



PROGRAM TUISYEN

2025

MATEMATIK

DWIBAHASA

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Tingkatan
4

DIKUASAI OLEH:



KITASELANGOR



PROGRAM TUISYEN RAKYAT SELANGOR 2025

TINGKATAN 4

MATEMATIK

DWIBAHASA

CIRI-CIRI EKSKLUSIF MODUL

Program Tuisyen Rakyat Selangor

Matematik Tingkatan 4

- Modul dibina berdasarkan silibus Matematik KSSM dan disusun mengikut bab Tingkatan 4.
- Modul dilengkapi dengan analisis soalan SPM Matematik bagi tahun 2021 hingga tahun 2023 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.

PANEL PENULIS

Program Tuisyen Rakyat Selangor

Matematik Tingkatan 4

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

KANDUNGAN

<i>Format Instrumen Peperiksaan SPM Matematik</i>	v
<i>Analisis SPM 2021-2023 Matematik Kertas 2</i>	vi
<i>Senarai Rumus</i>	vii – viii
Ulang Kaji Menengah Rendah	1 – 18
Tingkatan 4	
BAB 1 Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah <i>Quadratic Functions and Equations in One Variable</i>	19 – 24
BAB 2 Asas Nombor <i>Number Bases</i>	25 – 34
BAB 3 Penaakulan Logik <i>Logical Reasoning</i>	35 – 45
BAB 4 Operasi Set <i>Operations on Sets</i>	46 – 54
BAB 5 Rangkaian dalam Teori Graf <i>Network in Graph Theory</i>	55 – 61
BAB 6 Ketaksamaan Linear dalam Dua Pemboleh Ubah <i>Linear Inequalities in Two Variables</i>	62 – 69
BAB 7 Graf Gerakan <i>Graphs of Motion</i>	70 – 82
BAB 8 Sukatan Serakan Data Tak Terkumpul <i>Measures of Dispersion of Ungrouped Data</i>	83 – 88
BAB 9 Kebarangkalian Peristiwa Bergabung <i>Probability of Combined Events</i>	89 – 98
BAB 10 Matematik Pengguna: Pengurusan Kewangan <i>Consumer Mathematics: Financial Management</i>	99 – 105
Peperiksaan Akhr Sesi Akademik Tingkatan 4	106 – 136

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 Terhad • 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 2021-2023

MATEMATIK KERTAS 2

TAJUK	SPM 2021			SPMU 2022			SPM 2022			SPM 2023		
	Bahagian			Bahagian			Bahagian			Bahagian		
	A	B	C	A	B	C	A	B	C	A	B	C
Tingkatan 5												
Ubahan	4			5	3							
Matriks		9			8		5				10	
Matematik Pengguna: Insurans	3				6	5	4			4		
Matematik Pengguna: Percukaian	2							8		5		
Kekongruenan, Pembesaran dan Gabungan Transformasi		9		5	9					4		
Nisbah dan Graf Trigonometri							5				8	4
Sukatan Serakan Data Berkumpulan	6				10			10			10	3
Tingkatan 4												
Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah							4					5&3
Asas Nombor	3											
Penaakulan Logik				4			4			5		
Operasi Set		8				3		8		5		
Rangkaian dalam Teori Graf			3	3		4			4		9	
Ketaksamaan Linear Dalam Dua Pemboleh Ubah		10						9		4		
Graf Gerakan			3&5		9	6			4&3	4		
Sukatan Serakan Data Tak Berkumpulan							3			3		4
Kebarangkalian Peristiwa Bergabung	4		5&3	3					4			3
Pengurusan Kewangan	4			4		12	4				8	
Tingkatan 3												
Matematik Pengguna: Simpanan dan Pelaburan, Kredit dan Hutang				3				2	4			
Pelan dan Dongakan		9										
Garis Lurus	5			4						3		
Tingkatan 2												
Pola dan Jujukan	3											
Bentuk Geometri Tiga Dimensi				4					4			5
Graf Fungsi										3		
Laju dan Pecutan												
Kecerunan Garis Lurus	2											
Transformasi Isometri							3&5					
Sukatan Kecenderungan Memusat			4						4			
Tingkatan 1												
Ungkapan Algebra	2											
Persamaan Linear			4	5					3			
Garis dan Sudut			3					8				
Perimeter dan Luas							3					
Teorem Pythagoras	2											3
Jumlah Markah	40	45	30	40	45	30	40	45	30	40	45	30

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 Faedah mudah / Simple interest, $I = Prt$
- 6 Faedah kompaun / Compound interest,
 $MV = P\left(1 + \frac{r}{n}\right)^{nt}$
- 7 Jumlah bayaran balik / Total repayment, $A = P + Prt$

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 $m = -\frac{\text{pintasan-y}}{\text{pintasan-x}}$
$$m = -\frac{y\text{-intercept}}{x\text{-intercept}}$$
- 6 $A^{-1} = \frac{1}{ad - bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

SUKATAN DAN GEOMETRI MEASUREMENT AND GEOMETRY

- 1 Teorem Pythagoras / Pythagoras' Theorem, $c^2 = a^2 + b^2$
- 2 Hasil tambah sudut pedalaman poligon / Sum of interior angles of a polygon
 $= (n - 2) \times 180^\circ$
- 3 Lilitan bulatan $= \pi d = 2\pi r$
Circumference of circle $= \pi d = 2\pi r$
- 4 Luas bulatan $= \pi r^2$
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 $= \frac{1}{2} \times \text{hasil darab panjang dua pepenjuru}$
$$\text{Area of kite} = \frac{1}{2} \times \text{product of two diagonals}$$
- 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 $= 2\pi r^2 + 2\pi rh$
Surface area of cylinder $= 2\pi r^2 + 2\pi rh$
- 10 Luas permukaan kon $= \pi r^2 + \pi rs$
Surface area of cone $= \pi r^2 + \pi rs$
- 11 Luas permukaan sfera $= 4\pi r^2$
Surface area of sphere $= 4\pi r^2$
- 12 Isi padu prisma $= \text{luas keratan rentas} \times \text{tinggi}$
Volume of prism $= \text{area of cross section} \times \text{height}$

13 Isi padu silinder = $\pi j^2 t$
Volume of cylinder = $\pi r^2 h$

14 Isi padu kon = $\frac{1}{3} \pi j^2 t$
Volume of cone = $\frac{1}{3} \pi r^2 h$

15 Isi padu sfera = $\frac{4}{3} \pi j^3$
Volume of sphere = $\frac{4}{3} \pi r^3$

16 Isi padu piramid = $\frac{1}{3} \times \text{luas tapak} \times \text{tinggi}$
Volume of pyramid = $\frac{1}{3} \times \text{base area} \times \text{height}$

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

18 Luas imej = $k^2 \times \text{luas objek}$
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, $\bar{x} = \frac{\sum fx}{f}$

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

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

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

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

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

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

Ulang Kaji Menengah Rendah



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

Rumus/Formula

Faedah mudah
Simple interest

$$I = Prt$$

Nilai matang
Matured value

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

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 Puan Mariam membuat pinjaman peribadi sebanyak RM60 000 dari Bank Ehsan dengan kadar faedah 8% atas baki. Tempoh bayaran balik adalah selama 7 tahun, dan ansuran bulanan yang perlu dibayar adalah sebanyak RM470.

Puan Mariam make a personal loan of RM60 000 from Bank Ehsan with an interest rate of 8% on the balance. The repayment period is 7 years, and the monthly instalments to be paid is RM470.

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

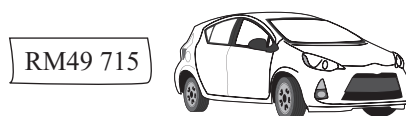
Calculate the balance of the loan after Puan Mariam make the first three instalment.

[5 markah/marks]

Jawapan/Answer:

- 2 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, his 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:



- 3 Puan Salina memasukkan RM50 000 dalam akaun simpanannya di Bank Makmur, mengikut prinsip wadiah sejak Januari 2024. Pada Disember 2024, beliau telah mendapat RM51 250 sebagai pulangan daripada simpanannya iaitu dengan penambahan RM1 250 yang merupakan hibah (hadiah) daripada Bank Makmur.

Puan Salina deposited RM50 000 into her savings account at Bank Makmur, according to the principle of wadiah since January 2024. In December 2024, she earned RM51 250 as a return on her savings with the additional RM1 250 which is a hibah (gift) from Bank Makmur.

Hitung jumlah wang dalam akaun simpanannya pada Disember 2026.

Calculate the amount of money in her savings account by December 2026.

[5 markah/marks]

Jawapan/Answer:

- 4 Encik Affan membeli Emas 999.9 daripada Syarikat Emas Indah menggunakan simpanannya sebanyak RM24 000. Pada masa yang sama, dia ingin mengetahui sama ada pembelian emas secara sekali gus atau melalui kaedah pemurataan yang lebih menguntungkan. Encik Affan membahagikan duit tersebut kepada dua bahagian. RM12 000 yang pertama untuk pembelian emas secara sekali gus pada bulan Januari, manakala RM12 000 yang kedua untuk pembelian emas secara kaedah pemurataan. Jadual 1 menunjukkan pembelian emas Encik Affan dalam tempoh setahun mengikut strategi pemurataan.

Encik Affan bought 999.9 Gold from Syarikat Emas Indah using his savings of RM24 000. At the same time, he wanted to know whether to buy the gold in a lump sum or through the cost averaging strategy that would give more profits. Encik Affan divided the money into two parts. The first RM12 000 was used for purchasing the gold in a lump sum during January, while the second RM12 000 was for purchasing the gold using the cost averaging strategy. Table 1 shows Encik Affan's gold purchases within one year using the cost averaging strategy.

Bulan Month	Jumlah belian Purchase amount (RM)	Harga per gram Price per gram (RM)
Januari/January	1 000	440
Februari/February	1 000	339
Mac/March	1 000	351
April/April	1 000	368
Mei/May	1 000	381
Jun/June	1 000	378
Julai/July	1 000	402
Ogos/August	1 000	384
September/September	1 000	378
Oktober/October	1 000	396
November/November	1 000	413
Disember/December	1 000	333

Jadual 1 / Table 1

Tentukan kaedah yang lebih menguntungkan Encik Affan. Justifikasi jawapan anda.
Determine the method that is more profitable to Encik Affan. Justify your answer.

[5 markah/marks]

Jawapan/Answer:



Garis Lurus Straight Lines

NOTA EFEKTIF

- 1 Persamaan garis lurus:
Equation of a straight line:

$$y = mx + c$$

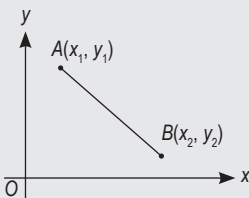
Kecerunan
Gradient

Pintasan-y
y-intersect

- 3 Kecerunan garis lurus, m :
The gradient of a straight line, m :

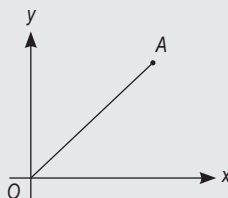
(a) $m = \frac{y_2 - y_1}{x_2 - x_1}$

(melalui dua titik)
(passes through two points)

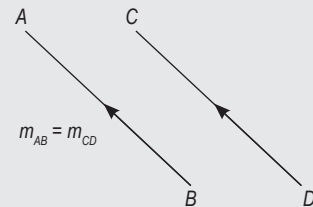


(b) $m = \frac{y}{x}$

(melalui asalan)
(passes the origin)

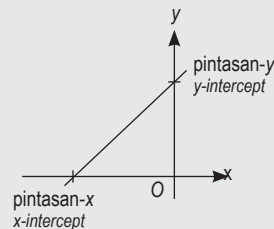


- 2 Garis selari mempunyai kecerunan yang sama.
The parallel lines have the same gradient.



(c) $m = -\frac{\text{pintasan-y}}{\text{pintasan-x}}$

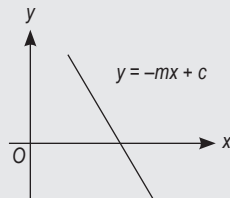
(melalui pintasan-x dan pintasan-y)
(passes x-intercept and y-intercept)



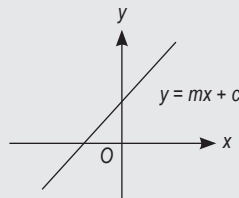
Pintasan-y adalah apabila $x = 0$.
The y-intercept is when $x = 0$.
Pintasan-x adalah apabila $y = 0$.
The x-intercept is when $y = 0$.

- 4 Persamaan garis lurus.
The equation of the straight lines.

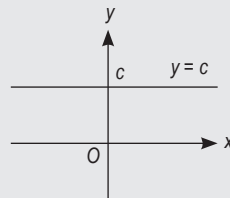
(a)



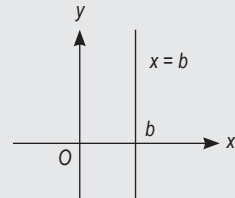
(b)



(c)



(d)



LATIHAN INTENSIF

- 1 Tentukan titik persilangan bagi pasangan garis lurus dengan kaedah graf.
Determine the point of intersection of pair of straight lines using a graphical method.

[2 markah/marks]

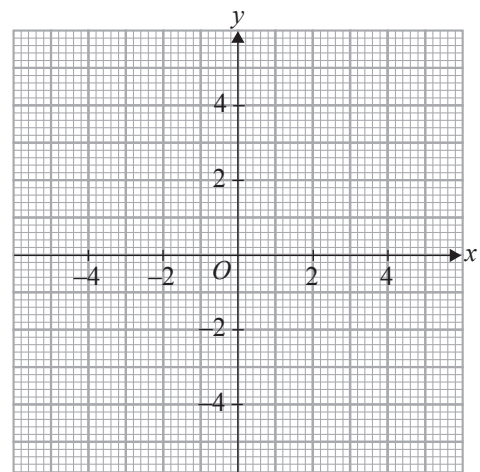
$$3x - 2y = 4$$

x	0	4
y		

$$x + 2y = 4$$

x	0	4
y		

Jawapan/Answer:



2 Selesaikan masalah yang berikut.

Solve the following problems.

- (a) Dalam Rajah 1, $OPQR$ ialah sebuah segi empat selari.

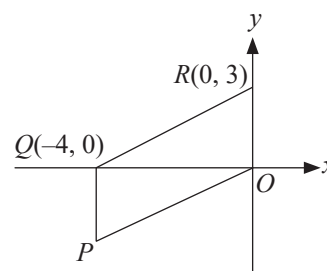
In Diagram 1, $OPQR$ is a parallelogram.

Cari/Find

- (i) koordinat P ,
the coordinates of P ,
- (ii) persamaan garis lurus OP , dalam bentuk am.
the equation of the straight line OP , in a general form.

[4 markah/marks]

Jawapan/Answer:



Rajah 1 / Diagram 1

- (b) Dalam Rajah 2, $OABC$ ialah sebuah trapezium. Kecerunan bagi garis lurus AB ialah $\frac{2}{5}$.

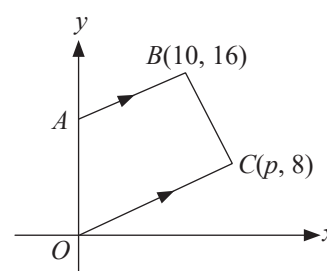
In Diagram 2, $OABC$ is a trapezium. The gradient of the straight line AB is $\frac{2}{5}$.

Cari/Find

- (i) nilai p ,
the value of p ,
- (ii) persamaan garis lurus AB .
the equation of the straight line AB .

[4 markah/marks]

Jawapan/Answer:

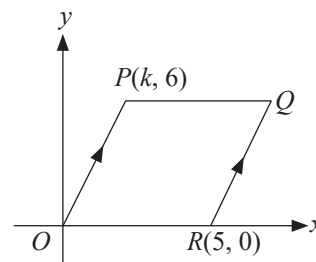


Rajah 2 / Diagram 2

- (c) Dalam Rajah 3, $OPQR$ ialah sebuah segi empat selari. Persamaan bagi garis lurus OP ialah $y = 3x$.
In Diagram 3, $OPQR$ is a parallelogram. The equation of the straight line OP is $y = 3x$.

Cari/Find

- (i) nilai k ,
the value of k ,
- (ii) persamaan garis lurus QR .
the equation of the straight line QR .

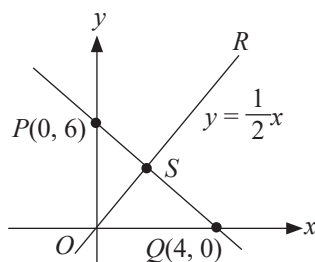


Rajah 3 / Diagram 3

[4 markah/marks]

Jawapan/Answer:

- (d) Dalam Rajah 4, PSQ dan OSR ialah garis lurus.
In Diagram 4, PSQ and OSR are straight lines.



Rajah 4 / Diagram 4

Cari koordinat titik S .
Find the coordinates of point S .

[4 markah/marks]

Jawapan/Answer:

- 3 Rajah 5 menunjukkan sebuah segi empat selari $PQRS$ yang dilukis pada suatu satah Cartes.

Diagram 5 shows a parallelogram $PQRS$ drawn on a Cartesian plane.

Persamaan garis lurus PQ ialah $3x - 2y + 12 = 0$.

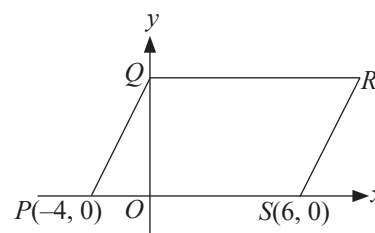
The equation of the straight line PQ is $3x - 2y + 12 = 0$.

- (a) Nyatakan persamaan garis lurus QR .
State the equation of the straight line QR .

- (b) Cari persamaan garis lurus RS .
Find the equation of the straight line RS .

[5 markah/marks]

Jawapan/Answer:



Rajah 5 / Diagram 5

- 4 Rajah 6 menunjukkan lokasi kedudukan gerai di sebuah tapak pasar malam yang diwakili titik S , T , dan U . Garis lurus TU adalah selari dengan paksi- y dan $SU = 5$ unit. Persamaan garis lurus ST ialah $3y - 2x = 12$.

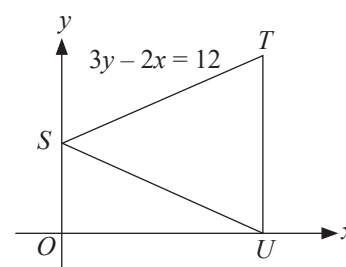
Diagram 6 shows the locations of stalls at a night market represented by the points S , T , and U . The line TU is parallel to the y -axis, and $SU = 5$ units. The equation of the straight line ST is $3y - 2x = 12$.

Cari/Find

- (a) pintasan- y bagi garis lurus ST ,
the y -intercept of the straight line ST ,
(b) persamaan bagi garis lurus SU .
the equation of the straight line SU .

[5 markah/marks]

Jawapan/Answer:



Rajah 6 / Diagram 6



Lokus dalam Dua Dimensi

Loci in Two Dimensions

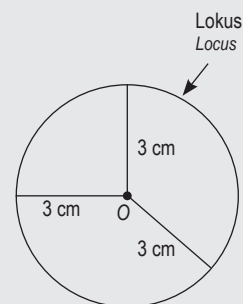
NOTA EFEKTIF

Apakah itu lokus? What is locus?

Satu set titik yang kedudukannya memenuhi syarat tertentu.
A set of points whose positions satisfy certain conditions.

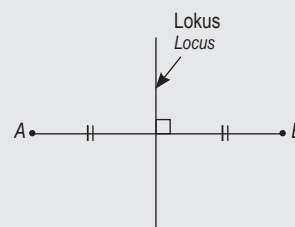
1

Lokus bagi titik yang berjarak tetap dari satu titik tetap.
The locus of points that are at a constant distance from a fixed point.



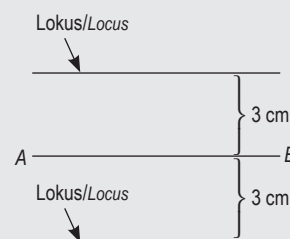
2

Lokus bagi titik yang berjarak sama dari dua titik tetap.
The locus of points that are equidistant from two fixed points.



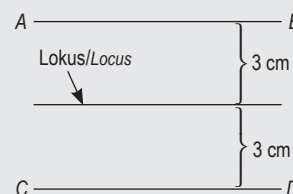
3

Lokus bagi titik yang berjarak tetap dari satu garis lurus.
The locus of points that are at a constant distance from a straight line.



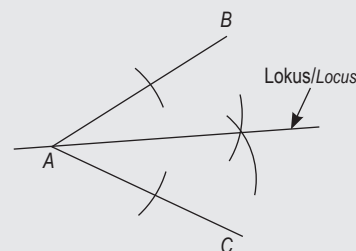
4

Lokus bagi titik berjarak sama dari dua garis lurus yang selari.
The locus of points that are equidistant from two parallel straight lines.



5

Lokus bagi titik yang berjarak sama dari dua garis lurus yang bersilang.
The locus of points that are equidistant from two intersecting straight lines.





LATIHAN INTENSIF

1 Rajah 1 menunjukkan bentangan bagi piramid $PQRSTUVW$.

Diagram 1 shows the net of pyramid $PQRSTUVW$.

(a) X ialah titik bergerak dengan keadaan titik itu sentiasa sama jarak dari titik P dan titik T . Dengan menggunakan huruf abjad pada rajah itu, nyatakan lokus bagi X .

X is a moving point that is always equidistant from points P and T . Using the letters on the diagram, state the locus of X .

(b) Pada Rajah 1,

In Diagram 1,

(i) lukis lokus bagi titik Y yang bergerak dengan keadaan titik itu sentiasa 3 unit dari titik S ,
draw the locus of point Y that moves such that it is always 3 units away from point S ,

(ii) tandakan dengan simbol $\otimes$ kedudukan bagi persilangan lokus Y dengan tapak piramid, $QSUV$.
mark with the symbol $\otimes$ the positions where the locus of Y intersects with the base of the pyramid, $QSUV$.

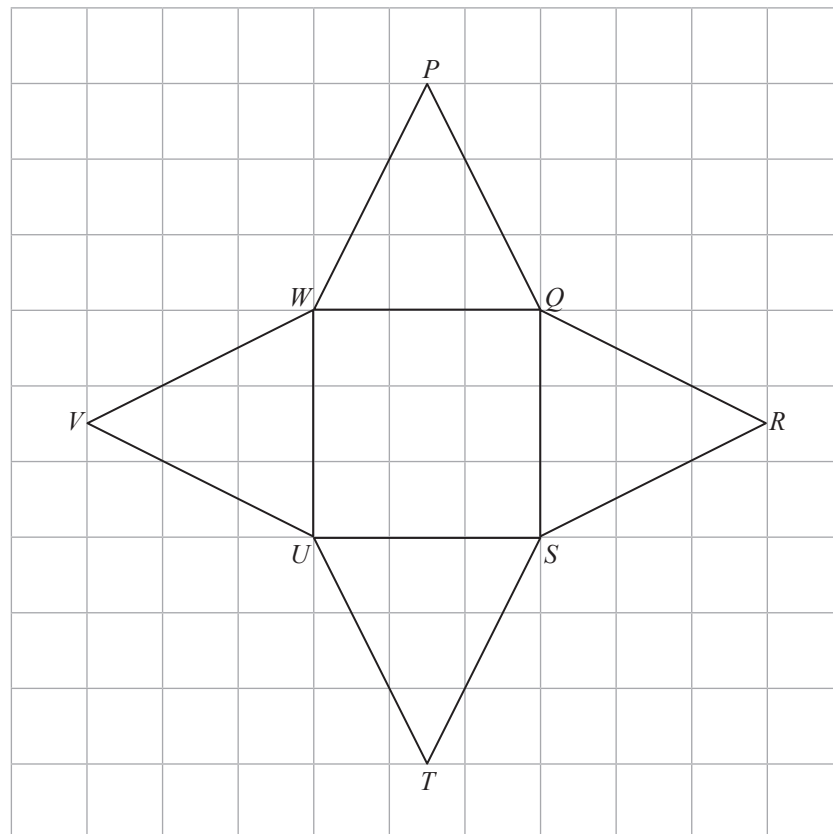
[4 markah/marks]

Jawapan/Answer:

(a)

(b) (i)

(ii)



Rajah 1 / Diagram 1

- 2 Rajah 2 di ruang jawapan menunjukkan sebuah segi empat sama, $STUV$ dengan sisi 6 unit yang dilukis pada grid segi empat sama bersisi 1 unit. X , Y dan Z adalah tiga titik yang bergerak di dalam segi empat sama itu.

Diagram 2 in the answer space shows a square, $STUV$ with sides of 6 units drawn on a square grid with sides of 1 unit. X , Y , and Z are three moving points within the square.

- (a) X ialah titik yang bergerak dengan keadaan jaraknya adalah sentiasa sama dari titik S dan titik U . Dengan menggunakan huruf di dalam Rajah 2, nyatakan lokus bagi X .

X is a point that moves such that its equidistant from points S and U . Using the letters in the Diagram 2, state the locus of X .

- (b) Pada Rajah 2, lukis

In Diagram 2, draw

- (i) lokus bagi titik Y yang bergerak dengan keadaan jaraknya adalah sentiasa sama dari garis lurus ST dan SV ,

the locus of point Y , which moves at the same distance from the straight lines ST and SV ,

- (ii) lokus bagi titik Z yang bergerak dengan keadaan titik itu sentiasa berjarak 2 unit dari titik K .

the locus of point Z which moves such that it is always 2 units from point K .

- (c) Seterusnya, tandakan dengan simbol $\otimes$ kedudukan bagi semua persilangan lokus Y dan lokus Z itu.

Then, mark with the symbol $\otimes$ the positions of all intersections of the loci of Y and Z .

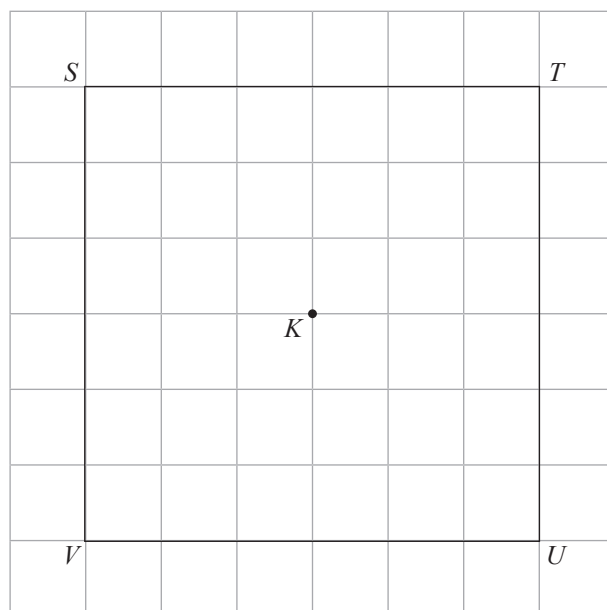
[4 markah/marks]

Jawapan/Answer:

(a)

(b) (i)(ii)

(c)



Rajah 2 / Diagram 2



NOTA EFEKTIF

**Poligon
Polygon**

**Poligon Sekata
Regular Polygon**

Sudut pedalaman/Interior angle

$$= \frac{(n-2) \times 180^\circ}{n}$$

Sudut peluaran/Exterior angle

$$= \frac{360^\circ}{n}$$

Hasil tambah sudut pedalaman
Total sum of interior angles

$$= (n-2) \times 180^\circ$$

Hasil tambah sudut peluaran
Total sum of exterior angles

$$= 360^\circ$$

**Poligon Tak Sekata
Irregular Polygon**

Sudut peluaran sebuah poligon ialah penggenap kepada sudut pedalaman poligon itu.
Exterior angle of a polygon is a complement to an interior angle of the polygon.

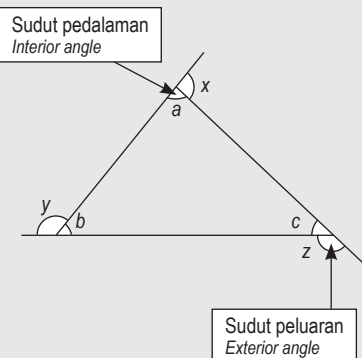
Sudut peluaran + Sudut pedalaman
Exterior angle + Interior angle

$$= 180^\circ$$

Hasil tambah sudut peluaran
Total sum of exterior angle

$$= 360^\circ$$

**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.



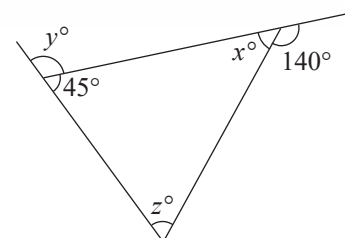
LATIHAN INTENSIF

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

Hitung nilai x, y dan z.
Calculate the values of x, y and z.

Jawapan/Answer:

[3 markah/marks]



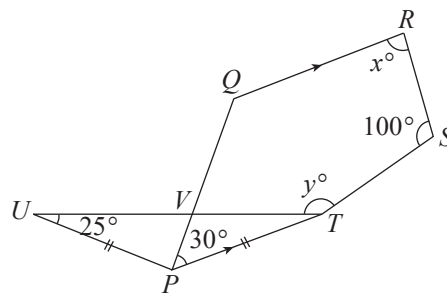
Rajah 1 / Diagram 1

- 2 Dalam Rajah 2, $PQRST$ ialah sebuah pentagon dan PUT ialah sebuah segi tiga sama kaki. PVQ ialah garis lurus.
In Diagram 2, $PQRST$ is a pentagon and PUT is an isosceles triangle. PVQ is a straight line.

Cari nilai $y + x$.
Find the value of $y + x$.

[3 markah/marks]

Jawapan/Answer:



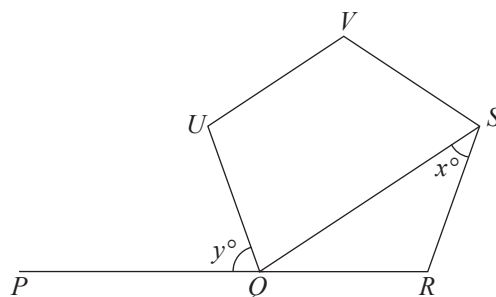
Rajah 2 / Diagram 2

- 3 Rajah 3 menunjukkan logo berbentuk pentagon sekata, $QRSVU$. PQR ialah garis lurus.
Diagram 3 shows a logo in the shape of a regular pentagon, $QRSVU$. PQR is a straight line.

Hitung nilai $y + x$.
Calculate the value of $y + x$.

[4 markah/marks]

Jawapan/Answer:

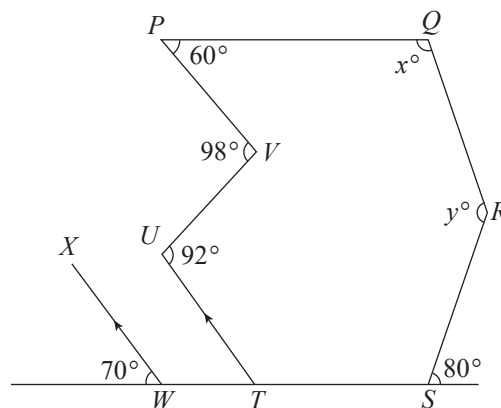


Rajah 3 / Diagram 3

- 4 Rajah 4 menunjukkan poligon tak sekata $PQRSTUV$ dan garis lurus WX .
Diagram 4 shows the irregular polygon $PQRSTUV$ and the straight line WX .
 Hitung nilai $x + y$.
Calculate the value of $x + y$.

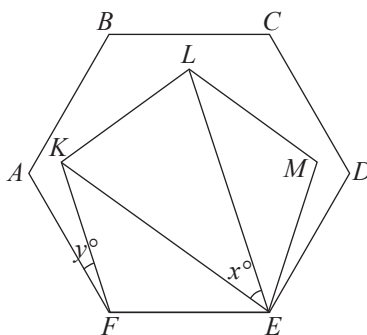
[3 markah/marks]

Jawapan/Answer:



Rajah 4 / Diagram 4

- 5 Dalam Rajah 5, $ABCDEF$ ialah sebuah heksagon sekata dan $FKLME$ ialah sebuah pentagon sekata.
In Diagram 5, $ABCDEF$ is a regular hexagon and $FKLME$ is a regular pentagon.



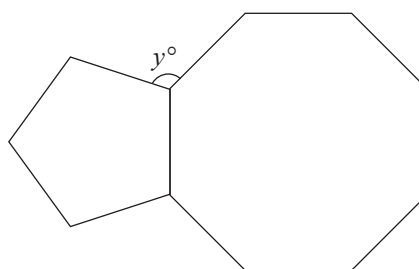
Rajah 5 / Diagram 5

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

[4 markah/marks]

Jawapan/Answer:

- 6 Rajah 6 menunjukkan dua buah kolam renang di sebuah pusat sukan yang berbentuk oktagon dan pentagon sekata.
Diagram 6 shows two swimming pools at a sports centre in the shape of a regular octagon and pentagon.



Rajah 6 / Diagram 6

Apakah nilai y ?
What is the value of y ?

[4 markah/marks]

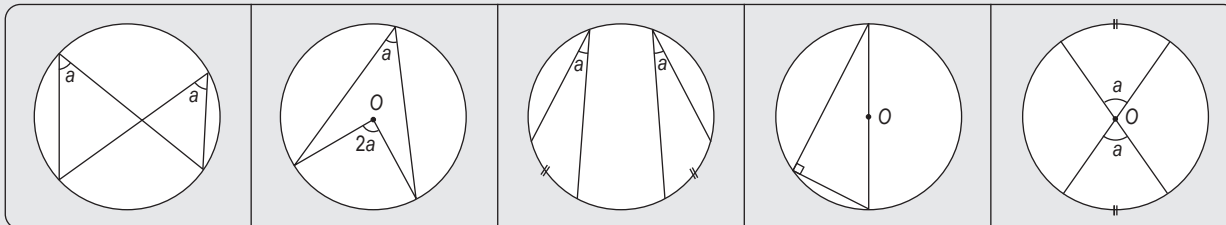
Jawapan/Answer:



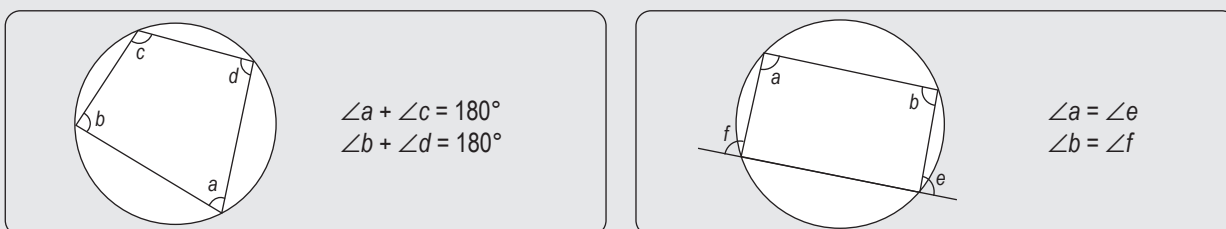
Sudut dan Tangen bagi Bulatan Angles and Tangent of Circles

NOTA EFEKTIF

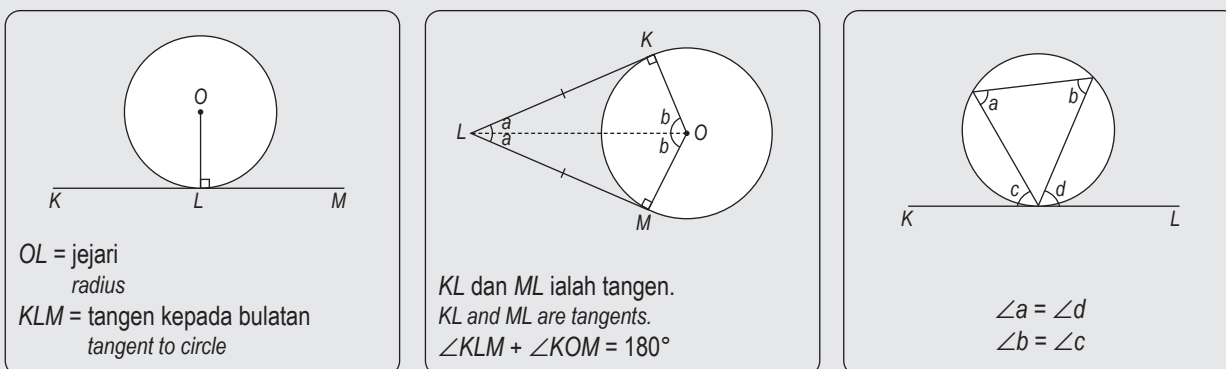
Ciri-ciri Sudut dalam Bulatan Properties of Angles in a Circle



Sisi Empat Kitaran Cyclic Quadrilaterals



Tangen kepada Bulatan Tangents to Circles

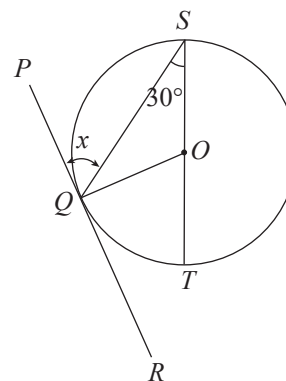


LATIHAN INTENSIF

- 1 Dalam Rajah 1, PQR ialah tangen kepada bulatan SQT di titik Q . SOT ialah diameter kepada bulatan tersebut.
In Diagram 1, PQR is a tangent to the circle SQT at point Q . SOT is a diameter of the circle.
Cari nilai x .
Find the value of x .

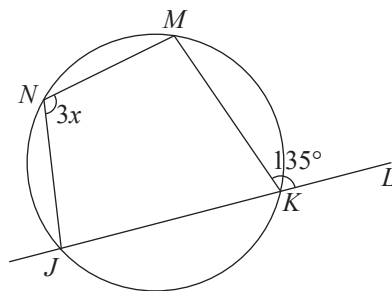
[2 markah/marks]

Jawapan/Answer:



Rajah 1 / Diagram 1

- 2 Dalam Rajah 2, JKL ialah garis lurus dan $JKMN$ ialah sebuah sisi empat.
In Diagram 2, JKL is a straight line and $JKMN$ is a quadrilateral.



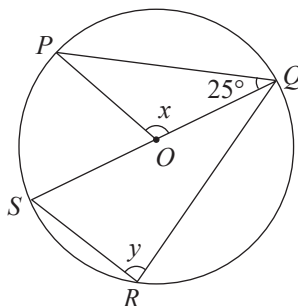
Rajah 2 / Diagram 2

Cari nilai x .
Find the value of x .

Jawapan/Answer:

[2 markah/marks]

- 3 Rajah 3 menunjukkan sebuah bulatan berpusat O .
Diagram 3 shows a circle with centre O .



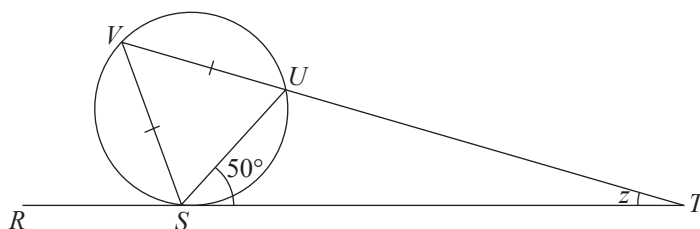
Rajah 3 / Diagram 3

Cari nilai $x + y$.
Find the value of $x + y$.

Jawapan/Answer:

[4 markah/marks]

- 4 Dalam Rajah 4, ST ialah tangen kepada bulatan SVU di S dan RST ialah garis lurus.
In Diagram 4, ST is a tangent to the circle SVU at S and RST is a straight line.



Rajah 4 / Diagram 4

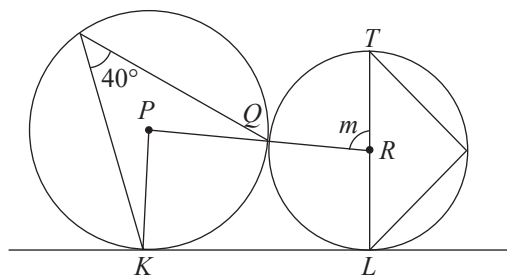
Hitung nilai z .

Calculate the value of z .

[3 markah/marks]

Jawapan/Answer:

- 5 Rajah 5 menunjukkan dua bulatan masing-masing berpusat di P dan R . Kedua-dua bulatan bersentuh di Q . LRT ialah diameter bulatan. KL adalah tangen sepunya kepada kedua-dua bulatan itu.
Diagram 5 shows two circles with centres P and R respectively. Both circles touching at Q . LRT is a diameter. KL is the common tangents to both circles.



Rajah 5 / Diagram 5

Cari nilai m .

Find the value of m .

[4 markah/marks]

Jawapan/Answer:



Rumus Algebra Algebraic Formulae

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:

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

- 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:

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

- 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.

(a) $3p = \frac{8}{10+q}$

[q]

(b) $3p - 6 = \frac{8}{q}$

[p]

(c) $\sqrt{m} - 2 = n - 8k$

[m]

(d) $\frac{m-2}{3} = n - 8k^2$

[k]

[4 markah/marks]

Jawapan/ Answer:

2 (a) Diberi $m + n = \frac{n+1}{-2k}$, hitung

Given $m + n = \frac{n+1}{-2k}$, calculate

(i) nilai k apabila $n = 3$ dan $m = 3n$,
the value of k when, $n = 3$ and $m = 3n$,

(ii) nilai m apabila $k = \frac{1}{3}$ dan $n = 2k$.
the value of m when $k = \frac{1}{3}$ and $n = 2k$.

(b) Diberi $9m = 22 - 10n$, hitung

Given $9m = 22 - 10n$, calculate

(i) nilai m apabila $n = 4$,
the value of m when $n = 4$,

(ii) nilai n apabila $m = -2$.
the value of n when $m = -2$.

[4 markah/marks]

Jawapan/ Answer:

3 Tulis rumus algebra berdasarkan maklumat berikut.

Write the algebraic formula based on the given information.

(a) Jumlah harga, RM p yang perlu dibayar oleh seorang murid yang membeli x buah buku rujukan dan y set alat tulis. Setiap buku rujukan dan set alat tulis masing-masing berharga RM8.90 dan RM4.50.

Total price, RM p to be paid by a student who buys x reference books and y stationery sets. Each reference book and stationery set costs RM8.90 and RM4.50 respectively.

(b) Aisyah mengambil masa 48 saat untuk berjalan sejauh 60 meter. Bantu Aisyah menulis rumus algebra bagi tempoh perjalanan, t , dalam minit, dari rumahnya ke sekolah yang berjarak s kilometer.

Aisyah takes 48 seconds to walk 60 meters. Help Aisyah in writing the algebraic formula for the travel time, t , in minutes, from her home to school which is s kilometers away.

[4 markah/marks]

Jawapan/ Answer:

BAB

1

Fungsi dan Persamaan Kuadrat dalam Satu Pemboleh Ubah

Quadratic Functions and Equations in One Variable



VIDEO PEMBELAJARAN

NOTA EFEKTIF

Ungkapan Kuadrat dalam Satu Pemboleh Ubah

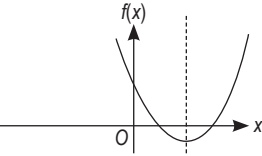
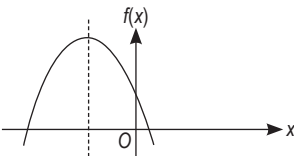
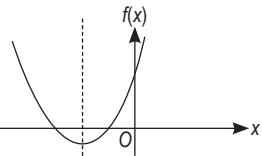
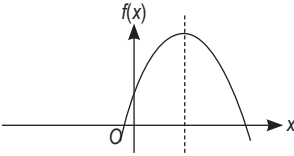
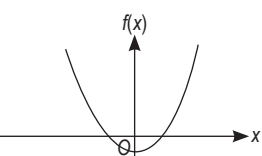
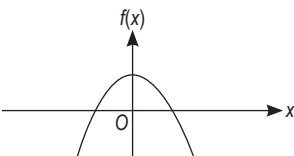
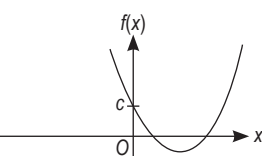
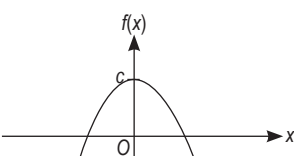
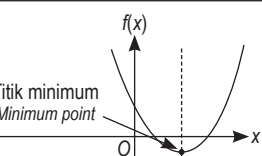
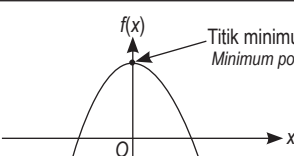
Quadratic Expressions in One Variable

- 1 Bentuk am
The general form $ax^2 + bx + c$ a, b dan c ialah pemalar, $a \neq 0$ dan x sebagai pemboleh ubah (**satu** pemboleh ubah).
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.

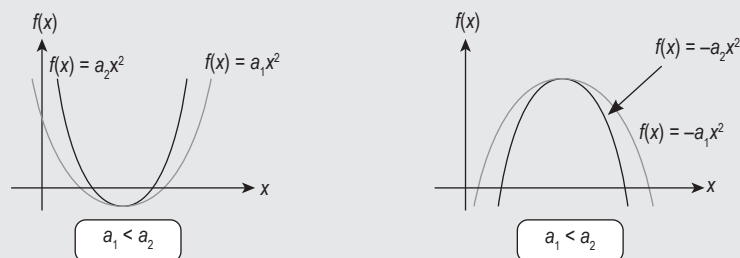
Fungsi Kuadrat

Quadratic Functions

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

Bentuk graf Shape of graph		 $a > 0$	 $a < 0$
Paksi simetri Axis of symmetry $x = \frac{-b}{2a}$	$b < 0$		
	$b > 0$		
	$b = 0$		
Pintasan-y y-intercept			
Titik minimum/maksimum Maximum/minimum point		 Titik minimum Minimum point	 Titik minimum Minimum 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 kuadratik dalam bentuk $ax^2 + bx + c = 0$ ditulis dalam bentuk $(x + a)(x + b) = 0$. Maka, punca-punca persamaan kuadratik 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 Kuadratik

Sketch Graphs of Quadratic Functions

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

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 axis of symmetry.
- 5 Menentukan titik minimum/maksimum.
Determine the minimum/maximum point.
- 6 Lakarkan graf.
Sketch the graph.

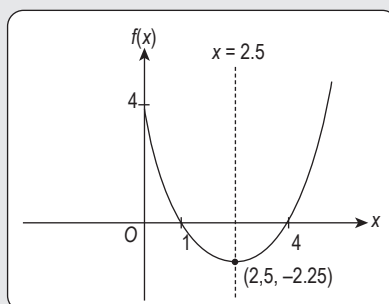
$$a > 0 \rightarrow \cup$$

$$y = 4$$

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

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

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





LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Antara berikut, yang manakah ungkapan kuadratik dalam satu pemboleh ubah?

Which of the following is a quadratic expression in one variable?

- A $2x^2 - 6 = 0$
- B $3x^2 - 4y - 3$
- C $x^{\frac{1}{2}} + 2x - 4$
- D $\frac{3}{x^2} + 3x = 6$

- 2 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 $k = 4, k = -2$

- 3 $2p^2 - 13p + 20 =$

- A $(2p + 5)(p + 4)$
- B $(2p - 5)(p - 4)$
- C $(2p + 5)(p - 4)$
- D $(2p + 5)(p - 4)$

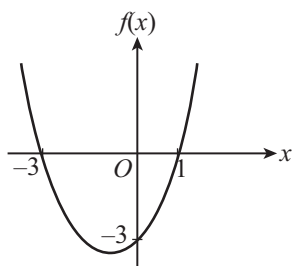
- 4 Ungkapkan $\frac{x^2 - 2}{3} + \frac{x^2 - 1}{7} = 2x$ dalam bentuk am.

Express $\frac{x^2 - 2}{3} + \frac{x^2 - 1}{7}$ in general form.

- A $4x^2 - 21x - 11 = 0$
- B $4x^2 - 42x - 13 = 0$
- C $10x^2 - 21x - 11 = 0$
- D $10x^2 - 42x - 17 = 0$

- 5 Rajah 1 menunjukkan satu graf fungsi kuadratik.

Diagram 1 shows a graph of a quadratic function.



Rajah 1 / Diagram 1

- Antara berikut, yang manakah persamaan bagi graf itu?

Which of the following is the equation of the graph?

- A $f(x) = x^2 - 2x - 3$
- B $f(x) = x^2 + 2x - 3$
- C $f(x) = -x^2 - 2x - 3$
- D $f(x) = -x^2 + 2x - 3$

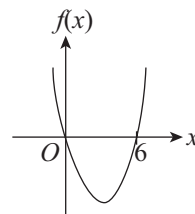
- 6 $(2x - 8)(x - 6) =$

- A $2x^2 - 4x + 48$
- B $2x^2 + 4x - 48$
- C $2x^2 - 20x + 48$
- D $2x^2 + 20x - 48$

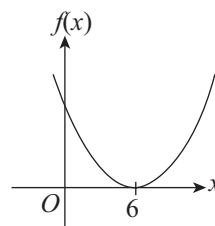
- 7 Antara berikut, graf yang manakah mewakili $f(x) = x^2 - 6x$?

Which of the following graphs represents $f(x) = x^2 - 6x$?

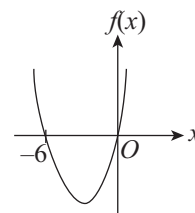
A



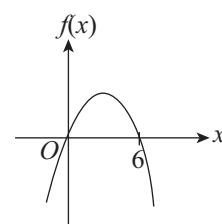
B



C



D



Soalan Subjektif
Jawab semua soalan.

- 1** Selesaikan persamaan kuadratik berikut:
Solve the following quadratic equations:

$$\frac{-k}{k-2} = \frac{4}{k+3}$$

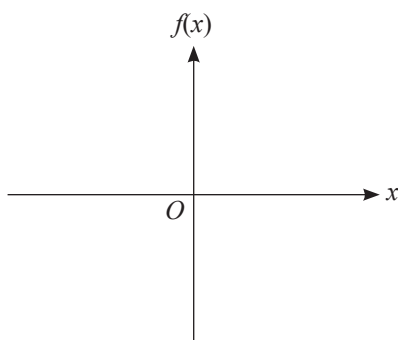
[4 markah/marks]

Jawapan/Answer:

- 2** Lakarkan graf bagi fungsi kuadratik $f(x) = -(x-3)^2 + 25$.
Sketch the graphs of the quadratic functions $f(x) = -(x-3)^2 + 25$.

[3 markah/marks]

Jawapan/Answer:

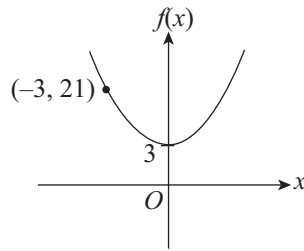


- 3** Diberi bahawa $3x(x-2) - kx = 5x + 6$ membentuk persamaan kuadratik $3x^2 + 8x - 6 = 0$. Cari nilai k .
Given that $3x(x-2) - kx = 5x + 6$ form the quadratic equation $3x^2 + 8x - 6 = 0$. Find the value of k .

[3 markah/marks]

Jawapan/Answer:

- 4 Rajah 1 menunjukkan graf bagi fungsi $f(x) = ax^n + c$.
 Diagram 1 shows the graph of the function $f(x) = ax^n + c$.



Rajah 1 / Diagram 1

- (a) Nyatakan nilai n dan nilai c .
 State the value of n and of c .
 (b) Seterusnya, hitung nilai a .
 Hence, calculate the value of a .

[4 markah/marks]

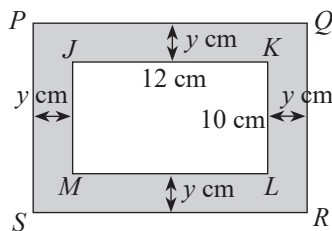
Jawapan/Answer:

- 5 Sebutir batu dilontar tegak ke atas. Tingginya, h m, dari permukaan tanah selepas t saat diberi oleh rumus $h = 17t - 2t^2$. Cari masa, dalam saat, apabila batu itu berada pada ketinggian 8 m dari permukaan tanah.
 A stone is thrown vertically upwards. Its height, h m, from the ground after t seconds is given by the formula $h = 17t - 2t^2$. Find the time, in seconds, when the stone is at a height of 8 m from the ground.

[4 markah/marks]

Jawapan/Answer:

- 6 Rajah 2 menunjukkan dua buah segi empat tepat, $JKLM$ dan $PQRS$.
Diagram 2 shows two rectangles, $JKLM$ and $PQRS$.



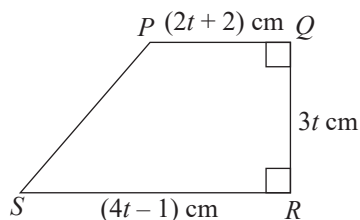
Rajah 2 / Diagram 2

- (a) Ungkapkan luas, $A \text{ cm}^2$, bagi kawasan berlorek dalam sebutan y .
Express the area, $A \text{ cm}^2$, of the shaded region in terms of y .
- (b) Jika luas kawasan berlorek itu ialah 168 cm^2 , cari nilai y .
If the area of the shaded region is 168 cm^2 , find the value of y .

[5 markah/marks]

Jawapan/Answer:

- 7 Rajah 3 menunjukkan suatu trapezium.
Diagram 3 shows a trapezium.



Rajah 3 / Diagram 3

- (a) Ungkapkan luas, $L \text{ cm}^2$, trapezium itu dalam sebutan t .
Express the area, $L \text{ cm}^2$, of the trapezium in terms of t .
- (b) Jika luasnya ialah 150 cm^2 , hitung nilai t .
If the area is 150 cm^2 , calculate the value of t .
- (c) Hitung panjang, dalam cm, PS .
Calculate the length, in cm, of PS .

[6 markah/marks]

Jawapan/Answer:

BAB

2

Asas Nombor

Number Bases

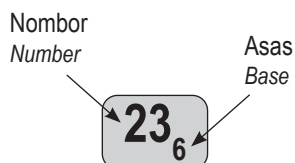


VIDEO PEMBELAJARAN

NOTA EFEKTIF

Asas Nombor

Number Base



dibaca sebagai/is read as

“dua tiga asas enam”
“two three base six”

Nilai Tempat, Nilai Digit dan Nilai Nombor

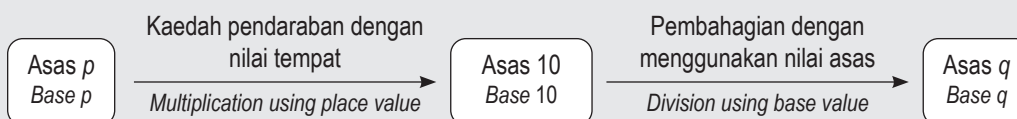
Place Value, Value of digit and Value of Number

Contoh/Example: 1324_7

Number 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	
9	11	2	
9	1	1	
	0		

$$\therefore 122_9$$

Operasi Tambah dan Tolak dalam Pelbagai Asas

Addition and Subtraction of Numbers in Various Bases

Bentuk Lazim/Vertical Form

Contoh/Example:

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

$$\begin{array}{r} 237 \\ 343_7 \\ - 56_7 \\ \hline 254_7 \end{array}$$

$7 + 3 - 6 = 4_7$

$7 + 3 - 5 = 5_7$

Penukaran Asas/Conversation of Base

Contoh/Example:

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

$$324_5 \rightarrow 89_{10}$$

$$42_5 \rightarrow 22_{10}$$

$$89 + 22 = 111$$

		Baki	
		Remainder	
5	111	1	
5	22	2	
5	2	4	
	0		



LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Rajah 1 menunjukkan satu set nombor yang mempunyai asas yang sama.

Diagram 1 shows a set of numbers of the same base.

23, 452, 83, 33, 100

Rajah 1 / Diagram 1

Apakah asas bagi nombor-nombor itu?

What is the base of the numbers?

- A 6
B 7
C 8
D 9
- 2 Diberi $1011_2 < k < 1101_2$, cari nilai k sebagai satu nombor dalam asas lapan.
Given $1011_2 < k < 1101_2$, find the value of k as a number in base eight.
- A 12_8
B 13_8
C 14_8
D 31_8
- 3 Ungkapkan $2 \times 7^2 + 4 \times 7^3 + 7^5$ sebagai satu nombor dalam asas tujuh.
Express $2 \times 7^2 + 4 \times 7^3 + 7^5$ as a number in base seven.
- A 24100₇
B 20401₇
C 102400₇
D 104200₇
- 4 Nyatakan nilai bagi digit 4, dalam asas sepuluh bagi nombor 2403₅.
State the value of digit 4, in base ten, of the number 2403₅.
- A 20
B 25
C 100
D 104
- 5 Apakah nilai digit 3, dalam asas sepuluh, bagi nombor 1320₄?
What is the value of digit 3, in base ten, in the number 1320₄?
- A 12
B 16
C 48
D 192

- 6 Diberi bahawa $142Q_5 = 239_{10}$. Cari nilai Q .
Given $142Q_5 = 239_{10}$, Find the value of Q .

A 1
B 2
C 3
D 4

- 7 Diberi bahawa $R_5 = 102_8$. Cari nilai R .
It is given $R_5 = 102_8$. Find the value of R .

A 132
B 213
C 231
D 312

- 8 Diberi $1001_t = 513_{10}$, apakah nilai t ?
Given $1001_t = 513_{10}$, what is the value of t ?

A 2
B 5
C 6
D 8

- 9 $12001_3 - 1110_3 =$

A 10121₃
B 11021₃
C 11120₃
D 11121₃

- 10 Diberi $3201_5 = 3(125) + 2(25) + 4m$, cari nilai m .
Given $3201_5 = 3(125) + 2(25) + 4m$, find the value of m .

A 2
B 1
C 0.50
D 0.25

- 11 Hitung hasil tambah nilai digit 7 dalam 8871₉ dan 17311₈.

Calculate the sum of the values of digit 7 in 8871₉ and 17311₈.

A 956
B 1 365
C 3 647
D 7 070

- 12 $(5 \times 6^3) + (1 \times 6^2) + (3 \times 6^1) + (4 \times 6^0) = (3 \times 7^3) + (2 \times 7^2) + (1 \times 7^1) + (q \times 7^0)$.

Cari nilai q .

Find the value of q .

A 3
B 4
C 5
D 6

- 13 $3143_6 - 245_6 =$
 A 2445_6
 B 2454_6
 C 2544_6
 D 2545_6
- 14 $1241_5 + 311_5 =$
 A 1652_5
 B 2102_5
 C 2302_5
 D 2212_5
- 15 Farish, Hazim, Hadif dan Amir merupakan sahabat baik. Umur mereka masing-masing ialah 25_6 , 34_5 , 31_7 dan 24_8 tahun. Siapakah yang paling muda di antara mereka?
Farish, Hazim, Hadif and Amir are good friends. Their ages are 25_6 , 34_5 , 31_7 and 24_8 . Who is the younger among them?
 A Farish
 B Hazim
 C Hadif
 D Amir
- 16 Diberi bahawa $x_{10} = 217_9$, dengan keadaan x ialah suatu integer. Cari nilai x .
Given $x_{10} = 217_9$, where x is an integer. Find the value of x .
 A 52
 B 162
 C 178
 D 1 602
- 17 $3145_7 - 246_7 =$
 A 2556_7
 B 2566_7
 C 2656_7
 D 2665_7
- 18 Diberi $10010000011_2 = 2^{x+4} + 2^7 + 3$. Cari nilai x .
Given $10010000011_2 = 2^{x+4} + 2^7 + 3$. Find the value of x .
 A 5
 B 6
 C 7
 D 8

Soalan Subjektif

Jawab semua soalan.

1 Diberi/Given:

$$3412_6 = 3 \times 6^3 + 4 \times 6^m + n + 2 \times 6^0$$

- (a) Nyatakan nilai m dan n .
State the values of m and n .
- (b) Tulis 3412_6 sebagai nombor dalam asas tujuh.
Write 3412_6 as a number in base seven.

[4 markah/marks]

Jawapan/Answer:

- 2 Rajah 1 menunjukkan empat keping kad nombor.

Diagram 1 shows four number cards.

312_5	1043_5	34_5	203_5
---------	----------	--------	---------

Rajah 1 / Diagram 1

Cari beza, dalam asas 5, antara nombor terbesar dengan nombor terkecil.

Find the difference, in base 5, between the largest and the smallest number.

[2 markah/marks]

Jawapan/Answer:

- 3 Sebuah van sekolah perlu berulang-alik sebanyak tiga kali untuk menghantar murid ke sekolah. Rajah 2 merupakan tempoh masa, dalam minit, yang diambil bagi ketiga-tiga perjalanan itu.

A school van needs to make three trips to drop students at school. Diagram 2 shows the period of time, in minutes, for all three trips.

401_5	1212_4	254_6
---------	----------	---------

Rajah 2 / Diagram 2

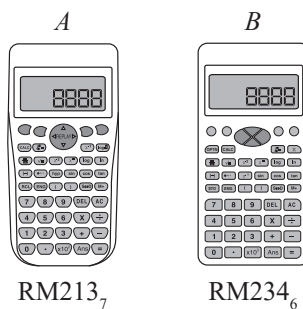
Tentukan tempoh masa, dalam minit, yang paling pendek van tersebut menghantar murid ke sekolah, dalam asas dua.

Determine the shortest period of time, in minutes, for the van to send to students at school, in base two.

[3 markah/marks]

Jawapan/Answer:

- 4 Rajah 3 menunjukkan harga dua buah kalkulator, dalam asas nombor yang berbeza.
Diagram 3 shows the prices of two calculators, in different number bases.



Rajah 3 / Diagram 3

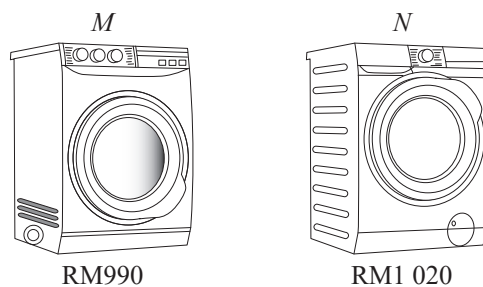
Berapakah beza harga kedua-dua kalkulator itu dalam asas sepuluh?
What is the price difference between the two calculators in base ten?

[3 markah/marks]

Jawapan/Answer:

- 5 Sebuah kedai peralatan elektik menawarkan diskaun bagi pembelian beberapa jenama mesin basuh. Rajah 4 menunjukkan harga asal bagi dua jenama mesin basuh.

An electrical shop offers discounts for several brands of washing machine. Diagram 4 shows the original price of two washing machines.



Rajah 4 / Diagram 4

Setelah diskaun, Sarah membeli mesin basuh jenama *M* dengan harga RM1265₈ dan Khadijah membeli mesin basuh jenama *N* dengan harga RM1635₇. Siapa yang mendapat diskaun yang lebih tinggi?

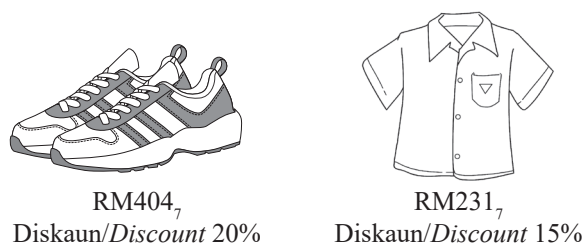
After the discount, Sarah bought a brand M washing machine for RM1265₈ and Khadijah bought a brand N washing machine for RM1635₇. Who got the highest discount?

[4 markah/marks]

Jawapan/Answer:

- 6 Rajah 5 menunjukkan harga dalam asas tujuh bagi sepasang kasut dan sehelai kemeja-T dengan peratus diskaun yang diberikan.

Diagram 5 shows the price in base seven for a pair of shoes and a T-shirt and the discounts percent.



Rajah 5 / Diagram 5

Syamir membeli sehelai kemeja-T dan sepasang kasut. Dia memberikan RM300 kepada juruwang. Berapakah baki wang yang Syamir terima?

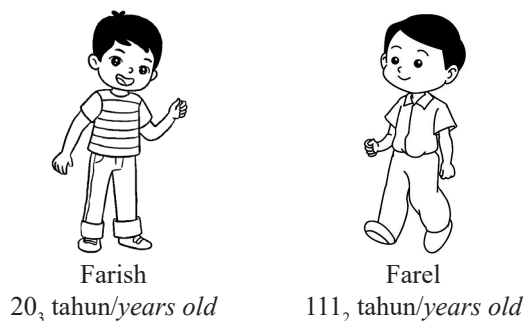
Syamir bought a T-shirt and a pair of shoes. He gave RM300 to the cashier. How much change did he receive?

[3 markah/marks]

Jawapan/Answer:

- 7 Had umur pengunjung bagi kemasukan percuma ke Zoo Negara ialah 6 tahun dan ke bawah. Pengunjung berusia melebihi 6 tahun akan dikenakan bayaran kemasukan. Rajah 6 menunjukkan dua orang pengunjung dengan umur dalam asas nombor yang berbeza.

The limit of visitors age for free entry to Zoo Negara is 6 years and below. The visitors aged over 6 years old will be charged an entry fee. Diagram 6 shows two visitors with ages in different base numbers.



Rajah 6 / Diagram 6

Siapakah pengunjung yang akan dikenakan bayaran kemasukan?

Which visitors will be charged an entry fee?

[3 markah/marks]

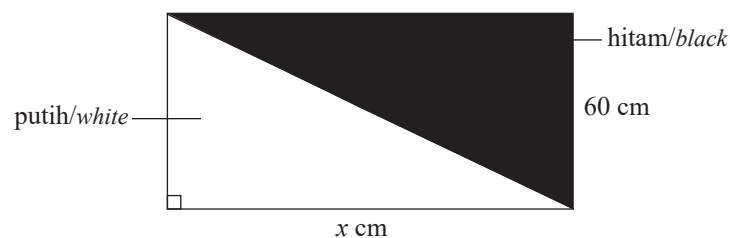
Jawapan/Answer:

- 8 Gaji bulanan Akia pada tahun 2023 dan 2024 masing-masing ialah RM22 452₆ dan RM25 012₆. Hitung peratusan kenaikan gaji tahunannya.
The monthly salary of Akia in the 2023 and 2024 were RM22 452₆ and RM25 012₆ respectively. Calculate the percentage of her annual increment.

[3 markah/marks]

Jawapan/Answer:

- 9 Rajah 7 menunjukkan karpét yang terdiri daripada dua bahagian yang berlainan warna, hitam dan putih.
Diagram 7 shows a carpet with of two parts of different colours, black and white.



Rajah 7 / Diagram 7

Diberi bahawa perimeter karpét itu ialah 2402₅ cm. Hitung luas, dalam cm², bahagian karpét yang berwarna hitam. Berikan jawapan dalam asas 10.

Given that the perimeter of the carpet is 2402₅ cm. Calculate the area, in cm², of the black part of the carpet. Give your answer in base 10.

[3 markah/marks]

Jawapan/Answer:

10 Jadual 1 menunjukkan markah yang diperoleh oleh tiga orang murid.

KBAT Table 1 shows the marks obtained by three students.

Murid Student	Pitriah	Khadijah	Nadhirah
Markah Mark	301_5	28 markah kurang daripada markah Pitriah <i>28 marks less than Pitriah's mark</i>	2 kali markah Khadijah <i>2 times Khadijah's mark</i>

Jadual 1 / Table 1

Ungkapkan markah Nadhirah sebagai nombor dalam asas tujuh.

Express Nadhirah's mark as a number 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

Pernyataan Statement

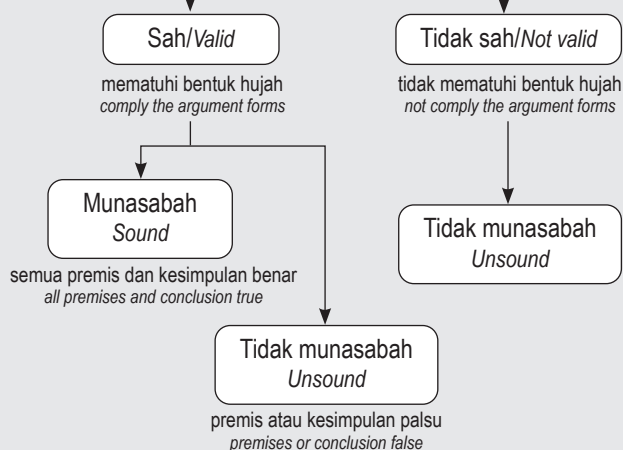
Pernyataan : Jika p , maka q
Statement : If p , then q
Akas : Jika q , maka p
Converse : If q , then p
Songsangan : Jika $\sim p$, maka $\sim q$
Inverse : If $\sim p$, then $\sim q$
Kontrapositif : Jika $\sim q$, maka $\sim p$
Contrapositive: If $\sim q$, then $\sim p$

p : antejadian
antecedent
 q : akibat
consequent

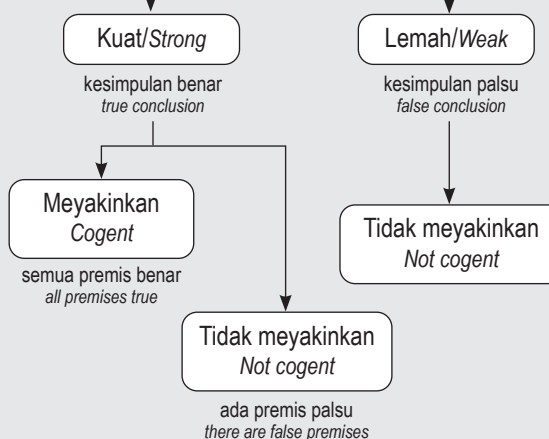
Hujah Deduktif Deductive Argument

	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



Hujah Induktif Inductive Argument





LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Antara berikut, yang manakah ialah satu pernyataan?

Which of the following is a statement?

- A $(-8) \times (-2)$
 B $n + 4 = 12$
 C $(-2)^3 = 6$
 D $a + 3b - 2c$

- 2 Antara berikut, pernyataan yang manakah benar?

Which of the following statements is true?

- A $-2 - 5 = 7$
 B $\{ \} \subset \{p, q, r\}$
 C $-6 > 0$
 D $\sqrt[3]{64} = 8$

- 3 Antara berikut, pernyataan yang manakah benar?

Which of the following statements is true?

- A Semua segi empat sama ialah rombus.
All squares are rhombuses.
 B Semua nombor perdana boleh dibahagikan dengan 1.
All prime numbers are divisible by 1.
 C Sebilangan nonagon mempunyai sembilan sisi.
Some nonagons have nine sides.
 D Sebilangan set kosong mempunyai unsur.
Some empty sets have elements.

- 4 Antara berikut, pernyataan yang manakah boleh diperluaskan dengan menggunakan pengkuantiti "semua"?

Which of the following statements can be generalised by using the quantifier "all"?

- A Nombor perdana, x , ialah satu nombor ganjil.
Prime number, x , is an odd number.
 B Set P mempunyai beberapa unsur.
Set P has some elements.
 C Heksagon $ABCDEF$ mempunyai sudut peluaran 60° .
Hexagon $ABCDEF$ has an exterior angle of 60° .
 D Sudut tirus, y , adalah kurang daripada 90° .
Acute angle, y , is less than 90° .

- 5 Antara berikut, pernyataan yang manakah benar?
Which of the following statements is true?

- A Semua nombor bulat adalah negatif.
All whole numbers are negative.
 B Sebilangan segi tiga ialah segi tiga bersudut tegak.
Some triangles are right-angled triangles.
 C Semua faktor bagi 20 ialah nombor genap.
All factors of 20 are even numbers.
 D Sebilangan sisi empat mempunyai lima sisi.
Some quadrilaterals have five sides.

6

Antejadian/Antecedent: $2 + x - y = 0$
 Akibat/Consequence : $x = y - 2$

Berdasarkan maklumat di atas, bentukkan implikasi yang sesuai.

Based on the information above, form a suitable implication.

- A Jika $x = y - 2$, maka $2 + x - y = 0$.
If $x = y - 2$, then $2 + x - y = 0$.
 B Jika $y = x$, maka $x - y = 2y$.
If $y = x$, then $x - y = 2y$.
 C Jika $2 + x - y = 0$, maka $x = y - 2$.
If $2 + x - y = 0$, then $x = y - 2$.
 D Jika $2 + x - y = 0$, maka $x = -y$.
If $2 + x - y = 0$, then $x = -y$.

- 7 Rajah 1 menunjukkan suatu maklumat.
Diagram 1 shows an information.

Implikasi : Jika $4^n = 64$, maka $n = 3$.
Implication: If $4^n = 64$, then $n = 3$.
 : Jika $n \neq 3$, maka $4^n \neq 64$.
 : If $n \neq 3$, then $4^n \neq 64$.

Rajah 1 / Diagram 1

Antara berikut, yang manakah perlu diisi di dalam petak kosong?

Which of the following has to be filled in the box?

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

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.

[5 markah/marks]

Jawapan/Answer:

Ayat <i>Sentence</i>	Pernyataan atau bukan <i>Statement or not</i>
(a) Kuantan ialah ibu negeri Pahang. <i>Kuantan is the capital of Pahang.</i>	
(b) $3k + 2 = 6k$	
(c) Sebuah heksagon mempunyai 7 sisi. <i>A hexagon has 7 sides.</i>	
(d) Tolong bersihkan dewan ini! <i>Please clean up this hall!</i>	
(e) $a \in \{a, b, c, d, e\}$	

- 2** Nyatakan sama ada setiap pernyataan yang berikut adalah benar atau palsu.
State whether each of the following statement is true or false.

[5 markah/marks]

Jawapan/Answer:

Pernyataan <i>Statement</i>	Benar atau palsu <i>True or false</i>
(a) 1 liter = 1 000 cm ³ dan 1 m ² = 10 000 cm ² . <i>1 litre = 1 000 cm³ and 1 m² = 10 000 cm².</i>	
(b) $\frac{1}{4} > \frac{1}{3}$ dan $8^2 = 64$. $\frac{1}{4} > \frac{1}{3}$ and $8^2 = 64$.	
(c) 10 ialah gandaan 5 atau 10 ialah faktor bagi 65. <i>10 is a multiple of 5 or 10 is a factor of 65.</i>	
(d) $8^3 = 24$ atau $\sin 90^\circ = 0$. $8^3 = 24$ or $\sin 90^\circ = 0$.	
(e) $\{p, q, r\} \subset \{p, r\}$ atau $a^2 + b^2 = (a + b)^2$. $\{p, q, r\} \subset \{p, r\}$ or $a^2 + b^2 = (a + b)^2$.	

- 3 Nyatakan antejadian dan akibat bagi implikasi “jika p , maka q ” berikut.
State the antecedent and consequent of the following implication “if p , then q ”.

- (a) Jika $x = -2$, maka $x^2 - 4 = 0$.
If $x = -2$, then $x^2 - 4 = 0$.
- (b) Jika y ialah nombor bulat, maka $2y$ ialah nombor genap.
If y is a whole number, then $2y$ is an even number.
- (c) Jika PQR ialah segi tiga sama sisi, maka $PQ = QR = RQ$.
If PQR is an equilateral triangle, then $PQ = QR = RQ$.

[6 markah/marks]

Jawapan/Answer:

-
- 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 ”.

- (a) $\angle PQR < 90^\circ$ jika dan hanya jika $\angle PQR$ ialah sudut tirus.
 $\angle PQR < 90^\circ$ if and only if $\angle PQR$ is an acute angle.
- (b) $\frac{n}{9} < 0$ jika dan hanya jika $n < 9$.
 $\frac{n}{9} < 0$ if and only if $n < 9$.
- (c) $y = 1$ jika dan hanya jika $2y + 3 = 5$.
 $y = 1$ if and only if $2y + 3 = 5$.

[6 markah/marks]

Jawapan/Answer:

- 5 Tulis akas, songsangan dan kontrapositif bagi implikasi berikut. Tentukan nilai kebenaran implikasi, akas, songsangan dan kontrapositif.

Write the converse, inverse and contrapositive of the following implications. Determine the truth value of the implication, converse, inverse and contrapositive.

- (a) Jika $x < 6$, maka $x < 8$.
If $x < 6$, then $x < 8$.
- (b) Jika $88 + 3 < 90$, maka $45 - 17 > 23$.
If $88 + 3 < 90$, then $45 - 17 > 23$.
- (c) Jika JKLM ialah sebuah segi empat selari, maka JK selari dengan LM.
If JKLM is a parallelogram, then JK is parallel to LM.

[12 markah/marks]

Jawapan/Answer:

- (a) Implikasi/Implication: _____
 Akas/Converse: _____
 Songsangan/Inverse: _____
 Kontrapositif/Contrapositive: _____
- (b) Implikasi/Implication: _____
 Akas/Converse: _____
 Songsangan/Inverse: _____
 Kontrapositif/Contrapositive: _____
- (c) Implikasi/Implication: _____
 Akas/Converse: _____
 Songsangan/Inverse: _____
 Kontrapositif/Contrapositive: _____

- 6 Tentukan sama ada hujah berikut adalah hujah deduktif atau hujah induktif.

Determine whether the following argument is a deductive argument or inductive argument.

- (a) Seekor haiwan tanpa tulang belakang dikenali sebagai invertebrata. Ular tiada tulang belakang. Oleh itu, ular ialah sejenis haiwan invertebrata.
An animal without backbone is called invertebrate. A snake does not have backbone. Thus, snake is an invertebrate animal.
- (b) Terdapat empat nombor dalam satu set. Nombor yang pertama ialah 2, nombor yang kedua ialah 3, nombor yang ketiga ialah 5 dan nombor yang keempat ialah 7. Oleh itu, semua nombor dalam set itu ialah nombor perdana.
There are four numbers in a set. The first number is 2, the second number is 3, the third number is 5 and the fourth number is 7. Therefore, all the numbers in the set are prime numbers.

[2 markah/marks]

Jawapan/Answer:

- 7 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 murid Tingkatan 4 Alpha mempunyai kalkulator.

Premise 1: All pupils in Form 4 Alpha have a calculator.

Premis 2: Suzila ialah murid Tingkatan 4 Alpha.

Premise 2: Suzila is a pupil in Form 4 Alpha.

Kesimpulan: Suzila mempunyai kalkulator.

Conclusion: Suzila has a calculator.

[2 markah/marks]

Jawapan/Answer:

- (b) Premis 1: Jika $n = 5$, maka $n^2 = 25$.

Premise 1: If $n = 5$, then $n^2 = 25$.

Premis 2: $n = 5$.

Premise 2: $n = 5$.

Kesimpulan: $n^2 = 25$.

Conclusion: $n^2 = 25$.

[2 markah/marks]

Jawapan/Answer:

- (c) Premis 1: Jika k ialah gandaan 6, maka k ialah gandaan 3.

Premise 1: If k is a multiple of 6, then k is multiple of 3.

Premis 2: 15 bukan gandaan 3.

Premise 2: 15 is not a multiple of 3.

Kesimpulan: 15 bukan gandaan 6.

Conclusion: 15 is not a multiple of 6.

[2 markah/marks]

Jawapan/Answer:

- (d) Premis 1: Semua pentagon sekata mempunyai 20 pepenjuru.

Premise 1: All regular pentagons have 20 diagonals.

Premis 2: $PQRST$ mempunyai 20 pepenjuru.

Premise 2: $PQRST$ has 20 diagonals.

Kesimpulan: $PQRST$ ialah pentagon sekata.

Conclusion: $PQRST$ is a regular pentagon.

[2 markah/marks]

Jawapan/Answer:

8 Lengkapkan hujah Bentuk I yang berikut.*Complete the following Form I arguments.*

[2 markah/marks]

- (a) Premis 1 : Semua set dengan
- n
- unsur mempunyai
- 2^n
- subset.

Premise 1 : All sets with n elements have 2^n subsets.

Premis 1 : _____

*Premise 1 : _____*Kesimpulan: Set P mempunyai 2^5 subset.*Conclusion : Set P has 2^5 subsets.*

- (b) Premis 1 : _____

*Premise 1 : _____*Premis 2 : $PQRST$ ialah sebuah pentagon sekata.*Premise 2 : $PQRST$ is a regular pentagon.*Kesimpulan: $PQRST$ mempunyai sudut pedalaman 108° .*Conclusion : $PQRST$ has an interior angle of 108° .***9** Lengkapkan hujah Bentuk II yang berikut.*Complete the following Form II arguments.*

[2 markah/marks]

- (a) Premis 1 : Jika
- x
- ialah satu sudut cakak, maka
- $90^\circ < x < 180^\circ$
- .

*Premise 1 : If x is an obtuse angle, then $90^\circ < x < 180^\circ$.*Premis 2 : y ialah satu sudut cakak.*Premise 2 : y is an obtuse angle.*

Kesimpulan: _____

Conclusion : _____

- (b) Premis 1 : _____

*Premise 1 : _____*Premis 2 : Digit akhir bagi m ialah sifar.*Premise 2 : The last digit of m is zero.*Kesimpulan: m ialah gandaan 10.*Conclusion : m is a multiple of 10.***10** Lengkapkan hujah Bentuk III yang berikut.*Complete the following Form III arguments.*

[2 markah/marks]

- (a) Premis 1 : Jika
- $PQRS$
- ialah sebuah segi empat sama, maka sisinya sama panjang.

Premise 1 : If $PQRS$ is a square, then its sides are equal.

Premis 2 : Sisinya tidak sama panjang.

Premise 2 : Its sides are not equal.

Kesimpulan: _____

Conclusion : _____

- (b) Premis 1 : _____

*Premise 1 : _____*Premis 2 : $x^2 \neq 100$ *Premise 2 : $x^2 \neq 100$* Kesimpulan: $x - 3 \neq 7$ *Conclusion : $x - 3 \neq 7$*

- 11** Buat satu kesimpulan secara deduksi bagi pernyataan yang diberikan.

Make a conclusion by deduction for the given statements.

(a)

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

Bulatan M mempunyai jejari 8 cm.

Circle M has a radius of 8 cm.

(b)

Bilangan pepenjuru bagi sebuah poligon bersisi n ialah $\frac{n(n-3)}{2}$.
The number of diagonals for an n -sided polygon is $\frac{n(n-3)}{2}$.

Cari bilangan pepenjuru bagi sebuah oktagon.

Find the number of diagonals for an octagon.

[2 markah/marks]

Jawapan/Answer:

- 12** Berdasarkan pada setiap pola yang berikut, buat satu kesimpulan umum secara induksi mengenai jujukan nombor yang diberikan.

Based on each of the following patterns, make a general conclusion by induction regarding the number sequences given.

(a) 8, 13, 18, 23, ...

$$5(1) + 3 = 8$$

$$5(2) + 3 = 13$$

$$5(3) + 3 = 18$$

$$5(4) + 3 = 23$$

(c) 6, 18, 36, 60, ...

$$3(1 \times 2) = 6$$

$$3(2 \times 3) = 18$$

$$3(3 \times 4) = 36$$

$$3(4 \times 5) = 60$$

(b) 23, 17, 11, 5, ...

$$23 - 6(0) = 23$$

$$23 - 6(1) = 17$$

$$23 - 6(2) = 11$$

$$23 - 6(3) = 5$$

(d) 4, 22, 52, 94, ...

$$6 \times 1 - 2 = 4$$

$$6 \times 4 - 2 = 22$$

$$6 \times 9 - 2 = 52$$

$$6 \times 16 - 2 = 94$$

[4 markah/marks]

Jawapan/Answer:

- 13 Tentukan sama ada hujah yang berikut adalah 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.

Premis 1: 24 ialah gandaan 6.
Premise 1: 24 is a multiple of 6.
 Premis 2: 36 ialah gandaan 6.
Premise 2: 36 is a multiple of 6.
 Premis 3: 40 ialah gandaan 6
Premise 3: 40 is a multiple of 6.
 Kesimpulan: Semua gandaan 6 ialah nombor genap.
Conclusion: All the multiple of 6 are even numbers.

[2 markah/marks]

Jawapan/Answer:

- 14 (a) Tukar setiap pernyataan benar yang berikut kepada pernyataan palsu, atau sebaliknya, dengan menggunakan 'bukan' atau 'tidak'.

Change each of the following true statements into false statements, or vice versa, using 'not' or 'no'.

- (i) Semua orang yang kaya adalah pemurah.
All rich people are generous.
 (ii) $(x + 6)(x - 2)$ adalah satu pernyataan.
 $(x + 6)(x - 2)$ is a statement.
 (iii) $x^2 - 25 = 0$ mempunyai dua punca penyelesaian.
 $x^2 - 25 = 0$ has two different roots.

[3 markah/marks]

- (b) Tulis Premis 2 untuk melengkapkan hujah berikut:

Write down Premise 2 to complete the following argument:

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

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

Premis 2: _____

Premise 2: _____

Kesimpulan: $3m \leq 15$

Conclusion: $3m \leq 15$

[1 markah/mark]

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

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

$$\begin{aligned} 3 &= 3(1) + 2(0)^2 \\ 8 &= 3(2) + 2(1)^2 \\ 17 &= 3(3) + 2(2)^2 \\ 30 &= 3(4) + 2(3)^2 \\ \dots &= \dots \end{aligned}$$

[2 markah/marks]

Jawapan/Answer:

- 15 (a) Tentukan sama ada hujah yang berikut adalah 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.

Premis 1: 3 ialah faktor bagi 30.
Premise 1: 3 is a factor of 30.
 Premis 2: 5 ialah faktor bagi 30.
Premise 2: 5 is a factor of 30.
 Kesimpulan: Semua faktor 30 ialah nombor ganjil.
Conclusion: All the factors of 30 are odd numbers.

[2 markah/marks]

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

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

[1 markah/mark]

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

Jika $(x + 3)(x - 3) = 0$, maka bentuk am persamaan kuadratik ialah $x^2 - 9 = 0$.
If $(x + 3)(x - 3) = 0$, then the general form of a quadratic equation is $x^2 - 9 = 0$.

[2 markah/marks]

- (d) Berikut ialah satu hujah yang tidak lengkap.
The following is an incomplete argument.

Premis/Premise 1: _____
 Premis/Premise 2: $12 \div n \neq 4$
 Kesimpulan/Conclusion: $n \neq 3$

- (i) Lengkapkan Premis 1 dalam hujah tersebut.
Complete the Premise 1 in the argument.

[1 markah/mark]

- (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

[2 markah/marks]

Jawapan/Answer:

(a)

(b)

(c) Anteajian/Antecedent: _____
 Akibat/Consequent: _____

(d) (i) Premis/Premise 1: _____

(ii)

- 16 (a) Tulis songsangan bagi implikasi berikut dan tentukan nilai kebenarannya.
Write the inverse of the following implication and determine its truth value.

Jika 6 ialah faktor bagi 36, maka 36 boleh dibahagi tepat dengan 6.
If 6 is a factor of 36, then 36 is divisible by 6.

[2 markah/marks]

- (b) Gabungkan dua pernyataan berikut supaya menjadi satu pernyataan yang benar.
Combine the two of the following statements to form a true statement.

Pernyataan/Statement I : $(-5)^3 = 125$
 Pernyataan/Statement II : $(-6)^2 = 36$

[1 markah/mark]

- (c) Lengkapkan setiap pernyataan berikut dengan pengkuantiti “semua” atau “sebilangan” supaya menjadi suatu pernyataan benar.
Complete each of the following statements with the quantifier “all” or “some” so that it will become a true statement.

- (i) _____ kuasa dua bagi nombor negatif adalah positif.
 _____ *square of negative numbers is positive.*
- (ii) _____ nombor perdana adalah nombor ganjil.
 _____ *prime numbers are odd numbers.*
- (iii) _____ pecahan tak wajar adalah lebih besar daripada 1.
 _____ *improper fractions are greater than 1.*

[3 markah/marks]

- (d) Berikut ialah satu hujah yang tidak lengkap.
The following is an incomplete argument.

Premis 1 : Jika r ialah faktor bagi 24, maka 24 boleh dibahagi tepat dengan r .
Premise 1 : If r is a factor of 24, then 24 is divisible by r .

Premis/Premise 2: _____

Kesimpulan: 3 bukan faktor bagi 24.
Conclusion: 3 is not a factor of 24.

- (i) Lengkapkan Premis 2 dalam hujah tersebut.
Complete the Premise 2 in the argument.

[1 markah/mark]

- (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. Give your justification

[2 markah/marks]

- (e) Diberi bahawa jumlah sudut pedalaman sebuah poligon dengan n sisi ialah $(n - 2) \times 180^\circ$. Beri satu kesimpulan secara deduksi tentang jumlah sudut pedalaman sebuah dekaagon.

It is given that the sum of the interior angles of a polygon of n sides is $(n - 2) \times 180^\circ$. Make one conclusion by deduction on the sum of the interior angles of a decagon.

[2 markah/marks]

Jawapan/Answer:

(a)

(b)

(c) (i)

(ii)

(iii)

(d) (i) Premis/Premise 2: _____

(ii)

(e)

Operasi Set

Operations on Sets



VIDEO PEMBELAJARAN

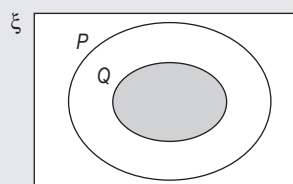
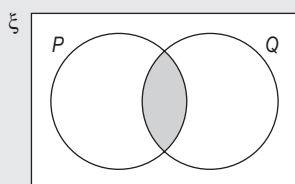
NOTA EFEKTIF

Persilangan Set

Intersection of Sets

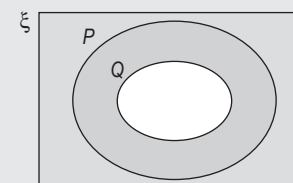
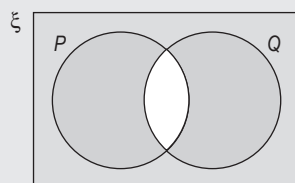
- 1 **Persilangan** set bagi set P dan set Q ialah set yang mengandungi unsur-unsur sepunya bagi kedua-dua set P dan set Q , $P \cap Q$.

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 , $(P \cap Q)'$.

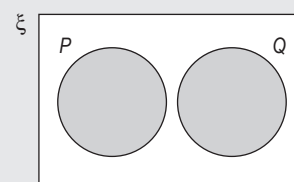
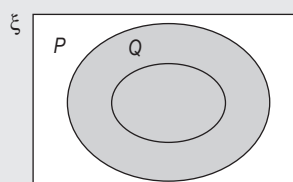
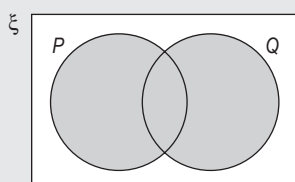


Kesatuan Set

Union of Sets

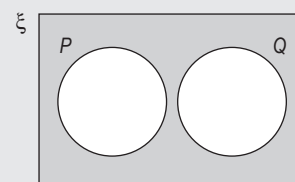
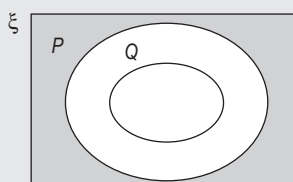
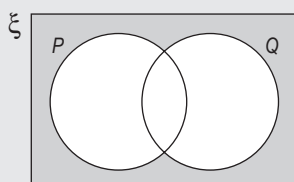
- 1 **Kesatuan** set bagi set P dan set Q ialah set yang mengandungi semua unsur dalam set P dan set Q , $P \cup Q$.

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.

- 1 Diberi bahawa set semesta, $\xi = \{x : 15 \leq x \leq 30, x \text{ ialah integer}\}$ dan set $N = \{x : x \text{ ialah nombor perdana}\}$.

It is given that universal set, $\xi = \{x : 15 \leq x \leq 30, x \text{ is an integer and set } N = \{x : x \text{ is a prime number}\}$.

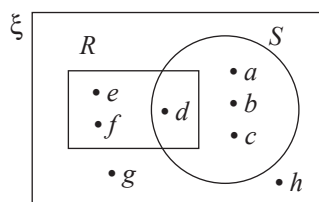
Senaraikan semua unsur bagi set N .

List all the elements of set N .

- A {15, 17, 19, 23} C {15, 17, 21, 23, 29}
B {17, 19, 23, 29} D {17, 19, 21, 23, 29}

- 2 Gambar rajah Venn dalam Rajah 1 menunjukkan set semesta, ξ , set R dan set S .

The Venn diagram in Diagram 1 shows the universal set, ξ , set R and set S .



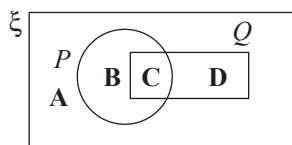
Rajah 1 / Diagram 1

Senaraikan semua unsur bagi set $(R \cup S)'$.

List all the elements of set $(R \cup S)'$.

- A {g, h} C {e, f, g, h}
B {a, b, c} D {a, b, c, d, e, f}

- 3 Rajah 2 menunjukkan suatu gambar rajah Venn.
Diagram 2 shows a Venn diagram.



Rajah 2 / Diagram 2

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 $P \cap Q$?

- 4 Diberi set semesta, $\xi = \{x : x \text{ ialah integer}, 1 \leq x \leq 30\}$, set $M = \{x : x \text{ ialah gandaan } 4\}$, set $R = \{x : x \text{ ialah gandaan } 8\}$.

Antara berikut, pernyataan yang manakah adalah benar?

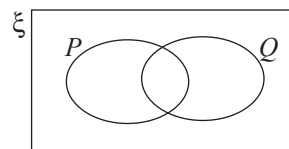
Given that the universal set $\xi = \{x : x \text{ is an integer}, 1 \leq x \leq 30\}$, set $M = \{x : x \text{ is a multiple of } 4\}$, set $R = \{x : x \text{ is a multiple of } 8\}$.

Which of the following statements is true?

- A $M \subset R$ C $M \cap R = R$
B $R \not\subset M$ D $M \cap R = M$

- 5 Rajah 3 ialah sebuah gambar rajah Venn yang menunjukkan set semesta, ξ , set P dan set Q .

Diagram 3 is a Venn diagram showing the universal set, ξ , set P and set Q .



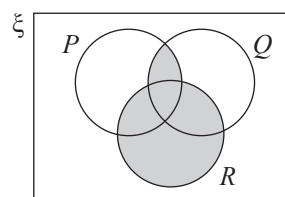
Rajah 3 / Diagram 3

Jika $n(\xi) = 50$, $n(P) = 16$, $n(Q) = 18$ dan $n(P \cap Q) = 7$, cari nilai bagi $n(P \cup Q)$.

If $n(\xi) = 50$, $n(P) = 15$, $n(Q) = 18$ and $(P \cap Q) = 7$, find the value of $n(P \cup Q)$.

- A 16 C 23
B 18 D 27

- 6 Rajah 4 menunjukkan suatu gambar rajah Venn.
Diagram 4 shows a Venn diagram.



Rajah 4 / Diagram 4

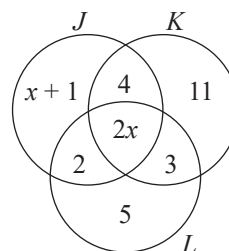
Nyatakan set yang diwakili oleh kawasan berlorek.

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 $(P \cup Q) \cap R$

- 7 Rajah 5 menunjukkan gambar rajah Venn dengan set semesta, $\xi = J \cup K \cup L$.

Diagram 5 shows a Venn diagram with the universal set, $\xi = J \cup K \cup L$.



Rajah 5 / Diagram 5

Diberi $n(J \cap K) = n(K')$, cari nilai x .

Given $n(J \cap K) = n(K')$, find the value of x .

- A 2 C 6
B 4 D 8

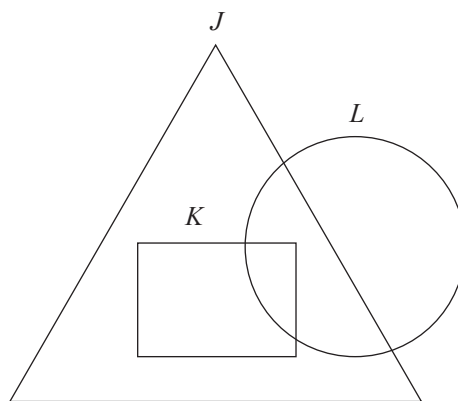
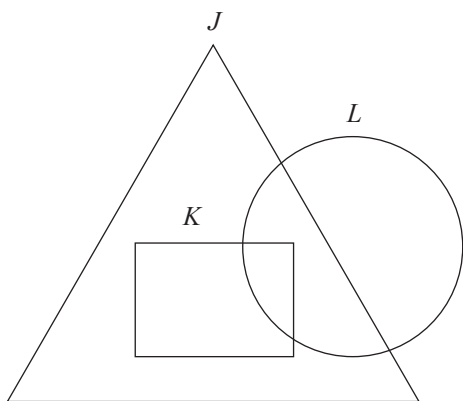
Soalan Subjektif

Jawab semua soalan.

- 1 Gambar rajah Venn di ruang jawapan menunjukkan set J , set K dan set L dengan keadaan $\xi = J \cup K \cup L$. Pada rajah di ruang jawapan, lorekkan rantau yang memuaskan setiap yang berikut.
The Venn diagrams in the answer space shows set J , set K and set L such that the universal set $\xi = J \cup K \cup L$. On the diagram in the answer space, shade the region that satisfy each of the following.

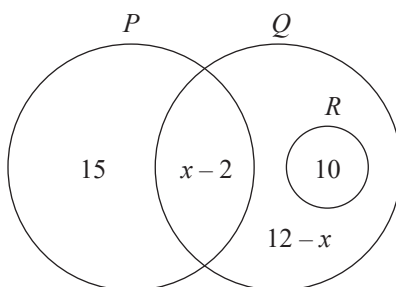
[3 markah/marks]

Jawapan/Answer:

(a) $J \cap L$ (b) $(J' \cap L) \cup K$ 

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

Daigram 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:

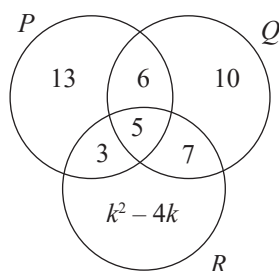


- 3 Diberi bahawa set semesta, $\xi = \{x : 10 \leq x \leq 30, x \text{ ialah integer}\}$, set $V = \{x : x \text{ mempunyai dua digit yang sama}\}$ dan set $W = \{x : x \text{ ialah gandaan bagi } 5\}$. Senaraikan semua unsur bagi
- It is given that universal set, $\xi = \{x : 10 \leq x \leq 30, x \text{ is an integer}\}$, and set $V = \{x : x \text{ has two same digits}\}$ and set $W = \{x : x \text{ is a multiple of } 5\}$. List all the elements of*
- (a) (i) set V , (ii) set W ,
 (b) set $(V \cap W)$.

[3 markah/marks]

Jawapan/Answer:

- 4 Gambar rajah Venn berikut menunjukkan set P , set Q dan set R dengan keadaan set semesta, $\xi = P \cup Q \cup R$. Bilangan unsur bagi setiap set itu ditunjukkan dalam rajah berikut.
- The following Venn diagram shows set P , set Q and set R such that the universal set, $\xi = P \cup Q \cup R$. The number of elements for each set is shown in the diagram below.*



Rajah 2 / Diagram 2

Cari/Find

- (a) $n(Q \cup R)'$,
 (b) nilai bagi $n[(P \cup Q) \cap R]$,
 the value of $n[(P \cup Q) \cap R]$,
 (c) dua nilai k jika $n(P) = n(R)$.
 the two values of k if $n(P) = n(R)$.

[4 markah/marks]

Jawapan/Answer:

- 5 Diberi set semesta, $\xi = \{x : x \text{ ialah integer, } 1 \leq x \leq 10\}$, set $P = \{x : x \text{ ialah gandaan } 5\}$ dan set $Q = \{x : x \text{ ialah nombor perdana}\}$.

Given the universal set, $\xi = \{x : x \text{ is an integer, } 1 \leq x \leq 10\}$, set $P = \{x : x \text{ is a multiple of } 5\}$ and set $Q = \{x : x \text{ is a prime number}\}$.

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

Complete the Venn diagram in the answer space.

- (b) Cari/Find

(i) $n(P)$,

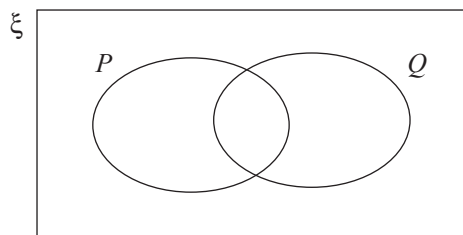
(ii) $n(P \cup Q)$.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)



- 6 (a) Gambar rajah Venn di ruang jawapan menunjukkan set V , set W dan set Z dengan keadaan set semesta, $\xi = V \cup W \cup Z$. Pada ruang jawapan, lorek set $(V \cap W) \cup Z$.

The Venn diagram in the answer space shows set V , set W and set Z such that the universal set, $\xi = V \cup W \cup Z$.

On the diagram in the answer space, shade the set $(V \cap W) \cup Z$.

- (b) Diberi bahawa/Given that

$\xi = \{2, 4, 6, 8, 10, 12, 14, 16, 18\}$,

Set $P = \{x : x \text{ ialah gandaan bagi } 4\}$,

Set $P = \{x : x \text{ is a multiple of } 4\}$,

Set $Q = \{x : x \text{ ialah nombor genap kurang daripada } 12\}$.

Set $Q = \{x : x \text{ is an even number is less than } 12\}$.

Senaraikan unsur-unsur bagi

List of the elements of

(i) $(P \cup Q)'$,

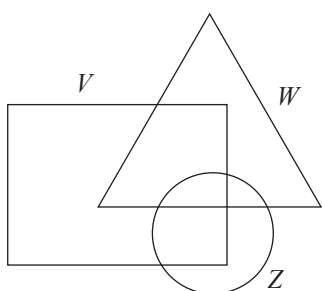
(ii) $(P' \cap Q)$.

[4 markah/marks]

Jawapan/Answer:

(a)

(b)

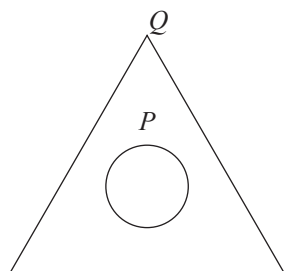


- 7 (a) Gambar rajah Venn di ruang jawapan menunjukkan set P dan set Q dengan keadaan set semesta, $\xi = P \cup Q$. Pada ruang jawapan, lorek set P' .
The Venn diagram in the answer space shows set P and set Q such that the universal set $\xi = P \cup Q$. On the diagram in the answer space, shade the set of P' .
- (b) Diberi set semesta, $\xi = M \cup N$, set M dan set N dengan keadaan $n(\xi) = 42$, $n(M) = 30$, $n(M \cap N) = 7$ dan $n(M') = x + 5$. Cari nilai x .
Given the universal set, $\xi = M \cup N$, set M and set N such that $n(\xi) = 42$, $n(M) = 30$, $n(M \cap N) = 7$ and $n(M') = x + 5$. Find the value of x .

[3 markah/marks]

Jawapan/Answer:

(a)



(b)

- 8 Terdapat 20 000 buah keluarga dalam bandar M . Satu kajian telah dijalankan mengenai pilihan keluarga membeli surat khabar P , Q dan R . Daripada kajian itu, 35% keluarga membeli surat khabar P , 20% membeli surat khabar Q dan 18% membeli surat khabar R . Daripada jumlah itu, 5% membeli surat khabar P dan Q , 3% membeli surat khabar Q dan R , 2.5% membeli surat khabar P dan R manakala 2% membeli ketiga-tiga surat khabar itu.

There are 20 000 families in town M . A survey is carried out to find the choice of newspapers, P , Q and R bought by the families. From the survey, 35% bought newspaper P , 20% bought newspaper Q and 18% bought newspaper R . From the total, 5% bought newspapers P and Q , 3% bought newspapers Q and R , 2.5% bought newspapers P and R while 2% bought all the three newspapers.

- (a) Lukis dan labelkan sebuah gambar rajah Venn untuk mewakili keadaan tersebut.

Draw and label a Venn diagram to represent the information.

- (b) Tentukan bilangan keluarga yang

Determine the number of families who

- tidak membeli sebarang surat khabar P , Q dan R ,
did not buy any of the newspapers P , Q and R ,
- membeli surat khabar R sahaja.
bought newspaper R only.

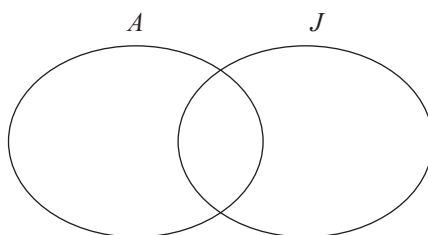
[4 markah/marks]

Jawapan/Answer:

- 9 (a) Diberi set semesta, $\xi = E \cup F \cup G$ dengan keadaan $E \subset F \not\subset G$ dan $F \cap G = 0$.
Given universal set, $\xi = E \cup F \cup G$ such that $E \subset F \not\subset G$ and $F \cap G = 0$.
 Lukis dan labelkan sebuah gambar rajah Venn untuk mewakili set E , F dan G di ruang jawapan.
Draw and label a Venn diagram to represent set E , F and G in the answer space.

[2 markah/marks]

- (b) Rajah 3 ialah sebuah gambar rajah Venn yang menunjukkan set A dan set J dengan keadaan $\xi = A \cup J$.
Diagram 3 is a Venn diagram showing set A and set J such that the universal set $\xi = A \cup J$.



Rajah 3 / Diagram 3

Diberi

Set semesta, $\xi = \{\text{sekumpulan pekerja di sebuah syarikat}\}$,Set $A = \{\text{pekerja yang boleh berbahasa Arab}\}$,Set $J = \{\text{pekerja yang boleh berbahasa Jepun}\}$.

Given

The universal set, $\xi = \{\text{a group of employees in a company}\}$,Set $A = \{\text{employees who can speak Arabic}\}$,Set $J = \{\text{employees who can speak Japanese}\}$.

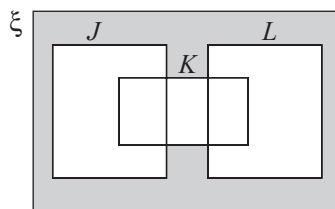
Jika $n(\xi) = 80$, $n(A) = 55$ dan $n(J) = 37$, berapakah bilangan pekerja yang boleh berbahasa Jepun sahaja?

If $n(\xi) = 80$, $n(A) = 55$ and $n(J) = 27$, how many of employees can speak Japanese only?

[4 markah/marks]

Jawapan/Answer:

- 10 (a) Gambar rajah Venn berikut menunjukkan universal set ξ , set J , set K dan set L .
The following Venn diagram shows universal set ξ , set J , set K and set L .

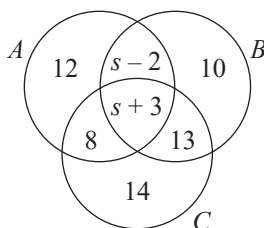


Rajah 4 / Diagram 4

Nyatakan set yang mewakili rantau berlorek.
State the set that represents the shaded region.

[2 markah/marks]

- (b) Gambar rajah Venn berikut menunjukkan set A , B dan C .
 Diberi bahawa set semesta $\xi = A \cup B \cup C$.
*The following Venn diagram shows sets, J , K and L .
 Given the universal set $\xi = A \cup B \cup C$.*



Rajah 5 / Diagram 5

Cari/Find

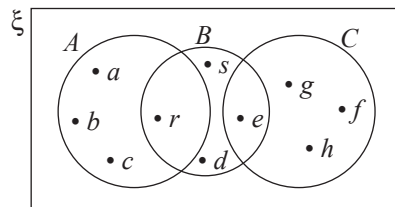
- $n(B \cup C)'$,
- $n[(A \cup C) \cap B']$,
- nilai bagi s jika $n(A \cap B)' = n(C' \cup B')$.
the value of s if $n(A \cap B)' = n(C' \cup B')$.

[3 markah/marks]

Jawapan/Answer:

11 Senaraikan semua unsur bagi set yang berikut.*List all the elements of the following sets.*

(a)



Rajah 6 / Diagram 6

Cari/Find:

- (i) $A \cup B \cap C$,
- (ii) $A \cup (B \cap C)$,
- (iii) $B' \cap (A \cup C)$.

[3 markah/marks]

Jawapan/Answer:

(b) Diberi/Given that:

set semesta, $\xi = \{x : x \text{ ialah integer, } 3 \leq x \leq 15\}$,universal set, $\xi = \{x : x \text{ is an integer, } 3 \leq x \leq 15\}$,set $P = \{x : x \text{ ialah nombor genap}\}$,set $P = \{x : x \text{ is an even number}\}$,set $Q = \{x : x \text{ ialah nombor gandaan 4}\}$,set $Q = \{x : x \text{ is a multiple of 4}\}$,set $R = \{x : x \text{ ialah faktor bagi 15}\}$.set $R = \{x : x \text{ is a factor of 15}\}$.(i) Lukiskan gambar rajah Venn bagi mewakili set P , Q dan R .*Draw a Venn diagram to represent sets P , Q and R .*(ii) Senaraikan semua unsur bagi $(P \cap Q) \cup R$.*List all the elements of $(P \cap Q) \cup R$.*

[2 markah/marks]

Jawapan/Answer:

BAB

5

Rangkaian dalam Teori Graf

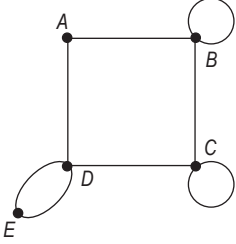
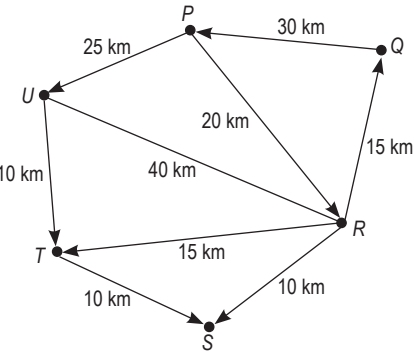
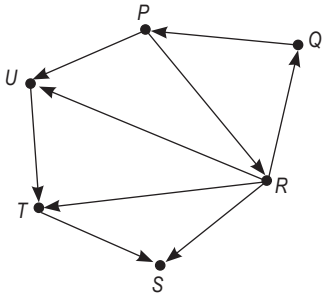
Network in Graph Theory



VIDEO 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 edges = $2 \times$ 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 <i>Undirected graph</i>	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 <i>Weighted graph</i>	- Bucu dihubungkan dengan nilai atau pemberat. <i>Edges are connected with a value of a weight.</i> - Melibatkan graf terarah dan graf tak terarah. <i>Involves directed graph and undirected graph.</i> - Tepi mewakili jarak antara dua tempat, masa pergerakan, nilai arus litar elektrik, kos dan sebagainya. <i>The edges represent the distance between two places, travelling time, the current in an electrical circuit, cost and etcetera.</i>	
Graf tak berpemberat <i>Unweighted graph</i>	- Bucu tidak dihubungkan dengan nilai atau pemberat. <i>Edges are not connected with a value or a weight.</i> - Melibatkan graf terarah dan graf tak terarah. <i>Involves directed graph and undirected graph.</i> - Tepi mengaitkan maklumat seperti hierarki jawatan dalam carta organisasi, peta alir, peta pokok dan peta buih. <i>The edge relates information like job hierarchy in an organization chart, flow map, tree map, and bubble map.</i>	

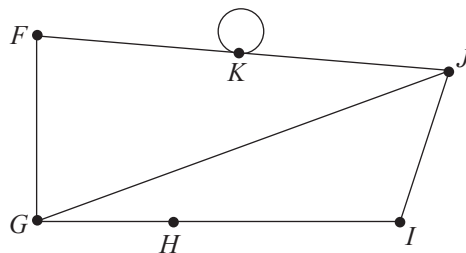


LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Rajah 1 menunjukkan suatu graf yang mempunyai gelung dan berbilang tepi.
Diagram 1 shows a graph which has loops and multiple edges.



Rajah 1 / Diagram 1

Cari jumlah bilangan darjah bagi graf itu.
Find the total number of degrees of the graph.

A 15

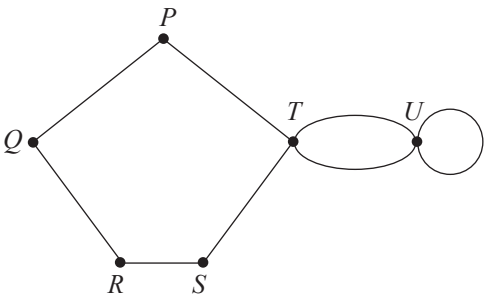
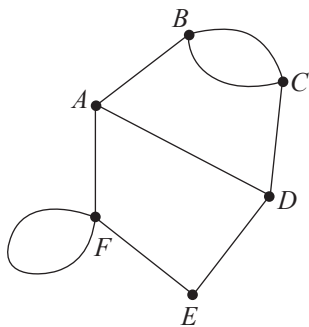
B 16

C 17

D 18

Soalan Subjektif
Jawab semua soalan.

- 1 Lengkapkan jadual di ruang jawapan berdasarkan graf berikut.
Complete the tables in the answer space based on following graphs.
(a) (b)



[2 markah/marks]

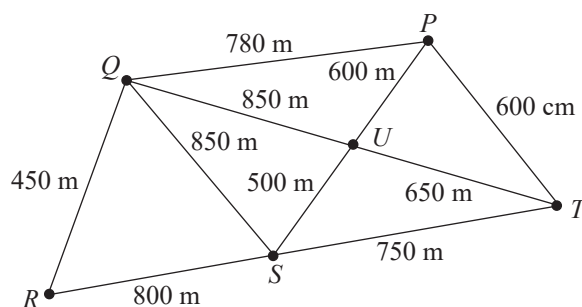
Jawapan/Answer:
(a) (b)

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

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

- 2 Encik Amran merupakan seorang ejen hartanah. Dia dilantik oleh pemaju perumahan untuk menjual enam buah rumah yang baru dibina. Dia ingin mengunjungi kesemua rumah tersebut. Rajah 1 menunjukkan kedudukan keenam-enam rumah tersebut, P , Q , R , S , T dan U .

Encik Amran is a property agent. He was appointed by a house developer to sell six houses that were recently built. He wants to visit all the houses. Diagram 1 shows the location of all the six houses, P , Q , R , S , T and U .



Rajah 1 / Diagram 1

Encik Amran bermula dengan mengunjungi rumah P dahulu. Lukis graf terarah yang mewakili jarak terpendek dan hitung jarak yang dilalui oleh Encik Amran.

Encik Amran starts by visiting house P first. Draw a directed graph representing the shortest distance and calculate the distance travelled by Encik Amran.

[2 markah/marks]

Jawapan/Answer:

3 Rajah 2 menunjukkan suatu rangkaian.

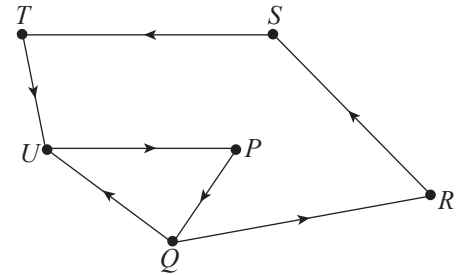
Diagram 2 shows a network.

(a) Nyatakan/State

- (i) V dan/and $n(V)$,
- (ii) E dan/and $n(E)$,
- (iii) bilangan darjah.
sum of degrees.

(b) Lukis satu pokok berdasarkan rajah tersebut.

Draw a tree based on the diagram.



Rajah 2 / Diagram 2

[6 markah/marks]

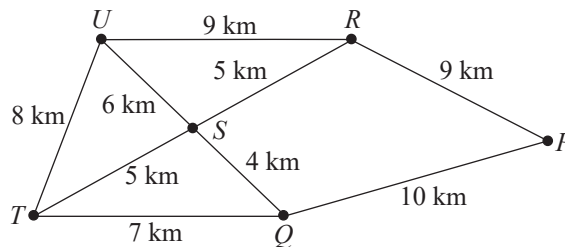
Jawapan/Answer:

- (a) (i) (ii) (iii)

(b)

4 Ani akan menyertai pertandingan berbasikal yang akan melalui enam lokasi yang berbeza. Rajah 3 menunjukkan graf tak terarah dan berpemberat yang menghubungkan semua lokasi tersebut.

Ani will participate in a cycling competition that will go through six different locations. Diagram 3 shows an undirected and weighted graph that connects all of the locations.



Rajah 3 / Diagram 3

(a) Lukis satu pokok berpemberat minimum dengan keadaan setiap lokasi hanya dilalui sekali sahaja.

Draw a minimum weighted tree with the condition that each location only travelled once.

(b) Hitung jarak maksimum yang dilalui dari lokasi P ke lokasi U dengan keadaan semua lokasi hanya dilalui sekali sahaja.

Calculate the maximum distance travelled from location P to location U with the condition that all locations are travelled only once.

[4 markah/marks]

Jawapan/Answer:

- (a) (b)

- 5 Jadual 1 menunjukkan jarak yang menghubungkan beberapa buah bandar.
Table 1 shows the distance connecting several towns.

Bandar Towns	Jarak Distance (km)
A dan/and B	12
B dan/and E	15
B dan/and C	14
C dan/and D	18
D dan/and E	17
B dan/and D	16
A dan/and E	10

Jadual 1 / Table 1

- (a) Lukiskan satu graf dengan pemberat berdasarkan maklumat dalam jadual tersebut.
Draw a graph with weightages based on the information in the table.
- (b) Nyatakan bilangan bucu dalam graf yang dilukis di (a).
State the number of vertices on the graph drawn in (a).
- (c) Tentukan $d(B)$.
Determine $d(B)$.

[4 markah/marks]

Jawapan/Answer:

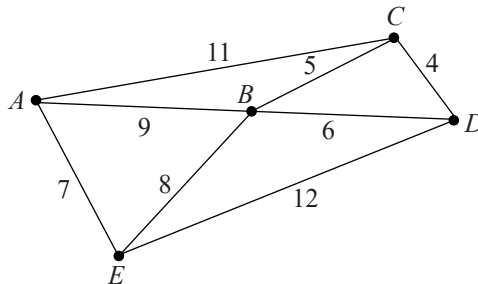
(a)

(b)

(c)

- 6 Rajah 4 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 4 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 4 / Diagram 4

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

[4 markah/marks]

Jawapan/Answer:



BAB

6

Ketaksamaan Linear dalam Dua Pemboleh Ubah

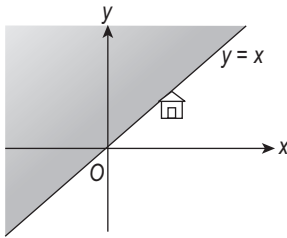
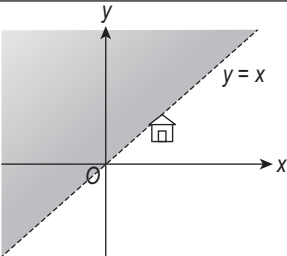
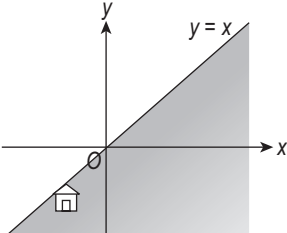
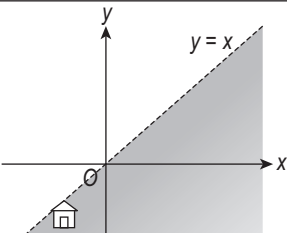
Linear Inequalities in Two Variables



VIDEO PEMBELAJARAN

NOTA EFEKTIF

1	Simbol Symbol	Ketaksamaan Inequality	Simbol Symbol	Ketaksamaan Inequality
	$>$	Lebih besar daripada Greater than	$\geq$	• Lebih besar daripada atau sama dengan Greater than or equal to • Sekurang-kurangnya At least • Tidak kurang daripada Not less than
	$<$	Kurang daripada Less than	$\leq$	• Kurang daripada atau sama dengan Less than or equal to • Selebih-lebihnya At most • Tidak lebih daripada Not more than

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>		

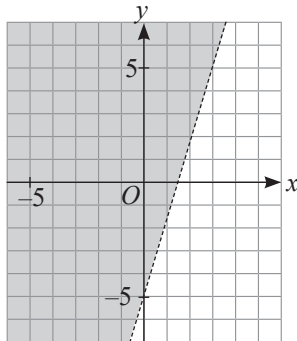


LATIHAN INTENSIF

 Soalan Objektif
Jawab semua soalan.

- 1 Rajah 1 menunjukkan rantau berlorek bagi suatu ketaksamaan linear.

Diagram 1 shows the shaded region for a linear inequality.



Rajah 1 / Diagram 1

Antara berikut, ketaksamaan linear yang manakah mewakili rantau berlorek?

Which of the following linear inequalities represents the shaded region?

- A $y > 3x + 5$ C $y > 3x - 5$
B $y < 3x - 5$ D $-3x < -y - 5$

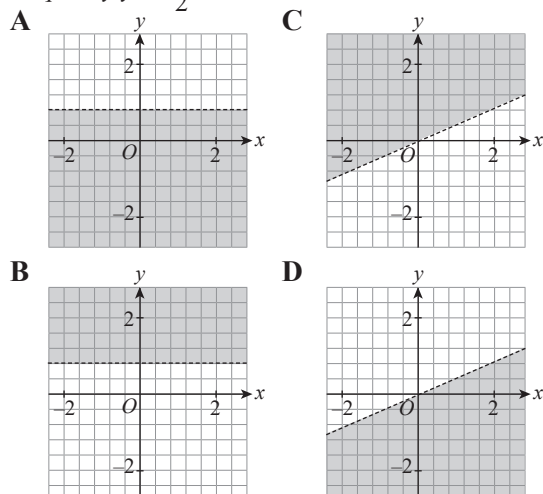
- 2 Antara berikut, titik yang manakah memuaskan ketaksamaan linear $y \leq \frac{1}{2}x + 7$?

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

- A $(-2, 4)$ C $(2, 10)$
B $(-4, 6)$ D $(4, 11)$

- 3 Antara berikut, rajah yang manakah mewakili ketaksamaan linear $y < \frac{1}{2}x$?

Which of the following diagram represents the linear inequality $y < \frac{1}{2}x$?



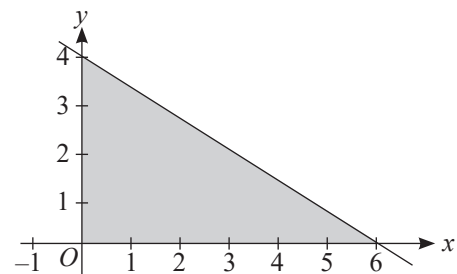
- 4 Dora menetapkan perbelanjaan maksimum RM50 untuk pembelian buah-buahan bagi satu minggu. Dora ingin membeli buah betik dan buah naga pada minggu tersebut. Harga bagi sekilogram betik ialah RM4.00 dan sekilogram buah naga ialah RM9.00. Ungkapkan situasi yang diberi dalam bentuk ketaksamaan linear.

Dora allocate a maximum budget of RM50 for purchasing fruits in a week. She plans to buy papayas and dragon fruits during that week. The price of papayas is RM4.00 per kilogram, and dragon fruits cost RM9.00 per kilogram. Express the situation given as a linear inequality.

- A $4x - 9y < 50$ C $4x - 9y > 50$
B $4x + 9y \leq 50$ D $4x + 9y \geq 50$

- 5 Rajah 2 menunjukkan satu rantau berlorek.

Diagram 2 shows a shaded region.



Rajah 2 / Diagram 2

Tentukan ketaksamaan yang memuaskan rantau berlorek dalam rajah tersebut.

Determine the inequality that satisfies the shaded region in the diagram.

- A $y \geq 0, x \geq 0$ dan/and $y \geq -\frac{2}{3}x + 4$
B $y \geq 0, x \geq 0$ dan/and $y \leq -\frac{2}{3}x + 4$
C $y \geq 0, x \geq 0$ dan/and $y \leq 6x + 4$
D $y \geq 0, x \geq 0$ dan/and $y \geq 6x + 4$

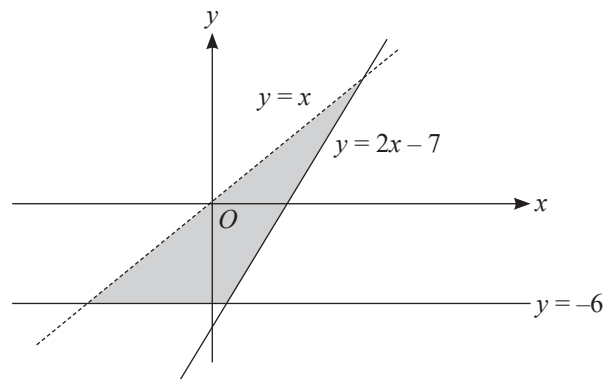
- 6 Antara padanan situasi dan ketaksamaan linear yang berikut, yang manakah **tidak benar**?

Which of the following pair of situations and linear inequalities is **incorrect**?

A	y tidak kurang daripada x y is not less than x	$y \geq x$
B	y kurang daripada x y less than x	$y < x$
C	Minimum y ialah k The minimum of y is k	$y \leq k$
D	Beza y dan x kurang daripada k The difference between y and x is less than k	$y - x < k$

Soalan Subjektif
Jawab semua soalan.

- 1 Berdasarkan rajah di bawah, tuliskan tiga ketaksamaan yang memuaskan rantau berlorek.
Based on the diagram below, write three inequalities that satisfy the shaded region.



[3 markah/marks]

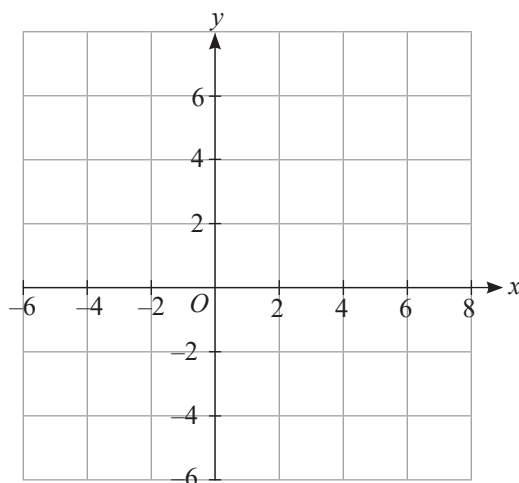
Jawapan/Answer:

- 2 Lukis graf dan lorek rantau yang memuaskan ketaksamaan linear yang berikut.
Draw a graph and shade the region that satisfies the following linear inequalities.

$$y \geq x + 2, y \geq -\frac{3}{4}x + 3, y \leq 5$$

[3 markah/marks]

Jawapan/Answer:

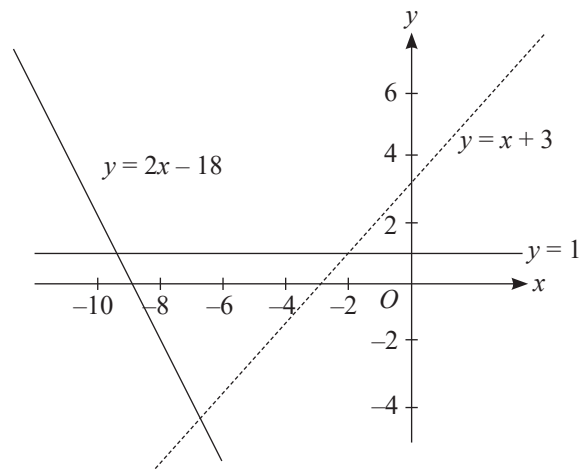


- 3 Lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan yang berikut.
Shade the region that satisfies all three of the following inequalities.

$$\begin{aligned} y &\geq -2x - 18 \\ y &\leq 1 \\ y &> x + 3 \end{aligned}$$

[3 markah/marks]

Jawapan/Answer:



- 4 Sebuah kilang kasut menghasilkan x ratus kasut jenama A dan y ratus kasut jenama B setiap hari. Jumlah kasut yang dihasilkan setiap hari tidak melebihi 4 ratus dan bilangan kasut jenama A yang dihasilkan adalah maksimum 2 kali bilangan kasut jenama B .

A shoe factory produces x hundreds of shoes of brand A and y hundreds of shoes of brand B each day. The total number of shoes produced each day does not exceed 4 hundred, and the number of brand A shoes produced is at most twice the number of brand B shoes.

- (a) Tulis dua ketaksamaan linear, selain $x \geq 0$ dan $y \geq 0$ yang mewakili keadaan tersebut.

Write two linear inequalities, other than $x \geq 0$ and $y \geq 0$, that represent the situation.

- (b) Dengan menggunakan skala 2 cm kepada 100 bagi paksi- x dan paksi y , lukis dan lorekkan kawasan yang memuakan sistem ketaksamaan linear itu.

By using the scale 2 cm to 100 for x -axis and y -axis, draw and shade the region that satisfies the system of linear inequalities.

- (c) Berdasarkan graf di (b), tentukan bilangan maksimum kasut jenama A yang boleh dihasilkan.

Based on the graph in (b), determine the maximum number of brand A shoes that can be produced.

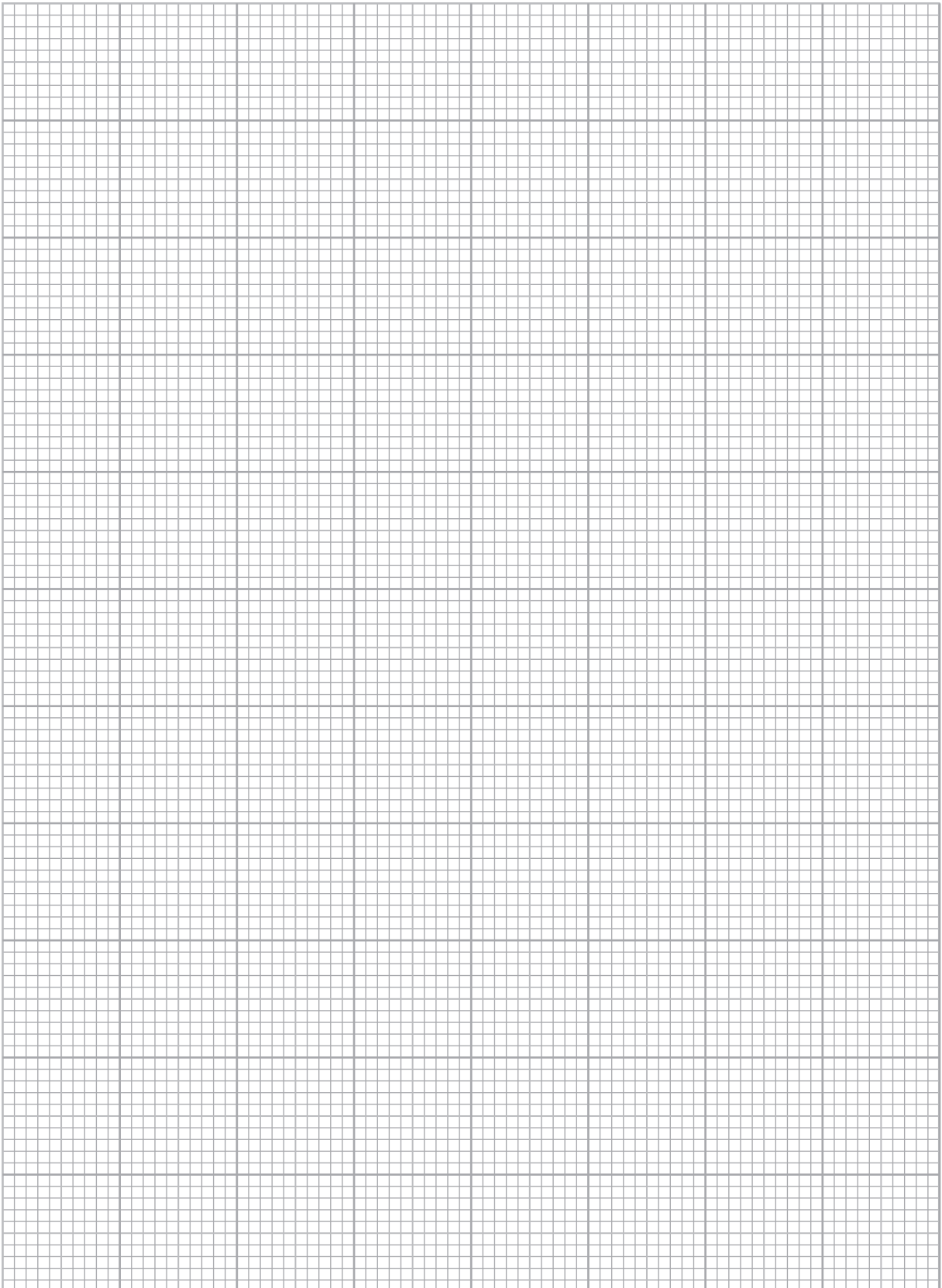
- (d) Pada suatu hari, kilang kasut tersebut menghasilkan 150 kasut jenama A dan 50 kasut jenama B . Adakah penghasilan kasut pada hari tersebut memuakan sistem ketaksamaan linear di (a)? Justikasikan jawapan anda.

On a particular day, the factory produces 150 shoes of brand A and 50 shoes of brand B . Does the shoes production on that day satisfy the system of linear inequalities in (a)? Justify your answer.

[9 markah/marks]

Jawapan/Answer:

Graf untuk Soalan 4
Graph for Question 4



- 5 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.

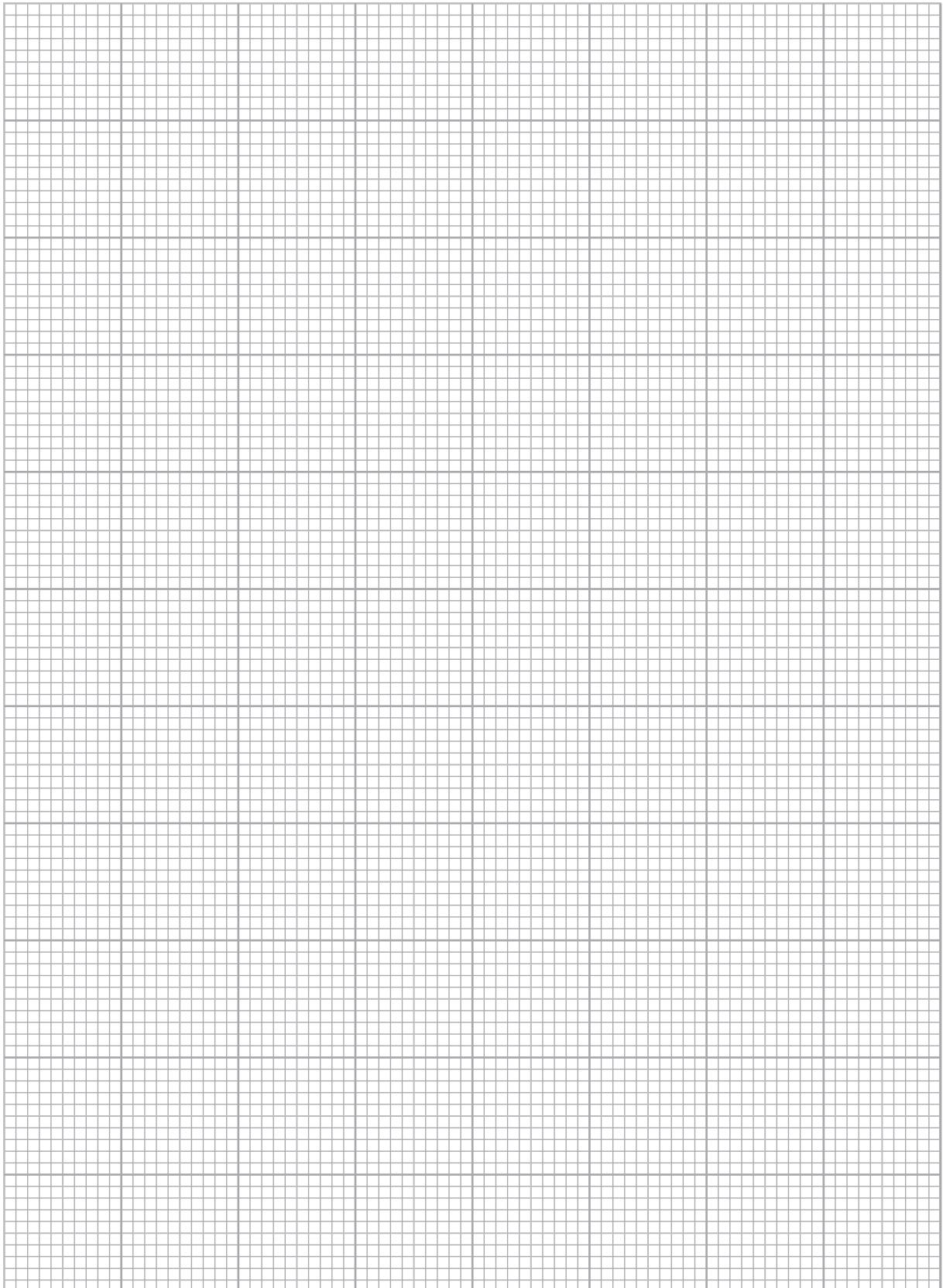
A recreational park in Bandar Anjung has collected data on visitors' attendance. The visitors consist of x adults and y children. The following information is about the visitor attendance.

- (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 maksimum bilangan 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:

Graf untuk Soalan 5
Graph for Question 5



BAB

7

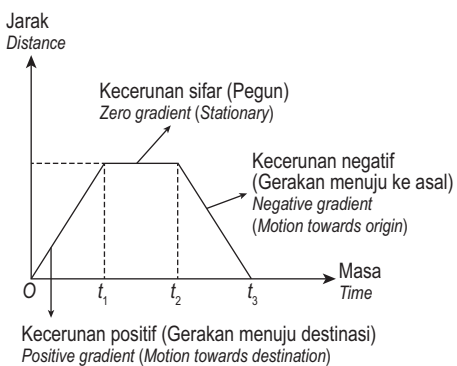
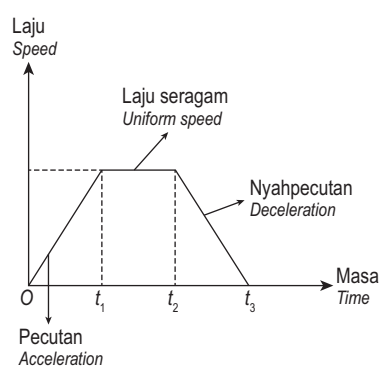
Graf Gerakan

Graphs of Motion



VIDEO PEMBELAJARAN

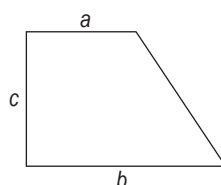
NOTA EFEKTIF

Jenis graf Type of graphs Item Items	Graf Jarak Masa <i>Distance-Time Graphs</i> 	Graf Laju-Masa <i>Speed-Time Graph</i> 
Jarak <i>Distance</i>	Nilai dibaca daripada graf <i>The value read from the graph</i>	Luas di bawah graf <i>The area under the graph</i>
Laju/Kadar perubahan jarak <i>Speed/Rate of change of distance</i>	Kecerunan graf <i>The gradient of the graph</i> $\text{Laju} = \frac{\text{Jarak}}{\text{Masa}}$ $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$	Nilai dibaca daripada graf <i>The value read from the graph</i>
Laju purata <i>Average speed</i>	$\text{Laju purata} = \frac{\text{Jumlah jarak}}{\text{Jumlah masa}}$ $\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$	
Pecutan/Kadar perubahan laju <i>Acceleration/Rate of change of speed</i>	-	Kecerunan graf <i>The gradient of the graph</i>



Luas trapezium
Area of trapezium

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

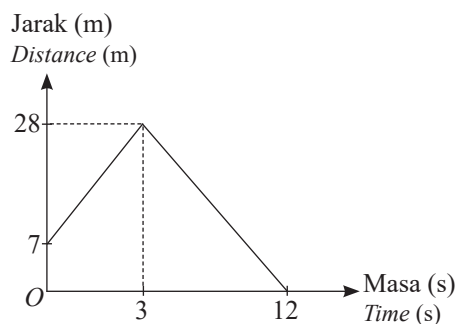




LATIHAN INTENSIF

Soalan Subjektif
Jawab semua soalan.

- 1 Rajah 1 menunjukkan graf jarak-masa bagi pergerakan sebutir zarah.
Diagram 1 shows the distance-time graph of a movement of a particle.



Rajah 1 / Diagram 1

- (a) Hitung laju, dalam m s^{-1} , untuk 3 saat pertama.
Calculate the speed, in m s^{-1} , for the first 3 seconds.
- (b) Hitung kadar perubahan jarak, dalam m s^{-1} , untuk tempoh 9 saat terakhir.
Calculate the rate of change of distance, in m s^{-1} , for the last 9 seconds.
- (c) Huraikan gerakan bola itu untuk tempoh 9 saat terakhir.
Describe the motion of the particle for the last 9 seconds.

[2 markah/marks]

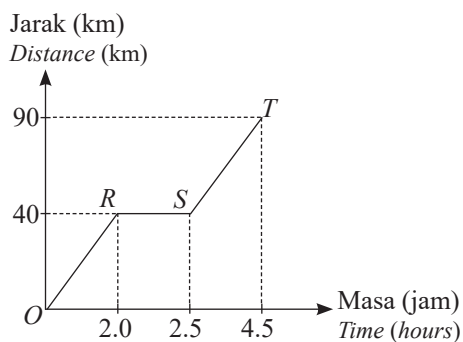
[2 markah/marks]

[2 markah/marks]

Jawapan/Answer:

- 2 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.

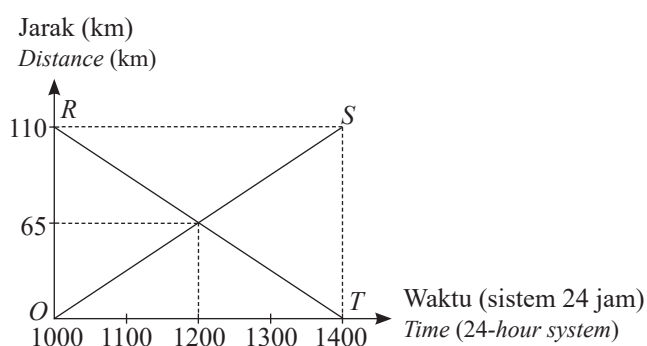
[1 markah/mark]

Jawapan/Answer:



- 3 Rajah 3 menunjukkan graf jarak-masa bagi perjalanan Isyraf dan Muqri, masing-masing memandu sebuah kereta.

Diagram 3 shows the distance-time graph for the journey of Isyraf and Muqri, each of them driving a car.



Rajah 3 / Diagram 3

Garis lurus OS mewakili perjalanan Isyraf dari bandar X ke bandar Y manakala garis lurus RT mewakili perjalanan Muqri dari bandar Y ke bandar X . Isyraf dan Muqri melalui jalan yang sama.

The straight line OS represents Isyraf's journey from town X to town Y while the straight line RT represents Muqri's journey from town Y to town X . Isyraf and Muqri use the same route.

- (a) Nyatakan jarak, dalam m, bandar Y dari bandar X .

State the distance, in m, of town Y from town X .

[1 markah/mark]

- (b) Cari waktu Isyraf dan Muqri bertemu dalam perjalanan mereka.

Find the time Isyraf and Muqri meet each other during their journey.

[1 markah/mark]

- (c) Cari jarak, dalam m, apabila mereka bertemu dari bandar Y .

Find the distance, in m, when they meet from town Y .

[1 markah/mark]

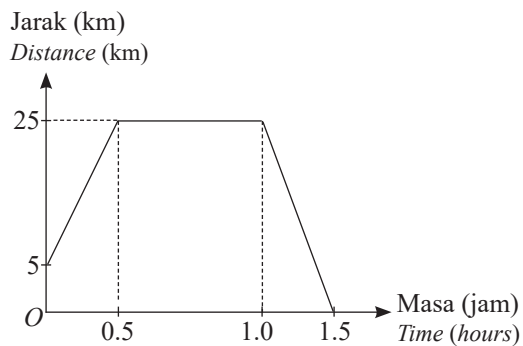
- (d) Hitung laju kereta Muqri, dalam km j^{-1} .

Calculate the speed of Muqri's car, in km h^{-1} .

[2 markah/marks]

Jawapan/Answer:

- 4 Rajah 4 menunjukkan graf jarak-masa bagi sebuah motosikal dalam tempoh 1.5 jam.
 Diagram 4 shows the distance-time graph of a motorcycle for a period of 1.5 hours.



Rajah 4 / Diagram 4

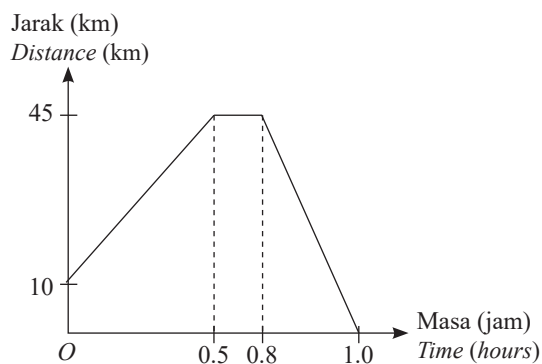
Hitung

Calculate

- (a) laju, dalam km j^{-1} , untuk 30 minit pertama,
 the speed, in km h^{-1} , for the first 30 minutes, [2 markah/marks]
- (b) jumlah jarak yang dilalui oleh motosikal tersebut dalam tempoh 60 minit. Nyatakan jarak tersebut dalam unit meter, m,
 the total distance travelled by the motorcycle in 60 minutes. State the distance in meters, m [2 markah/marks]
- (c) laju purata, dalam km j^{-1} .
 the average speed, in km h^{-1} . [2 markah/marks]

Jawapan/Answer:

- 5 Rajah 5 menunjukkan graf jarak-masa bagi sebuah van dalam tempoh 1 jam.
Diagram 5 shows the distance-time graph of a van in 1 hour.



Rajah 5 / Diagram 5

- (a) Nyatakan jarak yang dilalui untuk 30 minit yang pertama.
State the distance travelled for the first 30 minutes.
- (b) Nyatakan tempoh masa, dalam minit, van itu berhenti.
State the duration, in minutes, the van stops.
- (c) Cari laju purata, dalam km h^{-1} , van itu bagi seluruh perjalanan.
Find the average speed, in km h^{-1} , of the van for the whole journey.

[2 markah/marks]

[2 markah/marks]

[2 markah/marks]

Jawapan/Answer:

- 6 Amni memandu keretanya sejauh 140 km dari Ipoh ke Bukit Mertajam untuk melawat ibunya. Jadual 1 menunjukkan catatan perjalanannya.

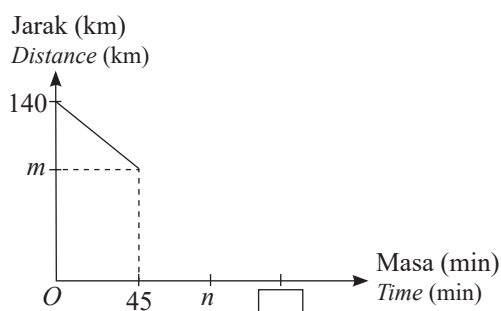
Amni drives her car for 140 km from Ipoh to Bukit Mertajam to visit her mother. Table 1 shows the note of her journey.

Masa Time	25 Dec 2024, Rabu 25 Dec 2024, Wednesday
Jam 0900 0900 hours	Memulakan perjalanan Start the journey
Jam 0945 0945 hours	Sarapan pagi di R&R Sungai Perak setelah memandu sejauh 30 km Breakfast at R&R Sungai Perak after driving for 30 km
Jam 1020 1020 hours	Meneruskan perjalanan untuk 110 km lagi. Continue the journey for another 110 km
Jam 1140 1140 hours	Tiba di rumah ibu Arrive at mother's house

Jadual 1 / Table 1

- (a) Rajah 6 menunjukkan graf jarak-masa tidak lengkap yang mewakili perjalanan Amni.

Diagram 6 shows an incomplete distance-time graph that represents Amni's journey.



Rajah 6 / Diagram 6

- (i) Nyatakan nilai m dan nilai n .
State the values of m and of n .
- (ii) Lengkapkan graf pada Rajah 6 bagi keseluruhan perjalanan Amni.
Complete the graph in Diagram 6 for Amni's whole journey.
- (b) Hitung laju purata, dalam km h^{-1} , bagi keseluruhan perjalanan Amni.
Calculate the average speed, in km h^{-1} , of Amni's whole journey.

[2 markah/marks]

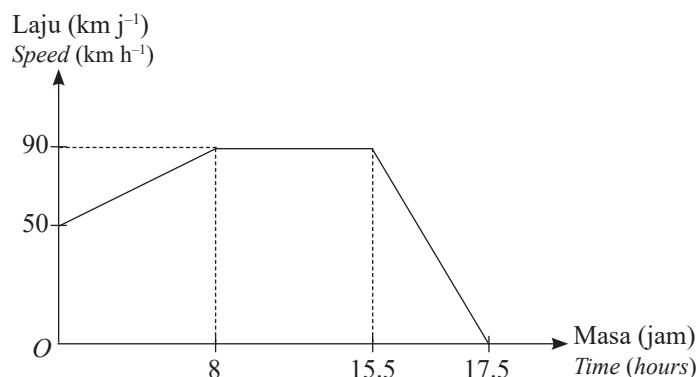
[2 markah/marks]

[2 markah/marks]

Jawapan/Answer:

7 Rajah 7 menunjukkan graf laju-masa bagi pergerakan sebuah motosikal dalam tempoh t jam.

Diagram 7 shows a speed-time graph of a motorcycle within t hours.



Rajah 7 / Diagram 7

- (a) Nyatakan tempoh masa, dalam jam, ketika motosikal itu bergerak dengan laju seragam.

State the duration, in hours, when the motorcycle was moving at a uniform speed.

[1 markah/mark]

- (b) Hitung kadar perubahan laju, dalam km j^{-2} , motosikal itu dalam tempoh 8 jam pertama.

Calculate the rate of change of speed, in km h^{-2} , of the motorcycle in the first 8 hours.

[2 markah/marks]

- (c) Hitung jumlah jarak yang dilalui oleh motosikal tersebut dalam tempoh 9.5 jam terakhir.

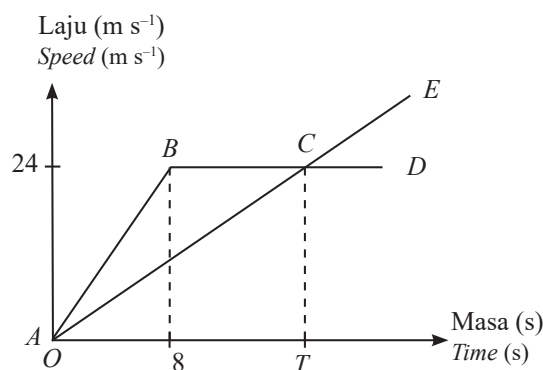
Calculate the total distance travelled by the motorcycle within the last 9.5 hours.

[3 markah/marks]

Jawapan/Answer:

- 8 Rajah 8 menunjukkan graf laju-masa bagi pergerakan dua objek, Y dan Z dalam tempoh T saat. Graf $ABCD$ mewakili pergerakan objek Y dan graf AE mewakili pergerakan objek Z. Kedua-dua objek bermula dari titik yang sama dan melalui laluan yang sama.

Diagram 8 shows the speed-time graph of the movements of two objects, Y and Z, for a period of T seconds. The graph of $ABCD$ represents the movement of object Y and the graph of AE represents the movement of object Z. Both objects start at the same point and move along the same route.

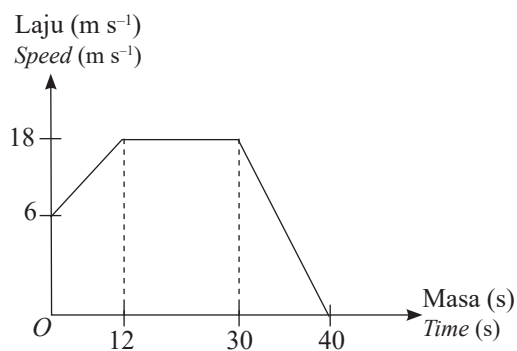


Rajah 8 / Diagram 8

- (a) Nyatakan laju seragam, dalam m s^{-1} , objek Y.
State the uniform speed, in m s^{-1} , of object Y. [1 markah/mark]
- (b) Hitung kadar perubahan laju, dalam m s^{-2} , bagi objek Y untuk 8 saat yang pertama.
Calculate the rate of change of speed, in m s^{-2} , of object Y for the first 8 seconds. [2 markah/marks]
- (c) Pada T saat, beza jarak yang dilalui oleh objek Y dan objek Z ialah 120 m. Hitung nilai T .
At T seconds, the difference in distance travelled by object P and object Q is 120 m. Calculate the value of T . [3 markah/marks]

Jawapan/Answer:

- 9 Rajah 9 menunjukkan graf laju-masa bagi pergerakan suatu zarah dalam tempoh 40 saat.
Diagram 9 shows the speed-time graph for the movement of a particle for a period of 40 seconds.



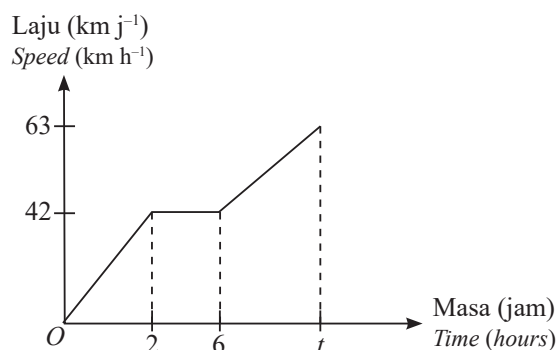
Rajah 9 / Diagram 9

- (a) Hitung nilai pecutan zarah itu dalam tempoh 12 saat pertama, jika $r = 6 \text{ m s}^{-1}$.
Calculate the acceleration of the particle during the first 12 seconds, if $r = 6 \text{ m s}^{-1}$. [1 markah/mark]
- (b) Berdasarkan graf pada Rajah 9, tentukan jumlah jarak yang dilalui oleh zarah itu dalam tempoh 40 saat.
Based on the graph in Diagram 9, determine the total distance travelled by the particle in the period of 40 seconds. [2 markah/marks]
- (c) Huraikan pergerakan zarah pada 10 saat terakhir.
Describe the movement of the particle in the last 10 seconds. [3 markah/marks]

Jawapan/Answer:

- 10** Rajah 10 menunjukkan graf laju-masa bagi pergerakan sebuah lori dari destinasi A ke destinasi B dalam tempoh t jam.

Diagram 10 the speed-time graph for the movement of a lorry from destination A to destination B in a period of t hours.



Rajah 10 / Diagram 10

- (a) Nyatakan laju seragam, dalam km j^{-1} , lori itu.

State the uniform speed, in km h^{-1} , of the lorry.

[1 markah/mark]

- (b) Hitung kadar perubahan laju, dalam km j^{-2} , lori itu untuk 2 jam yang pertama.

Calculate the rate of change of speed, in km h^{-2} , of the lorry for the first 2 hours.

[2 markah/marks]

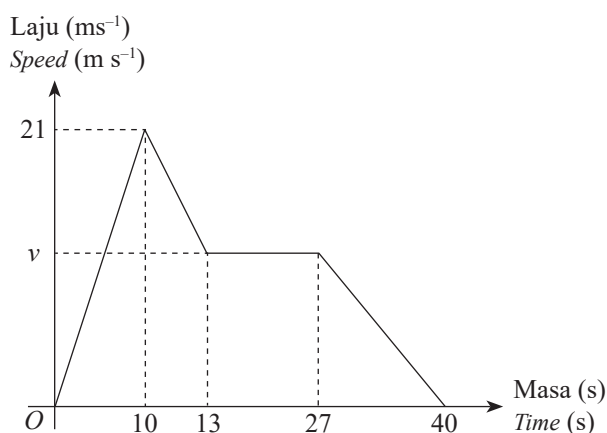
- (c) Diberi jarak yang dilalui dalam tempoh 2 jam yang pertama ialah separuh daripada jarak yang dilalui dari jam ke-6 hingga jam ke- t . Hitung nilai t .

Given the distance travelled in the first 2 hours is half of the distance travelled from the 6th to the t^{th} hours. Calculate the value of t .

[3 markah/marks]

Jawapan/Answer:

- 11 Rajah 11 menunjukkan graf laju-masa bagi suatu zarah dalam tempoh 40 saat.
 Diagram 11 shows a speed-time graph of a particle for a period of 40 seconds.



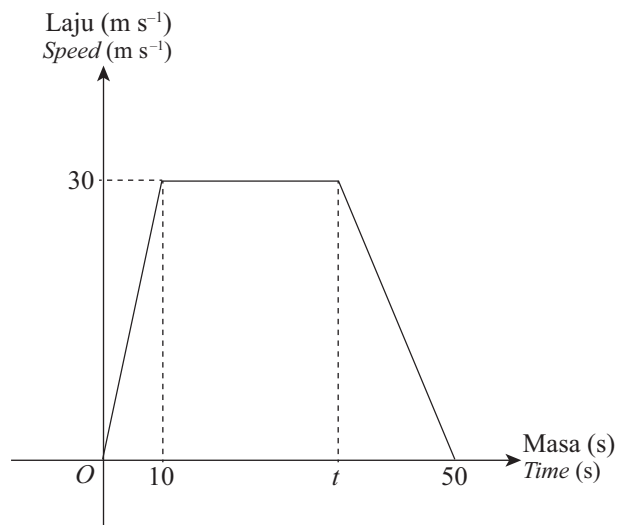
Rajah 11 / Diagram 11

- (a) Berdasarkan graf laju-masa di atas, nyatakan masa, dalam s, laju seragam zarah itu.
 Based on the speed-time graph above, determine the time, in s, at uniform speed of the particle. [1 markah/mark]
- (b) Hitung nyahpecutan, dalam m s^{-2} , zarah itu dalam tempoh 13 saat yang terakhir dalam sebutan v .
 Calculate the deceleration, in m s^{-2} , of the particle for the last 13 seconds in term of v . [2 markah/marks]
- (c) Hitung nilai v , jika jumlah jarak yang dilalui oleh zarah itu dalam 13 saat yang pertama ialah 150 m.
 Calculate the value of v , if the total distance travelled by the particle in the first 13 seconds is 150 m. [3 markah/marks]
- (d) Huraikan pergerakan zarah itu dalam tempoh 27 saat terakhir.
 Describe the motion of the particle within the last 27 seconds. [2 markah/marks]

Jawapan/Answer:

12 Rajah 12 menunjukkan graf laju-masa pergerakan suatu zarah dalam tempoh 50 saat.

Diagram 12 shows a speed-time graph for the movement of a particle for a period of 50 seconds.



Rajah 12 / Diagram 12

- (a) Hitung kadar perubahan laju, dalam m s^{-2} , bagi 10 saat pertama.

Calculate the rate of change of speed, in m s^{-2} , in the first 10 seconds.

[2 markah/marks]

- (b) Diberi jumlah jarak yang dilalui oleh zarah itu dalam tempoh 50 saat ialah 1 320 m. Hitung nilai t .

Given that the total distance travelled by the particle for the period of 50 seconds is 1 320 m. Calculate the value of t .

[3 markah/marks]

Jawapan/Answer:

BAB

8

Sukatan Serakan Data Tak Terkumpul

Measures of Dispersion of Ungrouped Data



VIDEO PEMBELAJARAN

NOTA EFEKTIF

Maksud Serakan

The Meaning of Dispersion

- 1 Sukatan serakan suatu data ialah **sukatan kuantitatif** seperti julat, julat antara kuartil, varians dan sisihan piawai.
*Measures of dispersion of set of a data are **quantitative measures** such as range, interquartile range, variance and standard deviation.*
- 2 Jika set data mempunyai **julat yang kecil**, maka **serakan adalah kecil**.
*If data set has a **small range**, then **the dispersion is small**.*

Plot Batang-dan-Daun

Stem-and-Leaf Plot

- 1 Plot batang-dan-daun merupakan satu cara untuk menunjukkan taburan suatu set data.
A stem-and-leaf plot is a way to show the distributions of a set of data.
- 2 Melalui plot batang-dan-daun, kita dapat melihat sama ada data adalah cenderung kepada satu nilai atau nilai manakah yang paling kerap muncul atau data manakah yang paling kurang muncul.
Through the stem-and-leaf plot, we can see whether the data is more likely to appear or least likely to appear.

Plot Titik

Dot Plot

- 1 Plot titik ialah carta statistik yang mengandungi titik-titik yang diplot dengan menggunakan skala seragam.
A dot plot is a statistical chart that contains points plotted using a uniform scale.
- 2 Setiap titik mewakili satu cerapan.
Each point represents a value.
- 3 Cerapan merupakan data atau dapatan yang diperoleh daripada sesuatu pemerhatian.
A value is a data or results obtained from an observation.

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 serakan 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?

	Apabila setiap cerapan dalam suatu set data didarab dengan suatu pemalar, k , maka <i>When each of a set of data is multiplied by a constant k, then</i>	Apabila setiap cerapan dalam suatu set data dibahagi dengan suatu pemalar, k , maka <i>When each of a set of data is divided by a constant k, then</i>
Julat baharu <i>New range</i>	$= k \times \text{julat asal}$ $k \times \text{original range}$	$= \frac{\text{julat asal/original range}}{k}$
Jula antara kuartil baharu <i>New interquartile range</i>	$= k \times \text{julat antara kuartil asal}$ $k \times \text{original interquartile range}$	$= \frac{\text{julat antara kuartil asal/original interquartile range}}{k}$
Sisihan piawai baharu <i>New standard deviation</i>	$= k \times \text{sisihan piawai asal}$ $k \times \text{original standard deviation}$	$= \frac{\text{sisihan piawai asal/original standard deviation}}{k}$
Varians baharu <i>New variance</i>	$= k^2 \times \text{varians asal}$ $k^2 \times \text{original variance}$	$= \frac{\text{varians asal/original variance}}{k^2}$



LATIHAN INTENSIF

Soalan Objektif

Jawab semua soalan.

- 1 Jadual 1 menunjukkan taburan kekerapan umur bagi 88 orang pekerja di sebuah kilang.
Table 1 shows the frequency distribution of the ages of 88 workers in a factory.

Umur (tahun) <i>Age (year)</i>	Bilangan pekerja <i>Number of workers</i>
26 – 30	3
31 – 35	9
36 – 40	27
41 – 45	31
46 – 50	11
51 – 55	5
56 – 60	2

Jadual 1 / Table 1

Hitung min umur bagi seorang pekerja itu.
Calculate the mean of the ages of a worker.

- A 39.47
B 41.47
C 43.47
D 45.47

- 2 Jadual kekerapan berikut menunjukkan masa ulang kaji bagi beberapa orang murid.
The following frequency table shows the time for revision of a group of students.

Masa ulang kaji (j) <i>Time for revision (h)</i>	Kekerapan <i>Frequency</i>
1	5
2	10
3	14
4	7
5	4

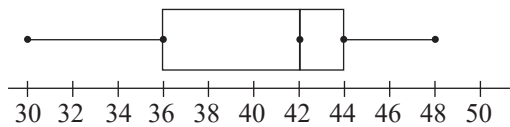
Jadual 2 / Table 2

Hitung sisihan piawai bagi data itu.
Calculate the standard deviation of the data.

- A 1.144
B 1.309
C 1.414
D 1.714

- 3 Rajah 1 menunjukkan suatu plot kotak yang mewakili umur sekumpulan guru.

Diagram 1 shows a box-plot which represents the age of a group of teachers.



Rajah 1 / Diagram 1

Tentukan julat antara kuartil.

Determine the interquartile range.

- A 6 C 14
B 8 D 18

- 4 Rajah 2 ialah plot batang-dan-daun yang menunjukkan markah Matematik bagi murid kelas 5 Bestari dalam satu ujian.

Diagram 2 is a stem-and-leaf plot showing the Mathematics marks of the pupils in 5 Bestari in a test.

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 2 / Diagram 2

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% C 40%
B 32% D 68%

- 5 Jadual 3 menunjukkan upah harian bagi sekumpulan pekerja.

Table 3 shows the daily wage of a group of workers.

Upah (RM) Wage (RM)	55	65	75	85	95
Kekerapan Frequency	7	8	10	6	4

Jadual 3 / Table 3

Tentukan julat antara kuartil bagi data itu.

Determine the interquartile range of the data.

- A 20
B 55
C 65
D 85

- 6 Rajah 3 ialah sebuah plot batang-dan-daun yang menunjukkan bilangan tin aluminium yang dikumpul oleh sekumpulan pengakap.

Diagram 3 is a stem-and-leaf plot showing the number of aluminium cans collected by a group of scouts.

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

Kekunci: bermaksud 20 tin

Key: means 20 cans

Rajah 3 / Diagram 3

Tentukan julat bagi data itu.

Determine the range of the data.

- A 20
B 37
C 42
D 57

- 7 Rajah 4 menunjukkan plot batang-dan-daun bagi umur pekerja di sebuah syarikat pembersihan.

Diagram 4 shows the stem-and-leaf plot for the age of workers in a cleaning company.

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

Kekunci: 2 | 3 bermaksud 20

Key: 2 | 3 means 23

Rajah 4 / Diagram 4

Nyatakan julat umur yang paling kerap muncul.

State the range of age that appear most frequent.

- A 23 hingga/to 27
B 30 hingga/to 38
C 41 hingga/to 49
D 50 hingga/to 55

Soalan Subjektif

Jawab semua soalan.

- 1 Rajah 1 menunjukkan markah ujian Sains bagi 15 orang murid Tingkatan 4 Cemerlang.

Diagram 1 shows the marks of Science test for 15 students of Form 4 Cemerlang.

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

Rajah 1 / Diagram 1

- (a) Hitung julat dan julat antara kuartil bagi markah ujian Sains tersebut.
Calculate the range and the interquartile range for the marks of the Science test.
- (b) Lukis plot batang-dan-daun bagi mewakili markah ujian Sains tersebut.
Draw a stem-and-leaf plot to represent the marks of the Science test.

[5 markah/marks]

Jawapan/Answer:

- 2 Hitung julat dan julat antara kuartil bagi set data 1, 2, 3, 5, 6, 7, 9, 10, 11 dan 30.

Tentukan sukatan serakan yang paling sesuai digunakan untuk mengukur taburan set data tersebut, dan justifikasikan jawapan anda.

Calculate the range and the interquartile range for the data set 1, 2, 3, 5, 6, 7, 9, 10, 11 and 30.

Determine the most suitable measures of dispersion that can be used to measure the distribution of the set of data, and justify your answer.

[3 markah/marks]

Jawapan/Answer:

- 3 Cikgu Salmiah ingin menentukan seorang wakil sekolah ke satu pertandingan berdasarkan markah keenam-enam ujian yang diperoleh murid. Asmawi dan Jason telah dicalonkan untuk mewakili sekolah. Jadual 1 menunjukkan maklumat markah ujian yang diperoleh Asmawi dan Jason.

Teacher Salmiah wants to determine a school representative to a competition based on the marks of the six tests obtained by students. Asmawi and Jason are nominated to represent the school. Table 1 shows the information of the test marks obtained by Asmawi and Jason.

Ujian Test	Asmawi	Jason
1	70	2002 ₃
2	61	64
3	67	132 ₄
4	60	124 ₇
5	48	60
6	50	79

Jadual 1 / Table 1

- (a) Hitung min dan sisihan piawai markah ujian bagi Asmawi dan Jason.
Calculate the mean and standard deviation of the test marks for Asmawi and Jason.
- (b) Antara Asmawi dan Jason, siapakah yang layak mewakili sekolah ke pertandingan itu? Berikan alasan anda.
Between Asmawi and Jason, who is eligible to represent the school for the competition? Give your reasons.

[8 markah/marks]

Jawapan/Answer:

- 4 Bina plot kotak bagi data berikut. Seterusnya, hitung varians dan sisihan piawai bagi data tersebut.

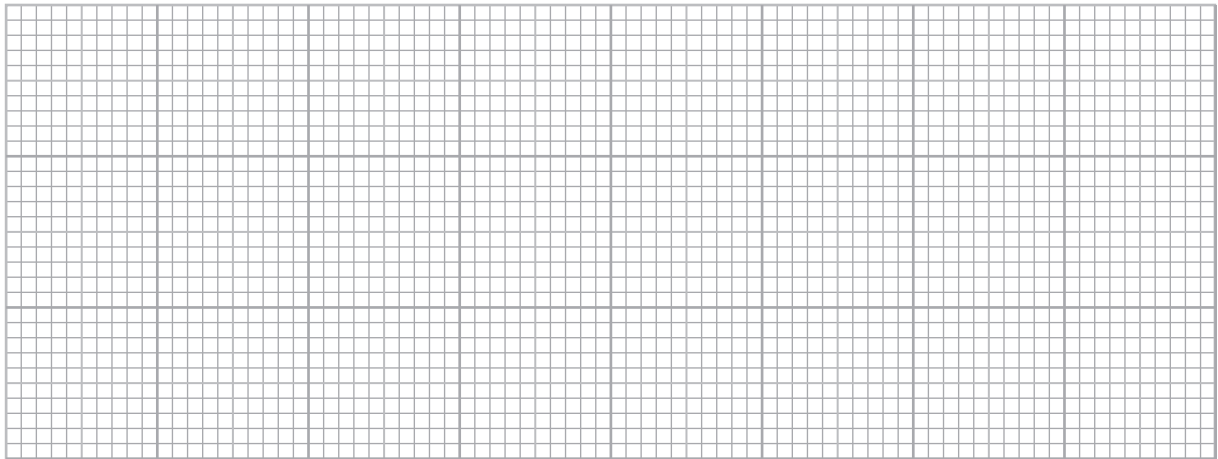
Construct a box plot for each of the following data. Hence, calculate the variance and standard deviation of the data.

- (a)

5	5	6	6	7	10	10	11	12	13	13	13	15	16	16	16	20	22	24	24
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[5 markah/marks]

Jawapan/Answer:

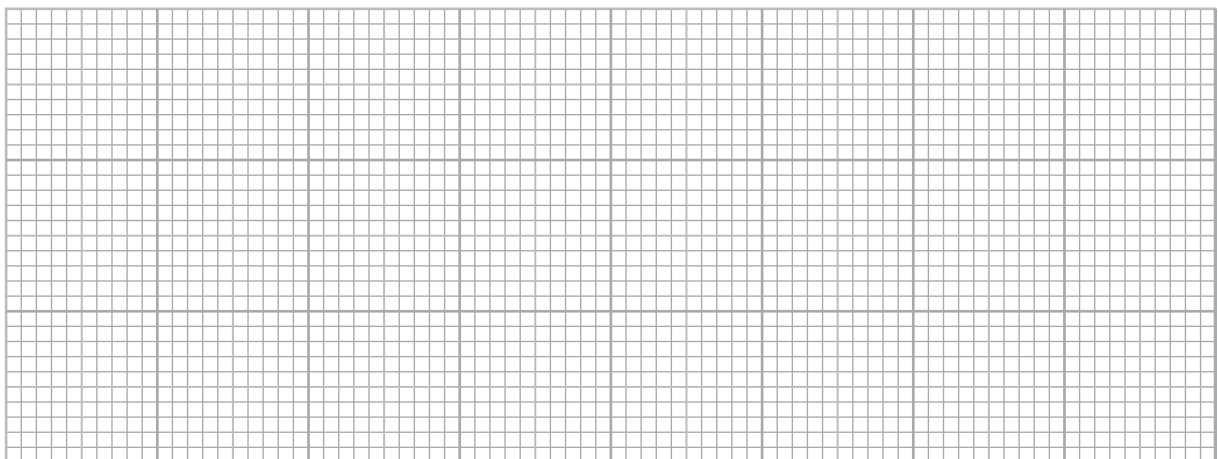


- (b)

19	11	11	18	15	21	22	13	45	30	42	12	20	34	17
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[5 markah/marks]

Jawapan/Answer:



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.

$$S = \{(1, A), (1, G), (2, A), (2, G), (3, A), (3, G), (4, A), (4, G), (5, A), (5, G), (6, A), (6, G)\}$$

$$n(S) = 12$$



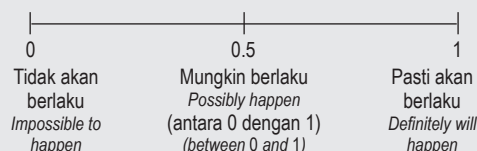
Kebarangkalian boleh ditulis dalam bentuk **pecahan**, **peratus** atau **nomor perpuluhan**.
Probability can be written as a fraction, a percentage, or a decimal number.

Rumus Kebarangkalian

Formula of Probability

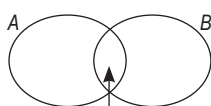
$$P(A) = \frac{n(A)}{n(S)}$$

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



Hukum Pendaraban Kebarangkalian

Multiplication Rule of Probability

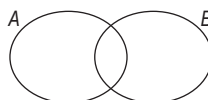


$$P(A \text{ dan/and } B) = P(A \cap B) = P(A) \times P(B)$$

Hukum Penambahan Kebarangkalian

Addition Rule of Probability

Peristiwa tidak saling eksklusif
Non-mutually exclusive events



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

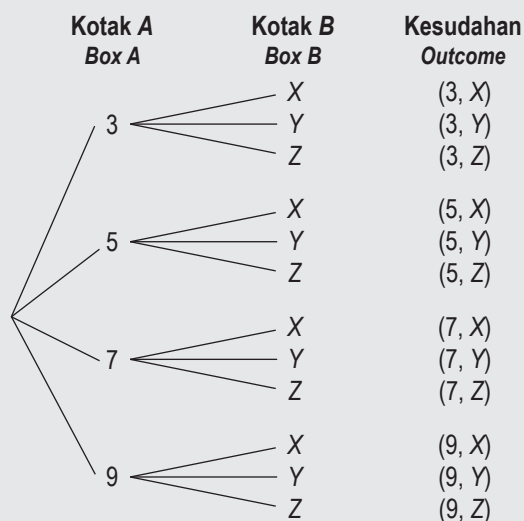
Peristiwa saling eksklusif
Mutually exclusive events



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

Gambar Rajah Pokok

Tree Diagram



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 Terdapat enam keping kad dengan huruf SENANG. Jika sekeping kad dipilih secara rawak, cari kebarangkalian mendapat huruf S atau vokal.

There are six pieces of cards with the letters SENANG. If a piece of card is chosen at random, find the probability of getting the letter S or a vowel.

- A $\frac{1}{6}$ C $\frac{2}{3}$
 B $\frac{1}{2}$ D $\frac{5}{6}$

- 2 Satu huruf dipilih secara rawak daripada huruf-huruf dalam perkataan RAMBUTAN. Cari kebarangkalian memilih huruf konsonan.

A letter is chosen at random from the letters in the word RAMBUTAN. Find the probability of choosing a consonant letter.

- A $\frac{1}{8}$ C $\frac{4}{8}$
 B $\frac{3}{8}$ D $\frac{5}{8}$

- 3 Seikat reben mengandungi 4 helai reben merah, 4 helai reben putih dan 8 helai reben kuning. Sehelai reben dipilih secara rawak dari ikatan reben itu. Cari kebarangkalian memilih sehelai reben merah atau kuning.

The ribbon bundle contains 4 pieces of red ribbon 4 pieces of white ribbon and 8 pieces of yellow ribbon. A piece of ribbon is chosen at random from the bundle of ribbons. Find the probability of choosing a piece of red or yellow ribbon.

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

- 4 Kebarangkalian Elysa lulus dalam ujian Matematik dan Sains masing-masing ialah 0.75 dan 0.6. Apakah kebarangkalian bahawa Elysa lulus dalam ujian Matematik tetapi gagal dalam ujian Sains itu?

The probabilities of Elysa passing in the Mathematics and Science tests were 0.75 and 0.6 respectively. What is the probability that Elysa passes the Mathematics test but fails the Science test?

- A 0.15 C 0.4
 B 0.3 D 0.45

- 5 Kebarangkalian Kamilia memenangi pertandingan silang kata dan menghafal sifir masing-masing ialah $\frac{1}{3}$ dan $\frac{1}{4}$. Cari kebarangkalian bahawa dia akan menang pertandingan silang kata tetapi gagal dalam menghafal sifir.

The probabilities of Kamila winning a crossword puzzle and memorising the numbers are $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that she will win a crossword puzzle but fail in memorising the numbers.

- A $\frac{1}{12}$ C $\frac{1}{4}$
 B $\frac{1}{7}$ D $\frac{3}{4}$

- 6 Kebarangkalian Arvind menang dalam pertandingan memanah ialah $\frac{1}{3}$. Tentukan kebarangkalian bahawa dia menang dua pertandingan memanah secara berturutan.

The probability of Arvind winning in an archery competition is $\frac{1}{3}$. Determine the probability that he wins two archery competitions in a row.

- A $\frac{1}{2}$ C $\frac{1}{9}$
 B $\frac{1}{6}$ D $\frac{2}{9}$

- 7 Dua biji dadu adil dilambung. Hitung kebarangkalian bahawa kedua-dua dadu menunjukkan digit 6.

Two fair dice are tossed. Calculate the probability that the two dice show the digit 6.

- A $\frac{1}{2}$ C $\frac{1}{12}$
 B $\frac{1}{5}$ D $\frac{1}{36}$

- 8 Diberi $S = \{x : 1 \leq x \leq 30\}$, x ialah integer. Cari kebarangkalian peristiwa mendapat nombor yang boleh dibahagi dengan 5.

Given $S = \{x : 1 \leq x \leq 30\}$, x is an integer. Find the probability event gets a number divisible by 5.

- A $\frac{1}{2}$ C $\frac{1}{12}$
 B $\frac{1}{5}$ D $\frac{1}{30}$

Soalan Subjektif
Jawab semua soalan.

- 1 Jadual 1 menunjukkan enam orang guru bertugas dalam Majlis Anugerah Kecemerlangan Murid.
Table 1 shows six teachers on duty during the Student Excellence Awards Ceremony.

Jantina <i>Gender</i>	Nama <i>Name</i>
Lelaki <i>Men</i>	Encik Suresh (S), Encik Chong (C), Encik Mizan (M)
Perempuan <i>Women</i>	Puan Umma (U), Puan Leong (L), Puan Ani (A)

Jadual 1 / Table 1

- (a) Dua orang guru dipilih masing-masing daripada setiap jantina. Senaraikan semua kesudahan.
Two teachers are selected, one from each gender respectively. List all the possible outcomes.
- (b) Dua orang guru dipilih seorang demi seorang untuk menjadi pengerusi majlis. Senaraikan semua kesudahan.
Two teachers are selected one by one to be the chairpersons of the ceremony. List all the possible outcomes.
- (c) Dua orang guru dipilih masing-masing sebagai ahli Jawatankuasa Jamuan dan ahli Jawatankuasa Persembahan. Senaraikan semua kesudahan.
Two teachers are selected as Banquet Committee and Performance Committee members, respectively. List all the possible outcomes.
- (d) Dua orang guru dipilih sebagai ahli Jawatankuasa Hadiah. Senaraikan semua kesudahan.
Two teachers are selected as Gift Committee members. List all the possible outcomes.

[8 markah/marks]

Jawapan/Answer:

- 2 Puan Shila menjemput sahabatnya, Puan Aini untuk makan malam di rumahnya. Pada sebelah pagi, dia pergi ke pasar tani untuk membeli tembikai. Terdapat 20 biji tembikai di dalam sebuah bakul dan 6 biji daripadanya telah rosak. Dua biji tembikai dipilih secara rawak dari kotak satu demi satu. Sekiranya tembikai pertama yang dipilih rosak, maka tembikai itu dipulangkan ke dalam bakul dan tembikai kedua akan dipilih. Sekiranya tembikai pertama itu tidak rosak, maka tembikai itu tidak dipulangkan ke dalam bakul sebelum tembikai kedua dipilih.

Puan Shila invites her friend, Puan Aini, for dinner at her house. In the morning, she goes to the market to buy watermelons. There are 20 watermelons in a basket and 6 of them are rotten. Two watermelons are selected randomly from the basket one after another. If the first watermelon selected is rotten, it is returned to the basket before the second is selected. If the first watermelon is not rotten, it is not returned to the basket before the second is selected.

- (a) Kenal pasti peristiwa berikut sama ada peristiwa bersandar atau peristiwa tidak bersandar.

Identify whether the following events are dependent or independent events.

(i) Sekiranya tembikai pertama adalah rosak, maka tembikai itu dipulangkan ke dalam bakul dan tembikai kedua akan dipilih. <i>If the first watermelon is rotten, it is returned to the basket before the second is selected.</i>	
(ii) Sekiranya tembikai pertama tidak rosak, maka tembikai itu tidak dipulangkan ke dalam bakul sebelum tembikai kedua dipilih. <i>If the first watermelon is not rotten, it is not returned to the basket before the second is selected.</i>	

- (b) Berdasarkan maklumat di atas, lengkapkan gambar rajah pokok di ruang jawapan.

Based on the information above, complete the tree diagram in the answer space.

- (c) Hitung kebarangkalian satu tembikai adalah rosak.

Calculate the probability one watermelon is rotten.

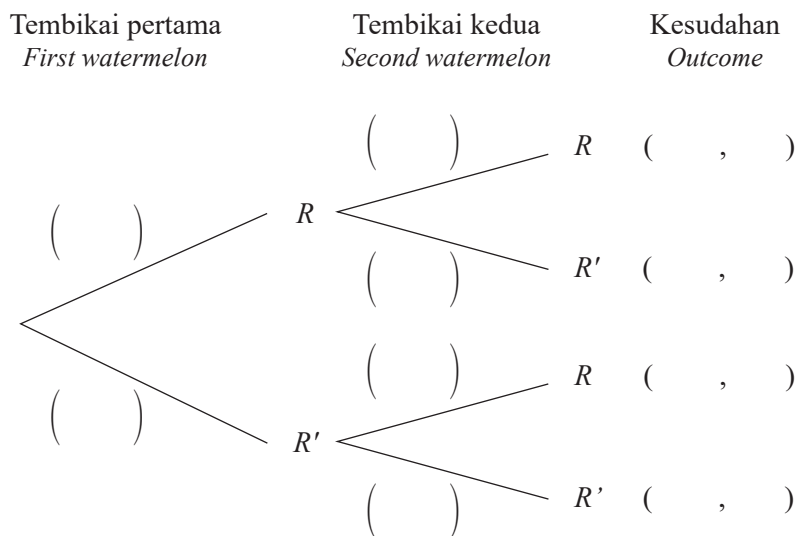
[6 markah/marks]

Jawapan/Answer:

- (a) (i)

- (ii)

- (b)



Petunjuk/Key:
 R – Rosak
 Rotten
 R' – Tidak rotak
 Not rotten

Rajah 1 / Diagram 1

- (c)

- 3 Kenal pasti peristiwa berikut adalah saling eksklusif atau tidak saling eksklusif. Tandakan (✓) jawapan yang betul.

Identify the following events are mutually exclusive or not mutually exclusive. Tick (✓) the correct answer.

[5 markah/marks]

Peristiwa bergabung <i>Combined events</i>	Saling eksklusif <i>Mutually exclusive</i>	Tidak saling eksklusif <i>Non-mutually exclusive</i>
(a) Memilih nombor genap dan nombor ganjil. <i>Choose an even number and an odd number.</i>		
(b) Memilih epal yang elok dan yang busuk daripada sekotak epal. <i>Choosing the good and spoiled apples from a box of apples.</i>		
(c) Mendapat nombor 4 dan nombor gandaan 2 pada sekali lambungan dadu adil. <i>Obtained number 4 and multiples of 2 on single fair dice roll.</i>		
(d) Menaiki tangga dan menuruni tangga. <i>Go up the stairs and down the stairs.</i>		
(e) Mendapat satu nombor ganjil dan nombor perdana dari kumpulan nombor x : $11 \leq x \leq 20$ <i>Obtain an odd number and prime number from the number group x: $11 \leq x \leq 20$</i>		

- 4 Semua guru di SMK Telok memiliki komputer riba. Bilangan guru lelaki dan perempuan yang memiliki komputer riba jenama K dan L ditunjukkan dalam Jadual 2.

All teachers at SMK Telok have a laptop. The number of male and female teachers who own laptops of brand K and L is shown in the table below.

Jenama komputer riba <i>Laptop brand</i>	Lelaki <i>Male</i>	Perempuan <i>Female</i>
K	30	50
L	60	20

Jadual 2 / Table 2

Seorang guru dipilih secara rawak dalam kalangan guru SMK Telok. Hitung kebarangkalian bahawa
A teacher is randomly selected among the teachers at SMK Telok. Calculate the probability that

- (a) seorang guru lelaki memiliki komputer riba jenama K atau seorang guru perempuan memiliki komputer riba jenama L ,
a male teacher owns a brand K laptop or a female teacher owns a brand L laptop,
- (b) seorang guru perempuan atau seorang guru memiliki komputer riba jenama K .
a female teacher or a teacher owns a brand K laptop.

[4 markah/marks]

Jawapan/Answer:

- 5 Dua jenis telefon pintar, A dan B , dihasilkan di sebuah kilang. Kebarangkalian kedua-dua jenis telefon pintar dalam keadaan baik dan rosak adalah seperti yang ditunjukkan dalam Jadual 3.

Two types of smartphones, A and B , are produced in a factory. The probabilities of both types of smartphones being in good condition and defective are shown in Table 3.

Keadaan Condition	Telefon pintar A Smartphone A	Telefon pintar B Smartphone B
Baik Good	$\frac{32}{40}$	x
Rosak Defect	y	$\frac{4}{45}$

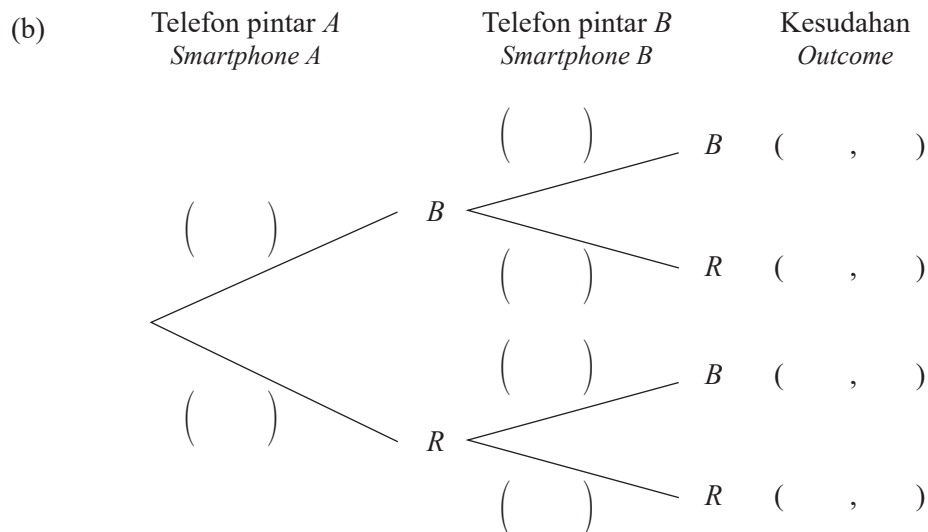
Jadual 3 / Table 3

- (a) Lengkapkan Jadual 3 dengan mengenal pasti nilai x dan y .
Complete Table 3 by identify the values of x and y .
- (b) Rajah 2 di ruang jawapan menunjukkan gambar rajah pokok yang tidak lengkap. Berdasarkan maklumat pada Jadual 3, lengkapkan gambar rajah pokok tersebut.
Diagram 2 in the answer space shows an incomplete tree diagram. Based on the information in Table 3, complete the tree diagram.
- (c) Seterunya, hitung kebarangkalian sekurang-kurangnya sebuah telefon pintar yang dipilih mengalami kerosakan.
Next, calculate the probability that at least one of the selected smartphones is defective.

[6 markah/marks]

Jawapan/Answer:

(a)



Rajah 2 / Diagram 2

(c)

- 6 Di dalam sebuah beg, terdapat enam batang pen merah, M , empat batang pen biru, B , dan lima batang pen hitam, H . Dua batang pen dipilih secara rawak, satu demi satu tanpa penggantian.

In a container, there are six red pens, M , four blue pens, B , and five black pens, H . Two pens are randomly selected, one after another, without replacement.

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

Complete the tree diagram in the answer space.

- (b) Hitung kebarangkalian:

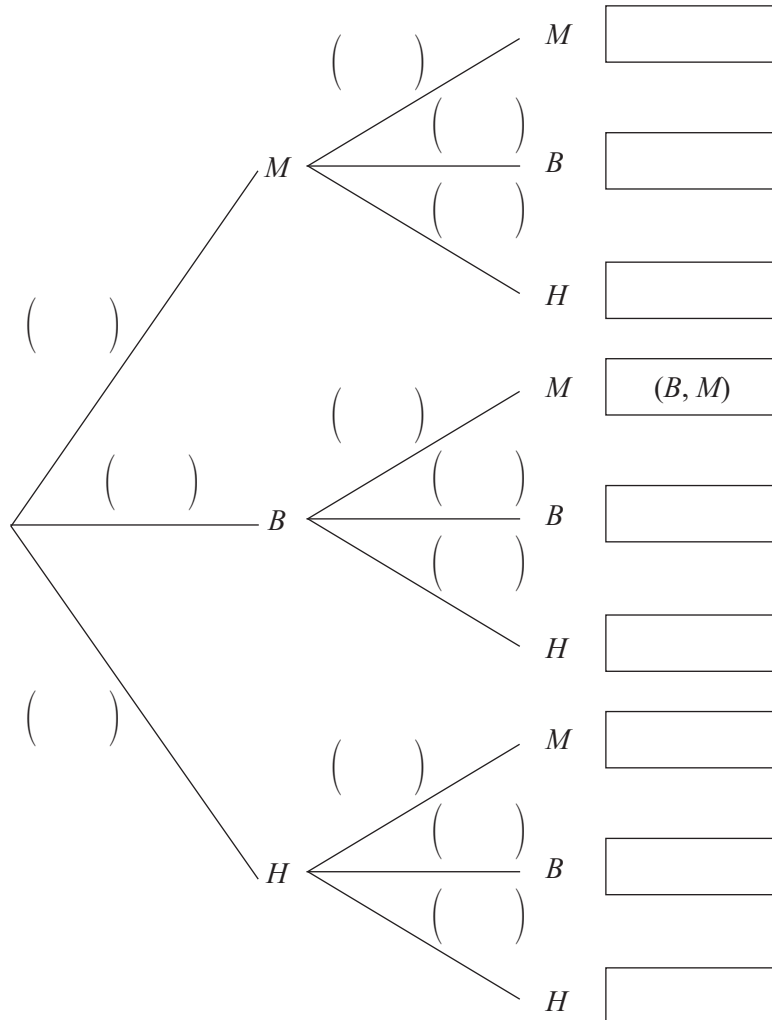
Calculate the probabilities:

- (i) kedua-dua pen yang dipilih berwarna merah,
both selected pens are red,
(ii) pen yang sama warna dipilih.
the selected pens are of the same color.

[6 markah/marks]

Jawapan/Answer:

- (a)



Rajah 3 / Diagram 3

- (b) (i)

- (ii)

- 7 Halid, Suresh dan Lim menduduki ujian Matematik. Kebarangkalian bahawa mereka lulus ujian Matematik masing-masing ialah $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$. Hitung kebarangkalian bahawa

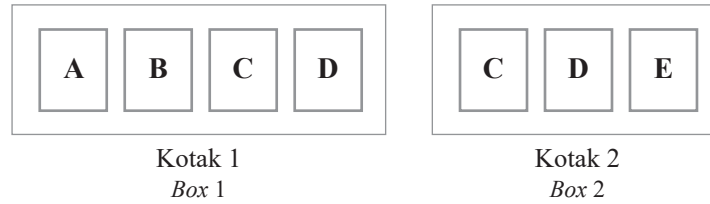
Halid, Suresh and Lim seat for the Mathematics test. The probability that they pass the Mathematics test is $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$ respectively. Calculate the probability that

- (a) Halid sahaja lulus ujian Matematik,
only Halid passes the Mathematics test,
- (b) sekurang-kurangnya dua orang lulus ujian Matematik,
at least two persons passes the Mathematics test,
- (c) sekurang-kurangnya seorang lulus ujian Matematik.
at least one person passes the Mathematics test.

[6 markah/marks]

Jawapan/Answer:

- 8 Rajah 4 menunjukkan empat kad abjad di dalam kotak 1 dan tiga kad abjad di dalam kotak 2.
Diagram 4 shows three alphabet cards in box 1 and three alphabet cards in box 2.



Rajah 4 / Diagram 4

Sekeping kad dikeluarkan secara rawak daripada setiap kotak. Hitung kebarangkalian bahawa:
A card is selecting at random from each box. Calculate the probability that:

- (a) kedua-dua kad itu mempunyai abjad yang sama,
both cards have same alphabet,
- (b) salah satu kad mempunyai huruf vokal.
one of the cards has a letter of vowel.

[4 markah/marks]

Jawapan/Answer:

- 9 Sebuah kotak mengandungi 20 batang pen merah dan beberapa batang pen biru serta hitam. Sebatang pen dipilih secara rawak, kebarangkalian mendapat pen biru dan hitam masing-masing ialah $\frac{3}{10}$ dan $\frac{1}{5}$. Kemudian 8 batang pen hitam ditambah ke dalam kotak itu dan 2 batang pen dipilih secara rawak dari kotak itu. Hitung kebarangkalian mendapat kedua-dua pen biru.

A box contains 20 red pens and some blue and black pens. A pen is chosen at random, the probability of getting a blue and black pen is $\frac{3}{10}$ and $\frac{1}{5}$ respectively. Then 8 black pens are added into the box and 2 pens are randomly selected from the box. Calculate the probability that both pens are blue.

[4 markah/marks]

Jawapan/Answer:

BAB 10

Matematik Pengguna: Pengurusan Kewangan

Consumer Mathematics: Financial Management

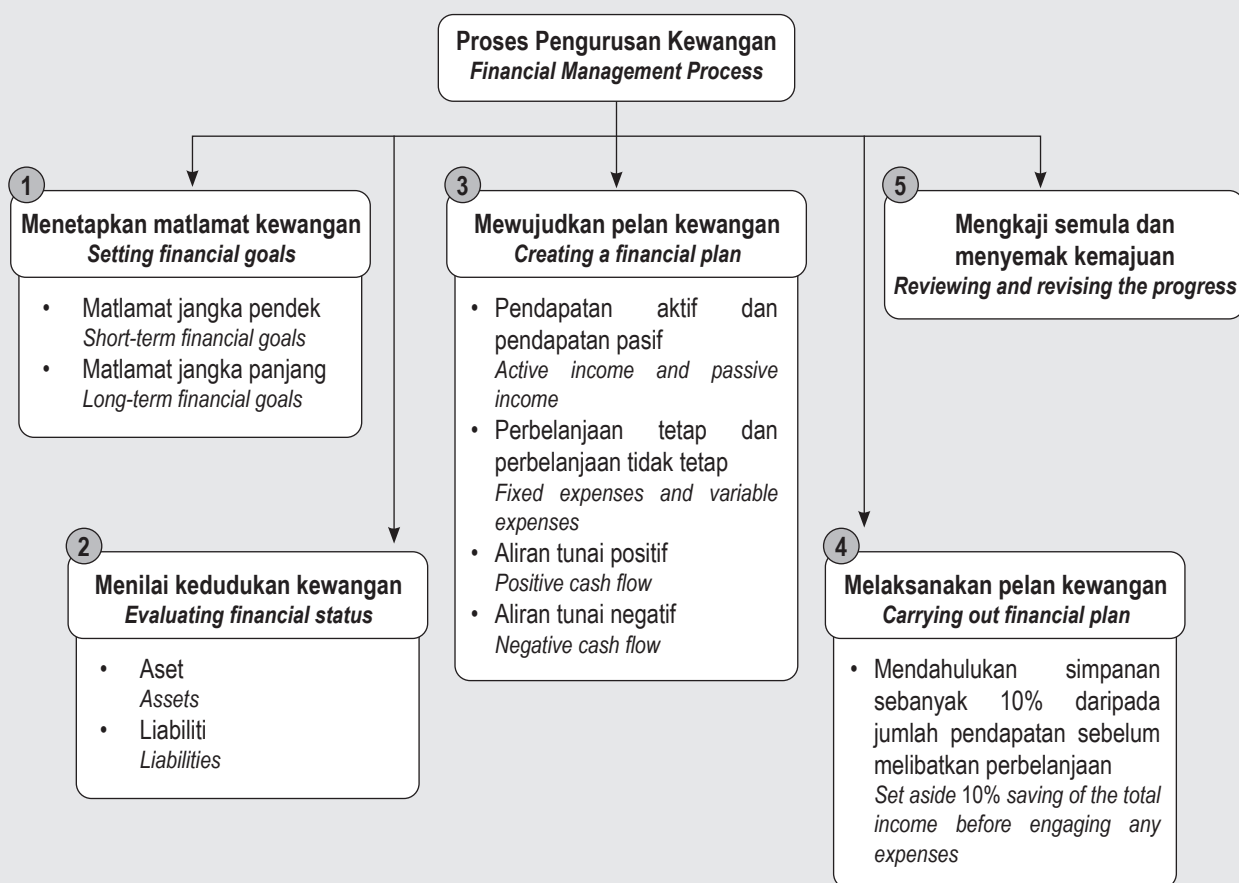


VIDEO
PEMBELAJARAN

NOTA EFEKTIF

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.



Matlamat kewangan **SMART**
SMART financial goals

S → *Specific* (Khusus)

M → *Measurable* (Boleh diukur)

A → *Attainable* (Boleh dicapai)

R → *Realistic* (Realistik)

T → *Time-bound* (Tempoh masa)



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>	Gaji <i>Salary</i>
B	Pendapatan pasif <i>Passive income</i>	Dividen <i>Dividend</i>
C	Perbelanjaan tetap <i>Fixed expenses</i>	Ansuran pinjaman perumahan <i>Housing loan instalment</i>
D	Perbelanjaan tidak tetap <i>Variable expenses</i>	Bayaran insurans <i>Insurance payment</i>

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

- I Membeli komputer riba
Purchasing a laptop
II Menabung untuk bersara
Saving for retirement
III Pendidikan anak-anak
Children education
IV Menyimpan untuk percutian
Saving for holiday trip

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

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

- A Sewa
Rent
B Barang runcit
Groceries
C Bayaran insurans
Insurance payment
D Pembayaran pinjaman perumahan
Housing loan payment

- 4 Gaji bulanan Wan Hafiy ialah RM3 500. Dia juga mempunyai perbelanjaan tetap dan tidak tetap masing-masing sebanyak RM1 200 dan RM900 pada setiap bulan. Berapakah aliran tunai bulanannya?

Wan Hafiy's monthly salary is RM3 500. He also has fixed and variable expenses of RM1 200 and RM900 respectively per month. What is his monthly cash flow?

- A RM1 400
B RM2 100
C RM2 300
D RM2 600

- 5 Jadual 1 menunjukkan perbelanjaan bulanan yang dirancang dan perbelanjaan bulanan sebenar Najmi.

Table 1 shows the planned and actual monthly expenses for Najmi.

Perbelanjaan <i>Expenses</i>	Perbelanjaan bulanan yang dirancang <i>Planned monthly expenses (RM)</i>	Perbelanjaan bulanan sebenar <i>Actual monthly expenses (RM)</i>
Sewa <i>Rental</i>	300	300
Pengangkutan <i>Transportation</i>	250	280
Makanan <i>Food</i>	500	600
Hiburan <i>Entertainment</i>	100	300

Jadual 1 / Table 1

Antara berikut, yang manakah **tidak** benar tentang perbelanjaan Najmi?

*Which of the following is **not** true about Najmi's expenses?*

- A Najmi mempunyai aliran tunai yang tinggi sebanyak RM1 480.
Najmi has a high cash flow of RM1 480.
B Terdapat perbezaan RM300 dalam perbelanjaan bulanan sebenar Najmi.
There is a difference of RM300 in Najmi's actual monthly expenses.
C Pola perbelanjaan Najmi mungkin membawa kepada aliran tunai negatif.
Najmi spending behaviour might lead to a negative cash flow.
D Najmi tidak akan mendapat memenuhi matlamat kewangannya berdasarkan pola perbelanjaan semasa.
Najmi will not be able to meet his financial goal based on his current spending behaviour.

- 6 Antara berikut, yang manakah matlamat yang jelas dan khusus?

Which of the following are clear and specific goals?

I Membeli telefon pintar yang bernilai RM2 000 dalam masa 4 bulan.

To buy smartphone worth RM2 000 in 4 months.

II Untuk menyimpan RM5 000 ke dalam akaun.

To save RM5 000 in an account.

III Untuk melangsaikan pinjaman pendidikan RM10 000 dalam masa 5 tahun.

To settle the education loan of RM10 000 in 5 years.

IV Untuk memperoleh wang yang banyak dengan membangunkan perniagaan sendiri.

To earn a lot of money by setting up own business.

A I dan/and III C II dan/and III

B II dan/and IV D III dan/and IV

- 7 Nurin Damia mahu menyimpan untuk membayar yuran kolejnya dalam tempoh 3 tahun. Adakah matlamat ini boleh dilaksanakan berdasarkan konsep SMART?

Nurin Damia wants to save for her college fee in 3 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 Nurin Damia mempunyai tempoh masa yang jelas untuk mencapai matlamat tersebut.

Yes. The goal is realistic as Nurin Damia has a clear time period to achieve the goal.

C Tidak. Matlamatnya tidak dapat diukur kerana jumlah yang diperlukan tidak ditentukan.

No. The goal is not measurable as the amount needed is not specified.

D Tidak. Matlamatnya tidak dapat dicapai kerana sukar untuk mempunyai sejumlah wang dalam 3 tahun.

No. The goal is not attainable as it is hard to have such amount of money in 3 years.

- 8 Jadual 2 menunjukkan pendapatan dan perbelanjaan Encik Irwan.

Table 2 shows Encik Irwan's income and expenditure.

Pendapatan dan perbelanjaan (RM) <i>Income and expenditure (RM)</i>	
Gaji bersih <i>Net salary</i>	4 300
Simpanan tetap bulanan <i>Fixed monthly savings</i>	300
Simpanan dana kecemasan <i>Savings for emergency funds</i>	100
Ansuran pinjaman perumahan <i>Housing loan instalment</i>	850
Ansursan pinjaman kereta <i>Car loan instalment</i>	800
Premium insurans <i>Insurance premiums</i>	150
Barang dapur <i>Groceries</i>	900
Melancong <i>Travel</i>	200
Utiliti rumah <i>Home utilities</i>	300
Belanja petrol <i>Petrol expenses</i>	200
Bil telefon <i>Telephone bill</i>	150

Jadual 2 / Table 2

Hitung perbelanjaan tetap bulanan Encik Irwan.
Calculate Encik Irwan's monthly fixed expenses.

A RM350

B RM400

C RM1 750

D RM1 800

Soalan Subjektif

Jawab semua soalan.

- 1 Puan Dania memperoleh pendapatan bulanan sebanyak RM4 000. Beliau juga memperoleh pendapatan sampingan sebanyak RM500. Beliau turut menerima sewaan rumahnya sebanyak RM850 sebulan. Puan Dania mempunyai perbelanjaan tetap dan perbelanjaan tidak tetap masing-masing sebanyak RM1 800 dan RM950 sebulan. Hitung aliran tunai bulanan Puan Dania. Jelaskan jawapan anda.

Puan Dania obtained a monthly income of RM4 000. She also earned a side income of RM500 every month. She also rents out her house for RM850 a month. Puan Dania have fixed expenses and variable expenses of RM1 800 and RM950 respectively per month. Calculate Puan Dania's monthly cash flow. Explain your answer.

[3 markah/marks]

Jawapan/Answer:

- 2 Encik Irfan mula bekerja pada tahun 2023 dengan gaji permulaan sebanyak RM1 800. Dia memiliki sebuah kereta dengan bayaran ansuran bulanan sebanyak RM400. Dia juga mempunyai komitmen bulanan sebanyak RM880.

Encik Irfan started working in year 2023 with a starting salary of RM1 800. He owns a car with monthly instalments of RM400. He also has a monthly commitment of RM880.

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

Calculate Encik Irfan's monthly cash flow. Explain your answer.

- (b) Jelaskan aliran tunai Encik Irfan jika jumlah perbelanjaannya meningkat sebanyak 70%.

Explain Encik Irfan's cash flow if his total expenses increased by 70%.

[5 markah/marks]

Jawapan/Answer:

- 3 Dini bekerja sebagai seorang pegawai sains. Pendapatan dan perbelanjaan bulanannya masing-masing ialah RM3 750 dan RM2 400. Dia bercadang untuk membeli sebuah motosikal yang berharga RM15 600 secara tunai dalam tempoh setahun.

Adakah Dini akan mencapai matlamat kewangannya? Jelaskan

Dini works as a science officer. His monthly income and expenses are RM3 750 and RM2 400 respectively. He plans to buy a motorcycle that costs RM15 600 in cash within a year.

Will Dini achieve his financial goal? Explain.

[3 markah/marks]

Jawapan/Answer:

- 4 Danial merupakan seorang pensyarah muda dan dia menerima pendapatan bulanan sebanyak RM4 500. Ketika waktu lapang, dia bekerja sebagai pemandu e-panggilan. Pada bulan November, Danial mempunyai perbelanjaan tetap dan tidak tetap sebanyak RM3 900. Jika Danial mempunyai aliran tunai positif sebanyak RM1 670 pada bulan tersebut, hitung pendapatan yang diperoleh daripada kerja sambilan.

Danial is a young lecturer and he receives a monthly income of RM4 500. During his free time, he works as an e-hailing driver. In November, Danial has a fixed and variable expenses of RM3 900.

If Danial has a positive cash flow of RM1 670 in that month, calculate his income earned from the part time job.

[2 markah/marks]

Jawapan/Answer:

-
- 5 Pada bulan April, Nurin menerima gaji sebanyak RM1 900 dan komisen sebagai agen insurans sebanyak RM1 187.60. Perbelanjaan tetap dan tidak tetap Nurin pada bulan itu masing-masing ialah RM2 850 dan RM780.

Tentukan aliran tunai Nurin pada bulan itu.

In April, Nurin receives RM1 900 as a salary and RM1 187.60 as an insurance agent. In that month, her fixed and non-fixed expenses are RM2 850 and RM780 respectively.

Determine Nurin's cash flow for that month.

[3 markah/marks]

Jawapan/Answer:

- 6 Puan Pitriah bekerja sebagai seorang pereka fesyen dengan gaji bulanan RM9 000. Dia juga menerima RM1 300 setiap bulan hasil sewa pangsapurnya. Perbelanjaan tetap bulanan dan perbelanjaan tidak tetap bulannya masing-masing ialah RM5 430 dan RM3 500.

Jika Puan Pitriah menetapkan 10% daripada gajinya sebagai simpanan tetap bulanan, hitung aliran tunai bulannya.

Puan Pitriah works as fashion designer with a monthly salary of RM9 000. She also receives RM1 300 monthly from her apartment rental. Her monthly fixed expenses and monthly variable expenses are RM5 430 and RM3 500.

If Puan Pitriah sets aside 10% of her salary as a fixed monthly saving, calculate her monthly cash flow.

[3 markah/marks]

Jawapan/Answer:

- 7 Harith merupakan seorang penternak kambing. Purata keuntungan bulanan Harith ialah RM13 500. Dia merancang untuk membeli lori berharga RM80 000 dengan ansuran bulanan sebanyak RM1 300 dalam tempoh 7 tahun. Menggunakan kaedah SMART, lengkapkan Jadual 1 di ruang jawapan. Seterusnya, tentukan sama ada Harith dapat mencapai matlamat kewangannya atau tidak.

Harith is a goat farmer. Harith's average monthly profit is RM13 500. He plans to buy a lorry worth RM80 000 with monthly instalment of RM1 300 within 7 years. Using the SMART concept, complete Table 1 in the answer space. Hence, determine whether Harith can achieve his financial goal.

[4 markah/marks]

Jawapan/Answer:

<i>S</i>	Beli lori <i>Buy a lorry</i>
<i>M</i>	
<i>A</i>	
<i>R</i>	
<i>T</i>	7 tahun/ <i>years</i>

Jadual 1 / Table 1

- 8 Jadual 2 menunjukkan pelan kewangan Encik Hafiy.
Table 2 shows a financial plan of Encik Hafiy.

Pelan Kewangan Encik Hafiy
Encik Hafiy's Financial Plan

Pendapatan dan Perbelanjaan <i>Income and Expenditure</i>	Pelan kewangan <i>Financial plan</i> (RM)	
Pendapatan/Income		
Pendapatan bulanan/ <i>Monthly income</i>	7 000	
Tolak simpanan untuk dana kecemasan <i>Minus saving for emergency fund</i>	<i>P</i>	
Baki pendapatan/ <i>Income balance</i>		<i>Q</i>
Perbelanjaan tetap bulanan <i>Monthly fixed expenses</i>		
Pinjaman bank/ <i>Bank loans</i>	2 500	
Premium insurans/ <i>Insurance premium</i>	550	
Jumlah perbelanjaan tetap bulanan <i>Total monthly fixed expenses</i>		<i>R</i>
Perbelanjaan tidak tetap bulanan <i>Monthly variable expenses</i>		
Bil utiliti/ <i>Utility bills</i>	350	
Makanan dan minuman/ <i>Food and drinks</i>	<i>S</i>	
Perbelanjaan petrol/ <i>Petrol expenses</i>	400	
Hiburan/ <i>Entertainment</i>	380	
Jumlah perbelanjaan tidak tetap bulanan <i>Total monthly variable expenses</i>		2 020
Lebihan pendapatan/Defisit <i>Surplus of income/Deficit</i>		1 580

Jadual 2 / Table 2

Berdasarkan pelan kewangan Encik Hafiy, tentukan nilai *P*, *Q*, *R* dan *S*.
Based on the financial plan of Encik Hafiy, determine the values of P, Q, R and S.

[4 markah/marks]

Jawapan/*Answer*:

Peperiksaan Akhir Sesi Akademik Tingkatan 4

KERTAS 1 [40 markah/marks]

Jawab **semua** soalan dalam bahagian ini.
Answer all questions in this section.

- 1 Bundarkan 690 493 betul kepada tiga angka bererti.

Round off 690 493 correct to three significant figures.

- A 690
- B 691
- C 690 000
- D 691 000

- 2 Jisim sehelai kertas A4 ialah 0.0089456 kg. Jika satu rim mengandungi 400 helai kertas A4, berapakah berat, dalam g, 200 rim kertas A4 dalam bentuk piawai?

The weight of an A4 paper is 0.0089456 kg. If a ream contains 400 sheets of A4 paper, what is the weight, in g, of 200 reams of A4 paper in standard form?

- A 7.15×10^5
- B 7.16×10^5
- C 7.16×10^6
- D 7.20×10^5

- 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 Diberi $p_5 = 10212_3$, dengan keadaan p ialah integer, cari nilai p .

Given $p_5 = 10212_3$, where p is an integer, find the value of p .

- A 404
- B 440
- C 442
- D 1004

- 5 Diberi $32021_4 - 3313_4 = 2m1n2_4$, cari nilai m dan nilai n .

Given $32021_4 - 3313_4 = 2m1n2_4$, find the value of m and of n .

- A $m = 0, n = 2$
- B $m = 2, n = 0$
- C $m = 2, n = 2$
- D $m = 3, n = 0$

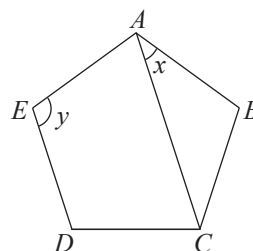
- 6 Jika setiap sudut pedalaman sebuah poligon sekata ialah 144° , berapakah bilangan sisi poligon tersebut?

If each interior angle of a regular polygon is 144° , how many sides does the polygon have?

- A 8
- B 10
- C 12
- D 15

- 7 Dalam Rajah 1, $ABCDE$ ialah sebuah pentagon sekata.

In Diagram 1, $ABCDE$ is a regular pentagon.



Rajah 1 / Diagram 1

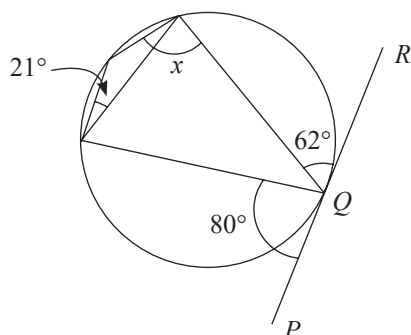
Nilai bagi $y - x$ ialah

The value of $y - x$ is

- A 144°
- B 108°
- C 72°
- D 36°

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

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



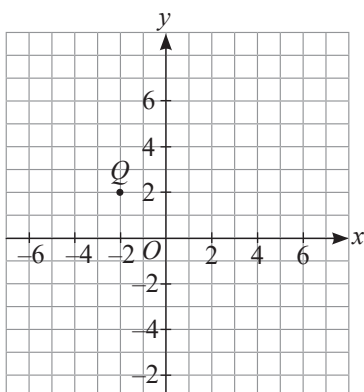
Rajah 2 / Diagram 2

Cari nilai $\sin x$.

Find the value of $\sin x$.

- A 0.9721
B 0.9848
C 0.9925
D 0.9945
- 9 Rajah 3 menunjukkan titik Q diplot pada suatu satah Cartes.

Diagram 3 shows point Q plotted on a Cartesian plane.



Rajah 3 / Diagram 3

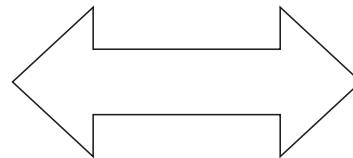
Transformasi P ialah translasi $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$. Tentukan koordinat imej Q di bawah transformasi P .

Transformation P is a translation $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$. Determine the image of coordinates of Q under the transformation P .

- A (1, 1)
B (1, 3)
C (-5, 1)
D (-5, 5)

- 10 Tentukan tertib simetri putaran bagi Rajah 4.

Determine the order of rotational symmetry for Diagram 4.

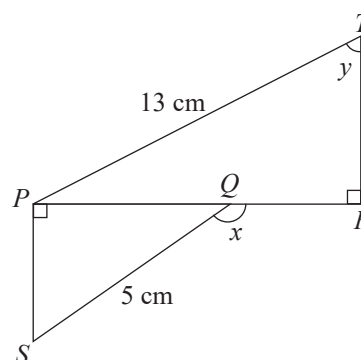


Rajah 4 / Diagram 4

- A 1
B 2
C 3
D 4

- 11 Dalam Rajah 5, PQR ialah suatu garis lurus.

In Diagram 5, PQR is a straight line.



Rajah 5 / Diagram 5

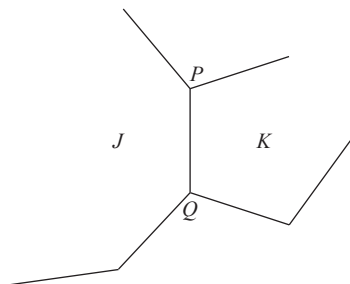
Diberi $\tan x = -\frac{3}{4}$ dan $\cos y = \frac{5}{13}$, hitung panjang, dalam cm, QR .

Given $\tan x = -\frac{3}{4}$ and $\cos y = \frac{5}{13}$, calculate the length, in cm, QR .

- A 4
B 5
C 8
D 12

- 12 Rajah 6 menunjukkan PQ ialah sisi sepunya bagi nonagon sekata J dan pentagon sekata K .

Diagram 6 shows PQ is common side of a regular nonagon J and a regular pentagon K .



Rajah 6 / Diagram 6

Hitung jumlah perimeter, dalam cm, poligon J dan K jika panjang sisi PQ ialah 5 cm.

Calculate the total perimeter, in cm, of polygons J and K if the length of side PQ is 5 cm.

- A 70
B 65
C 55
D 45

- 13 Antara berikut, yang manakah pernyataan **palsu**?

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

- A Faktor bagi 2 ialah 1 dan 2.

The factors of 2 are 1 and 2.

- B Sebahagian nombor dikuasakan dengan sifar menghasilkan 1.

Some of the numbers to the power of zero result in 1.

- 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 6.

30 is a multiple of 5 and 6.

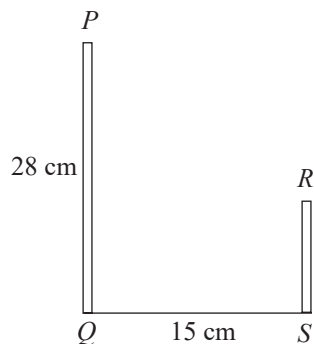
- 14 Antara berikut yang manakah rumus yang betul bagi jujukan $-2, 12, 50, 124, \dots$ dengan keadaan $n = 1, 2, 3, 4, \dots$?

Which of the following is the correct formula for the sequence $-2, 12, 50, 124, \dots$ such that $n = 1, 2, 3, 4, \dots$?

- A $6n - 4$
B $4n^2 - 2$
C $2n^3 - 4$
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 $\frac{8m-2n}{3} = mn + n$, ungkapkan m dalam sebutan n .

Given that $\frac{8m-2n}{3} = mn + n$, express m in terms of n .

- A $m = \frac{2}{8-3n}$
B $m = \frac{5}{3n-8}$
C $m = \frac{n}{3n-8}$
D $m = \frac{5n}{8-3n}$

- 17 Selesaikan persamaan linear yang berikut.

Solve the following linear equations.

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

- A $\frac{5}{2}$
B $\frac{2}{5}$
C 0
D 8

- 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.



Mangga
Mangoes
RM7.00 per kg



Jambu batu
Guava
RM3.50 per kg

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 Jika $2^x = 16$, berapakah nilai x ?

If $2^x = 16$, what is the value of x ?

- A 2
 B 3
 C 4
 D 5

- 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:

$$-5x \leq 9 + 3x$$

- A $x \geq -\frac{9}{8}$
 B $x \leq -\frac{9}{8}$
 C $x \geq -\frac{9}{2}$
 D $x \leq -\frac{9}{2}$

- 23 Rajah 9 ialah plot batang-dan-daun yang menunjukkan data markah bagi 26 orang murid dalam suatu ujian Matematik.

Diagram 9 is a stem-and-leaf plot showing the score data for 26 students in a Mathematics test.

Markah murid
Student scores

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

Kekunci: 5 | 1 bermakna 51 markah

Key: 5 | 1 means 51 scores

Rajah 9 / Diagram 9

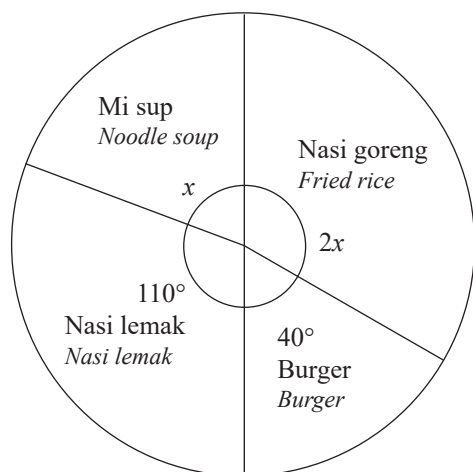
Cari julat markah murid tersebut.

Find the range of the student's score.

- A 35
 B 38
 C 42
 D 45

- 24 Rajah 10 ialah carta pai yang menunjukkan makanan kegemaran 72 orang murid.

Diagram 10 is pie chart showing the favourite food of 72 students.



Rajah 10 / Diagram 10

Diberi 28 orang murid suka makan nasi goreng. Hitung jumlah murid yang suka makan mi sup dan nasi lemak.

Given that 28 students like to eat fried rice. Calculate the total students who like to eat noodle soup and nasi lemak.

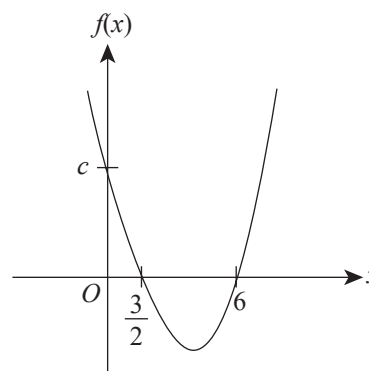
- 25 Antara berikut, yang manakah bukan aspek utama yang perlu diambil kira untuk membina pelan kewangan jangka panjang?

Which of the following is not a key aspect to be considered when building a long-term financial plan?

- A Kesihatan diri
Personal health
- B Kadar inflasi
Inflation rate
- C Kadar faedah
Interest rate
- D Kadar pengangguran
Unemployment rate

- 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

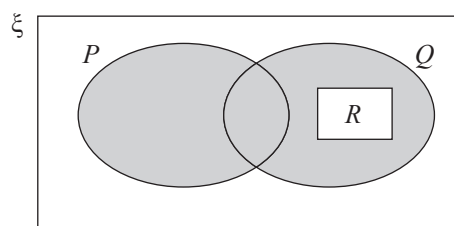
Cari nilai c .

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

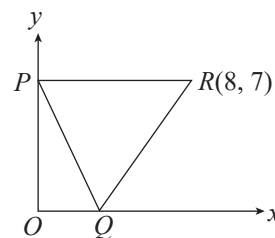
- 30 Diberi bahawa persamaan bagi suatu garis lurus ialah $4x - 5y = 9$. Cari pintasan- x bagi garis lurus itu.

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

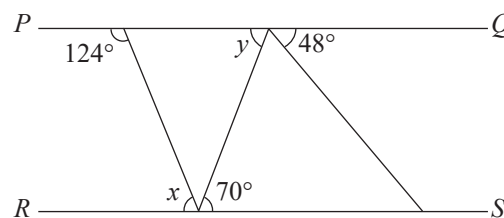
Diberi bahawa O ialah asalan dan jarak PQ ialah $\sqrt{53}$ unit. Cari kecerunan bagi garis lurus QR .

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 Dalam Rajah 14, PQ dan RS ialah dua garis lurus selari.

In Diagram 14, PQ and RS are two parallel straight lines.



Rajah 14 / Diagram 14

Hitung nilai $x + y$.

Calculate the value of $x + y$.

- A 128°
B 126°
C 118°
D 116°

- 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.

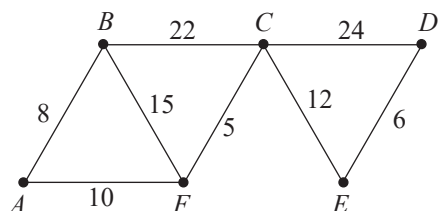
- A 18
B 21
C 36
D 42

- 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 suatu graf.
Diagram 15 shows a graph.



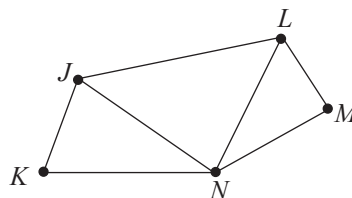
Rajah 15 / Diagram 15

Suatu pokok diterbitkan dari graf itu. Berapakah jumlah pemberat minimum bagi pokok itu?

A tree is derived from the graph. What is the minimum total weight for the tree?

- A 29
B 41
C 56
D 78

- 36 Rajah 16 menunjukkan suatu graf.
Diagram 16 shows a graph.



Rajah 16 / Diagram 16

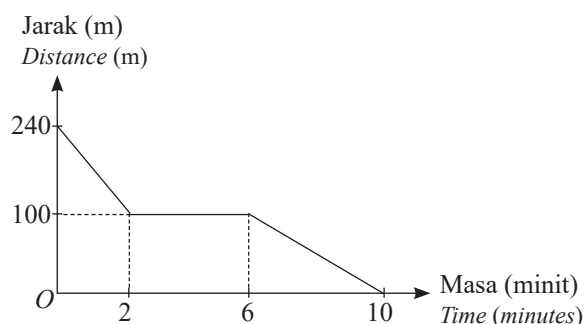
Nyatakan darjah bagi bucu N.

State the degree of vertex N.

- A 1
B 2
C 3
D 4

- 37 Rajah 17 ialah sebuah graf jarak-masa yang menunjukkan pergerakan zarah untuk tempoh 10 minit.

Diagram 17 is a distance-time graph showing the movement of a particle for a period of 10 minutes.



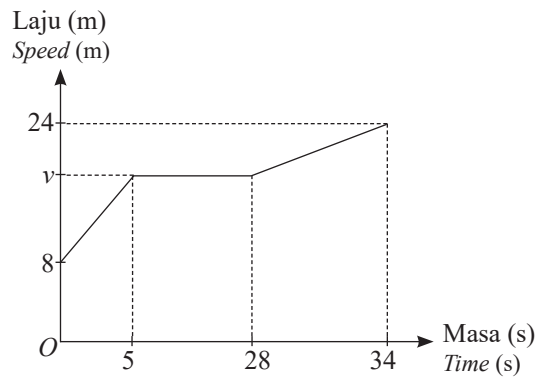
Rajah 17 / Diagram 17

Tentukan tempoh masa, dalam saat, zarah itu berada dalam keadaan pegun.

Determine the period, in seconds, which the particle is at rest.

- A 4.0
B 40.0
C 0.07
D 240.0

- 38 Rajah 18 menunjukkan graf laju-masa bagi pergerakan suatu zarah dalam tempoh 34 saat. Diagram 18 shows the speed-time graph for the movement of a particle in a period of 34 seconds.



Rajah 18 / Diagram 18

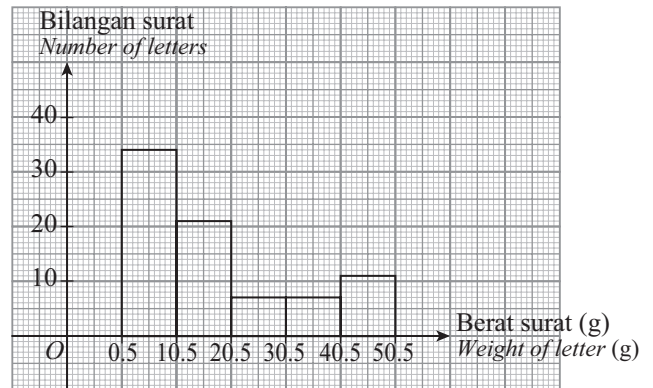
Diberi jarak yang dilalui dalam tempoh 29 saat terakhir ialah 332 m. Hitung nilai v .

Given that the distance travelled in the last 29 seconds is 332 m. Calculate the value of v .

- A 12
B 10
C 15
D 16
- 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 menunjukkan carta palang bagi jisim surat yang dihantar oleh seorang posmen pada suatu hari yang tertentu.

Diagram 19 is a bar chart showing the weight of letters delivered by a postman on a certain day.



Rajah 19 / Diagram 19

Hitung min jisim, dalam g, bagi sepucuk surat itu.

Calculate the mean of mass, in g, of a letter.

- A 40
B 32
C 18
D 8

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.

$$V = \{A, B, C, D\}$$

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

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:

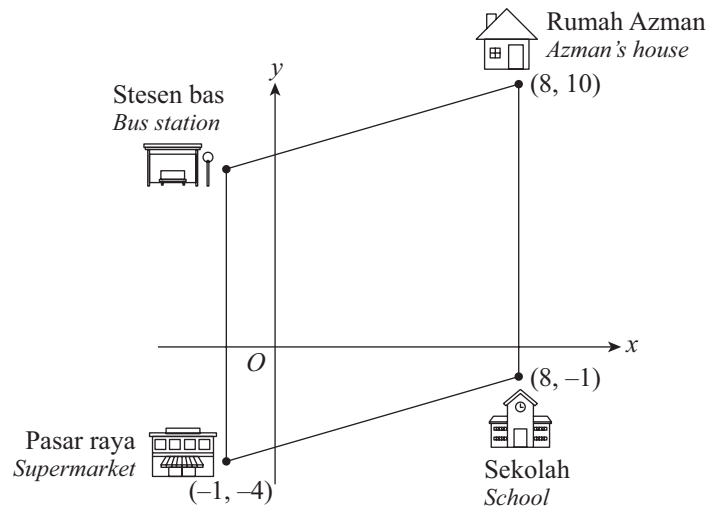
- 3 Jumlah harga 1 kg tepung gandum dan 1 kg gula ialah RM11. Beza harga antara 3 kg tepung gandum dan 1 kg gula ialah RM5. Tanpa menggunakan kaedah matriks, cari harga bagi 1 kg tepung gandum dan 1 kg gula.

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]

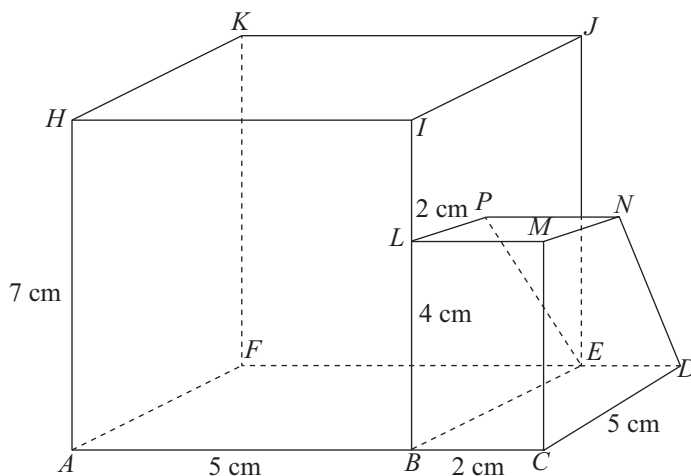
Jawapan/Answer:

(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

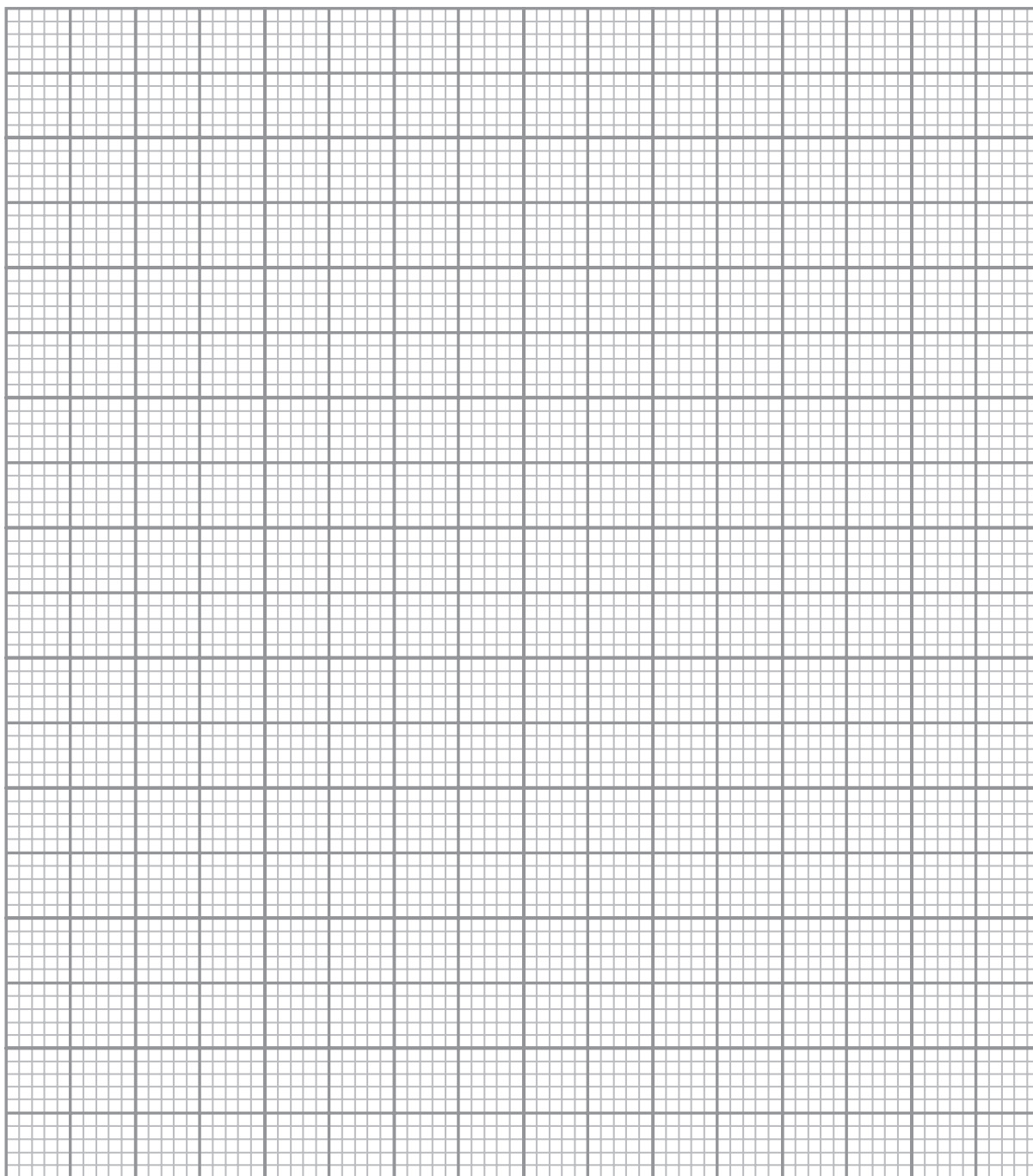
Jadual 1 / Table 1

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 $-3 \leq x \leq 4$.

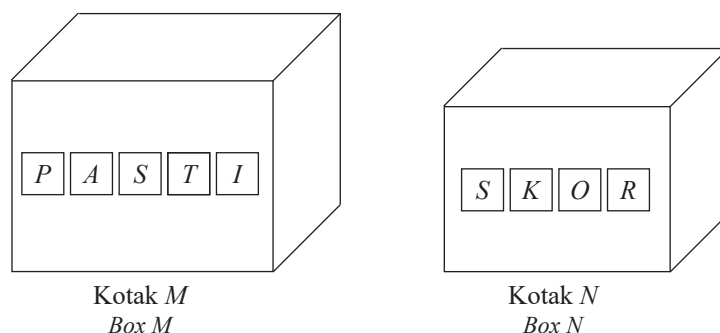
[4 markah/marks]

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.

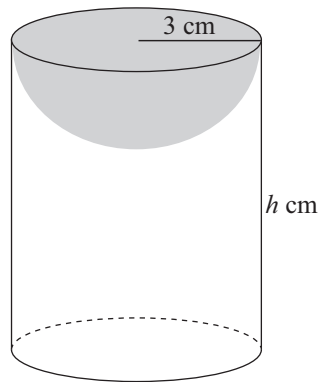
By listing all the possible outcomes, calculate the probability that the first card is labelled with the letter “ T ” or the second card is labelled with a consonant.

[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.

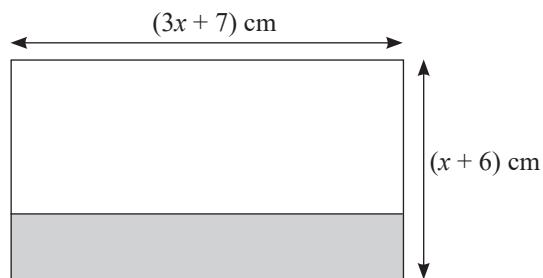
(Guna/Use $\pi = \frac{22}{7}$)

[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]

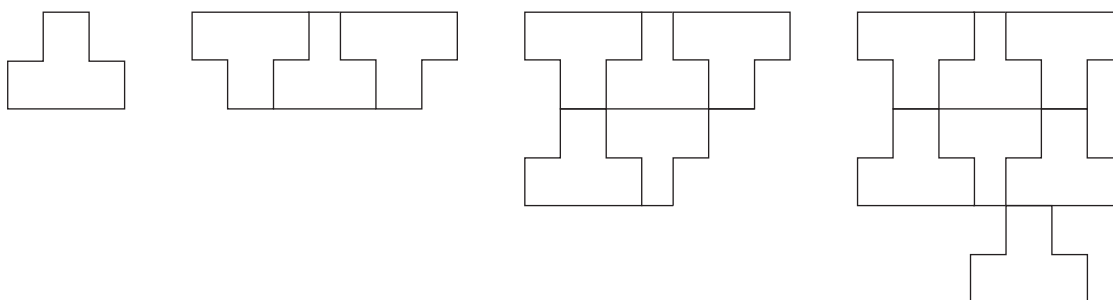
Jawab **semua** soalan dalam bahagian ini.
Answer all questions in this section.

- 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 20th 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]

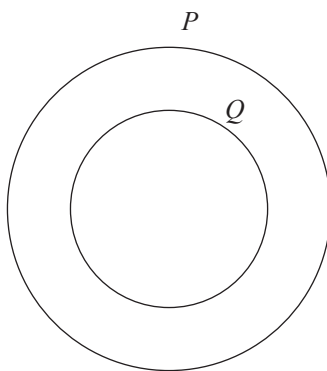
- (ii) Hitung/Calculate,

- bilangan orang yang menggemari badminton sahaja,
the number of people who like badminton only,
- bilangan orang yang menggemari sekurang-kurangnya dua sukan,
the number of people who like at least two sports,
- bilangan orang yang hanya menggemari badminton dan futsal sahaja.
the number of people who only like badminton and futsal.

[4 markah/marks]

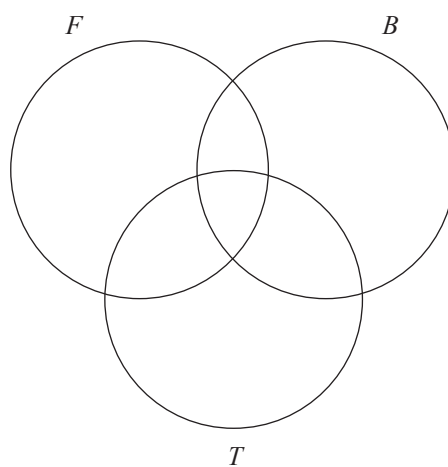
Jawapan/*Answer*:

(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>		<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 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>		<i>T</i>
Lebihan/Defisit <i>Surplus/Deficit</i>		<i>V</i>

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]

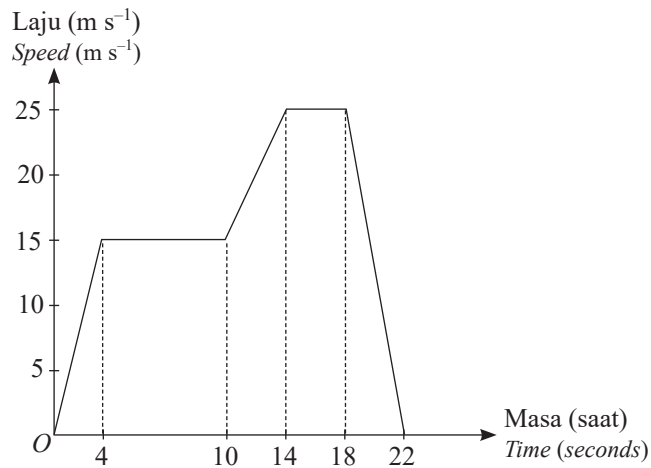
Jawapan/Answer:

(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)

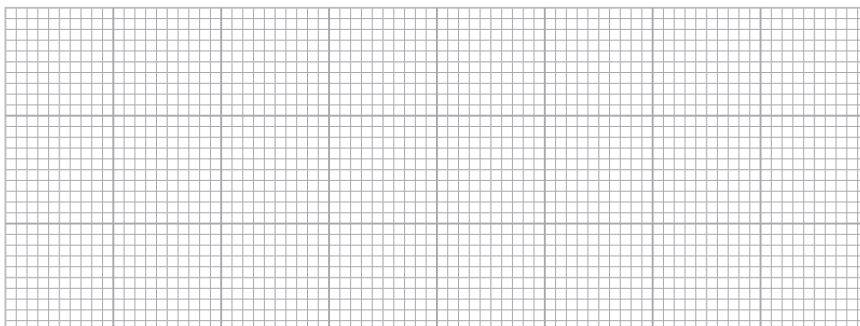
(ii)

(iii)

- (b)

- (c)

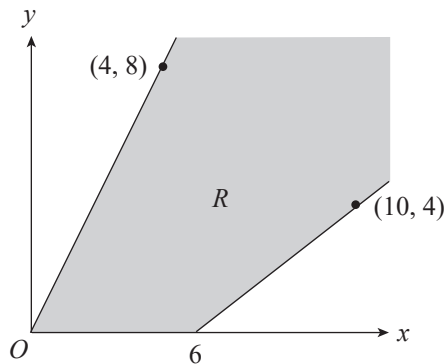
- (d)



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]

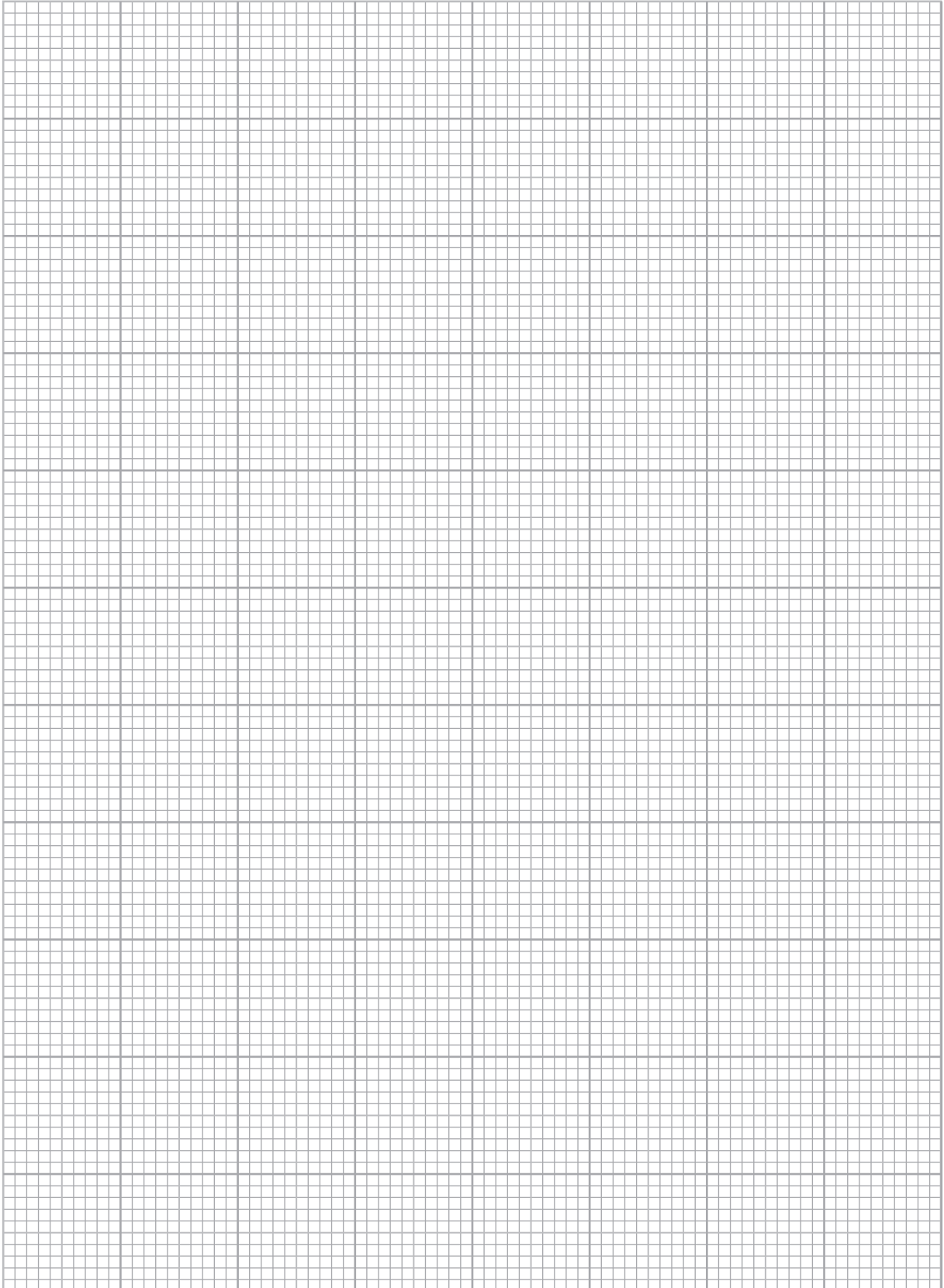
Jawapan/Answer:

(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

Tingkatan 4

Ulang Kaji Menengah Rendah

Matematik Pengguna: Simpanan dan Pelaburan, Kredit dan Hutang

Consumer Mathematics: Savings and Investments, Credit and Debt

1 Faedah bulan pertama

First month interest

$$= \text{RM}60\,000 \times \frac{8}{100} \times \frac{1}{12}$$

$$= \text{RM}400$$

Pinjaman pada akhir bulan pertama

Loan at the end of first month

$$= \text{RM}60\,000 + \text{RM}400$$

$$= \text{RM}60\,400$$

Baki selepas ansuran pertama

Balance after first instalment

$$= \text{RM}60\,400 - \text{RM}470$$

$$= \text{RM}59\,930$$

Faedah bulan kedua

Second month interest

$$= \text{RM}59\,930 \times \frac{8}{100} \times \frac{1}{12}$$

$$= \text{RM}399.53$$

Pinjaman pada akhir bulan kedua

Loan at the end of second month

$$= \text{RM}59\,930 + \text{RM}399.53$$

$$= \text{RM}60\,329.53$$

Baki selepas ansuran kedua

Balance after second instalment

$$= \text{RM}60\,329.53 - \text{RM}470$$

$$= \text{RM}59\,859.53$$

Faedah bulan ketiga

Third month interest

$$= \text{RM}59\,859.53 \times \frac{8}{100} \times \frac{1}{12}$$

$$= \text{RM}399.07$$

Pinjaman pada akhir bulan ketiga

Loan at the end of third month

$$= \text{RM}59\,859.53 + \text{RM}399.07$$

$$= \text{RM}60\,258.60$$

Baki pinjaman selepas ansuran ketiga

Balance of the loan after third instalment

$$= \text{RM}60\,258.60 - \text{RM}470$$

$$= \text{RM}59\,788.60$$

$$2 \quad r = 3.5\% = 0.035$$

$$t = 9 \text{ tahun/years}$$

$$P = 90\% \times \text{RM}49\,715$$

$$= \text{RM}44\,743.50$$

$$I = Prt$$

$$= (\text{RM}44\,743.50)(0.035)(9)$$

$$= \text{RM}14\,094.20$$

$$I + P = \text{RM}14\,094.20 + \text{RM}44\,743.50$$

$$= \text{RM}58\,837.70$$

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

$$= \text{RM}544.80 \times 4 \text{ tahun/years} \times 12 \text{ bulan/months}$$

$$= \text{RM}26\,150.40$$

3 Peratus Hibah/Percentage of Hibah

$$= \frac{1\,250}{50\,000} \times 100\%$$

$$= 2.5\%$$

$$\text{Dis } 2024 = \frac{2.5}{100} \times 50\,000 = 1\,250$$

$$\text{Dis } 2025 = \frac{2.5}{100} \times (50\,000 + 1\,250) = 1\,281.25$$

$$\text{Dis } 2025 = \frac{2.5}{100} \times (51\,250 + 1\,281.25) = 1\,313.28$$

Jumlah wang dalam akaun simpanan pada Disember 2026:

Amount of money in savings account by December 2026:

$$= \text{RM}52\,531.25 + \text{RM}1\,313.28$$

$$= \text{RM}53\,844.53$$

4 Kaedah sekali gus/Lump sum method:

$$= \frac{12\,000}{440}$$

$$= 27.2727 \text{ gram}$$

Strategi pemurataan/*Cost averaging strategy*:

Bulan Month	Jumlah belian Purchase amount (RM)	Harga per gram Price per gram (RM)	Kuantiti emas yang dibeli Quantity of gold purchased (gram)	Jumlah emas dalam akaun Quantity of gold in account (gram)
Januari/January	1 000	440	2.2727	2.2727
Februari/February	1 000	339	2.9499	5.2226
Mac/March	1 000	351	2.8490	8.0716
April/April	1 000	368	2.7174	10.7890
Mei/May	1 000	381	2.6247	13.4137
Jun/June	1 000	378	2.6455	16.0592
Julai/July	1 000	402	2.4876	18.5468
Ogos/August	1 000	384	2.6042	21.1510
September/September	1 000	378	2.6455	23.7965
Oktober/October	1 000	396	2.5253	26.3218
November/November	1 000	413	2.4213	28.7431
Disember/December	1 000	333	3.0030	31.7461

Kaedah pemurataan lebih menguntungkan kerana Encik Affan dapat membeli Emas 999.9 dengan lebih banyak berbanding kaedah sekaligus walaupun menggunakan modal yang sama.

The cost averaging strategy is profitable because Encik Affan can buy more 999.9 Gold compared to the lump sum method, although using the same amount of modal.

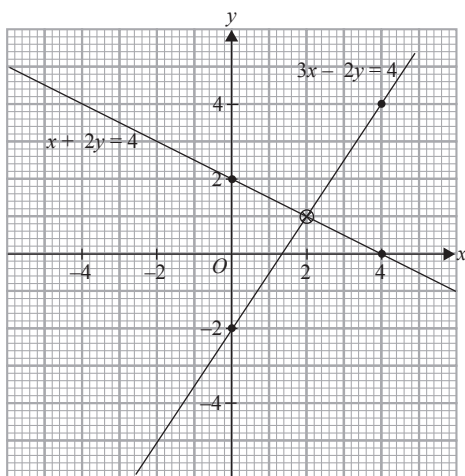
Garis Lurus Straight Lines

1 $3x - 2y = 4$

$x + 2y = 4$

x	0	4
y	-2	4

x	0	4
y	2	0



Maka, titik persilangan ialah (2, 1).

Thus, the intersection point is (2, 1).

2 (a) (i) Koordinat/Coordinate $P = (-4, -3)$

(ii) Kecerunan/Gradient OP

$$= \frac{0 - (-3)}{0 - (-4)} = \frac{3}{4}$$

Dengan $m = \frac{3}{4}$ dan $c = 0$, persamaan OP diberi oleh

With $m = \frac{3}{4}$ and $c = 0$, the equation of OP given by

$$y = mx + c$$

$$y = \frac{3}{4}x + 0$$

$$4y = 3x$$

$$3x - 4y = 0$$

(b) (i) Kecerunan OC = kecerunan AB
Gradient of OC = Gradient of AB

$$\frac{8-0}{p-0} = \frac{2}{5}$$

$$2p = 40$$

$$p = 20$$

(ii) Dengan $m = \frac{2}{5}$, persamaan AB ialah

With $m = \frac{2}{5}$, the equation of AB is

$$y = \frac{2}{5}x + c$$

Garis itu melalui titik $B(10, 16)$:

The line passes through point $B(10, 16)$:

$$16 = \frac{2}{5}(10) + c$$

$$c = 16 - 4$$

$$= 12$$

Persamaan AB ialah $y = \frac{2}{5}x + 12$.

The equation of AB is $y = \frac{2}{5}x + 12$.

(c) (i) Membandingkan $y = 3x$ dengan $y = mx + c$, maka kecerunan $OP = 3$

Comparing $y = 3x$ with $y = mx + c$, therefore gradient of $OP = 3$

$$\frac{6-0}{k-0} = 3$$

$$3k = 6$$

$$k = 2$$

$$6 \quad \frac{(8-2) \times 180^\circ}{8} = 135^\circ$$

$$\frac{(5-2) \times 180^\circ}{5} = 108^\circ$$

$$y = 360^\circ - 135^\circ - 108^\circ = 117^\circ$$

Sudut dan Tangen bagi Bulatan

Angles and Tangent of Circles

$$1 \quad x = 90^\circ - 30^\circ = 60^\circ$$

$$2 \quad x = \frac{135}{3} = 45^\circ$$

$$3 \quad x = 180^\circ - (25^\circ \times 2) = 130^\circ$$

$$y = 90^\circ$$

$$x + y = 130^\circ + 90^\circ = 220^\circ$$

$$4 \quad \angle UST = \angle UVS = 50^\circ$$

$$\angle VSU = \frac{180 - 50}{2} = 65^\circ$$

$$z = 180 - 65 - 50 - 50 = 15^\circ$$

$$5 \quad \angle RPK = 2 \times 40^\circ = 80^\circ$$

$$\angle PRL = 360^\circ - 90^\circ - 90^\circ - 80^\circ = 100^\circ$$

$$m = 180^\circ - 100^\circ = 80^\circ$$

Rumus Algebra

Algebraic Formulae

$$1 \quad (a) \quad 3p = \frac{8}{10+q}$$

$$10+q = \frac{8}{3p}$$

$$q = \frac{8}{3p} - 10$$

$$(b) \quad 3p - 6 = \frac{8}{q}$$

$$3p = \frac{8}{q} + 6$$

$$q = \frac{8}{3p} + 2$$

$$(c) \quad \sqrt{m} - 2 = n - 8k$$

$$\sqrt{m} = n - 8k + 2$$

$$m = (n - 8k + 2)^2$$

$$(d) \quad \frac{m-2}{3} = n - 8k^2$$

$$8k^2 = n - \frac{m-2}{3}$$

$$k^2 = \frac{n}{8} - \frac{m-2}{3(8)}$$

$$k = \sqrt{\frac{n}{8} - \frac{m-2}{24}}$$

$$2 \quad (a) \quad (i) \quad (3n) + n = \frac{3+1}{-2k}$$

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

$$-2k = \frac{3+1}{12}$$

$$k = \frac{4}{-24}$$

$$= -\frac{1}{6}$$

$$(ii) \quad m + 2k = \frac{2k+1}{-2k}$$

$$m + 2\left(\frac{1}{3}\right) = \frac{2\left(\frac{1}{3}\right) + 1}{-2\left(\frac{1}{3}\right)}$$

$$m = -\frac{19}{6}$$

$$(b) \quad (i) \quad 9m = 22 - 10(4)$$

$$m = -2$$

$$(ii) \quad 9(-2) = 22 - 10n$$

$$n = 4$$

$$3 \quad (a) \quad p = 8.90x + 4.50y$$

$$(b) \quad \text{Laju/Speed} = \frac{\text{Jarak / Distance}}{\text{Masa / Time}}$$

$$= \frac{60 \text{ m}}{48 \text{ s}}$$

$$= 1.25 \text{ m s}^{-1}$$

$$t = \frac{s \times 1000}{1.25 \times 60}$$

$$t = \frac{40}{3} \text{ s}$$

BAB 1

Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah

Quadratic Functions and Equations in One Variable

Soalan Objektif

- 1 A 2 C 3 B 4 D 5 B
6 C 7 A

Soalan Subjektif

$$1 \quad \frac{-k}{k-2} = \frac{4}{k+3}$$

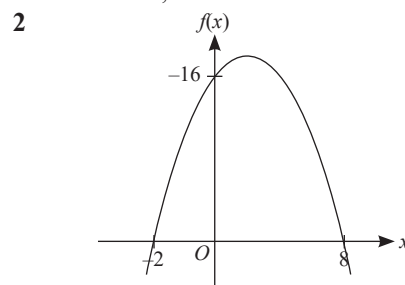
$$-k(k+3) = 4(k-2)$$

$$-k^2 - 3k = 4k - 8$$

$$k^2 + 7k - 8 = 0$$

$$(k+8)(k-1) = 0$$

$$k = -8, k = 1$$



$$3 \quad 3x(x-2) - kx = 5x + 6$$

$$3x^2 + (-11-k)x - 6 = 0$$

$$-11 - k = 8$$

$$k = -19$$

$$4 \quad (a) \quad n = 2, c = 3$$

$$(b) \quad 21 = a(-3)^2 + 3$$

$$a = 2$$

$$5 \quad 2t^2 - 17t + 8 = 0$$

$$(2t-1)(t-8) = 0$$

$$t = \frac{1}{2}, 8$$

$$6 \quad (a) \quad (2y+12)(2y+10) - (10)(12)$$

$$= 4y^2 + 20y + 24y + 120 - 120$$

$$= 4y^2 + 44y$$

$$(b) \quad 4y^2 + 44y - 168 = 0$$

$$y^2 + 11y - 42 = 0$$

$$(y+14)(y-3) = 0$$

$$y = -14, 3$$

$$\therefore y = 3$$

$$7 \quad (a) \quad L = \frac{1}{2}(2t+2+4t-1)(3t)$$

$$L = \frac{3}{2}t(6t+1)$$

$$(b) \quad \frac{3}{2}t(6t+1) = 150$$

$$6t^2 + t - 100 = 0$$

$$(6t+25)(t-4) = 0$$

$$t = 4$$

$$(c) \quad PS = \sqrt{12^2 + 5^2}$$

$$= 13 \text{ cm}$$

BAB 2

Asas Nombor Number Bases

Soalan Objektif

- | | | | | |
|------|------|------|------|------|
| 1 D | 2 C | 3 D | 4 C | 5 C |
| 6 D | 7 C | 8 D | 9 A | 10 D |
| 11 C | 12 B | 13 B | 14 B | 15 A |
| 16 C | 17 B | 18 B | | |

Soalan Subjektif

- 1 (a) $m = 2$
 $n = 6^1$
- (b) $3 \times 6^3 + 4 \times 6^2 + 1 \times 6^1 + 2 \times 6^0$
 $= 800$

	Baki Remainder
7	800 2
7	114 2
7	16 2
7	2 2
	0

$$\therefore 2222_7$$

$$2 \quad \begin{array}{r} 1 \ 0 \ 4 \ 3_5 \\ - \quad 3 \ 4_5 \\ \hline 1 \ 0 \ 0 \ 4_5 \end{array}$$

$$3 \quad 401_5 = 4 \times 5^2 + 0 \times 5^1 + 1 \times 5^0$$

$$= 101 \text{ min}$$

$$1212_4 = 1 \times 4^3 + 2 \times 4^2 + 1 \times 4^1 + 2 \times 4^0$$

$$= 102 \text{ min}$$

$$254_6 = 2 \times 6^2 + 5 \times 6^1 + 4 \times 6^0$$

$$= 106 \text{ min}$$

Masa paling cepat/The fastest time = 401_5

$$4 \quad 213_7 = 2 \times 7^2 + 1 \times 7^1 + 3 \times 7^0$$

$$= \text{RM}108$$

$$234_6 = 2 \times 6^2 + 3 \times 6^1 + 4 \times 6^0$$

$$= \text{RM}94$$

Beza harga/Price difference = $\text{RM}108 - \text{RM}94$
 $= \text{RM}14$

5

Jenama Brand	M	N
Harga selepas diskaun Price after discount	RM1265 ₈ $= 1 \times 8^3 + 2 \times 8^2 + 6 \times 8^1 + 5 \times 8^0$ $= \text{RM}693$	RM1635 ₇ $= 1 \times 7^3 + 6 \times 7^2 + 3 \times 7^1 + 5 \times 7^0$ $= \text{RM}663$
Diskaun Discount	RM990 - RM693 $= \text{RM}297$	RM1 020 - RM663 $= \text{RM}357$
Peratus diskaun Discount percentage	$\frac{297}{990} \times 100$ $= 30\%$	$\frac{357}{1\ 020} \times 100$ $= 35\%$

Khadijah mendapat diskaun yang lebih tinggi.
Khadijah gets a higher discount.

$$6 \quad 404_7 = 4 \times 7^2 + 0 \times 7^1 + 4 \times 7^0$$

$$= \text{RM}200$$

$$231_7 = 2 \times 7^2 + 3 \times 7^1 + 1 \times 7^0$$

$$= \text{RM}120$$

$$\text{Baki/Balance} = 300 - \left(\frac{80}{100} \times 200 + \frac{85}{100} \times 120 \right)$$

$$= \text{RM}38$$

$$7 \quad \text{Farish}$$

$$20_3 = 2 \times 3^1 + 0 \times 3^0$$

$$= 6 \text{ tahun/years old}$$

$$\text{Farel}$$

$$111_2 = 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$= 7 \text{ tahun/years old}$$

Farel akan dikenakan bayaran kemasukan.
Farel will be charged an entry fee.

$$8 \quad 25012_6 - 22452_6 = 2120_6$$

$$2120_6 = 2 \times 6^3 + 1 \times 6^2 + 2 \times 6^1 + 0 \times 6^0$$

$$= \text{RM}480$$

$$22452_6 = 2 \times 6^4 + 2 \times 6^3 + 4 \times 6^2 + 5 \times 6^1 + 2 \times 6^0$$

$$= \text{RM}3\ 200$$

$$\text{Peratusan kenaikan gaji}$$

$$\text{Percentage of increase of salary}$$

$$= \frac{480}{3\ 200} \times 100$$

$$= 15\%$$

$$9 \quad \text{Perimeter} = x + x + 60 + 60$$

$$= 2x + 120 \text{ cm}$$

$$2402_5 = 2 \times 5^3 + 4 \times 5^2 + 0 \times 5^1 + 2 \times 5^0$$

$$= 352$$

$$2x + 120 = 352$$

$$x = 116$$

Luas bahagian karpet berwarna hitam

The area of the black part of the carpet

$$= \frac{1}{2} \times 116 \times 60$$

$$= 3\,480 \text{ cm}^2$$

$$10 \quad 301_5 = 3 \times 5^2 + 0 \times 5^1 + 1 \times 5^0 \\ = 76$$

$$\text{Khadijah} = 76 - 28$$

$$= 48$$

$$\text{Nadhirah} = 2(48)$$

$$= 96$$

$$= 165_7$$

		Baki Remainder
7	96	5
7	13	6
7	1	1
	0	

BAB 3

Penaakulan Logik Logical Reasoning

Soalan Objektif

- 1 C 2 B 3 B 4 D 5 B
6 C 7 D

Soalan Subjektif

- 1 (a) Pernyataan
Statement
(b) Bukan pernyataan
Not a statement
(c) Pernyataan
Statement
(d) Bukan pernyataan
Not a statement
(e) Pernyataan
Statement
- 2 (a) Benar
True
(b) Palsu
False
(c) Benar
True
(d) Palsu
False
(e) Palsu
False
- 3 (a) Antejadian/Antecedent: $x = -2$
Akibat/Consequent: $x^2 - 4 = 0$
(b) Antejadian: y ialah nombor bulat.
Antecedent: y is a whole number.
Akibat: $2y$ ialah nombor genap.
Consequent: 2y is an even number.
(c) Antejadian: PQR ialah segi tiga sama sisi.
Antecedent: PQR is an equilateral triangle.
Akibat: $PQ = QR = RQ$
Consequent: PQ = QR = RQ
- 4 (a) Implikasi 1: Jika $\angle PQR < 90^\circ$, maka $\angle PQR$ ialah sudut tirus.
Implication 1: If $\angle PQR < 90^\circ$, then $\angle PQR$ is an acute angle.
Implikasi 2: Jika $\angle PQR$ ialah sudut tirus, maka $\angle PQR < 90^\circ$.
Implication 2: If $\angle PQR$ is an acute angle, then $\angle PQR < 90^\circ$.

- (b) Implikasi 1: Jika $\frac{n}{9} < 0$, maka $n < 9$.

Implication 1: If $\frac{n}{9} < 0$, then $n < 9$.

Implikasi 2: Jika $n < 9$, maka $\frac{n}{9} < 0$.

Implication 2: If $n < 9$, then $\frac{n}{9} < 0$.

- (c) Implikasi 1: Jika $y = 1$, maka $2y + 3 = 5$.

Implication 1: If $y = 1$, then $2y + 3 = 5$.

Implikasi 2: Jika $2y + 3 = 5$, maka $y = 1$.

Implication 2: If $2y + 3 = 5$, then $y = 1$.

- 5 (a) Implikasi: Jika $x < 6$, maka $x < 8$. (Benar)

Implication: If $x < 6$, then $x < 8$. (True)

Akas: Jika $x < 8$, maka $x < 6$. (Benar)

Converse: If $x < 8$, then $x < 6$. (True)

Songsangan: Jika $x \geq 6$, maka $x \geq 8$. (Benar)

Inverse: If $x \geq 6$, then $x \geq 8$. (True)

Kontrapositif: Jika $x \geq 8$, maka $x \geq 6$. (Benar)

Contrapositive: If $x \geq 8$, then $x \geq 6$. (True)

- (b) Implikasi: Jika $88 + 3 < 90$, maka

$$45 - 17 > 23. \text{ (Benar)}$$

Implication: If $88 + 3 < 90$, then $45 - 17 > 23$. (True)

Akas : Jika $45 - 17 > 23$, maka $88 + 3 < 90$.

(Palsu)

Converse: If $45 - 17 > 23$, then $88 + 3 < 90$. (False)

Songsangan: Jika $88 + 3 \geq 90$, maka

$$45 - 17 \leq 23. \text{ (Palsu)}$$

Inverse : If $88 + 3 \geq 90$, then $45 - 17 \leq 23$.

(False)

Kontrapositif: Jika $45 - 17 \leq 23$, maka

$$88 + 3 \geq 90. \text{ (Benar)}$$

Contrapositive: If $45 - 17 \leq 23$, then $88 + 3 \geq 90$.

(True)

- (c) Implikasi: Jika $JKLM$ ialah sebuah segi empat selari, maka JK selari dengan LM . (Benar)

Implication: If $JKLM$ is a parallelogram, then JK is parallel to LM . (True)

Akas: Jika JK selari dengan LM , maka $JKLM$ ialah sebuah segi empat selari. (Benar)

Converse: If JK is parallel to LM , then $JKLM$ is a parallelogram. (True)

Songsangan: Jika $JKLM$ bukan sebuah segi empat selari, maka JK tidak selari dengan LM . (Benar)

Inverse: If $JKLM$ is not a parallelogram, then JK is not parallel to LM . (True)

Kontrapositif: Jika JK tidak selari dengan LM , maka $JKLM$ bukan sebuah segi empat selari. (Benar)

Contrapositive: If JK is not parallel to LM , then $JKLM$ is not a parallelogram. (True)

- 6 (a) Hujah deduktif
Deductive argument

- (b) Hujah induktif
Inductive argument

- 7 (a) Sah dan munasabah.

Valid and sound.

- (b) Sah dan munasabah.

Valid and sound.

- (c) Sah. Tidak munasabah kerana Premis 2 palsu.

Valid. Unsound because Premise 2 is false.

- (d) Tidak sah kerana tidak memenuhi bentuk hujah deduktif yang sah.
Not valid because not fulfils the forms of a valid deductive argument.
 Tidak munasabah kerana Premis 1 palsu.
Not valid because Premise 1 is false.
- 8 (a) Set P mempunyai 5 unsur.
Set P has 5 elements.
- (b) Semua pentagon sekata mempunyai sudut pedalaman 108° .
All regular pentagons have interior angle of 108° .
- 9 (a) $90^\circ < y < 180^\circ$
- (b) Jika digit akhir bagi x ialah sifar, maka x ialah gandaan 10.
If the last digit of x is zero, then x is multiple of 10.
- 10 (a) $PQRS$ bukan segi empat sama.
 $PQRS$ is not a square.
- (b) Jika $x - 3 = 7$, maka $x^2 = 100$.
If $x - 3 = 7$, then $x^2 = 100$.
- 11 (a) Luas bulatan/Area of circle
 $= \pi r^2$
 $= \pi \times 8^2 \text{ cm}^2$
 $= 64\pi \text{ cm}^2$
- (b) Bilangan pepenjuru
Number of diagonals
 $= \frac{8(8-3)}{2} = 20$
- 12 (a) $5n + 3, n = 1, 2, 3, \dots$
- (b) $23 - 6n, n = 0, 1, 2, \dots$
- (c) $3n(n+1), n = 1, 2, 3, \dots$
- (d) $6n^2 - 2, n = 1, 2, 3, \dots$
- 13 Kuat tetapi tidak meyakinkan kerana Premis 3 adalah palsu.
Strong but not cogent because Premise 3 is false.
- 14 (a) (i) Bukan semua orang yang kaya adalah pemurah.
Not all rich people are generous.
- (ii) $(x+6)(x-2)$ bukan satu pernyataan.
 $(x+6)(x-2)$ is not a statement.
- (iii) $x^2 - 25 = 0$ tidak mempunyai dua punca penyelesaian.
 $x^2 - 25 = 0$ has no two different roots.
- (b) Premis/Premise 2: $m \leq 5$
- (c) $3n + 2(n-1)^2, n = 1, 2, 3, 4, \dots$
- 15 (a) Lemah dan tidak meyakinkan kerana kesimpulannya palsu.
Weak and not cogent because the conclusion is false.
- (b) $8 + x = 25$ jika dan hanya jika $x = 17$.
 $8 + x = 25$ if and only if $x = 17$.
- (c) Antejadian/Antecedent: $(x+3)(x-3) = 0$
 Akibat: Bentuk am persamaan kuadratik ialah $x^2 - 9 = 0$.
Consequent: The general form of a quadratic equation is $x^2 - 9 = 0$.
- (d) (i) Premis 1: Jika $n = 3$, maka $12 \div n = 4$.
Premise 1: If $n = 3$, then $12 \div n = 4$.
- (ii) Sah dan munasabah kerana menepati hujah Bentuk III.
Valid and sound because it does comply the argument of Form III.

- 16 (a) Jika 6 bukan faktor bagi 36, maka 36 tidak boleh dibahagi tepat dengan 6. (Benar)
If 6 is not a factor of 36, then 36 is not divisible by 6. (True)
- (b) $(-5)^3 = 125$ atau $(-6)^2 = 36$
 $(-5)^3 = 125$ or $(-6)^2 = 36$
- (c) (i) Semua/All
 (ii) Sebilangan/Some
 (iii) Semua/All
- (d) (i) 24 tidak boleh dibahagi tepat dengan 3.
24 is not divisible by 3.
- (ii) Sah tetapi tidak munasabah kerana kesimpulannya adalah palsu.
Valid but unsound because conclusion is false.
- (e) $(10 - 2) \times 180^\circ$
 $= 1440^\circ$

BAB 4

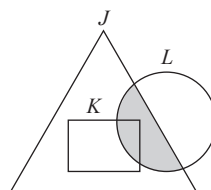
Operasi Set Operations on Sets

Soalan Objektif

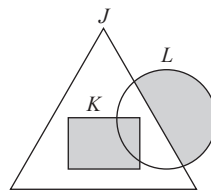
- 1 B 2 A 3 C 4 C 5 D
 6 C 7 B

Soalan Subjektif

1 (a)



(b)

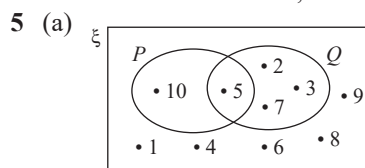


- 2 (a) $x - 2 = 10 + 12 - x$
 $2x = 24$
 $x = 12$

- (b) $n(Q) = x - 2 + 10 + 12 - x$
 $= 12 - 2 + 10 + 12 - 12$
 $= 20$

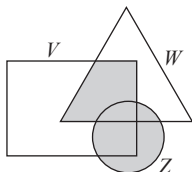
- 3 (a) (i) $\{11, 22\}$
 (ii) $\{10, 15, 20, 25, 30\}$
- (b) $\phi / \{ \}$

- 4 (a) 13
- (b) 15
- (c) $k^2 - 4k + 15 = 27$
 $k^2 - 4k - 12 = 0$
 $(k-6)(k+2) = 0$
 $k = -2, k = 6$



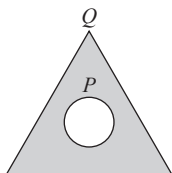
- (b) (i) 8 (ii) 5

6 (a)



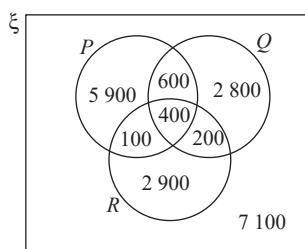
- (b) (i) {14, 18}
(ii) {2, 6, 10}

7 (a)



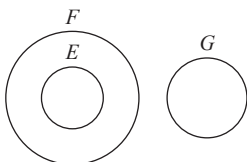
- (b) $30 + x + 5 = 42$
 $x = 7$

8 (a)



- (i) 7 100
(ii) 2 900

9 (a)



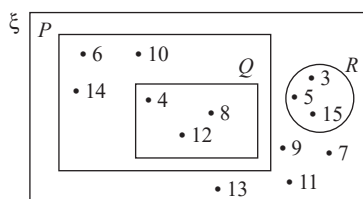
- (b) $55 - x + x + 37 - x = 80$
 $x = 12$

$$\therefore 37 - 12 = 25$$

10 (a) $(J \cup L)' \cap K'$

- (b) (i) 12
(ii) $12 + 8 + 14 = 34$
(iii) $12 + 8 + 14 + 13 + 10 = 12 + s - 2 + 10 + 8 + 14$
 $s = 15$

- 11 (a) (i) $A \cup B \cap C = \{e\}$
(ii) $A \cup (B \cap C) = \{a, b, c, e, r\}$
(iii) $B' \cap (A \cup C) = \{a, b, c, g, f, h\}$
(b) (i)



- (ii) $(P \cap Q) \cup R$
 $= \{3, 4, 5, 8, 12, 15\}$

BAB
5

Rangkaian dalam Teori Graf Network in Graph Theory

Soalan Objektif

1 B

Soalan Subjektif

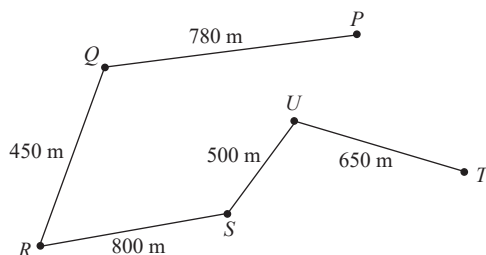
1 (a)

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	

2



Jarak terpendek

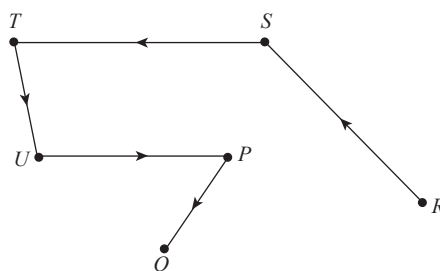
Shortest distance

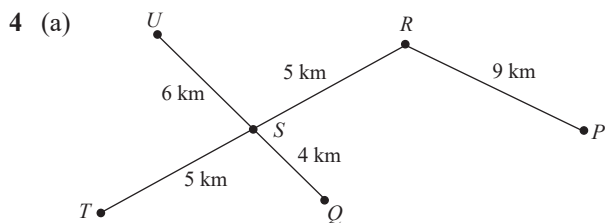
$$= 780 \text{ m} + 450 \text{ m} + 800 \text{ m} + 500 \text{ m} + 650 \text{ m}$$

$$= 3180 \text{ m}$$

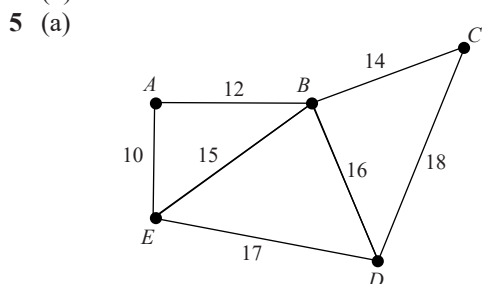
- 3 (a) (i) $V = \{P, Q, R, S, T, U\}; n(V) = 6$
(ii) $E = \{(S, T), (T, U), (U, P), (P, Q), (Q, U), (Q, R), (R, S)\}; n(E) = 7$
(iii) $\Sigma d = 2E = 2(7) = 14$

(b)





(b) $10 \text{ km} + 7 \text{ km} + 5 \text{ km} + 5 \text{ km} + 9 \text{ km} = 36 \text{ km}$



(b) 5

(c) 4

6 (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

$$= 69 \times 36$$

$$= 2\,484 \text{ m}$$



Ketaksamaan Linear dalam Dua Pemboleh

Ubah

Linear Inequalities in Two Variables

Soalan Objektif

1 C 2 A 3 D 4 B 5 B

6 C

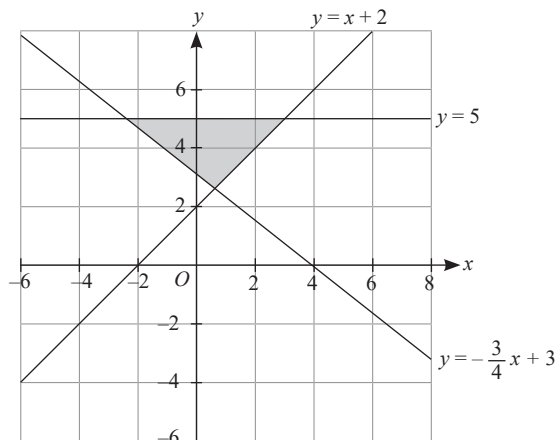
Soalan Subjektif

1 $y \geq 2x - 7$

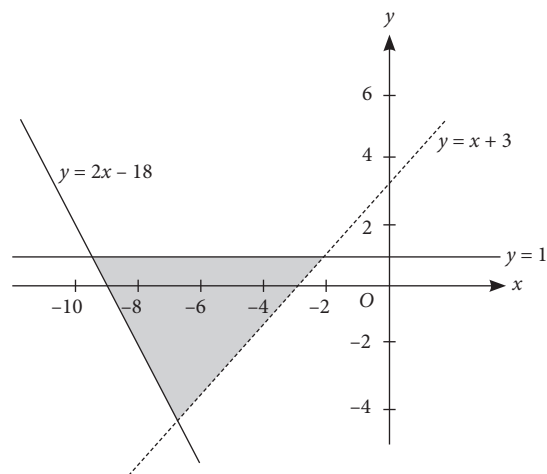
$$y < x$$

$$y \geq -6$$

2

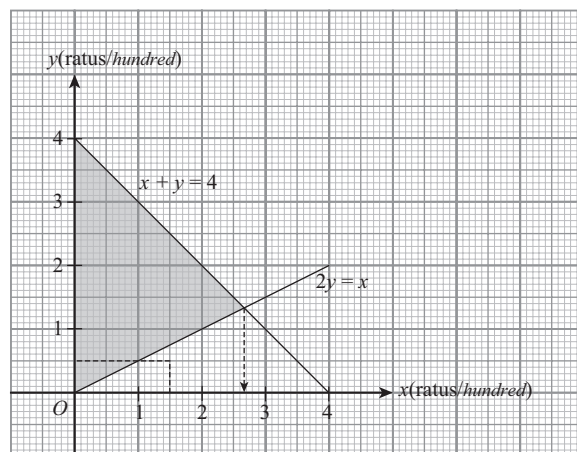


3



4 (a) $x + y \leq 4$, $x \leq 2y$

(b)



(c) 270

(d) Tidak. Penghasilan kasut tidak memuaskan ketaksamaan $x \leq 2y$.

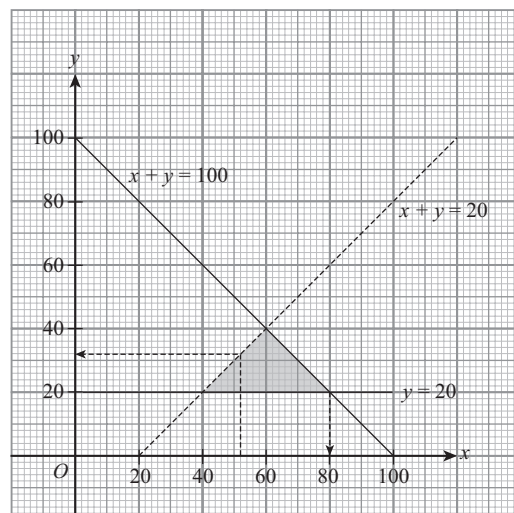
No. The production of shoes does not satisfy the inequality $x \leq 2y$.

5 (a) $x + y \leq 100$

$$y \geq 20$$

$$x - y > 20$$

(b)



(c) (i) 80

(ii) 32

BAB 7 **Graf Gerakan**
Graphs of Motion

Soalan Subjektif

- 1 (a) Laju
Speed
$$= \frac{28 - 7}{3 - 0}$$
$$= \frac{21}{3}$$
$$= 7 \text{ m s}^{-1}$$
- (b) Kadar perubahan jarak
Rate of change of distance
$$= \frac{0 - 28}{12 - 3}$$
$$= -\frac{28}{9}$$
$$= -3.11 \text{ m s}^{-1}$$
- (c) Zarah bergerak ke tempat asal sejauh 28 m dengan kelajuan 3.11 m s^{-1} bagi tempoh 9 saat terakhir.
The ball moves to the original place for 28 m with a speed of 3.11 m s^{-1} in the last 9 seconds.
- 2 (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
$$= 90 \text{ km} - 40 \text{ km}$$
$$= 50 \text{ km}$$
- 3 (a) 110 km
(b) Jam 1200
1200 hours
(c) $110 \text{ km} - 65 \text{ km}$
$$= 45 \text{ km}$$
- (d) $\frac{110}{4} = 27.5 \text{ km j}^{-1}/\text{km h}^{-1}$
- 4 (a) $\frac{25 - 5}{0.5 - 0} = \frac{20}{0.5} = 40 \text{ km j}^{-1}/\text{km h}^{-1}$
- (b) $25 - 5$
$$= 20 \text{ km}$$
$$= 20 \text{ 000 m}$$
- (c) $\frac{25 - 5 + 25}{1.5} = \frac{45}{1.5}$
$$= 30 \text{ km j}^{-1}/\text{km h}^{-1}$$
- 5 (a) $45 - 10 = 35 \text{ km}$
(b) $0.8 - 0.5$
$$= 0.3 \text{ jam/hour}$$
$$= 18 \text{ minit/minutes}$$

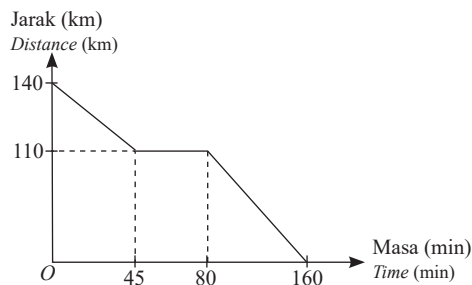
- (c) Laju purata/Average speed

$$= \frac{(35 + 45) \text{ km}}{1 \text{ j}}$$

$$= 80 \text{ km j}^{-1}/\text{km h}^{-1}$$

- 6 (a) (i) $m = 140 - 30 = 110 \text{ km}$
Tempoh masa
Duration
$$= 10:20 \text{ a.m.} - 9:45 \text{ a.m.}$$
$$= 35 \text{ minit/minutes}$$
$$n = 45 + 35$$
$$= 80 \text{ minit/minutes}$$

- (ii)



- (b) Jumlah masa/Total time
$$= 11:40 \text{ a.m.} - 9:00 \text{ a.m.}$$
$$= 160 \text{ minit/minutes}$$

Laju purata/Average speed

$$= \frac{140 \text{ km}}{\left(\frac{160}{60}\right) \text{ j}}$$

$$= 52.5 \text{ km j}^{-1}/\text{km h}^{-1}$$

- 7 (a)
- $15.5 - 8 = 7.5 \text{ jam/hours}$

(b) $\frac{90 - 50}{8 - 0} = \frac{40}{8}$
$$= 5 \text{ km j}^{-2}/\text{km h}^{-2}$$

(c) $(15.5 - 8) \times 90 + \frac{1}{2} \times 90 \times (17.5 - 15.5)$
$$= 675 + 90$$
$$= 765 \text{ km}$$

- 8 (a)
- 24 m s^{-1}

- (b) Kadar perubahan laju
-
- Rate of change of speed

$$= \frac{(24 - 0)}{(8 - 0)}$$
$$= 3 \text{ m s}^{-2}$$

- (c)

$$\left[\frac{1}{2} (T + (T - 8)) \times 24 \right] - \left[\frac{1}{2} \times T \times 24 \right] = 120$$

$$12(2T - 8) - 12T = 120$$

$$24T - 96 - 12T = 120$$

$$12T = 120 + 96$$

$$12T = 216$$

$$T = \frac{216}{12}$$

$$T = 18$$

- 9 (a) Pecutan/Acceleration

$$= \frac{(18 - 6) \text{ m s}^{-1}}{12 \text{ s}}$$
$$= 1 \text{ m s}^{-1}$$

- (b) Jumlah jarak/Total distance

$$= \left[\frac{1}{2} (6 + 18) \times 12 \right] + [18 \times 18] + \left[\frac{1}{2} \times 10 \times 18 \right]$$

$$= 144 + 324 + 90$$

$$= 558 \text{ m}$$

- (c) Zarah bergerak dengan nyahpecutan
- 1.8 m s^{-2}
- dalam tempoh 10 saat.

The particle moves with a deceleration of 1.8 m s^{-2} within the period of 10 seconds.

- 10 (a)
- $42 \text{ km s}^{-1}/\text{km h}^{-1}$

- (b) Kadar perubahan laju

Rate of change of speed

$$= \frac{42}{2} = 21 \text{ km j}^{-2}/\text{km h}^{-1}$$

- (c) Jarak untuk 8 saat pertama

Distance for the first 8 seconds

$$= \frac{1}{2} \times 2 \times 42 = 42 \text{ km}$$

Jarak saat ke-12 hingga t

Distance for 12 seconds until t seconds

$$= 42 \times 2 = 84 \text{ km}$$

$$84 = \frac{1}{2} (42 + 63)(t - 6)$$

$$84 = \frac{105}{2} (t - 6)$$

$$1.6 = t - 6$$

$$t = 7.6$$

- 11 (a)
- $27 - 13 = 14 \text{ s}$

$$(b) \frac{0 - v}{40 - 27} = \frac{-v}{13} = \frac{v}{13}$$

$$(c) \left(\frac{1}{2} \times 10 \times 21 \right) + \left(\frac{1}{2} (v + 21)(3) \right) = 150$$

$$105 + \frac{3}{2}v + \frac{63}{2} = 150$$

$$\frac{3}{2}v = \frac{27}{2}$$

$$v = 9$$

- (d) – Zarah bergerak dengan laju seragam
- 9 m s^{-1}
- dalam tempoh 14 saat.

The particle moves at uniform speed 9 m s^{-1} in 14 seconds.

- Zarah bergerak dengan nyahpecutan
- $\frac{9}{13} \text{ m s}^{-2}$
- dalam tempoh 13 saat.

The particle moves with a deceleration of $\frac{9}{13} \text{ m s}^{-2}$ in 13 seconds.

$$12 (a) \frac{30 - 0}{10 - 0} = 3 \text{ m s}^{-2}$$

- (b)

$$\left[\frac{1}{2} (30)(10) \right] + (t - 10)(30) + \left[\frac{1}{2} (50 - t)(30) \right] = 1320$$

$$150 + 30t - 300 + 750 - 15t = 1320$$

$$15t + 600 = 1320$$

$$15t = 720$$

$$t = 48$$



Sukatan Serakan Data Tak Terkumpul

Measures of Dispersion of Ungrouped Data

Soalan Objektif

- 1 B 2 A 3 B 4 B 5 A
6 D 7 B

Soalan Subjektif

- 1 (a) 52, 57, 60, 64, 66, 68, 69, 71, 74, 75, 77, 80, 80, 82, 83

$$\text{Julat/Range} = 83 - 52 = 31$$

Julat antara kuartil/Interquartile range

$$= 80 - 64$$

$$= 16$$

- (b)

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

Kekunci: 5 | 2 bermaksud 52

Key: 5 | 2 means 52

- 2 1, 2, 3, 5, 6, 7, 9, 10, 11, 30

$$\text{Julat/Range} = 30 - 1 = 29$$

$$\text{Julat antara kuartil/Interquartile range} = 10 - 3 = 7$$

Julat antara kuartil paling sesuai digunakan untuk mengukur taburan kerana terdapat pencilan pada tersebut iaitu 30.

The interquartile is most suitable measures of dispersion that can be used to measure the distribution because there is an outlier in the data which is 30.

- 3 (a)
- Asmawi:**

$$\text{Min/Mean} = \frac{70 + 61 + 67 + 60 + 48 + 50}{6} = 59.33$$

Sisihan piawai/Standard deviation

$$= \sqrt{\frac{70^2 + 61^2 + 67^2 + 60^2 + 48^2 + 50^2}{6} - 59.33^2}$$

$$= 8.10$$

Jason:

$$\text{Ujian/Test 1: } 2002_3 = 2 \times 3^3 + 2 \times 3^0 = 56$$

$$\text{Ujian/Test 3: } 132_4 = 1 \times 4^2 + 3 \times 4^1 + 2 \times 4^0$$

$$= 30$$

$$\text{Ujian/Test 4: } 124_7 = 1 \times 7^2 + 2 \times 7^1 + 4 \times 7^0$$

$$= 67$$

$$\text{Min/Mean} = \frac{56 + 64 + 30 + 67 + 60 + 79}{6}$$

$$= 59.33$$

Sisihan piawai/Standard deviation

$$= \sqrt{\frac{56^2 + 64^2 + 30^2 + 67^2 + 60^2 + 79^2}{6} - 59.33^2}$$

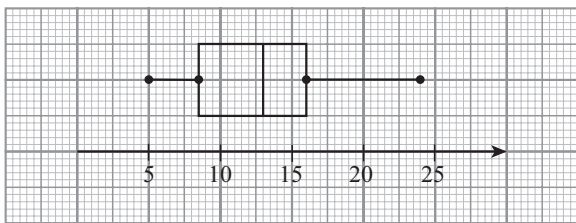
$$= 14.95$$

- (b) Asmawi akan dipilih. Walaupun min markah bagi Asmawi dan Jason adalah sama tetapi sisihan piawai bagi Asmawi adalah lebih kecil berbanding Jason. Ini menunjukkan markah Asmawi adalah lebih konsisten.

Asmawi will be selected. Although the mean marks for Asmawi and Jason is the same but the standard

deviation for Asmawi is smaller compared to Jason.
This shows that Asmawi's marks is more consistent.

4 (a)

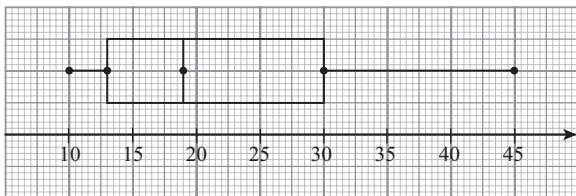


$$\bar{x} = \frac{264}{20} = 13.2$$

$$\sigma = \frac{4\,172}{20} - 13.2^2 = 34.36$$

$$\sigma^2 = \sqrt{34.36} = 5.86$$

(b)



$$\bar{x} = \frac{330}{15} = 22$$

$$\sigma = \frac{8\,924}{15} - 22^2 = 110.93$$

$$\sigma^2 = \sqrt{110.93} = 10.53$$

BAB 9

Kebarangkalian Peristiwa Bergabung Probability of Combined Events

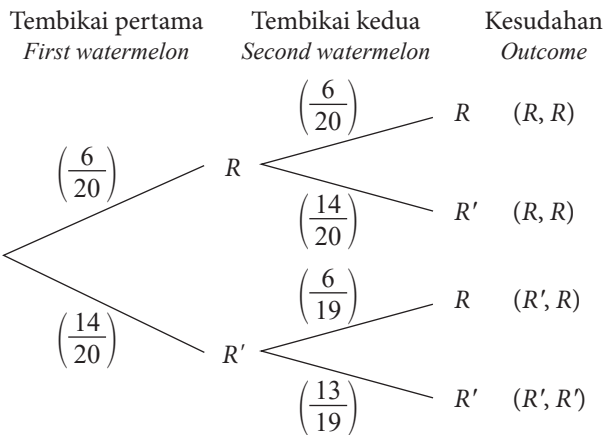
Soalan Objektif

- 1 B 2 D 3 B 4 B 5 C
6 C 7 D 8 B

Soalan Subjektif

- 1 (a) $\{(S, U), (S, L), (S, A), (C, U), (C, L), (C, A), (M, U), (M, L), (M, A)\}$
(b) $\{(S, C), (S, M), (S, U), (S, L), (S, A), (C, S), (C, M), (C, U), (C, L), (C, A), (M, S), (M, C), (M, U), (M, L), (M, A), (U, S), (U, C), (U, M), (U, L), (U, A), (L, S), (L, C), (L, M), (L, U), (L, A), (A, S), (A, C), (A, M), (A, U), (A, L)\}$
(c) $\{(S, C), (S, M), (S, U), (S, L), (S, A), (C, S), (C, M), (C, U), (C, L), (C, A), (M, S), (M, C), (M, U), (M, L), (M, A), (U, S), (U, C), (U, M), (U, L), (U, A), (L, S), (L, C), (L, M), (L, U), (L, A), (A, S), (A, C), (A, M), (A, U), (A, L)\}$
(d) $\{(S, C), (S, M), (S, U), (S, L), (S, A), (C, M), (C, U), (C, L), (C, A), (M, U), (M, L), (M, A), (U, L), (U, A), (L, A)\}$
- 2 (a) (i) Peristiwa tak bersandar/Independent events
(ii) Peristiwa bersandar/Dependent events

(b)



(c) $P(R \text{ dan/and } R') \text{ atau/or } P(R' \text{ dan/and } R)$

$$= \left(\frac{6}{20} \times \frac{14}{20}\right) + \left(\frac{14}{20} \times \frac{6}{19}\right)$$

$$= \frac{819}{1\,900}$$

3 (a) Saling eksklusif
Mutually exclusive

(b) Saling eksklusif
Mutually exclusive

(c) Tidak saling eksklusif
Non-mutually exclusive

(d) Saling eksklusif
Mutually exclusive

(e) Tidak saling eksklusif
Non-mutually exclusive

4 (a) $P(L_K) + P(P_L)$

$$= \frac{30}{160} + \frac{20}{160}$$

$$= \frac{5}{16}$$

(b) $P(P) + P(\text{Jenapa } K) - P(P \cap \text{Jenapa } K)$

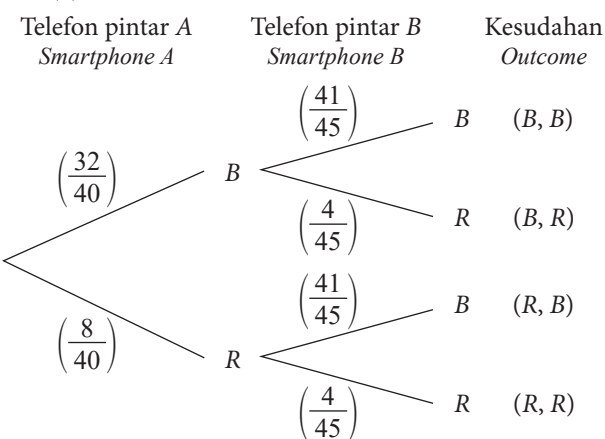
$$= \frac{7}{160} + \frac{80}{160} - \frac{50}{160}$$

$$= \frac{5}{8}$$

5 (a) $x = \frac{41}{45}$

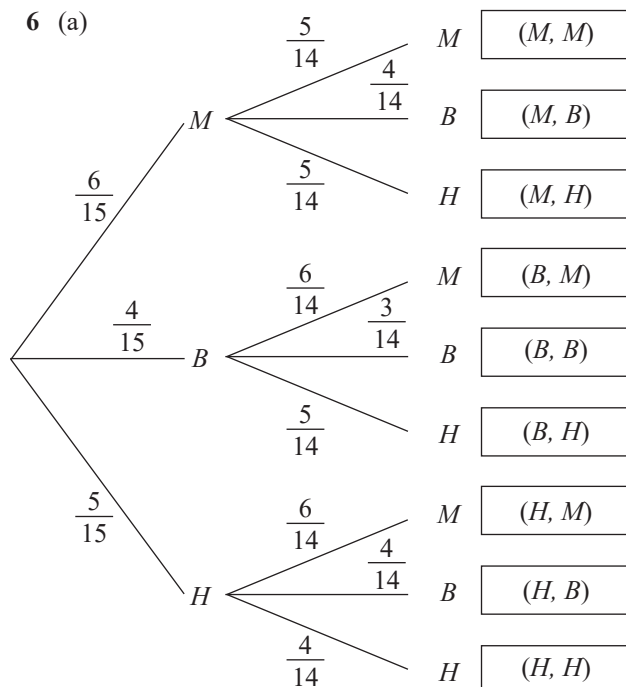
$$y = \frac{8}{40}$$

(b)



$$\begin{aligned}
 \text{(c)} \quad & 1 - P(B \text{ dan/and } B) \\
 &= 1 - \left(\frac{32}{40} \times \frac{41}{45} \right) \\
 &= \frac{61}{225}
 \end{aligned}$$

6 (a)

(b) (i) $P(M \text{ dan/and } M)$

$$\begin{aligned}
 &= \left(\frac{6}{15} \times \frac{5}{14} \right) \\
 &= \frac{30}{210} \\
 &= \frac{1}{7}
 \end{aligned}$$

(ii) $P(M \text{ dan/and } M) \text{ atau/or } P(B \text{ dan/and } B)$
atau/or $P(H \text{ dan/and } H)$

$$\begin{aligned}
 &= \left(\frac{6}{15} \times \frac{5}{14} \right) + \left(\frac{4}{15} \times \frac{3}{14} \right) + \left(\frac{5}{15} \times \frac{4}{14} \right) \\
 &= \frac{31}{105}
 \end{aligned}$$

7 Halid $\rightarrow L = \frac{1}{2}, G = \frac{1}{2}$ Suresh $\rightarrow L = \frac{2}{3}, G = \frac{1}{3}$ Lim $\rightarrow L = \frac{3}{4}, G = \frac{1}{4}$

$$\text{(a)} \quad P(H_L S_G L_G) = \left(\frac{1}{2} \times \frac{1}{3} \times \frac{1}{4} \right) = \frac{1}{24}$$

$$\text{(b)} \quad P(H_L S_L L_L) + (H_L S_L L_G) + (H_L S_G L_L) + (H_G S_L L_L)$$

$$\begin{aligned}
 &= \left(\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \right) + \left(\frac{1}{2} \times \frac{2}{3} \times \frac{1}{4} \right) + \left(\frac{1}{2} \times \frac{1}{3} \times \frac{3}{4} \right) \\
 &\quad + \left(\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \right) \\
 &= \frac{1}{4} + \frac{1}{12} + \frac{1}{8} + \frac{1}{4} \\
 &= \frac{17}{24}
 \end{aligned}$$

(c) $P(\text{sekurang-kurangnya seorang lulus/at least one person pass})$

$$\begin{aligned}
 &= 1 - P(H_G S_G L_G) \\
 &= 1 - \left(\frac{1}{2} \times \frac{1}{3} \times \frac{1}{4} \right) \\
 &= 1 - \frac{1}{24} \\
 &= \frac{23}{24}
 \end{aligned}$$

8 (a) $P(C \cap C) + P(D \cap D)$

$$\begin{aligned}
 &= \left(\frac{1}{4} \times \frac{1}{3} \right) + \left(\frac{1}{4} \times \frac{1}{3} \right) \\
 &= \frac{1}{12} + \frac{1}{12} \\
 &= \frac{2}{12} \\
 &= \frac{1}{6}
 \end{aligned}$$

(b) $P(V \cap B) + P(B \cap V)$

$$\begin{aligned}
 &= \left(\frac{1}{4} \times \frac{1}{3} \right) + \left(\frac{3}{4} \times \frac{2}{3} \right) \\
 &= \frac{2}{12} + \frac{6}{12} \\
 &= \frac{2}{3}
 \end{aligned}$$

9

	Merah Red	Biru Blue	Hitam Black
Bilangan pen Number of pens	20	B	H
Kebarangkalian Probability		$\frac{3}{10}$	$\frac{1}{5}$

Kebarangkalian pen merah

Probability of red pens

$$\begin{aligned}
 &= 1 - \frac{3}{10} - \frac{1}{5} \\
 &= \frac{1}{2}
 \end{aligned}$$

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

$$\frac{20}{n(S)} = \frac{1}{2}$$

$$n(S) = 2 \times 20 = 40$$

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

$$\frac{1}{5} = \frac{n(H)}{40}$$

$$n(H) = \frac{1}{5} \times 40 = 8$$

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

$$\frac{3}{10} = \frac{n(B)}{40}$$

$$n(B) = \frac{3}{10} \times 40 = 12$$

	Merah <i>Red</i>	Biru <i>Blue</i>	Hitam <i>Black</i>
Bilangan pen <i>Number of pen</i>	20	B	H
Penambahan pen <i>Addition of pens</i>			+8
Jumlah baru <i>New total</i>	20	12	16

Kebarangkalian kedua-dua pen biru

Probability that both pens are blue

$$P(B \cap B) = \frac{12}{48} \times \frac{11}{47}$$

$$= \frac{11}{118}$$

BAB
10

Matematik Pengguna: Pengurusan Kewangan

Consumer Mathematics: Financial Management

Soalan Objektif

- 1 D 2 C 3 B 4 A 5 B
6 A 7 C 8 D

Soalan Subjektif

- 1 RM4 000 + RM500 + RM850 – RM1 800 – RM950
= RM2 600

Aliran tunai positif/*Positive cash flow*

- 2 (a) RM1 800 – RM400 – RM880
= RM520

Aliran tunai positif/*Positive cash flow*

- (b) $RM1\ 800 - \left(\frac{170}{100} \times RM1\ 280\right)$
= –RM376

Aliran tunai negatif/*Negative cash flow*

- 3 RM3 750 – RM2 400 = RM1 350

$$\frac{RM15\ 600}{12} = RM\ 1\ 300$$

$$RM1\ 350 - RM1\ 300 = RM50$$

atau/or

$$(RM3\ 750 - RM2\ 400)12 = RM16\ 200$$

$$RM16\ 200 > RM15\ 600$$

Ya, Dini akan mencapai matlamat kewangannya.

Yes, Dini will achieve his financial goal.

- 4 Pendapatan kerja sambilan

Income earned from the part time

$$= RM1\ 670 + RM3\ 900 - RM4\ 500$$

$$= RM1\ 070$$

- 5 RM1 900 + RM1 187.60 – (RM2 850 + RM780)
= –RM542.40

Aliran tunai negatif/*Negative cash flow*

- 6 $RM9\ 000 + RM1\ 300 - \left(\frac{10}{100} \times RM9\ 000\right)$
– RM5 430 – RM3 500
= RM470

Aliran tunai positif/*Positive cash flow*

7	S	Beli lori <i>Buy a lorry</i>
	M	RM80 000
	A	Ansuran bulanan RM1 300 <i>Monthly instalment RM1 300</i>
	R	10% daripada/of RM13 500 = RM1 350
	T	7 tahun/years

Harith boleh mencapai matlamat kewangannya.

Harith can achieve his financial goal.

- 8 $R = RM2\ 500 + RM550$
= RM3 050

$$S = RM2\ 020 - RM350 - RM400 - RM380$$

$$= RM890$$

$$Q - R - RM2\ 020 = RM1\ 580$$

$$Q - RM3\ 050 - RM2\ 020 = RM1\ 580$$

$$Q = RM6\ 650$$

$$RM7\ 000 - P = RM6\ 650$$

$$P = RM350$$

Peperiksaan Akhir Sesi Akademik Tingkatan 4

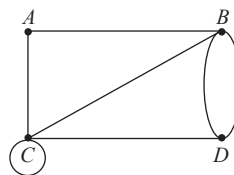
Kertas 1

- | | | | | |
|------|------|------|------|------|
| 1 C | 2 B | 3 C | 4 A | 5 B |
| 6 B | 7 C | 8 C | 9 A | 10 B |
| 11 C | 12 A | 13 B | 14 C | 15 A |
| 16 D | 17 D | 18 D | 19 B | 20 C |
| 21 D | 22 A | 23 C | 24 A | 25 D |
| 26 C | 27 A | 28 B | 29 A | 30 D |
| 31 D | 32 B | 33 C | 34 B | 35 B |
| 36 D | 37 D | 38 B | 39 D | 40 C |

Kertas 2

Bahagian A

1



- Graf mempunyai gelung.

The graph has loop.

- Graf mempunyai berbilang tepi.

The graph has multiple edges.

- 2 $(2x + 5)(40)(2)(2x + 5) = 3\ 920$

$$4x^2 + 20x - 24 = 0$$

$$x^2 + 5x - 6 = 0$$

$$(x + 6)(x - 1) = 0$$

$$x = -6, 1$$

$$\text{Panjang/Lebar} = 2[2(1) + 5]$$

$$= 14\text{ cm}$$

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) $\frac{-1 - (-4)}{8 - (-1)} = \frac{1}{3}$

$10 = \frac{1}{3}(8) + c$

$30 = 8 + 3c$

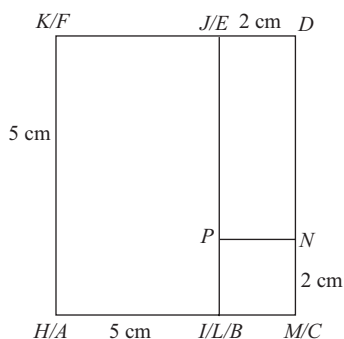
$30 - 8 = 3c$

$22 = 3c$

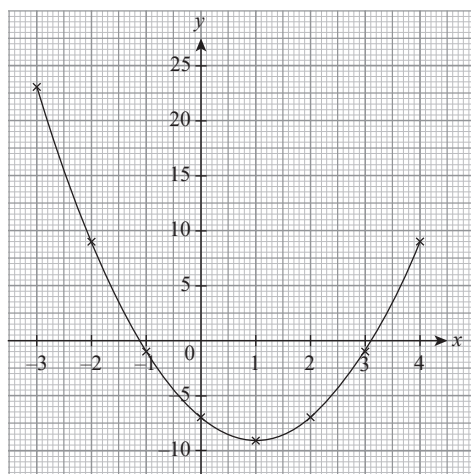
$c = \frac{22}{3}$

$y = \frac{1}{3}x + \frac{22}{3}$ atau /or $3y = x + 22$

5



6



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 berlorek/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) $2(1) - 1 = 1$
 $2(2) - 1 = 3$
 $2(3) - 1 = 5$
 $2(4) - 1 = 7$

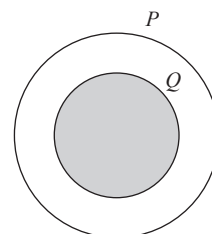
Kesimpulan induktif ialah $2n - 1$.

Inductive conclusion is $2n - 1$.

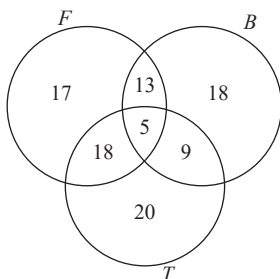
(ii) $T_{20} = 2(20) - 1 = 39$

(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*

$= -6.25 \text{ m s}^{-2}$

(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

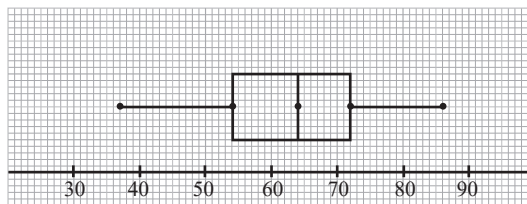
(b) 50% adalah merujuk kepada median.

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) $m = \frac{8 - 4}{4 - 10} = -\frac{2}{3}$

$y = mx + c$

$8 = -\frac{2}{3}(4) + c$

$c = 8 + \frac{8}{3} = \frac{32}{3}$

$y = mx + c$

$y = -\frac{2}{3}x + \frac{32}{3}$

$3y = -2x + 32$

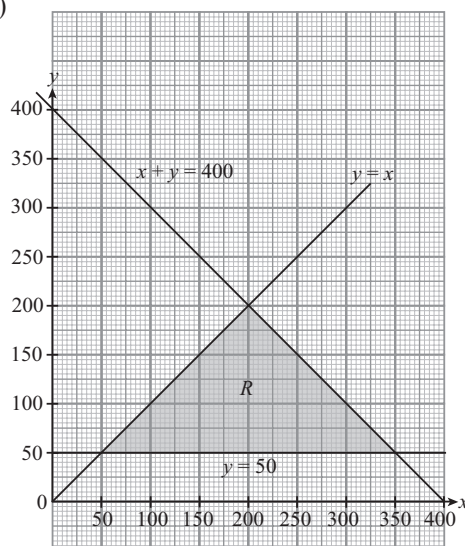
$\therefore 3y \leq -2x + 32$

(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*

$= \text{RM}200(150) + \text{RM}300(150)$

$= \text{RM}75\,000$

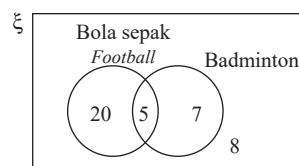
Yuran maksimum/*Maximum fees*

$= \text{RM}200(150) + \text{RM}300(250)$

$= \text{RM}105\,000$

$\text{RM}75\,000 \leq \text{Yuran/Fees} \leq \text{RM}105\,000$

17 (a)



$$\begin{aligned}
 & \text{(i) } P = \frac{5}{40} = \frac{1}{8} \\
 & \text{(ii) } P = \frac{20}{40} = \frac{1}{2} \\
 & \text{(b) (i) } S = \{(4, 3), (4, 7), (4, 12), (5, 3), (5, 7), \\
 & \quad (5, 12), (8, 3), (8, 7), (8, 12), (11, 3), \\
 & \quad (11, 7), (11, 12)\} \\
 & \text{(ii) (a) } P = \frac{4}{12} = \frac{1}{3} \\
 & \quad \text{(b) } P = \frac{6}{12} = \frac{1}{2} \\
 & \text{(c) (i) } P = \left(\frac{9}{15} \times \frac{8}{14}\right) + \left(\frac{6}{15} \times \frac{5}{14}\right) \\
 & \quad = \frac{17}{35} \\
 & \text{(ii) } P = \frac{6}{15} \times \frac{9}{14} = \frac{9}{35}
 \end{aligned}$$

$$\text{(d) } 5x + P(4) = 1$$

$$5x + \frac{1}{4} = 1$$

$$x = \frac{3}{20}$$

$P(\text{Nombor sama})$

$P(\text{Same number})$

$$= P[(1, 1) + (2, 2) + (3, 3) + (5, 5) + (6, 6)] + P(4, 4)$$

$$= 5\left(\frac{3}{20} \times \frac{3}{20}\right) + \left(\frac{1}{4} \times \frac{1}{4}\right)$$

$$= \frac{7}{40}$$

$P(\text{Nombor berlainan})$

$P(\text{Different number})$

$$= 1 - \frac{7}{40}$$

$$= \frac{33}{40}$$



KATA ALUAN YAB DATO' MENTERI BESAR SELANGOR

Program Tuisyen Rakyat Selangor (PTRS) merupakan salah satu inisiatif pendidikan unggul Kerajaan Negeri Selangor yang menyediakan kelas tambahan secara percuma kepada pelajar Tingkatan 4 dan Tingkatan 5 dalam enam (6) mata pelajaran teras, iaitu Bahasa Melayu, Bahasa Inggeris, Matematik, Matematik Tambahan, Sains, dan Sejarah.

Bagi memperkukuh persediaan awal pelajar menghadapi peperiksaan, PTRS kini diperluaskan kepada pelajar Tingkatan 4 bagi enam (6) mata pelajaran tertentu, dengan sasaran manfaat kepada seramai 70,000 pelajar.

Sejak diperkenalkan pada tahun 2012 dalam skala kecil dan dilaksanakan secara fizikal, modul latihan PTRS telah dikembangkan ke dalam bentuk dalam talian sejak pandemik Covid-19. Langkah ini bertujuan memudahkan akses kepada pelajar dan guru, sekali gus membolehkan lebih 271,000 pelajar memanfaatkan modul pembelajaran yang boleh diakses melalui aplikasi mudah alih, sama ada di telefon pintar atau tablet.

Bagi memastikan kejayaan pelaksanaan PTRS tahun ini, Kerajaan Negeri Selangor telah memperuntukkan sebanyak RM10 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.

Saya yakin bahawa inisiatif ini akan mengukuhkan daya saing anak-anak Selangor dalam pencapaian akademik, yang menjadi asas kepada masa depan yang lebih cerah. Ia juga akan meningkatkan kebolehpasaran mereka, membolehkan mereka bersaing dengan tenaga kerja dari negara maju.

Sumbangan generasi muda ini amat penting dalam merealisasikan aspirasi Selangor sebagai negeri termaju dan berdaya saing di barisan hadapan Malaysia.



YAB DATO' SERI AMIRUDIN BIN SHARI

DATO' MENTERI BESAR SELANGOR

 ePTRS.my

Imbas kod QR
untuk ketahui lebih
lanjut tentang MBI



Imbas kod QR
untuk mendapatkan
jawapan



Koleksi
Video PdP



DIKUASAI OLEH:

