



PROGRAM TUISYEN RAKYAT SELANGOR



MATEMATIK

DWIBAHASA

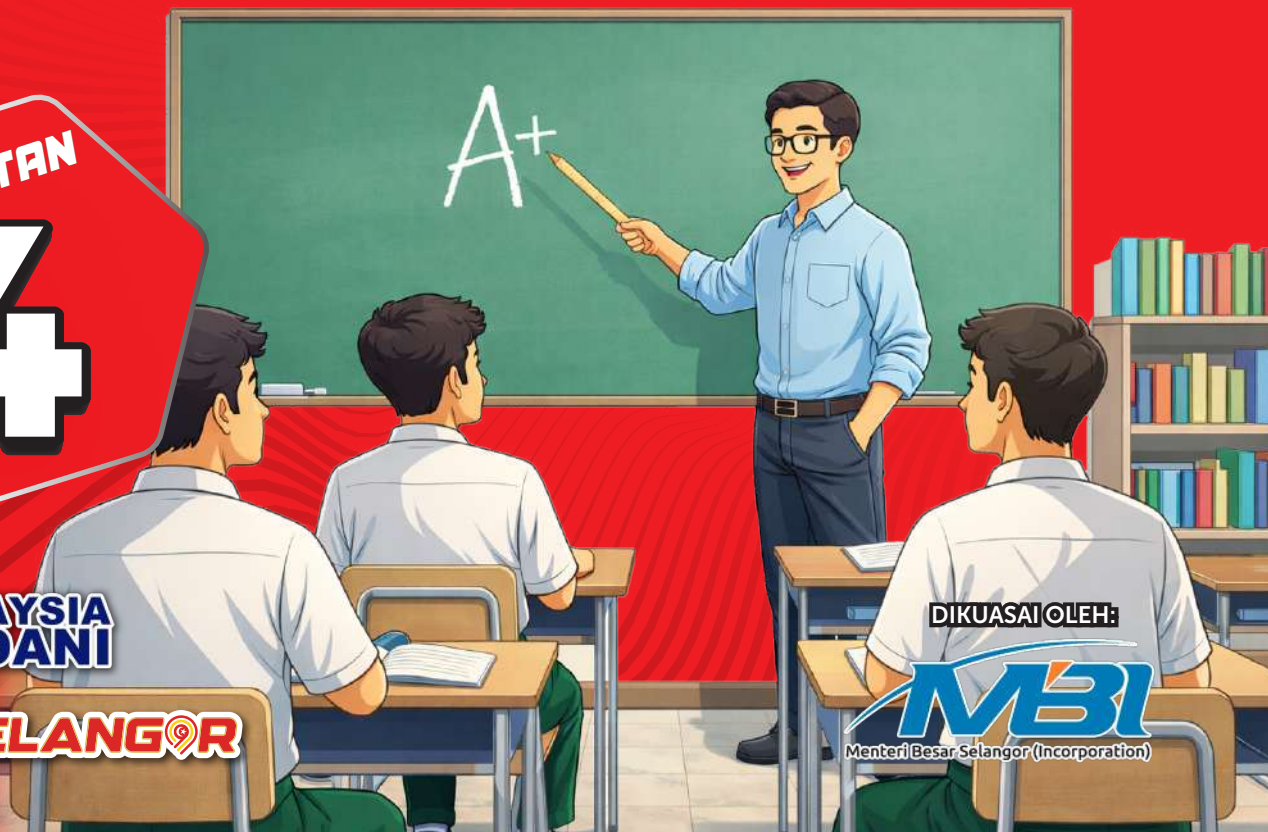
TINGKATAN

4



KITASELANGOR

DIKUASAI OLEH:



PROGRAM TUISYEN RAKYAT SELANGOR



MATEMATIK

DWIBAHASA

PANEL PENULIS

Norsiah binti Mohamed
SM Sains Hulu Selangor

Roshayati binti Salleh
SMK Bandar Saujana Putra

Maisarah binti Mohd Adnan
SMK Batu Laut

Norsiah binti Mohd Desa
SMK USJ 23

Premmalah a/p Subramaniam
SMK Dengkil

Haniza binti Abdul Rahman
SMK Serendah



Program Tuisyen Rakyat Selangor Matematik Tingkatan 4

CIRI-CIRI EKSklusif

- Modul dibina berdasarkan silibus Matematik KSSM dan disusun mengikut bab Tingkatan 4.
- Modul dilengkapi dengan analisis soalan SPM Matematik bagi tahun 2022 hingga tahun 2024 yang terperinci mengikut topik.
- Modul ini mengandungi Soalan Objektif (Kertas 1) dan Soalan Subjektif (Kertas 2) pada setiap bab.
- Soalan dibina berdasarkan Format SPM terkini.
- Latihan merangkumi pelbagai aras yang membolehkan guru mencakupi keperluan murid.
- Guru boleh mempraktikkan modul ini secara kaedah latih tubi berperingkat ataupun latih tubi sendiri kepada murid.
- Satu set Peperiksaan Akhir Sesi Akademik disediakan pada akhir modul.
- Jawapan disediakan bagi memberi panduan kepada guru dan murid untuk menjawab soalan.
- Modul ini mengandungi video ulasan jawapan bagi soalan yang terpilih.
- Penggubal berpengalaman luas sebagai penulis modul dalam mata pelajaran Matematik SPM.

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KOLEKSI VIDEO



JAWAPAN



FORMAT INSTRUMEN PEPERIKSAAN SPM MATEMATIK

Bil.	Perkara	Kertas 1 (1449/1)	Kertas 2 (1449/2)
1	Jenis Instrumen	Ujian Bertulis	
2	Jenis Item	Objektif Aneka Pilihan	• Subjektif Respons Terhadap • Subjektif Berstruktur
3	Bilangan Soalan	40 soalan (40 markah) (Jawab semua soalan)	Bahagian A: 10 soalan (40 markah) (Jawab semua soalan) Bahagian B: 5 soalan (45 markah) (Jawab semua soalan) Bahagian C: 2 soalan (15 markah) (Jawab satu soalan)
4	Jumlah Markah	40	100
5	Konstruk	• Mengingat dan Memahami • Mengaplikasi • Menganalisis	• Mengingat dan Memahami • Mengaplikasi • Menganalisis • Menilai • Mencipta
6	Tempoh Ujian	1 jam 30 minit	2 jam 30 minit
7	Cakupan Konstruk	Standard kandungan dan standard pembelajaran dalam Dokumen Standard Kurikulum dan Pentaksiran (DSKP) KSSM (Tingkatan 1 hingga Tingkatan 5)	
8	Aras Kesukaran	Rendah : Sederhana : Tinggi 5 : 3 : 2	
9	Kaedah Penskoran	Dikotomus	Analitik
10	Alatan Tambahan	Kalkulator saintifik yang tidak boleh diprogram	• Kalkulator saintifik yang tidak boleh diprogram • Alatan geometri

ANALISIS SOALAN SPM 2022-2024

MATEMATIK

KERTAS 1

TAJUK	SPM 2022	SPM 2023	SPM 2024
Tingkatan 1			
Nombor Nisbah	1	1	
Ungkapan Algebra			1
Persamaan Linear		1	1
Ketaksamaan Linear	1	1	1
Poligon Asas		1	
Perimeter dan Luas		2	
Pengendalian Data		2	
Tingkatan 2			
Pola dan Jujukan	1	1	1
Pemfaktoran dan Pecahan Algebra	1		
Poligon			1
Rumus Algebra	1		1
Bentuk Geometri Tiga Dimensi	2		
Graf Fungsi	1	1	
Laju dan Pecutan		1	
Kecerunan Garis Lurus	1		
Transformasi Isometri	1	1	1
Sukatan Kecenderungan Memusat	2		
Kebarangkalian Mudah	2	1	
Tingkatan 3			
Indeks	1		1
Matematik Pengguna: Simpanan dan Pelaburan, Kredit dan Hutang	1	1	
Sudut dan Tangen Bagi Bulatan	1	1	
Pelan dan Dongakan	1		
Lokus dalam Dua Dimensi			1
Garis Lurus			1
Tingkatan 4			
Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah			1
Asas Nombor	3	2	2
Penaakulan Logik	2	2	2
Operasi Set	3	2	2
Rangkaian dalam Teori Graf	1	1	1
Ketaksamaan Linear dalam Dua Pemboleh Ubah	1	2	
Graf Gerakan	1	2	2
Sukatan Serakan Data Tak Berkumpul	1	1	4
Kebarangkalian Peristiwa Bergabung		1	2
Tingkatan 5			
Ubahan	3	2	3
Matriks	2	2	2
Matematik Pengguna: Insurans		1	3
Matematik Pengguna: Percukaian	2	2	1
Kekongruenan, Pembesaran dan Gabungan Transformasi	1	1	2
Nisbah dan Graf Trigonometri	1	2	2
Sukatan Serakan Data Berkumpul	1	2	1
Jumlah Soalan	40	40	40

*Jadual menunjukkan bilangan soalan bagi tajuk yang keluar pada tahun tersebut.

KERTAS 2

TAJUK	SPM 2022			SPM 2023			SPM 2024		
	Bahagian			Bahagian			Bahagian		
	A	B	C	A	B	C	A	B	C
Tingkatan 1									
Persamaan Linear			3						
Garis dan Sudut		8					3		
Perimeter dan Luas	3								
Pengendalian Data									4, 4
Teorem Pythagoras						3			
Tingkatan 2									
Bentuk Geometri Tiga Dimensi			4			5			
Graf Fungsi				3			3		
Transformasi Isometri	3, 5								
Sukatan Kecenderungan Memusat			4						
Tingkatan 3									
Matematik Pengguna: Simpanan dan Pelaburan, Kredit dan Hutang		2	4						
Garis Lurus				3					
Tingkatan 4									
Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah	4					5, 3	4		4, 4
Penaakulan Logik	4			5			4		
Operasi Set		8		5				9	
Rangkaian dalam Teori Graf			4		9		4		
Ketaksamaan Linear Dalam Dua Pemboleh Ubah		9		4				9	
Graf Gerakan			4, 3	4			5		
Sukatan Serakan Data Tak Berkumpul	3			3		4		8	
Kebarangkalian Peristiwa Bergabung			4			3			
Matematik Pengguna: Pengurusan Kewangan	4				8		4		
Tingkatan 5									
Ubahan									2, 2
Matriks	5				10				5, 5
Matematik Pengguna: Insurans	4			4			3		
Matematik Pengguna: Percubaian		8		5				10	
Kekongruenan, Pembesaran dan Gabungan Transformasi				4				9	
Nisbah dan Graf Trigonometri	5				8	4	4		
Sukatan Serakan Data Berkumpul		10			10	3	6		
Jumlah Markah	40	45	30	40	45	30	40	45	30

*Jadual menunjukkan markah setiap soalan bagi tajuk yang keluar pada tahun tersebut.

SENARAI RUMUS

NOMBOR DAN OPERASI NUMBERS AND OPERATIONS

- 1 $a^m \times a^n = a^{m+n}$
- 2 $a^m \div a^n = a^{m-n}$
- 3 $(a^m)^n = a^{mn}$
- 4 $a^{\frac{m}{n}} = (a^{\frac{1}{n}})^m$
- 5 $a^{\frac{m}{n}} = (a^m)^{\frac{1}{n}} = (a^{\frac{1}{n}})^m$
- 6 $a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$
- 7 Faedah mudah / Simple interest, $I = Prt$
- 8 Nilai matang / Maturity value,

$$MV = P \left(1 + \frac{r}{n} \right)^{nt}$$
- 9 Jumlah bayaran balik / Total repayment, $A = P + Prt$
- 10 Premium

$$= \frac{\text{Nilai muka polisi}}{\text{RMx}} \times (\text{Kadar premium per RMx})$$

$$\text{Premium} = \frac{\text{Face value of policy}}{\text{RMx}} \times (\text{Premium rate per RMx})$$
- 11 Jumlah insurans yang harus dibeli

$$= \left(\begin{array}{c} \text{Peratusan} \\ \text{ko-insurans} \end{array} \right) \times \left(\begin{array}{c} \text{Nilai boleh} \\ \text{insurans harta} \end{array} \right)$$

$$\text{Amount of required insurance} = \left(\begin{array}{c} \text{Percentage of} \\ \text{co-insurance} \end{array} \right) \times \left(\begin{array}{c} \text{Insurance value} \\ \text{of property} \end{array} \right)$$

PERKAITAN DAN ALGEBRA RELATIONSHIP AND ALGEBRA

- 1 Jarak / Distance $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- 2 Titik tengah / Midpoint, $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
- 3 Laju purata $= \frac{\text{Jumlah jarak}}{\text{Jumlah masa}}$

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$
- 4 $m = \frac{y_2 - y_1}{x_2 - x_1}$
- 5 $A^{-1} = \frac{1}{ad - bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$
- 6 $m = -\frac{\text{pintasan-y}}{\text{pintasan-x}}$

$$m = -\frac{\text{y-intercept}}{\text{x-intercept}}$$

SUKATAN DAN GEOMETRI MEASUREMENT AND GEOMETRY

- 1 Teorem Pythagoras / Pythagoras Theorem, $c^2 = a^2 + b^2$
- 2 Hasil tambah sudut pedalaman poligon

$$\text{Sum of interior angles of a polygon} = (n - 2) \times 180^\circ$$
- 3 Lilitan bulatan $= \pi d = 2\pi r$

$$\text{Circumference of circle} = \pi d = 2\pi r$$
- 4 Luas bulatan $= \pi r^2$

$$\text{Area of circle} = \pi r^2$$
- 5 $\frac{\text{Panjang lengkok}}{2\pi r} = \frac{\theta}{360^\circ}$

$$\frac{\text{Arc length}}{2\pi r} = \frac{\theta}{360^\circ}$$
- 6 $\frac{\text{Luas sektor}}{\pi r^2} = \frac{\theta}{360^\circ}$

$$\frac{\text{Area of sector}}{\pi r^2} = \frac{\theta}{360^\circ}$$
- 7 Luas layang-layang

$$= \frac{1}{2} \times \text{hasil darab panjang dua pepenjuru}$$

$$\text{Area of kite} = \frac{1}{2} \times \text{product of two diagonals}$$
- 8 Luas trapezium

$$= \frac{1}{2} \times \text{hasil tambah dua sisi selari} \times \text{tinggi}$$

$$\text{Area of trapezium} = \frac{1}{2} \times \text{sum of two parallel sides} \times \text{height}$$
- 9 Luas permukaan silinder $= 2\pi r^2 + 2\pi rh$

$$\text{Surface area of cylinder} = 2\pi r^2 + 2\pi rh$$
- 10 Luas permukaan kon $= \pi r^2 + \pi rs$

$$\text{Surface area of cone} = \pi r^2 + \pi rs$$
- 11 Luas permukaan sfera $= 4\pi r^2$

$$\text{Surface area of sphere} = 4\pi r^2$$
- 12 Isi padu prisma $= \text{luas keratan rentas} \times \text{tinggi}$

$$\text{Volume of prism} = \text{area of cross section} \times \text{height}$$
- 13 Isi padu silinder $= \pi r^2 h$

$$\text{Volume of cylinder} = \pi r^2 h$$

14 Isi padu kon = $\frac{1}{3}\pi j^2 t$

$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h$$

15 Isi padu sfera = $\frac{4}{3}\pi j^3$

$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

16 Isi padu piramid = $\frac{1}{3} \times \text{luas tapak} \times \text{tinggi}$

$$\text{Volume of pyramid} = \frac{1}{3} \times \text{base area} \times \text{height}$$

17 Faktor skala, $k = \frac{PA'}{PA}$

$$\text{Scale factor, } k = \frac{PA'}{PA}$$

18 Luas imej = $k^2 \times \text{luas objek}$

$$\text{Area of image} = k^2 \times \text{area of object}$$

STATISTIK DAN KEBARANGKALIAN STATISTICS AND PROBABILITY

1 Min / Mean, $\bar{x} = \frac{\sum x}{N}$

2 Min / Mean, $\bar{x} = \frac{\sum fx}{\sum f}$

3 Varians / Variance, $\sigma^2 = \frac{\sum x^2}{N} - \bar{x}^2 = \frac{\sum (x - \bar{x})^2}{N}$

4 Varians / Variance, $\sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2 = \frac{\sum f(x - \bar{x})^2}{\sum f}$

5 Sisihan piawai / Standard deviation, $\sigma = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2} = \sqrt{\frac{\sum f(x - \bar{x})^2}{N}}$

6 Sisihan piawai / Standard deviation, $\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2} = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}}$

7 $P(A) = \frac{n(A)}{n(S)}$

8 $P(A') = 1 - P(A)$

Ulang Kaji Menengah Rendah

TOPIK
1
Matematik Pengguna: Simpanan dan Pelaburan, Kredit dan Hutang
Consumer Mathematics Savings and Investments, Credit and Debt
NOTA EFEKTIF
Jenis-jenis Akaun
Types of Accounts
1 Akaun Simpanan
Savings Account
2 Akaun Simpanan Tetap
Fixed Deposit Account
3 Akaun Semasa
Current Account
Perbandingan Simpanan dan Pelaburan
Comparison of Savings and Investments

Simpanan/Pelaburan <i>Savings/Investment</i>	Simpanan <i>Saving</i>	Simpanan tetap <i>Fixed deposit</i>	Saham syarikat <i>Company shares</i>	Amanah saham <i>Unit trust</i>	Hartanah <i>Real estate</i>
Tahap risiko <i>Risk level</i>	Bebas risiko <i>Risk-free</i>	Bebas risiko <i>Risk-free</i>	Tinggi <i>High</i>	Rendah <i>Low</i>	Rendah <i>Low</i>
Tahap pulangan <i>Return level</i>	Rendah <i>Low</i>	Rendah <i>Low</i>	Tinggi <i>High</i>	Sederhana <i>Moderate</i>	Tinggi <i>High</i>
Tahap kecairan <i>Liquidity level</i>	Tinggi <i>High</i>	Tinggi <i>High</i>	Sederhana <i>Moderate</i>	Tinggi <i>High</i>	Rendah <i>Low</i>

Rumus/Formula
Faedah mudah
Simple interest

$$I = Prt$$

Nilai matang
Matured value

$$MV = P \left(\frac{1+r}{n} \right)^{nt}$$

Jumlah bayaran balik
Total repayment

$$A = P + Prt$$

I = faedah / interest
P = prinsipal / principal
r = kadar faedah / interest rate
t = tempoh (tahun) / time (years)
n = bilangan kali faedah dikompaun dalam setahun
number of periods the interest is compounded per year


LATIHAN INTENSIF

- 1 Murni membeli sebuah peti ais berharga RM3 400. Dia membayar deposit sebanyak 10% daripada harga tersebut dan membayar baki secara ansuran bulanan selama 18 bulan. Kadar faedah mudah yang dikenakan ialah 8% setahun.

Murni bought a refrigerator costing RM3 400. She paid a deposit of 10% of the price and paid the balance in monthly installments over 18 months. The simple interest rate charged is 8% per annum.

Berapakah ansuran bulannannya?

What is her monthly installment?

[4 markah/marks]

Jawapan/Answer:

- 2 Puan Aisyah menyimpan RM60 000 dalam akaun simpanannya di Bank Sejahtera, mengikut prinsip wadiah sejak Januari 2025. Pada Disember 2025, beliau telah mendapat RM61 500 sebagai pulangan daripada simpanannya yang merupakan hibah (hadiah) daripada Bank Sejahtera.

Puan Aishah deposited RM60 000 into her savings account at Bank Sejahtera, according to the principle of wadiah since Januari 2025. In December 2025, she earned RM61 500 as a return on her savings which is a hibah (gift) from Bank Sejahtera.

Hitung jumlah wang dalam akaun simpanannya pada Disember 2027.

Calculate the amount of money in her savings account in December 2027.

[5 markah/marks]

Jawapan/Answer:

- 3 Puan Rafidah membuat pinjaman peribadi sebanyak RM50 000 dari Bank Kenanga dengan kadar faedah 7% atas baki. Tempoh bayaran balik adalah selama 5 tahun, dan ansuran bulanan yang perlu dibayar adalah sebanyak RM480.

Puan Rafidah made a personal loan of RM50 000 from Bank Kenanga with an interest rate of 7% on the balance. The repayment period is 5 years, and the monthly instalments to be paid is RM480.

Hitung baki pinjaman selepas Puan Rafidah membuat bayaran ansuran tiga bulan pertama.

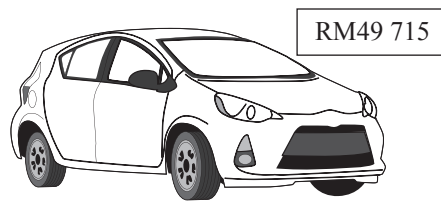
Calculate the balance of the loan after Puan Rafidah makes the first three instalments.

[5 markah/marks]

Jawapan/Answer:

- 4 Puan Irfa membeli sebuah kereta untuk anaknya. Setelah 5 tahun, anaknya ingin melangsaikan baki pinjaman kereta tersebut pada pihak bank.

Puan Irfa bought a car for her son. After 5 years, her son wants to pay off the remaining loan of the car to the bank.



Rajah 1 / Diagram 1

Hitung jumlah baki pinjaman kereta tersebut, jika Puan Irfa telah membayar pendahuluan sebanyak 10% dengan kadar faedah 3.5% bagi pinjaman selama 9 tahun.

Calculate the total balance of the car loan, if Puan Irfa has paid 10% down payment with an interest rate of 3.5% for the loan over 9 years.

[5 markah/marks]

Jawapan/Answer:

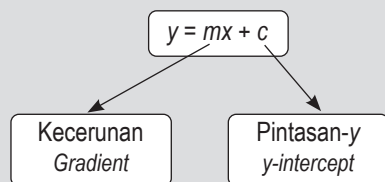


TOPIK 2
Garis Lurus
Straight Lines

NOTA EFEKTIF

1 Persamaan garis lurus:

Equation of a straight line:

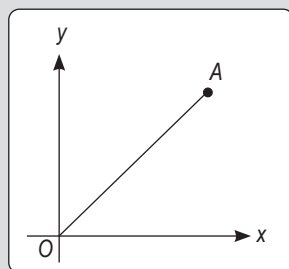
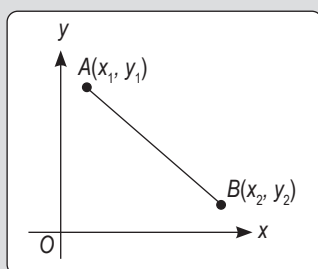


3 Kecerunan garis lurus, m :

The gradient of a straight line, m :

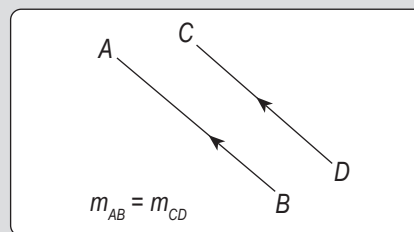
(a) $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$
(melalui dua titik)
(passes through two points)

(b) $m = \frac{y}{x}$
(melalui asalan)
(passes the origin)



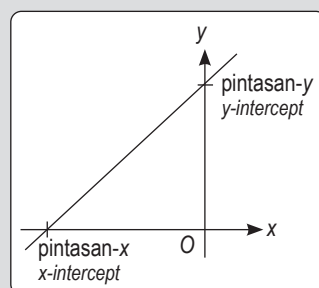
2 Garis selari mempunyai kecerunan yang sama.

The parallel lines have the same gradient.



(c) $m = -\frac{\text{pintasan-y}}{\text{pintasan-x}}$
 $m = -\frac{\text{y-intercept}}{\text{x-intercept}}$
(melalui pintasan-x dan pintasan-y)
(passes x-intercept and y-intercept)

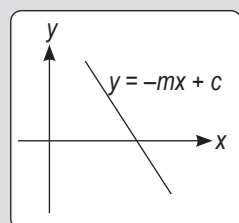
Pintasan-y adalah apabila $x = 0$.
The y-intercept is when $x = 0$.
Pintasan-x adalah apabila $y = 0$.
The x-intercept is when $y = 0$.



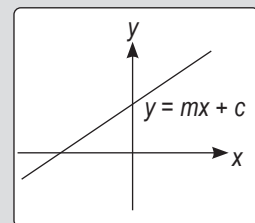
4 Persamaan garis lurus.

The equation of the straight lines.

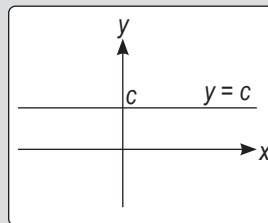
(a)



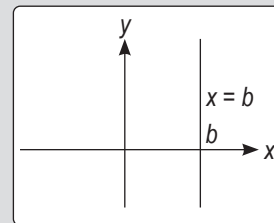
(b)



(c)



(d)



LATIHAN INTENSIF

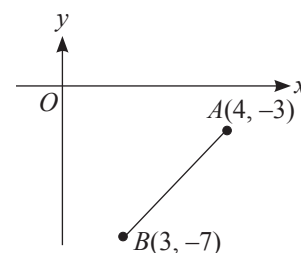
1 Rajah 1 menunjukkan garis lurus yang melalui titik $A(4, -3)$ dan $B(3, -7)$.

Diagram 1 shows a straight line that passes through points $A(4, -3)$ and $B(3, -7)$.

Cari kecerunan bagi garis lurus itu.

Find the gradient of the straight line.

- A 4 C $\frac{7}{10}$
B $\frac{1}{4}$ D $\frac{10}{7}$



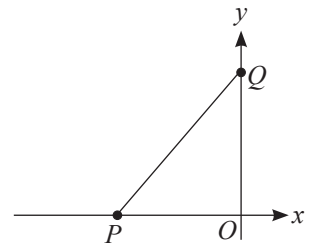
Rajah 1 / Diagram 1

- 2 Rajah 2 menunjukkan garis lurus PQ pada suatu satah Cartes.
Diagram 2 shows a straight-line PQ on a Cartesian plane.

Diberi bahawa $OP = \frac{3}{4}OQ$. Cari kecerunan garis lurus PQ .

It is given that $OP = \frac{3}{4}OQ$. Find the gradient of the straight line PQ .

- A $-\frac{4}{3}$ C $\frac{3}{4}$
B $-\frac{3}{4}$ D $\frac{4}{3}$



Rajah 2 / Diagram 2

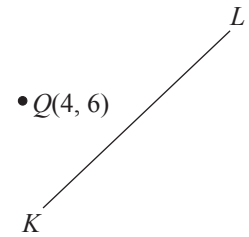
- 3 Rajah 3 menunjukkan garis lurus KL dengan persamaan $2y = -3x + 8$.
Diagram 3 shows the straight line KL with an equation of $2y = -3x + 8$.

Tentukan persamaan garis lurus yang selari dengan KL dan melalui titik Q .

Determine the equation of a straight line parallel to KL and passes through point Q .

[3 markah/marks]

Jawapan/Answer:



Rajah 3 / Diagram 3

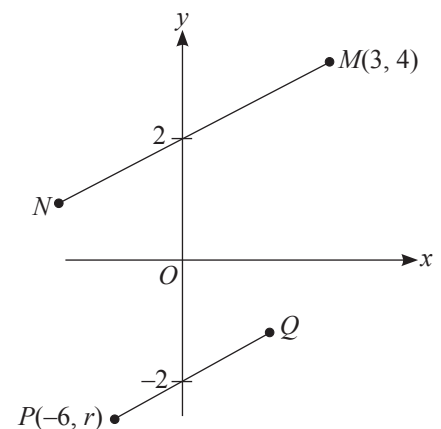
- 4 Rajah 4 menunjukkan dua garis lurus, MN dan PQ , dilukis pada suatu satah Cartes. Garis lurus MN selari dengan garis lurus PQ .
Diagram 4 shows two straight lines, MN and PQ , drawn on a Cartesian plane. The straight line MN is parallel to the straight line PQ .

(a) Cari persamaan garis lurus MN .
Find the equation of the straight line MN .

(b) Cari nilai r .
Find the value of r .

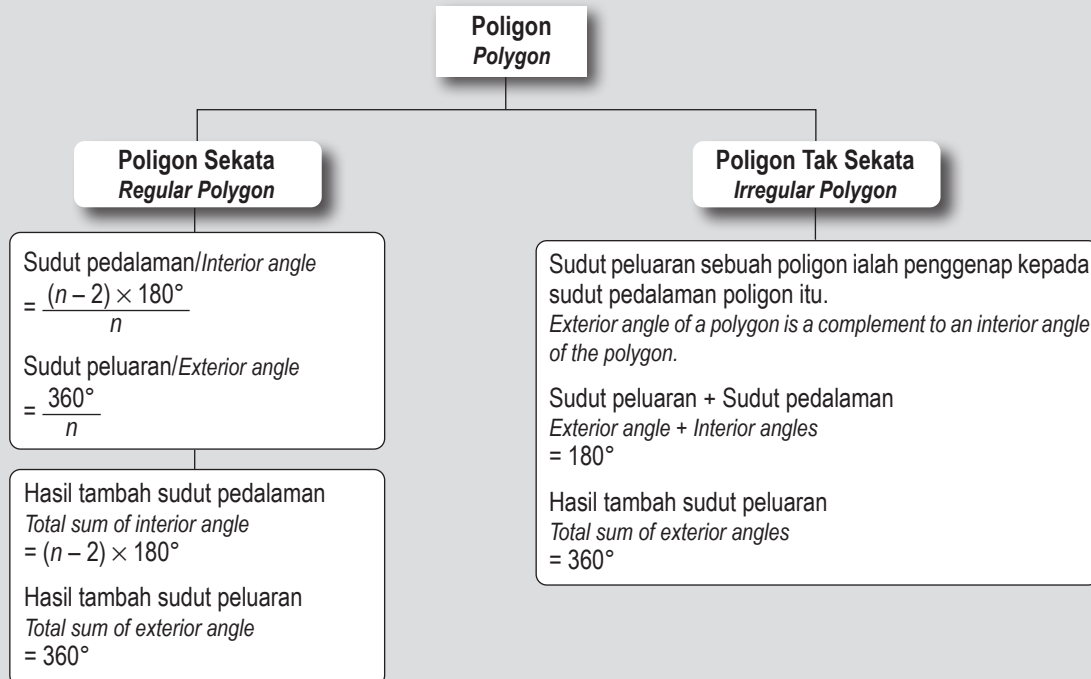
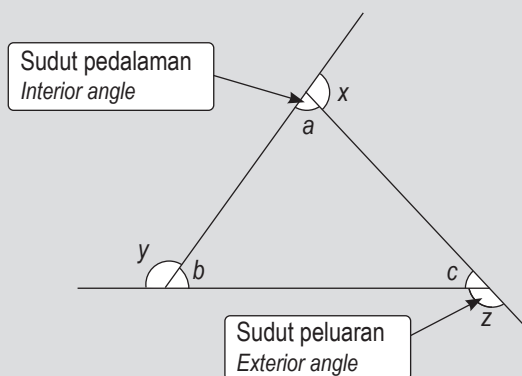
[4 markah/marks]

Jawapan/Answer:



Rajah 4 / Diagram 4

TOPIK
3 Poligon
 Polygon

NOTA EFEKTIF

Sudut Pedalaman dan Sudut Peluaran Poligon
Interior Angles and Exterior Angles of Polygons

Sudut pedalaman
Interior angle

- Sudut yang terbentuk oleh dua sisi bersebelahan di dalam sesuatu poligon.
An angle that is formed by two adjacent sides of a polygon.
- Sudut a, b dan c ialah sudut pedalaman.
Angles a, b, and c are interior angles.

Sudut peluaran
Exterior angle

- Sudut yang terbentuk apabila satu sisi poligon dipanjangkan.
An angle that is formed when one side of the polygon is extended.
- Sudut x, y dan z ialah sudut peluaran.
Angles x, y, and z are exterior angles.

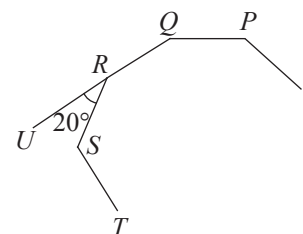

LATIHAN INTENSIF

- 1 Dalam Rajah 1, P, Q, R, S dan T ialah beberapa bucu bagi sebuah poligon sekata. Diberi QRU ialah satu garis lurus. Hitung bilangan sisi poligon sekata itu.

In Diagram 1, P, Q, R, S, and T are several vertices of a regular polygon. Given that QRU is a straight line. Calculate the number of sides of the regular polygon.

[2 markah/marks]

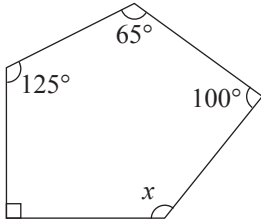
Jawapan/Answer:



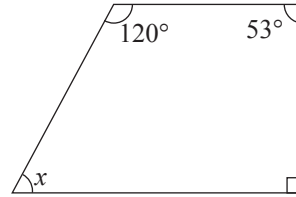
Rajah 1 / Diagram 1

- 2 Hitung nilai x bagi setiap yang berikut.
Calculate the value of x for each of the following.

(a)



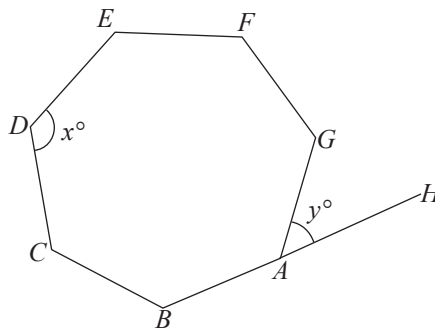
(b)



[2 markah/marks]

Jawapan/Answer:

- 3 Rajah 2 menunjukkan heptagon sekata $ABCDEFGH$ dan garis lurus BAH .
Diagram 2 shows a regular heptagon $ABCDEFGH$ and the straight line BAH .



Rajah 2 / Diagram 2

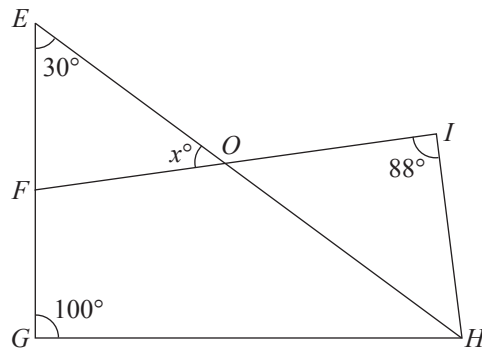
Hitung nilai $y - x$.
Find the value of $y - x$.

[3 markah/marks]

Jawapan/Answer:

- 4 Dalam Rajah 3, $EFGHIO$ ialah sebuah poligon tidak sekata. EOH dan FOI ialah garis lurus. Diberi $\angle EHG$ ialah dua kali $\angle EHI$.

Diagram 3 shows, $EFGHIO$ is an irregular polygon. EOH and FOI are straight lines. Given $\angle EHG$ is twice $\angle EHI$.



Rajah 3 / Diagram 3

Cari nilai x .

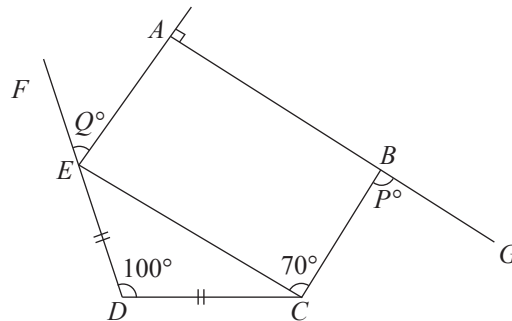
Find the value of x .

[3 markah/marks]

Jawapan/Answer:

- 5 Rajah 4 menunjukkan sebuah pentagon, $ABCDE$ dan sebuah segi tiga sama kaki, CDE . ABG dan DEF ialah garis lurus.

Diagram 4 shows a pentagon, $ABCDE$ and an isosceles triangle, CDE . ABG and DEF are straight lines.



Rajah 4 / Diagram 4

Cari nilai $P + Q$.

Find the value of $P + Q$.

[3 markah/marks]

Jawapan/Answer:

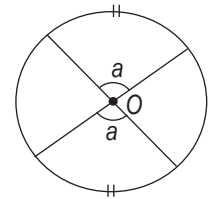
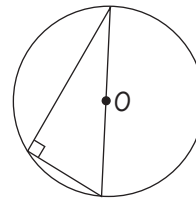
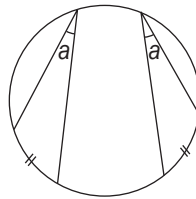
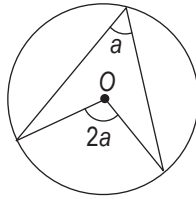
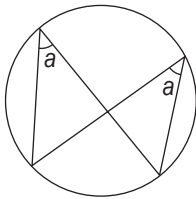
TOPIK
4

Sudut dan Tangen bagi Bulatan
Angles and Tangents of Circles

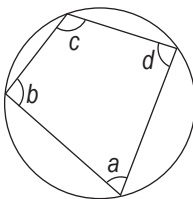


NOTA EFEKTIF

Ciri-ciri Sudut dalam Bulatan
Properties of Angles in a Circle

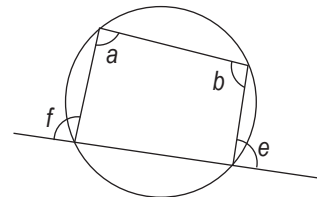


Sisi Empat Kitaran
Cyclic Quadrilaterals



$$\angle a + \angle c = 180^\circ$$

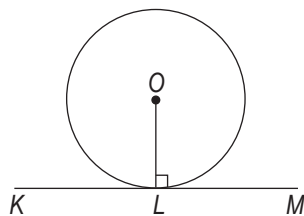
$$\angle b + \angle d = 180^\circ$$



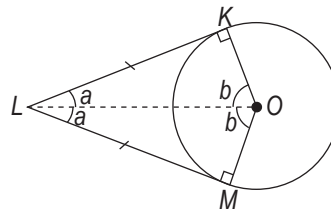
$$\angle a = \angle e$$

$$\angle b = \angle f$$

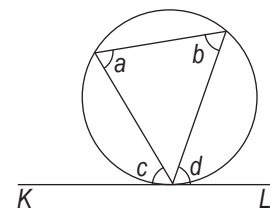
Tangen kepada Bulatan
Tangents to Circles



OL = jejari
radius
KLM = tangen kepada bulatan
tangent to circle



KL dan ML ialah tangen.
KL and ML are tangents.
 $\angle KLM + \angle KOM = 180^\circ$



$$\angle a = \angle d$$

$$\angle b = \angle c$$

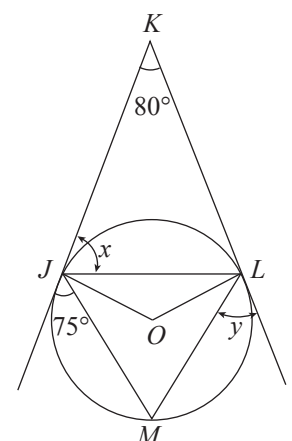


LATIHAN INTENSIF

- 1 Rajah 1 menunjukkan dua tangen kepada suatu bulatan berpusat O , masing-masing di titik J dan L .
Diagram 1 shows two tangents to a circle with centre O at points J and L respectively.
Cari nilai x dan nilai y .
Find the value of x and value of y .

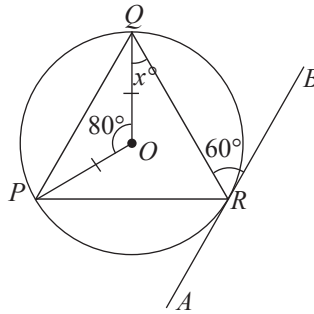
Jawapan/Answer:

[3 markah/marks]



Rajah 1 / Diagram 1

Ulang Kaji Menengah Rendah



Cari nilai x .
Find the value of x .

Jawapan/Answer:

-
- A diagram showing two circles of different sizes touching a horizontal line at points A and B . The centers of the circles are M and N . A line segment connects M and N . The angle between the vertical radius MA and the segment MN is labeled y . The angle between the vertical radius NB and the segment MN is labeled x .

Diberi bahawa AB ialah tangen sepunya kepada kedua-dua bulatan, hitung nilai y dan nilai x .
Given that AB is a common tangent to both circles, calculate the value of y and of x .

Jawapan/Answer:

TOPIK
5Rumus Algebra
Algebraic FormulaeUlang Kaji
Menengah Rendah

NOTA EFEKTIF

Rumus Algebra
Algebraic Formulae

- Rumus Algebra** menggabungkan ungkapan algebra dengan operasi tambah, tolak, darab atau bahagi dalam bentuk persamaan.

Algebraic formulae connect the algebraic expressions through addition, subtraction, multiplication, and division in an equation form.

Contoh/Example:

$$\begin{array}{ll} 1 & y = 2x + 5 \\ 2 & p = \frac{7q-4}{r} \end{array} \quad \begin{array}{ll} 3 & A = \frac{1}{2}bh \\ 4 & V = \pi r^2 h \end{array}$$

- Suatu nilai **pemboleh ubah** dalam rumus algebra boleh diperoleh apabila diberi suatu nilai pemboleh ubah yang lain.

*The value of the **variable** in an algebraic formula can be obtained when the values of the other variables are given.*

Contoh/Example:

Diberi $p = \frac{7q-4}{r}$, hitung nilai r , jika $p = 6$, $q = 4$.

Maka, $r = 4$.

Given $p = \frac{7q-4}{r}$, calculate the value of r , if $p = 6$, $q = 4$.

Thus, $r = 4$.

- Perkara rumus** diwakili oleh abjad.

***Subject of formula** is represented by a letter.*

- Perkara rumus boleh berubah bergantung kepada nilai pemboleh ubah yang ingin diperoleh.

Subject of formula can be changed according to the value of the variable.

Contoh/Example:

$$x = -8 - 4y \qquad y = \frac{-x-8}{4r}$$

- Penyelesaian masalah** melibatkan penukaran perkara rumus, gabungan operasi asas aritmetik, kuasa dan punca kuasa.

***Solving problems** involves changing the subject of a formula, combination of basic mathematical operations, square and square root.*



LATIHAN INTENSIF

- 1 Ungkapkan huruf dalam kurungan sebagai perkara rumus.

Express the letters in the brackets as the subject of formula.

$$\begin{array}{ll} (a) & 5m + 3n = 7 + n \qquad [n] \\ (b) & p - 4 = \frac{2p}{5q} \qquad [p] \\ (c) & 2k^2 + 5n = 3p \qquad [k] \\ (d) & 2p = \sqrt{\frac{m-n}{2}} \qquad [m] \end{array}$$

[4 markah/marks]

Jawapan/Answer:

- 2 (a) Diberi $f = 5g + h$, hitung nilai g apabila $f = 8$ dan $h = 3$.
Given that $f = 5g + h$, calculate the value of g when $f = 8$ and $h = 3$.
- (b) Diberi $p - q = \frac{p+3}{k}$, hitung nilai p apabila $q = 4$ dan $k = \frac{1}{2}$.
Given that $p - q = \frac{p+3}{k}$, calculate the value of p when $q = 4$ and $k = \frac{1}{2}$.

[4 markah/marks]

Jawapan/Answer:

- 3 Luas permukaan melengkung, $L \text{ cm}^2$, sebuah silinder diberikan dengan rumus $L = 2\pi jt$.

The curved surface area, $L \text{ cm}^2$, of a cylinder is given by the formula $L = 2\pi jt$.

- (a) Bina satu rumus bagi jejari, $j \text{ cm}$, silinder itu.
Construct a formula for the radius, $j \text{ cm}$, of the cylinder.

- (b) Cari nilai j apabila $L = 120$, $t = 12$ dan $\pi = \frac{22}{7}$.
Find the value of j when $L = 120$, $t = 12$ and $\pi = \frac{22}{7}$.

[3 markah/marks]

Jawapan/Answer:



NOTA EFEKTIF

Hukum indeks <i>Law of indices</i>	Rumus <i>Formula</i>	Contoh <i>Example</i>
Pendaraban <i>Multiplication</i>	$a^m \times a^n = a^{m+n}$	$4^3 \times 4^2 = 4^5$
Pembahagian <i>Division</i>	$a^m \div a^n = a^{m-n}$	$7^8 \div 7^2 = 7^6$
Kuasa <i>Power</i>	$(a^m)^n = a^{mn}$	$(5^4)^2 = 5^8$
Indeks sifar <i>Zero index</i>	$a^0 = 1 ; a \neq 0$	$9^0 = 1$
Indeks negatif <i>Negative index</i>	$a^{-n} = \frac{1}{a^n} ; a \neq 0$	$6^{-2} = \frac{1}{6^2}$
Indeks pecahan <i>Fractional index</i>	$a^{\frac{1}{n}} = \sqrt[n]{a}$	$8^{\frac{1}{3}} = \sqrt[3]{8} = 2$
	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$	$8^{\frac{2}{3}} = \sqrt[3]{8^2} = 4$



LATIHAN INTENSIF

- 1 Permudahkan setiap yang berikut dan tulis jawapan dalam bentuk indeks.

Simplify each of the followings and write the answer in index form.

(a) $g^4 \times g^6 \times h^4 \times g^3 \times h^8 \times h^2$

(b) $\frac{50x^2y^{12}z}{10xyz}$

[2 markah/marks]

Jawapan/Answer:

- 2 Diberi $4^m \times 4^3 = 4\,096$. Cari nilai m .

Given $4^m \times 4^3 = 4\,096$. Find the value of m .

[2 markah/marks]

Jawapan/Answer:

- 3 Diberi bahawa $\frac{4^{12} \times 7^n}{4^m \times 7^4} = 784$. Cari nilai bagi $\frac{n}{m}$.

Given that $\frac{4^{12} \times 7^n}{4^m \times 7^4} = 784$. Find the value of $\frac{n}{m}$.

[4 markah/marks]

Jawapan/Answer:

- 4 Hitung nilai p bagi $(x^2)^{4p} \times x^{(3p-2)} = x^{(30-5p)}$.
Calculate the value of p for $(x^2)^{4p} \times x^{(3p-2)} = x^{(30-5p)}$.

[2 markah/marks]

Jawapan/Answer:

- 5 Darwish membeli $2^{(x-2)}$ biji durian pada harga RM32 sebiji dengan membayar RM $2^{(y+6)}$. Shazmin membeli $5^{(-2x+9)}$ biji durian pada harga RM 5^y dengan membayar RM 5^2 . Cari nilai x dan nilai y .
Darwish bought $2^{(x-2)}$ durians at RM32 each by paying RM $2^{(y+6)}$. Shazmin bought $5^{(-2x+9)}$ durians at RM 5^y by paying RM 5^2 . Find the value of x and the value of y .

[3 markah/marks]

Jawapan/Answer:

BAB 1

Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah *Quadratic Functions and Equations in One Variable*


 VIDEO
PEMBELAJARAN


NOTA EFEKTIF

Ungkapan Kuadratik dalam Satu Pemboleh Ubah

Quadratic Expressions in One Variable

- 1 Bentuk am $ax^2 + bx + c$ a, b dan c ialah pemalar, $a \neq 0$ dan x sebagai pemboleh ubah (**satu** pemboleh ubah).
*The general form where a, b and c are constants, $a \neq 0$ and x as a variable (**one** variable).*
- 2 Kuasa tertinggi pemboleh ubah ialah dua.
The highest power of a variable is two.

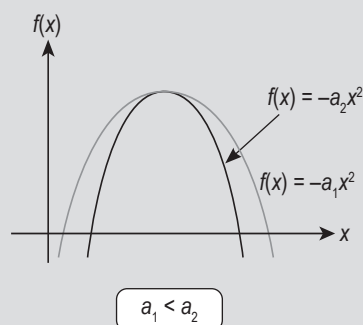
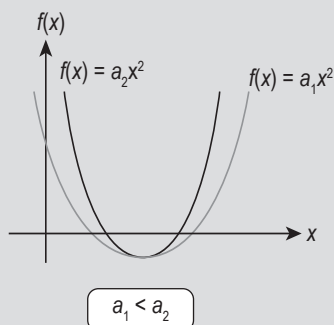
Fungsi Kuadratik

Quadratic Function

- 1 Bentuk am $f(x) = ax^2 + bx + c$
General form

2		Bentuk graf Shape of graph	 $a > 0$	 $a < 0$
Paksi simetri Axis of symmetry $x = -\frac{b}{2a}$	$b < 0$	 $f(x)$ x O	 $f(x)$ x O	
	$b > 0$	 $f(x)$ x O	 $f(x)$ x O	
	$b = 0$	 $f(x)$ x O	 $f(x)$ x O	
Pintasan-y y-intercept		 $f(x)$ c O x	 $f(x)$ c O x	
Titik minimum/maksimum Maximum/minimum point		 $f(x)$ x O Titik minimum Minimum point	 $f(x)$ x O Titik maksimum Maximum point	

- 3 Perubahan nilai a menentukan kelebaran bentuk lengkung graf.
The changing value of a determines the width of the curved shape of the graph.



Kaedah Pemfaktoran

Factorisation Method

Kaedah pemfaktoran memerlukan persamaan kuadrat dalam bentuk $ax^2 + bx + c = 0$ ditulis dalam bentuk $(x + a)(x + b) = 0$. Maka, punca-punca persamaan kuadrat ialah $-a$ dan $-b$.

The factorisation method requires a quadratic equation in the general form $ax^2 + bx + c = 0$ to be written in the form $(x + a)(x + b) = 0$. Then, the roots of the quadratic equations are $-a$ and $-b$.

Melakar Graf Fungsi Kuadrat

Sketch Graphs of Quadratic Functions

Langkah-langkah untuk melakar graf fungsi kuadrat $f(x) = x^2 - 5x + 4$.

Steps to sketch the graph of quadratic function $f(x) = x^2 - 5x + 4$.

- ① Tentukan bentuk graf.
Determine the shape of the graph.
- ② Tentukan pintasan-y.
Determine the y-intercept.
- ③ Tentukan pintasan-x.
Determine the x-intercept.
- ④ Menentukan paksi simetri.
Determine the axis of symmetry.
- ⑤ Menentukan titik minimum/maksimum.
Determine the minimum/maximum point.
- ⑥ Lakarkan graf.
Sketch the graph.

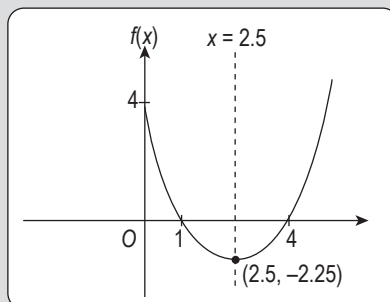
$$a > 0 \rightarrow \cup$$

$$y = 4$$

$$\begin{aligned} x^2 - 5x + 4 &= 0 \\ (x - 4)(x - 1) &= 0 \\ x &= 4, 1 \end{aligned}$$

$$\begin{aligned} x &= -\frac{(-5)}{2(1)} \\ &= 2.5 \end{aligned}$$

$$\begin{aligned} y &= (2.5)^2 - 5(2.5) + 4 \\ &= -2.25 \\ \therefore (2.5, -2.25) \end{aligned}$$



KALKULATOR

$$x^2 - 5x + 4 = 0$$

Tekan/Press:

MODE MODE MODE 1 ► 2

$$a? \rightarrow 1 =$$

$$b? \rightarrow - 5 =$$

$$c? \rightarrow 4 =$$

$$x = 4, 1$$



LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

1 Permudahkan/Simplify:

$$2(2y^2 + 1) - (2y - 5)^2$$

- A $-22y + 25$
- B $-20y + 23$
- C $22y - 25$
- D $20y - 23$

2 Antara berikut, yang manakah ialah persamaan kuadratik?

Which of the following is a quadratic equation?

- A $2x^2 + 4x - 8$
- B $3x^2 - 4.5x = 3$
- C $2x^2 - 7x + 4 = 0$
- D $\frac{3}{x^3} + 3x = 6$

3 Cari persamaan paksi simetri bagi fungsi kuadratik $g(x) = 2x^2 + 4x - 3$.

Find the equation of the axis of symmetry for the quadratic function $g(x) = 2x^2 + 4x - 3$.

- A $x = 1$
- B $x = -3$
- C $x = -2$
- D $x = -1$

4 Selesaikan/Solve:

$$2k + 1 = \frac{16 - 3k}{k}$$

- A $k = -\frac{1}{2}, 4$
- B $k = \frac{1}{2}, -4$
- C $k = -4, k = 2$
- D $k = 4, k = -2$

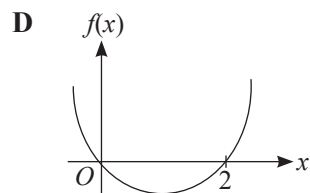
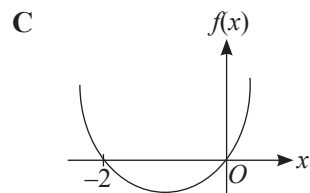
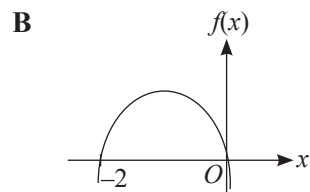
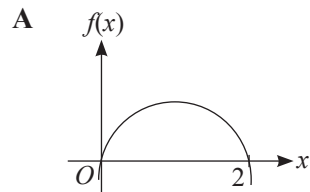
5 Antara fungsi kuadratik berikut, yang manakah tidak mempunyai titik maksimum?

Which of the following quadratic functions does not have a maximum point?

- A $f(x) = -3x - x^2$
- B $f(x) = -2x^2 + x^2 + 4$
- C $f(x) = -11 - 21x + 4x^2$
- D $f(x) = 36 - x^2$

6 Antara berikut, graf yang manakah mewakili $f(x) = -x^2 + 2x$?

Which of the following graphs represent $f(x) = -x^2 + 2x$?



7 Faktorkan/Factorise:

$$2p^2 - 5p - 12$$

- A $(2p + 3)(p + 4)$
- B $(p + 4)(2p - 3)$
- C $(p - 4)(2p + 3)$
- D $(2p - 4)(2p + 3)$

8 Harga bagi sekeping roti canai yang dibeli oleh Encik Raju ialah RM p . Jika jumlah yang perlu dibayar oleh Encik Raju untuk membeli $(p + 6)$ keping roti canai ialah RM $(p + 6)$, hitung harga yang dibayar oleh Encik Raju.

The price of one piece of roti canai bought by Mr. Raju is RM p . If the total that Mr. Raju has to pay to buy $(p + 6)$ pieces of roti canai is RM $(p + 6)$, calculate the price paid by Mr. Raju.

- A RM1
- B RM7
- C RM12
- D RM14

Soalan Subjektif

Jawab semua soalan.

- 1 Selesaikan persamaan kuadratik berikut.
Solve the following quadratic equations.

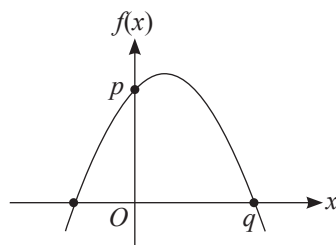
$$2k = \frac{12}{k} - 5$$

[4 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 2 Rajah 1 menunjukkan graf fungsi kuadratik $f(x) = -(x + 2)(x - 6)$.
Diagram 1 shows the graph of the quadratic function $f(x) = -(x + 2)(x - 6)$.



Rajah 1 / Diagram 1

Tentukan/Determine:

- nilai p dan q ,
the values of p and q ,
- persamaan paksi simetri,
the equation of the axis of symmetry,
- koordinat titik maksimum fungsi kuadratik.
the maximum point of the quadratic function.

[6 markah/marks]

Jawapan/Answer:

(a)

(b)

(c)

3 Bagi setiap fungsi kuadratik di ruang jawapan, nyatakan

For each of the quadratic functions in the answer space, state

- | | | |
|--|--|---|
| (i) bentuk graf,
<i>the shape of the graph,</i> | (ii) pintasan-y,
<i>the y-intercept,</i> | (iii) pintasan-x,
<i>the x- intercept,</i> |
| (iv) persamaan paksi simetri,
<i>the equation of symmetry line,</i> | (v) koordinat titik maksimum/minimum,
<i>the coordinate of maximum/minimum point,</i> | (vi) lakarkan graf.
<i>sketch the graph.</i> |

[6 markah/marks]

Jawapan/Answer:

(a) $f(x) = -2x^2 + 8x$

(b) $g(x) = x^2 - 7x + 10$

- 4 Teena merupakan seorang penggemar buah-buahan tempatan. Dia membeli buah rambutan dengan harga RM(3x + 2) bagi 1 kg. Teena memperoleh baki RMx setelah membayar dengan 6 keping wang kertas RM10 untuk membeli x kg buah rambutan. Hitung harga 1 kg buah rambutan.

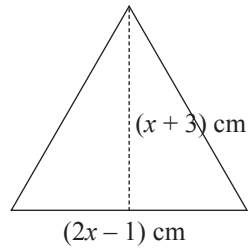
Teena is a fan of local fruits. She buys rambutans at the price of RM(3x + 2) per kg. Teena receives balance of RMx after paying with 6 notes of RM10 to buy x kg of rambutans. Calculate the price for 1 kg of rambutans.

[4 markah/marks]

Jawapan/Answer:



- 5 Rajah 2 menunjukkan sebuah segi tiga sama kaki.
Diagram 2 shows an isosceles triangle.



Rajah 2 / Diagram 2

Diberi luas segi tiga itu ialah 7.5 cm^2 . Cari panjang tapak segi tiga itu.
Given the area of the triangle is 7.5 cm^2 . Find the length of the base of the triangle.

[4 markah/marks]

Jawapan/Answer:

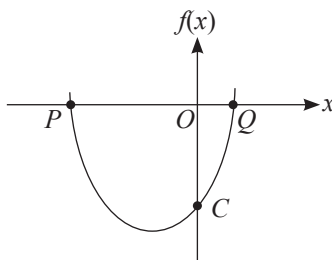
Tingkatan 4

- 6 Diberi bahawa isi padu sebuah kuboid ialah $(x^2 + 5) \text{ cm}^3$ dengan lebar, panjang dan tinggi masing-masing ialah $(2x) \text{ cm}$, $(x - 4) \text{ cm}$ dan 3 cm . Cari isi padu, dalam cm^3 , kuboid itu.
Given that the volume of a cuboid is $(x^2 + 5) \text{ cm}^3$ with width, length and height are $(2x) \text{ cm}$, $(x - 4) \text{ cm}$ and 3 cm respectively. Find the volume, in cm^3 , of the cuboid.

[4 markah/marks]

Jawapan/Answer:

- 7 Rajah 3 menunjukkan graf bagi suatu fungsi kuadratik, $f(x) = 2x^2 + 3x - 2$.
 Diagram 3 shows a graph of a quadratic function $f(x) = 2x^2 + 3x - 2$.



Rajah 3 / Diagram 3

- (a) Tentukan nilai P dan Q .
Determine the values of P and Q .
- (b) Nyatakan koordinat titik C .
State the coordinates of point C .
- (c) Tentukan koordinat titik minimum bagi fungsi kuadratik tersebut.
Determine the minimum point of the quadratic function.

[6 markah/marks]

Jawapan/Answer:

(a)

(b)

(c)

BAB 2

Asas Nombor Number Bases



VIDEO
PEMBELAJARAN

NOTA EFEKTIF

Asas Nombor Number Bases

Nombor
Number

→ **23**₆ ← Asas
Base

dibaca sebagai/is read as
"dua tiga asas enam"
"two three base six"

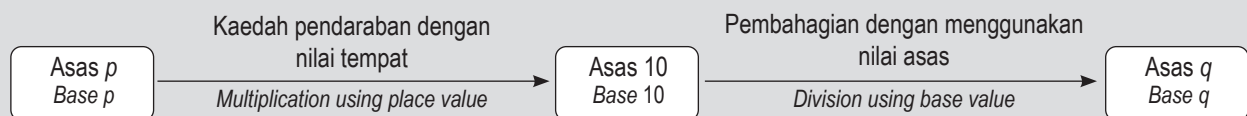
Nilai Tempat, Nilai Digit dan Nilai Nombor Place Value, Value of Digit and Value of Number

Contoh/Example: 1324_7

Nombor Number	1	3	2	4
Nilai tempat Place value	7^3	7^2	7^1	7^0
Nilai digit Digit value	1×7^3 = 343	3×7^2 = 147	2×7^1 = 14	4×7^0 = 4
Nilai nombor Value of number	$343 + 147 + 14 + 4 = 508$			

Penukaran Nombor dalam Suatu Asas Tertentu kepada Asas yang Lain

Conversion a Number in a Certain Base to Another Base



Contoh/Example:

Tukar 245_6 kepada asas sembilan.
Convert 245_6 to base nine.

- ① Tukar 245_6 kepada asas 10.
Convert 245_6 to base 10.

$$(2 \times 6^2) + (4 \times 6^1) + (5 \times 6^0) = 101$$

- ② Tukar 101 kepada asas sembilan.
Convert 101 to base nine.

		Baki Remainder	
9	101	2	$\therefore 122_9$
9	11	2	
9	1	1	
	0		

Operasi Tambah dan Tolak dalam Pelbagai Asas Addition and Subtraction of Numbers in Various Bases

Bentuk Lazim/Vertical Form

Contoh/Example:

$$343_7 - 56_7 = 254_7$$

	2	3	7
	3	4	3 ₇
-		5	6 ₇
	2	5	4 ₇

$7 + 3 - 6 = 4_7$

$7 + 3 - 5 = 5_7$

Penukaran Asas/ Conversation of Base

Contoh/Example:

$$324_5 + 42_5 = 421_5$$

		Baki Remainder
$324_5 \rightarrow 89_{10}$	5	111
$42_5 \rightarrow 22_{10}$	5	22
$89 + 22 = 111$	5	4
		0



LATIHAN INTENSIF

Soalan Objektif
Jawab semua soalan.

- 1 Antara berikut, yang manakah **tidak** benar?

*Which of the following is **not** true?*

- A 2634_7 C 4301_5
B 7361_6 D 1032_4

- 2 Hitung beza antara 73_8 dan 45_8 .

Calculate the difference between 73_8 and 45_8 .

- A 22_8 C 32_8
B 26_8 D 34_8

- 3 Antara pasangan berikut, yang manakah mempunyai nilai yang sama?

Which of the following pairs has the same value?

- A $53_6 = 34_{10}$ C $31_4 = 23_{10}$
B $47_9 = 1021_3$ D $201_3 = 10011_2$

- 4 Rajah 1 menunjukkan empat kad nombor yang disusun dalam tertib menurun.

Diagram 1 shows four numbered cards arranged in descending order.

310_8	2310_4	x	10101100_2
---------	----------	-----	--------------

Rajah 1 / Diagram 1

Antara berikut, yang manakah mewakili nilai x ?

Which of the following represents the value of x ?

- A 252_8 C 2231_4
B 264_8 D 11001001_2

- 5 Ungkapkan $5^4 + 3 \times 5^6 + 4 \times 5^3 + 6$ sebagai satu nombor dalam asas tujuh.

Express $5^4 + 3 \times 5^6 + 4 \times 5^3 + 6$ as a number in base seven.

- A 256641_7 C 256646_7
B 256642_7 D 256650_7

- 6 Seorang murid Sains Komputer sedang menyelamatkan data lama yang disimpan dalam kod asas 7. Salah satu nombor ialah 225_7 . Dia perlu menukarkan nombor itu dalam asas 4 untuk digunakan dalam sistem baharu.

A Computer Science student is in the process of recovering old data stored in base 7 code. One of the numbers is 225_7 . He needs to convert this number into base 4 to be used in a new system.

Apakah nombor tersebut dalam asas 4?

What is the number in base 4?

- A 117_4 C 1311_4
B 1022_4 D 2201_4

- 7 Hitung $99 - 71$. Nyatakan jawapan dalam asas 8.

Calculate $99 - 71$. Express the answer in base 8.

- A 28_8
B 34_8
C 143_8
D 107_8

- 8 Ungkapkan $1 + 1 \times 2^4 + 1 \times 2^3$ sebagai satu nombor dalam asas dua.

Express $1 + 1 \times 2^4 + 1 \times 2^3$ as a number in base two.

- A 11001_2
B 11100_2
C 10110_2
D 10011_2

- 9 Ramli membeli sebotol minyak wangi dengan harga $\text{RM}356_8$ selepas potongan diskaun sebanyak 30%. Berapakah harga asal minyak wangi itu dalam asas lapan?

Ramli bought a bottle of perfume for $\text{RM}356_8$ after a discount of 30%. What is the original price of the perfume in base eight?

- A $\text{RM}524_8$
B $\text{RM}340_8$
C $\text{RM}246_8$
D $\text{RM}238_8$

- 10 Diberi $1033_p = 263_7$. Tentukan nilai p .

Given that $1033_p = 263_7$. Determine the value of p .

- A 7
B 6
C 5
D 4

- 11 Diberi $104200_7 = 104m102_5$, dengan keadaan m ialah nombor satu digit. Cari nilai m .

Given $104200_7 = 104m102_5$, where m is a one-digit number. Find the value of m .

- A 1
B 2
C 3
D 4

- 12 Diberi $111000_2 - k_2 = 10011_2$, cari nilai k .

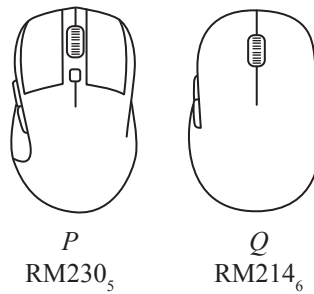
Given $111000_2 - k_2 = 10011_2$, find the value of k .

- A 101100
B 110000
C 100101
D 100100

Soalan Subjektif

Jawab semua soalan.

- 1 Rajah 1 menunjukkan harga dua tetikus, dalam asas nombor yang berbeza.
Diagram 1 shows the prices of two mouses, in different number bases.



Rajah 1 / Diagram 1

Berapakah jumlah harga kedua-dua tetikus itu dalam asas sepuluh?
What is the total price of the two mouses in base ten?

[3 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 2 Sempena cuti persekolahan, Noah telah mengadakan jualan murah di kedai bukunya. Beliau menawarkan diskaun sebanyak 20% bagi setiap pembelian buku. Diberi bahawa harga asal sebuah ensiklopedia ialah RM21001₃. Hitung harga ensiklopedia tersebut selepas diskaun, dalam asas enam.
In conjunction with the school holidays, Noah has organised a sale at his bookstore. He offers a 20% discount on every book purchase. Given that the original price of an encyclopaedia is RM21001₃. Calculate the price of the encyclopaedia after the discount, in base six.

[4 markah/marks]

Jawapan/Answer:

- 3 Gaji bulanan Ramasamy pada tahun 2023 dan tahun 2024 masing-masing ialah $\text{RM}22452_6$ dan $\text{RM}25012_6$. Hitung peratusan kenaikan gajinya.
The monthly salary of Ramasamy in the year 2023 and 2024 were $\text{RM}22452_6$ and $\text{RM}25012_6$ respectively. Calculate the percentage of increase of his salary.

[3 markah/marks]

Jawapan/Answer:

- 4 Diberi $1100_2 < p \leq 121_3$, dengan keadaan p ialah nombor dalam asas sepuluh. Nyatakan semua nilai yang mungkin bagi p .
Given $1100_2 < p \leq 121_3$, where p is a number in base ten. State all the possible values of p .

[3 markah/marks]

Jawapan/Answer:

- 5 Ungkapkan $7^4 + 2(7) + 4^0$ sebagai suatu nombor dalam asas tujuh dan seterusnya, dalam asas lapan.
Express $7^4 + 2(7) + 4^0$ as a number in base seven and hence, in base eight.

[3 markah/marks]

Jawapan/Answer:

- 6 Diberi $1130_4 + P_4 = 3322_4$. Hitung nilai P .
 Given $1130_4 + P_4 = 3322_4$. Calculate the value of P .

[3 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 7 Rajah 2 menunjukkan empat keping kad nombor.
 Diagram 2 shows four number cards.

82_{10}	148_{10}	19_{10}	53_{10}
-----------	------------	-----------	-----------

Rajah 2 / Diagram 2

- (a) Cari hasil tambah dua nombor yang terbesar. Berikan jawapan dalam asas lima.
 Find the sum of the two largest numbers. Give the answer in base five.
- (b) Cari beza antara nombor terbesar dengan nombor terkecil. Berikan jawapan dalam asas empat.
 Find the difference between the largest number and the smallest number. Give the answer in base four.

[4 markah/marks]

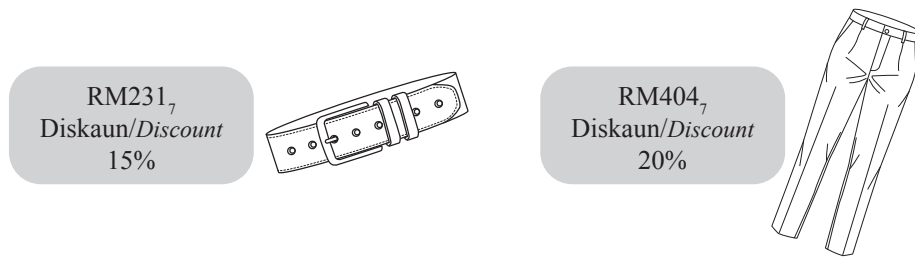
Jawapan/Answer:

(a)

(b)

- 8 Rajah 3 menunjukkan harga tali pinggang dan seluar dalam asas tujuh serta diskaun yang ditawarkan di sebuah pasar raya.

Diagram 3 shows the price of a belt and a trouser in base seven and the discounts given at a supermarket.



Rajah 3 / Diagram 3

Khairul membeli sehelai seluar dan seutas tali pinggang. Dia memberikan RM300 kepada juruwang itu. Berapakah baki wang yang diterimanya?

Khairul bought a trouser and a belt. He gave RM300 to the cashier. How much change did he receive?

[3 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 9 Harga bagi 5 kg durian ialah $RM3130_4$. Azlan mempunyai RM330 dan dia membeli 7 kg durian. Berapakah baki wangnya dalam asas tiga?

The price of 5 kg durians is $RM3130_4$. Azlan has RM330 and bought 7 kg of durians. How much is his money left in base three?

[5 markah/marks]

Jawapan/Answer:

- 10 Puan Rohana akan mengadakan sambutan hari lahir anak perempuannya. Dia membeli 150 biji buah-buahan. $\frac{1}{3}$ daripadanya adalah buah jambu batu, $\frac{1}{5}$ adalah buah oren dan $\frac{1}{10}$ adalah buah nanas manakala bakinya adalah buah epal. Cari bilangan buah epal dalam asas empat.

Puan Rohana will be celebrating her daughter's birthday. She bought 150 pieces of fruits. $\frac{1}{3}$ of them are guavas, $\frac{1}{5}$ are oranges, and $\frac{1}{10}$ are pineapples, while the rest are apples. Find the number of apples in base four.

[4 markah/marks]

Jawapan/Answer:

- 11 Jadual 1 menunjukkan markah ujian Matematik bagi tiga orang murid.

Table 1 shows the mathematics marks for three students.

Nama murid Students' name	Aira	Ali	Affan
Markah Marks	kurang 28 daripada markah Affan <i>28 less than Affan's marks</i>	2 kali markah Aira <i>2 times Aira's marks</i>	301_5

Jadual 1 / Table 1

Cari markah Ali, dan berikan jawapan dalam asas tujuh.

Find Ali's marks, and give the answer in base seven.

[5 markah/marks]

Jawapan/Answer:



BAB 3

Penaakulan Logik Logical Reasoning


 VIDEO
PEMBELAJARAN


NOTA EFEKTIF

Pernyataan Statement

Pernyataan ialah suatu ayat yang dapat ditentukan nilai kebenarannya, iaitu sama ada **benar** atau **palsu**, tetapi **bukan kedua-duanya**.

A statement is a sentence of which the truth can be determined, that is either **true** or **false**, but **not both**.

Nilai Kebenaran Truth Value

p	q	p dan/ and q	p atau/ or q
Benar True	Benar True	Benar True	Benar True
Benar True	Palsu False	Palsu False	Benar True
Palsu False	Benar True	Palsu False	Benar True
Palsu False	Palsu False	Palsu False	Palsu False

Implikasi Implication

Pernyataan : Jika p , maka q
 Statement : If p , then q
 Akas : Jika q , maka p
 Converse : If q , then p
 Songsangan : Jika $\sim p$, maka $\sim q$
 Inverse : If $\sim p$, then $\sim q$
 Kontrapositif : Jika $\sim q$, maka $\sim p$
 Contrapositive : If $\sim q$, then $\sim p$

p : antejadian
 antecedent
 q : akibat
 consequent

Hujah Deduktif Deductive Argument

	Bentuk I Form I	Bentuk II Form II	Bentuk III Form III
Premis 1 Premise 1	Semua A ialah B All A is B	Jika p , maka q If p , then q	Jika p , maka q If p , then q
Premis 2 Premise 2	C ialah A C is A	p adalah benar p is true	Bukan q adalah benar Not q is true
Kesimpulan Conclusion	C ialah B C is B	q adalah benar q is true	Bukan p adalah benar Not p is true

Hujah Deduktif Deductive Argument

Sah/Valid

mematuhi bentuk hujah
comply the argument forms

Tidak sah/Invalid

tidak mematuhi
bentuk hujah
not comply the
argument forms

Munasabah
Sound

semua premis dan
kesimpulan benar
all premises and
conclusion true

Tidak munasabah
Unsound

premis atau
kesimpulan palsu
premises or conclusion
false

Tidak munasabah
Unsound

Hujah Induktif Inductive Argument

Kuat/Strong

kesimpulan benar
true conclusion

Meyakinkan
Cogent

semua premis
benar
all premises true

Tidak meyakinkan
Not cogent

ada premis palsu
there are false premises

Lemah/Weak

kesimpulan palsu
false conclusion

Tidak meyakinkan
Not cogent



LATIHAN INTENSIF

Soalan Objektif
Jawab semua soalan.

- 1 Antara berikut, yang manakah ialah satu pernyataan?

Which of the following is a statement?

- A $(-3) \times (-8)$
B $n - 4 = -12$
C $(-2)^2 = -4$
D $ax^2 + bx + c$

- 2 Antara berikut, yang manakah merupakan pernyataan majmuk yang **palsu**?

*Which of the following is a **false** statement?*

- A $3^5 = 125$ atau/ $5^3 = 125$
B $3x^2 + 2x - 5$ ialah persamaan kuadratik dan 9 ialah nombor perdana.
 $3x^2 + 2x - 5$ is a equation and 9 is a prime number.
C 30 ialah gandaan bagi 6 dan $\{ \} \subset \{5, 10, 15\}$
 30 is a multiple of 6 and $\{ \} \subset \{5, 10, 15\}$
D Semua oktagon mempunyai 8 sisi atau 343 ialah nombor kuasa dua sempurna.
All octagons have 8 sides or 343 is a perfect square number.

- 3 Antara berikut, yang manakah hujah yang sah dan munasabah?

Which of the following is a valid and reasonable argument?

- A Premis 1: Semua gandaan 4 ialah gandaan 8.
Premise 1: All multiples of 4 are multiples of 8.
Premis 2: 28 ialah gandaan 4.
Premise 2: 28 is a multiple of 4.
Kesimpulan: 28 ialah gandaan 8.
Conclusion: 28 is a multiple of 8.
B Premis 1: Semua segi empat sama bersudut tepat.
Premise 1: All squares are right angled.
Premis 2: PQRS ialah segi empat sama.
Premise 2: PQRS is a square.
Kesimpulan: PQRS bersudut tepat.
Conclusion: PQRS is a right angled.
C Premis 1: Jika $x = 7$, maka $3x - 4 = 17$.
Premise 1: If $x = 7$, then $3x - 4 = 17$.
Premis 2: $3x - 4 = 17$.
Premise 2: $3x - 4 = 17$.
Kesimpulan: $x = 7$.
Conclusion: $x = 7$.

- D Premis 1: Jika x ialah nombor ganjil, maka $9x$ ialah nombor ganjil.

Premise 1: If x is an odd number, then $9x$ is an odd number.

Premis 2: $9x$ ialah nombor ganjil.

Premise 2: $9x$ is an odd number.

Kesimpulan: x bukan nombor ganjil.

Conclusion: x is not an odd number.

- 4 Tentukan songsangan bagi implikasi berikut.

Determine the inverse for the following implication.

Jika 23 ialah nombor ganjil, maka 23 tidak boleh dibahagi tepat dengan 2.

If 23 is an odd number, then 23 is not divisible by 2.

- A Jika 23 tidak boleh dibahagi tepat dengan 2, maka 23 ialah nombor ganjil.
If 23 is not divisible by 2, then 23 is an odd number.
B Jika 23 ialah nombor genap, maka 23 boleh dibahagi tepat dengan 2.
If 23 is an even number, then 23 is divisible by 2.
C Jika 23 boleh dibahagi tepat dengan 2, maka 23 ialah nombor genap.
If 23 is divisible by 2, then 23 is an even number.
D Jika 23 ialah nombor ganjil, maka 23 boleh dibahagi tepat dengan 2.
If 23 is an odd number, then 23 is divisible by 2.

- 5 Rajah 1 menunjukkan suatu maklumat.

Diagram 1 shows information.

Pernyataan: Jika $k = 7$, maka $2k - 11 = 3$

Statement: If $k = 7$, then $2k - 11 = 3$

: Jika $2k - 11 \neq 3$, maka $k \neq 7$

: If $2k - 11 \neq 3$, then $k \neq 7$

Rajah 1 / Diagram 1

Antara berikut, yang manakah perlu diisi di petak kosong?

Which of the following must be filled in the box?

- A Premis/Premise
B Akas/Converse
C Songsangan/Inverse
D Kontrapositif/Contrapositive

- 6 Rajah 2 menunjukkan satu bentuk hujah deduktif.

Diagram 2 shows a form of a deductive argument.

Premis 1: Jika $m \div 8 = -2$, maka $m = -16$.
 Premise 1: If $m \div 8 = -2$, then $m = -16$.
 Premis/Premise 2: $m = 16$
 Kesimpulan/Conclusion:

Rajah 2 / Diagram 2

Apakah kesimpulan bagi hujah deduktif tersebut?

What is the conclusion for the deductive argument?

- A $m \div 8 \neq -2$
 B $m \div 8 = -2$
 C $m \neq -16$
 D Jika $m = 16$, maka $m \div 8 = 2$.
 If $m = 16$, then $m \div 8 = 2$.

- 7 Rajah 3 menunjukkan suatu hujah yang tidak lengkap.

Diagram 3 shows an incomplete argument.

Premis/Premise 1:
 Premis/Premise 2: $x + 2 \neq 5$
 Kesimpulan/Conclusion: $x \neq 3$

Rajah 3 / Diagram 3

Antara Premis 1 berikut, yang manakah menjadikan hujah tersebut sebagai hujah deduktif yang sah?

Which of the following Premises 1 makes the argument a valid deductive argument?

- A Jika $x = 3$, maka $x + 2 = 5$.
 If $x = 3$, then $x + 2 = 5$.
 B Jika $x + 2 = 5$, maka $x = 3$.
 If $x + 2 = 5$, then $x = 3$.
 C Jika $x + 2 \neq 5$, maka $x \neq 3$.
 If $x + 2 \neq 5$, then $x \neq 3$.
 D Jika $x \neq 3$, maka $x + 2 \neq 5$.
 If $x \neq 3$, then $x + 2 \neq 5$.

Soalan Subjektif

Jawab semua soalan.

- 1 Tentukan sama ada ayat berikut adalah pernyataan atau bukan pernyataan.

Determine whether each of the following sentence is a statement or not a statement.

[3 markah/marks]

Jawapan/Answer:

Ayat Sentence	Pernyataan atau bukan pernyataan Statement or not a statement
(a) $4k - 3 = k$	
(b) $x + 3 = 5$	
(c) $-8 > -6$	

- 2 Nyatakan sama ada setiap pernyataan yang berikut adalah benar atau palsu.

State whether each of the following statements is true or false.

[3 markah/marks]

Jawapan/Answer:

Pernyataan Statement	Benar atau palsu True or false
(a) Sebilangan nombor kuasa dua sempurna ialah nombor bulat. Some perfect square numbers are whole numbers.	
(b) $9^{-1} = \frac{1}{9}$ dan 9 ialah faktor bagi 96. $9^{-1} = \frac{1}{9}$ and 9 is a factor 96.	
(c) $4^3 = 64$ atau $3 \times 4 = 7$ $4^3 = 64$ or $3 \times 4 = 7$	

3 Nyatakan antejadian dan akibat bagi implikasi berikut.

State the antecedent and consequence of the following implications.

[2 markah/marks]

Jawapan/Answer:

Implikasi Implications	Antejadian Antecedent	Akibat Consequence
(a) Jika $a = 5$, maka $a^2 = 25$. If $a = 5$, then $a^2 = 25$.		
(b) Jika 20% daripada 30 ialah 6, maka $0.2 \times 30 = 6$. If 20% of 30 is 6, then $0.2 \times 30 = 6$.		

4 Tulis dua implikasi berdasarkan implikasi “ p jika dan hanya jika q ” yang berikut.Write two implications based on the following implication “ p if and only if q ”.

[4 markah/marks]

Jawapan/Answer:

(a)	Pernyataan Statement	$\sqrt[3]{x} = 2$ jika dan hanya jika $x = 8$. $\sqrt[3]{x} = 2$ if and only if $x = 8$.
	Implikasi 1 Implications 1	
	Implikasi 2 Implications 2	
(b)	Pernyataan Statement	$\angle RST < 90^\circ$ jika dan hanya jika $\angle RST$ ialah sudut tirus. $\angle RST < 90^\circ$ if and only if $\angle RST$ is an acute angle.
	Implikasi 1 Implications 1	
	Implikasi 2 Implications 2	

5 Lengkapkan implikasi, akas, songsangan dan kontrapositif bagi pernyataan berikut. Seterusnya tentukan nilai kebenaran implikasi, akas, songsangan dan kontrapositif.

Complete the implication, converse, inverse and contrapositive. Hence, determine the truth value of the implication, converse and contrapositive.

[12 markah/marks]

Jawapan/Answer:

	Pernyataan Statement	Nilai kebenaran Truth value
(a)	Implikasi Implication	
	Akas Converse	Jika $3 + 3 = 3 \times 3$, maka $2 + 2 = 2 \times 2$. If $3 + 3 = 3 \times 3$, then $2 + 2 = 2 \times 2$.
	Songsangan Inverse	
	Kontrapositif Contrapositive	
(b)	Implikasi Implication	
	Akas Converse	
	Songsangan Inverse	Jika $x + 3 \leq 9$, maka $x \leq 5$. If $x + 3 \leq 9$, then $x \leq 5$.
	Kontrapositif Contrapositive	Palsu False

- 6 Tentukan sama ada hujah yang berikut sah dan munasabah. Sekiranya tidak, berikan justifikasi anda.
Determine whether the following argument is valid and sound. If it is not, give your justification.

(a) Premis 1: Semua gandaan 5 ialah gandaan 10.

Premise 1: All multiples of 5 are multiples of 10.

Premis 2: 65 ialah gandaan 5.

Premise 2: 65 is multiple of 5.

Kesimpulan: 65 ialah gandaan 10.

Conclusion: 65 is multiple of 10.

(b) Premis 1: Jika $\sqrt{x} < 3$, maka $x < 9$.

Premise 1: If $\sqrt{x} < 3$, then $x < 9$

Premis/Premise 2: $\sqrt{5} < 3$

Kesimpulan/Conclusion: $5 < 9$

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

- 7 Tentukan sama ada hujah yang berikut kuat atau lemah serta meyakinkan atau tidak meyakinkan. Berikan justifikasi anda.

Determine whether each of the following arguments is strong or weak and cogent or not cogent. Give your justification.

(a) Premis 1: 12 ialah gandaan 4.

Premise 1: 12 is a multiple of 4.

Premis 2: 24 ialah gandaan 4.

Premise 2: 24 is a multiple of 4.

Premis 3: 30 ialah gandaan 4.

Premise 3: 30 is a multiple of 4.

Kesimpulan: Semua gandaan 4 ialah nombor genap.

Conclusion: All the multiple of 4 are even number.

(b) Premis 1: 2^3 boleh dibahagi tepat dengan 4.

Premise 1: 2^3 is divisible by 4.

Premis 2: 2^5 boleh dibahagi tepat dengan 4.

Premise 2: 2^5 is divisible by 4.

Kesimpulan: 2^n boleh dibahagi tepat dengan 4.

Conclusion: 2^n is divisible by 4.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

- 8 Buat satu kesimpulan secara deduktif bagi pernyataan yang berikut.

Make a conclusion by deduction for the following statements

Semua bulatan dengan jejari j cm mempunyai luas πj^2 cm².
All circles with radius of r cm have an area πr^2 cm².

Bulatan N mempunyai jejari 7 cm.

Circle N has a radius of 7 cm.

[2 markah/marks]

Jawapan/Answer:

- 9 (a) Tentukan sama ada pernyataan berikut merupakan pernyataan atau bukan pernyataan.

Determine whether the following sentence is a statement or not a statement.

$$m - 7 = 4$$

- (b) Lengkapkan hujah berikut:

Complete the following argument:

Premis 1: Jika $3m > 15$, maka $m > 5$.

Premise 1: If $3m > 15$ then $m > 5$.

Premis/ Premise 2:

Kesimpulan: $3m \leq 15$.

Conclusion: $3m \leq 15$.

- (c) Bentukkan suatu hujah induktif berdasarkan jujukan nombor 3, 8, 17, 30,

Form an inductive argument based on the sequence number 3, 8, 17, 30,

$$3 = 3(1) + 2(0)^2$$

$$8 = 3(2) + 2(1)^2$$

$$17 = 3(3) + 2(2)^2$$

$$30 = 3(4) + 2(3)^2$$

$$\dots = \dots$$

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

(c)



- 10 (a) Tulis akas dan kontrapositif bagi implikasi berikut:
Write the converse and contrapositive of the following implication:

$$\begin{array}{l} \text{Jika } x = 5, \text{ maka } 2x - 3 = 7 \\ \text{If } x = 5, \text{ then } 2x - 3 = 7 \end{array}$$

- (b) Buat satu kesimpulan umum secara aruhan bagi urutan nombor 4, 25, 60, 109, ... yang mengikut pola berikut:
Make a general conclusion by induction for the number sequence 4, 25, 60, 109, ... which follows the following pattern:

$$\begin{array}{l} 4 = 7(1)^2 - 3 \\ 25 = 7(2)^2 - 3 \\ 60 = 7(3)^2 - 3 \\ 109 = 7(4)^2 - 3 \\ \dots = \dots \end{array}$$

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

- 11 (a) Nyatakan sama ada pernyataan berikut adalah benar atau palsu.
State whether the following statement is true or false.

$$\begin{array}{l} -7 \text{ lebih kecil daripada } 8 \text{ dan } (-8)^2 = 16 \\ -7 \text{ is smaller than } 8 \text{ and } (-8)^2 = 16 \end{array}$$

- (b) Kenal pasti antejadian dan akibat bagi implikasi di bawah.
Identify the antecedent and consequence of the implication below.

$$\begin{array}{l} \text{Jika } k = 11, \text{ maka } k - 6 = 5. \\ \text{If } k = 11, \text{ then } k - 6 = 5. \end{array}$$

- (c) Lengkapkan hujah berikut:

Complete the following argument:

Premis 1: Semua nombor perdana mempunyai dua faktor sahaja.

Premise 1: All prime numbers have two factors only.

Premis/Premise 2:

Kesimpulan: 19 mempunyai dua faktor sahaja.

Conclusion: 19 has two factors only.

[3 markah/marks]

Jawapan/Answer:

(a)

(b)

(c)

- 12 (a) Tentukan sama ada setiap hujah yang berikut kuat atau lemah. Seterusnya, tentukan sama ada hujah yang kuat itu adalah meyakinkan.

Determine whether the following argument is strong or weak. Hence, determine whether the strong argument is cogent.

Premis 1: $3 \times 6 = 18$.

Premise 1: $3 \times 6 = 18$.

Premis 2: $5 \times 8 = 40$.

Premise 2: $5 \times 8 = 40$.

Kesimpulan: Hasil darab satu nombor ganjil dengan satu nombor genap adalah nombor genap.

Conclusion: The product of an odd number and an even number is even number.

- (b) Tulis kesimpulan untuk melengkapkan hujah yang berikut.

Write down conclusion to complete the following argument.

Premis 1: Jika $(n + 1)$ ialah satu nombor ganjil, maka n ialah satu nombor genap.

Premise 1: If $(n + 1)$ is an odd number, then n is an even number.

Premis 2: $(x + 1)$ ialah satu nombor ganjil.

Premise 2: $(x + 1)$ is an odd number.

Kesimpulan/Conclusion:

[3 markah/marks]

Jawapan/Answer:

(a)

(b)

- 13 (a) Tentukan sama ada hujah yang berikut adalah kuat atau lemah serta meyakinkan atau tidak meyakinkan.
Determine whether the following argument is strong or weak and cogent or not cogent. Give your justification.

Premis 1: 3 ialah faktor bagi 60.
Premise 1: 3 is a factor of 60.
Premis 2: 5 ialah faktor bagi 60.
Premise 2: 5 is a factor of 60.
Kesimpulan: Semua faktor bagi 60 ialah nombor ganjil.
Conclusion: All the factors of 60 are odd numbers.

- (b) Bina satu implikasi yang sesuai berdasarkan pasangan implikasi berikut:
Make an appropriate implication based on the following pairs of implications:

Implikasi 1: Jika $17 + x = 25$, maka $x = 8$.
Implication 1: If $17 + x = 25$, then $x = 8$.
Implikasi 2: Jika $x = 8$, maka $17 + x = 25$.
Implication 2: If $x = 8$, then $17 + x = 25$.

- (c) Tentukan antejadian dan akibat bagi implikasi berikut:
Determine the antecedent and consequent of the following implication:

Jika $x < 6$, maka $x < 8$
If $x < 6$, then $x < 8$

- (d) Berikut ialah satu hujah yang tidak lengkap.
The following is an incomplete argument.
Premis 1: Jika m ialah gandaan 6, maka m ialah gandaan 3.
Premise 1: If m is a multiple of 6, then m is multiple of 3.
Premis 2: 21 bukan gandaan 3.
Premise 2: 21 is not a multiple of 3.
Kesimpulan/Conclusion:
(i) Lengkapkan kesimpulan dalam hujah tersebut.
Complete the conclusion in the argument.
(ii) Tentukan hujah tersebut sah atau tidak sah serta munasabah atau tidak munasabah. Berikan justifikasi anda.
Determine whether the argument is valid or invalid, and sound or unsound. Provide your justification.

[8 markah/marks]

Jawapan/Answer:

(a)

(b)

(c)

(d) (i)

(ii)

BAB 4

Operasi Set Operations on Sets



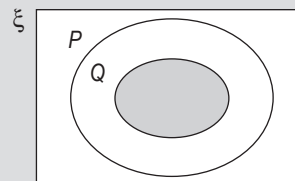
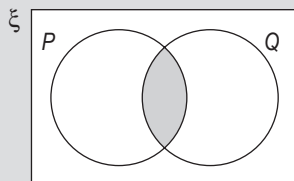
VIDEO
PEMBELAJARAN

NOTA EFEKTIF

Persilangan Set Intersection of Sets

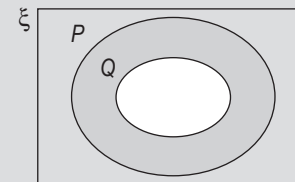
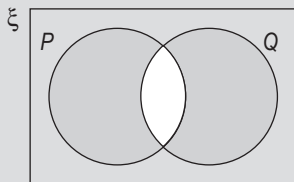
- 1 **Persilangan** set bagi set P dan set Q ialah set yang mengandungi unsur-unsur sepunya bagi kedua-dua set P dan set Q , $P \cap Q$.

The **intersection** of set P and set Q is a set that contains the common elements of both set P and set Q , $P \cap Q$.



- 2 **Pelengkap** bagi **persilangan** set P dan set Q ialah semua unsur dalam set semesta yang tidak terdapat dalam persilangan set P dan set Q , $(P \cap Q)'$.

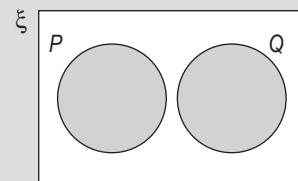
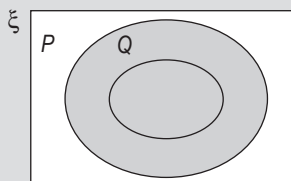
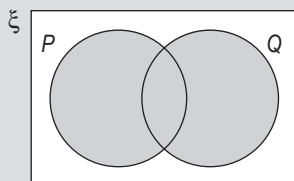
The **complement** of the **intersection** of set P and set Q is all the elements in the universal set that are not in the intersection of set P and set Q , $(P \cap Q)'$.



Kesatuan Set Union of Sets

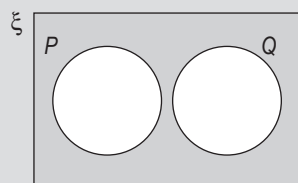
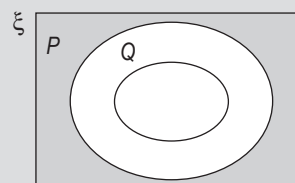
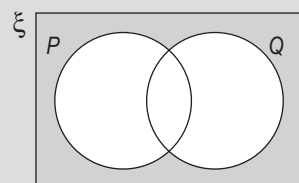
- 1 **Kesatuan** set bagi set P dan set Q ialah set yang mengandungi semua unsur dalam set P dan set Q , $P \cup Q$.

The **union** of set P and set Q is a set that contains all the elements in set P and set Q , $P \cup Q$.



- 2 **Pelengkap** bagi **kesatuan** set P dan set Q ialah semua unsur dalam set semesta yang tidak terdapat dalam kesatuan set P dan set Q , $(P \cup Q)'$.

The **complement** of the **union** of set P and set Q is all the elements in the universal set that are not in the union of set P and set Q , $(P \cup Q)'$.



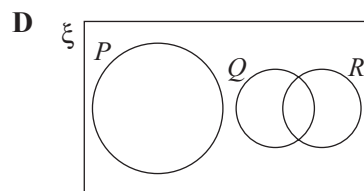
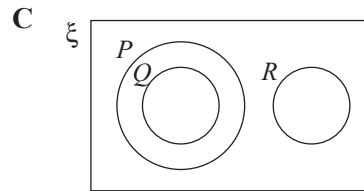
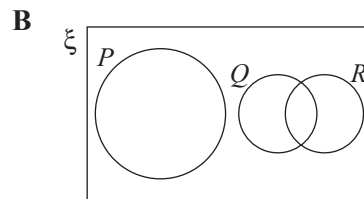
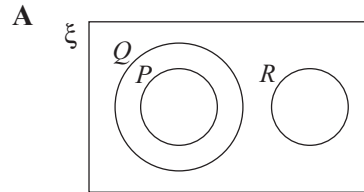


LATIHAN INTENSIF

Soalan Objektif
Jawab semua soalan.

- Diberi bahawa $P = \{2, 3, 4, 5\}$, bilangan subset bagi P ialah
Given that $P = \{2, 3, 4, 5\}$, the number of subsets of P is
A 16
B 12
C 8
D 4
- Diberi set semesta ξ , set W , set X dan set Y . Set X ialah subset bagi set W dan set Y ialah subset bagi set X . Antara berikut, yang manakah **tidak** benar?
*Given the universal set ξ , set W , set X and set Y . Set X is a subset of set W and set Y is a subset of set X . Which of the following is **not** true?*
A $Y \subset X \subset W \subset \xi$
B $Y \cap X \cap W = Y$
C $n(W) + n(W)' = n(\xi)$
D $Y \cap X' = W'$
- Diberi bahawa set semesta ξ , set T dan set U dengan $n(\xi) = 88$, $n(T) = 48$ dan $n(U) = 20$, cari nilai maksimum bagi $n(T \cup U)'$.
Given that the universal set ξ , set T and set U with $n(\xi) = 88$, $n(T) = 48$ and $n(U) = 20$, find the maximum value of $n(T \cup U)'$.
A 40
B 20
C 15
D 10
- Diberi $W = \{2, 3, 5, 7, 9\}$, $X = \{2, 4, 6, 8, 10\}$, $Y = \{1, 3, 5, 7, 9\}$ dan $\xi = W \cup X \cup Y$, cari $n(W \cap X) \cup Y$.
Given $W = \{2, 3, 5, 7, 9\}$, $X = \{2, 4, 6, 8, 10\}$, $Y = \{1, 3, 5, 7, 9\}$ and $\xi = W \cup X \cup Y$, find $n(W \cap X) \cup Y$.
A 2
B 6
C 4
D 8

- Diberi bahawa set semesta, $\xi = P \cup Q \cup R$, $Q \cap R = \phi$ dan $P \cap Q = Q$, antara berikut, gambar rajah Venn yang manakah mewakili hubungan itu?
Given the universal set $\xi = P \cup Q \cup R$, $Q \cap R = \phi$ and $P \cap Q = Q$, which of the following Venn diagrams represents the relationship?



- Diberi bahawa set $P = \{2, 3, 4, 5, 6, 7\}$, set $Q = \{2, 3, 5, 7\}$ dan set $R = \{9, 10, 11\}$, cari $n(P \cap Q \cup R)$.
Given that set $P = \{2, 3, 4, 5, 6, 7\}$, set $Q = \{2, 3, 5, 7\}$ and set $R = \{9, 10, 11\}$, find $n(P \cap Q \cup R)$.
A 3
B 7
C 8
D 10

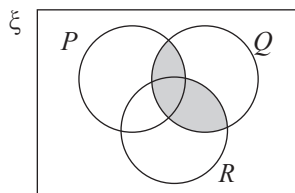
- 7 Diberi bahawa set semesta, $\xi = \{x : x \text{ ialah nombor perdana dan } 1 < x < 14\}$, set $P = \{2, 3, 5\}$ dan set $Q = \{7, 11, 13\}$, maka $Q' =$
 Given that the universal set, $\xi = \{x : x \text{ is a prime number and } 1 < x < 14\}$, set $P = \{2, 3, 5\}$ and set $Q = \{7, 11, 13\}$, then $Q' =$
 A P C $\{\}$
 B ξ D $\{0\}$

- 8 Bilangan subset dalam set $\{x, y, z\}$ ialah
 The number of subsets in the set $\{x, y, z\}$ is
 A 3
 B 4
 C 6
 D 8

- 9 Diberi $\xi = \{x : 1 \leq x \leq 10, x \text{ ialah integer}\}$, $R = \{x : x \text{ ialah gandaan 4}\}$ dan $S = \{x : x \text{ ialah nombor perdana}\}$, senaraikan semua unsur-unsur bagi set $(R \cup S)'$.
 Given $\xi = \{x : 1 \leq x \leq 10, x \text{ is an integer}\}$, $R = \{x : x \text{ is a multiple of 4}\}$ and $S = \{x : x \text{ is a prime number}\}$, list all the elements of set $(R \cup S)'$.
 A $\{1, 6, 9, 10\}$
 B $\{2, 3, 4, 10\}$
 C $\{2, 3, 5, 7, 9\}$
 D $\{5, 6, 10\}$

- 10 Diberi bahawa set semesta, $\xi = \{x : x \text{ ialah integer positif dan } x < 15\}$, set $P = \{x : x \text{ ialah nombor positif yang boleh dibahagi dengan 3}\}$ dan set $Q = \{x : x \text{ ialah nombor perdana}\}$, maka $n(P \cap Q)$ ialah
 Given that the universal set, $\xi = \{x : x \text{ is a positive integer and } x < 15\}$, set $P = \{x : x \text{ is a positive number divisible by 3}\}$ and set $Q = \{x : x \text{ is a prime number}\}$, then $n(P \cap Q)$ is
 A 1 C 3
 B 2 D 4

- 11 Rajah 1 menunjukkan sebuah gambar rajah Venn.
 Diagram 1 shows a Venn diagram.



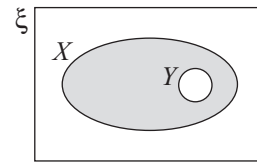
Rajah 1 / Diagram 1

Nyatakan set yang diwakili oleh kawasan berlorek.

State the set which is represented by the shaded region.

- A $(P \cup R) \cap Q$ C $(P \cap Q) \cup R$
 B $(P \cap R) \cup Q$ D $(P \cup Q) \cap R$

- 12 Rajah 2 ialah sebuah gambar rajah Venn yang menunjukkan set semesta ξ , set X dan set Y .
 Diagram 2 is a Venn diagram showing the universal set ξ , set X and set Y .



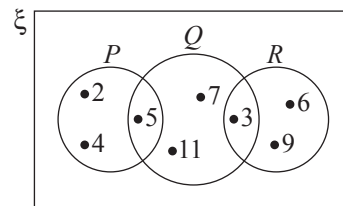
Rajah 2 / Diagram 2

Antara berikut, yang manakah menerangkan rantau berlorek?

Which of the following describes the shaded region?

- A $X \cap Y'$
 B $X \cup Y'$
 C $X' \cap Y'$
 D $X \cup Y$

- 13 Rajah 3 ialah sebuah gambar rajah Venn yang menunjukkan set P , set Q dan set R .
 Diagram 3 is a Venn diagram showing sets P , Q and R .



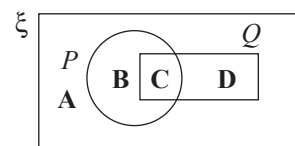
Rajah 3 / Diagram 3

Diberi bahawa $\xi = P \cup Q \cup R$, senaraikan semua unsur bagi set $(P \cap Q)'$.

Given that $\xi = P \cup Q \cup R$, list all the elements of set $(P \cap Q)'$.

- A $\{5\}$
 B $\{2, 4, 6, 9\}$
 C $\{2, 3, 4, 5, 6, 9, 11\}$
 D $\{2, 3, 4, 6, 7, 9, 11\}$

- 14 Rajah 4 menunjukkan sebuah gambar rajah Venn.
 Diagram 4 shows a Venn diagram.



Rajah 4 / Diagram 4

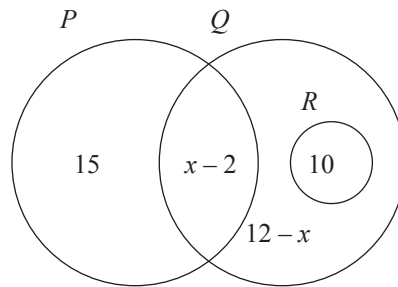
Antara kawasan A, B, C dan D, yang manakah mewakili set $P \cap Q$?

Which of the regions, A, B, C or D, represents the set $P \cap Q$?

Soalan Subjektif
Jawab semua soalan.

- 1 Rajah 1 ialah sebuah gambar rajah Venn yang menunjukkan set P , set Q dan set R dengan keadaan $\xi = P \cup Q \cup R$.

Diagram 1 is a Venn diagram showing set P , set Q and set R such that the universal set $\xi = P \cup Q \cup R$.



Rajah 1 / Diagram 1

Diberi bahawa $n(P \cap Q) = n(P')$.

Given that $n(P \cap Q) = n(P')$.

- (a) Cari nilai x .

Find the value of x .

- (b) Seterusnya, cari $n(Q)$.

Hence, find $n(Q)$.

[4 markah/marks]

Jawapan/Answer:

- (a)

- (b)



- 2 Kelas 4 Adil mempunyai 28 orang murid. 15 orang murid ialah ahli Kelab STEM dan 10 orang murid ialah ahli Kelab Pengguna. Seramai 5 orang murid yang merupakan ahli Kelab Pengguna, juga merupakan ahli Kelab STEM.

Class 4 Adil has 28 students. 15 students are members of the STEM Club and 10 students are members of the Consumer Club. 5 students who are members of the Consumer Club are also members of the STEM Club.

- (a) Lukis gambar rajah Venn untuk menunjukkan hubungan kes tersebut.

Draw a Venn diagram to show the relationship between the cases.

- (b) Berapakah bilangan murid yang bukan ahli kepada mana-mana kelab?

How many students are not members of any club?

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

Tingkatan 4

- 3 Pada rajah di ruang jawapan, lorekkan rantau yang memuaskan setiap yang berikut:

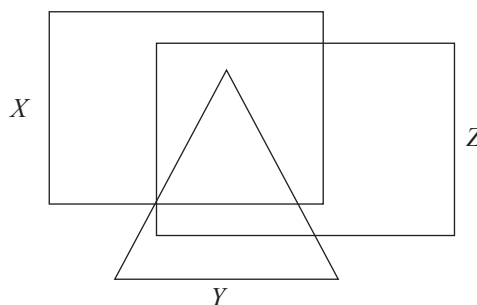
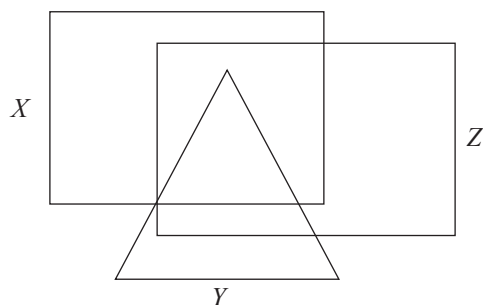
On the diagrams in the answer space, shade the region that satisfies each of the following:

[3 markah/marks]

Jawapan/Answer:

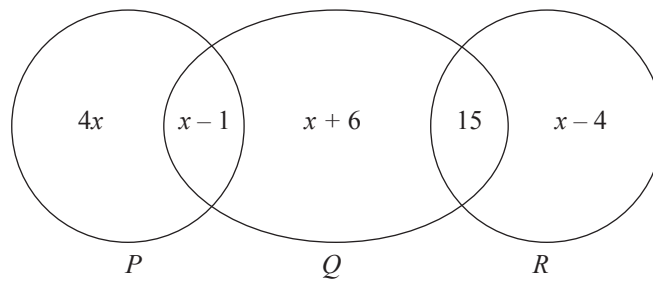
- (a) $X' \cap Y'$

- (b) $Z \cup (Y \cap X')$



- 4 Rajah 2 merupakan sebuah gambar rajah Venn yang menunjukkan bilangan unsur di dalam set P , set Q dan set R .

Diagram 2 is a Venn diagram showing the number of elements in set P , set Q and set R .



Rajah 2 / Diagram 2

Diberi bahawa $n(\xi) = 100$, cari nilai x .

Given that $n(\xi) = 100$, find the value of x .

[2 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 5 Diberi bahawa set semesta, $\xi = \{x : x \text{ ialah integer, } 1 \leq x \leq 20\}$, set $P = \{x : x \text{ ialah gandaan } 4\}$ dan set $Q = \{x : x \text{ ialah nombor kuasa dua sempurna}\}$.

Given the universal set, $\xi = \{x : x \text{ is an integer, } 1 \leq x \leq 20\}$, set $P = \{x : x \text{ is a multiple of } 4\}$ and set $Q = \{x : x \text{ is a perfect square number}\}$.

- (a) Lengkapkan gambar rajah Venn di ruang jawapan.

Complete the Venn diagram in the answer space.

- (b) Cari

Find

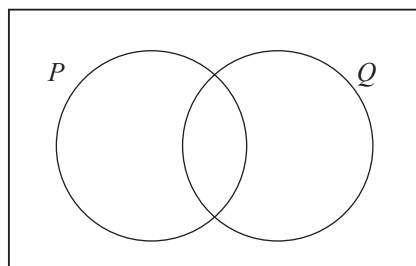
- (i) $n(Q')$,
(ii) $n(P \cap Q)'$.

[4 markah/marks]

Jawapan/Answer:

- (a)

ξ



- (b)

- 6 Diberi bahawa set semesta $\xi = \{x : 1 \leq x < 20, x \text{ ialah integer}\}$, set $A = \{2, 3, 5, 7, 11, 13, 17, 19\}$, set $B = \{1, 4, 9, 16\}$ dan set $C = \{1, 3, 5, 15\}$.

It is given that the universal set, $\xi = \{x : 1 \leq x < 20, x \text{ is integer}\}$, set $A = \{2, 3, 5, 7, 11, 13, 17, 19\}$, set $B = \{1, 4, 9, 16\}$ and set $C = \{1, 3, 5, 15\}$.

- (a) Senaraikan unsur bagi $(A \cup B) \cap C'$.

List the elements of $(A \cup B) \cap C'$.

- (b) Seterusnya, lengkapkan gambar rajah Venn untuk mewakili set semesta, set A , set B dan set C .

Hence, complete the Venn diagram to represent the universal set, set A , set B and set C .

[4 markah/marks]

Jawapan/Answer:

- (a)

- (b) ξ



- 7 (a) Diberi set $M = \{\text{sisi empat}\}$ dan set $N = \{\text{segi empat selari}\}$. Nyatakan hubungan antara M dan N .

Given set $M = \{\text{quadrilateral}\}$ and set $N = \{\text{parallelogram}\}$. State the relationship between M and N .

- (b) Diberi set semesta, $\xi = A \cup B$. Set A dan set B adalah dengan keadaan $n(A \cup B) = 52$, $n(A \cap B) = 13$ dan $n(A) = 35$. Cari nilai $n(B)$.

Given the universal set, $\xi = A \cup B$. Set A and set B are such that $n(A \cup B) = 52$, $n(A \cap B) = 13$ and $n(A) = 35$. Find the value of $n(B)$.

[4 markah/marks]

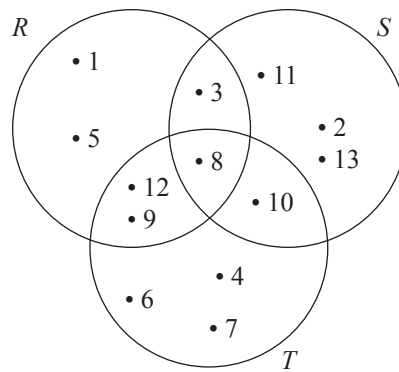
Jawapan/Answer:

- (a)

- (b)

- 8 Rajah 3 menunjukkan gambar rajah Venn bagi set R , set S dan set T . Diberi bahawa set semesta, $\xi = R \cup S \cup T$.

Diagram 3 shows a Venn diagram of set R , set S and set T . Given that the universal set, $\xi = R \cup S \cup T$.



Rajah 3 / Diagram 3

- (a) Senaraikan semua unsur bagi
List all the elements of
(i) $R \cap S'$,
(ii) $R \cup (T \cap S)$.
(b) Tentukan $n(T')$.
Determine $n(T')$.

[3 markah/marks]

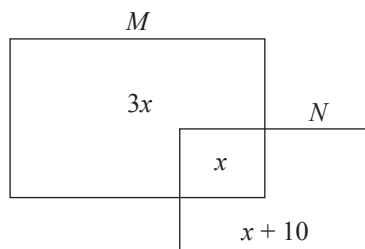
Jawapan/Answer:

(a) (i)

(ii)

(b) $n(T') =$

- 9 (a) Diberi set semesta, $\xi = \{x : x \text{ ialah integer, } 20 \leq x < 30\}$, set $P = \{x : x \text{ ialah gandaan } 3\}$ dan Set $Q = \{x : x \text{ ialah nombor ganjil}\}$.
 Given the universal set, $\xi = \{x : x \text{ is an integer, } 20 \leq x < 30\}$, set $P = \{x : x \text{ is multiple of } 3\}$ and Set $Q = \{x : x \text{ is an odd number}\}$.
 Lengkapkan gambar rajah Venn di ruang jawapan.
 Complete the Venn diagram in the answer space.
- (b) Rajah 4 ialah sebuah gambar rajah Venn yang menunjukkan bilangan peserta dalam pertandingan kuiz Sejarah dan Geografi.
 Diagram 4 is a Venn diagram showing the number of participants in History and Geography quiz competition.



Rajah 4 / Diagram 4

Diberi bahawa set semesta, $\xi = M \cup N$, set $M = \{\text{peserta kuiz Sejarah}\}$ dan set $N = \{\text{peserta kuiz Geografi}\}$.

It is given that universal set, $\xi = M \cup N$, set $M = \{\text{History quiz participants}\}$ and set $N = \{\text{Geography quiz participants}\}$.

Jika bilangan peserta yang menyertai satu kuiz sahaja ialah 70 orang, cari

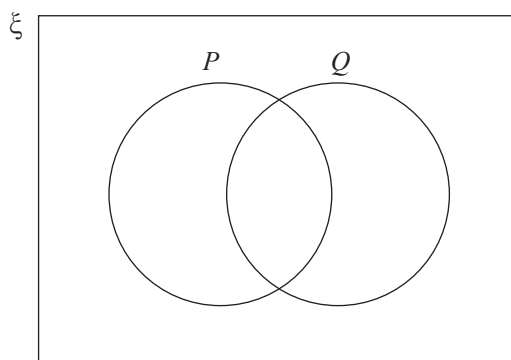
If the number of participants who participate only one quiz is 70, find

- nilai x ,
the value of x ,
- jumlah peserta yang menyertai kedua-dua kuiz.
the total number of the participants who participate both quizzes.

[5 markah/marks]

Jawapan/Answer:

(a)



(b) (i)

(ii)

- 10 Dalam satu kajian komuniti, seramai 240 orang peserta telah menyertai program kesukarelawanan yang dianjurkan oleh sebuah pertubuhan belia. Tiga program yang ditawarkan ialah Kempen Alam Sekitar (*S*), Program Kebajikan (*R*) dan Projek Teknologi (*P*). Maklumat penyertaan ditunjukkan dalam Jadual 1.
- In a community survey, 240 participants took part in a volunteer programme organised by a youth organisation. The three programmes offered were Environmental Campaign (S), Welfare Programme (R) and Technology Project (P). The participation details are shown in Table 1.*

Program kesukarelawanan <i>Volunteer programme</i>	Bilangan peserta <i>Number of participants</i>
Kempen Alam Sekitar sahaja <i>Environmental Campaign only</i>	72
Program Kebajikan sahaja <i>Charity Program only</i>	63
Projek Teknologi sahaja <i>Technology Project only</i>	39
Kempen Alam Sekitar dan Program Kebajikan sahaja <i>Environmental Campaigns and Welfare Programmes only</i>	19
Kempen Alam Sekitar dan Projek Teknologi sahaja <i>Environmental Campaigns and Technology Projects only</i>	21
Program Kebajikan dan Projek Teknologi sahaja <i>Welfare Programme and Technology Projects only</i>	14
Kempen Alam Sekitar, Program Kebajikan dan Projek Teknologi <i>Environmental Campaign, Charity Programme and Technology Project</i>	12

Jadual 1 / Table 1

- (a) Berdasarkan maklumat dalam Jadual 1, lukiskan gambar rajah Venn di ruang jawapan.
Based on the information in Table 1, draw a Venn diagram in the answer space.
- (b) Seterusnya, nyatakan bilangan murid yang menyertai Program Kebajikan dan Projek Teknologi.
Hence, state the number of students who participated in Welfare Programme and Technology Project only.
- (c) Nyatakan bilangan peserta yang menyertai dua atau lebih program kesukarelawanan.
State the number of participants who participated in two or more volunteer programmes.

[5 markah/marks]

Jawapan/Answer:

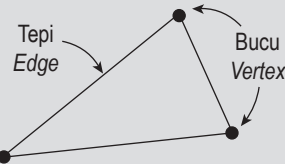
(a)

(b)

(c)

BAB
5Rangkaian dalam Teori Graf
Network in Graph TheoryVIDEO
PEMBELAJARAN

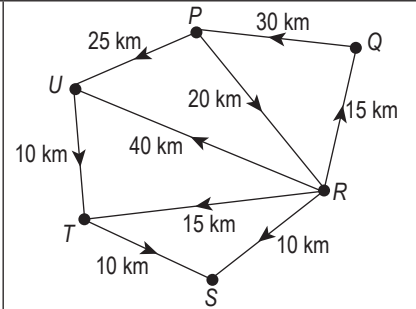
NOTA EFEKTIF



Bucu atau bintik, V Vertex or dot, V	Tepi atau garis, E Edge or line, E	Darjah, d Degree, d
$V = \{v_1, v_2, v_3, \dots, v_n\}$	$E = \{e_1, e_2, e_3, \dots, e_n\}$	$\sum d(V) = 2E$
Graf mudah Simple graph	- Tidak mempunyai gelung. <i>Does not have loops.</i> - Tidak mempunyai berbilang tepi. <i>Does not have multiple edges.</i> Bilangan darjah = $2 \times$ tepi <i>Number of degrees = $2 \times$ edges</i>	
Graf gelung dan berbilang tepi Graph with loops and multiple edges	Berbilang tepi/Multiples edges: - Melibatkan dua bucu. <i>Involve two vertices.</i> - Dua bucu dihubungkan dengan lebih daripada satu tepi. <i>Two vertices are connected by more than two edges.</i> - Bilangan darjah ialah dua kali bilangan tepi. <i>The number of degrees is twice the number of edges.</i> Gelung/Loops: - Melibatkan satu bucu. <i>Involve one vertex.</i> - Tepi berbentuk lengkung atau bulatan yang berbalik kepada bucu asal. <i>The edge is in the form of an arc that starts and ends at the same vertex.</i> - Bilangan darjah setiap gelung ialah dua. <i>The number of degrees in each loop is two.</i>	
Graf terarah Directed graph	- Graf dengan keadaan tepi yang mengaitkan dua bucu ditanda dengan arah kaitan. <i>A graph which a direction is assigned to the edges connecting two vertices.</i> - Berdasarkan arah anak panah: <i>Based on the directions of the arrows:</i> - Tepi AB: A ialah bucu awal dan B ialah bucu akhir. <i>Edge AB: A is the initial vertex and B is the terminal vertex.</i> - Semua bucu dikaitkan dengan satu arah sahaja. <i>All vertices are connected in one direction only.</i>	
Graf tak terarah Undirected graph	Graf mudah atau graf yang mempunyai gelung dan berbilang tepi yang dilukis tanpa penandaan arah. <i>A simple graph or a graph with loops and multiple edges drawn without any direction being assigned.</i>	

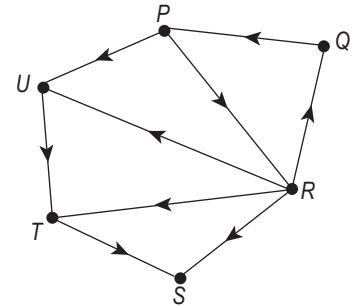
Graf berpemberat
Weighted graph

- Tepi menunjukkan nilai atau pemberat.
Edges show a value or a weight.
- Melibatkan graf terarah dan graf tak terarah.
Involves directed graph and undirected graph.
- Tepi mewakili jarak antara dua tempat, masa pergerakan, nilai arus litar elektrik, kos dan sebagainya.
The edges represent the distance between two places, travelling time, the current in an electrical circuit, cost and etcetera.



Graf tak berpemberat
Unweighted graph

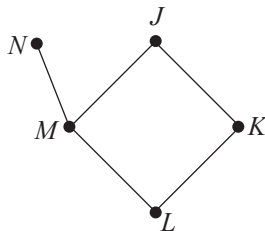
- Tepi tiada nilai atau pemberat.
Edges without value or a weight
- Melibatkan graf terarah dan graf tak terarah.
Involves directed graph and undirected graph.
- Tepi mengaitkan maklumat seperti hierarki jawatan dalam carta organisasi, peta alir, peta pokok dan peta buih.
The edge relates information like job hierarchy in an organization chart, flow map, tree map, and bubble map.



LATIHAN INTENSIF

Soalan Objektif
Jawab semua soalan.

- 1 Rajah 1 menunjukkan suatu graf.
Diagram 1 shows a graph.

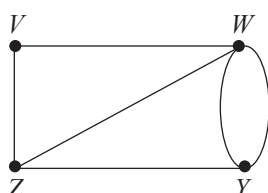


Rajah 1 / Diagram 1

Nyatakan set bucu.
State the set of vertices.

- A {J, N} C {J, K, L, M}
B {J, M, N} D {J, K, L, M, N}

- 2 Rajah 2 menunjukkan suatu graf yang mempunyai gelung dan berbilang tepi.
Diagram 2 shows a graph that has a loop and multiple edges.



Rajah 2 / Diagram 2

Hitung $n(V)$.
Find $n(V)$.

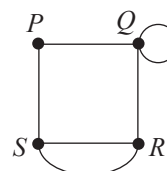
- A 4
B 5
C 6
D 7

- 3 Diberi $E = \{(P, Q), (P, S), (P, S), (P, R), (Q, Q), (Q, R), (R, S)\}$.
Given $E = \{(P, Q), (P, S), (P, S), (P, R), (Q, Q), (Q, R), (R, S)\}$.

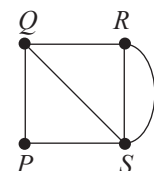
Antara graf berikut, yang manakah mewakili maklumat yang diberikan?

Which of the following graphs represents the information given?

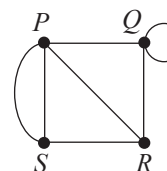
A



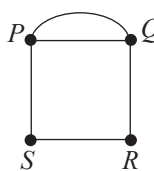
C



B

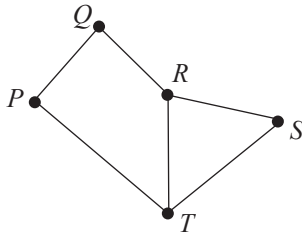


D



- 4 Rajah 3 menunjukkan suatu graf.

Diagram 3 shows a graph.



Rajah 3 / Diagram 3

Cari jumlah darjah graf itu.

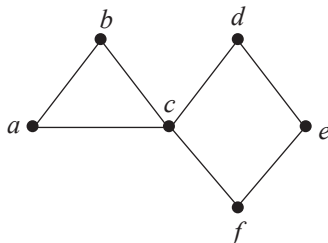
Find the total degree of the graph.

- A 5
B 6
C 10
D 12
- 5 Antara berikut, yang manakah bilangan darjah suatu graf?
Which of the following is the number of degrees of a graph?
- A 1, 1, 2, 2, 3
B 1, 2, 2, 3, 3
C 2, 2, 3, 3, 4
D 2, 2, 3, 4, 4
- 6 Satu pokok mempunyai bucu P, Q, R dan S . Antara berikut, yang manakah mungkin set tepinya?
A tree has vertices P, Q, R and S . Which of the following is a possible set of edges?

- A $\{(P, Q), (P, R), (Q, R)\}$
B $\{(P, Q), (P, Q), (R, S)\}$
C $\{(P, Q), (S, P), (Q, Q)\}$
D $\{(P, Q), (Q, R), (Q, S)\}$

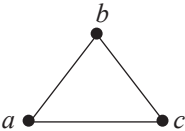
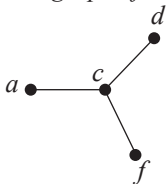
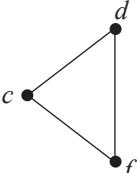
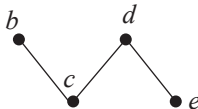
- 7 Rajah 4 menunjukkan suatu graf.

Diagram 4 shows a graph.



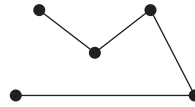
Rajah 4 / Diagram 4

Antara berikut, yang manakah **bukan** subgraf bagi graf itu?
Which of the following is **not** a subgraph of the graph?

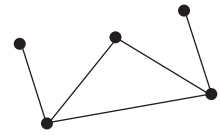
- A  C 
B  D 

- 8 Antara berikut, yang manakah suatu pokok?
Which of the following is a tree?

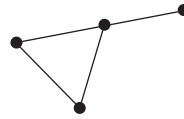
A



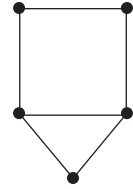
C



B

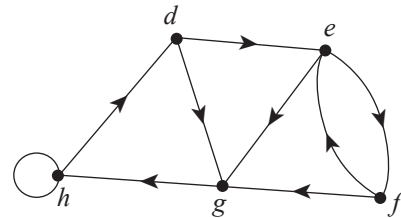


D



- 9 Rajah 5 menunjukkan suatu graf terarah.

Diagram 5 shows a directed graph.



Rajah 5 / Diagram 5

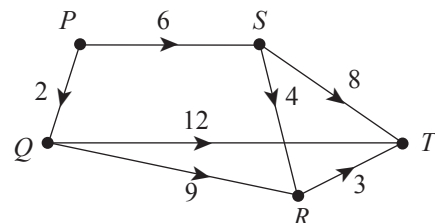
Antara berikut, yang manakah benar mengenai graf tersebut?
Which of the following is true about the graph?

Which of the following is true about the graph?

- A $d_{in}(g) = 2, d_{out}(d) = 1$
B $d_{in}(e) = 2, d_{out}(g) = 1$
C $d_{in}(f) = 3, d_{out}(e) = 2$
D $d_{in}(d) = 3, d_{out}(h) = 2$

- 10 Rajah 6 menunjukkan suatu graf terarah dan berpemberat yang menghubungkan lima tempat di sebuah bandar.

Diagram 6 shows a directed and weighted graph connecting five places in a town.



Rajah 6 / Diagram 6

Antara berikut, laluan manakah yang paling optimum untuk bergerak dari P ke T ?

Which of the following is the most optimal route to travel from P to T ?

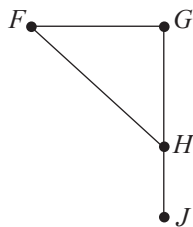
- A $P \rightarrow Q \rightarrow T$
B $P \rightarrow S \rightarrow T$
C $P \rightarrow S \rightarrow R \rightarrow T$
D $P \rightarrow Q \rightarrow R \rightarrow T$

Soalan Subjektif

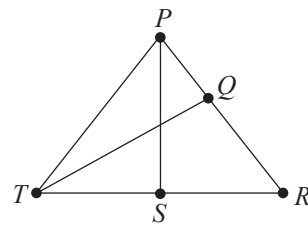
Jawab semua soalan.

- 1 Bagi setiap graf berikut, nyatakan set bucu, V , $n(V)$, set tepi, E , dan $n(E)$.
Based on the following graph, state the set of vertices, V , $n(V)$, set of edges, E , and $n(E)$.

(a)



(b)



[8 markah/marks]

Jawapan/Answer:

(a) $V =$

$n(V) =$

$E =$

$n(E) =$

(b) $V =$

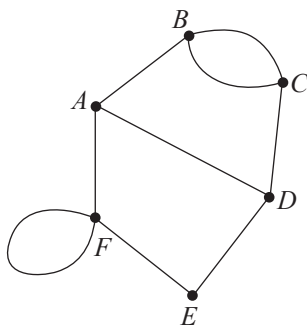
$n(V) =$

$E =$

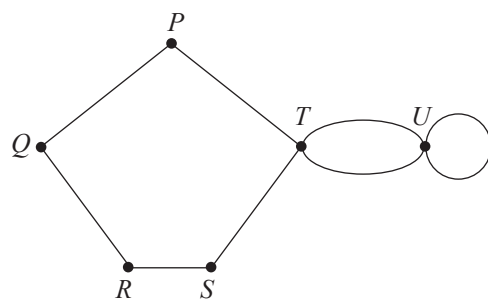
$n(E) =$

- 2 Lengkapkan jadual di ruang jawapan berdasarkan graf berikut.
Complete the tables in the answer space based on following graphs.

(a)



(b)



[2 markah/marks]

Jawapan/Answer:

(a)

Bucu Vertex	Darjah bagi bucu Degree of vertex	Jumlah tepi Total number of edges
A		
B		
C		
D		
E		
F		

(b)

Bucu Vertex	Darjah bagi bucu Degree of vertex	Jumlah tepi Total number of edges
P		
Q		
R		
S		
T		
U		

3 Lukis satu graf mudah berdasarkan maklumat yang diberikan.*Draw a simple graph based on the given information.*

(a) $V = \{A, B, C, D\}$

$E = \{(A, B), (A, C), (A, D), (B, C), (C, D)\}$

(b) $V = \{J, K, L, M, N\}$

$E = \{(J, M), (J, K), (K, M), (K, L), (L, M), (M, N)\}$

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

Tingkatan 4

4 Lukis satu graf berbilang tepi dan mempunyai gelung bagi set bucu dan pasangan set bucu yang berikut.*Draw a graph with multiple edges and loops for the following set of vertices and set of vertex pairs.*

(a) $V = \{L, M, N, P\}$

$E = \{(L, M), (L, N), (L, P), (L, P), (L, P), (M, N), (N, N), (N, P)\}$

(b) $V = \{1, 2, 3, 4, 5, 6\}$

$E = \{(1, 2), (1, 6), (1, 6), (2, 3), (2, 6), (3, 6), (3, 4), (4, 4), (4, 6), (4, 5), (5, 6)\}$

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

5 Lukis graf bagi bilangan darjah yang diberikan.

Draw a graph with the given of vertices.

(a) Graf mudah/Simple graph

Bilangan darjah = 2, 3, 2, 3

Degree of vertices = 2, 3, 2, 3

(b) Graf berbilang tepi dan mempunyai gelung.

A graph with multiple edges and loops.

Bilangan darjah = 1, 3, 4, 4, 2

Degree of vertices = 1, 3, 4, 4, 2

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

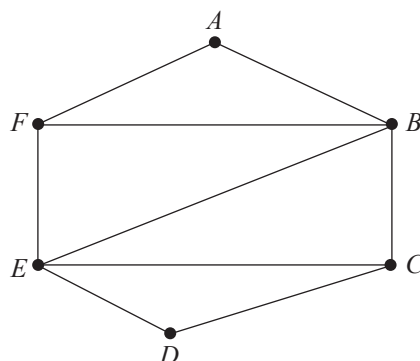
6 Lengkapkan graf terarah di ruang jawapan dengan menandakan anak panah berdasarkan maklumat yang diberikan.

Complete the directed graph in the answer space by marking the arrows based on the information given.

$d_{in}(A) = 1$	$d_{out}(A) = 1$
$d_{in}(B) = 2$	$d_{out}(B) = 2$
$d_{in}(C) = 3$	$d_{out}(C) = 0$
$d_{in}(D) = 0$	$d_{out}(D) = 2$
$d_{in}(E) = 2$	$d_{out}(E) = 2$
$d_{in}(F) = 1$	$d_{out}(F) = 2$

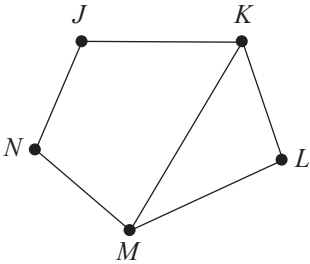
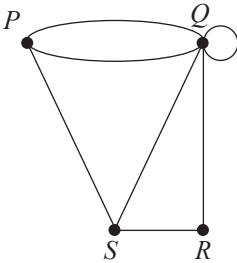
[2 markah/marks]

Jawapan/Answer:



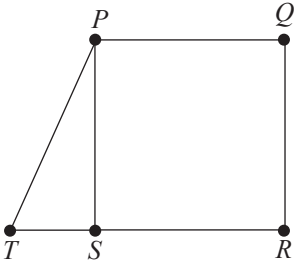
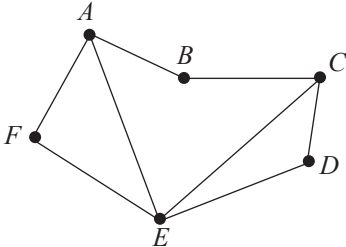
7 Lukis dua subgraf bagi setiap graf yang berikut.
Draw two subgraphs for each of the following graph.

[4 markah/marks]

Graf Graph	Subgraf 1 Subgraph 1	Subgraf 2 Subgraph 2
(a) 		
(b) 		

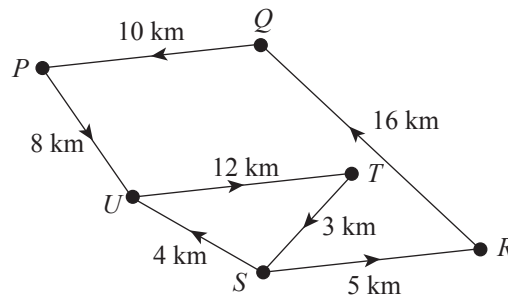
8 Lukis dua pokok berdasarkan setiap graf yang berikut.
Draw two trees based on each of the following graph.

[4 markah/marks]

Graf Graph	Pokok 1 Tree 1	Pokok 2 Tree 2
(a) 		
(b) 		

- 9 Rajah 1 menunjukkan graf yang menghubungkan enam tempat beserta dengan jarak di antara setiap lokasi tersebut.

Diagram 1 shows a graph that connects six places along with the distance between each of the place.



Rajah 1 / Diagram 1

Berdasarkan graf di atas,

Based on the graph above,

- (a) tentukan sama ada graf tersebut merupakan graf terarah atau tak terarah. Berikan justifikasi anda,
determine whether the graph is a directed graph or not. Give your justification,

[2 markah/marks]

- (b) lengkapkan Jadual 1 di ruang jawapan,
complete Table 1 in the answer space,

[3 markah/marks]

- (c) lukis dan hitung jarak terpendek yang menghubungkan semua tempat dalam satu laluan.
draw and calculate the shortest distance that connect all the places in one way.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

Tempat Place	$d_{in}(V)$	$d_{out}(V)$
P		
Q		
R		
S		
T		
U		

Jadual 1 / Table 1

(c)

- 10 Jadual 2 menunjukkan jarak yang menghubungkan enam buah bandar iaitu Bandar A , B , C , D , E dan F .
Table 2 shows the distance connecting six cities, namely City A , B , C , D , E and F .

Pasangan bucu <i>Vertex pairs</i>	Jarak (km) <i>Distance (km)</i>
A dan/ <i>and</i> B	5.5
A dan/ <i>and</i> E	12.6
A dan/ <i>and</i> F	8.2
B dan/ <i>and</i> C	7.8
B dan/ <i>and</i> F	4.6
C dan/ <i>and</i> D	5.2
C dan/ <i>and</i> F	4.5
F dan/ <i>and</i> D	3.2
E dan/ <i>and</i> D	4.3
F dan/ <i>and</i> E	5.0

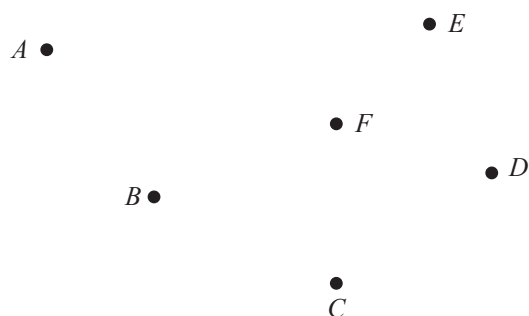
Jadual 2 / Table 2

- (a) Lengkapkan graf tak terarah dan berpemberat di ruang jawapan untuk mewakili maklumat dalam jadual di atas.
Complete an undirected and weighted graph in the answer space to represent the information in the table above.
- (b) (i) Lukis satu pokok berpemberat minimum dengan keadaan setiap bandar dilalui sekali sahaja.
Draw a tree with a minimum total weight which shows every city being visited once only.
- (ii) Hitung jarak minimum pokok itu berdasarkan jawapan di (b)(i).
Calculate the minimum distance of the tree based on the answer in (b)(i).

[6 markah/marks]

Jawapan/Answer:

(a)

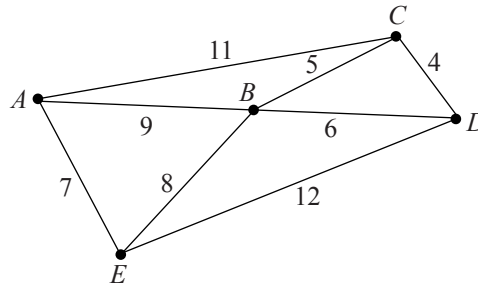


(b) (i)

(ii)

- 11 Rajah 2 menunjukkan rangkaian kedudukan lima buah rumah yang dihubungkan oleh jalan raya antara satu sama lain. Masa yang diambil, dalam minit, untuk berjalan dari satu rumah ke rumah yang lain diwakili oleh nilai yang ditunjukkan pada setiap tepi. Azmi bertolak dari rumah A untuk menghantar kad jemputan perkahwinannya ke setiap rumah dan kembali ke rumah A dengan purata laju 1.15 meter per saat.

Diagram 2 shows a network of position of five houses connected by roads to each other. The time taken, in minutes, to walk from a house to another house is represented by the value shown at the edges. Azmi departed from house A to send his wedding invitation cards to each house and return to house A with an average speed of 1.15 metre per second.



Rajah 2 / Diagram 2

- (a) Cari masa terpendek, dalam minit, bagi perjalanan Azmi.
Find the shortest time, in minutes, of Azmi's journey.
- (b) Cari jarak terpendek, dalam m, perjalanan Azmi.
Find the shortest distance, in m, of Azmi's journey.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)



BAB
6Ketaksamaan Linear dalam Dua
Pemboleh Ubah

Linear Inequalities in Two Variables

VIDEO
PEMBELAJARAN

NOTA EFEKTIF

1	Contoh situasi <i>Example of situation</i>	Ketaksamaan linear <i>Linear inequality</i>	Contoh situasi <i>Example of situation</i>	Ketaksamaan linear <i>Linear inequality</i>
	y lebih besar daripada x <i>y greater than x</i>	$y > x$	y kurang daripada x <i>y less than x</i>	$y < x$
	y tidak kurang daripada x <i>y is not less than x</i>	$y \geq x$	y tidak lebih daripada x <i>y is not more than x</i>	$y \leq x$
	y sekurang-kurangnya k kali ganda x <i>y is at least k times x</i>	$y \geq kx$	y selebih-lebihnya k kali ganda x <i>y is at most k times x</i>	$y \leq kx$
	Minimum y ialah k <i>Minimum of y is k</i>	$y \geq k$	Maksimum y ialah k <i>Maximum of y is k</i>	$y \leq k$
	Jumlah x dan y tidak kurang daripada k <i>Total x and y is not less than k</i>	$x + y \geq k$	Beza x dan y tidak lebih daripada k <i>Different x and y not more than k</i>	$x - y \leq k$
	y melebihi x sekurang-kurangnya k <i>y is more than x by at least k</i>	$y - x \geq k$	x melebihi y selebih-lebihnya k <i>x is more than y by at most k</i>	$x - y \leq k$

2	Ketaksamaan <i>Inequality</i>	Jenis garisan <i>Type of lines</i>	Contoh rantau berlorek <i>Example of shaded region</i>	
	$y \geq x$	Garis padu <i>Solid line</i>		Rantau atas dilorek <i>Region above shaded</i>
	$y > x$	Garis sempang <i>Dashed line</i>		
	$y \leq x$	Garis padu <i>Solid line</i>		Rantau bawah dilorek <i>Region below shaded</i>
	$y < x$	Garis sempang <i>Dashed line</i>		



LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Penyelesaian bagi $6 - \frac{5}{2}x \geq 5x$ ialah

The solution for $6 - \frac{5}{2}x \geq 5x$ is

- A $x \leq -3$ C $x \leq \frac{4}{5}$
B $x \leq -\frac{3}{2}$ D $x \geq \frac{4}{5}$

- 2 Antara ketaksamaan berikut, yang manakah memuakan ketaksamaan linear serentak $3x - 6 < x$ dan $9 + 4x \geq x$?

Which of the following inequalities satisfies the simultaneous linear inequalities $3x - 6 < x$ and $9 + 4x \geq x$?

- A $3 \leq x < -3$ C $-3 < x \leq 3$
B $-3 \leq x < 3$ D $3 < x \leq -3$

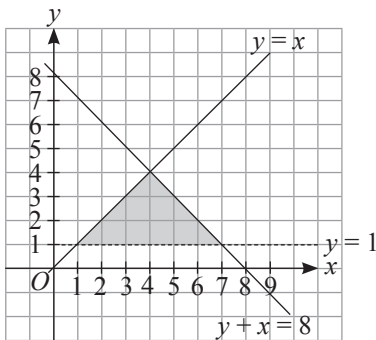
- 3 Antara berikut, titik yang manakah memuakan ketaksamaan linear $y \leq \frac{1}{2}x + 7$?

Which of the following point satisfies the linear inequality $y \leq \frac{1}{2}x + 7$?

- A $(-2, 6)$ C $(2, 9)$
B $(-4, 6)$ D $(4, 10)$

- 4 Rajah 1 menunjukkan rantau berlorek yang dibatasi oleh tiga garis lurus.

Diagram 1 shows the shaded region bounded by three straight lines.



Rajah 1 / Diagram 1

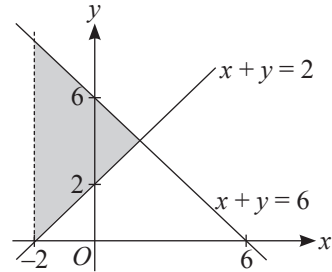
Antara berikut, yang manakah sistem ketaksamaan linear yang mewakili rantau berlorek di atas?

Which of the following is the system of linear inequalities that represents the shaded region above?

- A $y \leq x, y + x \leq 8, y > 1$
B $y \leq x, y + x \leq 8, y \geq 1$
C $y \geq x, y + x \geq 8, y > 1$
D $y \leq x, y + x \leq 8, y \leq 1$

- 5 Rajah 2 menunjukkan sebuah graf yang mewakili suatu sistem ketaksamaan linear.

Diagram 2 shows a graph representing a system of linear inequalities.



Rajah 2 / Diagram 2

Antara berikut, titik yang manakah **tidak** memuakan rantau berlorek?

Which of the following points does **not** satisfy the shaded region?

- A $(0, 3)$
B $(-1, 5)$
C $(1, 4)$
D $(-2, 6)$

- 6 Penyelesaian $3 - \frac{r}{2} \leq 5 - r$ ialah

The solution for $3 - \frac{r}{2} \leq 5 - r$ is

- A $r \leq -4$ C $r \leq 4$
B $r \geq -4$ D $r \geq 7$

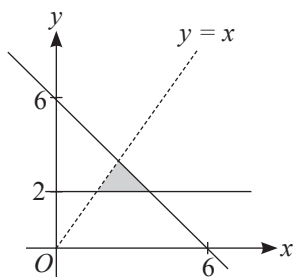
- 7 Sebuah kedai buku ingin menempah x buah novel dan y buah buku cerita. Harga bagi sebuah novel dan sebuah buku cerita masing-masing ialah RM19.90 dan RM8.90. Bilangan buku cerita yang ditempah melebihi bilangan novel sekurang-kurangnya sebanyak 15 buah. Jumlah wang yang diperuntukkan tidak melebihi RM500. Ungkapkan situasi yang diberikan dalam bentuk ketaksamaan.

A bookstore wants to order x units of novels and y units of storybooks. The price of a novel and a storybook is RM19.90 and RM8.90 respectively. The number of storybooks ordered is more than the number of novels by at least 15. The amount of money allocated is not exceed than RM500. Express the given situation in the form of an inequality.

- A $19.9x + 8.9y < 500, x - y \geq 15$
B $19.9x + 8.9y \leq 500, y - x \geq 15$
C $19.9x + 8.9y > 500, y - x < 15$
D $19.9x + 8.9y \geq 500, y - x > 15$

- 8 Rajah 3 menunjukkan rantau berlorek yang memuaskan tiga ketaksamaan yang diwakili oleh tiga garis lurus.

Diagram 3 shows the shaded region that satisfying three inequalities represents by three straight lines.



Rajah 3 / Diagram 3

Tiga ketaksamaan itu ialah

The three inequalities are

- A $y > 2, 6x \leq 6y, y \leq x$
- B $y > 2, y \geq 6 - x, y < x$
- C $y \geq 2, y + x \leq 6 + x, x < y$
- D $y \geq 2, y \leq 6 - x, y < x$

Soalan Subjektif

Jawab semua soalan.

- 1 Lukis graf dan lorek rantau yang memuaskan ketaksamaan linear yang berikut.

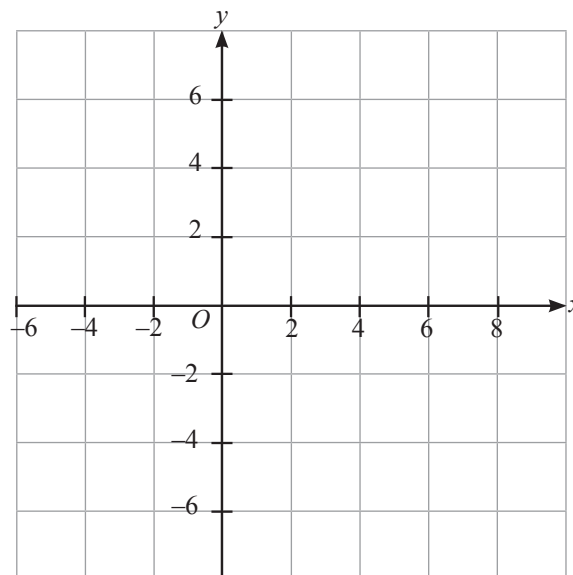
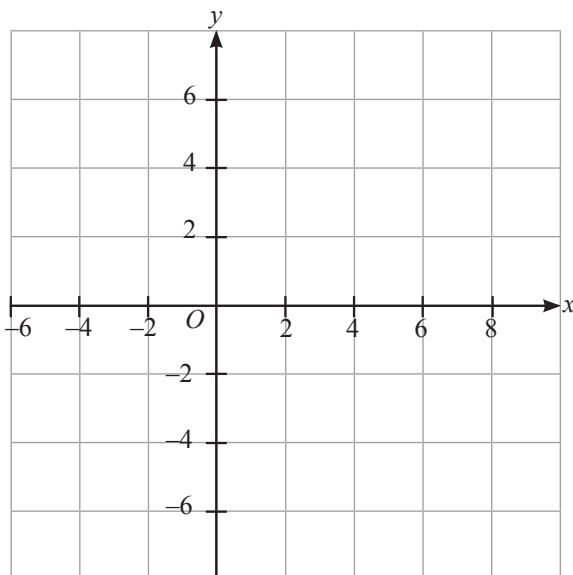
Draw a graph and shade the region that satisfies the following linear inequalities.

(a) $x - y - 4 \leq 0, x + y > 0, y \leq 4$

(b) $y < x + 2, x + 2y \geq 4, x \leq 6$

[8 markah/marks]

Jawapan/Answer:



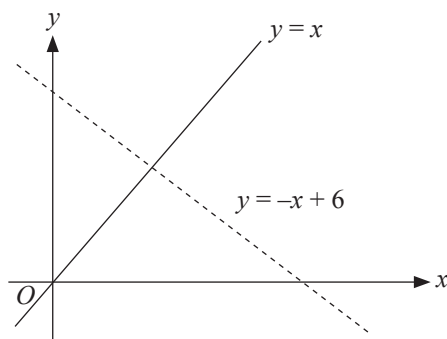
- 2 Wakilkan situasi berikut dalam bentuk ketaksamaan linear.
Represent each of the situation in linear inequality form.

Situasi <i>Situation</i>	Ketaksamaan linear <i>Linear inequality</i>
(a) Zidan perlu mendapatkan sekurang-kurangnya 20 markah bagi Kertas 1 Matematik dan 50 markah bagi Kertas 2 Matematik untuk lulus ujian peperiksaan awal tahun. Markah lulus ialah 50 markah. <i>Zidan needs to obtain at least 20 marks for Mathematics Paper 1 and 50 marks for Mathematics Paper 2 to pass the early-year examination. The passing mark is 50.</i>	
(b) Encik Azman ingin membeli sebidang tanah berbentuk segi empat tepat untuk membina rumah idamannya. Diketahui perimeter tanah itu telah melebihi 1800 m. <i>Mr. Azman wants to buy a rectangular plot of land to build his dream house. It is known that the perimeter of the land exceeds 1 800 m.</i>	
(c) Rozi mempunyai dua keping wang kertas RM50. Dia ingin menukarkan wang itu kepada x keping duit syiling 20 sen dan y keping duit syiling 50 sen. <i>Rozi has two RM50 notes. She wants to exchange the money into x pieces of 20-cent coins and y pieces of 50-cent coins.</i>	
(d) Sebuah koperasi sekolah menjual dua jenis kalkulator saintifik. Jenama A dan Jenama B . Keuntungan yang diperoleh daripada seunit kalkulator saintifik Jenama A ialah RM10.50 dan kalkulator saintifik Jenama B ialah RM7.50. Jumlah keuntungan perlu melebihi RM1 200 untuk mendapat keuntungan minimum. <i>A school cooperative sells two types of scientific calculators, Brand A and Brand B. The profit obtained from each unit of Brand A is RM10.50 and from Brand B is RM7.50. The total profit must exceed RM1 200 to achieve the minimum profit target.</i>	
(e) Sebuah universiti menawarkan dua kursus, P dan Q . Bilangan pelajar kursus P ialah x dan bilangan pelajar kursus Q ialah y . Bilangan maksimum pelajar kursus Q separuh daripada bilangan pelajar P . Jumlah bilangan pelajar tidak kurang daripada 80 orang. <i>A university offers two courses, P and Q. The number of students in course P is x and the number of students in course Q is y. The number of students in course Q is at most half of the number of students in course P. The total number of students is not less than 80.</i>	
(f) Di sebuah sekolah, terdapat x orang guru lelaki dan y orang guru perempuan. Bilangan guru perempuan adalah selebih-lebihnya 3 kali bilangan guru lelaki. Beza antara bilangan guru perempuan dan guru lelaki adalah kurang daripada 75 orang. Jumlah guru di sekolah adalah lebih daripada 100 orang. <i>In a school, there are x male teachers and y female teachers. The number of female teachers is at most 3 times the number of male teachers. The difference between the number of female and male teachers is less than 75. The total number of teachers in the school is more than 100.</i>	

- 3 Pada rajah di ruang jawapan, lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan $y \leq x$, $y > -x + 6$ dan $x < 6$.

On the diagram in the answer space, shade the region that satisfies the three inequalities $y \leq x$, $y > -x + 6$ and $x < 6$.

Jawapan/Answer:

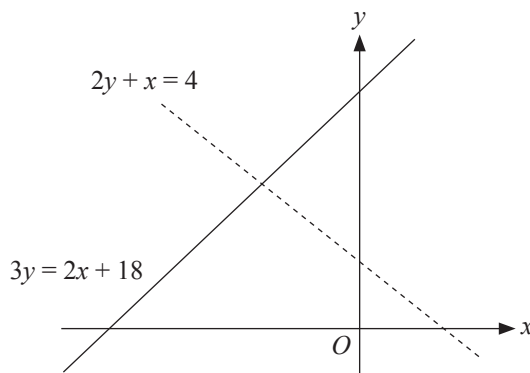


[3 markah/marks]

- 4 Pada rajah di ruang jawapan, lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan $2y + x > 4$, $3y \geq 2x + 18$ dan $y \leq 6$.

On the diagram in the answer space, shade the region that satisfies the three inequalities $2y + x > 4$, $3y \geq 2x + 18$ and $y \leq 6$.

Jawapan/Answer:



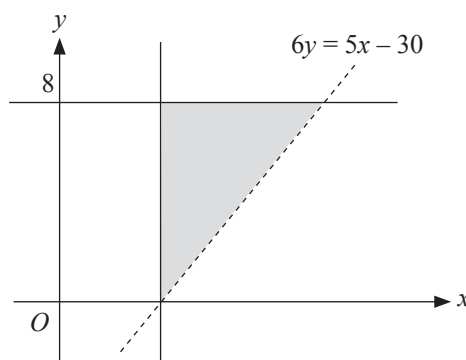
[3 markah/marks]

- 5 Tuliskan tiga ketaksamaan yang memuaskan rantau berlorek.

Write three inequalities that satisfy the shaded region.

Jawapan/Answer:

- (a)
(b)
(c)



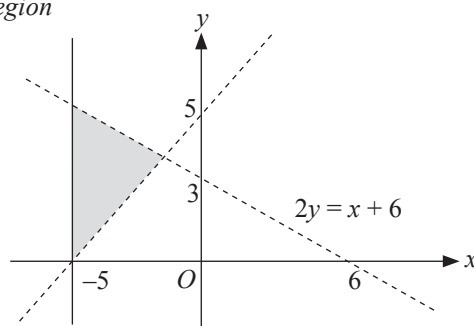
[3 markah/marks]

- 6 Berdasarkan rajah, tuliskan tiga ketaksamaan yang mentakrif rantau berlorek.

Based on the diagram, write three inequalities that define the shaded region

Jawapan/Answer:

- (a)
(b)
(c)



[3 markah/marks]

- 7 Sebuah taman rekreasi di Bandar Anjung telah mengumpul data mengenai kehadiran pengunjung. Pengunjung terdiri daripada x orang dewasa dan y orang kanak-kanak. Maklumat berikut berkaitan kehadiran pengunjung.

A recreational park in Bandar Anjung has collected data on visitors' attendance. The visitors consist of x adults and y children. The following information is about the visitor attendance.

- (i) Jumlah maksimum orang dewasa dan kanak-kanak ialah 100 orang.
The maximum number of adults and children is 100.
- (ii) Bilangan kanak-kanak sekurang-kurangnya 20 orang.
Number of children is at least 20.
- (iii) Beza antara bilangan dewasa dan bilangan kanak-kanak lebih daripada 20 orang.
The difference between the number of adults and the number of children is more than 20.

- (a) Berdasarkan maklumat yang diberi, tulis tiga ketaksamaan linear, selain $x \geq 0$ dan $y \geq 0$.
Based on the information given, write three linear inequalities, other than $x \geq 0$ and $y \geq 0$.

- (b) Menggunakan skala 2 cm kepada 20 orang pengunjung pada kedua-dua paksi, lukis dan lorekkan kawasan yang memuaskan sistem ketaksamaan linear itu.
Using a scale of 2 cm to 20 visitors on both axes, draw and shade the regions that satisfy the system of linear inequalities.

- (c) Daripada graf/*From the graph,*

- (i) berapakah bilangan maksimum pengunjung dewasa?
what is the maximum number of adult visitors?
- (ii) berapakah bilangan kanak-kanak jika kehadiran dewasa dicatatkan seramai 52 orang?
what is the number of children if the attendance of adults is recorded as 52?

[10 markah/marks]

Jawapan/Answer:

(a)

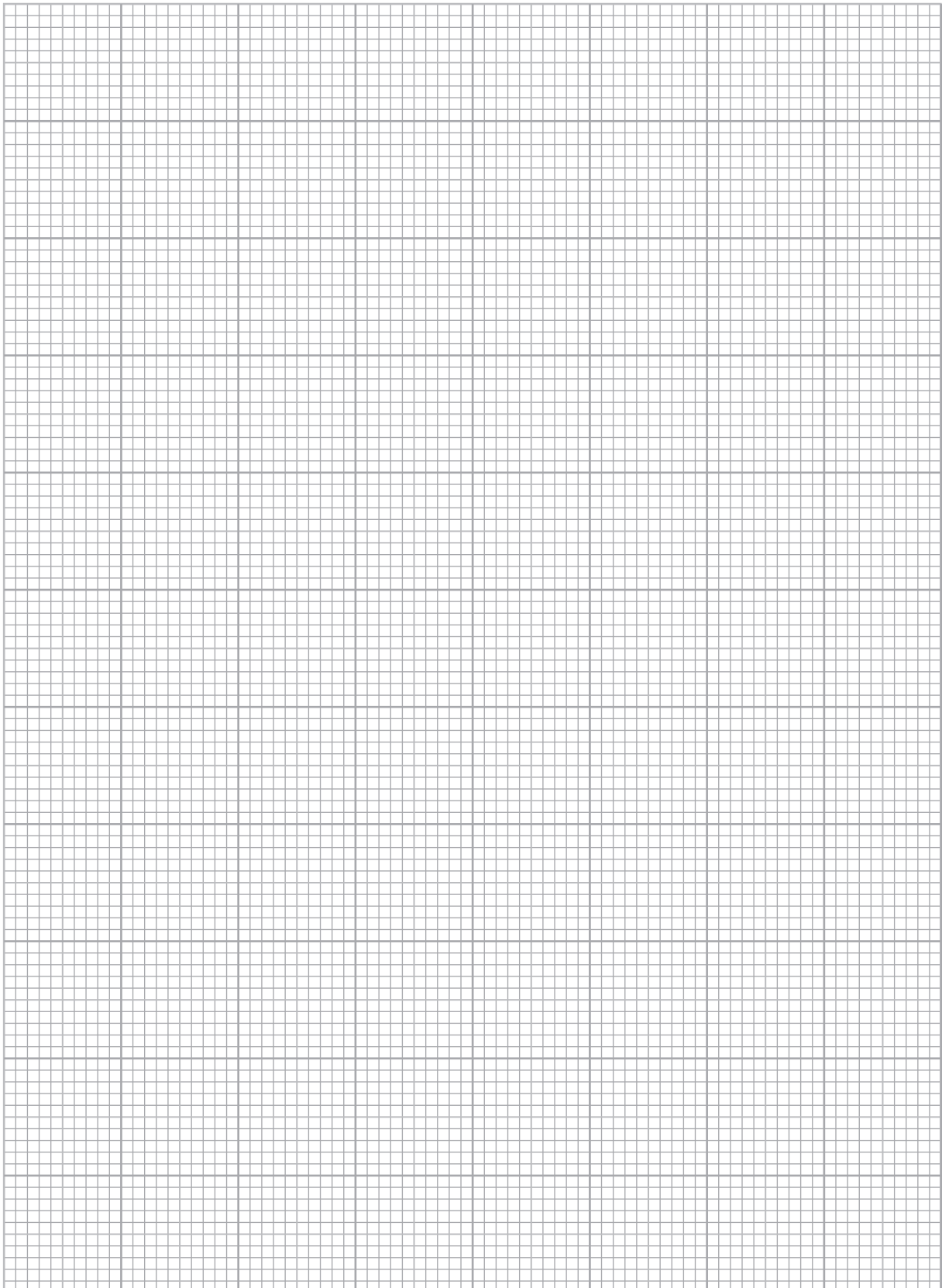
- (b) Rujuk graf.
Refer to the graph.

(c) (i)

(ii)

Graf untuk Soalan 7
Graph for Question 7

Tingkatan 4



- 8 Chuah merancang untuk membeli beg dan rantai kunci untuk cenderahati sempena majlis sambutan hari lahirnya. Jadual 1 menunjukkan bilangan cenderahati serta harga bagi setiap jenis.

Chuah plans to buy bags and keychains as souvenirs for her birthday celebration. Table 1 shows the number of souvenirs and the price for each type.

Jenis cenderahati <i>Type of souvenir</i>	Bilangan cenderahati <i>Number of souvenirs</i>	Harga per unit <i>Price per unit</i>
Beg <i>Bag</i>	x	RM3
Rantai kunci <i>Keychains</i>	y	RM10

Jadual 1 / Table 1

Syarat-syarat pembelian cenderahati adalah seperti berikut:

The conditions for purchasing the souvenirs are as follows:

- I: Bilangan beg yang dibeli tidak melebihi 50.
The number of bags purchased does not exceed 50.
- II: Bilangan rantai kunci selebih-lebihnya dua kali bilangan beg.
The number of keychains is at most twice the number of the bags.
- III: Jumlah harga pembelian melebihi RM350.
The purchase amount does exceed RM350.

- (a) Tulis tiga ketaksamaan linear, selain $x \geq 0$ dan $y \geq 0$, yang memuaskan semua syarat-syarat di atas.
Write three linear inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the conditions above.
- (b) Dengan menggunakan skala 2 cm kepada 10 unit pada setiap paksi, lukis dan lorek rantau yang memuaskan sistem ketaksamaan linear di atas.
By using a scale of 2 cm to 10 units on each axis, draw and shade the region that satisfy the above linear inequalities system.
- (c) Menggunakan graf di (b),
Using the graph in (b),
 - (i) cari jumlah harga maksimum bagi kedua-dua cenderahati itu,
find the total maximum price for both souvenirs,
 - (ii) 15 buah beg dan 70 rantai kunci telah dibeli. Adakah penjualan ini memuaskan sistem ketaksamaan linear yang anda bina? Berikan justifikasi anda.
15 bags and 70 keychains were purchased. Does this purchase satisfy the system of linear inequalities you constructed? Give your justification.

[12 markah/marks]

Jawapan/Answer:

(a)

(b) Rujuk graf.
Refer to the graph.

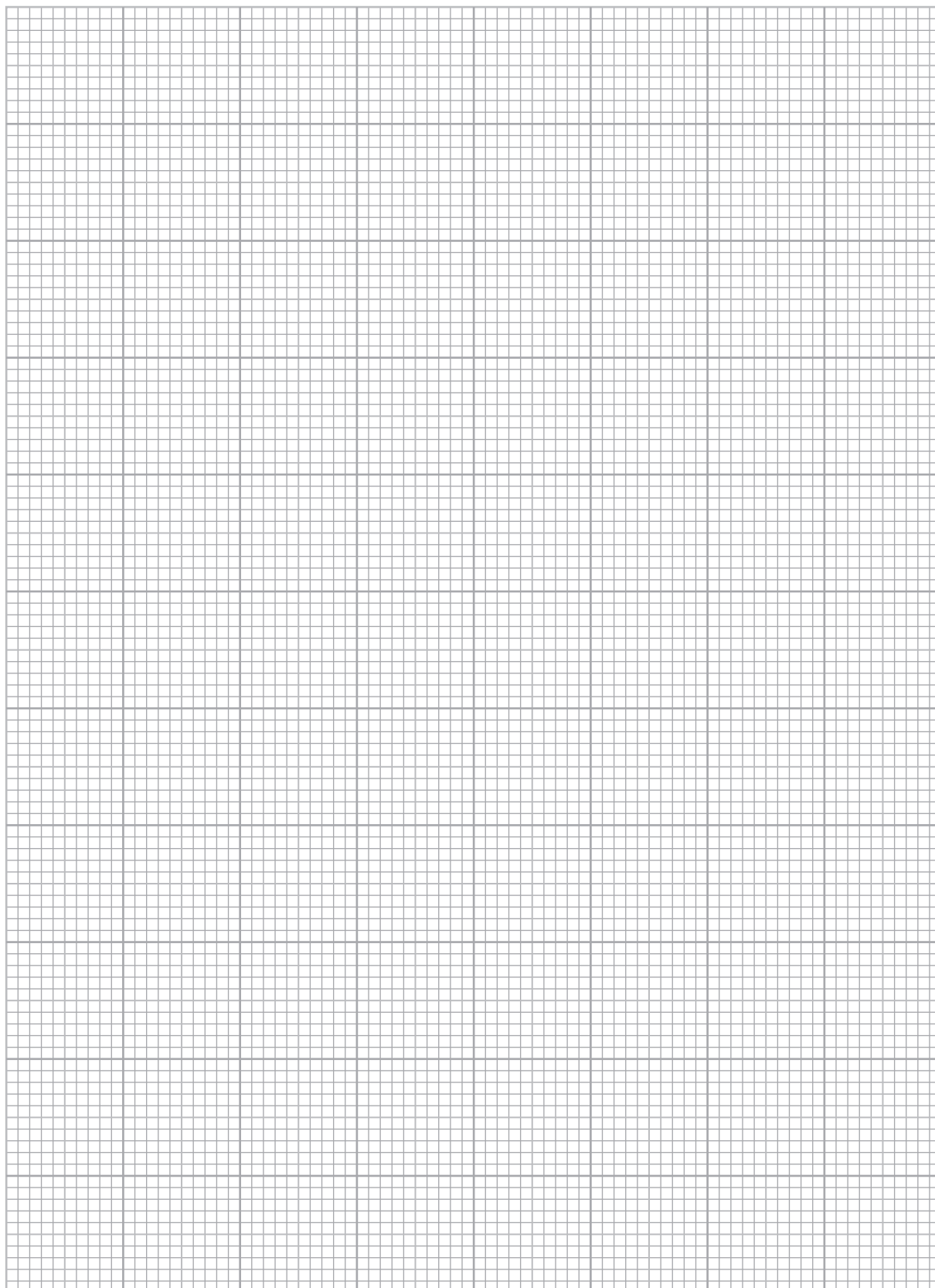
(c) (i)

(ii)



Graf untuk Soalan 8
Graph for Question 8

Tingkatan 4



BAB 7

Graf Gerakan Graphs of Motion


 VIDEO
PEMBELAJARAN

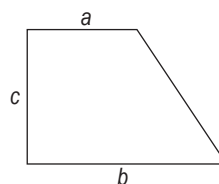

NOTA EFEKTIF

Item Items	Jenis graf Type of graphs	
	Graf Jarak-Masa Distance-Time Graphs	Graf Laju-Masa Speed-Time Graphs
	Jarak Distance Kecerunan positif (Gerakan menuju destinasi) Positive gradient (Motion towards destination) Kecerunan sifar (Pegun) Zero gradient (Stationary) Kecerunan negatif (Gerakan menuju ke asal) Negative gradient (Motion towards origin) Masa Time	Laju Speed Pecutan Acceleration Laju seragam Uniform speed Nyahpecutan Deceleration Masa Time
	Jarak Distance	Luas di bawah graf The area under the graph
	Laju/Kadar perubahan jarak Speed/Rate of change of distance	Nilai dibaca daripada graf The value read from the graph
	Kecerunan graf The gradient of the graph $\text{Laju} = \frac{\text{Jarak}}{\text{Masa}}$ $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$	
Laju purata Average speed	$\text{Laju purata} = \frac{\text{Jumlah jarak}}{\text{Jumlah masa}}$ $\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$	
Pecutan/Kadar perubahan laju Acceleration/Rate of change of speed		Kecerunan graf The gradient of the graph

TIP

 Luas trapezium
Area of trapezium

$$= \frac{1}{2} \times (a + b) \times c$$





LATIHAN INTENSIF

Soalan Subjektif

Jawab semua soalan.

- 1 Lukis graf jarak-masa berdasarkan maklumat yang diberi.

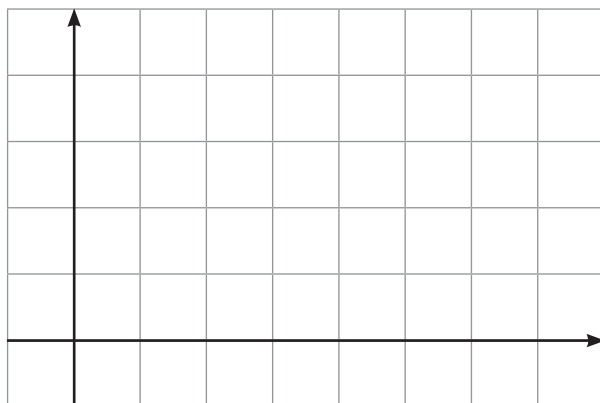
Draw a distance-time graph based on the given information.

[2 markah/marks]

(a)

Masa/Time (s)	0	5	10	15	20
Jarak/Distance (m)	0	6.5	13.0	19.5	26.0

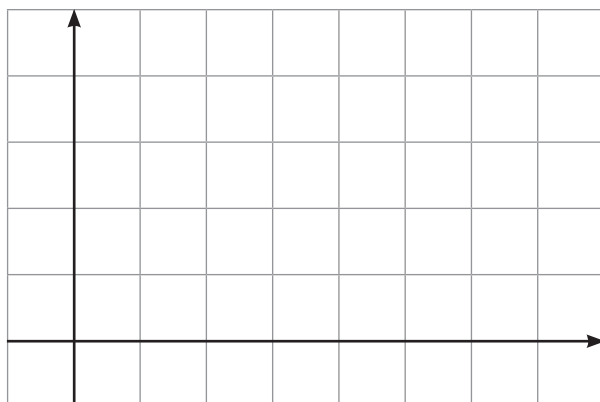
Jawapan/Answer:



(b)

Masa/Time (s)	0	1	2	3	4	5
Jarak/Distance (m)	0	75	150	150	225	300

Jawapan/Answer:



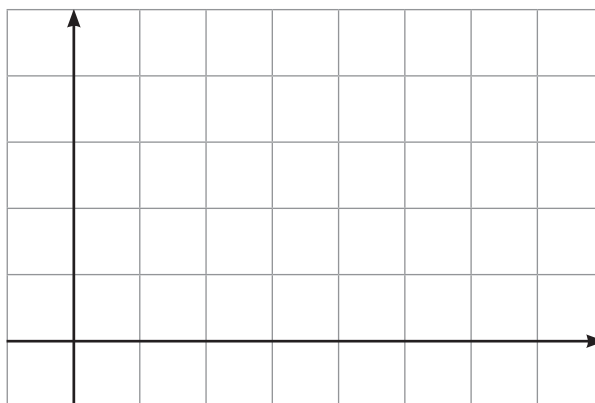
- 2 Lukis graf laju-masa berdasarkan maklumat yang diberi.
Draw a speed-time graph based on the given information.

[2 markah/marks]

(a)

Masa/Time (s)	0	1.5	3.0	4.5	6.0
Laju/Speed (m s^{-1})	0	7	14	21	28

Jawapan/Answer:



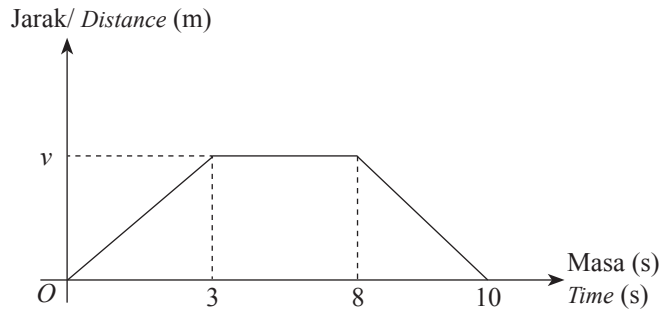
(b)

Masa/Time (s)	0	2	4	6	8
Laju/Speed (km h^{-1})	0	60	60	60	0

Jawapan/Answer:



- 3 Rajah 1 menunjukkan pergerakan suatu zarah dalam tempoh masa 10 saat.
Diagram 1 shows the motion of a particle over a period of 10 seconds.



Rajah 1 / Diagram 1

- (a) Tentukan tempoh masa, dalam saat, zarah itu berada dalam keadaan pegun.
Determine the duration, in seconds, that the particle is stationary.
- (b) Hitung nilai v , jika laju zarah bagi 3 saat yang pertama ialah 100 m s^{-1} .
Calculate the value of v , if the speed of the particle for the first 3 seconds is 100 m s^{-1} .
- (c) Hitung kadar perubahan jarak, dalam m s^{-1} , untuk tempoh 2 saat terakhir.
Calculate the rate of change of distance, in m s^{-1} , for the last 2 seconds.

[1 markah/mark]

[2 markah/marks]

[2 markah/marks]

Jawapan/Answer:

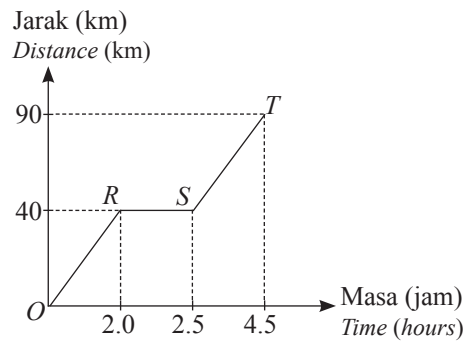
(a)

(b)

(c)

- 4 Rajah 2 menunjukkan graf jarak-masa bagi pergerakan sebuah teksi. Teksi itu bergerak dari bandar O ke bandar T dalam tempoh 4.5 jam.

Diagram 2 shows the distance-time graph for the motion of a taxi. The taxi moves from town O to town T for a period of 4.5 hours.



Rajah 2 / Diagram 2

- (a) Nyatakan tempoh masa, dalam minit, ketika teksi itu berhenti seketika.
State the duration, in minutes, when the object is stationary.

[1 markah/mark]

- (b) Hitung laju, dalam km h^{-1} , teksi itu dari bandar O ke bandar R .
Calculate the speed, in km h^{-1} , of the taxi from town O to town R .

[2 markah/marks]

- (c) Cari jarak, dalam km, yang dilalui oleh teksi itu dalam 2 jam terakhir.
Find the distance, in km, travelled by the taxi in the last 2 hours.

[1 markah/mark]

Jawapan/Answer:

(a)

(b)

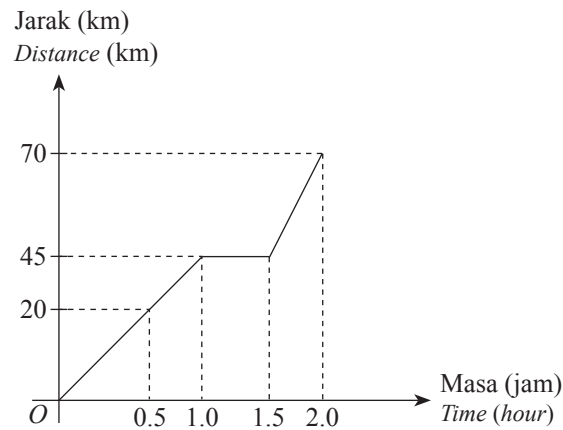
(c)



VIDEO ULASAN
JAWAPAN

- 5 Rajah 3 menunjukkan pergerakan sebuah kereta e-panggilan dari Petaling Jaya ke Kuala Lumpur dalam tempoh 2 jam.

Diagram 3 shows the movement of a e-hailing car from Petaling Jaya to Kuala Lumpur over a period of 2 hours.



Rajah 3 / Diagram 3

- (a) Nyatakan tempoh masa, dalam minit, apabila kereta itu berhenti.
State the duration, in minutes, when the car is at rest.

[1 markah/mark]

- (b) Hitung laju purata bagi keseluruhan perjalanan.
Calculate the average speed for the entire journey.

[2 markah/marks]

- (c) Hitung laju kereta dalam situasi berikut:
Calculate the speed of the car in the following situations:

- (i) 0.5 jam yang pertama,
the first 0.5 hour,

[2 markah/marks]

- (ii) 0.5 jam yang terakhir.
the last 0.5 hour.

[2 markah/marks]

Jawapan/Answer:

(a)

(b)

(c) (i)

(ii)

- 6 Jadual 1 menunjukkan rekod pergerakan sebuah meteor yang sedang menghampiri Bumi.
Table 1 shows the record of the movement of a meteor approaching the Earth.

Masa (saat) <i>Time (seconds)</i>	0	10	20	30	40	50
Jarak (km) <i>Distance (km)</i>	500	400	300	200	100	0

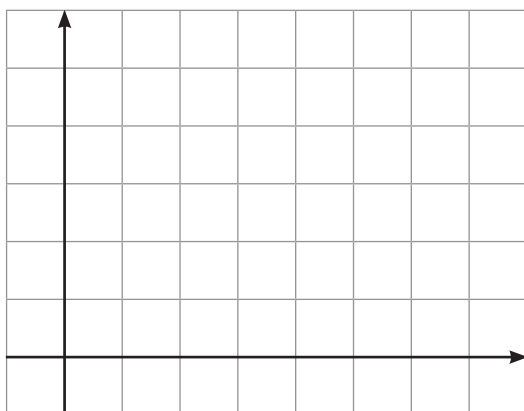
Jadual 1 / Table 1

- (a) Lukis graf jarak-masa berdasarkan maklumat yang diberi.
Draw a distance-time graph based on the given information.
- (b) Berdasarkan graf, nyatakan
Based on the graph, state
- (i) jarak awal meteor dari Bumi pada saat ke-0,
the initial distance of the meteor from the Earth at time 0 seconds,
- (ii) masa yang diambil meteor untuk sampai ke permukaan Bumi.
the time taken by the meteor to reach the Earth's surface.
- (c) Hitung kelajuan seragam meteor sepanjang pergerakannya.
Calculate the uniform speed of the meteor throughout its motion.

[6 markah/marks]

Jawapan/Answer:

(a)

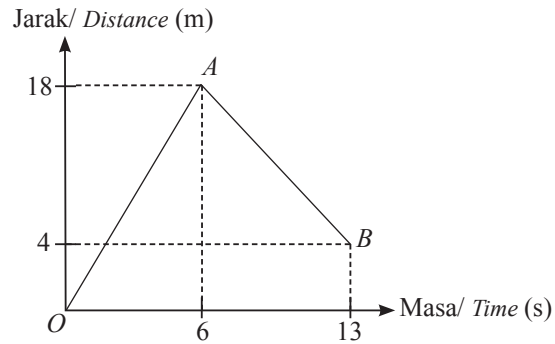


(b) (i)

(ii)

(c)

- 7 Rajah 4 menunjukkan graf jarak-masa pergerakan sebuah basikal.
 Diagram 4 shows the distance-time graph for the movement of a bicycle.



Rajah 4 / Diagram 4

- (a) Hitung laju, dalam m s^{-1} , untuk 6 saat pertama.
 Calculate the speed, in m s^{-1} , for the first 6 seconds.
- (b) Hitung kadar perubahan jarak, dalam m s^{-1} , untuk tempoh 7 saat terakhir.
 Calculate the rate of change in distance, in m s^{-1} , for the last 7 seconds.
- (c) Hitung laju purata untuk keseluruhan perjalanan.
 Calculate the average speed of the whole journey.

[2 markah/marks]

[2 markah/marks]

[2 markah/marks]

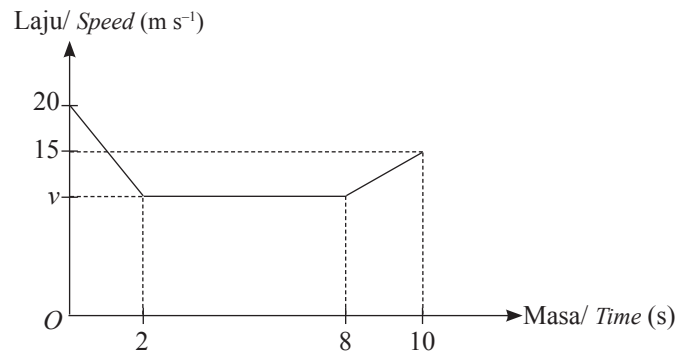
Jawapan/Answer:

(a)

(b)

(c)

- 8 Rajah 5 menunjukkan graf laju-masa. Diberi kadar perubahan laju sebelum laju seragam ialah -5 m s^{-2} .
Diagram 5 shows the speed-time graph. Given that the rate of change of speed before the uniform speed is -5 m s^{-2} .



Rajah 5 / Diagram 5

- (a) Hitung nilai v .
Calculate the value of v . [2 markah/marks]
- (b) Nyatakan tempoh masa, dalam saat, laju seragam.
State the duration, in seconds, of the uniform speed. [1 markah/mark]
- (c) Hitung kadar perubahan laju terhadap masa, dalam m s^{-2} , bagi 2 saat yang terakhir.
Calculate the rate of change of speed with respect to time, in m s^{-2} , for the last 2 seconds. [2 markah/marks]

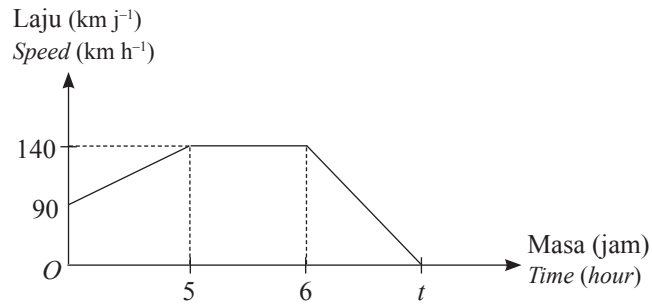
Jawapan/Answer:

(a)

(b)

(c)

- 9 Rajah 6 menunjukkan graf laju-masa bagi pergerakan sebuah kereta dalam tempoh t jam.
 Diagram 6 shows a speed-time graph for the movement of a car within t hours.



Rajah 6 / Diagram 6

- (a) Nyatakan tempoh masa, dalam minit, ketika kereta itu bergerak dengan laju seragam.
 State the duration, in minutes, when the car was moving at a uniform speed.

[2 markah/marks]

- (b) Hitung kadar perubahan laju, dalam km h^{-2} , kereta itu bagi 5 jam yang pertama.
 Calculate the rate of change of speed, in km h^{-2} , of the car in the first 5 hours.

[2 markah/marks]

- (c) Hitung nilai t , dalam jam, jika jarak seluruh pergerakan kereta itu ialah 785 km.
 Calculate the value of t , in hours, if the distance of whole journey of the car is 785 km.

[3 markah/marks]

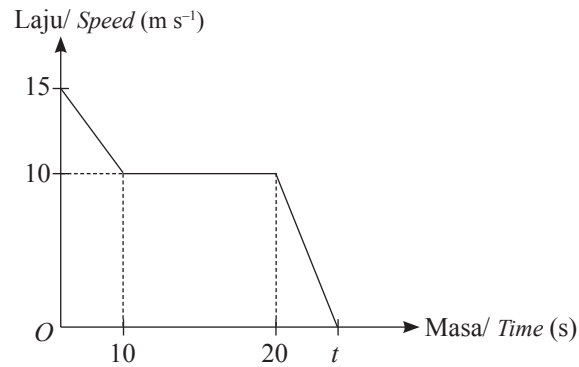
Jawapan/Answer:

(a)

(b)

(c)

- 10 Rajah 7 menunjukkan graf laju-masa bagi pergerakan sebuah van dalam tempoh t saat.
 Diagram 7 shows a speed-time graph for the movement of a van over a period of t seconds.



Rajah 7 / Diagram 7

- (a) Hitung nyahpecutan pergerakan van tersebut, dalam m s^{-2} , bagi 10 saat yang pertama.
 Calculate the deceleration of the van's motion, in m s^{-2} , for the first 10 seconds.

[2 markah/marks]

- (b) Hitung nilai t jika jumlah jarak yang dilalui oleh van itu ialah 265 m.
 Calculate the value of t if the total distance travelled by the van is 265 m.

[3 markah/marks]

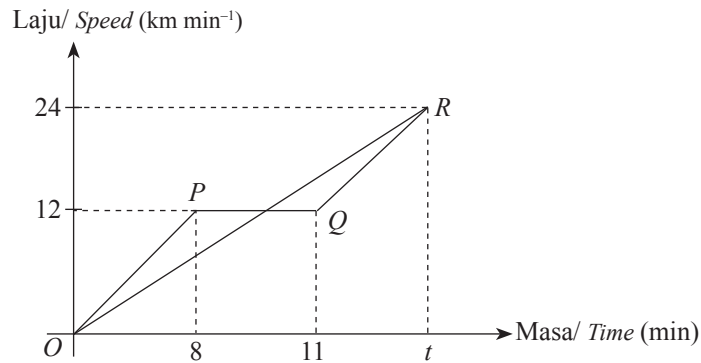
Jawapan/Answer:

(a)

(b)

- 11 Rajah 8 ialah graf laju-masa yang menunjukkan pergerakan sebuah van dan sebuah bas. Graf OR ialah pergerakan van manakala graf $OPQR$ ialah pergerakan bas.

Diagram 8 is a speed-time graph showing the motion of a van and a bus. The graph of OR is the movement of the van and the graph of $OPQR$ is the movement of the bus.



Rajah 8 / Diagram 8

- (a) Hitung tempoh masa bas bergerak dengan laju seragam.
Calculate the duration when the bus travels at a uniform speed. [1 markah/mark]
- (b) Hitung nilai t , jika jarak yang dilalui oleh van dan bas adalah sama untuk tempoh t minit.
Calculate the value of t , if the distances travelled by the van and the bus are the same for the period of t minutes. [3 markah/marks]

Jawapan/Answer:

(a)

(b)

BAB 8

Sukatan Serakan Data Tak Terkumpul

Measures of Dispersion for Grouped Data



VIDEO
PEMBELAJARAN



NOTA EFEKTIF

Topik Topic	Penerangan Explanation
Serakan <i>Dispersion</i>	- Sukatan serakan: julat, julat antara kuartil, varians, sisihan piawai. <i>Measures of dispersion: range, interquartile range, variance, standard deviation.</i> - Julat kecil → serakan kecil <i>Small range → small dispersion</i>
Plot batang-dan-daun <i>Stem-and-leaf plot</i>	- Menunjukkan taburan data secara visual. <i>Displays data distribution visually.</i> - Kenal pasti nilai lazim dan nilai luar. <i>Identifies frequent and rare values.</i>
Plot titik <i>Dot plot</i>	- Carta dengan titik pada skala seragam. <i>Chart with dots on a uniform scale.</i> - Setiap titik = satu cerapan. <i>Each dot = one observation.</i> - Cerapan ialah data daripada pemerhatian. <i>Observation is data from measurement.</i>

Menentukan Julat Antara Kuartil, Min, Varians dan Sisihan Piawai

Determine the Interquartile Range, Mean, Variance and Standard Deviation

- 1 Julat antara kuartil = Kuartil ketiga, Q_3 – Kuartil pertama, Q_1
Interquartile range = Third quartile, Q_3 – First quartile, Q_1

2 Min/Mean, $\bar{x} = \frac{\sum x}{N}$

3 Min/Mean, $\bar{x} = \frac{\sum fx}{f}$

4 Varians / Variance, $\sigma^2 = \frac{\sum (x - \bar{x})^2}{N} = \frac{\sum x^2}{N} - \bar{x}^2$

5 Varians / Variance, $\sigma^2 = \frac{\sum f(x - \bar{x})^2}{\sum f} = \frac{\sum fx^2}{\sum f} - \bar{x}^2$

- 6 Sisihan piawai / Standard deviation,

$$\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

- 7 Sisihan piawai / Standard deviation,

$$\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

Apakah kesan perubahan sukatan apabila setiap nilai dalam suatu set data didarab atau dibahagikan dengan suatu pemalar?

What are the effects on the measures of dispersion when each value of a set of data is multiplied or divided by a constant?

Sukatan Measure	Ditambah dengan pemalar, k Added by a constant, k	Didarab dengan pemalar, k Multiplied by a constant, k	Dibahagi dengan pemalar, k Divided by a constant, k
Julat Range	Tidak berubah No change	$= k \times \text{julat asal}$ $k \times \text{original range}$	$= \text{julat asal}$ original range
Julat antara kuartil Interquartile range	Tidak berubah No change	$= k \times \text{julat antara kuartil asal}$ $k \times \text{original interquartile range}$	$= \text{julat antara kuartil asal}$ $\text{original interquartile range}$
Sisihan piawai Standard deviation	Tidak berubah No change	$= k \times \text{sisihan piawai asal}$ $k \times \text{original standard deviation}$	$= \text{sisihan piawai asal}$ $\text{original standard deviation}$
Varians Variance	Tidak berubah No change	$= k^2 \times \text{variens asal}$ $k^2 \times \text{original variance}$	$= \text{variens asal}$ original variance



LATIHAN INTENSIF

Soalan Objektif
Jawab semua soalan.

- 1 Rajah 1 menunjukkan markah ujian Matematik bagi 15 orang murid kelas 4 Adil.
Diagram 1 shows the Mathematics test scores of 15 students from class 4 Adil.

80	75	82	66	52
60	68	83	64	69
71	57	74	80	77

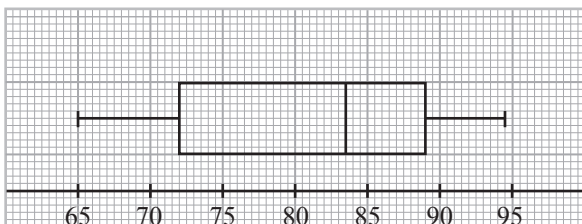
Rajah 1 / Diagram 1

Hitung julat dan julat antara kuartil bagi markah ujian Matematik tersebut.

Calculate the range and the interquartile range for the marks of the Science test.

- A Julat/Range = 31
Julat antara kuartil/ Interquartile range = 14
B Julat/Range = 31
Julat antara kuartil/ Interquartile range = 16
C Julat/Range = 33
Julat antara kuartil/ Interquartile range = 14
D Julat/Range = 33
Julat antara kuartil/ Interquartile range = 16

- 2 Rajah 2 menunjukkan suatu plot kotak.
Diagram 2 shows a box-plot.



Rajah 2 / Diagram 2

Berdasarkan plot kotak, tentukan julat antara kuartil.

Based on the box plot, determine the interquartile range.

- A 17
B 29
C 83
D 86
3 Hitung sisihan piawai bagi data berikut.
Calculate the standard deviation for the following data.

−5, 3, 4, 6, 7, 8, 10, 12, 13, 15

- A 29.7
B 8.62
C 6.67
D 5.51

- 4 Cikgu Harun, guru Matematik Kelas 5 Azam, ingin menganalisis pencapaian muridnya dalam ujian topikal. Beliau telah merekodkan markah penuh bagi setiap 25 murid dalam bentuk plot batang-dan-daun seperti dalam Rajah 3.

Mr. Harun, the Mathematics teacher of Class 5 Azam, wants to analyse his students' performance in the topical test. He has recorded the full marks of all 25 students in the form of a stem-and-leaf plot as shown in Diagram 3.

Batang Stem	Daun Leaf
3	5
4	3 6 7
5	1 1 2 3
6	0 2 3 4 5 9
7	0 2 2 3 4 4 5 9
8	0 2 5

Kekunci: 3 | 5 bermakna 35 markah
Key: 3 | 5 means 35 marks

Rajah 3 / Diagram 3

Murid yang mendapat kurang daripada 60 markah perlu menghadiri kelas pemulihan. Hitung peratus murid yang **tidak** perlu menghadiri kelas pemulihan.

*Students who achieve less than 60 marks need to attend the remedial class. Calculate the percentage of the students who **do not** need to attend the remedial class.*

- A 24%
B 32%
C 40%
D 68%

- 5 Jadual 1 menunjukkan bilangan anak bagi 50 buah keluarga di Taman Angsana.
Table 1 shows the number of children for 50 families in Taman Angsana.

Bilangan anak Number of children	0	1	2	3	4
Bilangan keluarga Number of families	6	12	10	12	10

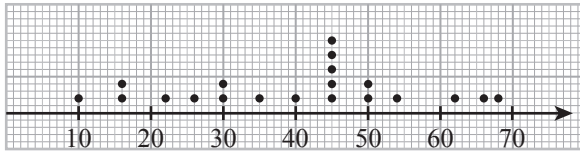
Jadual 1 / Table 1

Hitung sisihan piawai bagi data yang diberi.
Calculate the standard deviation of the data given.

- A 1.12
B 1.24
C 1.32
D 1.44

- 6 Rajah 4 menunjukkan data umur pelancong yang mengunjungi sebuah pameran.

Diagram 4 shows the data on the ages of tourists who visited an exhibition.



Rajah 4 / Diagram 4

Tentukan min umur pelancong tersebut.

Determine the mean age of the tourist.

- A 35 tahun/years C 40 tahun/years
B 38 tahun/years D 42 tahun/years
- 7 Rajah 5 menunjukkan jisim badan (kg) bagi dua pasukan bola keranjang sekolah yang direkodkan selepas menjalani ujian kecergasan.

Diagram 5 shows the body mass (kg) of two school basketball teams recorded after undergoing a fitness test.

Kumpulan Infiniti Infiniti Group					Kumpulan Alfa Alfa Group				
39	63	47	85	53	76	51	74	38	92
67	72	58	77	41	37	62	36	45	53

Rajah 5 / Diagram 5

Jika jurulatih ingin memilih pasukan yang mempunyai jisim ahli yang lebih konsisten untuk mewakili sekolah, pasukan manakah yang lebih sesuai?

If the coach wants to select the team with more consistent body mass to represent the school, which team is more suitable?

- A Kumpulan Infiniti
Infiniti Group
B Kumpulan Alfa
Alfa Group
C Kedua-dua kumpulan sama sesuai
Both groups are equally suitable
D Tidak dapat ditentukan
Cannot be determined

- 8 Data berikut menunjukkan masa (dalam minit) yang diambil oleh 9 orang murid untuk menyiapkan satu latihan Matematik.

The following data shows the time (in minutes) taken by 9 students to complete a Mathematics exercise.

12, 15, 18, 20, 22, 25, 28, 30, 35

Apakah nilai julat antara kuartil bagi data tersebut?

What is the interquartile range value for the data?

- A 12.5
B 16.5
C 22
D 29

- 9 Dua kumpulan murid, P dan Q , mempunyai min markah yang sama iaitu 70. Data markah adalah seperti berikut:

Two groups of students, P and Q , have the same mean score of 70. The score data is as follows:

Kumpulan/Group P:
65, 68, 70, 72, 75

Kumpulan/Group Q:
50, 60, 70, 80, 90

Antara berikut, pernyataan manakah yang benar?

Which of the following statements is true?

- A Sisihan piawai kumpulan P lebih besar berbanding kumpulan Q .
The standard deviation of group P is larger than that of group Q .
B Julat kumpulan P lebih besar daripada kumpulan Q .
The range of group P is larger than group Q .
C Kumpulan Q mempunyai serakan data yang lebih besar berbanding kumpulan P .
Group Q has a larger data dispersion than group P .
D Kedua-dua kumpulan mempunyai serakan yang sama.
Both groups have the same dispersion

Soalan Subjektif
Jawab semua soalan.

- 1 Bina plot batang-dan-daun, plot kotak dan plot titik bagi data berikut pada ruang jawapan yang disediakan.
Construct a stem-and-leaf plot, a box plot, and a dot plot for the following data in the answer space provided.

5, 7, 8, 9, 10, 10, 11, 12, 12, 13, 13, 14, 15, 15, 16, 17, 18, 20, 22, 25

Rajah 1 / Diagram 1

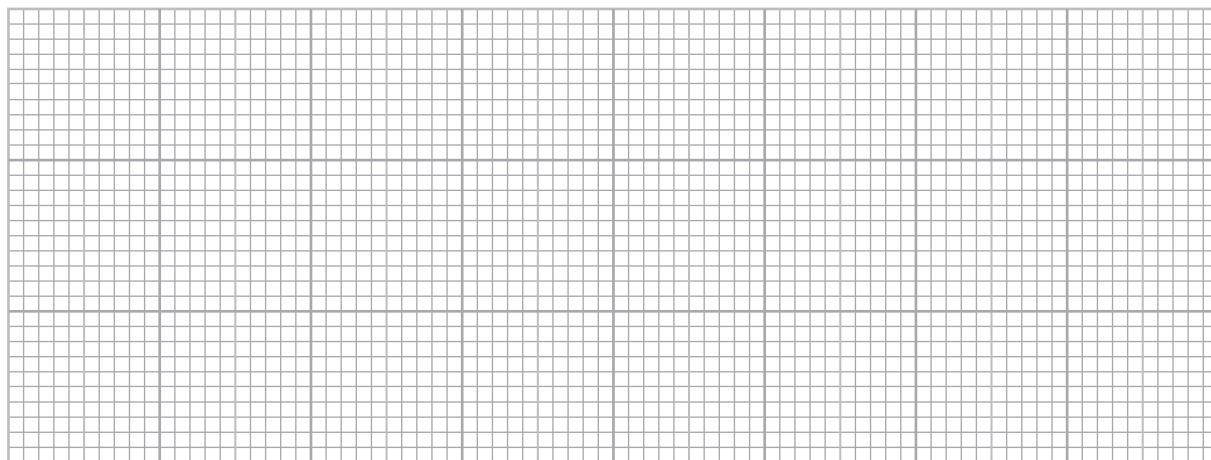
[6 markah/marks]

Jawapan/Answer:

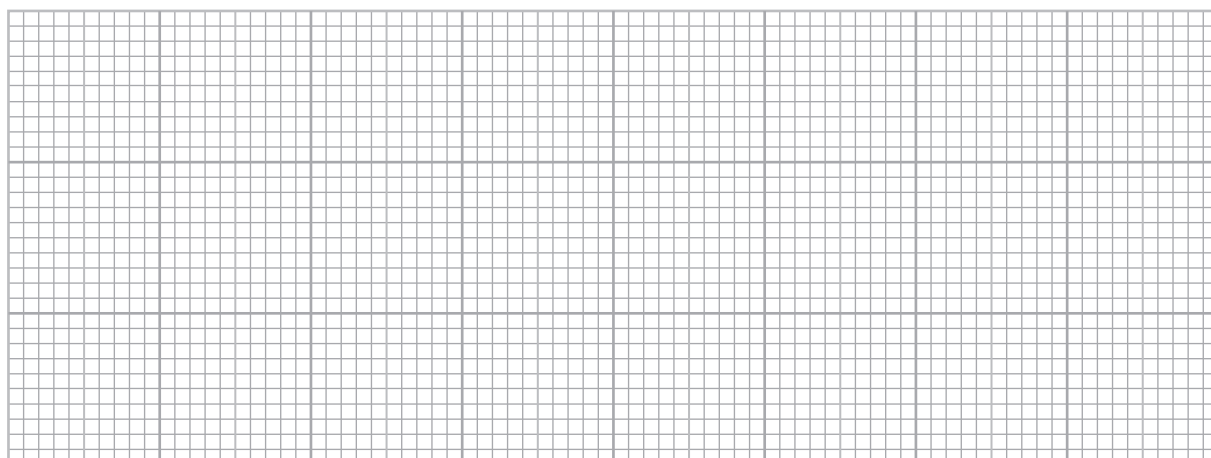
- (a) Plot batang-dan-daun/*Stem-and-leaf plot*

Tingkatan 4

- (b) Plot kotak/*Box plot*



- (c) Plot titik/*Dot plot*



- 2 Jadual 1 menunjukkan markah bagi 50 orang murid SMK Hebat dalam suatu ujian topikal Matematik.
Table 1 shows the scores for 50 students of SMK Hebat in a Mathematics topical test.

Skor Score	Kekerapan Frequency
80	3
75	7
70	13
65	12
60	9
55	6

Jadual 1 / Table 1

Hitung mod, median dan min bagi data dalam Jadual 1.
Calculate the mode, median and mean for the data in Table 1.

[4 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 3 Rajah 2 ialah data yang menunjukkan berat badan, dalam kg, bagi sekumpulan 12 orang murid Kelas 5 Alif.
Diagram 2 is data shows the weight, in kg, of a group of 12 students from Class 5 Alif.

50	52	54	56	58	60	62	64	66	68	70	72
----	----	----	----	----	----	----	----	----	----	----	----

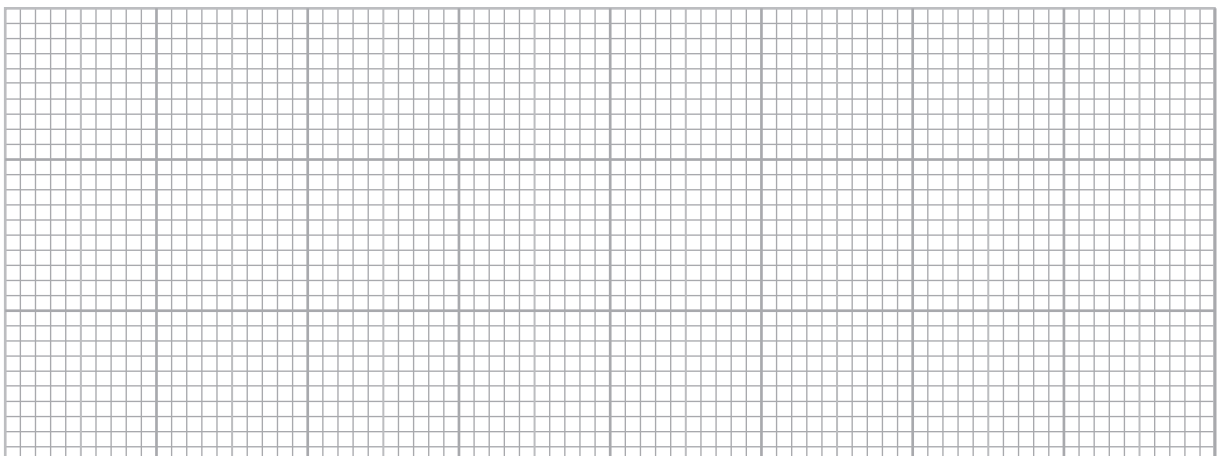
Rajah 2 / Diagram 2

- (a) Berdasarkan maklumat di atas, bina satu plot kotak.
Based on the information above, construct a box plot.
- (b) Daripada plot kotak di (a), nyatakan bentuk plot kotak itu.
From the box plot in (a), state the shape of the box plot.

[4 markah/marks]

Jawapan/Answer:

(a)



(b)

- 4 Jadual 2 menunjukkan jisim, dalam kg, tujuh orang peserta pertandingan angkat berat. Jisim peserta disusun dalam tertib menaik. Diberi bahawa mod jisim ialah 92 kg.

Table 2 shows the mass, in kg, of seven participants in a weightlifting competition. The participant's masses are arranged in ascending order. Given the mode of the masses is 92 kg.

Peserta Participant	<i>J</i>	<i>K</i>	<i>L</i>	<i>M</i>	<i>N</i>	<i>O</i>	<i>P</i>
Jisim (kg) Mass (kg)	79	x	92	99	111	118	y

Jadual 2 / Table 2

- (a) Tentukan nilai x dan y jika min jisim peserta ialah 104 kg.
Find the values of x and y if the mean mass of the participants is 104 kg.
- (b) Seterusnya, tentukan nilai sisihan piawai bagi jisim peserta itu.
Hence, calculate the standard deviation of the mass of the participants.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

- 5 Diberi satu set data yang mengandungi 15 nilai dengan $\sum x = 330$ dan $\sum x^2 = 8\,924$.
A set of data contains 15 values with $\sum x = 330$ and $\sum x^2 = 8\,924$.

Hitung/Calculate:

- (a) min, $\bar{x}$,
the mean, $\bar{x}$,
 (b) sisihan piawai, σ .
the standard deviation, σ .

[4 markah/marks]

Jawapan/Answer:

- (a)

- (b)

- 6 Jadual 3 menunjukkan catatan jarak lontaran peluru, dalam meter, bagi dua orang atlet yang berpotensi mewakili sekolah dalam lima ujian prestasi.

Table 3 shows the shot put throwing distances, in metres, of two athletes who are potential school representatives in five performance trials.

Ujian Trial Peserta Athlete	1	2	3	4	5
Farid	9.8	10.2	9.9	10.1	10.0
Armin	8.7	11.5	9.2	10.8	11.0

Jadual 3 / Table 3

- (a) Sebagai seorang jurulatih, tentukan sukatan serakan yang sesuai untuk digunakan dalam membuat pemilihan antara dua orang atlet tersebut.

As a coach, determine the measure of dispersion that is most suitable to be used in selecting between the two athletes.

- (b) Seterusnya, nyatakan atlet pilihan anda dan tunjukkan pengiraan bagi menjustifikasikan pemilihan tersebut.

Next, state your chosen athlete and show the calculations to justify your selection.

[8 markah/marks]

Jawapan/Answer:

(a)

(b)

BAB 9

Kebarangkalian Peristiwa Bergabung

Probability of Combined Events



VIDEO
PEMBELAJARAN



NOTA EFEKTIF

Ruang Sampel Sample Space

- Set semua kesudahan yang mungkin bagi satu peristiwa bergabung.
The set of all possible outcomes for a combined event.
- Contoh/Example:
Melambung dadu dan duit syiling.
Rolling a die and flipping a coin.
 $S = \{(1, A), (1, G), (2, A), (2, G), (3, A), (3, G), (4, A), (4, G), (5, A), (5, G), (6, A), (6, G)\}$

$$n(S) = 12$$

TIP

Kebarangkalian boleh ditulis dalam bentuk pecahan, peratus atau nombor perpuluhan.
Probability can be written as a fraction, a percentage, or a decimal number.

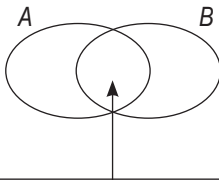
Rumus Kebarangkalian Formula of Probability

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A') = 1 - P(A)$$

0	0.5	1
Tidak akan berlaku <i>Impossible to happen</i>	Mungkin berlaku <i>Possibly happen</i> (antara 0 dengan 1) (between 0 and 1)	Pasti akan berlaku <i>Definitely will happen</i>

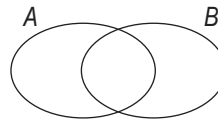
Hukum Pendaraban Kebarangkalian Multiplication Rule of Probability



$$P(A \text{ dan/ and } B) = P(A \cap B) = P(A) \times P(B)$$

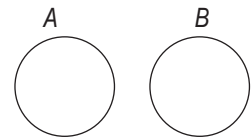
Hukum Penambahan Kebarangkalian Addition Rule of Probability

Peristiwa tidak saling eksklusif
Non-mutually exclusive events



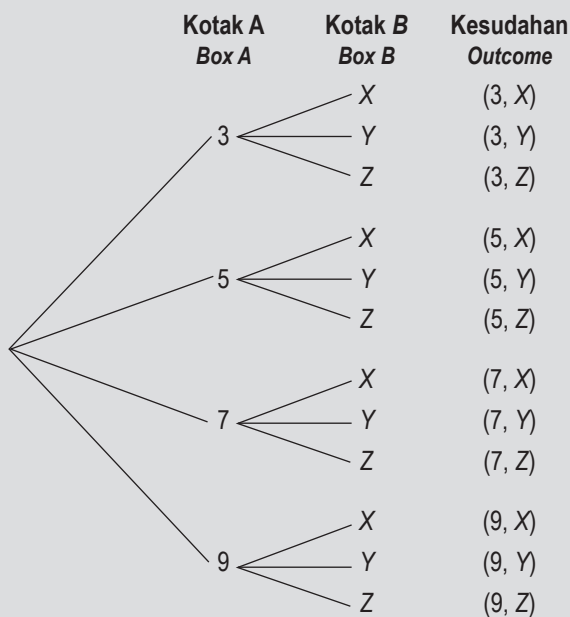
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Peristiwa saling eksklusif
Mutually exclusive events



$$P(A \cup B) = P(A) + P(B)$$

Gambar Rajah Pokok Tree Diagram



Jadual Table

Kesudahan Outcome

Kotak A Box A \ Kotak B Box B	X	Y	Z
3	(3, X)	(3, Y)	(3, Z)
5	(5, X)	(5, Y)	(5, Z)
7	(7, X)	(7, Y)	(7, Z)
9	(9, X)	(9, Y)	(9, Z)



LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Dua keping duit syiling adil dilambung. G mewakili gambar dan A mewakili angka. Antara berikut, ruang sampel yang manakah betul?
Two fair coins are tossed. G represents a head and A represents a tail. Which of the following sample spaces is correct?

A $\{(A, A), (G, G)\}$
 B $\{(G, A), (A, G)\}$
 C $\{(G, G), (A, A), (G, A), (A, G)\}$
 D $\{(G, G), (A, A), (G, A)\}$

- 2 Antara peristiwa berikut, yang manakah ialah peristiwa bersandar?
Which of the following events is dependent event?

A Mendapat nombor 4 apabila dadu adil dilambung dan mendapat angka apabila duit syiling adil dilambung.
Getting number 4 when a fair dice is rolled and getting a tail when a fair coin is tossed.

B Faizah menjaringkan dua gol dalam perlawanan bola jaring.
Faizah scores two goals in two netball matches.

C Memilih sebiji bola daripada sebuah kotak dan memilih sebiji guli daripada sebuah beg.
Choosing a ball from a box and choosing a marble from a bag.

D Cikgu Rashid memilih seorang ketua kelas dan seorang penolong ketua kelas daripada 30 orang murid.
Cikgu Rashid selects a class monitor and an assistant class monitor from 30 students.

- 3 Sebuah kotak mengandungi 5 batang pensel, 4 batang pen merah dan 7 batang pen biru. Sebatang pensel atau pen dipilih secara rawak daripada kotak itu. Cari kebarangkalian memilih sebatang pensel atau sebatang pen biru.
A box contains 5 pencils, 4 red pens and 7 blue pens. A pencil or a pen is chosen at random from the box. Find the probability of choosing a pencil or a blue pen.

A $\frac{1}{2}$ C $\frac{7}{16}$
 B $\frac{3}{4}$ D $\frac{11}{16}$

- 4 Kebarangkalian Azlan menang dalam pertandingan memanah ialah $\frac{2}{3}$. Tentukan kebarangkalian bahawa dia menang dua pertandingan memanah secara berturutan.
The probability of Azlan winning in an archery competition is $\frac{2}{3}$. Determine the probability that he wins two archery competition in a row.

A $\frac{1}{3}$ C $\frac{4}{9}$
 B $\frac{1}{9}$ D $\frac{5}{9}$

- 5 Kebarangkalian Nurul lulus dalam ujian Sains dan Matematik masing-masing ialah 0.65 dan 0.7. Apakah kebarangkalian Nurul lulus dalam ujian Sains tetapi gagal dalam ujian Matematik itu?
The probabilities of Nurul passing in the Science and Mathematics tests were 0.65 and 0.7 respectively. What is the probability that Nurul passes the Science test but fails the Mathematic test?

A 0.105 C 0.245
 B 0.195 D 0.455

- 6 Dua batang pen dipilih secara rawak daripada tujuh batang pen yang terdiri daripada empat batang pen hitam dan tiga batang pen biru. Hitung kebarangkalian kedua-dua pen yang dipilih adalah daripada warna yang sama.
Two pens are chosen at random from seven pens, where four of them are black pens and three of them are blue pens. Calculate the probability that both pens chosen are the same colour.

A $\frac{3}{7}$ C $\frac{12}{49}$
 B $\frac{16}{49}$ D $\frac{9}{49}$

- 7 Terdapat 5 biji epal hijau dan 4 biji epal merah di dalam sebuah bakul. Dua biji epal dipilih secara rawak daripada bakul itu, satu demi satu tanpa pengembalian. Cari kebarangkalian bahawa kedua-dua epal berbeza warna.
There are 5 green apples and 4 red apples in a basket. Two apples are chosen at random from the basket, one after another without replacement. Find the probability that both apples selected are in the different colour.

A $\frac{20}{81}$ C $\frac{5}{9}$
 B $\frac{5}{18}$ D $\frac{13}{18}$

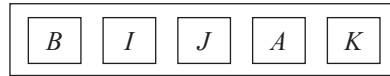
- 8 Kajian tentang jantina anak terhadap 20 000 buah keluarga yang mempunyai dua orang anak telah dijalankan. Anggarkan bilangan keluarga yang mempunyai sekurang-kurangnya seorang anak lelaki dalam kajian tersebut.
A study is carried out on the gender of the children from 20 000 families with two children. Estimate the number of families with at least one son in that study.

A 18 000 C 10 000
 B 15 000 D 5 000

Soalan Subjektif

Jawab semua soalan.

- 1 Rajah 1 menunjukkan sebuah kotak yang mengandungi lima keping kad yang berlabel dengan huruf. Dua keping kad dikeluarkan secara rawak daripada kotak itu satu demi satu tanpa pemulangan.
Diagram 1 shows a box containing five cards labelled with letters. Two cards are taken out randomly one by one from the box without replacement.



Rajah 1 / Diagram 1

- (a) Lengkapkan ruang sampel bagi peristiwa tersebut di ruang jawapan.
Complete the sample space of the event in the answer space.
- (b) Seterusnya, hitung kebarangkalian mendapat kad pertama berhuruf konsonan dan kad kedua berhuruf vokal.
Hence, calculate the probability of getting the first card labelled with a consonant and the second card labelled with a vowel.

[3 markah/marks]

Jawapan/Answer:

(a)

Kad pertama <i>First card</i>	Kad kedua <i>Second card</i>				
	<i>B</i>	<i>I</i>	<i>J</i>	<i>A</i>	<i>K</i>
<i>B</i>					
<i>I</i>					
<i>J</i>					
<i>A</i>					
<i>K</i>					

Jadual 1 / Table 1

(b)

- 2 Sebuah bakul mengandungi sebiji bola kuning, dua biji bola hijau dan enam biji bola biru. Dua biji bola dipilih secara rawak daripada kotak itu. Hitung kebarangkalian bahawa kedua-dua bola yang dipilih adalah daripada warna yang sama.
A box contains a yellow ball, two green balls and six blue balls. Two balls are chosen at random from the box. Calculate the probability that both balls chosen are of the same colour.

[3 markah/marks]

Jawapan/Answer:

- 3 Jadual 2 menunjukkan bilangan ahli kadet bomba di SMK USJ 25.
Table 2 shows the number of fire cadets in SMK USJ 25.

Sesi <i>Session</i>	Bilangan ahli <i>Number of members</i>	
	Lelaki <i>Male</i>	Perempuan <i>Female</i>
Pagi <i>Morning</i>	170	75
Petang <i>Afternoon</i>	68	52

Jadual 2 / Table 2

- (a) Dua orang ahli dipilih secara rawak daripada sesi petang. Hitung kebarangkalian bahawa kedua-dua orang ahli yang dipilih ialah murid lelaki.
Two members are selected randomly from the afternoon session. Calculate the probability that both members chosen are male.
- (b) Dua orang ahli dipilih secara rawak daripada ahli perempuan. Hitung kebarangkalian kedua-dua orang ahli dipilih adalah dari sesi pagi.
Two members are selected randomly from the female members. Calculate the probability that both members chosen are from the morning session.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

- 4 Satu jambangan ros terdiri daripada empat tangkai ros merah, lima tangkai ros kuning dan tiga tangkai ros putih. Dua tangkai ros dipilih secara rawak daripada jambangan satu demi satu. Sekiranya ros pertama berwarna putih, maka ros putih itu akan diletakkan semula sebelum ros kedua dipilih. Sekiranya ros pertama bukan berwarna putih, maka ros itu tidak dipulangkan dan ros kedua akan dipilih. Hitung kebarangkalian mendapat dua tangkai ros yang berlainan warna.

A bouquet of roses consists of four red roses, five yellow roses, and three white roses. Two roses are chosen randomly from the bouquet one by one. If the first rose is white, the white rose is put back before the second rose is chosen. If the first rose is not white, the rose is not returned and the second rose is chosen. Calculate the probability of getting two roses of different colours.

[3 markah/marks]

Jawapan/Answer:

- 5 Dua orang murid dipilih secara rawak daripada tujuh orang murid Tingkatan 4 dan lima orang murid Tingkatan 5. Hitung kebarangkalian bahawa kedua-dua orang murid yang dipilih adalah daripada tingkatan yang sama.

Two students are chosen at random from seven Form 4 students and five Form 5 students. Calculate the probability that both chosen students are in the same form.

[3 markah/marks]

Jawapan/Answer:

- 6 Kebarangkalian Farish dilantik sebagai pengerusi Kelab Matematik (M) dan ketua rumah sukan hijau (H) masing-masing ialah $\frac{6}{7}$ dan $\frac{2}{9}$.

The probability of appointing Farish as the chairman of the Mathematics Club (M) and the head of the green sports house (H) are $\frac{6}{7}$ and $\frac{2}{9}$ respectively.

- (a) Lengkapkan gambar rajah Venn di ruang jawapan untuk mewakili hubungan kebarangkalian Farish dilantik sebagai pengerusi Kelab Matematik dan ketua rumah sukan hijau.

Complete the Venn diagram in the answer space to represent the relationship between the probabilities of appointing Farish as the chairman of the Mathematics Club and the head of the green sports house.

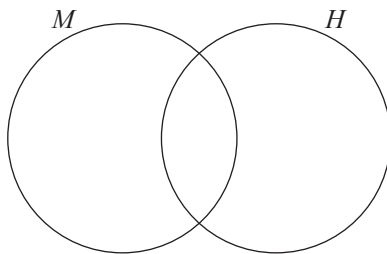
- (b) Seterusnya, hitung kebarangkalian Farish tidak dilantik sebagai pengerusi Kelab Matematik atau ketua rumah sukan hijau.

Hence, calculate the probability of not appointing Farish as the chairman of the Mathematics Club or the head of the green sports house.

[4 markah/marks]

Jawapan/Answer:

(a)



(b)

- 7 Encik Khaer merupakan seorang jurulatih bola baling. Dia melatih pasukan sekolahnya yang terdiri daripada pasukan lelaki dan pasukan perempuan bagi suatu pertandingan. Pada hari pertandingan, kedua-dua pasukan sekolah Encik Khaer akan menentang dua buah sekolah pada peringkat kumpulan. Jadual 3 menunjukkan kebarangkalian kedua-dua pasukan memenangi perlawanan ke atas sekolah *M* dan sekolah *N*.

Encik Khaer is a handball coach. He is coaching his school teams which consist of a boy team and a girl team for a tournament. On the day of tournament, both Encik Khaer's school teams will play against two schools at the group level. Table 3 shows the probability of winning the match against school M and school N for both teams.

Pasukan <i>Team</i>	Kebarangkalian menang ke atas <i>Probability of winning against</i>	
	Sekolah <i>M</i> <i>School M</i>	Sekolah <i>N</i> <i>School N</i>
Lelaki <i>Boy</i>	$\frac{7}{15}$	$\frac{2}{5}$
Perempuan <i>Girl</i>	$\frac{4}{7}$	$\frac{3}{8}$

Jadual 3 / Table 3

Jika kebarangkalian memenangi sekurang-kurangnya satu perlawanan melebihi $\frac{3}{5}$, maka pasukan itu berpeluang ke peringkat seterusnya. Adakah pasukan lelaki atau pasukan perempuan yang akan mendapat peluang itu? Justifikasikan jawapan anda.

If the probability of winning at least one match is more than $\frac{3}{5}$, then the team will have the chance to the next level.

Will the boy team or the girl team get the chance? Justify your answer.

[4 markah/marks]

Jawapan/Answer:

- 8 Kebarangkalian akan hujan pada hari Khamis dan Jumaat masing-masing ialah $\frac{1}{4}$ dan $\frac{3}{5}$.
The probabilities that it will rain on Thursday and Friday are $\frac{1}{4}$ and $\frac{3}{5}$ respectively.

- (a) Cari kebarangkalian akan hujan pada salah satu hari.
Find the probability that it will rain on either one day.
- (b) Cari kebarangkalian akan hujan pada kedua-dua hari.
Find the probability that it will rain on both days.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

Tingkatan 4

- 9 Jadual 4 menunjukkan bilangan guli di dalam sebuah kotak.
Table 4 shows the number of marbles in a box.

Warna Colour	Bilangan guli Number of marbles
Merah/Red	3
Biru/Blue	7
Putih/White	5

Jadual 4 / Table 4

Dua biji guli dipilih secara rawak daripada kotak itu tanpa pemulangan. Cari kebarangkalian kedua-dua guli yang dipilih adalah sama warna.

Two marbles are drawn randomly from the box without replacement. Find the probability that both marbles chosen are of the same colour.

[3 markah/marks]

Jawapan/Answer:

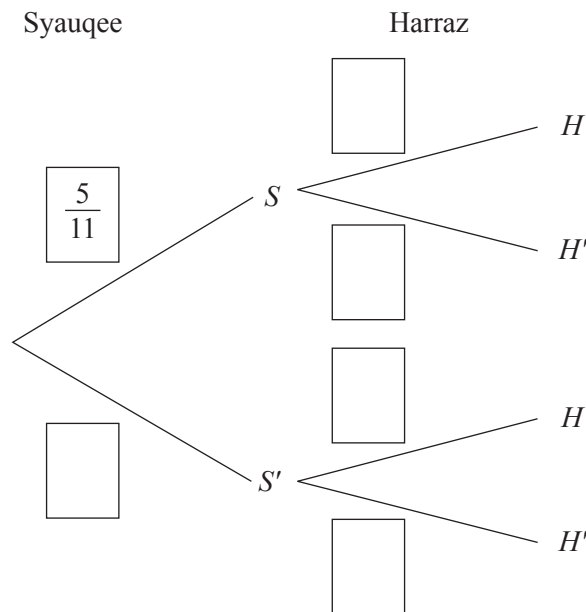
- 10 Persatuan Sains SMK Chanis mengadakan lawatan ke Muzium Sultan Alam Shah. Kebarangkalian Syauqee dan Harraz menyertai lawatan itu masing-masing ialah $\frac{5}{11}$ dan $\frac{3}{7}$.

Lengkapkan gambar rajah pokok di ruang jawapan. Seterusnya, hitung kebarangkalian bahawa hanya seorang daripada mereka yang menyertai lawatan itu.

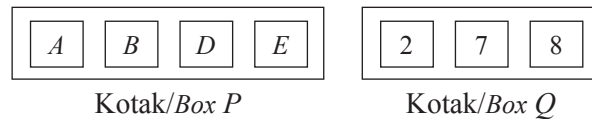
The Science Society of SMK Chanis organises a tour to Sultan Alam Shah Museum. The probability of Syauqee and Harraz joining that tour is $\frac{5}{11}$ and $\frac{3}{7}$ respectively.

Complete the tree diagram in the answer space. Hence, calculate the probability of only one of them joining the tour.
[3 markah/marks]

Jawapan/Answer:



- 11 Rajah 2 menunjukkan empat kad abjad di dalam kotak P dan tiga kad nombor di dalam kotak Q .
Diagram 2 shows four alphabet cards in box P and three number cards in box Q .



Rajah 2 / Diagram 2

Sekeping kad dipilih secara rawak daripada setiap kotak.

A card is chosen at random from each box.

- (a) Senaraikan ruang sampel.
List all the sample space.
- (b) Dengan menyenaraikan semua kesudahan yang mungkin, hitung kebarangkalian:
By listing all the possible outcomes, calculate the probability that:
- (i) satu vokal dan satu nombor perdana dipilih,
a vowel and a prime number are chosen,
 - (ii) satu vokal atau satu nombor perdana dipilih.
a vowel or a prime number is chosen.

[6 markah/marks]

Jawapan/Answer:

(a)

(b) (i)

(ii)

- 12 Kebarangkalian Fauzi lulus ujian Bahasa Melayu dan Sejarah masing-masing ialah 0.85 dan 0.64. Hitung kebarangkalian bahawa
The probabilities of Fauzi passing Bahasa Melayu and History tests are 0.85 and 0.64 respectively. Calculate the probability that

- (a) Fauzi lulus kedua-dua mata pelajaran,
Fauzi passes both tests,
- (b) Fauzi hanya lulus satu mata pelajaran.
Fauzi passes only one test.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

- 13 Jadual 5 menunjukkan bilangan atlet mengikut jantina di dua kelas yang berbeza. Bilangan atlet lelaki kelas Theta tidak ditunjukkan.

Table 5 shows the number of athletes by gender in two different classes. The number of boy athletes in Theta class is not shown.

Kelas Class	Lelaki Male	Perempuan Female
Theta	x	6
Epsilon	7	5

Jadual 5 / Table 5

- (a) Seorang atlet dipilih secara rawak dari setiap kelas. Cari nilai x jika kebarangkalian kedua-dua atlet yang dipilih adalah jantina yang sama dari kelas yang berbeza ialah $\frac{31}{60}$.

An athlete is randomly selected from each class. Find the value of x if the probability that both selected athletes are same genders from different classes is $\frac{31}{60}$.

- (b) Dua orang atlet dipilih secara rawak, seorang dari setiap kelas. Cari kebarangkalian sekurang-kurangnya seorang atlet perempuan dipilih.

Two athletes are randomly selected, one from each class. Find the probability that at least one female athlete is selected.

[5 markah/marks]

Jawapan/Answer:

(a)

(b)

BAB 10

Matematik Pengguna: Pengurusan Kewangan *Consumer Mathematics: Financial Management*



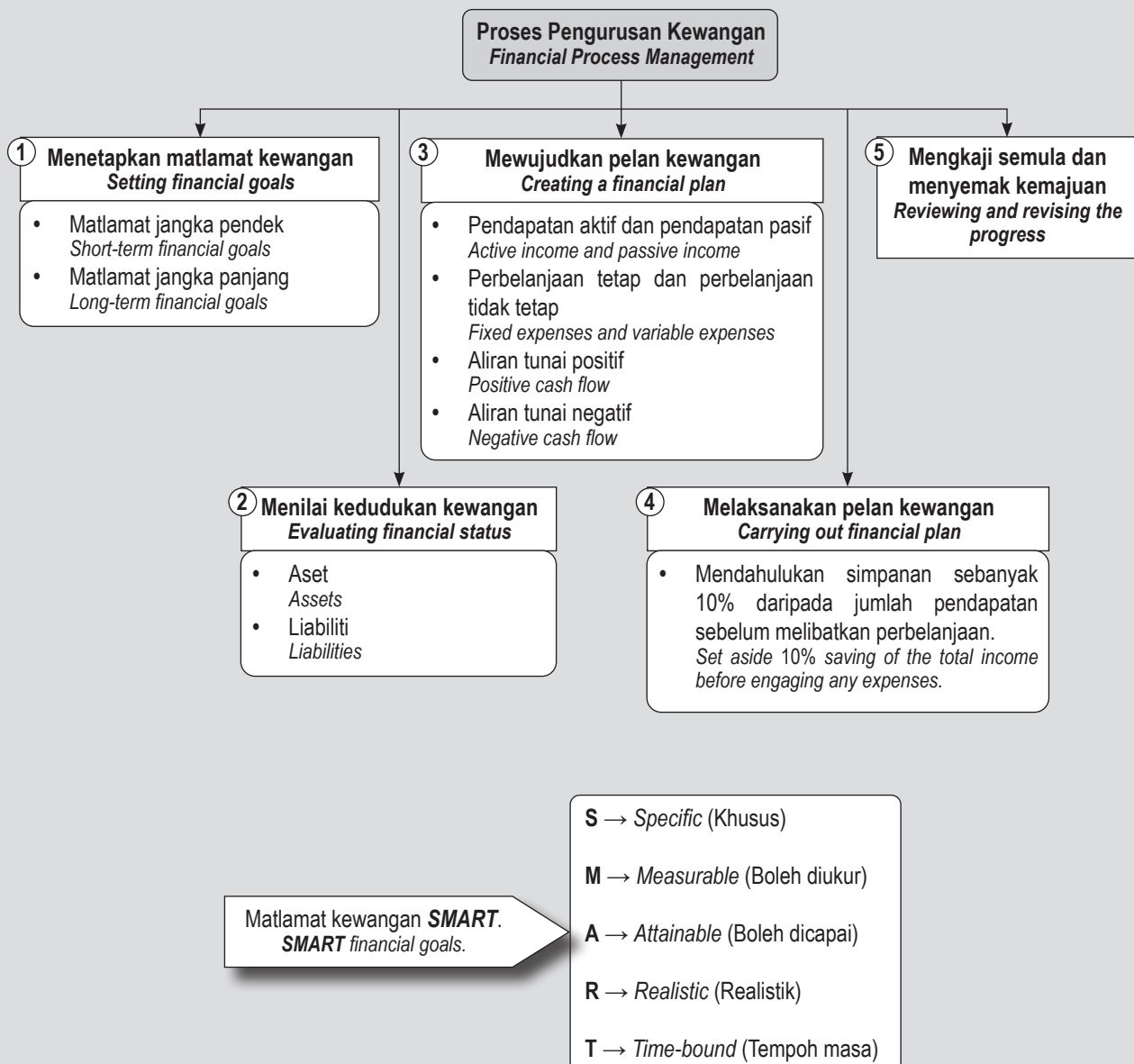
VIDEO
PEMBELAJARAN



NOTA EFEKTIF

Proses pengurusan kewangan merupakan suatu proses yang melibatkan pengurusan wang daripada sumber pendapatan terhadap simpanan, perbelanjaan, perlindungan dan pelaburan.

Financial management is a proses that involves managing money from sources of income into savings, expenses, protections and investment.





LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Antara berikut yang manakah **tidak** benar?
*Which of the following is **not** true?*

A	Pendapatan aktif <i>Active income</i>	Komisen <i>Commission</i>
B	Pendapatan pasif <i>Passive income</i>	Gaji <i>Salary</i>
C	Perbelanjaan tetap <i>Fixed expense</i>	Ansuran pinjaman kereta <i>Car loan instalment</i>
D	Perbelanjaan tidak tetap <i>Variable expense</i>	Perbelanjaan petrol <i>Petrol expenses</i>

- 2 Antara berikut, yang manakah merupakan matlamat kewangan jangka panjang?
Which of the following are long-term financial goals?

- I Membeli sebuah rumah
Purchasing a house
II Pendidikan anak-anak
Children education
III Menyimpan untuk percutian
Saving for holiday trip
IV Menabung untuk bersara
Saving for retirement

- A I, II dan/and III C I, III dan/and IV
B I, II dan/and IV D II, III dan/and IV

- 3 Antara berikut, yang manakah merupakan perbelanjaan tidak tetap?
Which of the following is a variable expense?

- A Rahman membayar sewa rumah RM800
Rahman pays RM800 for house rental
B Nazir membelanjakan RM300 untuk pembelian petrol pada bulan November.
Nazri spends RM300 for petrol purchasing in November
C Sharul membayar RM150 untuk insurans perubatan
Shahrul pays RM150 for medical insurance
D Bayaran pinjaman perumahan Marzuki adalah sebanyak RM1 800
Marzuki's housing loan is RM1 800

- 4 Gaji bulanan Syafiq ialah RM3 500. Dia juga mempunyai perbelanjaan tetap dan tidak tetap masing-masing sebanyak RM1 500 dan RM900. Berapakah aliran tunai bulanannya?
Shafiq's monthly salary is RM3 500. He also has fixed and variable expenses of RM1 500 and RM900 respectively per month. What is his monthly cash flow?

- A RM1 100 C RM2 300
B RM2 100 D RM2 600

- 5 Pendapatan bulanan Puan Wong ialah RM5 500. Dia menyimpan RM300 setiap bulan untuk membeli sebuah peti sejuk yang berharga RM2 100 dalam tempoh 7 bulan. Antara berikut, pernyataan yang manakah merujuk kepada konsep *Measurable* dalam pendekatan SMART? *Paun Wong's monthly income is RM5 500. Puan Wong saves RM300 each month because she wants to purchase a refrigerator priced at RM2 100 within 7 months. Which of the following statements refers to the concept of Measurable in the SMART approach?*

- A Pendapatan bulanan Puan Wong ialah RM5 500.
Puan Wong's monthly income is RM5 500.
B Puan Wong bercadang untuk membeli peti sejuk yang berharga RM2 100.
Puan Wong plans to buy a refrigerator priced at RM2 100.
C Pendapatan bulanan Puan Wong ialah RM5 500 dan dia menyimpan RM300 setiap bulan.
Puan Wong's monthly income is RM5 500 and she saves RM300 each month.
D Puan Wong merancang membeli peti sejuk dalam tempoh 7 bulan.
Puan Wong plans to buy a refrigerator within a period of 7 months.

- 6 Amir bercadang untuk menyimpan wang bagi memulakan sebuah perniagaan kecil dalam tempoh 2 tahun. Adakah matlamat ini boleh dilaksanakan berdasarkan konsep SMART? *Amir plans to save money to start a small business within 2 years. Is this a feasible goal based on the SMART concept?*

- A Ya. Matlamatnya khusus dan boleh dicapai.
Yes. The goal is specific and attainable.
B Ya. Matlamatnya realistik kerana Amir mempunyai tempoh masa yang jelas untuk mencapai matlamat tersebut.
Yes. The goal is realistic as Amir has a clear time frame to achieve the goal.
C Tidak. Matlamatnya tidak dapat diukur kerana jumlah modal yang diperlukan tidak dinyatakan.
No. The goal is not measurable as the amount of capital required is not stated.
D Tidak. Matlamatnya tidak dapat dicapai kerana sukar untuk mengumpul modal perniagaan dalam tempoh 2 tahun.
No. The goal is not attainable as it is difficult to save business capital within 2 years.

Soalan 7 dan 8 adalah berdasarkan jadual di bawah.
Questions 7 and 8 based on the table below.

Jadual 1 menunjukkan pendapatan dan perbelanjaan bulanan Puan Aisyah.
 Table 1 shows Puan Aisyah's income and expenditure.

Pendapatan dan perbelanjaan (RM) Income and expenditure (RM)	
Gaji bersih Net salary	4 800
Simpanan tetap bulanan Fixed monthly savings	400
Simpanan dana kecemasan Savings for emergency funds	150
Ansuran pinjaman perumahan Housing loan instalment	1 000
Ansuran pinjaman kereta Car loan instalment	700
Premium insurans Insurance premiums	200
Barang dapur Groceries	850
Utiliti rumah Home utilities	280
Belanja petrol Petrol expenses	220
Bil telefon Telephone bill	200

Jadual 1 / Table 1

7 Hitung perbelanjaan tetap bulanan Puan Aisyah.

Calculate Puan Aisyah's monthly fixed expenses.

- A** RM1 700
- B** RM1 900
- C** RM2 300
- D** RM2 450

8 Pernyataan yang manakah **betul** tentang aliran tunai bulanan Puan Aisya, jika pendapatan bulanan telah dikurangkan kepada RM3 800 setelah syarikat mengumumkan pelarasan gaji baharu?

Which statement is **correct** about Puan Aisya's monthly cash flow, if her monthly income has been reduced to RM3 800 after the company announced a new salary adjustment?

- A** Puan Aisya mempunyai aliran tunai positif sebanyak RM330.
Puan Aisya has a positive cash flow of RM330.
- B** Puan Aisya mempunyai aliran tunai sifar kerana jumlah pendapatan sama dengan perbelanjaan.
Puan Aisya has a zero cash flow because her total income is equal to her total expenditure.
- C** Puan Aisya mempunyai aliran tunai negatif kerana jumlah perbelanjaan melebihi pendapatan.
Puan Aisya has a negative cash flow because her total expenditure exceeds her income.
- D** Puan Aisya mempunyai lebih pendapatan yang boleh digunakan untuk pelaburan.
Puan Aisya has surplus income that can be used for investment.

Soalan Subjektif

Jawab semua soalan.

- 1 Encik Cheong menerima pendapatan bulanan sebanyak RM5 000. Beliau juga menyewakan rumahnya sebanyak RM950 sebulan. Beliau mempunyai perbelanjaan tetap dan perbelanjaan tidak tetap masing-masing sebanyak RM2 000 dan RM1 050 sebulan. Hitung aliran tunai bulanan Encik Cheong. Jelaskan jawapan anda.

Mr. Cheong receives a monthly income of RM5 000. He also rents out her house for RM950 a month. He has fixed expenses and variable expenses of RM2 000 and RM1 050 respectively per month. Calculate Mr. Cheong's monthly cash flow. Explain your answer.

[3 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 2 Natasha mula bekerja pada tahun 2024 dengan gaji permulaan sebanyak RM1 950. Dia telah memiliki sebuah kereta dengan bayaran ansuran bulanan sebanyak RM550. Dia juga mempunyai perbelanjaan bulanan sebanyak RM1 000.

Natasha starts working in year 2024 with a starting salary of RM1 950. She already owns a car with monthly instalments of RM550. She also has a monthly expenditure of RM1 000.

- (a) Hitung aliran tunai bulanan Natasha. Jelaskan jawapan anda.

Calculate Natasha's monthly cash flow. Explain your answer.

[3 markah/marks]

- (b) Jelaskan aliran tunai Natasha jika kenaikan gaji pada tahun 2025 adalah sebanyak 10% dan perbelanjaan meningkat sebanyak 30%.

Explain Natasha's cash flow if her salary increases by 10% in 2025 and her expenditure increases by 30%.

[4 markah/marks]

Jawapan/Answer:

- 3 Puan Athirah bekerja sebagai seorang pereka dalaman dengan gaji bersih RM8 000 sebulan. Dia juga menerima RM1 100 setiap bulan hasil sewa pangsapurnya. Perbelanjaan tetap dan perbelanjaan tidak tetap bulannya masing-masing ialah RM4 230 dan RM3 500. Jika Puan Athirah menetapkan 8% daripada gajinya sebagai simpanan tetap bulanan, hitung aliran tunai bulannya.

Puan Athirah works as interior designer with a monthly salary of RM8 000. She also receives RM1 100 monthly from her apartment rental. Her monthly fixed and variable expenses respectively are RM4 230 and RM3 500. If Puan Athirah sets aside 8% of her salary as a fixed monthly saving, calculate her monthly cash flow.

[3 markah/marks]

Jawapan/Answer:

Tingkatan 4

- 4 Dr. Darmesh merupakan seorang pensyarah junior dan menerima pendapatan bulanan satu per tiga berbanding pensyarah kanan yang menerima pendapatan bulanan sebanyak RM14 100. Dr. Darmesh juga menjalankan kelas tuisyen pada hujung minggu. Pada bulan November, Dr. Darmesh mempunyai perbelanjaan tetap dan tidak tetap sebanyak RM4 500. Jika Dr. Darmesh mempunyai aliran tunai positif sebanyak RM2 700 pada bulan tersebut, hitung pendapatan yang diperoleh daripada kelas tuisyen.

Dr. Darmesh is a junior lecturer and receives a monthly income of one-third of a senior lecturer, who earns a monthly income of RM14 100. Dr. Darmesh also conducts tuition classes on weekends. In the month of November, Dr. Darmesh had fixed and variable expenses amounting to RM4 500. If Dr. Darmesh has a positive cash flow of RM2 700 for that month, calculate the income earned from the tuition classes.

[3 markah/marks]

Jawapan/Answer:

- 5 Farah bekerja sebagai seorang juruteknik makmal. Pendapatan bulanannya ialah RM4 200 manakala jumlah perbelanjaan bulanannya ialah RM2 950. Farah bercadang untuk membeli sebuah motosikal berharga RM18 000 secara tunai dalam tempoh 15 bulan.

Farah works as a laboratory technician. Her monthly income is RM4 200 while her monthly expenditure is RM2 950. Farah plans to purchase a motorcycle priced at RM18 000 in cash within 15 months.

- (a) Hitung jumlah simpanan maksimum yang boleh dibuat dalam tempoh tersebut.

Calculate the maximum amount of savings that can be made within that period.

[3 markah/marks]

- (b) Tentukan sama ada Farah mampu mencapai matlamat kewangannya.

Determine whether Farah is able to achieve her financial goal.

[2 markah/marks]

- (c) Jelaskan satu langkah yang boleh diambil oleh Farah sekiranya matlamat tersebut tidak dapat dicapai.

Explain one action that Farah can take if the goal cannot be achieved.

[3 markah/marks]

Jawapan/Answer:

- 6 Jadual 1 menunjukkan pelan kewangan Encik Farish.
Table 1 shows Encik Farish's financial plan.

Pelan Kewangan Encik Farish
Encik Farish's Financial Plan

Pendapatan dan Perbelanjaan <i>Income and Expenditure</i>	RM	
Pendapatan bersih / <i>Net income</i>	10 800	
Pendapatan pasif / <i>Passive income</i>	0	
Jumlah pendapatan bulanan / <i>Total monthly income</i>	10 800	
Tolak dana kecemasan / <i>Minus savings for emergency fund</i>	500	
Baki pendapatan <i>Income balance</i>	<i>R</i>	
Tolak perbelanjaan tetap bulanan <i>Minus monthly fixed expenses</i>		
Pinjaman perumahan / <i>Housing loan</i>	1 500	
Ansuran kereta / <i>Car instalment</i>	1 831	
Pinjaman pendidikan / <i>Education loan</i>	200	
Insurans perubatan / <i>Medical insurance</i>	680	
Jumlah perbelanjaan tetap bulanan <i>Total monthly fixed expenses</i>	4 211	
Tolak perbelanjaan tidak tetap bulanan <i>Minus monthly variable expenses</i>		
Barangan dapur / <i>Groceries</i>	1 000	
Bil utiliti / <i>Utility bills</i>	800	
Petrol / <i>Petrol</i>	500	
Tol / <i>Toll</i>	300	
Pendidikan anak / <i>Child education</i>	800	
Simpanan melancong / <i>Travel savings</i>	600	
Jumlah perbelanjaan tidak tetap bulanan <i>Total monthly variable expenses</i>	<i>T</i>	
Lebihan / Defisit <i>Surplus / Deficit</i>	<i>V</i>	

Jadual 1 / *Table 1*

- (a) Hitung nilai R , T dan V .
Calculate the values of R , T and V . [3 markah/marks]
- (b) Tentukan sama ada Encik Farish menguruskan kewanganya dengan cekap atau tidak cekap. Berikan justifikasi anda.
Determine whether Encik Farish manages her finances efficiently or inefficiently. Give your justification. [2 markah/marks]
- (c) Encik Farish dan isterinya ingin membeli sebuah rumah baharu yang berharga RM600 000 dalam masa 5 tahun dengan wang pendahuluan sebanyak RM60 000.
Encik Farish and his wife want to buy a new house for RM600 000 within 5 years with a down payment RM60 000.
- (i) Hitung simpanan bulanan yang perlu disimpan oleh Encik Farish dan isterinya bagi mencapai matlamat tersebut.
Calculate the monthly savings Encik Farish and his wife must save in order to achieve the goal.
- (ii) Hitung peratus simpanan Encik Farish dan isterinya.
Calculate the percentage of savings of Mr. Farish and his wife.
- (iii) Adakah Encik Farish bijaksana dari segi pembelian rumah baharu tersebut? Berikan justifikasi anda.
Is it wise for Encik Farish to buy the new house? Justify your answer. [4 markah/marks]

Jawapan/Answer:

(a)

(b)

(c) (i)

(ii)

(iii)



Peperiksaan Akhir Sesi Akademik Tingkatan 4

KERTAS 1

[40 markah/marks]

Jawab **semua** soalan.

Answer **all** questions.

- 1 Bundarkan 5.435 kepada tiga angka bererti. Kemudian darabkan dengan 4.

Round off 5.435 to three significant figures. Hence multiply it by 4.

- A 2.18×10
 B 0.216×10^3
 C 2.176×10
 D 2.176×10^{-1}

- 2 Diberi bahawa 30 biji guli logam berbentuk sfera dengan setiap satu berjejari 35 cm dileburkan untuk membentuk 70 buah kon yang serupa. Cari isi padu, dalam cm^3 , bagi sebuah kon itu.

Given that 30 spherical metal marbles, each with a radius of 35 cm, are melted to form 70 similar cones. Find the volume, in cm^3 , of one cone.

[Guna/Use $\pi = \frac{22}{7}$]

- A 7.7×10^4
 B 7.7×10^3
 C 6.6×10^4
 D 6.6×10^3

- 3 Seorang peruncit membungkus 40.5 kg garam ke dalam 300 bungkusan yang lebih kecil. Hitung purata jisim, dalam g, garam di dalam setiap bungkusan.

A grocer packed 40.5 kg of salt into 300 smaller packets.

Calculate the average mass, in g, of salt in each packet.

- A 7.4×10^{-3}
 B 1.35×10^{-2}
 C 1.35×10^2
 D 7.4×10^3

- 4 Alesya membeli sebotol minyak wangi dengan harga $\text{RM}257_8$ selepas diskaun sebanyak 30%. Berapakah harga asal minyak wangi itu dalam asas lapan?

Alesya bought a bottle of perfume for $\text{RM}257_8$ after a discount of 30%. What is the original price of the perfume in base eight?

- A 122_8
 B 175_8
 C 250_8
 D 372_8

- 5 Butik Afia menjual dompet dengan harga $\text{RM}235$. Pelanggan akan mendapat diskaun $\text{RM}15$ bagi pembelian itu. Hitung harga, dalam asas 6, yang perlu dibayar oleh pelanggan bagi dompet itu.

Afia Boutique sell a wallet for $\text{RM}235$. The customer will get $\text{RM}15$ discount for the purchase. Calculate the price, in base 6, that the customer has to pay for the wallet.

- A $\text{RM}1004_6$
 B $\text{RM}1031_6$
 C $\text{RM}1054_6$
 D $\text{RM}1055_6$

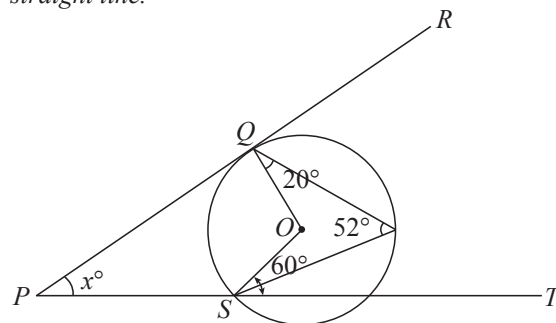
- 6 Sebuah papan tanda berbentuk poligon mempunyai jumlah sudut pedalaman 1440° . Berapakah bilangan sisinya?

A signboard in the shape of a polygon has the total interior angles of 1440° . What is the number of its sides?

- A 8
 B 9
 C 10
 D 12

- 7 Rajah 1 menunjukkan suatu bulatan berpusat O. Garis lurus PQR ialah tangen kepada bulatan di Q dan PST ialah garis lurus.

Diagram 1 shows a circle with centre O. The straight line PQR is the tangent to the circle at Q and PST is a straight line.



Rajah 1 / Diagram 1

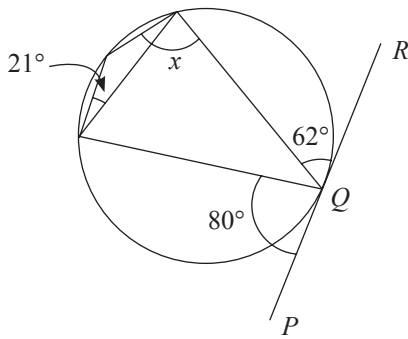
Hitung nilai x .

Calculate the value of x .

- A 46
 B 58
 C 66
 D 76

- 8 Dalam Rajah 2, PQR ialah tangen kepada bulatan di Q .

In Diagram 2, PQR is a tangent to the circle at Q .



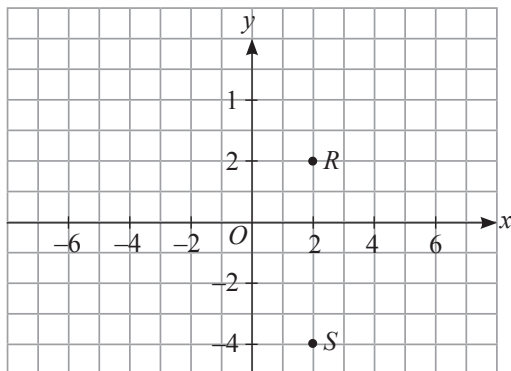
Rajah 2 / Diagram 2

Cari nilai $\sin x$.

Find the value of $\sin x$.

- A 0.9721
B 0.9848
C 0.9925
D 0.9945
- 9 Dalam Rajah 3, titik S ialah imej bagi titik R di bawah suatu pantulan pada suatu satah Cartes.

In Diagram 3, point S is the image of point R under a reflection on a Cartesian plane.



Rajah 3 / Diagram 3

Tentukan paksi pantulan.

Determine the axis of reflection.

- A $x = -1$
B $y = -1$
C $x = 1$
D $y = 1$

- 10 Tentukan tertib simetri putaran bagi Rajah 4.

Determine the order of rotational symmetry for Diagram 4.

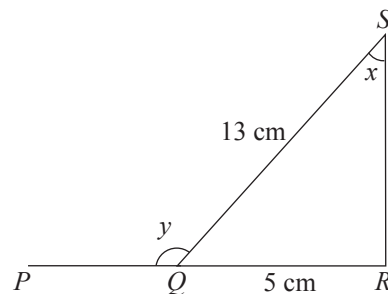


Rajah 4 / Diagram 4

- A 1
B 2
C 3
D 4

- 11 Rajah 5 menunjukkan sebuah segi tiga bersudut tegak, QRS , dan PQR ialah garis lurus.

Diagram 5 shows a right angled triangle, QRS , and a straight line PQR .



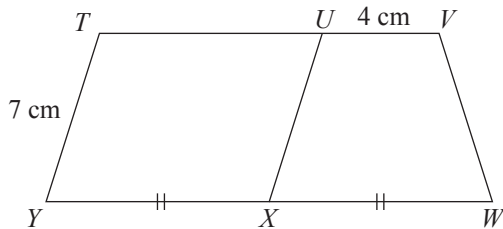
Rajah 5 / Diagram 5

Antara berikut, yang manakah benar?

Which of the following is true?

- A $\sin x = -\frac{5}{12}$, $\cos y = \frac{12}{13}$
B $\sin x = \frac{5}{12}$, $\cos y = -\frac{12}{13}$
C $\sin x = -\frac{5}{13}$, $\cos y = \frac{5}{12}$
D $\sin x = \frac{5}{13}$, $\cos y = -\frac{5}{13}$

- 12 Dalam Rajah 6, $TUXY$ ialah sebuah segi empat selari dengan perimeter 30 cm dan luas 48 cm^2 . Diberi TUV dan WXY ialah garis lurus. In Diagram 6, $TUXY$ is a parallelogram with a perimeter of 30 cm and an area of 48 cm^2 . Given that TUV and WXY are straight lines.



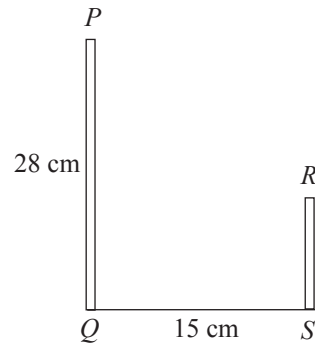
Rajah 6 / Diagram 6

Cari luas, dalam cm^2 , seluruh rajah.
Find the area, in cm^2 , of the whole diagram.

- A 72
B 80
C 84
D 96
- 13 Antara berikut, pernyataan yang manakah benar?
Which of the following statement is true?
A 4 dan 8 ialah faktor bagi 20.
4 and 8 are factors of 20.
B $9^\circ = 0$
C Hasil tambah sudut peluaran pentagon ialah 360.
The sum of the exterior angles of a pentagon is 360° .
D 30 ialah gandaan bagi 5 dan 7.
30 is a multiple of 5 and 7.

- 14 Antara berikut yang manakah rumus yang betul bagi jujukan 1, 3, 5, 7, ... dengan keadaan $n = 1, 2, 3, 4, \dots$?
Which of the following is the correct formula for the sequence 1, 3, 5, 7, ... such that $n = 1, 2, 3, 4, \dots$?
A $2n - 1$
B $4n^2 - 3$
C $2n^3 - 1$
D $n^2 - 2$

- 15 Rajah 7 menunjukkan dua tiang tegak, PQ dan RS , berdiri pada suatu satah mengufuk. Diagram 7 shows two vertical poles, PQ and RS , standing on a horizontal plane.



Rajah 7 / Diagram 7

Sudut dongakan bagi bucu P dari bucu R ialah 56° . Hitung tinggi, dalam m, RS .
The angle of elevation of vertex P from vertex R is 56° . Calculate the height, in m, of RS .

- A 5.76
B 7.21
C 11.26
D 22.24

- 16 Diberi bahawa $mn + 1 = n^2 + m$. Ungkapkan m dalam sebutan n .
It is given that $mn + 1 = n^2 + m$. Express m in terms of n .

- A $m = \frac{n^2 + 1}{n + 1}$ C $m = \frac{n^2 + 1}{n - 1}$
B $m = n + 1$ D $m = n - 1$

- 17 Selesaikan persamaan linear yang berikut:
Solve the following linear equation:

$$\frac{4(2p - 3)}{6} = 5$$

- A $\frac{21}{4}$
B $\frac{2}{5}$
C 20
D 80

- 18 Ungkapkan $\frac{x}{5} - \frac{x-2}{8}$ sebagai satu pecahan tunggal dalam bentuk termudah.

Express $\frac{x}{5} - \frac{x-2}{8}$ as a single fraction in its simplest form.

- A $\frac{x-10}{40}$
B $\frac{2x+15}{40}$
C $\frac{3x+8}{40}$
D $\frac{3x+10}{40}$

- 19 Rajah 8 menunjukkan harga bagi dua jenis buah-buahan.

Diagram 8 shows the prices of two types of fruits.



Rajah 8 / Diagram 8

Ramesh membeli x kg mangga dan y kg jambu batu dengan harga RM84.

Tulis persamaan bagi jisim jambu batu dalam bentuk jisim mangga.

Ramesh bought x kg of mangoes and y kg of guavas for RM84.

Write the equation for the mass of guavas in terms of the mass of mangoes.

- A $y = 24 - x$
B $y = 24 - 2x$
C $y = 36 - x$
D $y = 36 - 2x$

- 20 Hitung nilai bagi ungkapan berikut:

Evaluate the value of the following expression:

$$(216)^{\frac{2}{3}} \times (36)^{-\frac{1}{2}} \div (1\ 296)^{-\frac{1}{4}}$$

- A 6
B 6^{-2}
C 6^2
D 6^3

- 21 Cari penyelesaian untuk $\frac{1}{3}(x-6) \geq \frac{2x-3}{5}$.

Find the solution for $\frac{1}{3}(x-6) \geq \frac{2x-3}{5}$.

- A $x \geq -39$
B $x \geq -21$
C $x \leq -39$
D $x \leq -21$

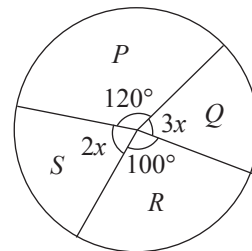
- 22 Selesaikan/Solve:

$$\frac{1}{2}x \leq 4 + 7x$$

- A $x \geq \frac{8}{13}$
B $x \geq -\frac{8}{13}$
C $x \leq -\frac{8}{13}$
D $x \leq \frac{8}{13}$

- 23 Rajah 9 ialah carta pai yang menunjukkan empat jenama kenderaan, P , Q , R dan S , yang digemari oleh pelanggan.

Diagram 9 is a pie chart showing four vehicle brands, P , Q , R and S , that are preferred by customers.



Rajah 9 / Diagram 9

Hitung sudut sektor bagi jenama Q .

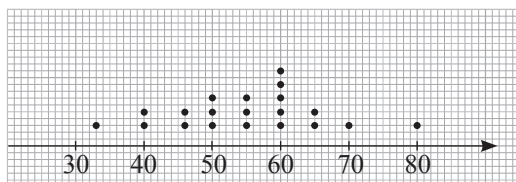
Calculate the sector angle of brand Q .

- A 28°
B 44°
C 56°
D 84°

- 24 Rajah 10 ialah satu plot titik yang menunjukkan skor bagi 20 orang murid di sebuah sekolah yang mengambil bahagian dalam kuiz Matematik.

Diagram 10 is a dot plot representing the scores of 20 students in a school that participate a Mathematical Quiz.

Skor dalam Kuiz Matematik
Scores in Mathematical Quiz



Rajah 10 / Diagram 10

Hitung median.

Calculate the median.

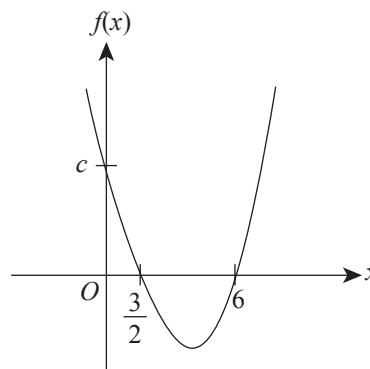
- A 45
B 50
C 55
D 60
- 25 Ammar ingin membeli sebuah kereta yang berharga RM65 000. Dia perlu menyediakan wang pendahuluan kerana bank hanya meluluskan pinjaman sebanyak RM55 000. Berapakah jumlah minimum yang perlu dia simpan setiap bulan selama 5 bulan jika wang simpanannya ketika ini ialah RM8 500?

Ammar wants to buy a car which costs RM65 000. He needs to prepare a down payment as the bank only approves a loan of RM55 000. What is the minimum amount that he needs to save every month within 5 months if his saving at the moment is RM8 500?

- A RM250
B RM300
C RM350
D RM400

- 26 Rajah 11 menunjukkan suatu graf fungsi kuadratik, $f(x) = ax^2 + bx + c$, dengan keadaan a , b , c adalah integer.

Diagram 11 shows a graph of quadratic function, $f(x) = ax^2 + bx + c$, such that a , b , c are integers.



Rajah 11 / Diagram 11

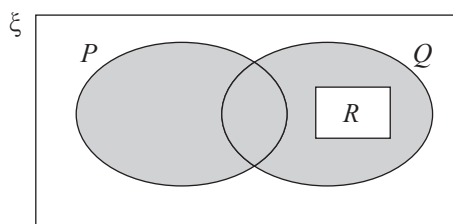
Cari nilai c .

Find the value of c .

- A 9
B 12
C 18
D 24

- 27 Rajah 12 menunjukkan sebuah gambar rajah Venn dengan set semesta, ξ , set P , set Q dan set R .

Diagram 12 shows a Venn diagram with a universal set, ξ , set P , set Q and set R .



Rajah 12 / Diagram 12

Antara berikut, yang manakah mewakili kawasan berlorek?

Which of the following represents the shaded region?

- A $(P \cup Q) \cap R'$
B $(P' \cup Q) \cap R'$
C $(P \cap Q) \cap R'$
D $(P \cap Q) \cup R$

- 28 Diberi set semesta, $\xi = \{x : x \text{ ialah satu integer, } 5 \leq x \leq 15\}$,

Given that the universal set, $\xi = \{x : x \text{ is an integer, } 5 \leq x \leq 15\}$,

Set $E = \{x : x \text{ ialah suatu nombor perdana}\}$,

Set $E = \{x : x \text{ is a prime number}\}$,

Set $F = \{x : x \text{ ialah suatu gandaan } 5\}$.

Set $F = \{x : x \text{ is a multiple of } 5\}$.

Cari $n(E \cup F)'$.

Find $n(E \cup F)'$.

- A 4
B 5
C 6
D 7

- 29 Suatu kajian yang dijalankan terhadap 52 orang murid menunjukkan terdapat 21 orang murid menggemari subjek Matematik dan 32 orang murid menggemari subjek Sains. Terdapat 8 orang murid menggemari kedua-dua subjek itu. Cari bilangan murid yang tidak menggemari kedua-dua subjek itu.

A survey carried out on 52 pupils shows that 21 of them like Mathematics subject and 32 of them like Science subject. There are 8 pupils who like both subjects. Find the number of pupils who dislike both subjects.

- A 7
B 9
C 13
D 44

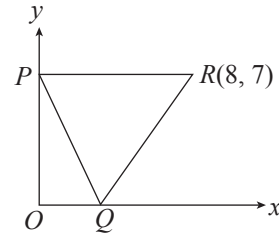
- 30 Diberi bahawa persamaan bagi suatu garis lurus ialah $4x - 5y = 9$. Cari pintasan- x bagi garis lurus itu.

Given that the equation of a straight line is $4x - 5y = 9$. Find the x -intercept of the straight line.

- A $-\frac{9}{5}$
B $-\frac{9}{4}$
C $\frac{9}{5}$
D $\frac{9}{4}$

- 31 Rajah 13 menunjukkan tiga garis lurus, PQ , PR dan RQ , pada suatu satah Cartes.

Diagram 13 shows three straight lines, PQ , PR and RQ , on a Cartesian plane.



Rajah 13 / Diagram 13

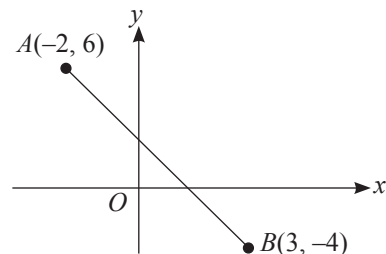
Diberi bahawa O ialah asalan dan jarak PQ ialah $\sqrt{53}$ unit. Cari kecerunan bagi garis lurus QR .

Given that O is the origin and the distance of PQ is $\sqrt{53}$ units. Find the gradient of the straight line QR .

- A $-\frac{7}{6}$
B $-\frac{6}{7}$
C $\frac{6}{7}$
D $\frac{7}{6}$

- 32 Rajah 14 menunjukkan garis lurus yang melalui titik $A(-2, 6)$ dan $B(3, -4)$.

Diagram 14 shows a straight line that passes through points $A(-2, 6)$ and $B(3, -4)$.



Rajah 14 / Diagram 14

Cari kecerunan bagi garis lurus itu.

Find the gradient of the straight line.

- A 6
B -2
C 2
D -4

- 33 Dalam suatu acara sukan sekolah, pasukan Hijau mempunyai 15 orang peserta. Kebarangkalian memilih seorang peserta bagi acara itu untuk pasukan Kuning dan pasukan Biru masing-masing ialah $\frac{1}{3}$ dan $\frac{1}{4}$. Cari jumlah peserta bagi acara ini.

In a school's sport event, Green team has 15 participants. The probability of choosing a participant of the event for Yellow team and Blue team are $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the total number of the participants in the event.

- A 18
B 21
C 36
D 42

- 34 Terdapat tiga orang guru Matematik, tiga orang guru Sains dan seorang guru Bahasa Inggeris di dalam bilik guru. Dua orang guru di dalam bilik guru dipilih secara rawak.

Hitung kebarangkalian bahawa kedua-dua guru itu mengajar subjek yang sama.

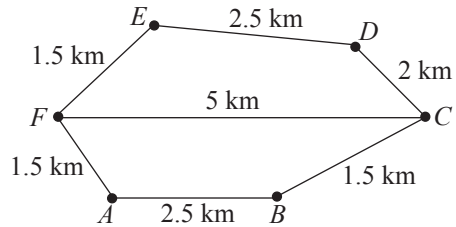
There are three Mathematics teachers, three Science teachers and one English teacher in a staff room. Two teachers in the staff room are chosen at random.

Calculate the probability that both teachers are teaching the same subject.

- A $\frac{1}{7}$
B $\frac{2}{7}$
C $\frac{15}{49}$
D $\frac{16}{49}$

- 35 Rajah 15 menunjukkan jarak antara enam tempat. Sharifah berada di F dan perlu memandu ke C . Dia memilih laluan yang paling jauh untuk memaksimumkan tuntutan perjalanannya.

Diagram 15 shows the distances between six places. Sharifah is at F and needs to go to C by driving. She chooses the longest route to maximise her travel claim.



Rajah 15 / Diagram 15

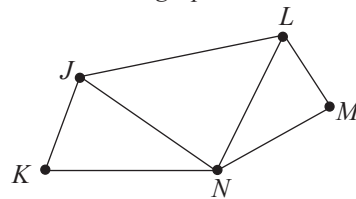
Diberi bahawa kadar tuntutan bagi 1 km ialah RM0.80. Berapakah jumlah tuntutan yang akan diterima oleh Sharifah jika setiap tempat hanya boleh dilalui sekali?

Given that the claim rate for 1 km is RM0.80 What is the total claim Sharifah will receive if each place can only be visited once?

- A RM4.00
B RM4.40
C RM4.80
D RM6.00

- 36 Rajah 16 menunjukkan suatu graf.

Diagram 16 shows a graph.



Rajah 16 / Diagram 16

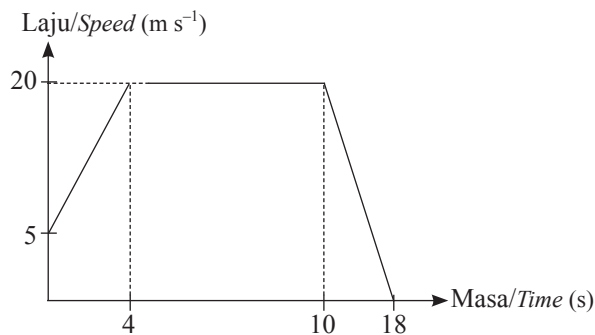
Nyatakan darjah bagi bucu N .

State the degree of vertex N .

- A 1
B 2
C 3
D 4

- 37 Rajah 17 menunjukkan graf laju-masa bagi suatu objek dalam tempoh 18 saat.

Diagram 17 shows the speed-time graph of an object over a period of 18 seconds.



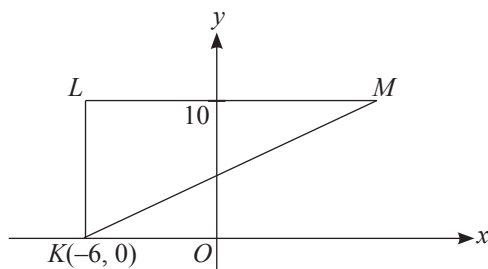
Rajah 17 / Diagram 17

Hitung jumlah jarak yang dilalui oleh objek itu dalam km.

Calculate the total distance traveled by the object in km.

- A 25 C 0.25
B 36 D 0.36
- 38 Dalam Rajah 18, garis lurus LM adalah selari dengan paksi- x .

In Diagram 18, the straight line LM is parallel to the x -axis.



Rajah 18 / Diagram 18

Jarak di antara titik M dengan titik K ialah 26 unit. Cari koordinat bagi titik M .

The distance between point M and point K is 26 units. Find the coordinates of point M .

- A (18, 10) C (6, 10)
B (12, 10) D (-6, 10)

- 39 Varians bagi suatu set data yang terdiri daripada lapan nombor ialah 12.

Jika setiap nilai dalam set data itu didarabkan dengan 3, cari varians baharunya.

The variance of a set of data which consists of eight numbers is 12.

If every value in the set of data is multiplied by 3, find the new variance.

- A $\frac{4}{3}$
B 4
C 36
D 108

- 40 Rajah 19 ialah plot batang-dan-daun yang menunjukkan markah ujian sekumpulan murid.

Diagram 19 is a stem-and-leaf plot showing the test marks of a group of students.

Markah Murid
Students' Marks

Batang Stem	Daun Leaf
5	2 5
6	0 4 7
7	1 3 8
8	5 9

Kekunci: 5 | 2 bermaksud 52 markah

Key: 5 | 2 means 52 marks

Rajah 19 / Diagram 19

Hitung sisihan piawai bagi set data tersebut. Berikan jawapan anda betul kepada tiga tempat perpuluhan.

Calculate the standard deviation of the data set. Give your answer correct to three decimal places.

- A 10.512
B 11.621
C 130.800
D 110.512

KERTAS 2
Bahagian A
[40 markah/marks]

Jawab **semua** soalan dalam bahagian ini.
*Answer **all** questions in this section.*

- 1 Rajah 1 menunjukkan maklumat berkaitan sebuah graf.
Diagram 1 shows information related to a graph.

$$\begin{aligned} V &= \{A, B, C, D\} \\ E &= \{(A, B), (A, C), (B, C), (B, D), (B, D), (C, C), (C, D)\} \end{aligned}$$

Rajah 1 / Diagram 1

Lukis satu graf berdasarkan maklumat yang diberi dan kemudian nyatakan dua alasan mengapa graf tersebut bukan suatu graf mudah.

Draw a graph based on the information given and then state two reasons why the graph is not a simple graph.

[3 markah/marks]

Jawapan/Answer:

- 2 Sebuah tangki air yang berbentuk kuboid mempunyai panjang $(2x + 5)$ cm, tinggi 40 cm dan lebar dua kali panjangnya. Jumlah isi padu tangki air itu ialah $3\,920\text{ cm}^3$. Hitung lebar, dalam cm, tangki air itu.
- A water tank in the shape of a cuboid has a length of $(2x + 5)$ cm, a height of 40 cm and a width that is twice the length. The total volume of the water tank is $3\,920\text{ cm}^3$. Calculate the width, in cm, of the water tank.*
- [4 markah/marks]

Jawapan/Answer:

- 3 Jumlah harga 1 kg tepung gandum dan 1 kg gula ialah RM11. Beza harga antara 3 kg tepung gandum dan 1 kg gula ialah RM5. Tanpa menggunakan kaedah matriks, cari harga bagi 1 kg tepung gandum dan 1 kg gula.

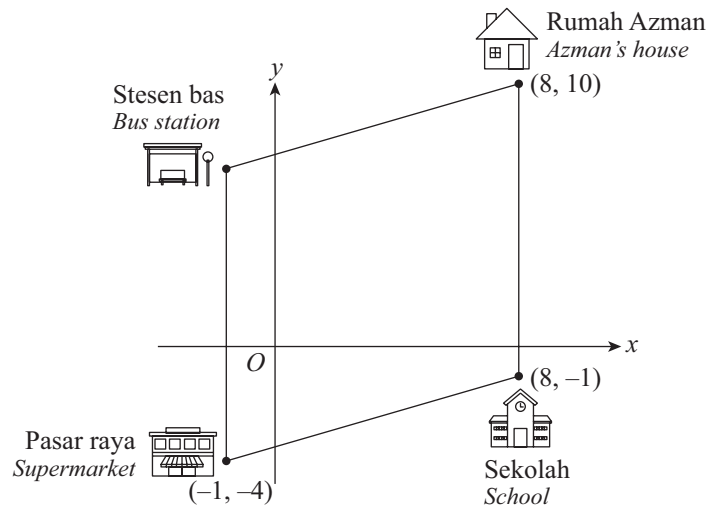
The total price of 1 kg of flour and 1 kg of sugar is RM11. The difference in price between 3 kg of flour and 1 kg of sugar is RM5. Without using the matrix method, find the price of 1 kg of flour and 1 kg of sugar.

[4 markah/marks]

Jawapan/Answer:

- 4 Rajah 2 menunjukkan sebuah segi empat selari yang dilukis pada satah Cartes, mewakili kedudukan rumah Azman, sekolah, stesen bas dan pasar raya. Diberi skala ialah 1 unit = 2 km.

Diagram 2 shows a parallelogram drawn on a Cartesian plane, representing Azman's house, school, bus station and supermarket. Given that the scale is 1 unit = 2 km.



Rajah 2 / Diagram 2

- (a) Hitung jarak, dalam km, dari rumah Azman ke sekolah.
Calculate the distance, in km, from Azman's house to school.
- (b) Tentukan persamaan garis lurus dari rumah Azman ke stesen bas.
Determine the equation of the straight line from Azman's house to the bus station.

[2 markah/marks]

[3 markah/marks]

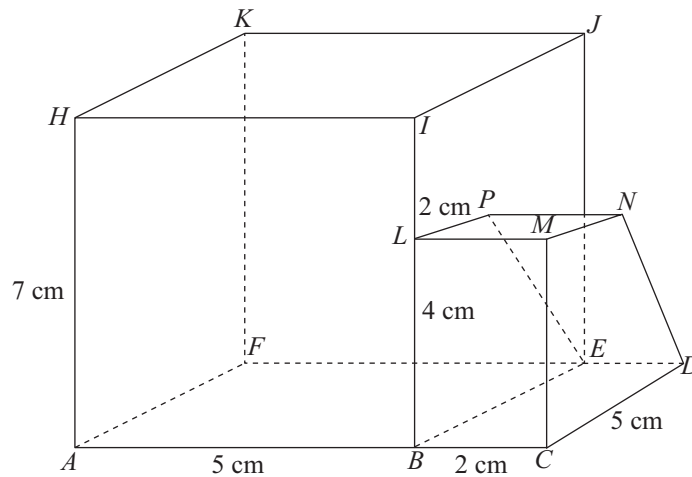
Jawapan/Answer:

(a)

(b)

- 5 Rajah 3 menunjukkan sebuah pepejal yang terdiri daripada sebuah prisma tegak dan sebuah kuboid yang bercantum pada satah mencancang $BEPL$. Tapak segi empat tepat $ACDF$ terletak secara mengufuk di atas sebuah meja. Trapezium $CDNM$ ialah keratan rentas seragam prisma itu.

Diagram 3 shows a solid consisting of a right prism and a cuboid which are joined at the vertical plane $BEPL$. Its rectangular base $ACDF$ is placed horizontally on a table. The trapezium $CDNM$ is the uniform cross section of the prism.



Rajah 3 / Diagram 3

Lukis dengan skala penuh pelan pepejal itu.
Draw to full scale the plan of the solid.

[4 markah/marks]

Jawapan/Answer:

6 Jadual 1 menunjukkan nilai-nilai bagi fungsi $y = 2x^2 - 4x - 7$.

Table 1 shows the values for the function $y = 2x^2 - 4x - 7$.

x	-3	-2	-1	0	1	2	3	4
y	23	9	-1	-7	-9	-7	-1	9

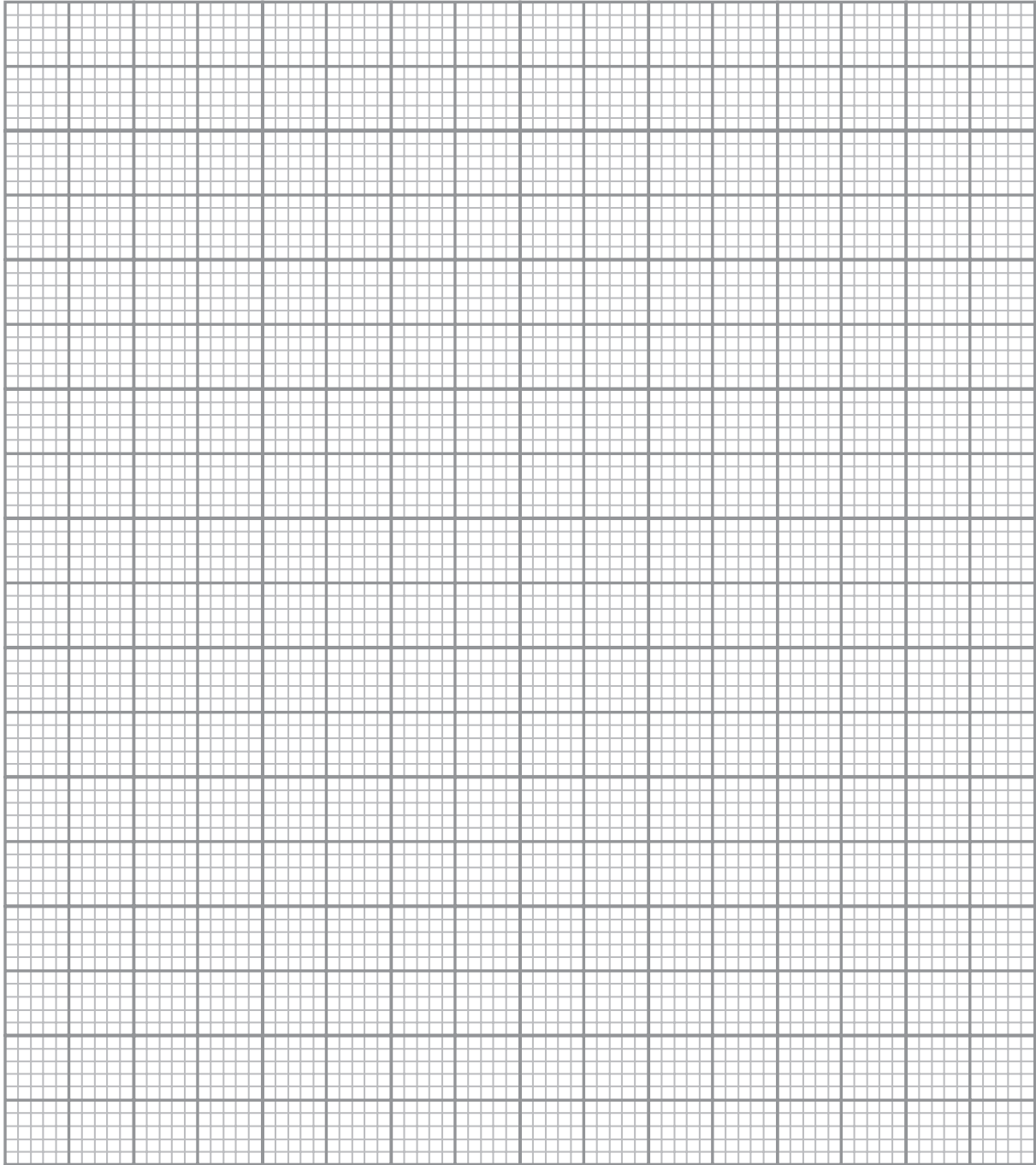
Jadual 1 / Table 1

Menggunakan skala 2 cm kepada 1 unit pada paksi-x dan 2 cm kepada 5 unit pada paksi-y, lukis graf $y = 2x^2 - 4x - 7$ untuk $-3 \leq x \leq 4$.

Using a scale of 2 cm to 1 unit on the x-axis and 2 cm to 5 units on the y-axis, draw the graph of $y = 2x^2 - 4x - 7$ for $-3 \leq x \leq 4$.

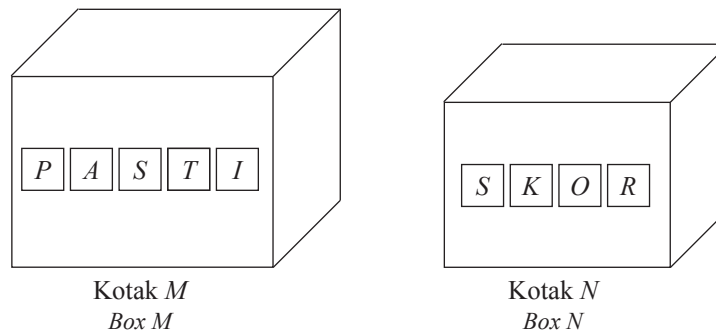
[4 markah/marks]

Jawapan/Answer:



- 7 Rajah 4 menunjukkan sejumlah kad berlabel dengan huruf vokal dan huruf konsonan di dalam kotak M dan kotak N .

Diagram 4 shows a number of cards labelled with vowels and consonants in box M and box N .



Rajah 4 / Diagram 4

- (a) Dua keping kad dipilih secara rawak, kad pertama dari kotak M diikuti satu lagi kad dari kotak N . Senaraikan semua ruang sampel.

Two cards are chosen at random, the first one from box M and followed by another from box N . List all the sample space.

[2 markah/marks]

- (b) Dengan menyenaraikan semua kesudahan yang mungkin, hitung kebarangkalian bahawa kad pertama berlabel huruf “ T ” atau kad kedua berlabel huruf konsonan.

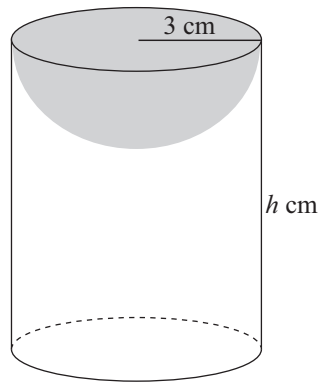
By listing all the possible outcomes, calculate the probability that the first card is labelled with the letter “ T ” or the second card is labelled with a consonant.

[2 markah/marks]

Jawapan/Answer:

- 8 Rajah 5 menunjukkan sebuah pepejal berbentuk silinder dengan jejari 3 cm dan tinggi h cm. Satu bahagian yang berbentuk hemisfera dikeluarkan daripada silinder itu.

Diagram 5 shows a cylinder with a radius of 3 cm and a height of h cm. A hemispherical shaped is taken out from the cylinder.



Rajah 5 / Diagram 5

Diberi bahawa isi padu pepejal yang tinggal ialah $282\frac{6}{7} \text{ cm}^3$. Hitung tinggi, h , silinder itu dalam cm.

Given that the volume of the remaining solid is $282\frac{6}{7} \text{ cm}^3$. Calculate the height, h , of the cylinder in cm.

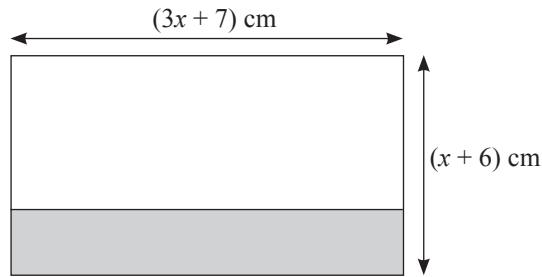
(Guna/Use $\pi = \frac{22}{7}$)

[4 markah/marks]

Jawapan/Answer:

9 Rajah 6 menunjukkan sebuah segi empat tepat.

Diagram 6 shows a rectangle.



Rajah 6 / Diagram 6

Diberi bahawa perimeter bagi segi empat tepat itu ialah 122 cm. Hitung luas, dalam cm^2 , kawasan tidak berlorek, jika kawasan berlorek adalah $\frac{1}{3}$ daripada keseluruhan rajah.

Given the perimeter of the rectangle is 122 cm. Calculate the area, in cm^2 , of unshaded region, if the area of shaded region is $\frac{1}{3}$ from the whole diagram.

[4 markah/marks]

Jawapan/Answer:

- 10 Sally merancang membeli sebuah kereta baharu berharga RM90 000. Dia akan membayar 10% daripada harga kereta itu secara tunai dan selebihnya melalui pembiayaan bank tempatan yang mengenakan kadar faedah 2.8% bagi tempoh selama 9 tahun. Hitung ansuran bulanan, dalam RM, yang perlu dijelaskan oleh Sally bagi pembelian itu.

Sally plans to purchase a new car priced at RM90 000. She will pay 10% of the car's price in cash and the remainder through local bank financing, which charges an interest rate of 2.80% for a period of 9 years. Calculate the monthly installment, in RM, that Sally needs to prepare for this purchase.

[4 markah/marks]

Jawapan/Answer:

Bahagian B
[45 markah/marks]

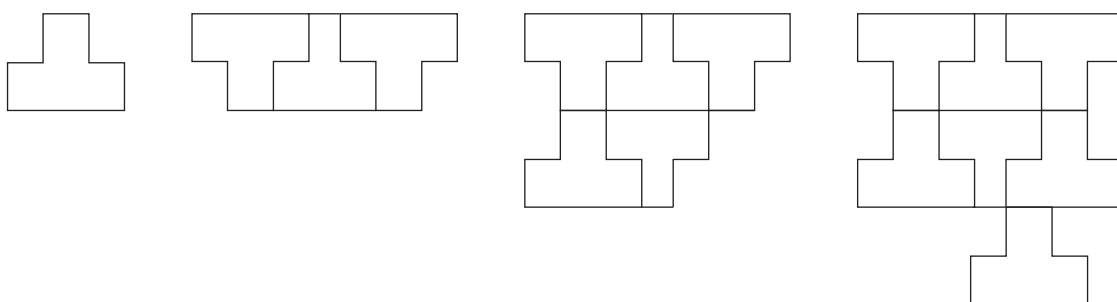
Jawab **semua** soalan dalam bahagian ini.
Answer all questions in this section.

- 11 (a) Tuliskan akas, songsangan dan kontrapositif bagi implikasi berikut.
Write the converse, inverse and contrapositive of the following implication.

Jika $x = 8$, maka $\sqrt[3]{x} = 2$.
If $x = 8$, then $\sqrt[3]{x} = 2$.

[3 markah/marks]

- (b) Rajah 7 menunjukkan empat corak yang pertama dalam suatu pola.
Diagram 7 shows the first four patterns of a sequence.



Rajah 7 / Diagram 7

- (i) Bentukkan satu kesimpulan induktif bagi bilangan poligon sekata pada corak ke- n .
Form an inductive conclusion for the number of regular polygons of n^{th} pattern.

[2 markah/marks]

- (ii) Cari bilangan poligon sekata bagi corak ke-20.
Find the number of regular polygons of the 20^{th} pattern.

[2 markah/marks]

- (iii) Apakah sebutan yang mempunyai 59 buah poligon sekata kesemuanya?
Which term has a total of 59 regular polygons?

[2 markah/marks]

Jawapan/Answer:

(a) Akas/Converse: _____

Songsangan/Inverse: _____

Kontrapositif/Contrapositive: _____

(b) (i)

(ii)

(iii)

- 12 (a) Rajah 8 di ruang jawapan ialah sebuah gambar rajah Venn yang menunjukkan set P dan set Q dengan keadaan set semesta, $\xi = P \cup Q$. Pada Rajah 8 di ruang jawapan, lorekkan set $P \cap Q = Q$.
Diagram 8 in the answer space is a Venn diagram showing set P and set Q such that the universal set $\xi = P \cup Q$. On Diagram 8 in the answer space, shade set of $P \cap Q = Q$.
- [2 markah/marks]

- (b) Diberi bahawa/*Given that*
 set semesta $\xi = \{\text{penduduk di sebuah taman perumahan}\}$, dengan keadaan $\xi = F \cup B \cup T$,
universal set $\xi = \{\text{residents in a housing area}\}$, such that $\xi = F \cup B \cup T$,
 Set $F = \{\text{bilangan orang yang menggemari futsal}\}$,
Set $F = \{\text{the number of people who like futsal}\}$,
 Set $B = \{\text{bilangan orang yang menggemari badminton}\}$,
Set $B = \{\text{the number of people who like badminton}\}$,
 Set $T = \{\text{bilangan orang yang menggemari tenis}\}$.
Set $T = \{\text{the number of people who like tennis}\}$.

Seramai 100 orang penduduk dipilih secara rawak. Didapati 17 orang menggemari futsal sahaja, 20 orang menggemari tenis sahaja, 23 orang menggemari futsal dan tenis, 18 orang menggemari futsal dan badminton, 14 orang menggemari badminton dan tenis, dan 5 orang menggemari ketiga-tiga permainan.

A total of 100 residents were randomly selected. It was found that 17 people like futsal only, 20 people like tennis only, 23 people like badminton and tennis, 18 people like futsal and badminton, 14 people like badminton and tennis, and 5 people like all three games.

- (i) Diberi set F , set B dan set T masing-masing mewakili sukan futsal, badminton dan tenis. Lengkapkan gambar rajah Venn di ruang jawapan.
Given set F , set B and set T are representing futsal, badminton and tennis respectively. Complete the Venn diagram in the answer space.
- [3 markah/marks]

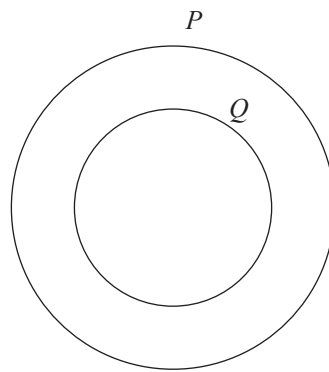
- (ii) Hitung/*Calculate*,

- (a) bilangan orang yang menggemari badminton sahaja,
the number of people who like badminton only,
- (b) bilangan orang yang menggemari sekurang-kurangnya dua sukan,
the number of people who like at least two sports,
- (c) bilangan orang yang hanya menggemari badminton dan futsal sahaja.
the number of people who only like badminton and futsal.

[4 markah/marks]

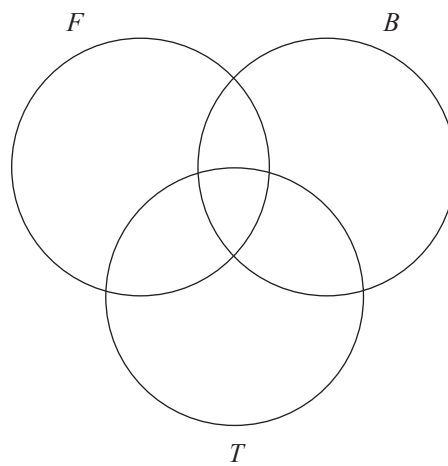
Jawapan/*Answer*:

(a)



Rajah 8 / *Diagram 8*

(b) (i)



Rajah 9 / *Diagram 9*

(ii) (a)

(b)

(c)

13 Jadual 2 menunjukkan pelan kewangan Encik Farish.

Table 2 shows Encik Farish's financial plan.

Pendapatan & Perbelanjaan <i>Income & Expenditure</i>	Amaun/Amount (RM)	
Pendapatan bersih <i>Net income</i>	10 800	
Pendapatan pasif <i>Passive income</i>	0	
Jumlah pendapatan bulanan <i>Total monthly income</i>	10 800	
Tolak dana kecemasan <i>Minus savings for emergency fund</i>	500	
Baki pendapatan <i>Income balance</i>		R
Tolak perbelanjaan tetap bulanan/ <i>Minus monthly fixed expenses</i>		
Pinjaman perumahan <i>Housing loan</i>	1 500	
Ansuran kereta <i>Car instalment</i>	1 831	
Pinjaman pendidikan <i>Education loan</i>	200	
Insurans perubatan <i>Medical insurance</i>	680	
Jumlah perbelanjaan tetap bulanan <i>Total monthly fixed expenses</i>		4 211
Tolak perbelanjaan tidak tetap bulanan/ <i>Minus monthly variable expenses</i>		
Barangan dapur <i>Groceries</i>	1 000	
Bil utility <i>Utility bills</i>	800	
Petrol <i>Petrol</i>	500	
Tol <i>Toll</i>	300	
Pendidikan anak <i>Child education</i>	800	
Simpanan melancong <i>Travel savings</i>	600	
Jumlah perbelanjaan tidak tetap bulanan <i>Total monthly variable expenses</i>		T
Lebihan/Defisit <i>Surplus/Deficit</i>		V

Jadual 2 / Table 2

(a) Hitung nilai R, T dan V.

Calculate the values of R, T and V.

[3 markah/marks]

(b) Tentukan sama ada Encik Farish menguruskan kewanganya dengan cekap atau tidak cekap. Berikan justifikasi anda.

Determine whether Encik Farish manages her finances efficiently or inefficiently. Give your justification.

[2 markah/marks]

- (c) Encik Farish dan isterinya ingin membeli sebuah rumah baharu yang berharga RM600 000 dalam masa 5 tahun dengan wang pendahuluan sebanyak RM60 000.

Encik Farish and his wife want to buy a new house for RM600 000 within 5 years with a down payment RM60 000.

Hitung simpanan bulanan yang perlu disimpan oleh Encik Farish dan isterinya bagi mencapai matlamat tersebut. Adakah Encik Farish bijaksana dari segi pembelian rumah baharu tersebut? Berikan justifikasi anda.

Calculate the monthly savings Encik Farish and his wife must save in order to achieve the goal. Is it wise for Encik Farish to buy the new house? Justify your answer.

[4 markah/marks]

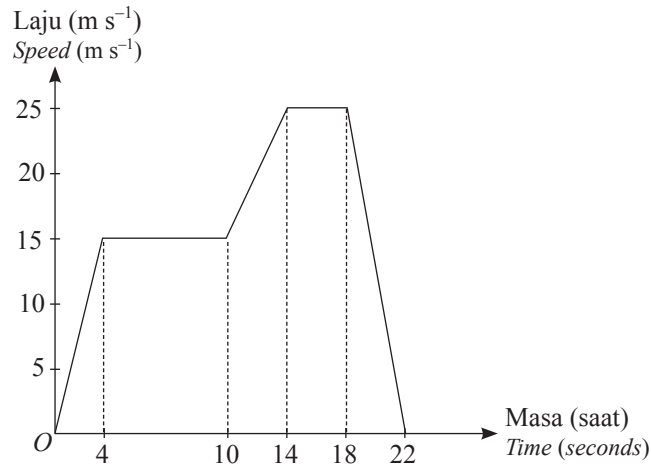
Jawapan/Answer:

(a)

(b)

(c)

- 14 Rajah 10 ialah sebuah graf laju-masa bagi pergerakan suatu objek yang bergerak dari P ke Q .
Diagram 10 is a speed-time graph for the motion of an object moves from P to Q .



Rajah 10 / Diagram 10

- (a) Hitung kadar perubahan laju, dalam m s^{-2} , objek itu pada 4 saat yang terakhir.
Calculate the rate of change of speed, in m s^{-2} , of the object in the last 4 seconds.
- (b) Hitung jumlah jarak yang dilalui oleh objek itu dalam tempoh 22 saat.
Calculate the total distance travelled by the object in 22 seconds.
- (c) Huraikan gerakan objek pada 10 saat pertama.
Describe the motion of the object in the first 10 seconds.

[2 markah/marks]

[3 markah/marks]

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

(c)

15 Rajah 11 menunjukkan plot batang-dan-daun berdasarkan markah kuiz Matematik bagi kelas Tingkatan 4 Einstein.

Diagram 11 shows a plot of stems-and-leaf based on the Math quiz scores for class of Form 4 Einstein.

Batang Stem	Daun Leaf				
3	x				
4	1	8	9		
5	3	5	7	8	
6	2	4	4	8	9
7	0	1	3	5	6
8	1	6			

Kekunci: 4 | 1 bermaksud 41 markah

Key: 4 | 1 means 41 marks

Rajah 11 / Diagram 11

(a) Cari/Find

(i) bilangan murid dalam kelas Tingkatan 4 Einstein,
the number of students in class of Form 4 Einstein,

(ii) markah tertinggi,
the highest score,

(iii) kelas mod.
the modal class.

[3 markah/marks]

(b) Diberi bahawa 50% murid mendapat k markah dan ke atas. Nyatakan nilai k .
Given that 50% of the students scored k marks and above. State the value of k .

[1 markah/mark]

(c) Julat taburan markah ialah 49. Cari nilai x .
The range of the distribution of scores is 49. Find the value of x .

[1 markah/mark]

(d) Lukiskan satu plot kotak berdasarkan data di Rajah 11.
Draw a box plot based on data in Diagram 11.

[4 markah/marks]

Jawapan/Answer:

(a) (i)

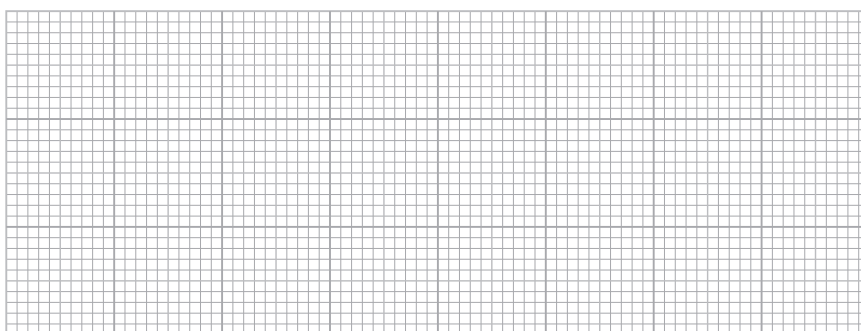
(ii)

(iii)

(b)

(c)

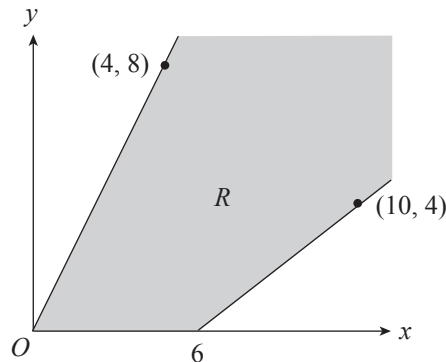
(d)



Bahagian C
[15 markah/marks]

Jawab **satu** soalan dalam bahagian ini.
*Answer **one** question in this section.*

- 16 (a) Rajah 12 menunjukkan suatu rantau berlorek R dalam suatu satah Cartes.
Diagram 12 shows a shaded region R in a Cartesian plane.



Rajah 12 / Diagram 12

- (i) Tentukan dua ketaksamaan, selain daripada $y \geq 0$, yang mentakrifkan rantau berlorek R .
Determine two inequalities, other than $y \geq 0$, that define the shaded region R . [3 markah/marks]
- (ii) Suatu garis lurus boleh dilukis dalam satah Cartes tersebut supaya rantau R menjadi suatu rantau tertutup. Tentukan satu lagi ketaksamaan yang diperlukan untuk tujuan ini, jika garis lurus itu menyentuh titik (4, 8) dan (10, 4).
A straight line can be drawn in the Cartesian plane such that the region R becomes an enclosed region. Determine another inequality required for this purpose, if the straight line touches points (4, 8) and (10, 4). [3 markah/marks]

Jawapan/Answer:

(a) (i)

(ii)

- (b) Suatu pusat pendidikan menawarkan dua jenis kursus, P dan Q . Terdapat x calon dan y calon masing-masing mendaftar kursus P dan kursus Q . Operasi pusat itu tertakluk kepada kekangan berikut.
An education centre offers two types of courses, P and Q . There are x candidates and y candidates enroll for course P and course Q respectively. The operation of the centre is subject to the following constraints.
- I Jumlah bilangan calon bagi kedua-dua kursus itu adalah selebih-lebihnya 400.
The total number of candidates for the two courses is at most 400.
 - II Bilangan calon bagi kursus P mestilah tidak kurang daripada bilangan calon bagi kursus Q .
The number of candidates of course P must not be less than the number of candidates of course Q .
 - III Bilangan calon bagi kursus Q mestilah sekurang-kurangnya 50.
The number of candidates of course Q must be at least 50.
- (i) Tulis tiga ketaksamaan selain daripada $x \geq 0$ dan $y \geq 0$, yang memuaskan kekangan itu.
Write three inequalities other than $x \geq 0$ and $y \geq 0$, which satisfy the constraints. [3 markah/marks]
- (ii) Menggunakan suatu skala 2 cm kepada 50 calon pada kedua-dua paksi, bina dan lorekkan rantau R yang memuaskan kekangan itu pada kertas graf yang disediakan.
Using a scale of 2 cm to 50 candidates on both axes, construct and shade the region R which satisfies the above constraints on a graph paper provided. [3 markah/marks]
- (iii) Diberi 150 calon mendaftar kursus Q . Nyatakan julat yang mungkin bagi jumlah yuran yang dikutip di pusat pendidikan itu jika yuran kursus P dan Q masing-masing ialah RM200 dan RM300.
Given 150 candidates enrolled for course Q . State the possible range of the total fees collected at the education centre if the fees for course P and Q are RM200 and RM300 respectively. [3 markah/marks]

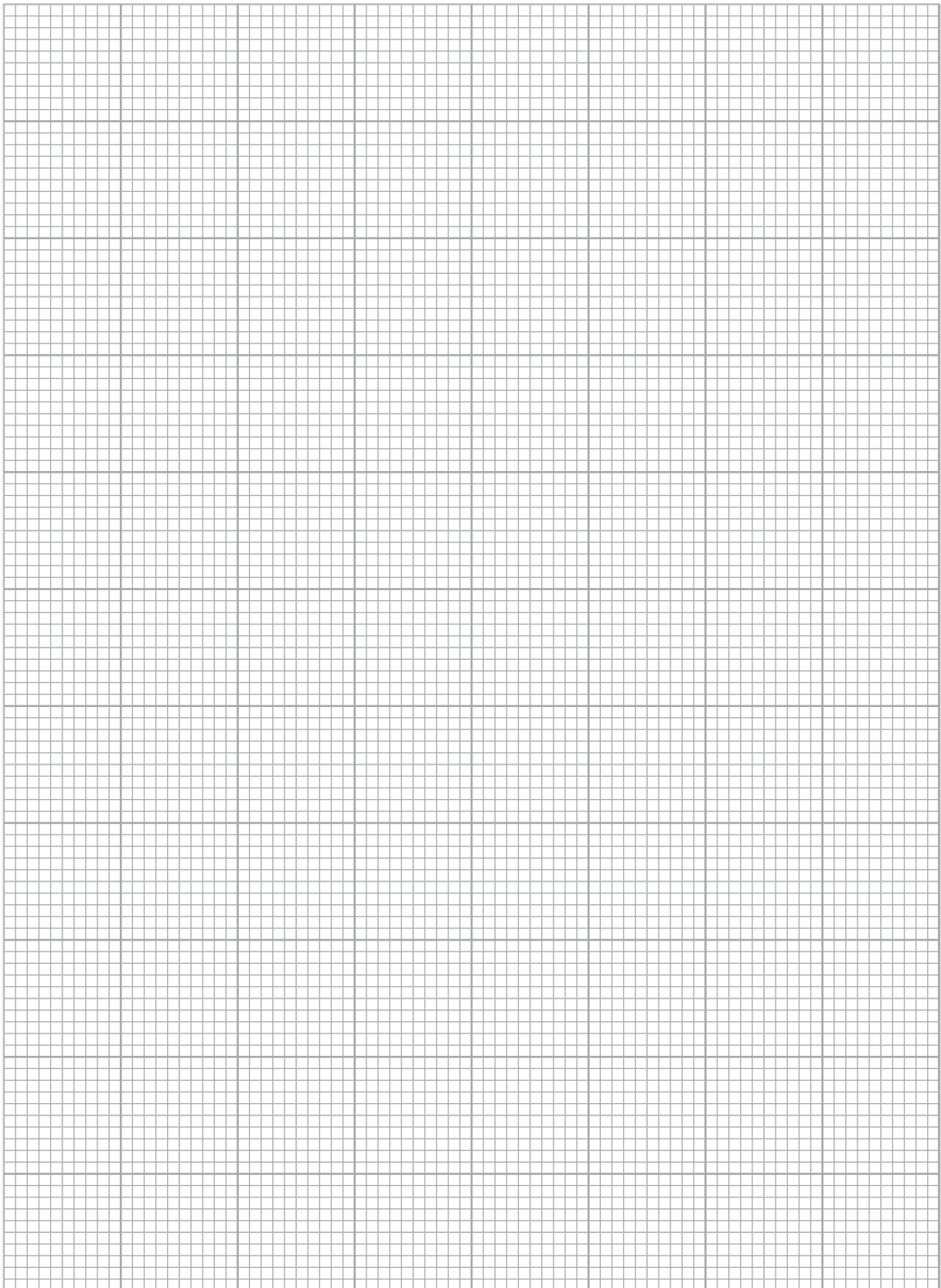
Jawapan/Answer:

(b) (i)

(ii) Rujuk graf
Refer to the graph

(iii)

Graf untuk Soalan 16
Graph for Question 16



- 17 (a) Dalam sekumpulan 40 orang murid, 25 orang bermain bola sepak, 12 orang bermain badminton dan 8 orang tidak bermain kedua-dua permainan itu. Jika seorang murid dipilih secara rawak daripada kumpulan itu, tentukan kebarangkalian bahawa murid itu bermain

In a group of 40 students, 25 of them play football, 12 of them play badminton and 8 of them play neither. If a student is chosen at random from the group, determine the probability that the student chosen plays

- (i) bola sepak dan badminton,
football and badminton,
- (ii) bola sepak sahaja.
football only.

[2 markah/marks]

- (b) Diberi set $A = \{4, 5, 8, 11\}$ dan set $B = \{3, 7, 12\}$. Satu nombor dipilih secara rawak daripada setiap set.

Given set $A = \{4, 5, 8, 11\}$ and set $B = \{3, 7, 12\}$. A number is selected at random from each set.

- (i) Senaraikan ruang sampel.
List the sample space.

[2 markah/marks]

- (ii) Hitung kebarangkalian bahawa
Calculate the probability that

- (a) kedua-dua nombor itu ganjil,
both numbers are odd,
- (b) satu nombor perdana dan satu nombor genap dipilih.
a prime number and an even number are selected.

[4 markah/marks]

Jawapan/Answer:

- (a) (i)

(ii)

- (b) (i)

(ii) (a)

(b)

- (c) Dalilah mempunyai sebuah beg yang mengandungi 6 biji manik biru dan 9 biji manik kuning. Dia mengeluarkan secara rawak dua biji manik daripada beg itu, satu per satu, tanpa penggantian.

Dalilah has a bag containing 6 blue beads and 9 yellow beads. She randomly draws two beads from the bag, one by one, without replacement.

Hitung kebarangkalian bahawa dia mengeluarkan

Calculate the probability that she draws

- (i) dua biji manik yang sama warna,
two yellow beads of the same colour;
- (ii) sebiji manik biru diikuti dengan sebiji manik kuning.
a blue bead followed by a yellow bead.

[4 markah/marks]

Jawapan/Answer:

(c) (i)

(ii)

- (d) Sebiji dadu tidak adil yang terdiri daripada enam muka, dilabelkan dengan nombor 1 hingga 6, dilemparkan. Kebarangkalian bagi mendapat nombor 4 is $\frac{1}{4}$. Kebarangkalian bagi mendapatkan nombor-nombor lain adalah sama. Dadu itu dilemparkan dua kali.

Hitung kebarangkalian bagi mendapatkan dua nombor berlainan.

An unfair dice which consists of six faces, labelled from 1 to 6, is thrown. The probability of getting number 4 is $\frac{1}{4}$. The probabilities of getting the other numbers are the same. The dice is thrown twice.

Calculate the probability of getting two different numbers.

[3 markah/marks]

Jawapan/Answer:

(d)

JAWAPAN

Ulang Kaji Menengah Rendah



Matematik Pengguna: Simpanan dan Pelaburan, Kredit dan Hutang Consumer Mathematics: Savings and Investments, Credit and Debt

$$1 \quad \frac{10}{100} \times \text{RM}3\,400 = \text{RM}340$$

Ansuran bulanan/Monthly installment

$$= \frac{(3\,400 - 340) + (3\,060)\left(\frac{8}{100}\right)(1.5)}{18}$$

$$= \text{RM}190.40$$

$$2 \quad \text{Peratus hibah/Percentage of hibah}$$

$$= \frac{1\,500}{60\,000} \times 100$$

$$= 2.5\%$$

$$\text{Dis 2025} = \text{RM}61\,500.00$$

$$\text{Dis 2026} = \frac{2.5}{100} \times 61\,500 = \text{RM}1\,537.50$$

$$\text{Dis 2027} = \frac{2.5}{100} \times (61\,500 + 1\,537.50) = \text{RM}1\,575.94$$

Jumlah wang dalam akaun simpanan pada Disember 2027:

Amount of money in savings account by December 2027:

$$= \text{RM}63\,037.50 + \text{RM}1\,575.94$$

$$= \text{RM}64\,613.44$$

$$3 \quad \text{Faedah bulan pertama/First month interest}$$

$$= \text{RM}50\,000 \times \frac{7}{100} \times \frac{1}{12}$$

$$= \text{RM}291.67$$

Baki selepas ansuran pertama/Balance after first instalment

$$= \text{RM}50\,000 + \text{RM}291.67 - \text{RM}480$$

$$= \text{RM}49\,811.67$$

Faedah bulan kedua/Second month interest

$$= \text{RM}49\,811.67 \times \frac{7}{100} \times \frac{1}{12}$$

$$= \text{RM}290.57$$

Baki selepas ansuran kedua/Balance after second instalment

$$= \text{RM}49\,811.67 + \text{RM}290.57 - \text{RM}480$$

$$= \text{RM}49\,622.24$$

Faedah bulan ketiga/Third month interest

$$= \text{RM}49\,622.24 \times \frac{7}{100} \times \frac{1}{12}$$

$$= \text{RM}289.46$$

Baki selepas ansuran ketiga/Balance after third instalment

$$= \text{RM}49\,622.24 + \text{RM}289.46 - \text{RM}480$$

$$= \text{RM}49\,431.70$$

$$4 \quad r = 3.5\% = 0.035$$

$$t = 9 \text{ tahun/years}$$

$$P = 90\% \times \text{RM}49\,715$$

$$= \text{RM}44\,743.50$$

$$I = Prt$$

$$= (\text{RM}44\,743.50)(0.035)(9)$$

$$= \text{RM}14\,094.20$$

$$I + P = \text{RM}14\,094.20 + \text{RM}44\,743.50$$

$$= \text{RM}58\,837.70$$

Ansuran bulanan/Monthly installment

$$= \frac{\text{RM}58\,837.70}{(9 \text{ tahun/years} \times 12 \text{ bulan/months})}$$

$$= \text{RM}544.80$$

Baki pinjaman 4 tahun/Balance of loan for 4 years

$$= \text{RM}544.80 \times 4 \text{ tahun/years} \times 12 \text{ bulan/months}$$

$$= \text{RM}26\,150.40$$



Garis Lurus Straight Lines

$$1 \quad A$$

$$2 \quad D$$

$$3 \quad 2y = -3x + 8$$

$$y = -\frac{3}{2}x + 4$$

$$m = -\frac{3}{2}$$

$$y = mx + c$$

$$6 = -\frac{3}{2}(4) + c$$

$$c = 12$$

$$\therefore y = -\frac{3}{2}x + 12$$

$$4 \quad (a) \quad m_{MN} = \frac{4-2}{3-0}$$

$$= \frac{2}{3}$$

$$y = mx + c$$

$$\therefore y = \frac{2}{3}x + 2$$

$$(b) \quad \frac{2}{3} = \frac{-2-r}{0-(-6)}$$

$$r = -6$$



Polygon Polygons

$$1 \quad \frac{360}{20} = 18$$

$$2 \quad (a) \quad x + 100^\circ + 65^\circ + 125^\circ + 90^\circ = 540^\circ$$

$$x = 160^\circ$$

$$(b) \quad x + 120^\circ + 53^\circ + 90^\circ = 360^\circ$$

$$x = 97^\circ$$

$$3 \quad x = \frac{(7-2)180}{7}$$

$$x = 128.57^\circ$$

$$y = \frac{360}{7}$$

$$= 51.43^\circ$$

$$x - y = 128.57 - 51.43$$

$$= 77.14^\circ$$

$$4 \quad \angle EHG = 180^\circ - 30^\circ - 100^\circ$$

$$= 50^\circ$$

$$\angle EHI = \frac{1}{2} \times 50^\circ$$

$$= 25^\circ$$

$$\angle HOI = 180^\circ - 88^\circ - 25^\circ$$

$$= 67^\circ$$

$$x = \angle HOI = 67^\circ$$

$$5 \quad \angle DEC = \angle DCE = \frac{180 - 100}{2} = 40^\circ$$

$$70^\circ + \angle CBA = 180^\circ$$

$$\angle CBA = 180^\circ - 70^\circ$$

$$\angle CBA = 110^\circ$$

$$P = 180^\circ - 110^\circ$$

$$= 70^\circ$$

$$Q = 180^\circ - 40^\circ - 90^\circ$$

$$= 50^\circ$$

$$P + Q = 70^\circ + 50^\circ$$

$$= 120^\circ$$



Sudut dan Tangen bagi Bulatan Angles and Tangents of Circles

$$1 \quad \angle JOL = 100^\circ$$

$$\angle LJO = 40^\circ$$

$$x = 90^\circ - 40^\circ = 50^\circ$$

$$\angle MJO = 15^\circ$$

$$\angle JOL = 360^\circ - 100^\circ = 260^\circ$$

$$\angle JML = 100^\circ \div 2 = 50^\circ$$

$$\angle MLO = 360^\circ - 15^\circ - 260^\circ - 50^\circ = 35^\circ$$

$$y = 90^\circ - 35^\circ = 55^\circ$$

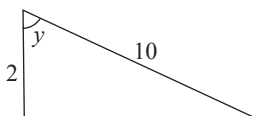
$$2 \quad \angle PRQ = 80^\circ \div 2 = 40^\circ$$

$$\angle PRA = 180^\circ - 40^\circ - 60^\circ = 80^\circ$$

$$\angle PQO = \frac{180^\circ - 80^\circ}{2} = 50^\circ$$

$$x = 80^\circ - 50^\circ = 30^\circ$$

3



$$\text{Kos } y^\circ = \frac{2}{10}$$

$$y^\circ = \cos^{-1} \left(\frac{2}{10} \right)$$

$$y^\circ = 78.46^\circ$$

$$x^\circ = 180^\circ - 78.46^\circ$$

$$= 101.54^\circ$$



Rumus Algebra Algebraic Formulae

$$1 \quad (a) \quad 5m + 3n = 7 + n$$

$$2n = 7 - 5m$$

$$n = \frac{7 - 5m}{2}$$

$$(b) \quad p - 4 = \frac{2p}{5q}$$

$$5pq - 20q = 2p$$

$$5pq - 2p = 20q$$

$$p(5q - 2) = 20q$$

$$p = \frac{20q}{5q - 2}$$

$$(c) \quad 2k^2 + 5n = 3p$$

$$2k^2 = 3p - 5n$$

$$k^2 = \frac{3p - 5n}{2}$$

$$k = \sqrt{\frac{3p - 5n}{2}}$$

$$(d) \quad 2p = \sqrt{\frac{m - n}{2}}$$

$$4p^2 = \frac{m - n}{2}$$

$$8p^2 = m - n$$

$$m = 8p^2 + n$$

$$2 \quad (a) \quad f = 5g + h$$

$$8 = 5g + 3$$

$$5g = 5$$

$$g = 1$$

$$(b) \quad p - q = \frac{p + 3}{k}$$

$$p - 4 = \frac{p + 3}{\left(\frac{1}{2}\right)}$$

$$p - 4 = 2(p + 3)$$

$$p - 4 = 2p + 6$$

$$p = -10$$

$$3 \quad (a) \quad j = \frac{L}{2\pi t}$$

$$(b) \quad 120 = 2 \left(\frac{22}{7} \right) (j) (12)$$

$$j = 1.591$$



Indeks Indices

$$1 \quad (a) \quad g^{13} h^{14}$$

$$(b) \quad 5xy^{11}$$

$$2 \quad 4^m \times 4^3 = 4\,096$$

$$4^m \times 4^3 = 4^6$$

$$4^{m+3} = 4^6$$

$$m + 3 = 6$$

$$m = 3$$

$$\begin{aligned} 3 \quad \frac{4^{12} + 7^n}{4^m + 7^4} &= 784 \\ \frac{4^{12} + 7^n}{4^m + 7^4} &= 4^2 \times 7^2 \\ 12 - m &= 2 \\ m &= 10 \\ n - 4 &= 2 \\ n &= 6 \\ \frac{n}{m} &= \frac{6}{10} = \frac{3}{5} \end{aligned}$$

$$\begin{aligned} 4 \quad 8p + 3p - 2 &= 30 - 5p \\ 16p &= 32 \\ p &= 2 \end{aligned}$$

$$\begin{aligned} 5 \quad 2^{(x-2)} \times (32) &= 2^{(y+6)} \\ 2^{(x-2)} \times 2^5 &= 2^{(y+6)} \\ 2^{(x-2+5)} &= 2^{(y+6)} \\ 2^{(x+3)} &= 2^{(y+6)} \\ x + 3 &= y + 6 \\ x &= y + 3 \dots \textcircled{1} \end{aligned}$$

Gantikan ① dalam ②,
Substitute ① into ②,
 $-2(y+3) + y = -7$
 $-2y - 6 + y = -7$
 $y = 1$
 $x = 1 + 3$
 $= 4$

Tingkatan 4



Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah Quadratic Functions and Equations in One Variable

Soalan Objektif

- 1 D 2 B 3 D 4 C 5 C
6 A 7 C 8 B

Soalan Subjektif

$$\begin{aligned} 1 \quad 2k &= \frac{12}{k} - 5 \\ 2k^2 &= 12 - 5k \\ 2k^2 + 5k - 12 &= 0 \\ (2k-3)(k+4) &= 0 \\ k &= \frac{3}{2}, k = 4 \end{aligned}$$

$$\begin{aligned} 2 \quad (a) \quad f(x) &= (-x-2)(x-6) \\ 0 &= -x^2 + 6x - 2x + 12 \\ 0 &= -x^2 + 4x + 12 \\ 0 &= (x-6)(x+2) \\ x &= 6, x = -2, \\ \therefore p &= 12, q = 6 \end{aligned}$$

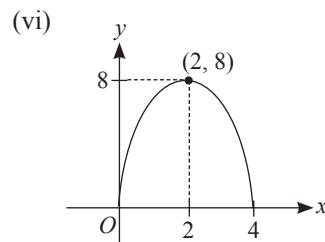
(b) Persamaan paksi simetri
The equation of the axis of symmetry
 $x = -\frac{b}{2a}$
 $x = -\frac{4}{2(-1)}$
 $x = 2$

$$\begin{aligned} (c) \quad \text{Ganti } x = 2 \text{ dalam } f(x) &= -(x+2)(x-6), \\ \text{Substitute } x = 2 \text{ in } f(x) &= -(x+2)(x-6), \\ f(2) &= -(2+2)(2-6) \\ &= 16 \end{aligned}$$

Titik maksimum/Maximum point = (2, 16)

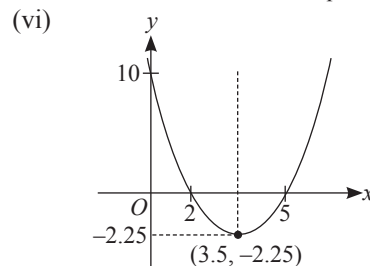
$$\begin{aligned} 3 \quad (a) \quad (i) \quad \cap \\ (ii) \quad 0 \\ (iii) \quad 0 &= -2x^2 + 8x \\ 0 &= -2x(x-4) \\ x &= 0, x = 4 \\ (iv) \quad x &= -\frac{8}{2(-2)} \\ x &= 2 \\ (v) \quad f(2) &= -2(2)^2 + 8(2) \\ &= 8 \end{aligned}$$

Titik maksimum/Maximum point = (2, 8)



$$\begin{aligned} (b) \quad (i) \quad \cup \\ (ii) \quad 10 \\ (iii) \quad 0 &= x^2 - 7x + 10 \\ 0 &= (x-2)(x-5) \\ x &= 2, x = 5 \\ (iv) \quad x &= -\frac{-7}{2(1)} \\ x &= 3.5 \\ (v) \quad f(3.5) &= (3.5)^2 - 7(3.5) + 10 \\ &= -2.25 \end{aligned}$$

Titik minimum/Minimum point = (3.5, -2.25)



$$\begin{aligned} 4 \quad x(3x+2) &= 60 - x \\ 3x^2 + 2x &= 60 - x \\ 3x^2 + 3x - 60 &= 0 \\ x^2 + x - 20 &= 0 \\ (x-4)(x+5) &= 0 \\ x &= 4, x = -5 \text{ (abaikan/ignored)} \\ \text{Harga bagi 1 kg rambutan/Price of 1 kg of rambutans} \\ &= 3(4) + 2 \\ &= \text{RM14} \end{aligned}$$

$$\begin{aligned} 5 \quad \frac{1}{2}(2x-1)(x+3) &= 7.5 \\ 2x^2 + 5x - 3 &= 15 \\ 2x^2 + 5x - 18 &= 0 \\ (x-2)(2x+9) &= 0 \\ x &= 2, x = -\frac{9}{2} \text{ (abaikan/ignored)} \end{aligned}$$

Panjang tapak/*Length of the base*

$$= 2(2) - 1$$

$$= 3 \text{ cm}$$

$$6 \quad (2x)(x-4)(3) = x^2 + 5$$

$$6x^2 - 24x - x^2 - 5 = 0$$

$$5x^2 - 24x - 5 = 0$$

$$(x-5)(5x+1) = 0$$

$$x = 5, x = -\frac{1}{5} \text{ (abaikan/ignored)}$$

Isi padu kuboid/*Volume of cuboid*

$$= 5^2 \times 5$$

$$= 30 \text{ cm}^3$$

$$7 \text{ (a)} \quad 0 = 2x^2 + 3x - 2$$

$$0 = (x+2)(2x-1)$$

$$x = -2, x = \frac{1}{2}$$

$$\therefore P = -2, Q = \frac{1}{2}$$

$$(b) \quad (0, -2)$$

$$(c) \quad \text{Persamaan paksi simetri}$$

Equation of the axis of symmetry

$$x = -\frac{b}{2a}$$

$$x = -\frac{3}{2(2)}$$

$$x = -\frac{3}{4}$$

$$f\left(-\frac{3}{4}\right) = 2\left(-\frac{3}{4}\right)^2 + 3\left(-\frac{3}{4}\right) - 2$$

$$= -\frac{25}{8}$$

$$\therefore \text{Titik minimum/Minimum point} = \left(-\frac{3}{4}, -\frac{25}{8}\right)$$



Asas Nombor Number Bases

Soalan Objektif

$$1 \text{ B} \quad 2 \text{ B} \quad 3 \text{ D} \quad 4 \text{ C} \quad 5 \text{ D}$$

$$6 \text{ C} \quad 7 \text{ B} \quad 8 \text{ A} \quad 9 \text{ A} \quad 10 \text{ C}$$

$$11 \text{ A} \quad 12 \text{ C}$$

Soalan Subjektif

$$1 \text{ P: } \text{RM}230_5 = 2 \times 5^2 + 3 \times 5^1 + 0 \times 5^0$$

$$= \text{RM}65_{10}$$

$$Q: \text{RM}214_6 = 2 \times 6^2 + 1 \times 6^1 + 4 \times 6^0$$

$$= \text{RM}82_{10}$$

Jumlah harga/*Total price*

$$= 65 + 82$$

$$= \text{RM}147_{10}$$

$$2 \text{ RM}21001_3 = 2(3^4) + 1(3^3) + 0(3^2) + 0(3^1) + 1(3^0)$$

$$= \text{RM}190$$

$$\frac{80}{100} \times \text{RM}190 = \text{RM}152_{10}$$

$$6 \overline{) 152} - 1$$

$$6 \overline{) 25} - 2$$

$$6 \overline{) 4} - 4$$

$$0$$

$$\therefore \text{RM}412_6$$

$$3 \text{ RM}22452_6$$

$$= 2(6^4) + 2(6^3) + 4(6^2) + 5(6^1) + 2(6^0)$$

$$= \text{RM}3200_{10}$$

$$\text{RM}25012_6$$

$$= 2(6^4) + 5(6^3) + 0(6^2) + 1(6^1) + 2(6^0)$$

$$= \text{RM}3680_{10}$$

$$\therefore \frac{480}{3200} \times 100 = 15\%$$

$$4 \quad 1100_2 < p \leq 121_3$$

$$1100_2 = 12_{10}$$

$$121_3 = 16_{10}$$

$$12_{10} < p \leq 16_{10}$$

$$p = 13, 14, 15, 16$$

$$5 \quad 7^4 + 2(7) + 4^0 = 10021_7$$

$$10021_7 = 2416_{10}$$

$$= 4560_8$$

$$6 \quad 1130_4 + P_4 = 3322_4$$

$$P_4 = 3322_4 - 1130_4$$

$$= 2132_4$$

$$7 \text{ (a)} \quad 148_{10} + 82_{10} = 230_{10}$$

$$5 \overline{) 230} - 0$$

$$5 \overline{) 46} - 1$$

$$5 \overline{) 9} - 4$$

$$5 \overline{) 1} - 1$$

$$0$$

$$\therefore 1410_5$$

$$(b) \quad 148_{10} - 19_{10} = 129_{10}$$

$$4 \overline{) 129} - 1$$

$$4 \overline{) 32} - 0$$

$$4 \overline{) 8} - 0$$

$$4 \overline{) 2} - 2$$

$$0$$

$$\therefore 2001_4$$

$$8 \text{ RM}404_7 = \text{RM}200_{10}$$

$$\frac{80}{100} \times \text{RM}200 = \text{RM}160$$

$$\text{RM}231_7 = \text{RM}120_{10}$$

$$\frac{85}{100} \times \text{RM}120 = \text{RM}102$$

$$\text{RM}300 - \text{RM}160 - \text{RM}102 = \text{RM}38$$

$$9 \quad 5 \text{ kg} = \text{RM}3130_4$$

$$= 3(4^3) + 1(4^2) + 3(4^1) + 0(4^0)$$

$$= \text{RM}220_{10}$$

$$1 \text{ kg} = \text{RM}44_{10}$$

$$7 \text{ kg} = \text{RM}308_{10}$$

$$\text{RM}330_{10} - \text{RM}308_{10} = \text{RM}22_{10}$$

$$3 \overline{) 22} - 1$$

$$3 \overline{) 7} - 1$$

$$3 \overline{) 2} - 2$$

$$0$$

$$\therefore 211_3$$

$$10 \quad n(\text{Jambu batu/Guava}) = \frac{1}{3} \times 150 = 50$$

$$n(\text{Oren/Orange}) = \frac{1}{5} \times 150 = 30$$

$$n(\text{Nanas/Pineapple}) = \frac{1}{10} \times 150 = 15$$

$$n(\text{Epal/Apples}) = 150 - 50 - 30 - 15 = 55$$

$$\begin{array}{r} 4 \overline{) 55} - 3 \\ 4 \overline{) 13} - 1 \\ 4 \overline{) 3} - 3 \\ \hline 0 \end{array}$$

$$\therefore 313_4$$

$$11 \quad \text{Affan} = 301_5 = 76_{10}$$

$$\text{Aira} = 48_{10}$$

$$\text{Ali} = 96_{10}$$

$$\begin{array}{r} 7 \overline{) 96} - 5 \\ 7 \overline{) 13} - 6 \\ 7 \overline{) 1} - 1 \\ \hline 0 \end{array}$$

$$\therefore 165_7$$



Penaakulan Logik Logical Reasoning

Soalan Objektif

- 1 C 2 B 3 B 4 B 5 D
6 A 7 A

Soalan Subjektif

- 1 (a) Bukan pernyataan
Not a statement
(b) Bukan pernyataan
Not a statement
(c) Pernyataan
Statement
- 2 (a) Palsu/False
(b) Palsu/False
(c) Benar/True
- 3 (a) Antejadian/Antecedent: $a = 5$
Akibat/Consequence: $a^2 = 25$
(b) Antejadian: 20% daripada 30 ialah 6
Antecedent: 20% of 30 is 6
Akibat/Consequence: $0.2 \times 30 = 6$
- 4 (a) Implikasi 1: Jika $\sqrt[3]{x} = 2$, maka $x = 8$.
Implications 1: If $\sqrt[3]{x} = 2$, then $x = 8$.
Implikasi 2: Jika $x = 8$, maka $\sqrt[3]{x} = 2$.
Implications 2: If $x = 8$, then $\sqrt[3]{x} = 2$.
(b) Implikasi 1: Jika $\angle RST < 90^\circ$, maka $\angle RST$ ialah sudut tirus.
Implications 1: If $\angle RST < 90^\circ$, then $\angle RST$ is an acute angle.
Implikasi 2: Jika $\angle RST$ ialah sudut tirus, maka $\angle RST < 90^\circ$.
Implications 2: If $\angle RST$ is an acute angle, then $\angle RST < 90^\circ$.
- 5 (a) **Implikasi:** Jika $2 + 2 = 2 \times 2$, maka $3 + 3 = 3 \times 3$. (Palsu)
Implication: If $2 + 2 = 2 \times 2$, then $3 + 3 = 3 \times 3$. (False)

Songsangan: Jika $2 + 2 \neq 2 \times 2$, maka $3 + 3 \neq 3 \times 3$. (Benar)

Inverse: If $2 + 2 \neq 2 \times 2$, then $3 + 3 \neq 3 \times 3$. (True)

Kontrapositif: Jika $3 + 3 \neq 3 \times 3$, maka $2 + 2 \neq 2 \times 2$. (Palsu)

Contrapositive: If $3 + 3 \neq 3 \times 3$, then $2 + 2 \neq 2 \times 2$. (False)

(b) **Implikasi:** Jika $x + 3 > 9$, maka $x > 5$. (Benar)

Implication If $x + 3 > 9$, then $x > 5$. (True)

Akas: Jika $x > 5$, maka $x + 3 > 9$. (Palsu)

Converse: If $x > 5$, then $x + 3 > 9$. (False)

Kontrapositif: Jika $x \leq 5$, maka $x + 3 \leq 9$. (Benar)

Contrapositive: If $x \leq 5$, then $x + 3 \leq 9$. (True)

6 (a) Sah dan tidak munasabah.

Valid and unsound.

Kesimpulan palsu kerana 65 bukan gandaan 10.

The conclusion is false because 65 is not the multiple of 10.

(b) Sah dan munasabah

Valid and sound.

7 (a) Hujah kuat tetapi tidak meyakinkan. Premis 3 adalah palsu.

Strong but not cogent argument. Premise 3 is false.

(b) Hujah lemah dan tidak meyakinkan. Kesimpulan mungkin palsu.

Weak and not cogent arguments. The conclusion may be false.

8 Luas bulatan $N = 49\pi \text{ cm}^2/154 \text{ cm}^2$

Area of circle $N = 49\pi \text{ cm}^2/154 \text{ cm}^2$

9 (a) Bukan pernyataan

Not a statement

(b) $m \leq 5$

(c) $3(n) + 2(n - 1)^2, n = 1, 2, 3, \dots$

10 (a) Akas: Jika $2x - 3 = 7$, maka $x = 5$.

Converse: If $2x - 3 = 7$, then $x = 5$.

Kontrapositif: Jika $2x - 3 \neq 7$, maka $x \neq 5$

Contrapositive: if $2x - 3 \neq 7$, then $x \neq 5$

(b) $7n^2 - 3, n = 1, 2, 3, \dots$

11 (a) Palsu/False

(b) Antejadian/Antecedent: $k = 11$

Akibat/Consequence: $k - 6 = 5$

(c) Premis 2: 19 ialah nombor perdana.

Premise 2: 19 is a prime number.

12 (a) Hujah kuat dan meyakinkan.

Strong and convincing argument.

(b) Kesimpulan: x ialah satu nombor genap.

Conclusion: x is an even number.

13 (a) Lemah dan tidak meyakinkan. Kesimpulan palsu

Weak and not cogent. The conclusion is false.

(b) $17 + x = 25$ jika dan hanya jika $x = 8$.

$17 + x = 25$ if and only if $x = 8$.

(c) Antejadian/Antecedent: $x < 6$

Akibat/Consequent: $x < 8$

(d) (i) Kesimpulan: 21 bukan gandaan 6.

Conclusion: 21 is not a multiple of 6.

(ii) Sah kerana menepat hujah Bentuk III. Tidak munasabah kerana Premis 2 palsu.

Valid because it does comply the argument of Form III. Unsound because Premise 2 is false.



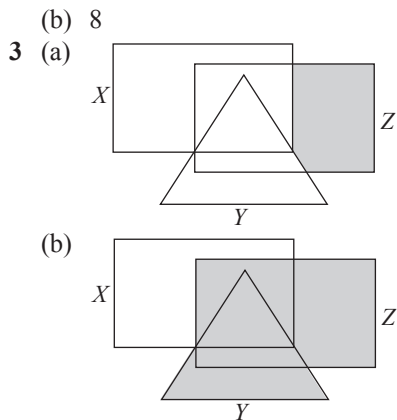
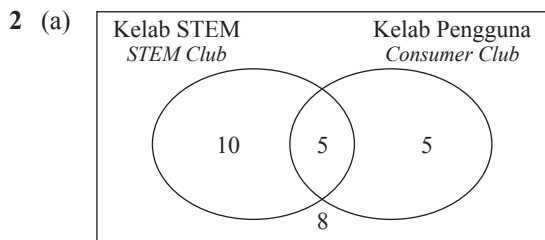
Operasi Set Operations on Sets

Soalan Objektif

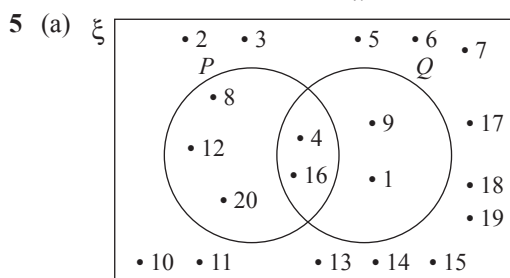
- 1 A 2 D 3 A 4 B 5 C
6 B 7 A 8 D 9 A 10 A
11 A 12 A 13 D 14 C

Soalan Subjektif

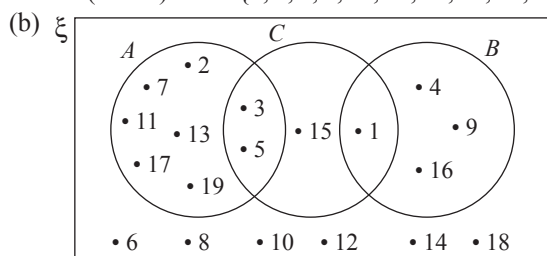
- 1 (a) $x - 2 = 10 + 12 - x$
 $2x = 24$
 $x = 12$
(b) $n(Q) = x - 2 + 10 + 12 - x$
 $= 12 - 2 + 10 + 12 - 12$
 $= 20$



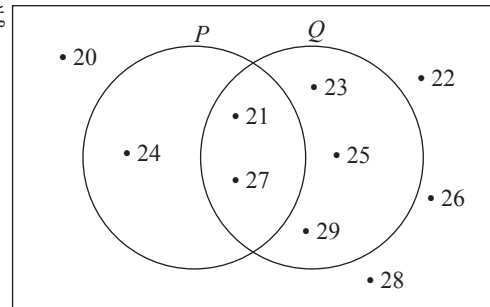
4 $4x + x - 1 + x + 6 + 15 + x - 4 = 100$
 $x = 12$



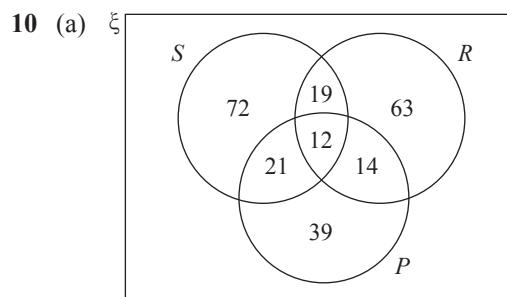
- (b) (i) $n(Q)' = 16$
(ii) $n(P \cap Q)' = 18$
6 (a) $A \cup B = \{1, 2, 3, 4, 5, 7, 9, 11, 13, 16, 17, 19\}$
 $C' = \{2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19\}$
 $\therefore (A \cup B) \cap C' = \{2, 4, 7, 9, 11, 13, 16, 17, 18, 19\}$



- 7 (a) $M \cap N = N$
(b) 30
8 (a) (i) $\{1, 5, 9, 12\}$
(ii) $\{1, 3, 5, 8, 9, 10, 12\}$
(b) 6
9 (a) ξ



- (b) (i) $3x + x + 10 = 70$
 $x = 15$
(ii) $3(15) + 15 + 15 + 10$
 $= 85$



- (b) $12 + 14 = 26$
(c) $19 + 12 + 14 + 21 = 66$



Rangkaian dalam Teori Graf Network in Graph Theory

Soalan Objektif

- 1 D 2 A 3 B 4 D 5 C
6 D 7 B 8 A 9 B 10 C

Soalan Subjektif

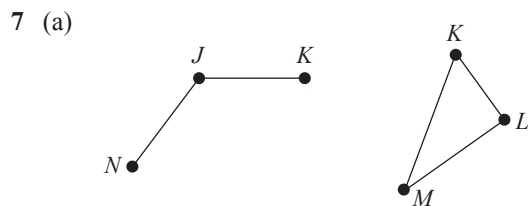
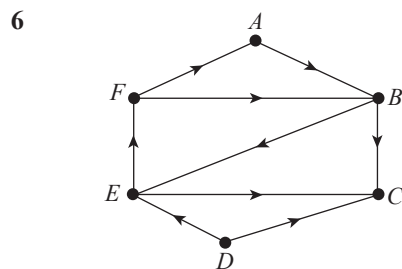
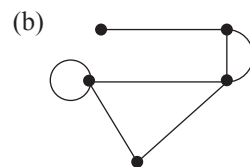
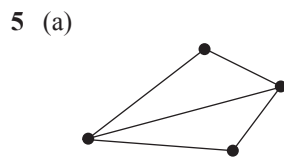
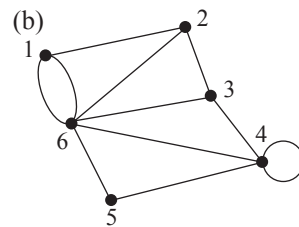
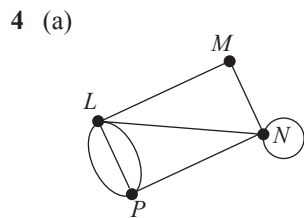
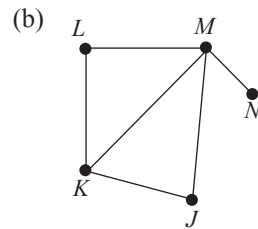
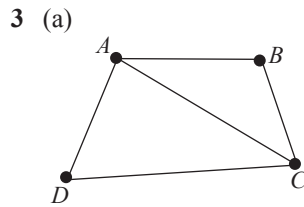
- 1 (a) $V = \{F, G, H, J\}$
 $n(V) = 4$
 $E = \{(F, G), (F, H), (G, H), (H, J)\}$
 $n(E) = 4$
(b) $V = \{P, Q, R, S, T\}$
 $n(V) = 5$
 $E = \{(P, Q), (P, T), (P, S), (Q, R), (Q, T), (R, S), (S, T)\}$
 $n(E) = 7$

2 (a)

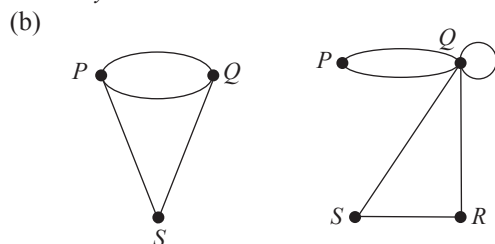
Bucu Vertex	Darjah bagi bucu Degree of vertex	Jumlah tepi Total number of edges
A	3	9
B	3	
C	3	
D	3	
E	2	
F	4	

(b)

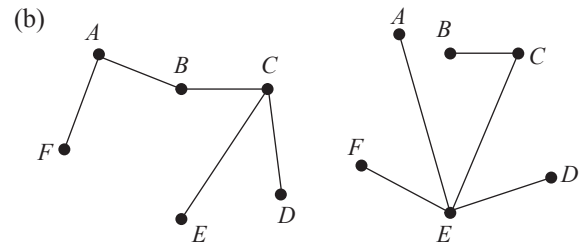
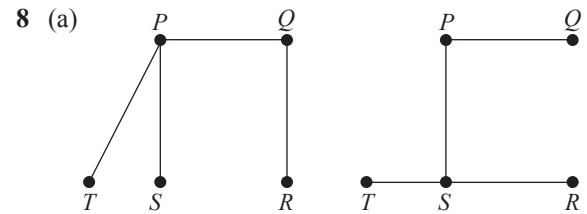
Bucu Vertex	Darjah bagi bucu Degree of vertex	Jumlah tepi Total number of edges
P	2	8
Q	2	
R	2	
S	2	
T	4	
U	4	



*Mana-mana jawapan yang munasabah.
Any reasonable answer.



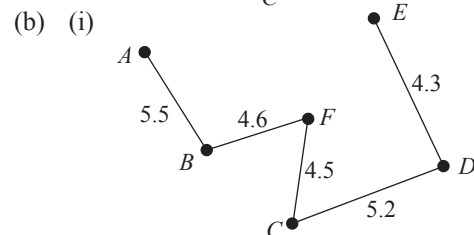
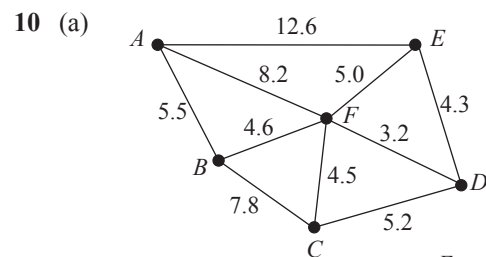
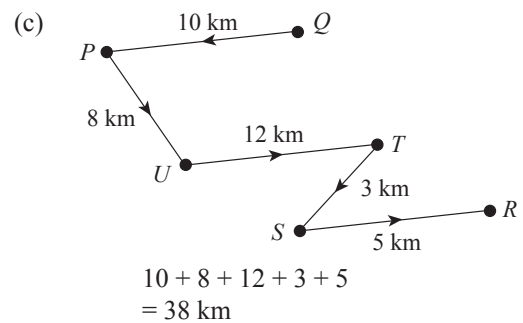
*Mana-mana jawapan yang munasabah.
Any reasonable answer.



9 (a) Graf terarah kerana mempunyai tanda arah.
Directed graph because it has sign of direction.

(b)

Tempat/Place	$d_{in}(V)$	$d_{out}(V)$
P	1	1
Q	1	1
R	1	1
S	1	2
T	1	1
U	2	1



(ii) 24.1 km

11 (a) $A \rightarrow C \rightarrow D \rightarrow B \rightarrow E \rightarrow A$
Masa terpendek/Shortest time = $11 + 4 + 6 + 8 + 7$
 $= 36 \text{ minit/minutes}$

(b) Laju/Speed = 1.15 m s^{-1}
 $= 1.15 \times 60$
 $= 69 \text{ m min}^{-1}$

Jarak perjalanan terpendek/Distance of shortest route
 $= 69 \times 36$
 $= 2484 \text{ m}$



Ketaksamaan Linear dalam Dua Pemboleh Ubah

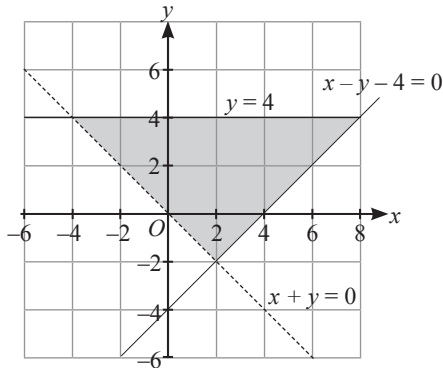
Linear Inequalities in Two Variable

Soalan Objektif

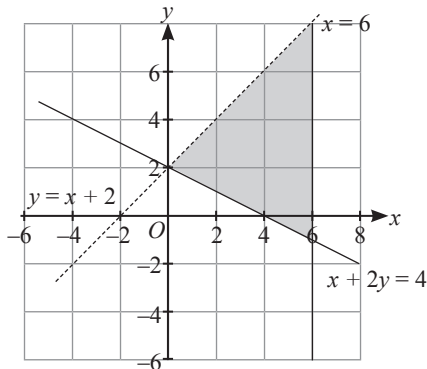
- 1 C 2 B 3 A 4 A 5 D
6 C 7 B 8 D

Soalan Subjektif

1 (a)



(b)



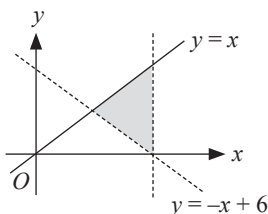
- 2 (a) $20x + 50y \geq 50$
(b) $2x + 2y > 1\,800$ atau/ or $x + y > 900$
(c) $20x + 50y \leq 10\,000$ atau/ or $2x + 5y \leq 1\,000$
(d) $10.50x + 7.50y \geq 1\,200$
 $105x + 75y \geq 12\,000$
 $7x + 5y \geq 800$

(e) $y \leq \frac{1}{2}x$

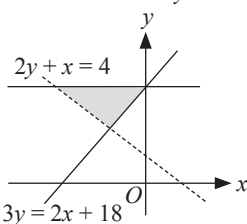
$x + y \geq 80$

(f) $y \leq 3x$
 $y - x < 75$
 $x + y > 100$

3



4

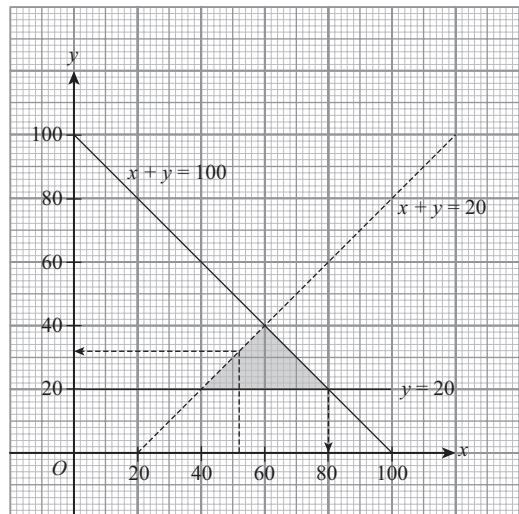


- 5 (a) $6y > 5x - 30$ (b) $y \leq 8$ (c) $x \geq 6$

6 (a) $2y < x + 6$ (b) $x \geq -5$ (c) $y > x + 5$

7 (a) $x + y \leq 100$
 $y \geq 20$
 $x - y > 20$

(b)

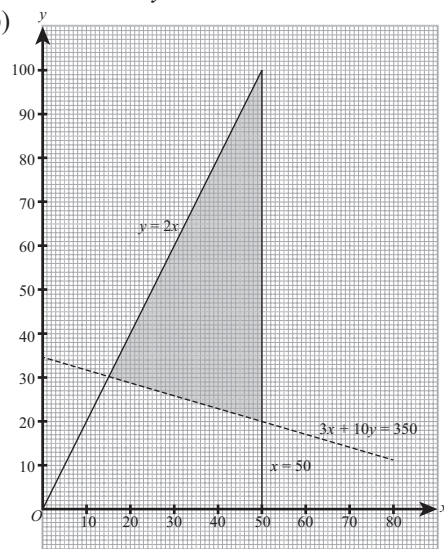


(c) (i) 80

(ii) 32

- 8 (a) I: $x \leq 50$
II: $y \leq 2x$
III: $3x + 10y > 350$

(b)



- (c) (i) $(50, 100) \rightarrow 3(50) + 10(100) = \text{RM}1\,150$
(ii) Tidak, titik $(15, 70)$ berada di luar rantau berlorek.
No, point $(15, 70)$ is outside the shaded region.

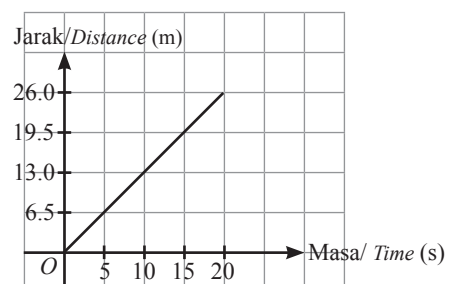


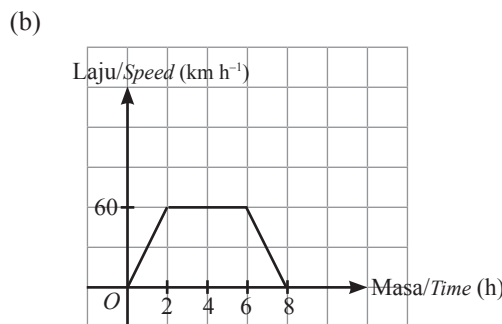
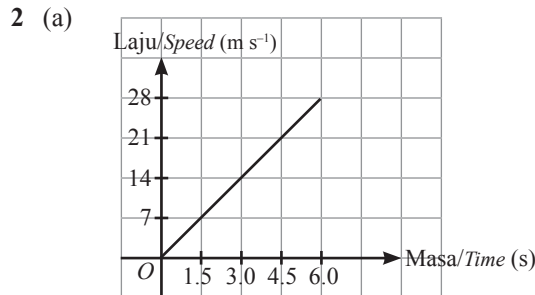
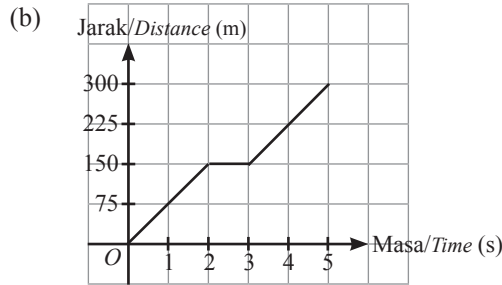
Graf Gerakan

Graphs of Motion

Soalan Subjektif

1 (a)

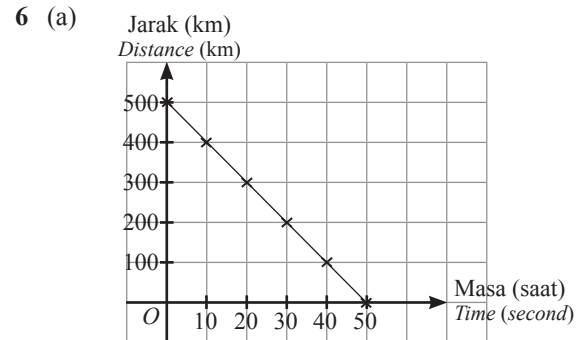




- 3 (a) $8 - 3 = 5$ saat/seconds
- (b) $\frac{v}{3} = 100$
 $v = 3 \times 100$
 $v = 300$
- (c) $\frac{0 - 300}{10 - 8} = -150 \text{ m s}^{-1} = 150 \text{ m s}^{-1}$

- 4 (a) Tempoh masa
 Duration
 $= (2.5 - 2) \times 60$
 $= 30 \text{ minit/minutes}$
- (b) Laju
 Speed
 $= \frac{40}{2}$
 $= 20 \text{ km j}^{-1}/\text{km h}^{-1}$
- (c) Jarak
 Distance
 $= 90 \text{ km} - 40 \text{ km}$
 $= 50 \text{ km}$

- 5 (a) 30 minit/minutes
- (b) $\frac{70}{2} = 35 \text{ km/j}$
- (c) (i) $\frac{20}{0.5} = 40 \text{ km/j}$
- (ii) $\frac{70 - 45}{2.0 - 1.5} = 50 \text{ km/j}$



- (b) (i) 500 km
 (ii) 50 saat/seconds
- (c) Kelajuan / Speed $= \frac{500 - 0}{40}$
 $= 12.5 \text{ m s}^{-1}$
- 7 (a) $\frac{18 - 0}{6 - 0} = 3 \text{ m s}^{-1}$
- (b) $\frac{4 - 18}{13 - 6} = -2 \text{ m s}^{-1} = 2 \text{ m s}^{-1}$
- (c) $(0 \rightarrow 18) + (18 \rightarrow 4) = 18 + 14 = 32 \text{ m}$
 $\frac{18 + 14}{13} = 2.46 \text{ m s}^{-1}$
- 8 (a) $\frac{v - 20}{2} = -5$
 $v = -10 + 20$
 $v = 10 \text{ m s}^{-1}$
- (b) $8 - 2 = 6 \text{ saat/seconds}$
- (c) $\frac{15 - 10}{10 - 8} = 2.5 \text{ m s}^{-2}$
- 9 (a) Tempoh masa/Duration
 $= 6.0 - 5.0$
 $= 1 \text{ jam/hour}$
 $= 60 \text{ minit/minutes}$
- (b) Kadar perubahan laju/Rate of change of speed
 $= \frac{140 - 90}{5}$
 $= 10 \text{ km j}^{-2}/\text{km h}^{-2}$
- (c) $\left(\frac{1}{2} \times 5.0 \times (140 + 90) + (140 \times 1.0)\right)$
 $+ \left(\frac{1}{2} \times (t - 6.0) \times 140\right) = 785$
 $575 + 140 + 70(t - 6.0) = 785$
 $t - 6 = 1$
 $t = 7 \text{ jam/hours}$
- 10 (a) $\frac{10 - 15}{10 - 0}$
 $= \frac{1}{2} \text{ m s}^{-2}$
- (b) $\left[\frac{1}{2} (15 + 10)10\right] + (10)(10) + \left[\frac{1}{2} \times (t - 20) \times 10\right] = 265$
 $125 + 100 + 5(t - 20) = 265$
 $5(t - 20) = 140$
 $(t - 20) = 8$
 $t = 8 + 20$
 $t = 28$

11 (a) $11 - 8 = 3 \text{ min}$

(b)

$$d_{\text{Bas}} = d_{\text{Van}}$$

$$\left(\frac{1}{2} \times 8 \times 12\right) + (3 \times 12) + \frac{1}{2}(12 + 24)(t - 11) = \frac{1}{2} \times t \times 24$$

$$12t = 84 + 18(t - 11)$$

$$6t = 114$$

$$t = 19 \text{ min}$$



Sukatan Serakan Data Tak Terkumpul Measures of Dispersion for Grouped Data

Soalan Objektif

- 1 B 2 A 3 D 4 D 5 C
6 C 7 A 8 A 9 C

Soalan Subjektif

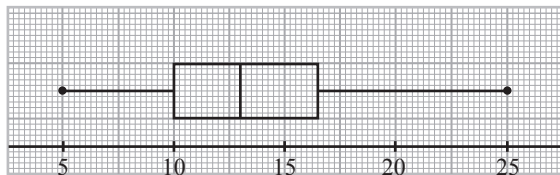
1 (a)

Batang Stem	Daun Leaf
0	5 7 8 9
1	0 0 1 2 2 3 3 4 5 5 6 7 8
2	0 2 5

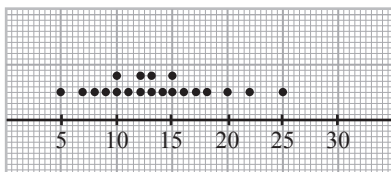
Kekunci: 2 | 0 bermaksud 20

Key: 2 | 0 means 20

(b)



(c)



2 Mod/Mode = 70

Median/Median = 65

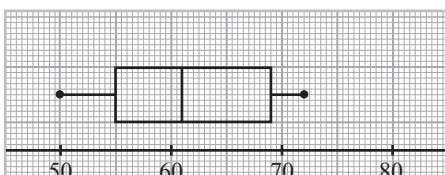
Min/Mean

$$= \frac{3(80) + 7(75) + 13(70) + 12(65) + 9(60) + 6(55)}{50}$$

$$= \frac{3325}{50}$$

$$= 66.5$$

3 (a)



(b) Simetri/Symmetry

- 4 (a) Oleh sebab mod ialah 92, maka nilai 92 muncul dua kali. Maka, $x = 92$.
Since the mode is 92, so the value of 92 appears twice.
Hence, $x = 92$.

$$\frac{79 + 92 + 92 + 99 + 111 + 118 + y}{7} = 104$$

$$y = 137$$

$$(b) \sigma^2 = \frac{79^2 + 92^2 + 92^2 + 99^2 + 111^2 + 118^2 + 137^2}{7} - 104^2$$

$$= \frac{2272}{7}$$

$$\sigma = \sqrt{\frac{2272}{7}}$$

$$= 18.02$$

5 (a) $\bar{x} = \frac{330}{15}$

$$= 22$$

(b) $\sigma = \sqrt{\frac{8924}{15} - 22^2}$

$$= \sqrt{110.93}$$

$$= 10.53$$

- 6 (a) Sisihan piawai
Standard deviation

(b) $\text{Min}_{\text{Farid}} = \frac{9.8 + 10.2 + 9.9 + 10.1 + 10.0}{5} = 10.0$

$$\text{Min}_{\text{Armin}} = \frac{8.7 + 11.5 + 9.2 + 10.8 + 11.0}{5} = 10.24$$

Sisihan piawai_{Farid}/Standard deviation_{Farid}

$$= \sqrt{\frac{9.8^2 + 10.2^2 + 9.9^2 + 10.1^2 + 10.0^2}{5} - 10.0^2}$$

$$= 0.1414$$

Sisihan piawai_{Armin}/Standard deviation_{Armin}

$$= \sqrt{\frac{8.7^2 + 11.5^2 + 9.2^2 + 10.8^2 + 11.0^2}{5} - 10.24^2}$$

$$= 1.0892$$

Atlet pilihan ialah Farid kerana ujian jaraknya lebih konsisten.

The chosen athlete is Farid because his distance tests are more consistent.



Kebarangkalian Peristiwa Bergabung Probability of Combined Events

Soalan Objektif

- 1 C 2 D 3 B 4 C 5 B
6 A 7 C 8 B

Soalan Subjektif

1 (a)

Kad pertama First card	Kad kedua Second card				
	B	I	J	A	K
B		(B, I)	(B, J)	(B, A)	(B, K)
I	(I, B)		(I, J)	(I, A)	(I, K)
J	(J, B)	(J, I)		(J, A)	(J, K)
A	(A, B)	(A, I)	(A, J)		(A, K)
K	(K, B)	(K, I)	(K, J)	(K, A)	

(b) $\frac{6}{20}$

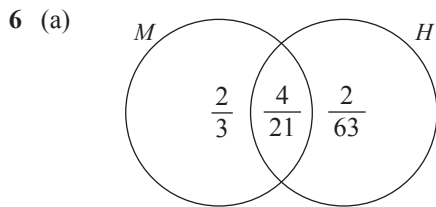
2 $\left(\frac{1}{9} \times \frac{0}{8}\right) + \left(\frac{2}{9} \times \frac{1}{8}\right) + \left(\frac{6}{9} \times \frac{5}{8}\right)$
 $= \frac{4}{9}$

3 (a) $\frac{68}{120} \times \frac{67}{119}$
 $= \frac{67}{210}$

(b) $\frac{75}{127} \times \frac{74}{126}$
 $= \frac{925}{2667}$

4 $\left(\frac{4}{12} \times \frac{5}{11}\right) + \left(\frac{4}{12} \times \frac{3}{11}\right) + \left(\frac{5}{12} \times \frac{4}{11}\right) + \left(\frac{5}{12} \times \frac{3}{11}\right)$
 $+ \left(\frac{3}{12} \times \frac{4}{12}\right) + \left(\frac{3}{12} \times \frac{5}{12}\right)$
 $= \frac{367}{528}$

5 $\left(\frac{7}{12} \times \frac{6}{11}\right) + \left(\frac{5}{12} \times \frac{4}{11}\right)$
 $= \frac{31}{66}$



(b) $1 - \left(\frac{2}{3} + \frac{4}{21} + \frac{2}{63}\right)$
 $= \frac{1}{9}$

7 Kebarangkalian pasukan lelaki menang
The probability of boys' team wins

$$= \left(\frac{7}{15} \times \frac{3}{5}\right) + \left(\frac{2}{5} \times \frac{8}{15}\right) + \left(\frac{7}{15} \times \frac{2}{5}\right)$$

$$= \frac{17}{25}$$

Kebarangkalian pasukan perempuan menang
The probability of girls' team wins

$$= \left(\frac{4}{7} \times \frac{5}{8}\right) + \left(\frac{3}{8} \times \frac{3}{7}\right) + \left(\frac{4}{7} \times \frac{3}{8}\right)$$

$$= \frac{41}{56}$$

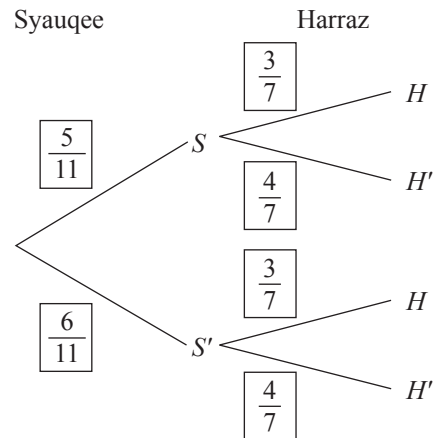
Kedua-dua pasukan lelaki dan pasukan perempuan akan mendapat peluang ke peringkat seterusnya.
Both boy team and girl team will get the chance to the next level.

8 (a) $\left(\frac{3}{4} \times \frac{3}{5}\right) + \left(\frac{1}{4} \times \frac{2}{5}\right)$
 $= \frac{11}{20}$

(b) $\frac{1}{4} \times \frac{3}{5}$
 $= \frac{3}{20}$

9 $\left(\frac{3}{15} \times \frac{2}{14}\right) + \left(\frac{7}{15} \times \frac{6}{14}\right) + \left(\frac{5}{15} \times \frac{4}{14}\right)$
 $= \frac{34}{105}$

10 Syauqee



$$\left(\frac{5}{11} \times \frac{4}{7}\right) + \left(\frac{6}{11} \times \frac{3}{7}\right)$$

$$= \frac{38}{77}$$

11 (a) $\{(A, 2), (A, 7), (A, 8), (B, 2), (B, 7), (B, 8), (D, 2), (D, 7), (D, 8), (E, 2), (E, 7), (E, 8)\}$

(b) (i) $\{(A, 2), (A, 7), ((E, 2), (E, 7))\}$

$$\frac{4}{12}$$

(ii) $\{(A, 2), (A, 7), (A, 8), (B, 2), (B, 7), (D, 2), (D, 7), (E, 2), (E, 7), (E, 8)\}$

$$\frac{10}{12}$$

12 (a) $0.85 \times 0.64 = 0.544$

(b) $(0.85 \times 0.36) + (0.64 \times 0.15) = 0.402$

13 (a) $\left(\frac{x}{x+6} \times \frac{7}{12}\right) + \left(\frac{6}{x+6} \times \frac{5}{12}\right) = \frac{31}{60}$
 $48x = 432$
 $x = 9$

(b) Kebarangkalian sekurang-kurangnya seorang atlet perempuan dipilih

The probability that at least one female athlete is selected

$$= 1 - \left(\frac{9}{15} \times \frac{7}{12}\right)$$

$$= \frac{13}{20}$$



Matematik Pengguna: Pengurusan Kewangan
Consumer Mathematics: Financial Management

Soalan Objektif

- 1 B 2 B 3 B 4 A 5 C
 6 C 7 D 8 C

Soalan Subjektif

- $RM5\,000 + RM950 - RM2\,000 - RM1\,050 = RM2\,900$
 $\therefore$ Aliran tunai positif/*Positive cash flow*
- $RM1\,950 - RM550 - RM1\,000 = RM400$
 $\therefore$ Aliran tunai positif/*Positive cash flow*
 - Gaji tahun 2025/*Salary in 2025*
 $= \left(\frac{110}{100} \times RM1\,950\right) = RM2\,145$
 Perbelanjaan/*Expenditure*
 $= \left(\frac{130}{100} \times RM1\,550\right) = RM2\,015$
 $RM2\,145 - RM2\,015 = RM130$
 $\therefore$ Aliran tunai positif/*Positive cash flow*
- $RM8\,000 + RM1\,100 - \left(\frac{8}{100} \times RM8\,000\right) - RM4\,230 - RM3\,500 = RM730$
 $\therefore$ Aliran tunai positif/*Positive cash flow*
- Pendapatan bulanan/*Monthly income*
 $= \frac{1}{3} \times 14\,100 = RM4\,700$
 Pendapatan kelas tuisyen
Income earned from tuition classes
 $= RM2\,700 + RM4\,500 - RM4\,700 = RM2\,500$
- Pendapatan bulanan/*Monthly income* = RM4 200
 Perbelanjaan bulanan/*Monthly expenditure* = RM2 950
 Lebihan pendapatan bulanan/*Monthly surplus* = 4 200 – 2 950 = RM1 250
 Tempoh simpanan/*Saving period* = 15 bulan/*months*
 Jumlah simpanan maksimum/*Maximum savings* = 1 250 $\times$ 15 = RM18 750
 - Harga motosikal / *Price of motorcycle* = RM18 000
 Oleh itu, Farah mampu mencapai matlamat kewangannya kerana jumlah simpanan (RM18 750) melebihi harga motosikal.
Therefore, Farah is able to achieve her financial goal as the total savings (RM18 750) exceed the price of the motorcycle.
 - Mana-mana satu langkah munasabah:
Any reasonable action:
 - Mengurangkan perbelanjaan yang tidak perlu
Reduce unnecessary expenses
 - Menambah pendapatan melalui kerja sampingan
Increase income through part-time work

- Memanjangkan tempoh simpanan
Extend the saving period

6 (a) $R = RM10\,800 - RM500 = RM10\,300$

$$T = RM1\,000 + RM800 + RM500 + RM300 + RM800 + RM600 = RM4\,000$$

$$V = RM10\,300 - RM4\,211 - RM4\,000 = RM2\,089$$

- (b) Cekap/*Efficiently*

Aliran tunai positif/*Cash flow positive*

(c) (i) Simpanan bulanan/*Monthly savings*
 $= \frac{RM60\,000}{5 \times 12} = RM1\,000$

(ii) Peratus simpanan /*Savings percent*
 $= \frac{RM1\,000}{RM10\,300} \times 100\% = 9.7\%$

- (iii) Ya. Jumlah yang perlu disimpan setiap bulan kurang daripada 10%.
Yes. Total monthly savings less than 10%.

Peperiksaan Akhir Sesi Akademik Tingkatan 4

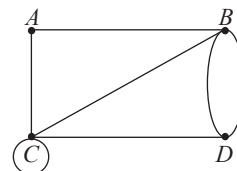
Kertas 1

- | | | | | |
|------|------|------|------|------|
| 1 C | 2 A | 3 C | 4 D | 5 A |
| 6 C | 7 A | 8 C | 9 B | 10 B |
| 11 D | 12 C | 13 C | 14 A | 15 A |
| 16 B | 17 A | 18 D | 19 B | 20 C |
| 21 D | 22 B | 23 D | 24 C | 25 B |
| 26 C | 27 A | 28 B | 29 A | 30 D |
| 31 D | 32 B | 33 C | 34 B | 35 C |
| 36 D | 37 C | 38 A | 39 D | 40 B |

Kertas 2

Bahagian A

1



- Graf mempunyai gelung.
The graph has loop.

- Graf mempunyai berbilang tepi.
The graph has multiple edges.

2 $(2x + 5)(40)(2)(2x + 5) = 3\,920$
 $4x^2 + 20x - 24 = 0$
 $x^2 + 5x - 6 = 0$
 $(x + 6)(x - 1) = 0$
 $x = -6, 1$

Panjang/Lebar = $2[2(1) + 5]$
 $= 14\text{ cm}$

3 $x + y = 11 \dots ①$

$3x - y = 5 \dots ②$

Daripada/From ①

$x = 11 - y \dots ③$

③ $\rightarrow$ ②

$3(11 - y) - y = 5$

$33 - 3y - y = 5$

$4y = 28$

$y = 7$

Ganti $y = 7$ dalam ③

Substitute $y = 7$ in ③

$x = 11 - 7$

$= 4$

1 kg tepung/flour = RM4

1 kg gula/sugar = RM7

4 (a) $[10 - (-1)] \times 2$

$= 22 \text{ km}$

(b) $\frac{-1 - (-4)}{8 - (-1)} = \frac{1}{3}$

$10 = \frac{1}{3}(8) + c$

$30 = 8 + 3c$

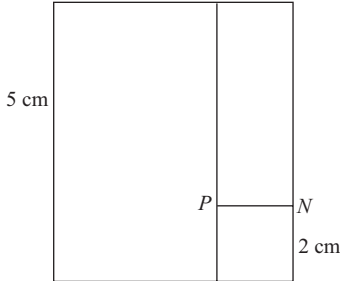
$30 - 8 = 3c$

$22 = 3c$

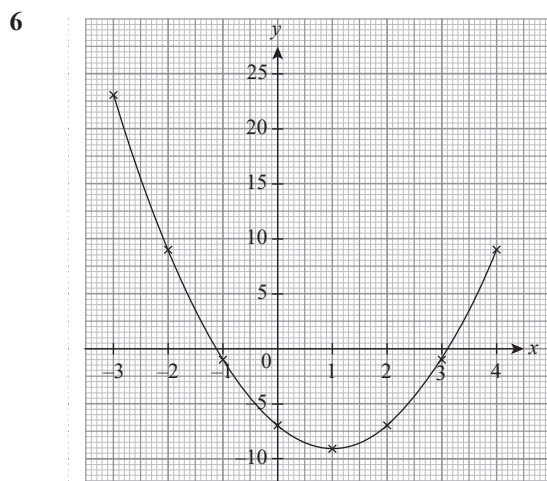
$c = \frac{22}{3}$

$y = \frac{1}{3}x + \frac{22}{3}$ atau/or $3y = x + 22$

5 K/F J/E 2 cm D



H/A 5 cm I/L/B M/C



7 (a) $\{(P, S), (P, K), (P, O), (P, R), (A, S), (A, K), (A, O), (A, R), (S, S), (S, K), (S, O), (S, R), (T, S), (T, K), (T, O), (T, R), (I, S), (I, K), (I, O), (I, R)\}$

(b) $\{(T, S), (T, K), (T, O), (T, R), (P, S), (P, K), (P, R), (A, S), (A, K), (A, R), (S, S), (S, K), (S, R), (I, S), (I, K), (I, R)\}$

$= \frac{16}{20} = \frac{4}{5}$

8 $\left(\frac{22}{7} \times 3^2 \times h\right) - \left(\frac{2}{3} \times \frac{22}{7} \times 3^3\right) = 282 \frac{6}{7}$

$\frac{198}{7}h - \frac{396}{7} = 282 \frac{6}{7}$

$\frac{198}{7}h = 339 \frac{3}{7}$

$h = 12 \text{ cm}$

9 $2(3x + 7) + 2(x + 6) = 122$

$8x + 26 = 122$

$x = 12$

Luas kawasan tidak berllorek/Area of unshaded region

$= \frac{2}{3} \times 43 \times 18$

$= 516 \text{ cm}^3$

10 Jumlah pinjaman/Total loan

$= 81\,000 + \frac{2.8}{100} \times 81\,000 \times 9$

$= \text{RM}101\,412$

Ansuran bulanan/Monthly instalment

$= \frac{101\,412}{9 \times 12}$

$= \text{RM}939$

Bahagian B

11 (a) Akas: Jika $\sqrt[3]{x} = 2$, maka $x = 8$

Converse: If $\sqrt[3]{x} = 2$, then $x = 8$

Songsangan: Jika $x \neq 8$, maka $\sqrt[3]{x} \neq 2$

Inverse: If $x \neq 8$, then $\sqrt[3]{x} \neq 2$

Kontrapositif: Jika $\sqrt[3]{x} \neq 2$, maka $x \neq 8$

Contrapositive: If $\sqrt[3]{x} \neq 2$, then $x \neq 8$

(b) (i) $2(1) - 1 = 1$

$2(2) - 1 = 3$

$2(3) - 1 = 5$

$2(4) - 1 = 7$

Kesimpulan induktif ialah $2n - 1$.

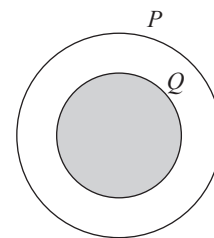
Inductive conclusion is $2n - 1$.

(ii) $T_{20} = 2(20) - 1 = 39$

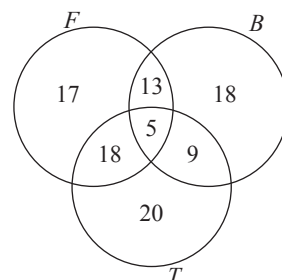
(iii) $59 = 2n - 1$

$n = 30$

12 (a)



(b) (i)



(ii) (a) 18

(b) $5 + 13 + 9 + 18 = 45$

(c) 13

13 (a) $R = \text{RM}10\,800 - \text{RM}500$

$= \text{RM}10\,300$

$T = \text{RM}1\,000 + \text{RM}800 + \text{RM}500 + \text{RM}300$
 $+ \text{RM}800 + \text{RM}600$

$= \text{RM}4\,000$

$V = \text{RM}10\,300 - \text{RM}4\,211 - \text{RM}4\,000$

$= \text{RM}2\,089$

(b) Cekap/*Efficiently*Aliran tunai positif/*Positive cash flow*(c) Simpanan bulanan/*Monthly savings*

$= \frac{\text{RM}60\,000}{5 \times 12} = \text{RM}1\,000$

Peratus simpanan/*Savings percent*

$= \frac{\text{RM}1\,000}{\text{RM}10\,300} \times 100 = 9.7\%$

Ya. Jumlah yang perlu disimpan setiap bulan kurang daripada 10%.

Yes. Total monthly savings less than 10%.

14 (a) Koordinat (22, 0) dan (18, 25):

Coordinates of (22, 0) and (18, 25):

$= \frac{25 - 0}{18 - 22}$

$= -\frac{25}{4} \text{ m s}^{-2}$

atau/*or*

$= -6.25 \text{ m s}^{-1}$

(b) Jumlah Jarak/*Total distance*

$= \left(\frac{1}{2} \times 4 \times 15\right) + (10 - 4) \times 15 + \frac{1}{2} (15 + 25)(14 - 10)$

$+ (18 - 14) \times 25 + \left(\frac{1}{2} \times 4 \times 25\right)$ atau setara
or equivalent

$= 30 + 90 + 80 + 100 + 50$

$= 350$

(c) 0 s – 4 s: Pecutan/*Acceleration*Laju bertambah daripada 0 m s⁻¹ ke 15 m s⁻¹.*The speed increases from 0 m s⁻¹ to 15 m s⁻¹.*4 s – 10 s: Laju seragam/*Uniform speed*Laju kekal pada 15 m s⁻¹.*The speed remains at 15 m s⁻¹.*

15 (a) (i) 20

(ii) 86

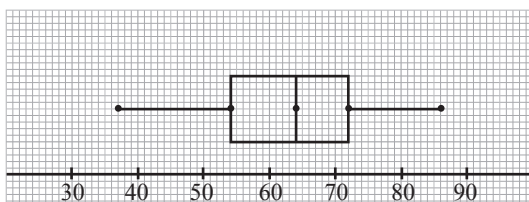
(iii) 64

(b) 50% adalah merujuk kepada median.

Maka, $k = 64$.*50% is referring to the median. So, $k = 64$.*

(c) $x = 7$

(d)

**Bahagian C**

16 (a) (i) $y \leq 2x, y \geq x - 6$

(ii) $m = \frac{8 - 4}{4 - 10} = -\frac{2}{3}$

$y = mx + c$

$8 = -\frac{2}{3}(4) + c$

$c = 8 + \frac{8}{3} = \frac{32}{3}$

$y = mx + c$

$y = -\frac{2}{3}x + \frac{32}{3}$

$3y = -2x + 32$

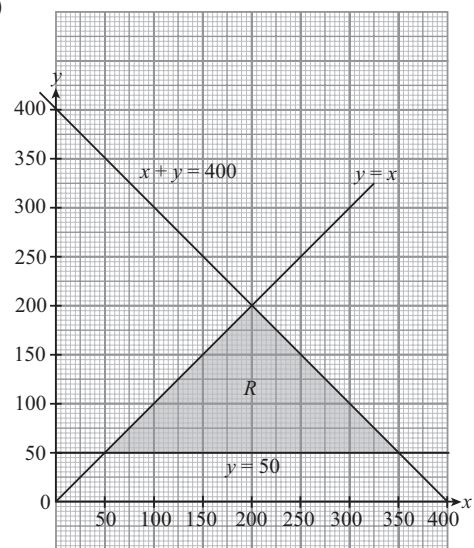
$\therefore 3y \leq -2x + 32$

(b) (i) $x + y \leq 400$

$x \geq y, y \leq x$

$y \geq 50$

(ii)

(iii) Apabila/*When*

$y = 150, 150 \leq x \leq 250$

Yuran minimum/*Minimum fees*

$= \text{RM}200(150) + \text{RM}300(150)$

$= \text{RM}75\,000$

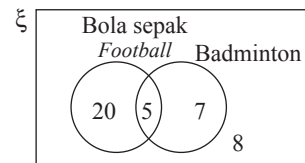
Yuran maksimum/*Maximum fees*

$= \text{RM}200(150) + \text{RM}300(250)$

$= \text{RM}105\,000$

$\text{RM}75\,000 \leq \text{Yuran}/\text{Fees} \leq \text{RM}105\,000$

17 (a)



(i) $P = \frac{5}{40} = \frac{1}{8}$

(ii) $P = \frac{20}{40} = \frac{1}{2}$

(b) (i) $S = \{(4, 3), (4, 7), (4, 12), (5, 3), (5, 7), (5, 12), (8, 3), (8, 7), (8, 12), (11, 3), (11, 7), (11, 12)\}$

$$(ii) (a) \quad P = \frac{4}{12} = \frac{1}{3}$$

$$(b) \quad P = \frac{6}{12} = \frac{1}{2}$$

$$(c) \quad (i) \quad P = \left(\frac{9}{15} \times \frac{8}{14}\right) + \left(\frac{6}{15} \times \frac{5}{14}\right) \\ = \frac{17}{35}$$

$$(ii) \quad P = \frac{6}{15} \times \frac{9}{14} = \frac{9}{35}$$

$$(d) \quad 5x + P(4) = 1$$

$$5x + \frac{1}{4} = 1$$

$$x = \frac{3}{20}$$

P (Nombor sama)

P (Same number)

$$= P[(1, 1) + (2, 2) + (3, 3) + (5, 5) + (6, 6)] + P(4, 4)$$

$$= 5\left(\frac{3}{20} \times \frac{3}{20}\right) + \left(\frac{1}{4} \times \frac{1}{4}\right)$$

$$= \frac{7}{40}$$

P (Nombor berlainan)

P (Different number)

$$= 1 - \frac{7}{40}$$

$$= \frac{33}{40}$$

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.



YAB DATO' SERI AMIRUDIN BIN SHARI
DATO' MENTERI BESAR SELANGOR

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.

 ePTRS.my

Imbas kod QR
untuk ketahui lebih
lanjut tentang MBI



Imbas kod QR
untuk mendapatkan
jawapan



Koleksi
Video PdP



DIKUASAI OLEH:

