(x - 1) \geq 0$  $x \leq -4, x \geq 1$	1 1	2
4	$y = q - x$ $x^2 - 2x + 2(q - x)^2 = 3$ $x^2 - 2x + 2(q^2 - 2qx + x^2) = 3$ $x^2 - 2x + 2q^2 - 4qx + 2x^2 - 3 = 0$ $3x^2 + (-2 - 4q)x + 2q^2 - 3 = 0$ $b^2 - 4ac > 0$ $(-2 - 4q)^2 - 4(3)(2q^2 - 3) > 0$ $4 + 16q + 16q^2 - 24q^2 + 36 > 0$ $-8q^2 + 16q + 40 > 0$ $q^2 - 2q - 5 < 0$ $q^2 < 2q + 5$ (Tertunjuk/Shown)	1 1 1 1	4

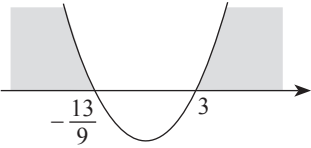
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
5	$x(x+y)=k$ $x(x+2x+3)=k$ $x^2+2x^2+3x=k$ $3x^2+3x-k=0$ $a=3, b=3, c=-k$ $b^2-4ac < 0$ $3^2-4(3)(-k) < 0$ $9+12k < 0$ $12k < -9$ $k < -\frac{9}{12}$ $k < -\frac{3}{4}$	1 1	2
6	$f(x) = 2x^2 + 7x - 2$ $= 2\left(x^2 + \frac{7}{2}x - 1\right)$ $= 2\left[x^2 + \frac{7}{2}x + \left(\frac{7}{2}\right)^2 - \left(\frac{7}{2}\right)^2 - 1\right]$ $= 2\left[x^2 + \frac{7}{2}x + \left(\frac{7}{4}\right)^2 - \left(\frac{7}{4}\right)^2 - 1\right]$ $= 2\left[\left(x + \frac{7}{4}\right)^2 - \frac{49}{16} - 1\right]$ $= 2\left[\left(x + \frac{7}{4}\right)^2 - \frac{65}{16}\right]$ $= 2\left(x + \frac{7}{4}\right)^2 - \frac{65}{8}$ Bandingkan dengan/Comparing with $f(x) = a(x+b)^2 + c$ Maka/Thus, $a = 2, b = \frac{7}{4}, c = -\frac{65}{8}$	1 1 1	3
7	(a)  Bentuk graf/Shape of graph $\cap$ Titik maksimum/Maximum point $(-3, 11)$ Pintasan-y/y-intercept $(0, 2)$ (b) $g(x) = -(x-3)^2 + 11$	1 1 1 1	4

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

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $k(x) = 2x^2 - 5x + 3$ $= 2\left(x^2 - \frac{5}{2}x + \frac{3}{2}\right)$ $= 2\left[x^2 - \frac{5}{2}x + \left(\left(\frac{-5}{2}\right)^2 - \left(\frac{-5}{2}\right)^2 + \frac{3}{2}\right]\right]$ $= 2\left[\left(x - \frac{5}{4}\right)^2 - \frac{1}{16}\right]$ $= 2\left(x - \frac{5}{4}\right)^2 - \frac{1}{8}$ Titik minimum/<i>Minimum point</i> $\left(\frac{5}{4}, -\frac{1}{8}\right)$. Persamaan paksi simetri/<i>Equation of axis of symmetry</i>, $x = \frac{5}{4}$.	1 1 1	6
10	(a) Punca-punca/<i>The roots</i>: $x = -\frac{3}{2} \quad x = 2$ $2x + 3 = 0 \quad x - 2 = 0$ $a(2x + 3)(x - 2) = 0$ $f(0) = -3$ $f(x) = a(2x + 3)(x - 2)$ $-3 = a[2(0) + 3](0 - 2)$ $-3 = a(3)(-2)$ $a = -\frac{3}{(-6)}$ $a = \frac{1}{2}$ $f(x) = \frac{1}{2}(2x + 3)(x - 2)$ (b) $f(x) = \frac{1}{2}(2x + 3)(x - 2)$ $= \frac{1}{2}(2x^2 - 4x + 3x - 6)$ $= x^2 - \frac{1}{2}x - 3$ $= x^2 - \frac{1}{2}x + \left[\left(\frac{-1}{2}\right)^2 - \left[\left(\frac{-1}{2}\right)^2\right] - 3$ $= \left(x - \frac{1}{4}\right)^2 - \frac{49}{16}$ Titik minimum/<i>Minimum point</i> $= \left(\frac{1}{4}, -\frac{49}{16}\right)$.	1 1 1 1 1 1	5
11	(a) (i) Graf akan bergerak ke bawah secara mencancang. <i>The graph moves down vertically.</i> (ii) Graf akan bergerak ke kanan secara mengufuk. <i>The graph moves to the right horizontally.</i> (b) $f(x) = 2(x - k)^2 + h$	1 1 1	3

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
12	(a) Daripada persamaan $f(x) = (x + 3)^2 + 3k - 1$ <i>From the equation $f(x) = (x + 3)^2 + 3k - 1$</i> Persamaan paksi simetri, $x = -3$ <i>The equation of the axis of symmetry, $x = -3$</i> (b) Daripada persamaan $f(x) = (x + 3)^2 + 3k - 1$ <i>From the equation $f(x) = (x + 3)^2 + 3k - 1$</i> Titik minimum $(-3, 3k - 1)$ <i>Minimum point $(-3, 3k - 1)$</i> Gantikan nilai minimum $= -7$ bagi koordinat y <i>Substitute minimum value $= -7$ into y-coordinate</i> $3k - 1 = -7$ $k = \frac{-7 + 1}{3}$ $k = -2$ $f(x) = (x + 3)^2 + 3(-2) - 1$ $= (x + 3)^2 - 6 - 1$ $= (x + 3)^2 - 7$ Apabila dipantulkan pada paksi-x, $f(x) = -(x + 3)^2 + 7$. <i>When reflected on the x-axis, $f(x) = -(x + 3)^2 + 7$.</i>	1 1 1 1	4
13	$C = 0.25n^2 - 10n + 800$ $= 0.25(n^2 - 40n + 3\,200)$ $= 0.25\left[n^2 - 40n + \left(-\frac{40}{2}\right)^2 - \left(-\frac{40}{2}\right)^2 + 3\,200\right]$ $= 0.25[(n^2 - 40n + (-20)^2 - (-20)^2 + 3\,200)]$ $= 0.25[(n - 20)^2 + 2\,800]$ $= 0.25(n - 20)^2 + 700$ Oleh sebab $a > 0$, maka bilangan lampu hiasan, $n = 20$ dengan nilai kos minimum, $C = \text{RM}700$. <i>Since $a > 0$, then the number of lights, $n = 20$ with the minimum cost, $C = \text{RM}700$.</i>	1 1 1	3
14	(a) $f(x) = px^2 + 4x + q$ $f(x) = p\left(x^2 + \frac{4}{p}x + \frac{q}{p}\right)$ $= p\left[x^2 + \frac{4}{p}x + \left(\frac{\frac{4}{p}}{2}\right)^2 - \left(\frac{\frac{4}{p}}{2}\right)^2 + \frac{q}{p}\right]$ $= p\left[x^2 + \frac{4}{p}x + \left(\frac{2}{p}\right)^2 - \left(\frac{2}{p}\right)^2 + \frac{q}{p}\right]$ $= p\left[\left(x + \frac{2}{p}\right)^2 - \frac{4}{p^2} + \frac{q}{p}\right]$ $= p\left(x + \frac{2}{p}\right)^2 - \frac{4p}{p^2} + \frac{pq}{p}$ $= p\left(x + \frac{2}{p}\right)^2 + \frac{pq - 4}{p} \text{ (Tertunjuk/Shown)}$	1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) Titik minimum/<i>Minimum point</i> $\left(-\frac{2}{p}, \frac{pq-4}{p}\right)$ Gantikan titik minimum pada koordinat x dan y <i>Substitute minimum point at x and y-coordinates</i> $-\frac{2}{p} = -4 \quad \text{dan/and} \quad \frac{pq-4}{p} = 2$ $p = \frac{-2}{-4}$ $p = \frac{1}{2}$ $\frac{\frac{1}{2}q-4}{\frac{1}{2}} = 2$ $\frac{1}{2}q - 4 = 1$ $\frac{1}{2}q = 1 + 4$ $q = 5 \times 2$ $q = 10$	1 1	7
	(c) $f(x) = p\left(x + \frac{2}{p}\right)^2 + \frac{pq-4}{p}$ $= \frac{1}{2}\left(x + \frac{2}{\frac{1}{2}}\right)^2 + \frac{\frac{1}{2}(10)-4}{\frac{1}{2}}$ $= \frac{1}{2}(x+4)^2 + 2$ $= \frac{1}{2}(x^2 + 8x + 16) + 2$ $= \frac{1}{2}x^2 + 4x + 8 + 2$ $= \frac{1}{2}x^2 + 4x + 10$  Bentuk graf kuadratik minimum <i>Shape of the minimum quadratic graph</i> Titik minimum $(-4, 2)$ <i>Minimum point $(-4, 2)$</i> Pintasan-y $(0, 10)$ <i>y-intercept $(0, 10)$</i>	1 1 1	
15	(a) (i) $m + n = 2 + 5$ $= 7$ (ii) $mn = 2(5)$ $= 10$ (b) $3x^2 + 2x = 6$ $3x^2 + 2x - 6 = 0$ $x^2 + \frac{2}{3}x - 2 = 0$ Hasil tambah punca/<i>Sum of roots</i>: $\alpha + \beta = -\frac{2}{3}$ dan/and Hasil darab punca/<i>Product of roots</i>: $\alpha\beta = -2$	1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Hasil tambah punca/Sum of roots: $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2 + \beta^2}{\alpha\beta}$ $= \frac{(\alpha + \beta)^2 - 2\alpha\beta}{\alpha\beta}$ $= \frac{\left(-\frac{2}{3}\right)^2 - 2(-2)}{-2}$ $= \frac{\frac{4}{9}}{-2}$ $= -\frac{20}{9}$ atau/or Hasil darab punca/Product of roots: $\left(\frac{\alpha}{\beta}\right)\left(\frac{\beta}{\alpha}\right) = \frac{\alpha\beta}{\alpha\beta}$ $= 1$ $x^2 - (\text{HTP/SOR}) + (\text{HDP/POR}) = 0$ $x^2 - \left(-\frac{20}{9}\right)x + 1 = 0$ $9x^2 - (-20)x + 9 = 0$ $9x^2 + 20x + 9 = 0$ (c) $x^2 + (3h - 1)x = -2h - 10$ $x^2 + (3h - 1)x + 2h + 10 = 0$ $b^2 - 4ac > 0$ $(3h - 1)^2 - 4(1)(2h + 10) > 0$ $9h^2 - 6h + 1 - 8h - 40 > 0$ $9h^2 - 14h - 39 > 0$ $(9h + 13)(h - 3) > 0$  $h < -\frac{13}{9}, h > 3$	1 1 1 1 1	8



Sistem Persamaan Systems of Equations

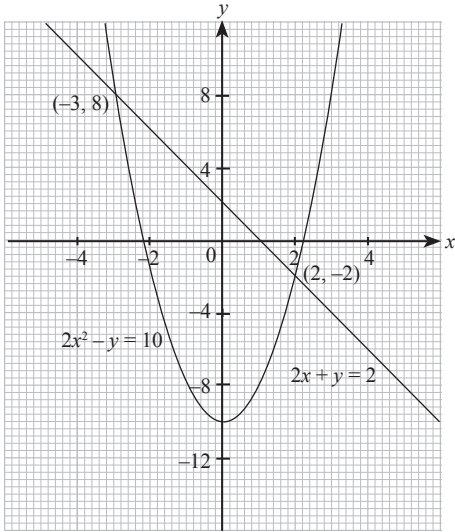
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	$x + 2y = 8 \dots \textcircled{1}$ $3x + 4y = 12 \dots \textcircled{2}$ $\textcircled{1} \times 2: 2x + 4y = 16 \dots \textcircled{3}$ $\textcircled{2} - \textcircled{3}:$ $\begin{array}{r} 3x + 4y = 12 \\ (-) 2x + 4y = 16 \\ \hline x = -4 \end{array}$ Gantikan $x = -4$ ke dalam $\textcircled{1}$ Substitute $x = -4$ into $\textcircled{1}$ $-4 + 2y = 8$ $2y = 12$ $y = 6$	1 1 1	3

Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Gantikan $q = -\frac{40}{21}$ ke dalam ⑤ Substitute $q = -\frac{40}{21}$ into ⑤ $r = \frac{32\left(-\frac{40}{21}\right) + 60}{9}$ $= -\frac{20}{189}$ Gantikan $q = -\frac{40}{21}$ ke dalam ④ Substitute $q = -\frac{40}{21}$ into ④ $p = \frac{6 + 2\left(-\frac{40}{21}\right)}{9}$ $= \frac{46}{189}$ Maka, $p = \frac{46}{189}$, $q = -\frac{40}{21}$ dan $r = -\frac{20}{189}$ ialah penyelesaian bagi sistem persamaan linear ini. Therefore, $p = \frac{46}{189}$, $q = -\frac{40}{21}$ and $r = -\frac{20}{189}$ are the solutions for the system of linear equations.	1 1	5
4	$3x - 3y - z = -4$... ① $2x - y + z = -3$... ② $2x + 2y + 3z = 2$... ③ ③ - ② : $3y + 2z = 5$... ④ ② $\times$ 3 : $6x - 3y + 3z = -9$... ⑤ ① $\times$ 2 : $6x - 6y - 2z = -8$... ⑥ ⑥ - ⑤ : $-3y - 5z = 1$... ⑦ ⑦ + ④ : $-3z = 6$ $z = -2$ Gantikan $z = -2$ ke dalam ④ Substitute $z = -2$ into ④ $3y + 2(-2) = 5$ $3y = 5 + 4$ $y = \frac{9}{3}$ $= 3$ Gantikan $z = -2$ dan $y = 3$ ke dalam ⑤ Substitute $z = -2$ and $y = 3$ into ⑤ $6x - 3(3) + 3(-2) = -9$ $6x = -9 + 9 + 6$ $6x = 6$ $x = \frac{6}{6}$ $= 1$ Maka, $x = 1$, $y = 3$, $z = -2$ ialah penyelesaian sistem persamaan linear ini. Therefore, $x = 1$, $y = 3$, $z = -2$ are the solutions for the system of linear equations.	1 1 1 1	5

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
5	$x - y = 4 \quad \dots \textcircled{1}$ $2x^2 + y = 17 \quad \dots \textcircled{2}$ $\textcircled{2} + \textcircled{1}: \quad \begin{array}{r} 2x^2 + y = 17 \\ + \quad x - y = 4 \\ \hline 2x^2 + x = 21 \\ 2x^2 + x - 21 = 0 \\ (2x + 7)(x - 3) = 0 \\ 2x + 7 = 0, \quad x - 3 = 0 \\ x = -\frac{7}{2} \quad \quad x = 3 \end{array}$ Apabila/When $x = -\frac{7}{2}$, $-\frac{7}{2} - y = 4$ $y = -\frac{7}{2} - 4$ $y = -\frac{15}{2}$ Apabila/When $x = 3$, $3 - y = 4$ $y = 3 - 4$ $= -1$ Maka, $x = -\frac{7}{2}, y = -\frac{15}{2}$ atau $x = 3, y = -1$ ialah penyelesaian bagi sistem persamaan linear ini. Therefore, $x = -\frac{7}{2}, y = -\frac{15}{2}$ or $x = 3, y = -1$ are the solutions for the system of linear equations.	1 1 1 1	4
6	$3p + 6q + r = 500 \quad \dots \textcircled{1}$ $p + 3q + 7r = 400 \quad \dots \textcircled{2}$ $6p + q + 2r = 450 \quad \dots \textcircled{3}$ Daripada/From $\textcircled{1}$ $r = 500 - 3p - 6q \quad \dots \textcircled{4}$ Gantikan $\textcircled{4}$ ke dalam $\textcircled{2}$ Substitute $\textcircled{4}$ into $\textcircled{2}$ $p + 3q + 7(500 - 3p - 6q) = 400$ $p + 3q + 3\,500 - 21p - 42q = 400$ $-20p - 39q = -3\,100$ $20p + 39q = 3\,100 \quad \dots \textcircled{5}$ Gantikan $\textcircled{4}$ ke dalam $\textcircled{3}$ Substitute $\textcircled{4}$ into $\textcircled{3}$ $6p + q + 2(500 - 3p - 6q) = 450$ $6p + q + 1\,000 - 6p - 12q = 450$ $-11q = -550$ $q = 50$ Gantikan $q = 50$ ke dalam $\textcircled{3}$ Substitute $q = 50$ into $\textcircled{3}$ $20p + 39(50) = 3\,100$ $20p = 1\,150$ $p = \frac{115}{2}$	1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah																					
	Gantikan $q = 50$ dan $p = \frac{115}{2}$ ke dalam ④ <i>Substitute $q = 50$ and $p = \frac{115}{2}$ into ④</i> $r = 500 - 3\left(\frac{115}{2}\right) - 6(50)$ $r = \frac{55}{2}$	1	5																					
7	$p = 1 - m$... ① $p^2 + 2m^2 + pm = 8$... ② Gantikan ① ke dalam ② <i>Substitute ① into ②</i> $(1 - m)^2 + 2m^2 + (1 - m)m = 8$ $1 - 2m + m^2 + 2m^2 + m - m^2 - 8 = 0$ $2m^2 - m - 7 = 0$ $m = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-7)}}{2(2)}$ $m = 2.14$ dan/and $m = -1.64$ Apabila/When $m = 2.14$ Apabila/When $m = -1.64$ $p = 1 - 2.14$ $p = 1 - (-1.64)$ $p = -1.14$ dan/and $p = 2.64$	1 1 1 1 1	5																					
8	$4x + y = -3$... ① $x^2 + x - y = -3$... ② ② + ①: $x^2 + 5x = -6$ $x^2 + 5x + 6 = 0$ $(x + 2)(x + 3) = 0$ $x = -2$ dan/and $x = -3$ Apabila/When $x = -2$ Apabila/When $x = -3$ $4(-2) + y = -3$ $4(-3) + y = -3$ $-8 + y = -3$ $-12 + y = -3$ $y = 5$ dan/and $y = 9$	1, 1 1 1 1	5																					
9	Jadual nilai untuk persamaan linear dan persamaan tak linear. <i>The table of values for linear equation and non-linear equation.</i> <table><tr><th>x</th><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td></tr><tr><th>Nilai y Value of y $2x + y = 2$</th><td>8</td><td>6</td><td>4</td><td>2</td><td>0</td><td>-2</td></tr><tr><th>Nilai y Value of y $2x^2 - y = 10$</th><td>8</td><td>-2</td><td>-8</td><td>-10</td><td>-8</td><td>-2</td></tr></table>	x	-3	-2	-1	0	1	2	Nilai y Value of y $2x + y = 2$	8	6	4	2	0	-2	Nilai y Value of y $2x^2 - y = 10$	8	-2	-8	-10	-8	-2	1 1	
x	-3	-2	-1	0	1	2																		
Nilai y Value of y $2x + y = 2$	8	6	4	2	0	-2																		
Nilai y Value of y $2x^2 - y = 10$	8	-2	-8	-10	-8	-2																		

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	 Satu titik diplot dengan betul <i>One point plotted correctly</i> Semua titik diplot dengan betul <i>All points plotted correctly</i> Graf kuadratik sempurna <i>Perfect quadratic graph</i> Graf garis lurus sempurna <i>Perfect straight line graph</i> Dua titik persilangan <i>Two intersection points</i> Maka, $x = 2, y = -2$ dan $x = -3, y = 8$ ialah penyelesaian bagi persamaan serentak ini. <i>Therefore, $x = 2, y = -2$ and $x = -3, y = 8$ are the solutions for the simultaneous equations.</i>	1 1 1 1 1 1 1	8
10	Andaikan/Let Nasi goreng/Fried rice = x Ayam bakar/Grilled chicken = y Jus oren/Orange juice = 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 <i>Substitute ④ into ②</i> $3x + 2y + 40.50 - 2x - y = 65.50$ $x + y = 25$ $x = 25 - y$... ⑤ Gantikan ④ ke dalam ③ <i>Substitute ④ into ③</i> $x + 3y + 2(40.50 - 2x - y) = 66$ $x + 3y + 81 - 4x - 2y = 66$ $-3x + y = -15$... ⑥ Gantikan ⑤ ke dalam ⑥ <i>Substitute ⑤ into ⑥</i> $-3(25 - y) + y = -15$ $-75 + 3y + y = -15$ $4y = 60$ $y = 15.00$	1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Gantikan $y = 15$ ke dalam ⑤ <i>Substitute $y = 15$ into ⑤</i> $x = 25 - 15$ $x = 10.00$ Gantikan $x = 10$ dan $y = 15$ ke dalam ① <i>Substitute $x = 10$ and $y = 15$ into ①</i> $2(10) + 15 + z = 40.50$ $35 + z = 40.50$ $z = 5.50$ Harga satu hidangan nasi goreng, ayam bakar dan segelas jus oren masing-masing ialah RM10, RM15 dan RM5.50. <i>The price of a serving of fried rice, grilled chicken and a glass of orange juice are RM10, RM15 and RM5.50 respectively.</i>	1 1	7
11	$x^2 + 2y^2 + x - y = 25 \quad \dots \text{①}$ $y - 3x + 1 = 0 \quad \dots \text{②}$ $y = 3x - 1 \quad \dots \text{③}$ Gantikan ③ ke dalam ① <i>Substitute ③ into ①</i> $x^2 + 2(3x - 1)^2 + x - (3x - 1) = 25$ $x^2 + 2(9x^2 - 6x + 1) + x - 3x + 1 - 25 = 0$ $x^2 + 18x^2 - 12x + 2 + x - 3x + 1 - 25 = 0$ $19x^2 - 14x - 22 = 0$ $x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(19)(-22)}}{2(19)}$ $x = 1.506 \quad \text{dan/and} \quad x = -0.7689$ Gantikan $x = 1.506$ ke dalam ③ <i>Substitute $x = 1.506$ into ③</i> $y = 3(1.506) - 1$ $= 3.518$ Gantikan $x = -0.7689$ ke dalam ③ <i>Substitute $x = -0.7689$ into ③</i> $y = 3(-0.7689) - 1$ $= -3.307$ Titik-titik persilangan ialah (1.506, 3.518) dan (-0.7689, -3.307). <i>The points of intersection are (1.506, 3.518) and (-0.7689, -3.307).</i>	1 1 1 1	5



Indeks, Surd dan Logaritma Index, Surds and Logarithms

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\frac{x^4 y^2}{x^3 y^2} = x^{4-3} y^{2-2}$ $= x(1)$ $= x$ (b) $(pq)^{\frac{1}{4}} \times (pq^4)^{\frac{1}{4}} \times (pq^2)^{\frac{1}{4}}$ $= p^{\frac{1}{4} + \frac{1}{4} + \frac{1}{4}} \times q^{\frac{1}{4} + 1 + \frac{1}{2}}$ $= p^{\frac{3}{4}} q^{\frac{7}{4}}$	1 1 1	3
2	$(5^2)^{\frac{3}{2}} \times (5^3)^{-\frac{2}{3}} \times (5^4)^{-\frac{1}{4}} = 5^3 \times 5^{-2} \times 5^{-1}$ $= 5^{3-2-1}$ $= 5^0$ $= 1$	1 1	2

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	$\begin{aligned} 3 \times 9^{2x+1} &= 27^{x+3} \\ 3 \times 3^{2(2x+1)} &= 3^{3(x+3)} \\ 3^{1+4x+2} &= 3^{3x+9} \\ 3^{4x+3} &= 3^{3x+9} \\ 4x + 3 &= 3x + 9 \\ x &= 6 \end{aligned}$	1 1 1	3
4	(a) $\begin{aligned} 2^n 3^n (2 \times 2 \times 3)^m &= 2^{3n-m} 3^{3n-2m} \\ 2^{2m+n} 3^{n+m} &= 2^{3n-m} 3^{3n-2m} \\ 2m + n = 3n - m &\quad \text{atau/or} \quad n + m = 3n - 2m \\ 3m &= 2n \\ \frac{m}{n} &= \frac{2}{3} \\ m : n &= 2 : 3 \end{aligned}$ (b) $\begin{aligned} y &= mx + 3 \\ 7 &= m(1 + \sqrt{5}) + 3 \\ m(1 + \sqrt{5}) &= 7 - 3 \\ m &= \frac{4}{1 + \sqrt{5}} \\ &= \frac{4}{1 + \sqrt{5}} \times \frac{1 - \sqrt{5}}{1 - \sqrt{5}} \\ &= -1 + \sqrt{5} \end{aligned}$ (c) $\log_3 h - 3 \log_{27} k = 1$ $\log_3 h - 3 \frac{\log_3 k}{\log_3 27} = 1 \quad (\text{Tukar asas}/Change base)$ $\log_3 h - 3 \frac{\log_3 k}{\log_3 3^3} = 1$ $\log_3 h - 3 \frac{\log_3 k}{3} = 1$ $\log_3 h - \log_3 k = 1$ $\log_3 \frac{h}{k} = 1$ $\frac{h}{k} = 3$ $h = 3k$	1 1 1 1 1 1 1	9
5	(a) $\begin{aligned} \sqrt{\frac{3^{3n} \times 3^7}{3^{-2n}}} &= (3^{5n} 3^7)^{\frac{1}{2}} \\ &= [(3^{4n+6})(3^{n+1})]^{\frac{1}{2}} \\ &= 3^{2n+3} \times \sqrt{3^{n+1}} \quad (\text{Tertunjuk}/Shown) \end{aligned}$ (b) (i) $\begin{aligned} 3^{\log_3 a} &= x^2 \\ a &= x^2 \\ 5^{\log_5 b} &= y^{\frac{3}{2}} \\ b &= y^{\frac{3}{2}} \\ (b)^2 &= \left(y^{\frac{3}{2}}\right)^2 \\ b^2 &= y^3 \\ \frac{2x^2 + 3}{4y^3} &= \frac{2a + 3}{4b^2} \end{aligned}$ (ii) $\begin{aligned} \log_a a + \log_b b^{\frac{2}{3}} \\ &= 1 + \frac{2}{3} \\ &= \frac{5}{3} \end{aligned}$	1 1 1 1 1 1 1	7

[illegible]

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$(b) 3\left[\frac{x}{3}(1 + \sqrt{20})\right] + 3 + \sqrt{5} = 22 + \sqrt{5}$ $3\left[\frac{x}{3}(1 + \sqrt{4 \times 5})\right] + 3 + \sqrt{5} = 22 + \sqrt{5}$ $x(1 + 2\sqrt{5}) + 3 + \sqrt{5} = 22 + \sqrt{5}$ $x(1 + 2\sqrt{5}) = 22 + \sqrt{5} - 3 - \sqrt{5}$ $x(1 + 2\sqrt{5}) = 19$ $x = \frac{19}{1 + 2\sqrt{5}} \times \frac{1 - 2\sqrt{5}}{1 - 2\sqrt{5}}$ $= \frac{19(1 - 2\sqrt{5})}{1 + 2\sqrt{5} - 2\sqrt{5} - 4(5)}$ $= -1 + 2\sqrt{5}$	1 1 1	6
9	(a) $\log_2 p = q$ $p = 2^q$ $16^q - 4^{-q}$ $= (2^4)^q - (2^2)^{-q}$ $= (2^q)^4 - (2^q)^{-2}$ $= p^4 - p^{-2}$ (b) $\log_x 81 = \log_3 x$ $\frac{\log_3 81}{\log_3 x} = \log_3 x$ $\frac{\log_3 3^4}{\log_3 x} = \log_3 x$ $(\log_3 x)^2 = \log_3 3^4$ $(\log_3 x)^2 = 4$ $\log_3 x = \pm\sqrt{4}$ $\log_3 x = 2 \quad \text{atau/or} \quad \log_3 x = -2$ $x = 3^2 \quad \quad \quad x = 3^{-2}$ $= 9 \quad \quad \quad = \frac{1}{9}$	1 1 1 1 1	6
10	(a) $V = 250\,000e^{a(0)}$ $V = 250\,000$ (b) $V = 250\,000e^{an}$ $350\,000 = 250\,000e^{3a}$ $e^{3a} = 1.4$ $3a = \ln 1.4$ $a = 0.1122$ (c) $V > 250\,000e^{0.1122n}$ $500\,000 > 250\,000e^{0.1122n}$ $e^{0.1122n} < 2$ $0.1122n < \ln 2$ $n < 6.178$ $n = 6 \text{ tahun/years}$	1 1 1 1 1 1 1	7
11	(a) Katakan/Suppose, $\sqrt[3]{x} = x^n$ $(\sqrt[3]{x})^3 = (x^n)^3$ $x^1 = x^{3n}$ $1 = 3n$ $n = \frac{1}{3}$ Maka/Hence, $\sqrt[3]{x} = x^{\frac{1}{3}}$.	1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) Perimeter = x $3 + 2 + \sqrt{x+1} = x$ $x - 5 = \sqrt{x+1}$ $(x-5)^2 = (\sqrt{x+1})^2$ $x^2 - 10x + 25 = x + 1$ $x^2 - 11x + 24 = 0$ $(x-8)(x-3) = 0$ $x - 8 = 0$, $x - 3 = 0$ $x = 8$ $x = 3$ (ditolak/rejected) $AC = \sqrt{8+1}$ $= \sqrt{9}$ $= 3$	1 1 1 1 1	7



Janjang Progressions

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Beza sepunya/Common difference = $(x+2) - (2x-3)$ $= x+2-2x+3$ $= 5-x$ (b) $S_{12} = \frac{12}{2}[2(2x-3) + (12-1)(5-x)]$ $= 6(4x-6+55-11x)$ $= 6(49-7x)$	1 1 1	3
2	(a) $S_{10} = \frac{10}{2}[5(10)-3]$ $= 5(50-3)$ $= 235$ (b) $S_9 = \frac{9}{2}[5(9)-3]$ $= 189$ $T_{10} = S_{10} - S_9$ $= 235 - 189$ $= 46$	1 1 1 1	4
3	(a) $d_1 = d_2$ $p-3-q = 4p+3q-(p-3)$ $p-3-q = 4p+3q-p+3$ $p-3-q = 3p+3q+3$ $p-3p = 3q+3+3+q$ $p-3p = 4q+6$ $-2p = 4q+6$ $p = -2q-3$ (b) $p = -2(2)-3$ $= -7$ $d = -7-3-2$ $= -12$	1 1 1	4
4	$d_1 = \ln(x+2) - \ln x$ $= \ln\left(\frac{x+2}{x}\right)$ atau/or $d_2 = \ln(x+12) - \ln(x+2)$ $= \ln\left(\frac{x+12}{x+2}\right)$	1	

Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
7	(a) $T_1 = \frac{6}{2} = 3$ $T_2 = \frac{3}{2}$ $r = \frac{T_2}{T_1}$ $= \frac{\frac{3}{2}}{3}$ $= \frac{1}{2}$ $T_7 = ar^6$ $= 3\left(\frac{1}{2}\right)^6$ $= \frac{3}{64}$ (b) $T_1 = \frac{1}{2} \times 3 \times 3$ $T_2 = \frac{1}{2} \times \frac{3}{2} \times \frac{3}{2}$ $= \frac{9}{2}$ $= \frac{9}{8}$ $r = \frac{T_2}{T_1}$ $= \frac{9}{8} \div \frac{9}{2}$ $= \frac{1}{4}$ $S_\infty = \frac{\frac{9}{2}}{1 - \frac{1}{4}}$ $= 6 \text{ cm}^2$	1 1 1 1 1 1	6
8	(a) $\frac{k}{1\,365} = \frac{12\,285}{k}$ $k^2 = 16\,769\,025$ $k = \pm\sqrt{16\,769\,025}$ $= \pm 4\,095$ $r = \frac{\pm 4\,095}{1\,365}$ $= \pm 3$ $\therefore r = 3$ (b) $S_4 = 18\,200$ $\frac{a(3^4 - 1)}{3 - 1} = 18\,200$ $a(3^4 - 1) = 18\,200 \times 2$ $a(81 - 1) = 36\,400$ $a = \frac{36\,400}{80}$ $= 455$	1 1 1 1 1	

[illegible]

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
10	(a) $ar = 64k^2 \quad \dots \textcircled{1}$ $ar^4 = k^5 \quad \dots \textcircled{2}$ $\frac{\textcircled{2}}{\textcircled{1}} : \frac{ar^4}{ar} = \frac{k^5}{64k^2}$ $r^3 = \frac{k^3}{64}$ $r^3 = \left(\frac{k}{4}\right)^3$ $\therefore r = \frac{k}{4}$ (b) (i) Gantikan $r = \frac{k}{4}$ ke dalam $\textcircled{1}$: <i>Substitute $r = \frac{k}{4}$ into $\textcircled{1}$:</i> $a\left(\frac{k}{4}\right) = 64k^2$ $a = 256k$ $S_{\infty} = \frac{256k}{1 - \frac{k}{4}}$ $= \frac{1\,024k}{4 - k}$ (ii) Diberi/Given $S_{\infty} = 256$ $256 = \frac{1\,024k}{4 - k}$ $256(4 - k) = 1\,024k$ $1\,024 - 256k = 1\,024k$ $1\,280k = 1\,024$ $k = \frac{4}{5} \text{ atau/or } 0.8$	1 1 1 1 1 1	7



Hukum Linear Linear Law

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $y = ax^n$ $\log_{10} y = \log_{10} ax^n$ $\log_{10} y = \log_{10} a + \log_{10} x^n$ $\log_{10} y = n \log_{10} x + \log_{10} a$ Bandingkan dengan/Comparing with $Y = mX + c$, Pintasan-y/y-intercept, $c = -3$ $\log_{10} a = -3$ $a = 10^{-3}$ $a = 0.001$ Kecerunan/Gradient, $m = \frac{9 - (-3)}{6 - 0}$ $= \frac{12}{6}$ $= 2$ $\therefore n = 2$ (b) Kecerunan/Gradient, $m = 2$ $\frac{9 - p}{6 - 2} = 2$ $9 - p = 2(4)$ $9 - p = 8$ $p = 9 - 8$ $p = 1$	1 1 1 6 1 1 1	6

Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
4	$\frac{p}{y} \times \frac{1}{p} = \left(2 - \frac{q}{x^2}\right) \times \frac{1}{p}$ $\frac{1}{y} = \frac{2}{p} - \frac{q}{px^2}$ $\frac{1}{y} = -\frac{q}{p}\left(\frac{1}{x^2}\right) + \frac{2}{p}$ Bandingkan dengan/Comparing with $Y = mX + c$ $m = -\frac{q}{p}$ dan/and $c = \frac{2}{p}$ Berdasarkan rajah/Based on the diagram, Pintasan-y/y-intercept, $c = 8$ $\frac{2}{p} = 8$ $p = \frac{2}{8}$ $= \frac{1}{4}$ Kecerunan/Gradient, $m = \frac{8-2}{0-3}$ $-\frac{q}{p} = -2$ $\frac{q}{\frac{1}{4}} = 2$ $q = 2 \times \frac{1}{4}$ $q = \frac{1}{2}$	1 1 1 1 1	5
5	(a) Kecerunan/Gradient, $m = \frac{25-16}{5-2}$ $m = 3$ $16 = 3(2) + c$ $c = 10$ $\ln y = 3(2^x) + 10$ (b) $\ln y = 3(2^2) + 10$ $\ln y = 22$ $y = e^{22}$	1 1 1 1	4
6	(a) (i) $y = \frac{2x}{3x^2 + n}$ $\frac{1}{y} = \frac{3x^2 + n}{2x}$ $\frac{1}{y} = \frac{3}{2}x + \frac{n}{2x}$ $\frac{x}{y} = \frac{3}{2}x^2 + \frac{n}{2}$ (ii) $\frac{n}{2}$ (b) Pada titik/At point $(h, k+2)$, $k+2 = \frac{3}{2}h + \frac{n}{2}$ $2k+4 = 3h+n$ $n = 2k-3h+4$	1 1 1 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah														
7	(a) $m = \frac{2.3 - 1.7}{0.2 - 0.6}$ $= \frac{0.6}{-0.4}$ $= -1.5$ atau/or $-\frac{3}{2}$ Jadi/Thus, $\ln y = -1.5 \ln x + c$ Pada titik/At point $(0.2, 2.3)$, $2.3 = -1.5(0.2) + c$ $2.3 = -0.3 + c$ $c = 2.6$ atau/or $\frac{13}{5}$ Maka/Hence, $\ln y = -1.5 \ln x + 2.6$ $\ln y + \ln x^{1.5} = 2.6$ $\ln (yx^{1.5}) = 2.6$ $yx^{1.5} = e^{2.6}$ $y = \frac{e^{2.6}}{x^{1.5}}$ (b) Apabila/When $x = 4$, $y = \frac{e^{2.6}}{4^{1.5}}$ $= 1.683$	1 1 1 1 1	5														
8	(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>3.30</td><td>2.75</td><td>2.20</td><td>1.65</td><td>1.10</td><td>0.55</td></tr></table> (b) Paksi betul, skala seragam dan satu titik ditanda betul Correct axes, uniform scales and one correct point Semua titik ditanda betul All points marked correctly Garis lurus penyuaiian terbaik Line of best fit (c) $\frac{n}{y} = px + 1$ $\frac{1}{y} = \frac{p}{n}x + \frac{1}{n}$	x	0.1	0.2	0.3	0.4	0.5	0.6	$\frac{1}{y}$	3.30	2.75	2.20	1.65	1.10	0.55	1 1 1 1	
x	0.1	0.2	0.3	0.4	0.5	0.6											
$\frac{1}{y}$	3.30	2.75	2.20	1.65	1.10	0.55											

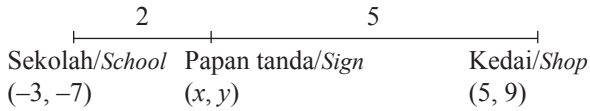
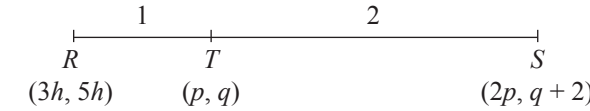
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(i) Apabila/When $x = 0.38$, $\frac{1}{y} = 1.75$ $y = \frac{1}{1.75}$ $= 0.5714 \text{ atau/or } \frac{4}{7}$ (ii) Pintasan-y/y-intercept $= 3.85$, $\frac{1}{n} = 3.85$ $n = \frac{1}{3.85}$ $= 0.260$ (iii) Kecerunan/Gradient, $m = \frac{p}{n}$, $\frac{p}{n} = \frac{3.30 - 0.55}{0.1 - 0.6}$ $\frac{p}{0.260} = \frac{2.75}{-0.5}$ $\frac{p}{0.260} = -5.5$ $p = -5.5 \times 0.260$ $= -1.43$	1 1 1 1 1	10



Geometri Koordinat

Coordinate Geometry

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $RS : ST = m : n$ $15 : 45 = 1 : 3$ (b) S membahagi reben RT dengan nisbah $1 : 3$. <i>S divides ribbon RT with the ratio $1 : 3$.</i> (c) $S(x, y) = \left(\frac{0(3) + 28(1)}{1 + 3}, \frac{0(3) + 0(1)}{1 + 3} \right)$ $= (7, 0)$	1 1 1 1	4
2	Luas/Area of $\triangle ABC = 18$ $\frac{1}{2} \begin{vmatrix} -k & 2 & 2k & -k \\ 3 & 5 & 1 & 3 \end{vmatrix} = 18$ $\frac{1}{2} [(-k \times 5) + (2 \times 1) + (2k \times 3)] - [(2 \times 3) + (2k \times 5) + (-k \times 1)] = 18$ $ (-5k + 2 + 6k) - (6 + 10k - k) = 2 \times 18$ $ -5k + 2 + 6k - 6 - 10k + k = 36$ $-8k - 4 = \pm 36$ $-8k - 4 = 36$ atau/or $-8k - 4 = -36$ $-8k = 36 + 4$ $k = \frac{36 + 4}{-8}$ $= -5$ $-8k = -36 + 4$ $k = \frac{-36 + 4}{-8}$ $= 4$ Maka, nilai-nilai yang mungkin bagi k ialah -5 dan 4. <i>Thus, the possible values of k are -5 and 4.</i>	1 1 1, 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	 $(x, y) = \left(\frac{(-3)(5) + (5)(2)}{2 + 5}, \frac{(-7)(5) + (9)(2)}{2 + 5} \right)$ $(x, y) = \left(-\frac{5}{7}, -\frac{17}{7} \right)$	1 1	2
4	 $RT : TS = 1 : 2$ Koordinat-x bagi T: x-coordinates of T: $p = \frac{3h(2) + 2p(1)}{2 + 1}$ $p = \frac{6h + 2p}{3}$ $3p = 6h + 2p$ $p = 6h$ $p = 6\left(\frac{q-1}{5}\right)$ $= \frac{6q-6}{5}$ Koordinat-y bagi T: y-coordinates of T: $q = \frac{5h(2) + 1(q+2)}{2 + 1}$ $q = \frac{10h + q + 2}{3}$ $3q = 10h + q + 2$ $10h = 2q - 2$ $h = \frac{2q-2}{10}$ $= \frac{q-1}{5}$	1 1, 1	3
5	(a) Luas/Area of $\triangle ABC = 18$ $\frac{1}{2} \begin{vmatrix} -2 & p & -3 & -2 \\ 5 & q & -2 & 5 \end{vmatrix} = 18$ $\frac{1}{2} \left [(-2 \times q) + (p \times -2) + (-3 \times 5)] - [(5 \times p) + (q \times -3) + (-2 \times -2)] \right = 18$ $ (-2q - 2p - 15) - (5p - 3q + 4) = 36$ $ -2q - 2p - 15 - 5p + 3q - 4 = 36$ $-7p + q - 19 = \pm 36$ $-7p + q - 19 = 36 \quad \text{atau/or} \quad -7p + q - 19 = -36$ $-7p + q = 55 \quad \text{atau/or} \quad -7p + q = -17$ $q = 55 + 7p \dots \textcircled{1} \quad q = 7p - 17 \dots \textcircled{2}$ Daripada persamaan garis lurus CB dan $B(p, q)$ <i>From the equation of straight line CB and $B(p, q)$</i> $y = x + 1$ $q = p + 1 \dots \textcircled{3}$ Selesaikan persamaan serentak <i>Solve simultaneous equation</i> $\textcircled{1} = \textcircled{3} \quad \textcircled{2} = \textcircled{3}$ $55 + 7p = p + 1 \quad \text{atau/or} \quad 7p - 17 = p + 1$ $6p = -54 \quad 6p = 18$ $p = -9 \quad p = 3$ $q = -9 + 1 \quad q = 3 + 1$ $= -8 \quad = 4$ Maka, $p = 3$ dan $q = 4$ kerana berdasarkan rajah, titik B berada pada sukuan I. <i>Thus, $p = 3$ and $q = 4$ because based on the diagram, point B lies on quadrant I.</i> (b) Titik D berada pada paksi-x, maka $y = 0$, <i>Point D lie on the x-axis, thus $y = 0$,</i> $y = x + 1$ $0 = x + 1$ $x = -1$ $\therefore D(-1, 0)$	1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
8	(a) Kecerunan/<i>Gradient of AC</i>, $m_{AC} = \frac{12-0}{16-2}$ $= \frac{6}{7}$ Titik tengah/<i>Midpoint of AC</i> $= \left(\frac{2+16}{2}, \frac{0+12}{2} \right)$ $= (9, 6)$ $m_1 \times \frac{6}{7} = -1$ $m_1 = -\frac{7}{6}$ $y - 6 = -\frac{7}{6}(x - 9)$ $y = -\frac{7}{6}x + \frac{33}{2}$ (b) $m_{AD} = m_{BC}$ $= \frac{12-3}{16-13}$ $= 3$ $m_{AD} \times m_{CD} = -1$ $3 \times m_{CD} = -1$ $m_{CD} = -\frac{1}{3}$ Persamaan garis lurus <i>CD</i> <i>Equation of straight line CD</i> $y - 12 = -\frac{1}{3}(x - 16)$ $y = -\frac{1}{3}x + \frac{16}{3} + 12$ $y = -\frac{1}{3}x + \frac{52}{3} \quad \dots \textcircled{1}$ Persamaan garis lurus <i>AD</i> <i>Equation of straight line AD</i> $y - 0 = 3(x - 2)$ $y = 3x - 6 \quad \dots \textcircled{2}$ Selesaikan persamaan serentak <i>Solve the simultaneous equation</i> $\textcircled{1} = \textcircled{2}$ $-\frac{1}{3}x + \frac{52}{3} = 3x - 6$ $3x + \frac{1}{3}x = \frac{52}{3} + 6$ $\frac{10}{3}x = \frac{70}{3}$ $10x = 70$ $x = 7$ Gantikan $x = 7$ ke dalam $\textcircled{2}$ <i>Substitute $x = 7$ into $\textcircled{2}$</i> $y = 3(7) - 6$ $= 15$ Koordinat titik $D(7, 15)$. <i>The coordinates of point $D(7, 15)$.</i>	1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) Koordinat-x atau/or Koordinat-y x-coordinate y-coordinate $\frac{1(2) + 4(x)}{4 + 1} = 13$ $\frac{1(0) + 4(y)}{4 + 1} = 3$ $2 + 4x = 13 \times 5$ $4y = 3 \times 5$ $4x = 65 - 2$ $4y = 15$ $x = \frac{63}{4}$ $y = \frac{15}{4}$ Koordinat titik $E\left(\frac{63}{4}, \frac{15}{4}\right)$ atau (15.75, 3.75). <i>The coordinates of point E</i> $\left(\frac{63}{4}, \frac{15}{4}\right)$ or (15.75, 3.75). (d) Luas/Area of ADCE $= \frac{1}{2} \begin{vmatrix} 2 & 7 & 16 & 15.75 & 2 \\ 0 & 15 & 12 & 3.75 & 0 \end{vmatrix}$ $= \frac{1}{2} [(2 \times 15) + (7 \times 12) + (16 \times 3.75) + (15.75 \times 0)] -$ $= \frac{1}{2} [(0 \times 7) + (15 \times 16) + (12 \times 15.75) + (3.75 \times 2)]$ $= \frac{1}{2} (30 + 84 + 60) - (240 + 189 + 7.5)$ $= \frac{1}{2} 174 - 436.5$ $= \frac{1}{2} -262.5$ $= 131.25 \text{ unit}^2/\text{units}^2$	1 1 1 1	10
9	(a) (i) Katakan $P(x, y)$ ialah titik yang bergerak. <i>Let $P(x, y)$ is a moving point.</i> $PA = AQ$ $\sqrt{(x-1)^2 + (y-2)^2} = \sqrt{(1-0)^2 + [2-(-3)]^2}$ $x^2 + y^2 - 2x - 4y - 21 = 0$ (ii) $R(6, m)$ $(6)^2 + (m)^2 - 2(6) - 4(m) - 21 = 0$ $m^2 - 4m + 3 = 0$ $(m-1)(m-3) = 0$ $m-1 = 0$, $m-3 = 0$ $m = 1$, $m = 3$ (b) Kecerunan/Gradient of AQ, $m_{AQ} = \frac{2-(-3)}{1-0}$ $= 5$ $m_1 \times m_2 = -1$ $5 \times m_2 = -1$ $m_2 = -\frac{1}{5}$ Persamaan tangen/Equation of tangent $y - (-3) = -\frac{1}{5}(x - 0)$ $y = -\frac{1}{5}x - 3$ Pada paksi-x/At x-axis, $y = 0$, $0 = -\frac{1}{5}x - 3$ $\frac{1}{5}x = -3$ $x = -15$ $K(-15, 0)$	1 1 1 1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$\text{Luas/Area of } \triangle OQK = \frac{1}{2}(3)(15)$ $= 22.5 \text{ unit}^2/\text{units}^2$	1 1	10
10	(a) $PQ = QR$ $\sqrt{(0-5)^2 + (m-5)^2} = \sqrt{(5-8)^2 + (5-9)^2}$ $25 + m^2 - 10m + 25 = 9 + 16$ $m^2 - 10m + 25 = 0$ $(m-5)^2 = 0$ $m = 5$ (b) (i) Katakan/Let $S(x, 11)$ $PS = SR$ $\sqrt{(0-x)^2 + (5-11)^2} = \sqrt{(x-8)^2 + (11-9)^2}$ $x^2 + 36 = x^2 - 16x + 64 + 4$ $16x = 32$ $x = \frac{32}{16}$ $x = 2$ $S(2, 11)$ (ii) $\text{Luas/Area of } PQR = \frac{1}{2} \begin{vmatrix} 0 & 5 & 8 & 0 \\ 5 & 5 & 9 & 5 \end{vmatrix}$ $= \frac{1}{2} [0(5) + 5(9) + 8(5)] - [5(5) + 5(8) + 9(0)]$ $= \frac{1}{2} 0 + 45 + 40 - 25 - 40 - 0 $ $= \frac{1}{2} 20 $ $= 10 \text{ unit}^2/\text{units}^2$ $\text{Luas/Area of } PQRS = \frac{1}{2} \begin{vmatrix} 0 & 5 & 8 & 2 & 0 \\ 5 & 5 & 9 & 11 & 5 \end{vmatrix}$ $= \frac{1}{2} [0(5) + 5(9) + 8(11) + 2(5)] - [5(5) + 5(8) + 9(2) + 11(0)]$ $= \frac{1}{2} 143 - 83 $ $= \frac{1}{2} 60 $ $= 30 \text{ unit}^2/\text{units}^2$ $PQR : PQRS = 10 : 30$ $PQR : PQRS = 1 : 3$	1 1 1 1 1 1 1 1 1	10

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	$\vec{PS} = h\vec{PT}$ $\vec{PR} + \vec{RS} = h(2\vec{a} + 9\vec{b})$ $12\vec{b} + k(2\vec{a} - 7\vec{b}) = h(2\vec{a} + 9\vec{b})$ $12\vec{b} + 2k\vec{a} - 7k\vec{b} = 2h\vec{a} + 9h\vec{b}$ $2k\vec{a} + (12 - 7k)\vec{b} = 2h\vec{a} + 9h\vec{b}$ $2k = 2h \quad \text{dan/and} \quad 12 - 7k = 9h$ $k = h \quad 12 - 7k = 9k$ $16k = 12$ $k = \frac{12}{16}$ $= \frac{3}{4}$ $h = \frac{3}{4}$	1 1 1 1 1	5
4	(a) $\vec{KL} = \vec{KM} + \vec{ML}$ dan/and $\vec{MN} = \vec{ML} + \vec{LN}$ $= -15\vec{y} + (-5\vec{x})$ $= -5\vec{x} - 15\vec{y}$ $= -5\vec{x} + 4\vec{x} + 12\vec{y}$ $= -\vec{x} + 12\vec{y}$ (b) $\vec{KN} = \vec{KM} + \vec{MN}$ $= -15\vec{y} + (-\vec{x} + 12\vec{y})$ $= -15\vec{y} - \vec{x} + 12\vec{y}$ $= -\vec{x} - 3\vec{y}$ $p\vec{KN} = q\vec{KL}$ $p(-3\vec{y} - \vec{x}) = q(-5\vec{x} - 15\vec{y}) \quad \text{atau/or} \quad -3p\vec{y} - p\vec{x} = -5q\vec{x} - 15q\vec{y}$ $p(-3\vec{y} - \vec{x}) = 5q(-\vec{x} - 3\vec{y}) \quad -3p = -15q \quad \text{atau/or} \quad -p = -5q$ $p = 5q \quad \frac{p}{q} = \frac{-15}{-3} \quad \frac{p}{q} = \frac{-5}{-1}$ $\frac{p}{q} = \frac{5}{1}$ $p : q = 5 : 1$ $\therefore p = 5, q = 1$	1 1 1 1 1 1 1	7
5	(a) (i) $\vec{a} - k\vec{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix} - k\begin{pmatrix} 2 \\ -9 \end{pmatrix}$ $= \begin{pmatrix} 1 - 2k \\ 3 + 9k \end{pmatrix}$ (ii) Selari dengan paksi-x, $y = 0$ Parallel to the x-axis, $y = 0$ $3 + 9k = 0$ $9k = -3$ $k = \frac{-3}{9}$ $= -\frac{1}{3}$ (b) $2m + 3 = 0$ dan/and $4 - 2n = 0$ $2m = -3 \quad 2n = 4$ $m = -\frac{3}{2} \quad n = 2$	1 1 1 1 1	5

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
6	(a) $m\begin{pmatrix} 1 \\ -2 \end{pmatrix} - r\begin{pmatrix} -1 \\ 3 \end{pmatrix} = \lambda\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\begin{pmatrix} m+r \\ -2m-3r \end{pmatrix} = \begin{pmatrix} 2\lambda \\ 3\lambda \end{pmatrix}$ $m+r = 2\lambda$ $\lambda = \frac{m+r}{2} \dots \textcircled{1}$ $-2m-3r = 3\lambda \dots \textcircled{2}$ Gantikan $\textcircled{1}$ ke dalam $\textcircled{2}$ <i>Substitute $\textcircled{1}$ into $\textcircled{2}$</i> $-2m-3r = 3\left(\frac{m+r}{2}\right)$ $-4m-6r = 3m+3r$ $-7m = 9r$ $m = -\frac{9}{7}r$ (b) $\vec{OD} = 3\begin{pmatrix} 1 \\ -2 \end{pmatrix} - \begin{pmatrix} -1 \\ 3 \end{pmatrix}$ $= \begin{pmatrix} 4 \\ -9 \end{pmatrix}$ $D(4, -9)$ (c) $\vec{DC} = \vec{DO} + \vec{OC}$ $= \begin{pmatrix} -4 \\ 9 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $= \begin{pmatrix} -2 \\ 12 \end{pmatrix}$ $\widehat{DC} = \frac{1}{\sqrt{(-2)^2 + (12)^2}} \begin{pmatrix} -2 \\ 12 \end{pmatrix}$ $= \frac{1}{2\sqrt{37}} \begin{pmatrix} -2 \\ 12 \end{pmatrix}$ $= \frac{1}{\sqrt{37}} \begin{pmatrix} -1 \\ 6 \end{pmatrix}$ $= \begin{pmatrix} \frac{-1}{\sqrt{37}} \\ \frac{6}{\sqrt{37}} \end{pmatrix} \text{ atau/or } \frac{-1}{\sqrt{37}} \hat{i} + \frac{6}{\sqrt{37}} \hat{j}$	1 1 1 1 1 1 1	8
7	(a) (i) $\vec{PQ} = \lambda\vec{QR}$ $3\hat{x} + 6\hat{y} = \lambda(5\hat{x} + m\hat{y})$ $3\hat{x} + 6\hat{y} = 5\lambda\hat{x} + m\lambda\hat{y}$ $5\lambda = 3$ $\lambda = \frac{3}{5}$ $m\lambda = 6$ $m\left(\frac{3}{5}\right) = 6$ $m = 10$ (ii) $\vec{PQ} = \frac{3}{5}\vec{QR}$ $\frac{\vec{PQ}}{\vec{QR}} = \frac{3}{5}$ $PQ : QR = 3 : 5$	1 1 1 1	

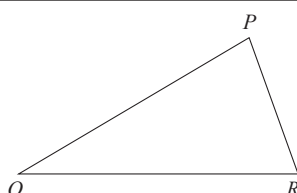
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $\vec{MK} = \vec{MJ} + \vec{JK}$ $= 4\underline{a} - \underline{b} - \underline{a} + 5\underline{b}$ $= 3\underline{a} + 4\underline{b}$ $\vec{RK} = \frac{1}{2}\vec{MK}$ $= \frac{1}{2}(3\underline{a} + 4\underline{b})$ $= \frac{3}{2}\underline{a} + 2\underline{b}$	1 1 1	7
8	(a) (i) $\vec{PR} = \vec{PQ} + \vec{QR}$ $= \underline{m} + \underline{n}$ (ii) $\vec{QS} = \vec{QP} + \vec{PS}$ $= \vec{QP} + \left(\frac{3}{3+h}\right)\vec{PR}$ $= -\underline{m} + \left(\frac{3}{3+h}\right)(\underline{m} + \underline{n})$ $= -\underline{m} + \left(\frac{3}{3+h}\right)\underline{m} + \left(\frac{3}{3+h}\right)\underline{n}$ $= \left(\frac{-3-h+3}{3+h}\right)\underline{m} + \left(\frac{3}{3+h}\right)\underline{n}$ $= \left(\frac{-h}{3+h}\right)\underline{m} + \left(\frac{3}{3+h}\right)\underline{n}$ (b) $\vec{QS} = \lambda\vec{QT}$ $\left(\frac{-h}{3+h}\right)\underline{m} + \left(\frac{3}{3+h}\right)\underline{n} = \lambda(8\underline{m} + 6\underline{n})$ $\left(\frac{-h}{3+h}\right)\underline{m} + \left(\frac{3}{3+h}\right)\underline{n} = 8\lambda\underline{m} + 6\lambda\underline{n}$ Bandingkan pekali/Comparing the coefficients $8\lambda = \frac{-h}{3+h} \qquad 6\lambda = \frac{3}{3+h} \dots \textcircled{2}$ $\lambda = \frac{-h}{24+8h} \dots \textcircled{1}$ Gantikan ① ke dalam ② Substitute ① into ② $6\left(\frac{-h}{24+8h}\right) = \frac{3}{3+h}$ $-6h(3+h) = 3(24+8h)$ $-18h-6h^2 = 72+24h$ $6h^2+42h+72=0$ $h^2+7h+12=0$ $(h+4)(h+3)=0$ $h=-4 \text{ atau/or } h=-3$	1 1 1 1 1 1, 1	8
9	(a) (i) $\vec{PR} = \vec{PQ} + \vec{QR}$ $= 3\underline{x} + 6\underline{y}$ (ii) $\vec{SQ} = \vec{SR} + \vec{RQ}$ $= 3\underline{PQ} + \underline{RQ}$ $= 3(3\underline{x}) - 6\underline{y}$ $= 9\underline{x} - 6\underline{y}$	1 1 1	

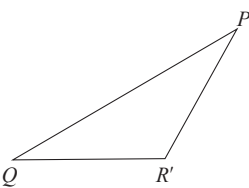
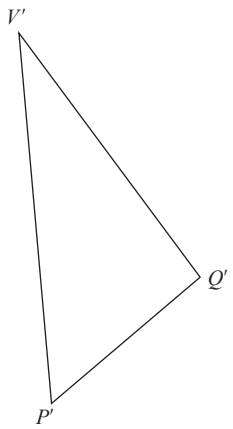
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) (i) $\vec{RT} = h\vec{RP}$ $= h(-3\hat{x} - 6\hat{y})$ $= -3h\hat{x} - 6h\hat{y}$ (ii) $\vec{ST} = k\vec{SQ}$ $\vec{SR} + \vec{RT} = k\vec{SQ}$ $\vec{RT} = k\vec{SQ} - \vec{SR}$ $= k(9\hat{x} - 6\hat{y}) - 9\hat{x}$ $= 9k\hat{x} - 6k\hat{y} - 9\hat{x}$ $= (9k - 9)\hat{x} - 6k\hat{y}$ Bandingkan pekali/Comparing the coefficients $9k - 9 = -3h$ $-6k = -6h$ $9k + 3h = 9$ $k = h \dots \textcircled{2}$ $3k + h = 3 \dots \textcircled{1}$ Gantikan $\textcircled{2}$ ke dalam $\textcircled{1}$ Substitute $\textcircled{2}$ into $\textcircled{1}$ $3k + k = 3$ $4k = 3$ $k = \frac{3}{4}$ $h = \frac{3}{4}$	1 1 1 1	8



Penyelesaian Segi Tiga Solution of Triangles

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) (i) Menggunakan rumus Heron/Using Heron's formulae: Semiperimeter, $s = \frac{2x + 11 + 23 - 2x}{2}$ $= 17$ Luas/Area $= 6\sqrt{51}$ $\sqrt{(17)(17 - 2x)(17 - 11)(17 - 23 + 2x)} = 6\sqrt{51}$ $(17)(17 - 2x)(6)(2x - 6) = 1\ 836$ $102(17 - 2x)(2x - 6) = 1\ 836$ $34x - 102 - 4x^2 + 12x = 18$ $-4x^2 + 46x - 120 = 0$ $2x^2 - 23x + 60 = 0$ $(2x - 15)(x - 4) = 0$ $x = \frac{15}{2}$ atau/or $x = 4$ Maka/Thus, $x = 4$ Kewajaran/Justification $= AB < AC$. (ii) $8^2 = 11^2 + 15^2 - 2(11)(15) \cos/\cos \angle ACB$ $\cos/\cos \angle ACB = \frac{11^2 + 15^2 - 8^2}{2(11)(15)}$ $\angle ACB = 31.29^\circ$	1 1 1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) (i) $\angle BCD = 180^\circ - 31.29^\circ$ $= 148.71^\circ$ $\frac{BD}{\sin 148.71^\circ} = \frac{11}{\sin 15^\circ}$ $BD = \frac{11}{\sin 15^\circ} \times \sin 148.71^\circ$ $= 22.07 \text{ cm}$	1 1 1	10
2	(a) $PR^2 = 11^2 + 6^2 - 2(11)(6) \cos / \cos 72^\circ$ $= 121 + 36 - 132 \cos / \cos 72^\circ$ $PR = \sqrt{116.21}$ $= 10.78 \text{ cm}$ $\frac{10.78}{\sin 72^\circ} = \frac{11}{\sin \angle QRP}$ $\sin \angle QRP = \frac{11}{10.78} \times \sin 72^\circ$ $\sin \angle QRP = 0.9705$ $\angle QRP = \sin^{-1} 0.9705$ $\angle QRP = 76.05^\circ$ (b) $\angle RQS = 180^\circ - 2(76.05^\circ)$ $= 27.9^\circ$ $\frac{6}{\sin 76.05^\circ} = \frac{RS}{\sin 27.9^\circ}$ $RS = \frac{6}{\sin 76.05^\circ} \times \sin 27.9^\circ$ $= 2.893 \text{ cm}$ (c) $\angle PQS = 72^\circ - 27.9^\circ$ $= 44.1^\circ$ $\text{Luas/Area } PQS = \frac{1}{2} \times 11 \times 6 \times \sin 44.1^\circ$ $= 22.97 \text{ cm}^2$ (d) Jarak terdekat/Shortest distance = x $\text{Luas/Area } \angle PQS = 22.97 \text{ cm}^2$ $\frac{1}{2} \times 11 \times x = 22.97$ $x = \frac{22.97 \times 2}{11}$ $= 4.176 \text{ cm}$	1 1 1 1 1 1 1 1 1	10
3	(a)  (b) (i) $\frac{1}{2}(8.5)QR \sin 38^\circ = 32$ $QR = \frac{32}{\frac{1}{2}(8.5) \sin 38^\circ}$ $= 12.23 \text{ cm}$ (ii) $PR^2 = 8.5^2 + 12.23^2 - 2(8.5)(12.23) \cos / \cos 38^\circ$ $PR^2 = 57.99$ $PR = 7.615 \text{ cm}$	1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(iii) $\frac{\sin \angle PRQ}{8.5} = \frac{\sin 38^\circ}{7.615}$ $\sin \angle PRQ = 8.5 \times \frac{\sin 38^\circ}{7.615}$ $\angle PRQ = 43.41^\circ$ (c)  Luas/Area = $\frac{1}{2}(8.5)(7.615) \sin 5.41^\circ$ $= 3.051 \text{ cm}^2$	1 1 1 1 1	10
4	(a) Panjang/Length of $PQ = \sqrt{4^2 + 4^2}$ $= 4\sqrt{2}$ Panjang/Length of $MP = \sqrt{4^2 + 8^2}$ $= 4\sqrt{5}$ Panjang/Length of $VP = \sqrt{7^2 + (4\sqrt{5})^2}$ $= \sqrt{129}$ (i) Panjang/Length of $VQ = VP = \sqrt{129}$ $(4\sqrt{2})^2 = (\sqrt{129})^2 + (\sqrt{129})^2 - 2(\sqrt{129})(\sqrt{129}) \cos \angle QVP$ $\cos \angle QVP = \frac{(\sqrt{129})^2 + (\sqrt{129})^2 - (4\sqrt{2})^2}{2(\sqrt{129})(\sqrt{129})}$ $\angle QVP = 28.84^\circ$ (ii) Luas segi tiga/Triangle of $QVP = \frac{1}{2} \times \sqrt{129} \times \sqrt{129} \times \sin 28.84^\circ$ $= 31.11 \text{ cm}^2$ (b) $(\sqrt{129})^2 = (7)^2 + (4\sqrt{5})^2 - 2(7)(4\sqrt{5}) \cos \angle VMP$ $\cos \angle VMP = \frac{(7)^2 + (4\sqrt{5})^2 - (\sqrt{129})^2}{2(7)(4\sqrt{5})}$ $\angle VMP = 90^\circ$ (c) 	1 1 1 1 1 1 1 1 1 1	10

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\frac{p}{2.00} \times 100 = 125$ $Q = \frac{6.00}{5.00} \times 100$ $\frac{9.00}{r} \times 100 = 25r$ $\frac{p}{2.00} \times 100 = 125$ $p = \frac{125 \times 2.00}{100}$ $= \text{RM}2.50$ $Q = \frac{6.00}{5.00} \times 100$ $= 120$ $\frac{9.00}{r} \times 100 = 25r$ $25r^2 = 900$ $r = \sqrt{36}$ $= 6$ (b) (i) $\bar{I}_{2025/2022} = 131$ $\frac{P_{2025}}{P_{2022}} \times 100 = 131$ $\frac{36}{P_{2022}} \times 100 = 131$ $P_{2022} = \frac{36 \times 100}{131}$ $= \text{RM}27.48$ (ii) $\frac{125(4) + 120(1) + 150(2) + 130(x)}{4 + 1 + 2 + x} = 131$ $920 + 130x = 131(7 + x)$ $920 + 130x = 917 + 131x$ $x = 3$	1 1 1 1 1 1 1, 1 1	10
2	(a) $\frac{\text{RM}7.20}{x} \times 100 = 120$ $\frac{y}{\text{RM}5.00} \times 100 = 110$ $z = \frac{\text{RM}9.10}{\text{RM}7.00} \times 100$ $x = \frac{\text{RM}7.20}{120} \times 100$ $= \text{RM}6.00$ $\frac{y}{\text{RM}5.00} \times 100 = 110$ $y = \frac{110}{100} \times \text{RM}5.00$ $= \text{RM}5.50$ $z = \frac{\text{RM}9.10}{\text{RM}7.00} \times 100$ $= 130$	1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $I_{2021/2020} = \frac{6.00}{5.45} \times 100$ $= 110.09$ (c) $\bar{I} = \frac{\sum W_i I_i}{\sum W_i}$ $= \frac{120(120) + 110(90) + 130(80) + 130(70)}{120 + 90 + 80 + 70}$ $= \frac{14\,400 + 9\,900 + 10\,400 + 9\,100}{360}$ $= \frac{43\,800}{360}$ $= 121.67$	1 1 1, 1 1	10
3	(a) $\frac{13.50}{x} \times 100 = 150$ $x = \text{RM}9.00$ $\frac{y}{8.00} \times 100 = 125$ $y = \text{RM}10.00$ $z = \frac{5.80}{4.00} \times 100$ $= 145$ (b) $\frac{150(2) + 125(4) + 150(k) + 145(8)}{2 + 4 + k + 8} = 143$ $7k = 42$ $k = 6$ (c) $\frac{P_{2023}}{35.00} \times 100 = 143$ $P_{2023} = \text{RM}50.05$ (d) $\bar{I}_{2025/2021} = 145 \times \frac{143}{100}$ $= 207.35$	1 1 1 1 1 1 1 1	10
4	(a) (i) $x = 120$ (ii) $I_{2025/2023} = 120$ $\frac{3.6}{y} \times 100 = 120$ $y = \frac{3.6 \times 100}{120}$ $= \text{RM}3.00$ (b) $\bar{I}_{2025/2023} = \frac{120(20) + 125(60) + 150(20)}{20 + 60 + 20}$ $= \frac{12\,900}{100}$ $= 129$ (c) (i) Diberi/Given $\bar{I}_{2025/2020} = 149$ Maka/Hence, $\bar{I}_{2023/2020} = \frac{149}{129} \times 100$ $= 115.5$	1 1 1 1 1 1 1	

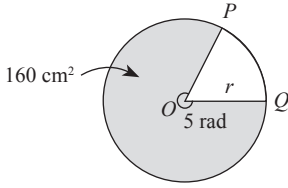
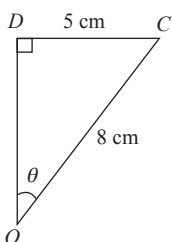
Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
6	(a) $I_{2020/2017} = I_{2020/2015} \times I_{2015/2017}$ $= \frac{120}{108} \times 100$ $= 111.11$ (b) (i) $\frac{28.60}{22} \times 100 = x$ $x = 130$ (ii) $Q_{2017} = \frac{117 \times 22}{100}$ $= \text{RM}25.74$ (c) $\frac{108(2) + 125(k) + 117(3)}{2 + k + 3} = 119.2$ $\frac{567 + 125k}{5 + k} = 119.2$ $5.8k = 29$ $k = 5$ (d) $119.2 = \frac{59.60}{P_{2015}} \times 100$ $P_{2015} = \text{RM}50.00$	1 1 1 1 1 1 1 1 1	10

Tingkatan 5


Sukatan Membulat
Circular Measure

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	Perimeter = $12 + 12 + 12\left(2\pi - \frac{\pi}{2}\right)$ $= 24 + 12\left(\frac{3}{2}\pi\right)$ $= 24 + 18\pi \text{ cm}$	1 1	2
2	(a) Panjang lengkok/Arc length $QR = r\theta$ $5 = 10\theta$ $\theta = \frac{5}{10}$ $= 0.5 \text{ rad}$ (b) Tukar radian kepada darjah/Change radians to degree $0.5 \text{ rad} \times \frac{180^\circ}{\pi} = 28.65^\circ$ $PS^2 = 6^2 + 6^2 - 2(6)(6) \cos 28.65^\circ$ $PS = \sqrt{8.8153}$ $= 2.969 \text{ cm}$ Perimeter rantau berlorek/The perimeter of the shaded region $= 5 + 4 + 4 + 2.969$ $= 15.969 \text{ cm}$	1 1 1 1	4

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	 $\frac{1}{2}r^2(5) = 160$ $r^2 = \frac{160 \times 2}{5}$ $r^2 = 64$ $r = 8 \text{ cm}$	1 1	2
4	(a) Tukar darjah kepada radian/<i>Change degree to radians</i> $= 106^\circ \times \frac{\pi}{180^\circ}$ $= 1.850 \text{ rad}$ $S_{AB} = 12(1.850)$ $= 22.20 \text{ cm}$ (b) Luas sektor/<i>Area of sector AOB</i> $= \frac{1}{2}(12)^2(1.850)$ $= 133.20 \text{ cm}^2$ Luas/<i>Area of</i> $\triangle COD = \frac{1}{2}(6)^2 \sin 106^\circ$ $= 17.303 \text{ cm}^2$ Luas kawasan berlerek/<i>Area of shaded region</i> $= \text{Luas sektor/Area of sector AOB} - \text{Luas/Area of } \triangle COD$ $= 133.20 - 17.303$ $= 115.897 \text{ cm}^2$	1 1 1 1 1 1	6
5	$s_{CD} = 6\alpha$, $s_{AB} = 10\beta$ $BC = 10 - 6$ $= 4 \text{ cm}$		
	Perimeter = 40 $6 + 6\alpha + 4 + 10\beta + 10 = 40$ $20 + 6\alpha + 10\beta = 40$ $10\beta = 40 - 20 - 6\alpha$ $10\beta = 20 - 6\alpha$ $\beta = \frac{20 - 6\alpha}{10}$ $\beta = 2 - \frac{3}{5}\alpha \text{ atau setara/or equivalent}$	1 1	2
6	(a) $\sin \theta = \frac{5}{8}$ $\theta = \sin^{-1}\left(\frac{5}{8}\right)$ $= 38.68^\circ$ $\angle AOC = 2(38.68^\circ)$ $= 77.36^\circ$ $= 1.350 \text{ rad}$  (b) Luas kawasan berlerek/<i>Area of the shaded region</i> $= \text{Luas sektor OABC} - \text{Luas } \triangle AOC$ $\text{Area of sector OABC} - \text{Area of } \triangle AOC$ $= \frac{1}{2}(8)^2(1.350) - \frac{1}{2}(8)^2 \sin 77^\circ 22'$ $= 43.20 - 31.2253$ $= 11.9747 \text{ cm}^2$	1 1 1 1, 1, 1 1	7

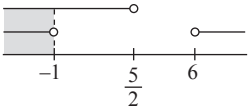
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
7	(a) $\tan \theta = \frac{12}{5}$ $\theta = \tan^{-1} \left(\frac{12}{5} \right)$ $= 67.38^\circ \times \frac{3.142}{180^\circ}$ $= 1.176 \text{ rad}$ (b) $OR^2 = 12^2 + 5^2$ $OR = \sqrt{169}$ $= 13 \text{ cm}$ $QR = 13 - 5$ $= 8 \text{ cm}$ $S_{PQ} = 5 \times 1.176 \text{ rad}$ $= 5.880 \text{ cm}$ Perimeter kawasan berlorek/Perimeter of the shaded region $= 12 + 8 + 5.880$ $= 25.88 \text{ cm}$	1 1 1 1 1 1 1	6
8	Luas sektor POQ/Area of sector $POQ = \frac{1}{2} \times 20^2 \times 2.2 \text{ rad}$ $= 440 \text{ cm}^2$ Tukar darjah kepada radian/Change degree to radians $45.84^\circ \times \frac{\pi}{180^\circ} = 0.8001 \text{ rad}$ Luas sektor BAC/Area of sector $BAC = \frac{1}{2} \times 15^2 \times 0.8001 \text{ rad}$ $= 90.01 \text{ cm}^2$ Luas kawasan berlorek/Area of the shaded region $= \text{Luas sektor } POQ - \text{Luas sektor } BAC$ $\text{Area of sector } POQ - \text{Area of sector } BAC$ $= 440 - 90.01$ $= 349.99 \text{ cm}^2$	1 1 1 1 1 1	5
9	(a) Apabila/When $y = 0$ $x^2 + 0^2 = 100$ $x^2 = 100$ $x = \pm 10$ Maka, jejari bulatan ialah 10 unit. Hence, the radius the circle is 10 units. Luas sektor major/Area of major sector $PQRS$ $= \frac{1}{2} \times 10^2 \times \left(270^\circ \times \frac{\pi}{180} \right)$ $= \frac{1}{2} \times 10^2 \times \frac{3\pi}{2}$ $= 75\pi \text{ unit}^2/\text{units}^2$ (b) $PQ^2 = 10^2 + 10^2$ $PQ = 10\sqrt{2} \text{ unit}/\text{units}^2$ Jejari semibulatan/The radius of semicircle $= \frac{10\sqrt{2}}{2}$ $= 5\sqrt{2} \text{ unit}/\text{units}$ Luas semibulatan/Area of semicircle $= \frac{(5\sqrt{2})^2}{2} \pi$ $= 25\pi \text{ unit}^2/\text{units}^2$	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	$\text{Luas/Area of } \triangle OPQ = \frac{1}{2} \times 10 \times 10$ $= 50 \text{ unit}^2/\text{units}^2$		
	$\text{Luas perentas } OP \text{ dan } OQ/\text{Area of segment } OP \text{ and } OQ = (25\pi - 50) \text{ unit}^2/\text{units}^2$	1	
	$\text{Luas kawasan berlorek/Area of shaded region}$ $= 75\pi - (25\pi - 50)$ $= 75\pi - 25\pi + 50$ $= 50\pi + 50$ $= 50(\pi + 1) \text{ unit}^2/\text{units}^2$	1 1	7



Pembezaan
Differentiation

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Penggantian langsung menghasilkan bentuk tak tertakrif, $\frac{0}{0}$. <i>Direct substitution obtains the undefined form, $\frac{0}{0}$.</i> Maka/Hence, $3^2 - k = 0$ $9 - k = 0$ $k = 9$ (b) $(-2)^2 - 2(-2) - h = 0$ $8 - h = 0$ $h = 8$ $-2k + 4 = 0$ $k = 2$ $h - k = 8 - 2$ $= 6$	1 1 1 1 1	5
2	(a) $y = 3x(10 - x)$ $= 30x - 3x^2$ $\frac{dy}{dx} = 30 - 6x$ Nilai maksimum/Maximum value, $\frac{dy}{dx} = 0$ $30 - 6x = 0$ $6x = 30$ $x = \frac{30}{6}$ $= 5$ (b) y maksimum/y maximum $= 3x(10 - x)$ $= 3(5)(10 - 5)$ $= 15 \times 5$ $= 75$	1 1 1 1	4
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. <i>By comparing, the constant h is 17.</i>	1 1 1	3

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
4	$y = \frac{64}{x^2}$ $= 64x^{-2}$ $\frac{dy}{dx} = -128x^{-3}$ $= -\frac{128}{8^3}$ $= -\frac{1}{4}$ $\delta x = 8 + h - 8$ $= h$ $\delta y \approx \frac{dy}{dx} \times \delta x$ $\approx -\frac{1}{4} \times h$ $\approx -\frac{1}{4}h$	1 1 1 1	4
5	$y = \frac{2x-5}{x^2+6}$ $\frac{dy}{dx} = \frac{2(x^2+6) - 2x(2x-5)}{(x^2+6)^2}$ $= \frac{-2x^2+10x+12}{(x^2+6)^2}$ 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
6	$A = 4\pi r^2$ $\frac{dA}{dr} = 8\pi r$ $\frac{dA}{dt} = \frac{dA}{dr} \times \frac{dr}{dt}$ $19.2\pi = 8\pi r \times 0.4$ $19.2\pi = 3.2\pi r$ $3.2r = 19.2$ $r = \frac{19.2}{3.2}$ $= 6 \text{ cm}$	1 1 1	3
7	(a) $y = 5x(2+6x)$ $y = 10x + 30x^2$ $\frac{dy}{dx} = 10 + 60x$ Apabila y adalah minimum/When y is minimum, $\frac{dy}{dx} = 0$, $60x + 10 = 0$ $x = -\frac{1}{6}$ (b) $y = 10\left(-\frac{1}{6}\right) + 30\left(-\frac{1}{6}\right)^2$ $= -\frac{5}{6}$	1 1 1 1 1	5

Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
10	Perimeter tanah/<i>Perimeter of the land</i>, $2x + 2y = 120$ $x + y = 60$ $y = 60 - x \dots \textcircled{1}$ Luas tanah/<i>Area of the land</i>, $A = p \times l$ $A = xy \dots \textcircled{2}$ Gantikan $\textcircled{1}$ ke dalam $\textcircled{2}$ <i>Substitute $\textcircled{1}$ into $\textcircled{2}$</i> $A = x(60 - x)$ $= 60x - x^2$ $\frac{dA}{dx} = 60 - 2x$ Nilai x maksimum apabila/<i>Maximum value of x when $\frac{dA}{dx} = 0$</i> $60 - 2x = 0$ $2x = 60$ $x = \frac{60}{2}$ $= 30$ $\frac{dA}{dx} = 60 - 2x$ $\frac{d^2A}{dx^2} = -2 < 0$ Maka, A mempunyai nilai maksimum dengan panjang tanah ialah 30 m. <i>Hence, A is maximum with the length of the land is 30 m.</i>	1 1 1 1 1	5
11	$V = \frac{1}{3}h^3 + 6h$, $\frac{dV}{dt} = 12$ $\frac{dV}{dh} = h^2 + 6$ $\frac{dV}{dt} = \frac{dV}{dh} \times \frac{dh}{dt}$ $12 = (h^2 + 6) \times \frac{dh}{dt}$ $\frac{dh}{dt} = \frac{12}{h^2 + 6}$ Apabila/<i>When $h = 2$,</i> $\frac{dh}{dt} = \frac{12}{2^2 + 6}$ $= 1.2 \text{ cm/s}$	1 1 1 1	4
12	(a) $y = x^3 - 12x + 16$ $\frac{dy}{dx} = 3x^2 - 12$ Untuk mendapatkan titik minimum dan maksimum, <i>To obtain minimum and maximum point,</i> $\frac{dy}{dx} = 0$ $3x^2 - 12 = 0$ $3x^2 = 12$ $x^2 = \frac{12}{3}$ $x = \pm\sqrt{4}$ $= \pm 2$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	Apabila/When $x = 2$, $y = x^3 - 12x + 16$ $= (2)^3 - 12(2) + 16$ $= 0$ $\therefore A(2, 0)$ Apabila/When $x = -2$, $y = x^3 - 12x + 16$ $= (-2)^3 - 12(-2) + 16$ $= 32$ $\therefore B(-2, 32)$ (b) Apabila/When $x = -1$, $\frac{dy}{dx} = 3(-1)^2 - 12$ $= -9$ Kecerunan normal pada titik $C(-1, 27)$, $m_{\text{normal}} = -\frac{1}{\frac{dy}{dx}}$ <i>Gradient of the normal at point $C(-1, 27)$</i> $= \frac{1}{9}$ Persamaan normal/<i>Equation of the normal</i>, $y - 27 = \frac{1}{9}(x + 1)$ $y - 27 = \frac{1}{9}x + \frac{1}{9}$ $y = \frac{1}{9}x + \frac{1}{9} + 27$ $y = \frac{1}{9}x + \frac{244}{9}$	1 1 1 1 1	7
13	(a) $A = 2\pi r^2 + 2\pi rh$ $= 2\pi r^2 + 2\pi r(18)$ $= 2\pi r^2 + 36\pi r$ $\frac{dA}{dr} = 4\pi r + 36\pi$ $= 4\pi(r + 9)$ (Tertunjuk/Shown) (b) Apabila/When $r = 5$, $\frac{dA}{dr} = 4\pi(5 + 9)$ $= 56\pi$ $\delta r = 5.04 - 5$ $= 0.04$ $\delta A \approx \frac{dA}{dr} \times \delta r$ $\approx 56\pi \times 0.04$ $\approx 2.24\pi$ Anggaran luas permukaan/<i>Approximate surface area</i> $\approx A + \delta A$ $\approx [2\pi(5)^2 + 36\pi(5)] + 2.24\pi$ $\approx 230\pi + 2.24\pi$ $\approx 232.24\pi$	1 1 1 1 1 1 1	7


Pengamiran
Integration

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\int [5 - h(x)] dx = \frac{x-3}{(2-3x)^3}$ $\int_0^3 h(x) dx = \left[5x \right]_0^3 - \left[\frac{x-3}{(2-3x)^3} \right]_0^3$ $= [5(3) - 5(0)] - \left[\frac{3-3}{[2-3(3)]^3} - \frac{0-3}{[2-3(0)]^3} \right]$ $= \frac{117}{8}$ (b) $\int_{-h}^0 [x(x-h)] dx = \frac{20}{3}$ $\left[\frac{x^3}{3} - \frac{hx^2}{2} \right]_{-h}^0 = \frac{20}{3}$ $\left[\frac{0^3}{3} - \frac{h(0)^2}{2} \right] - \left[\frac{(-h)^3}{3} - \frac{h(-h)^2}{2} \right] = \frac{20}{3}$ $h = 2$	1 1 1 1 1 1 1	6
2	(a) $\frac{dy}{dx} = 4 - x$ $y = \int (4 - x) dx$ $= 4x - \frac{1}{2}x^2 + c$ Pada titik/At point $P(2, 9)$, $9 = 4(2) - \frac{1}{2}(2)^2 + c$ $9 = 8 - 2 + c$ $c = 3$ Maka/Hence, $y = 3 + 4x - \frac{1}{2}x^2$ (b) Apabila/When $x = 2$, $\frac{dy}{dx} = 4 - 2$ $= 2$ $2 \times m_2 = -1$ $m_2 = -\frac{1}{2}$ Persamaan/Equation of PQ: $y - 9 = -\frac{1}{2}(x - 2)$ $2y - 18 = -x + 2$ $2y = -x + 20$ $y = -\frac{1}{2}x + 10$ Selesaikan dua persamaan secara serentak Solve two equations simultaneously: $3 + 4x - \frac{1}{2}x^2 = -\frac{1}{2}x + 10$ $6 + 8x - x^2 = -x + 20$ $x^2 - 9x + 14 = 0$ $(x - 2)(x - 7) = 0$ $x = 7$ Apabila/When $x = 7$, $y = -\frac{1}{2}(7) + 10$ $= \frac{13}{2}$ Maka/Hence, $Q\left(7, \frac{13}{2}\right)$	1 1 1 1 1 1 1 1 1 1	8

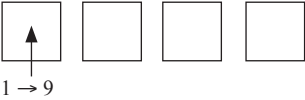
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	$\int_0^1 g(x) dx = \left[x^2 - \frac{1}{3}x^3 \right]_0^1$ Luas rantau berlorek <i>Area of shaded region</i> $= \int_0^1 g(x) dx - \int_0^1 x^4 dx$ $= \left[x^2 - \frac{1}{3}x^3 \right]_0^1 - \left[\frac{x^5}{5} \right]_0^1$ $= \left[\left(1^2 - \frac{1}{3}(1^3) \right) - \left(0^2 - \frac{1}{3}(0^3) \right) \right] - \left(\frac{1^5}{5} - \frac{0^5}{5} \right)$ $= \frac{2}{3} - \frac{1}{5}$ $= \frac{7}{15} \text{ unit}^2$	1 1 1 1	4
4	(a) $\int_0^3 (18 - x^2) dx - \frac{1}{2}(6 + 9)(3)$ $= \left[18x - \frac{x^3}{3} \right]_0^3 - \frac{45}{2}$ $= \left[18(3) - \frac{3^3}{3} \right] - \left[18(0) - \frac{0^3}{3} \right] - \frac{45}{2}$ $= 45 - \frac{45}{2}$ $= \frac{45}{2} \text{ unit}^2/\text{units}^2$ (b) $\pi \int_3^{18} (18 - y) dy$ $= \pi \left[18y - \frac{y^2}{2} \right]_3^{18}$ $= \pi \left[\left(18(18) - \frac{18^2}{2} \right) - \left(18(3) - \frac{3^2}{2} \right) \right]$ $= \frac{225\pi}{2} \text{ unit}^3/\text{units}^3$	1 1 1 1 1 1 1	7
5	(a) $\left[\frac{x^2}{2} + 2x \right]_1^p = 3.5$ $\left[\frac{p^2}{2} + 2p \right] - \left[\frac{1^2}{2} + 2(1) \right] = 3.5$ $p^2 + 4p - 12 = 0$ $(p + 6)(p - 2) = 0$ $p = -6, \quad p = 2$ $\therefore p = 2$ (b) $y = \int (3x - 2)^{\frac{1}{2}} dx = \frac{(3x - 2)^{\frac{3}{2}}}{\frac{3}{2}(3)} + c$ $= \frac{2}{9}(3x - 2)^{\frac{3}{2}} + c$ $8 = \frac{2}{9}[3(1) - 2]^{\frac{3}{2}} + c$ $c = \frac{70}{9}$ $y = \frac{2}{9}(3x - 2)^{\frac{3}{2}} + \frac{70}{9}$	1 1 1 1 1 1 1	

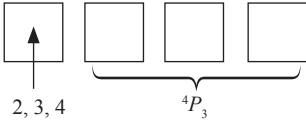
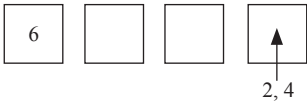
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) $2 \int_0^4 (ax)^{\frac{1}{2}} dx = \frac{64}{3}$ $\left[\frac{(ax)^{\frac{3}{2}}}{\frac{3}{2}a} \right]_0^4 = \frac{32}{3}$ $\left[\frac{2(ax)^{\frac{3}{2}}}{3a} \right]_0^4 = \frac{32}{3}$ $\frac{2[a(4)]^{\frac{3}{2}}}{3a} - \frac{2[a(0)]^{\frac{3}{2}}}{3a} = \frac{32}{3}$ $a^{\frac{1}{2}} = 2$ $a = 4$	1 1 1	10
6	(a) Luas kawasan/Area of region $A = \frac{1}{2}(3)(7)$ $= \frac{21}{2} \text{ unit}^2/\text{units}^2$ Luas kawasan/Area of region $B = \int_3^4 (16 - x^2) dx$ $= \left[16x - \frac{x^3}{3} \right]_3^4$ $= \left[\left(16(4) - \frac{4^3}{3} \right) - \left(16(3) - \frac{3^3}{3} \right) \right]$ $= \frac{11}{3} \text{ unit}^2/\text{units}^2$ Jumlah luas/Total area $= \frac{21}{2} + \frac{11}{3}$ $= 14\frac{1}{6} \text{ unit}^2/\text{units}^2$ (b) Isi padu/Volume $= \pi \int_3^4 (16 - x^2)^2 dx$ $= \pi \int_3^4 (256 - 32x^2 + x^4) dx$ $= \pi \left[256x - \frac{32}{3}x^3 + \frac{x^5}{5} \right]_3^4$ $= \pi \left[\left(256(4) - \frac{32}{3}(4^3) + \frac{4^5}{5} \right) - \left(256(3) - \frac{32}{3}(3^3) + \frac{3^5}{5} \right) \right]$ $= \frac{263}{15} \pi \text{ unit}^3/\text{units}^3$	1 1 1 1 1 1 1 1 1 1	8

[illegible]

Pilih Atur dan Gabungan

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) ${}^{11}C_8 = 165$ (b) $({}^{12}C_6 \times {}^{11}C_2) + ({}^{12}C_7 \times {}^{11}C_1) + ({}^{12}C_8 \times {}^{11}C_0)$ $= 50\,820 + 8\,712 + 495$ $= 60\,027$	1, 1 1 1 1	5
2	(a) ${}^7P_7 = 5\,040$ (b) ${}^6P_3 \times 3 = 360$	1, 1 1, 1	4
3	(a) Bilangan nombor 3-digit/3-digit numbers $= {}^6P_3$ $= 120$ (b) Bilangan nombor 3-digit/3-digit numbers $= 6 \times 6 \times 6$ $= 216$	1 1 1 1	4

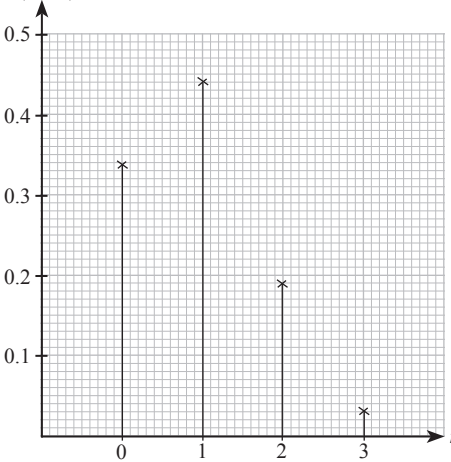
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
4	(a) $7!$ $= 5\,040$ (b) $4! \times 3!$ $= 144$ (c) $4! \times 4!$ $= 576$ (d) $(4! \times 3!) + (3! \times 4!)$ $= 288$	1 1 1 1 1 1	8
5	(a) $(7-1)!$ $= 720$ (b) $(6-1)! \times 2!$ $= 240$	1 1 1 1	4
6	(a) ${}^5C_2 = 10$ (b) ${}^5C_3 = 10$ (c) ${}^5C_4 = 5$ (d) ${}^5C_2 - 5 = 10 - 5$ $= 5$	1, 1 1, 1 1, 1 1 1	8
7	Bilangan nombor dari 1 000 hingga 9 999 <i>The numbers from 1 000 to 9 999</i> $= 9\,999 - 999$ $= 9\,000$ Bilangan nombor yang mempunyai empat digit yang berlainan <i>The number of numbers that have four different digits</i> $= 9 \times 9 \times 8 \times 7$ $= 4\,536$  Bilangan nombor yang tidak mempunyai empat digit berlainan <i>The number of numbers that do not have four different digits</i> $= 9\,000 - 4\,536$ $= 4\,464$	1 1 1 1	4
8	$\frac{{}^{10}P_7}{2(7)} = \frac{{}^{10}P_7}{14}$ $= 43\,200$	1 1	2
9	${}^7C_3 \times {}^4C_4$ atau/or ${}^7C_4 \times {}^3C_3$ $= 35$ $= 35$	1 1	2
10	(a) 6P_4 $= 360$ (b) $1 \times {}^5P_3 = 1 \times \frac{5!}{(5-3)!}$ $= \frac{5!}{2!}$ $= 60$ (c) $1 \times {}^4P_2 \times 3 = 1 \times \frac{4!}{(4-2)!} \times 3$ $= 3 \times \frac{4!}{2!}$ $= 36$	1 1 1 1 1 1	6

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
11	(a) ${}^8C_5 \times {}^{12}C_5 = 56 \times 792$ $= 44\,352$ (b) ${}^4C_4 \times {}^{16}C_6$ $= 8\,008$	1 1 1 1	4
12	(a) Bilangan nombor 4-digit/4-digit numbers $= {}^5P_4$ $= 120$ (b)  Bilangan nombor 4-digit/4-digit numbers $= 3 \times {}^4P_3$ $= 3 \times 24$ $= 72$ (c)  Bilangan nombor genap 4-digit/4-digit even numbers $= {}^1P_1 \times {}^2P_1 \times {}^3P_2$ $= 1 \times 2 \times 6$ $= 12$	1 1 1 1 1 1	6
13	Diberi bilangan huruf, $n = 9$ dan bilangan huruf secaman T dan A keduanya ialah 2. Untuk huruf pertama ialah P dan huruf terakhir ialah N, <i>Given that the number of letters, $n = 9$ and the identical letters, T and A are both 2 each. For the condition P is the first letter and N is the last letter,</i> $= \frac{7!}{2! \, 2!}$ $= 1\,260$	1 1	2
14	Bilangan cara/Number of ways $= \frac{(15-1)!}{2 \times 4!5!6!}$ $= 21\,021$	1 1	2



Taburan Kebarangkalian
Probability Distribution

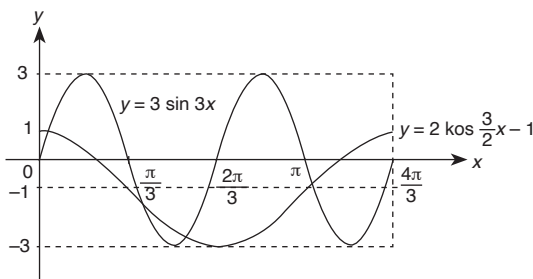
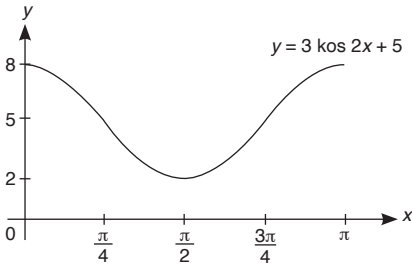
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) Pemboleh ubah rawak diskret/<i>Discrete random variable</i> $X = \{0, 1, 2, 3, 4, 5\}$ (b) Pemboleh ubah rawak selanjar/<i>Continuous random variable</i> $X = \{x : x \text{ ialah isi padu air dalam mililiter, } 245 \leq X \leq 255\}$ $= \{x : x \text{ is the volume of water in millilitre, } 245 \leq X \leq 255\}$	1 1 1 1	4
2	Lambungan Kedua <i>Second Toss</i> Kesudahan <i>Outcomes</i> $X = r$ $\frac{1}{9}$ K $\frac{1}{9}$ K $\{K, K\}$ 2 $\frac{8}{9}$ K' $\frac{8}{9}$ K' $\{K, K'\}$ 1 $\frac{1}{9}$ K' $\frac{1}{9}$ K $\{K', K\}$ 1 $\frac{8}{9}$ K' $\frac{8}{9}$ K' $\{K', K'\}$ 0 Lambungan Pertama <i>First Toss</i> $\frac{1}{9}$ ditulis $\frac{1}{9}$ is written $\frac{8}{9}$ ditulis $\frac{8}{9}$ is written Senaraikan kesudahan <i>List of outcomes</i>	1 1 1	3
3	(a) $X = \{0, 1, 2, 3\}$ (b) Kesudahan <i>Outcomes</i> $X = r$ $\frac{4}{9}$ M $\frac{4}{9}$ M $\{MMM\}$ 0 $\frac{5}{9}$ B $\frac{5}{9}$ B $\{MMB\}$ 1 $\frac{4}{9}$ M $\frac{4}{9}$ M $\{MBM\}$ 1 $\frac{5}{9}$ B $\frac{5}{9}$ B $\{MBB\}$ 2 $\frac{4}{9}$ M $\frac{4}{9}$ M $\{BMM\}$ 1 $\frac{5}{9}$ B $\frac{5}{9}$ B $\{BMB\}$ 2 $\frac{4}{9}$ M $\frac{4}{9}$ M $\{BBM\}$ 2 $\frac{5}{9}$ B $\frac{5}{9}$ B $\{BBB\}$ 3	1	

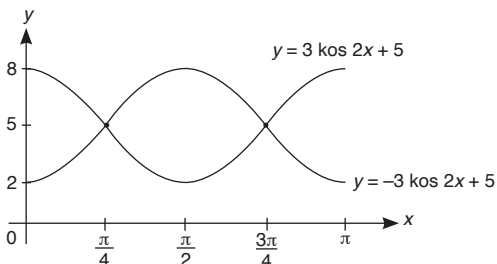
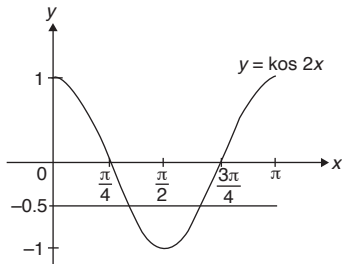
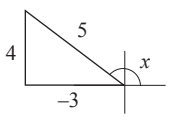
Soalan	Skema Pemarkahan	Markah	Jumlah Markah										
	Lukis sekurang-kurangnya 1 dahan betul <i>Draw at least 1 correct branch</i> Lukis semua dengan betul <i>Draw everything correctly</i> Senaraikan semua kesudahan dengan betul <i>List all outcomes correctly</i> Senaraikan semua $X = r$ <i>List all $X = r$</i>	1 1 1 1	5										
4	(a) $X = \{0, 1, 2, 3, 4\}$ (b) $P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3) + P(X = 4) = 1$ $\frac{h}{5} + \frac{3}{5}h + \frac{7}{8} + \frac{3}{5}h + \frac{h}{5} = 1$ $h = \frac{5}{64}$ (c) $P(X \geq 1) = 1 - P(0)$ $= 1 - \frac{1}{64}$ $= \frac{63}{64}$	1 1 1 1 1	5										
5	$P(X = 5) = {}^{10}C_5(0.4)^5(0.6)^5$ $= 0.2007$	1 1	2										
6	(a) <table><thead><tr><th>$X = r$</th><th>$P(X = r)$</th></tr></thead><tbody><tr><td>0</td><td>${}^3C_0(0.30)^0(0.70)^3 = 0.3430$</td></tr><tr><td>1</td><td>${}^3C_1(0.30)^1(0.70)^2 = 0.4410$</td></tr><tr><td>2</td><td>${}^3C_2(0.30)^2(0.70)^1 = 0.1890$</td></tr><tr><td>3</td><td>${}^3C_3(0.30)^3(0.70)^0 = 0.0270$</td></tr></tbody></table> Senaraikan $X = r$ dengan betul. <i>List $X = r$ correctly.</i> Senaraikan semua $P(X = r)$ dengan betul. <i>List all $P(X = r)$ correctly.</i> (b)  Lukis sekurang-kurangnya satu kesudahan dengan betul. <i>Draw at least one outcome correctly.</i> Lukis semua titik dengan betul. <i>Draw all points correctly.</i>	$X = r$	$P(X = r)$	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	${}^3C_3(0.30)^3(0.70)^0 = 0.0270$	1 1 1 1	4
$X = r$	$P(X = r)$												
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	${}^3C_3(0.30)^3(0.70)^0 = 0.0270$												

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
7	${}^nC_n(0.70)^n(0.30)^0 > \frac{1}{64}$ $(1)(0.70)^n(1) > \frac{1}{64}$ $\log_{10}(0.70)^n > \log_{10}\left(\frac{1}{64}\right)$ $n \log_{10}(0.70) > \log_{10}\left(\frac{1}{64}\right)$ $n < \frac{\log_{10}\left(\frac{1}{64}\right)}{\log_{10} 0.70}$ $n < 11.66$ Bilangan minimum lemparan ialah 11. The minimum throws is 11.	1 1 1	3
8	(a) 18 (b) $P(X < 15)$ (c) $P(X < 15) = \frac{1 - 0.2122}{2}$ $= 0.3939$ $P(X > 15) = 1 - 0.3939$ $= 0.6061$	1 1 1 1 1	5
9	${}^nC_n(0.65)^n(0.35)^0 > \frac{2}{35}$ $(1)(0.65)^n(1) > \frac{2}{35}$ $\log_{10}(0.65)^n > \log_{10}\left(\frac{2}{35}\right)$ $n \log_{10}(0.65) > \log_{10}\left(\frac{2}{35}\right)$ $n < \frac{\log_{10}\left(\frac{2}{35}\right)}{\log_{10} 0.65}$ $n < 6.644$ Bilangan maksimum jaringan gol ialah 6. The maximum goals is 6.	1 1 1	3
10	(a) $P(0.5 \leq Z \leq 1.235) = 0.3085 - 0.1084$ $= 0.2001$ (b) $P(Z > 2.231) = P(Z < -2.231) + P(Z \geq 2.231)$ $= 0.0129 + 0.0129$ $= 0.0258$ (c) $P(Z \leq 0.727) = P(-0.727 \leq Z \leq 0.727)$ $= 1 - P(Z < -0.727) - P(Z > 0.727)$ $= 1 - 0.2337 - 0.2337$ $= 0.5326$	1 1 1 1 1 1	6
11	$P\left(Z < \frac{19.7 - 15}{\sigma}\right) = 0.7327$ $P\left(Z < \frac{4.7}{\sigma}\right) = 0.2673$ $\frac{4.7}{\sigma} = 0.621$ $\sigma = 7.568$	1 1 1	3

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
12	(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
13	$\mu = 200, \sigma = 10$ $P(k < X < 221.5) = 0.3708$ $P\left(\frac{k - 200}{10} < Z < \frac{221.5 - 200}{10}\right) = 0.3708$ $P\left(\frac{k - 200}{10} < Z < 2.15\right) = 0.3708$ $P\left(Z > \frac{k - 200}{10}\right) = 0.3708 + P(Z \geq 2.15)$ $P\left(Z > \frac{k - 200}{10}\right) = 0.3708 + 0.0158$ $P\left(Z > \frac{k - 200}{10}\right) = 0.3866$ $\frac{k - 200}{10} = 0.288$ $k = 202.88$	1 1 1 1 1	5
14	(a) $p = 0.3$ (b) Min/Mean, $\mu = np$ $= 100(0.3)$ $= 30$ Varians/Variance, $\sigma^2 = npq$ $= 100(0.3)(0.7)$ $= 21$ Sisihan piawai/Standard deviation, $\sigma = \sqrt{npq}$ $= \sqrt{21}$ $= 4.583$	1 1 1 1 1 1	6
15	(a) $P(X > h) = 0.727$ $P(X < h) = 0.273$ $\frac{h - 37}{17} = -0.604$ $h = 26.732$ $h \approx 27$ (b) $P(20 < X < 40.4) = P\left(\frac{20 - 37}{17} < Z < \frac{40.4 - 37}{17}\right)$ $= P(-1 < Z < 0.2)$ $= 0.4206$ $0.4206 \times 100 = 42.06\%$	1 1 1 1 1	5

Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $\tan 2A = -\frac{24}{7}$ $\frac{2 \tan A}{1 - \tan^2 A} = -\frac{24}{7}$ $14 \tan A = -24 + 24 \tan^2 A$ $24 \tan^2 A - 14 \tan A - 24 = 0$ $12 \tan^2 A - 7 \tan A - 12 = 0$ $(4 \tan A + 3)(3 \tan A - 4) = 0$ $\tan A = -\frac{3}{4} \quad (90^\circ < A < 180^\circ)$ Maka/Hence, $\cos A = -\frac{4}{5}$ (c) $\tan \frac{1}{2}x = \pm \sqrt{\frac{1 - \cos x}{1 + \cos x}}$ atau/or $\tan \frac{x}{2} = \frac{\sin x}{1 + \cos x}$ $= \pm \sqrt{\frac{1 - \frac{3}{5}}{1 + \frac{3}{5}}} = \frac{-\frac{4}{5}}{1 + \frac{3}{5}} = \frac{-\frac{4}{5}}{\frac{8}{5}} = -\frac{1}{2}$	1 1 1 1	8
4	(a)  Graf sinus/Sinus graph $-3 \leq y \leq 3$ 2 kitaran dalam $\frac{4\pi}{3}$ 2 cycles in $\frac{4\pi}{3}$ Graf kosinus/Cosinus graph $-3 \leq y \leq 1$ 1 kitaran dalam $\frac{4\pi}{3}$ 1 cycle in $\frac{4\pi}{3}$ (b) Bilangan penyelesaian/Number of solutions = 4	1 1 1 1 1 1 1	7
5	(a) Amplitud/Amplitude = $a = 3 = 3$ Kala/Cycle, $p = \frac{2\pi}{b}$ $= \frac{2\pi}{2}$ $= \pi$ (b)  Graf kosinus/Cosinus graph $2 \leq y \leq 8$ 1 kitaran dalam π 1 cycle in π	1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) Nilai maksimum/<i>Maximum value</i> $= c + a$ $= 5 + 3$ $= 8$ Nilai minimum/<i>Minimum value</i> $= c - a$ $= 5 - 3$ $= 2$ (d)  Nilai-nilai x ialah $\frac{\pi}{4}$ dan $\frac{3\pi}{4}$. <i>The values of x are $\frac{\pi}{4}$ and $\frac{3\pi}{4}$.</i>	1 1 1 1, 1	10
6	(a) $a = 4$ Daripada graf/<i>From the graph</i>, kala/<i>cycle</i> $= 8\pi$ Jadi/<i>Thus</i>, $\frac{2\pi}{b} = 8\pi$ $b = \frac{2\pi}{8\pi}$ $= \frac{1}{4}$ Paksi graf/<i>Graph axis</i>, $c = -2$. (b) (i) $\sec 2x = -2$ $\frac{1}{\cos 2x} = -2$ $\cos 2x = -\frac{1}{2} \leftarrow \alpha = \frac{\pi}{3}$ $2x = \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{8\pi}{3}, \frac{10\pi}{3}$ $x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ (ii)  Graf kosinus/<i>Cosinus graph</i> $-1 \leq y \leq 1$ 1 kitaran dalam π <i>1 cycle in π</i> Garis lurus betul <i>Correct straight line</i> Julat nilai x ialah $\frac{\pi}{3} \leq x \leq \frac{2\pi}{3}$.	1 1 1 1 1 1 1 1	10
7	(a)  $\sin\left(x + \frac{\pi}{4}\right) - \cos\left(x - \frac{\pi}{4}\right)$ $= \sin x \cos \frac{\pi}{4} + \cos x \sin \frac{\pi}{4} - \left(\cos x \cos \frac{\pi}{4} + \sin x \sin \frac{\pi}{4}\right)$ $= \left(\frac{4}{5}\right)\left(\frac{1}{\sqrt{2}}\right) + \left(-\frac{3}{5}\right)\left(\frac{1}{\sqrt{2}}\right) - \left(-\frac{3}{5}\right)\left(\frac{1}{\sqrt{2}}\right) - \left(\frac{4}{5}\right)\left(\frac{1}{\sqrt{2}}\right)$ $= 0$ (Terbukti/<i>Proven</i>)	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah																		
	(b) $y = 3 \cos 2x$ <table border="1"><tr><td>x</td><td>0</td><td>$\frac{\pi}{4}$</td><td>$\frac{\pi}{2}$</td><td>$\frac{3\pi}{4}$</td><td>π</td></tr><tr><td>y</td><td>3</td><td>0</td><td>-3</td><td>0</td><td>3</td></tr></table> Graf kosinus/<i>Cosinus graph</i> 1 kitaran dalam π 1 cycles in π $-3 \leq y \leq 3$ Garis lurus betul <i>Correct straight line</i> $y = \frac{2x}{\pi} - 1$ <table border="1"><tr><td>x</td><td>0</td><td>$\frac{\pi}{2}$</td></tr><tr><td>y</td><td>-1</td><td>0</td></tr></table> $\therefore$ Bilangan penyelesaian/<i>Number of solutions</i> = 2	x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	y	3	0	-3	0	3	x	0	$\frac{\pi}{2}$	y	-1	0	1 1 1 1 1 1	10
x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π																
y	3	0	-3	0	3																
x	0	$\frac{\pi}{2}$																			
y	-1	0																			



Pengaturcaraan Linear Linear Programming

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) RS: Kecerunan/Gradient, $m = -1$ Pintasan-y/y-intercept, $c = 5$ Persamaan garis lurus/Equation of straight line: $y = -x + 5$ $\therefore y \geq -x + 5$ RT: Kecerunan/Gradient, $m = 1$ Pintasan-y/y-intercept, $c = 2$ Persamaan garis lurus/Equation of straight line: $y = x + 2$ $\therefore y \leq x + 2$ ST: Kecerunan/Gradient, $m = 3$ (4, 0): $0 = 3(4) + c$ Pintasan-y/y-intercept, $c = -12$ Persamaan garis lurus/Equation of straight line: $y = 3x - 12$ $\therefore y \geq 3x - 12$	1 1 1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) Andaikan nilai maksimum/Let the maximum value, $k = 2x + 3y$ (i) Pada titik/At point $P(0, 5)$ $k = 2(0) + 3(5)$ $= 15$ (ii) Pada titik/At point $T(7, 9)$ $k = 2(7) + 3(9)$ $= 41$	1 1 1 1	10
2	(a) $x + y \leq 400$ $y \leq 3x$ $50x + 25y \leq 15\,000 \Rightarrow 2x + y \leq 600$ (b) Kedua-dua paksi dilabel dengan skala seragam antara $0 \leq x \leq 300$ dan $0 \leq y \leq 300$. <i>Both of the axes are labelled with uniform scale within $0 \leq x \leq 300$ and $0 \leq y \leq 300$.</i> Sekurang-kurangnya dua garis lurus dilukis dengan betul. <i>At least two straight lines are drawn correctly.</i> Semua garis lurus dilukis dan rantau R dilorek dengan betul. <i>All the straight lines are drawn and region R is shaded correctly.</i>	1 1 1 1 1 1	6

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	(a) $x + y \geq 300$ $x \leq 3y$ $1\,200x + 800y \leq 480\,000 \Rightarrow 3x + 2y \leq 1\,200$ (b)	1 1 1	10
Kedua-dua paksi dilabel dengan skala seragam antara $0 \leq x \leq 400$ dan $0 \leq y \leq 600$. <i>Both of the axes are labelled with uniform scale within $0 \leq x \leq 400$ and $0 \leq y \leq 600$.</i>		1	
Sekurang-kurangnya dua garis lurus dilukis dengan betul. <i>At least two straight lines are drawn correctly.</i>		1	
Semua garis lurus dilukis dan rantau R dilorek dengan betul. <i>All the straight lines are drawn and region R is shaded correctly.</i>		1	
(c) (i) Apabila/When $y = 300$, Nilai maksimum/Maximum value $x = 200$ Maka, maksimum 200 unit Model A perlu dihasilkan. <i>Hence, maximum 200 units of Model A should be produced.</i>		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 fungsi objektif yang betul dilihat dalam graf <i>Correct objective function line seen in the graph</i>		1	
Titik optimum pada/Optimum point at $(225, 75)$, Keuntungan minimum/Minimum point $= 300(225) + 400(75)$ $= \text{RM}97\,500$		1 1	

[illegible]

Kinematik Gerakan Linear

Kinematic Linear Motion

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $s = 0$		
	$0 = t^2 - 4t - 5$	1	
	$0 = (t - 5)(t + 1)$		
	$t = 5 \text{ s}$	1	
	(b) $v = \frac{d}{dt}(t^2 - 4t - 5)$		
	$= 2t - 4$	1	
	$v = 0$		
	$0 = 2t - 4$	1	
	$2t = 4$		
	$t = 2 \text{ s}$	1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(c) (i) Jumlah jarak/<i>Total distance</i> = $[t^2 - 4t - 5]_0^2$ $= [2^2 - 4(2) - 5] - [(0)^2 - 4(0) - 5]$ $= 4 \text{ m}$ (ii) Jumlah jarak/<i>Total distance</i> = $[t^2 - 4t - 5]_0^2 + [t^2 - 4t - 5]_2^5$ $= 4 + [5^2 - 4(5) - 5] - [(2)^2 - 4(2) - 5]$ $= 4 + 9$ $= 13 \text{ m}$	1 1 1 1 1	10
2	(a) $v = (t + 2)(t - 4)$ $= t^2 - 2t - 8$ $\frac{dv}{dt} = 2t - 2$ $a = 2t - 2$ $a = 2(0) - 2$ $= -2 \text{ m s}^{-2}$ (b) Halaju minimum apabila/<i>Velocity is minimum when</i> $a = 0$, $2t - 2 = 0$ $t = 1$ $v(1) = 1^2 - 2(1) - 8$ $= -9 \text{ m s}^{-1}$ (c) $s = \int_2^3 v \, dt$ atau/<i>or</i> $s_3 - s_2$ $s = \int_2^3 t^2 - 2t - 8 \, dt$ $= \left[\frac{t^3}{3} - t^2 - 8t \right]_2^3$ $= \left[\frac{(3)^3}{3} - (3)^2 - 8(3) \right] - \left[\frac{(2)^3}{3} - (2)^2 - 8(2) \right]$ $= -\frac{20}{3} \text{ m}$ Jarak/<i>Distance</i> = $\frac{20}{3} \text{ m}$	1 1 1 1 1 1 1 1, 1 1	10
3	(a) (i) $a = 3 - 2t$ $v = \int 3 - 2t \, dt$ $= 3t - t^2 + c$ Apabila/<i>When</i> $t = 0$, $v = 28$, $c = 28$ $v = -t^2 + 3t + 28$ Halaju adalah maksimum apabila $a = 0$, <i>Velocity is maximum when</i> $a = 0$, $3 - 2t = 0$ $t = \frac{3}{2} \text{ s}$ Halaju maksimum/<i>Maximum velocity</i> = $-\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right) + 28$ $= 30\frac{1}{4} \text{ m s}^{-1}$ (ii) $s = \int -t^2 + 3t + 28 \, dt$ $= -\frac{t^3}{3} + \frac{3t^2}{2} + 28t + c$ Apabila/<i>When</i> $t = 0$, $s = 0$, $c = 0$ $s = -\frac{t^3}{3} + \frac{3t^2}{2} + 28t$	1 1 1 1 1	

[illegible]

Kertas Model SPM

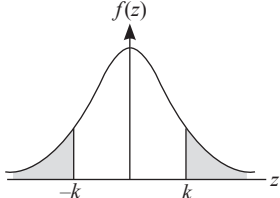
Kertas 1

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $f(-5) = -5 + 2 + 1$ $= 4$ $f(x) = 4$ $x + 2 + 1 = 4$ $x + 2 = 3$ $x + 2 = \pm 3$ $x + 2 = 3$ dan/and $x + 2 = -3$ $x = 1$ $x = -5$ Nilai objek yang satu lagi ialah 1. <i>The value of the other object is 1.</i> (b) $fg(x) = 3f(2)$ $3(4x - 5) + 7 = 3(3(2) + 7)$ $12x - 15 + 7 = 3(13)$ $12x = 47$ $x = \frac{47}{12}$	1 1 1 1	4
2	(a) (i) $h(x) = -x^2 + 4x + 5$ $= -(x^2 - 4x - 5)$ $= -\left[x^2 - 4x + \left(\frac{-4}{2}\right)^2 - \left(\frac{-4}{2}\right)^2 - 5\right]$ $= -[(x^2 - 4x + (-2)^2 - (-2)^2 - 5)]$ $= -[(x - 2)^2 - 4 - 5]$ $= -[(x - 2)^2 - 9]$ $= -(x - 2)^2 + 9$ Maka, tinggi maksimum ialah 9 m. <i>Hence, the maximum height is 9 m.</i> (ii) 2 m (b) $h(x) = 0$ $-(x - 2)^2 + 9 = 0$ $(x - 2)^2 = 9$ $x^2 - 4x + 4 - 9 = 0$ $x^2 - 4x - 5 = 0$ $(x + 1)(x - 5) = 0$ $x + 1 = 0$, $x - 5 = 0$ $x = -1$ $x = 5$ Jarak mengufuk antara Ammar dan bola ialah 5 m. <i>The horizontal distance between Ammar and the ball is 5 m.</i>	1 1 1 1 1	6
3	(a) $\vec{OP} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$, $\vec{OR} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$ $\vec{PR} = \vec{PO} + \vec{OR}$ atau/or $\vec{PR} = \vec{PO} + \vec{OR}$ $= \begin{pmatrix} -3 \\ 1 \end{pmatrix} + \begin{pmatrix} 5 \\ 6 \end{pmatrix}$ $= -3\hat{i} + \hat{j} + 5\hat{i} + 6\hat{j}$ $= \begin{pmatrix} 2 \\ 7 \end{pmatrix}$ $= 2\hat{i} + 7\hat{j}$ $= \begin{pmatrix} 2 \\ 7 \end{pmatrix}$ $= \begin{pmatrix} 2 \\ 7 \end{pmatrix}$	1	

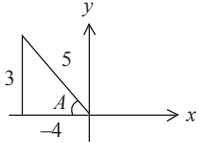
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) (i) $3\binom{2}{7} - \binom{2k}{5} = \binom{2}{16}$ atau/or $3(2\hat{i} + 7\hat{j}) - (2k\hat{i} + 5\hat{j}) = 2\hat{i} + 16\hat{j}$ $6\hat{i} + 21\hat{j} - (2k\hat{i} + 5\hat{j}) = 2\hat{i} + 16\hat{j}$ $(6 - 2k)\hat{i} + 16\hat{j} = 2\hat{i} + 16\hat{j}$ $\binom{6-2k}{16} = \binom{2}{16}$ Bandingkan pekali/Comparing coefficient $6 - 2k = 2$ $2k = 4$ $k = 2$ (ii) $\vec{QR} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ atau/or $\vec{QR} = 4\hat{i} + 5\hat{j}$ $\vec{QR} = \sqrt{4^2 + 5^2}$ $= \sqrt{41}$ Vektor unit dalam arah/Unit vector in the direction of $\widehat{\vec{QR}} = \frac{1}{\sqrt{41}} \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ $= \begin{pmatrix} \frac{4}{\sqrt{41}} \\ \frac{5}{\sqrt{41}} \end{pmatrix}$	1 1 1	5
4	Jujukan/Sequence = $(4 \times 3), (7 \times 3), (10 \times 3), \dots$ $= 12, 21, 30, \dots$ Sebutan pertama/First term, $a = 12$ Beza sepunya/Common difference, $d = 9$ $S_n = 1\,272$ $\frac{n}{2}[2(12) + (n-1)(9)] = 1\,272$ $n(24 + 9n - 9) = 2\,544$ $24n + 9n^2 - 9n - 2\,544 = 0$ $9n^2 + 15n - 2\,544 = 0$ $3n^2 + 5n - 848 = 0$ $(3n + 53)(n - 16) = 0$ $n = -\frac{53}{3}$ (ditolak/rejected) , $n = 16$ 16 segi tiga sama sisi yang boleh dibentuk. 16 equilateral triangles can be formed.	1 1 1 1	4
5	(a) $\frac{dy}{dx} = 3f(x)$ $y = 3 \int f(x) dx$ $\int f(x) dx = \frac{1}{3}y$ $\int_{-2}^3 f(x) dx = \left[\frac{1}{3}(3x(3x+4)^4) \right]_{-2}^3$ $= \left[x(3x+4)^4 \right]_{-2}^3$ $= [3(3(3)+4)^4] - [(-2)(3(-2)+4)^4]$ $= 85\,683 - (-32)$ $= 85\,715$ (b) $\int_5^p 3 dx + \int_5^p f(x) dx = [3x]_5^p + (30 - 20)$ $= [3p - 3(5)] + 10$ $= 3p - 5$	1 1 1 1 1 1	6

[illegible]

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
8	(a) $\lim_{x \rightarrow 4} \frac{\sqrt{x-3}}{2-\sqrt{x+1}} = \frac{\sqrt{4-3}}{2-\sqrt{4+1}}$ $= \frac{\sqrt{1}}{2-\sqrt{5}}$ $= \left(\frac{1}{2-\sqrt{5}}\right)\left(\frac{2+\sqrt{5}}{2+\sqrt{5}}\right)$ $= \frac{2+\sqrt{5}}{4+2\sqrt{5}-2\sqrt{5}-5}$ $= \frac{2+\sqrt{5}}{-1}$ $= -2-\sqrt{5}$ (b) (i) $y = 4x^2 + qx^3$ $\frac{dy}{dx} = -5$ $8x + 3qx^2 = -5$ $8(-2) + 3q(-2)^2 = -5$ $-16 + 12q = -5$ $12q = 11$ $q = \frac{11}{12}$ (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 1 1 1 1 1 1	7
9	(a) $y = \frac{3h}{x+2k}$ $\frac{1}{y} = \frac{x+2k}{3h}$ $\frac{1}{y} = \frac{1}{3h}x + \frac{2k}{3h}$ $\frac{1}{3h} = m \quad \frac{2k}{3h} = c$ $\frac{1}{3h} = \frac{1-(-2)}{9-0} \quad \text{atau/or} \quad \frac{2k}{3h} = -2$ $\frac{1}{3h} = \frac{1}{3} \quad \frac{2k}{3(1)} = -2$ $3h = 3 \quad 2k = -6$ $h = 1 \quad \text{dan/and} \quad k = -3$ (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

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
10	(a) $r + r + 3 = 25$ $2r = 22$ $r = 11$ (b) (i) $\frac{9!}{2!2!2!} = 45\,360$ (ii) $\frac{4!}{2!} \times \frac{5!}{2!2!}$ $= 360$	1 1 1 1 1	5
11	(a) $P(X < 1) = 1 - [P(X = 1) + P(X = 2)]$ $= 1 - \left[\frac{12}{25} + \frac{9}{25} \right]$ $= \frac{4}{25}$ (b) $4a = \frac{4}{25}$ $a = \frac{1}{25}$	1 1 1	3
12	(a) (i)  (ii) $1 - P(Z \leq k) = 2P(Z \geq k)$ $= 2(0.0196)$ $= 0.0392$ (b) (i) $Z = \frac{a + 3 - a}{\sqrt{b}}$ $= \frac{3}{\sqrt{b}}$ atau/or $\frac{3\sqrt{b}}{b}$ (ii) $Z = \frac{3}{\sqrt{25}}$ $= \frac{3}{5}$	1 1 1 1 1 1	6
13	(a) (i) $\frac{dy}{dx} = \frac{3(x^2 - 3) - 2x(3x + 2)}{(x^2 - 3)^2}$ Apabila/When $x = 1$, $\frac{dy}{dx} = \frac{3[(1)^2 - 3] - 2(1)[3(1) + 2]}{[(1)^2 - 3]^2}$ $= -4$ $\therefore m = -4$ (ii) $-4 \times m_{\text{normal}} = -1$ $m_{\text{normal}} = \frac{1}{4}$ $R(1, k)$ $k = -4(1) + \frac{3}{2}$ atau/or $k = \frac{3(1) + 2}{(1)^2 - 3}$ $k = -\frac{5}{2}$ $k = -\frac{5}{2}$ $y - \left(-\frac{5}{2}\right) = \frac{1}{4}(x - 1)$ $y = \frac{1}{4}x - \frac{11}{4}$	1 1 1 1 1 1 1 1	

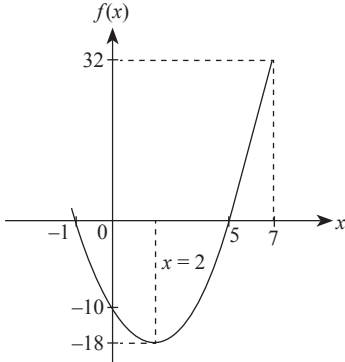
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(b) $V = \frac{1}{3} \pi h^2(24 - h)$ $= 8\pi h^2 - \frac{1}{3} \pi h^3$ $\frac{dV}{dh} = 16\pi h - \pi h^2$ $= 16\pi(2) - \pi(2)^2$ $= 28\pi$ $\frac{dV}{dt} = \frac{dV}{dh} \times \frac{dh}{dt}$ $6 = 28\pi \times \frac{dh}{dt}$ $\frac{dh}{dt} = \frac{6}{28} \pi$ $= \frac{3}{14} \pi$	1 1 1	8
14	(a) $3x - 2 \neq 0$ $3x \neq 2$ $x \neq \frac{2}{3}$ $h = \frac{2}{3}$ (b) $f(x) = x$ $3x - 2 = x$ $2x = 2$ $x = 1$ (c) (i) $f(x) = y$ $y = 3x - 2$ $3x = y + 2$ $x = \frac{y + 2}{3}$ $f^{-1}(x) = \frac{x + 2}{3}$ $gff^{-1}(x) = \frac{5}{3\left(\frac{x + 2}{3}\right) - 2}$ $g(x) = \frac{5}{x}, x \neq 0$ (ii) $g(x) = \frac{5}{x}, x \neq 0$ $g^2(x) = x$ $g^3(x) = \frac{5}{x}, x \neq 0$ 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 1 1 1 1 1	8
15	(a) (i) $3 \sin \theta \tan \theta = 8$ $3 \sin \theta \left(\frac{\sin \theta}{\cos \theta} \right) = 8$ $3 \left(\frac{\sin^2 \theta}{\cos \theta} \right) = 8$ $3(1 - \cos^2 \theta) = 8 \cos \theta$ $3 - 3 \cos^2 \theta = 8 \cos \theta$ $3 \cos^2 \theta + 8 \cos \theta - 3 = 0$	1 1	

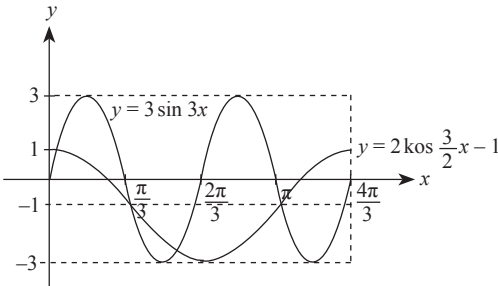
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
	(ii) $3 \cos^2 \theta + 8 \cos \theta - 3 = 0$ $(3 \cos \theta - 1)(\cos \theta + 3) = 0$ $\cos \theta = \frac{1}{3}$ $\cos \theta = -3$ (abaikan/ignored) Sudut rujukan/Reference angle = 70.53° $\theta = 70.53^\circ, 289.47^\circ$ (b) $\tan 2A = -\frac{24}{7}$ $\frac{2 \tan A}{1 - \tan^2 A} = -\frac{24}{7}$ $14 \tan A = -24 + 24 \tan^2 A$ $24 \tan^2 A - 14 \tan A - 24 = 0$ $12 \tan^2 A - 7 \tan A - 12 = 0$ $(4 \tan A + 3)(3 \tan A - 4) = 0$ $\tan A = -\frac{3}{4}$ $\tan A = \frac{4}{3}$ $(90^\circ < A < 180^\circ)$  $\cos A = -\frac{4}{5}$ (c) $\sin(-45^\circ) = -\frac{\sqrt{2}}{2}$ $\csc(-45^\circ) = \frac{1}{\sin(-45^\circ)}$ $= \frac{1}{-\frac{\sqrt{2}}{2}}$ $= \frac{-2}{\sqrt{2}} = \frac{-2}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = -\sqrt{2}$	1 1 1 1 1	8

Kertas 2

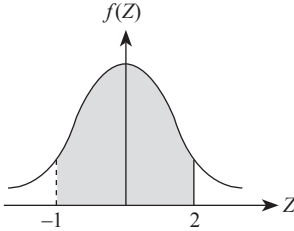
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
1	(a) $\angle TRS = 40^\circ$ $\cos 50^\circ = \frac{6}{QR}$ $QR = 9.334$ cm $TR = 9.334 - 6$ $= 3.334$ cm Panjang lengkok/The arc length of $TS = 3.334 \times \left(40^\circ \times \frac{3.142}{180^\circ}\right)$ $= 2.328$ cm (b) $PR = \sqrt{(9.334)^2 - (6)^2}$ $= 7.150$ cm Luas/Area of $\triangle PQR = \frac{1}{2} \times 6 \times 7.150$ $= 21.45$ cm² Luas sektor/Area of sector $PQT = \frac{1}{2} \times (6)^2 \times 0.8728$ $= 15.71$ cm² Luas sektor/Area of sector $TRS = \frac{1}{2} \times (3.334)^2 \times 0.6982$ $= 3.880$ cm² Luas kawasan berlorek/Area of shaded region = $21.45 - 15.71 - 3.880$ $= 1.860$ cm²	1 1 1 1 1 1 1 1	7

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
2	(a) $a = 6$ $T_2 = \sqrt{3^2 + 3^2} = 3\sqrt{2}$ $T_3 = \sqrt{\left(\frac{3\sqrt{2}}{2}\right)^2 + \left(\frac{3\sqrt{2}}{2}\right)^2} = 3$ $r = \frac{T_2}{a} = \frac{3\sqrt{2}}{6} = \frac{\sqrt{2}}{2}$ Maka, susunan corak ialah janjang geometri. <i>Thus, the pattern arrangement is geometry progression.</i> $T_7 = 6\left(\frac{\sqrt{2}}{2}\right)^{7-1}$ $= \frac{3}{4} \text{ cm // } 0.75 \text{ cm}$ Panjang sisi segi empat sama yang ketujuh ialah 0.75 cm. <i>The length of the side of the seventh square is 0.75 cm.</i> (b) Luas segi empat sama terakhir/<i>Area of the last square</i> $= \frac{9}{64}$ $p \times l = \frac{9}{64}$ $x^2 = \frac{9}{64}$ $x = \sqrt{\frac{9}{64}}$ $x = \frac{3}{8}$ Panjang sisi segi empat sama terakhir/<i>Length of the last square</i>, $x = \frac{3}{8}$ $T_n = \frac{3}{8}$ $6\left(\frac{\sqrt{2}}{2}\right)^{n-1} = \frac{3}{8}$ $\left(\frac{\sqrt{2}}{2}\right)^{n-1} = \frac{1}{16}$ $\log_{10}\left(\frac{\sqrt{2}}{2}\right)^{n-1} = \log_{10}\left(\frac{1}{16}\right)$ $(n-1) \log_{10}\left(\frac{\sqrt{2}}{2}\right) = \log_{10}\left(\frac{1}{16}\right)$ $n-1 = \frac{\log_{10}\left(\frac{1}{16}\right)}{\log_{10}\left(\frac{\sqrt{2}}{2}\right)}$ $n = 8 + 1$ $= 9$ Susunan luas segi empat sama/<i>Arrangement area of the squares</i>: $6 \times 6, 3\sqrt{2} \times 3\sqrt{2}, 3 \times 3, \dots, \frac{9}{64}$ $36, 18, 9, \dots, \frac{9}{64}$ $a = 36$, $r = \frac{18}{36}$ $= \frac{1}{2}$ $S_9 = \frac{36\left[1 - \left(\frac{1}{2}\right)^9\right]}{1 - \frac{1}{2}}$ $S_9 = 71\frac{55}{64} \text{ cm}^2$	1 1 1 1 1 1 1 1 1 1 1	9

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
3	(a) $f(x) = 2x^2 - 8x - 10$ $= 2(x^2 - 4x - 5)$ $= 2\left[x^2 - 4x + \left(\frac{-4}{2}\right)^2 - \left(\frac{-4}{2}\right)^2 - 5\right]$ $= 2[(x - 2)^2 - 9]$ $= 2(x - 2)^2 - 18$ Koordinat titik pusingan/<i>Coordinates of turning point</i>: (2, -18) (b) $f(x) = 2(x^2 - 4x - 5)$ $= 2(x + 1)(x - 5)$  Bentuk graf/<i>Shape of graph</i> Julat/<i>Range</i> $-1 \leq x \leq 7$ dan paksi simetri $x = 2$ and axes of symmetry $x = 2$	1 1 1 1 1 1	6
4	(a) (i) $m(h, 2) = \left(\frac{2(4) + 1(x)}{1 + 2}, \frac{2(4) + 1(y)}{1 + 2}\right)$ $\frac{2(4) + 1(x)}{1 + 2} = h$ atau/ $\frac{2(4) + 1(y)}{1 + 2} = 2$ $8 + x = 3h$ $8 + y = 6$ $x = 3h - 8$ $y = -2$ $S(3h - 8, -2)$ (ii) $\frac{1}{2} \begin{vmatrix} 1 & h & 3h - 8 & 1 \\ 0 & 2 & -2 & 0 \end{vmatrix} = 14$ $\frac{1}{2} [1(2) + h(-2) + (3h - 8)(0)] - [0(h) + 2(3h - 8) + (-2)(1)] = 14$ $\frac{1}{2} (2 - 2h + 0) - (0 + 6h - 16 - 2) = 14$ $20 - 8h = 28$ $20 - 8h = 28$ atau/ $20 - 8h = -28$ $-8h = 8$ $-8h = -48$ $h = -1$ (abaikan/ignore) $h = 6$ $\therefore h = 6$ (b) $JN = JS$ $\sqrt{(x - 4)^2 + (y - 4)^2} = \sqrt{(x - 10)^2 + [y - (-2)]^2}$ $x^2 - 8x + 16 + y^2 - 8y + 16 = x^2 - 20x + 100 + y^2 + 4y + 4$ $12x - 12y - 72 = 0$ $x - y - 6 = 0$	1 1 1 1 1 1 1	6

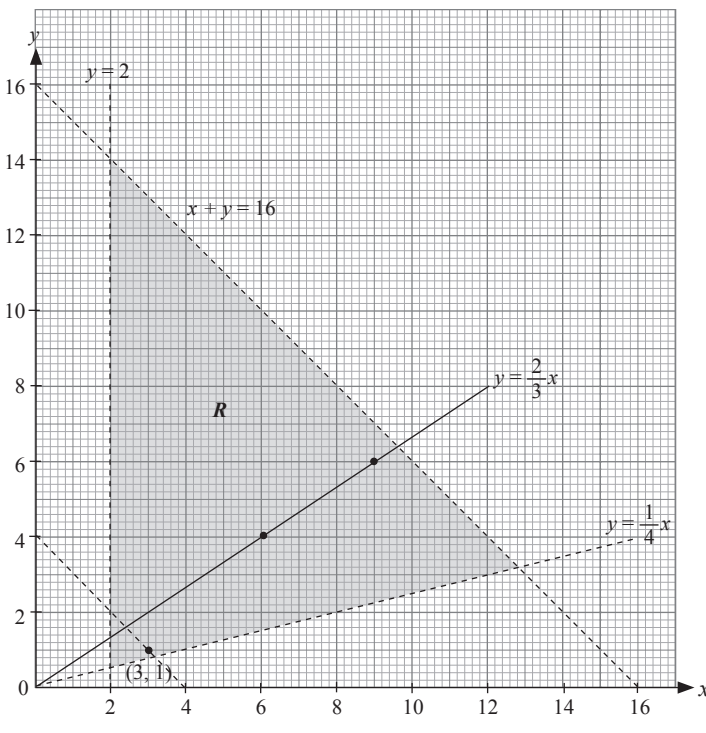
Soalan	Skema Pemarkahan	Markah	Jumlah Markah
5	(a) $a = -4$ Daripada graf, kala = 8π From the graph, period = 8π $\frac{2\pi}{b} = 8\pi$ $b = \frac{2\pi}{8\pi}$ $b = \frac{1}{4}$ $c = -2$ (b)  Bentuk sinus atau bentuk kosinus Shape of sinus or shape of cosinus Graf sinus/Graph of sinus Amplitud/Amplitude = 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) $y = -2 + 7$ $= 5$ $A(2, 5)$ (b) $A_1 = \int_0^2 (x^2 + 1) dx$ $= \left[\frac{x^3}{3} + x \right]_0^2$ $= \left[\frac{(2)^3}{3} + (2) \right] - 0$ $= \frac{14}{3} \text{ unit/units}$	1 1	

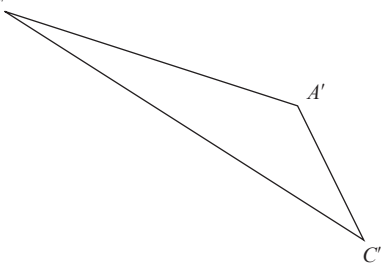
Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
9	(a) $p = \frac{3}{7} \quad q = \frac{4}{7} \quad n = 12$ (i) $P(X=2) = {}^{12}C_2 \times \left(\frac{3}{7}\right)^2 \times \left(\frac{4}{7}\right)^{10}$ $= 0.04500$ (ii) $P(X \geq 3) = 1 - P(X=0) - P(X=1) - P(X=2)$ $= 1 - \left[{}^{12}C_0 \times \left(\frac{4}{7}\right)^0 \times \left(\frac{3}{7}\right)^{12} \right] - \left[{}^{12}C_1 \times \left(\frac{4}{7}\right)^1 \times \left(\frac{3}{7}\right)^{11} \right]$ $- \left[{}^{12}C_2 \times \left(\frac{4}{7}\right)^2 \times \left(\frac{3}{7}\right)^{10} \right]$ $= 0.9948$ (b) (i) $P(2.5 < X \leq 4.0)$ $= P\left(\frac{2.5-3.0}{0.5} < Z \leq \frac{4.0-3.0}{0.5}\right)$ $= P(-1 < Z \leq 2)$ $= 1 - P(Z < -1) - P(Z > 2)$ $= 1 - 0.1587 - 0.0228$ $= 0.8185$ (ii) $P(X < m) = 0.05$ atau/ or $P(X > m) = 0.95$ $P\left(Z < \frac{m-3.0}{0.5}\right) = 0.05$ $Z = 1.645$ $\frac{m-3.0}{0.5} = -1.645$ $m - 3.0 = -0.8225$ $m = 2.1775 \text{ kg}$ 	1 1 1 1 1 1 1 1 1 1 1	10
10	(a) (i) $\vec{OP} = \vec{OA} + \vec{AP}$ $= 6\vec{a} + \vec{b}$ (ii) $\vec{BR} = \vec{BA} + \vec{AR}$ $= -3\vec{b} - 2\vec{a}$ (b) $\vec{OQ} = \lambda \vec{OP}$ $\vec{OR} + \vec{RQ} = \lambda(6\vec{a} + \vec{b})$ $4\vec{a} + \frac{1}{2}\vec{a} + \frac{3}{4}\vec{b} = 6\lambda\vec{a} + \lambda\vec{b}$ $\frac{9}{2}\vec{a} + \frac{3}{4}\vec{b} = 6\lambda\vec{a} + \lambda\vec{b}$ Bandingkan pekali/Compare the coefficient $\frac{9}{2} = 6\lambda \quad \text{dan/and} \quad \lambda = \frac{3}{4}$ $\lambda = \frac{3}{4}$ Titik P, R dan O segaris kerana $\lambda_1 = \lambda_2 = \frac{3}{4}$. Points P, R and O are collinear because $\lambda_1 = \lambda_2 = \frac{3}{4}$. (c) Luas/Area of $\triangle ABR = \frac{1}{3} \times 45$ $= 15 \text{ cm}^2$	1 1 1 1 1, 1 1 1 1 1	10

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
11	(a) $h = 3$ (b) Luas/Area = $\int_0^3 (-x^2 + 21) dx - \int_0^3 (3x + 3) dx$ $= \left[\frac{-x^3}{3} + 21x \right]_0^3 - \left[\frac{3x^2}{2} + 3x \right]_0^3$ $= \left[\frac{-(3)^3}{3} + 21(3) - 0 \right] - \left[\frac{3(3)^2}{2} + 3(3) - 0 \right]$ $= 54 - \frac{45}{2}$ $= \frac{63}{2} \text{ atau/or } 31.50 \text{ unit}^2/\text{units}^2$ atau/or Luas/Area = $\int_0^3 y dx$ – Luas trapezium/Area of trapezium $= \int_0^3 (-x^2 + 21) dx - \frac{1}{2}(3 + 12)(3)$ $= \left[\frac{-x^3}{3} + 21x \right]_0^3 - \frac{45}{2}$ $= \left[\frac{-(3)^3}{3} + 21(3) - 0 \right] - \frac{45}{2}$ $= 54 - \frac{45}{2}$ $= \frac{63}{2} \text{ atau/or } 31.5 \text{ unit}^2/\text{units}^2$ (c) Isi padu/Volume A = $\int \pi x^2 dy$ $= \pi \int_{12}^{21} 21 - y dy$ $= \pi \left[21y - \frac{y^2}{2} \right]_{12}^{21}$ $= \pi \left[\left(21(21) - \frac{(21)^2}{2} \right) - \left(21(12) - \frac{(12)^2}{2} \right) \right]$ $= 40.5\pi \text{ unit}^3/\text{units}^3$ Isi padu/Volume B = Isi padu kon/Volume of cone $= \frac{1}{3} \times \pi \times 3^2 \times 9$ $= 27\pi \text{ unit}^3/\text{units}^3$ atau/or Isi padu/Volume B = $\int \pi x^2 dy$ $= \pi \int_3^{12} \left(\frac{y}{3} - 1 \right)^2 dy$ $= \pi \left[\frac{y^3}{27} - \frac{y^2}{3} + y \right]_3^{12}$ $= \pi \left[\left(\frac{12^3}{27} - \frac{12^2}{3} + 12 \right) - \left(\frac{3^3}{27} - \frac{3^2}{3} + 3 \right) \right]$ $= 27\pi \text{ unit}^3/\text{units}^3$ Isi padu janaan/Volume generated = $V_A + V_B$ $= 40.5\pi + 27\pi$ $= 67.5\pi \text{ unit}^3/\text{units}^3$	1 1 1 1 1 1, 1 1 1 10 1 1 1 1 1	10

Program Tuisyen Rakyat Selangor

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
13	(a) $m = 16$ dan/and $n = 2$ (b) III $y > \frac{1}{4}x$	1 1	
	 The graph shows a Cartesian coordinate system with x and y axes ranging from 0 to 16. A shaded region labeled R is defined by several constraints: - Vertical boundary at $x = 2$. - Horizontal boundary at $y = 2$. - Diagonal boundary $x + y = 16$. - Solid diagonal boundary $y = \frac{2}{3}x$. - Dashed diagonal boundary $y = \frac{1}{4}x$. The minimum point of the region is marked as $(3, 1)$. Garis lurus $y = \frac{1}{4}x$ dilukis betul 1 <i>Correct straight line of $y = \frac{1}{4}x$</i> Rantau R dilorek 1 <i>Region R is shaded</i>		10
	(c) (i) Garis lurus $y = \frac{2}{3}x$ dilukis betul/ <i>Straight line $y = \frac{2}{3}x$ is drawn correctly</i> Bilangan jam tangan jenis A yang mungkin dihasilkan ialah 3, 6 atau 9 utas. <i>The possible number of watch type A is produced is 3, 6 or 9 units.</i>	1 1	
	(ii) $k = 15x + 12.5y$ Garis fungsi objektif/ <i>Line of objective function</i> Titik minimum/ <i>Minimum point</i> (3, 1) Kos minimum ialah/ <i>Minimum cost is</i> $k = 15(3) + 12.5(1)$ $= RM57.50$	1 1 1 1	

Soalan	Skema Pemarkahan	Markah	Jumlah Markah
14	(a) $\frac{P_{2020}}{4} \times 100 = 148$ $P_{2020} = \text{RM}5.92$ (b) $\frac{110(0.2m) + 148(0.3) + 110(0.1) + 120(m)}{0.2m + 0.3 + 0.1 + m} = 128.95$ $22m + 44.4 + 11 + 120m = 154.74m + 51.58$ $12.74m = 3.82$ $m = 0.3$ (c) $\frac{48}{P_{2017}} \times 100 = 128.95$ $P_{2017} = \text{RM}37.22$ (d) $I_{2023/2017} = 110 \times \frac{118}{100}$ $= 129.8$ $\bar{I} = \frac{110(0.06) + 148(0.3) + 129.8(0.1) + 120(0.3)}{0.06 + 0.3 + 0.1 + 0.3}$ $= 131.55$	1 1 1 1 1 1 1 1	10
15	(a) (i) $AC^2 = (12.7)^2 + (10.5)^2 - (2)(12.7)(10.5)(\cos 35^\circ)$ $AC = 7.285 \text{ cm}$ (ii) $\frac{\sin \theta}{7.285} = \frac{\sin 15}{3}$ $\theta = 38.94^\circ$ $\angle ABC = 180^\circ - 38.94^\circ$ $= 141.06^\circ$ (iii) Luas/Area of $\triangle ABC = \frac{1}{2} \times 3 \times 7.285 \times \sin 23.94^\circ$ $= 4.434 \text{ cm}^2$ atau/or Luas/Area $\triangle ACD = \frac{1}{2} \times 10.5 \times 12.7 \times \sin 35^\circ$ $= 38.24 \text{ cm}^2$ Luas sisi empat/Area of quadrilateral $ABCD = 4.434 + 38.24$ $= 42.674 \text{ cm}^2$ (b) $\sin 35^\circ = \frac{x}{10.5}$ $x = 6.023$ 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. (c)  $\frac{\sin \theta}{9.58} = \frac{\sin 15}{3}$ $\theta = 55.74^\circ$ $\angle B'A'C' = 180^\circ - 55.74^\circ$ $= 124.26^\circ$	1 1 1 1 1 1 1 1 1 1	10

PROGRAM TUISYEN RAKYAT SELANGOR



KATA ALUAN YAB DATO' MENTERI BESAR SELANGOR

Program Tuisyen Rakyat Selangor (PTRS) terus menjadi antara intervensi pendidikan strategik Kerajaan Negeri Selangor dalam memperkukuh prestasi akademik pelajar sekolah menengah, khususnya bagi menghadapi peperiksaan Sijil Pelajaran Malaysia (SPM).

Memasuki tahun 2026, pelaksanaan PTRS memberi tumpuan kepada pendekatan berasaskan hasil (outcome-based intervention) dengan sasaran meningkatkan penguasaan lapan (8) mata pelajaran teras iaitu Bahasa Melayu, Bahasa Inggeris, Matematik, Sejarah, Sains, Matematik Tambahan, Fizik dan Kimia dalam kalangan pelajar Tingkatan 4 dan Tingkatan 5.

Bagi tahun ini, program menyasarkan manfaat kepada sekurang-kurangnya 150,000 pelajar di seluruh Negeri Selangor, dengan penekanan kepada akses saksama, peningkatan kompetensi subjek kritikal serta pengurangan jurang pencapaian akademik antara sekolah dan daerah.

Sejak diperkenalkan pada tahun 2009 dan melalui fasa transformasi digital pascapandemik, modul latihan PTRS kini distrukturkan dalam bentuk hibrid; fizikal dan dalam talian bagi memastikan keberkesanan penyampaian serta kebolehcapaian yang lebih meluas. Platform digital yang dibangunkan telah membolehkan lebih ramai pelajar mengakses bahan pembelajaran secara fleksibel melalui peranti mudah alih, selaras dengan aspirasi pendigitalan pendidikan negeri.

Bagi memastikan kejayaan pelaksanaan PTRS tahun ini, Kerajaan Negeri Selangor telah memperuntukkan sebanyak RM11 juta, dengan pembiayaan serta pelaksanaan bersama oleh Jawatankuasa Tetap Pendidikan dan Modal Insan Negeri Selangor, Menteri Besar Selangor (Pemerbadanan) MBI serta Jabatan Pendidikan Negeri Selangor.

Kerajaan Negeri yakin bahawa PTRS 2026 bukan sahaja meningkatkan pencapaian akademik, malah memperkukuh kesiapsiagaan pelajar untuk melangkah ke pendidikan tinggi dan pasaran kerja yang semakin kompetitif. Pembangunan modal insan berkualiti kekal menjadi teras kepada agenda menjadikan Selangor sebagai negeri termaju, berdaya tahan dan berdaya saing di peringkat nasional dan serantau.

Komitmen ini mencerminkan iltizam Kerajaan Negeri dalam memastikan setiap anak Selangor diberi peluang yang adil untuk berjaya.



YAB DATO' SERI AMIRUDIN BIN SHARI

DATO' MENTERI BESAR SELANGOR

 ePTRS.my

Imbas kod QR
untuk ketahui lebih
lanjut tentang MBI



Imbas kod QR
untuk mendapatkan
jawapan



Koleksi
Video PdP



DIKUASAI OLEH:

