# JAWAPAN

## 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*

$= \text{RM60 000} \times \frac{8}{100} \times \frac{1}{12}$

$= \text{RM400}$

Pinjaman pada akhir bulan pertama
*Loan at the end of first month*
$= \text{RM60 000} + \text{RM400}$
$= \text{RM60 400}$

Baki selepas ansuran pertama
*Balance after first instalment*
$= \text{RM60 400} - \text{RM470}$
$= \text{RM59 930}$

Faedah bulan kedua
*Second month interest*

$= \text{RM59 930} \times \frac{8}{100} \times \frac{1}{12}$

$= \text{RM399.53}$

Pinjaman pada akhir bulan kedua
*Loan at the end of second month*
$= \text{RM59 930} + \text{RM399.53}$
$= \text{RM60 329.53}$

Baki selepas ansuran kedua
*Balance after second instalment*
$= \text{RM60 329.53} - \text{RM470}$
$= \text{RM59 859.53}$

Faedah bulan ketiga
*Third month interest*

$= \text{RM59 859.53} \times \frac{8}{100} \times \frac{1}{12}$

$= \text{RM399.07}$

Pinjaman pada akhir bulan ketiga
*Loan at the end of third month*
$= \text{RM59 859.53} + \text{RM399.07}$
$= \text{RM60 258.60}$

Baki pinjaman selepas ansuran ketiga
*Balance of the loan after third instalment*
$= \text{RM60 258.60} - \text{RM470}$
$= \text{RM59 788.60}$

**2** Wang pendahuluan/*Down payment*

$= \frac{10}{100} \times \text{RM49 715}$

$= \text{RM4 971.50}$

$P = \text{RM49 715} - \text{RM4 971.50} = \text{RM44 743.50}$

$I = Prt = (44\,743.50)\left(\frac{3.5}{100}\right)(9)$

$= \text{RM14 094.20}$

$P + I = \text{RM44 743.50} + \text{RM14 094.20}$

$= \text{RM58 837.70}$

Bayaran bulanan/*Monthly payment*

$= \frac{\text{RM58 837.70}}{9 \times 12}$

$= \text{RM544.79}$

Pinjaman sudah dibayar/*Amount of loan paid*
$= \text{RM544.79} \times 5 \times 12$
$= \text{RM32 687.40}$
Jumlah baki pinjaman/*Total balance of loan*
$= \text{RM58 837.70} - \text{RM32 687.40}$
$= \text{RM26 150.30}$

**3** Peratus Hibah/*Percentage of Hibah*

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

$= 2.5\%$

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

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

Dis 2026 $= \frac{2.5}{100} \times (51\,250 + 1\,281.25) = 1\,313.28$

Jumlah wang dalam akaun simpanan pada Disember 2026:
*Amount of money in savings account by December* 2026:
$= \text{RM52 531.25} + \text{RM1 313.28}$
$= \text{RM53 844.53}$

### Garis Lurus
***Straight Lines***

**1** Kecerunan/*Gradient* $PQ = -\frac{6}{-12} = \frac{1}{2}$

$m = \frac{1}{2}$

Melalui asalan/*Passes through origin*, $c = 0$

Persamaan garis lurus yang selari dengan $PQ$ dan melalui asalan ialah $y = \frac{x}{2}$.

*The equation of the line that is parallel to PQ and passes through the origin is* $y = \frac{x}{2}$.

**2** (a) $3y - 2x = 12$
$3y = 2x + 12$
$y = \frac{2}{3}x + 4$
Pintasan-*y*/*y-intercept* = 4

(b) Teorem Pythagoras: $OU = \sqrt{5^2 - 4^2} = 3$
$m = -\frac{\text{pintasan-}y\text{/}y\text{-intercept}}{\text{pintasan-}x\text{/}x\text{-intercept}} = -\frac{4}{3}$
$(0, 4)$ ; $4 = \frac{-4}{3}(0) + c$
$c = 4$
Persamaan bagi garis lurus *SU*:
*Equation of the straight line SU:*
$y = -\frac{4}{3}x + 4$

**3** (a) Paksi-*y*/*y-axis*

(b) $x = -4$

(c) $m = -\frac{\text{pintasan-}y\text{/}y\text{-intercept}}{\text{pintasan-}x\text{/}x\text{-intercept}}$
$\frac{3}{2} = -\frac{y}{-4}$
$y = \frac{3}{2} \times 4$
$y = 6$
Pintasan-*y*/ *y-intercept* = 6

(d) $y = \frac{3}{2}x + 6$

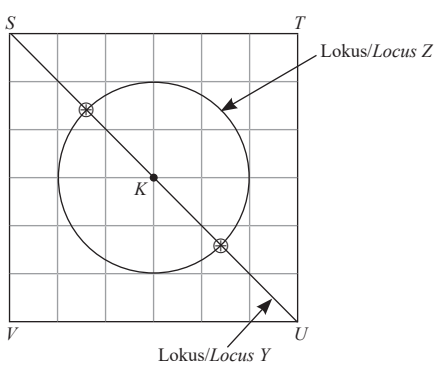
(e) $\frac{6 - 0}{-4 - x} = \frac{3}{2}$
$12 = 3(-4 - x)$
$12 = -12 - 3x$
$3x = -12 - 12$
$x = \frac{-24}{3}$
$= -8$
Koordinat/*Coordinate P* = (–8, 0)

## Lokus dalam Dua Dimensi
***Loci in Two Dimensions***

**1** (a) *TV* atau/*or TKV*

(b) (i) (ii)

(c)




## Poligon
***Polygon***

**1** $y = 135°$
$x = 40°$
$z = 180° - 45° - 40°$
$= 95°$

**2** $y + x = 540° - 30° - 150° - 100° - 25°$
$= 235°$

**3** $x = \frac{180° - 108°}{2}$
$= 36°$
$y = 180° - 108°$
$= 72°$
$y + x = 108°$

**4** $x + y = 900° - 110° - 92° - 60° - 262° - 100°$
$= 276°$

## Sudut dan Tangen bagi Bulatan
***Angles and Tangent of Circles***

**1** $x = 90° - 30°$
$= 60°$

**2** $x = 180° - (25° \times 2)$
$= 130°$
$y = 90°$
$x + y = 130° + 90°$
$= 220°$

**3** $\angle UST = \angle UVS$
$= 50°$
$\angle VSU = \frac{180 - 50}{2}$
$= 65°$
$z = 180 - 65 - 50 - 50$
$= 15°$

**4** $\angle RPK = 2 \times 40° = 80°$
$\angle PRL = 360° - 90° - 90° - 80°$
$= 100°$
$m = 180° - 100°$
$= 80°$

## Rumus Algebra
***Algebraic Formulae***

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

(b) $3p - 6 = \frac{8}{q}$
$3p = \frac{8}{q} + 6$
$p = \frac{8}{3q} + 2$

(c) $\sqrt{m} - 2 = n$
$\sqrt{m} = n + 2$
$m = (n + 2)^2$
$m = n^2 + 4n + 4$

(d) $\frac{m-1}{2} = n^2 - 3k$

$m - 1 = 2n - 6k$

$6k^2 = 2n^2 - m + 1$

$k^2 = \frac{2n^2 - m + 1}{6}$

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

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

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

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

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

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

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

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

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

$m = -2$

(ii) $9(-2) = 22 - 10n$

$n = 4$

**3** $p = 8.90x + 4.50y$

## Tingkatan 4

### BAB 1 Fungsi dan Persamaan Kuadratik dalam Satu Pemboleh Ubah

*Quadratic Functions and Equations in One Variable*

**LATIHAN INTENSIF**

**Soalan Objektif**

| | | | | |
|---|---|---|---|---|
| **1** B | **2** B | **3** A | **4** A | **5** A |
| **6** B | **7** D | | | |

**Soalan Subjektif**

**1** $\frac{3}{x} + 2x = 5$

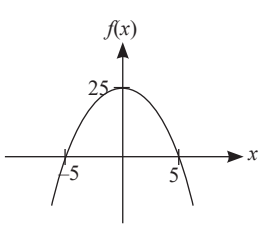
$3 + 2x^2 = 5x$

$2x^2 - 5x + 3 = 0$

$(2x - 3)(x - 1) = 0$

$x = 1, \frac{3}{2}$

**2**




**3** $(3x + 2)(x - 4) = kx - 6$

$3x^2 - 10x - kx - 2 = 0$

$3x^2 + (-10 - k)x - 2 = 0$

$(3x + 1)(x - 2) = 0$

$3x^2 - 5x - 2 = 0$

$3x^2 + x(-5) - 2 = 0$

$-10 - k = -5$

$k = -5$

**4** $(x + x + 4)^2 = 64$

$4x^2 + 16x - 48 = 0$

$x^2 + 4x - 12 = 0$

$(x - 2)(x + 6) = 0$

$x = 2, -6$

$\therefore x = 2$

**5** (a) $(4 + x)(1 - x)$

$a = 4, b = 1$

(b) $(4 + x)(1 - x) = 0$

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

$-x^2 - 3x + 4 = 0$

$\therefore k = 4$

**6** (a) $3(2x)(x - 4) = x^2 + 5$

$5x^2 - 24x - 5 = 0$

$(5x + 1)(x - 5) = 0$

$x = -\frac{1}{5}, 5$

(b) Isi padu/*Volume* $= 5^2 + 5 = 30\ \text{cm}^2$

### BAB 2 Asas Nombor

*Number Bases*

**LATIHAN INTENSIF**

**Soalan Objektif**

| | | | | |
|---|---|---|---|---|
| **1** C | **2** C | **3** D | **4** C | **5** A |
| **6** C | **7** A | **8** B | **9** C | **10** A |
| **11** C | **12** A | **13** C | | |

**Soalan Subjektif**

**1** (a) $52_9 = 5 \times 9^1 + 2 \times 9^0$

$= 47$

$325_6 = 3 \times 6^2 + 2 \times 6^1 + 5 \times 6^0$

$= 125$

$50_9 = 5 \times 9^1 + 0 \times 9^0$

$= 45$

$324_6 = 3 \times 6^2 + 2 \times 6^1 + 4 \times 4^0$

$= 124$

Farish akan memilih Kedai Mesra kerana menawarkan harga yang lebih murah.

*Farish will choose Mesra Shop because its offer the lower price.*

(b) RM47 – RM45 = RM2

**2** (a) $p = 2$

$q = 0$

(b) $3 \times 6^3 + 4 \times 6^2 + 3 \times 6^1 + 2 \times 6^0$
$= 812$

| | | Baki *Remainder* |
|---|---|---|
| 7 | 812 | 0 |
| 7 | 116 | 4 |
| 7 | 16 | 2 |
| 7 | 2 | 2 |
| | 0 | |

$\therefore 2240_7$

**3** $\frac{45 + 19}{100} \times 150 = 96$

| | | Baki *Remainder* |
|---|---|---|
| 4 | 96 | 0 |
| 4 | 24 | 0 |
| 4 | 6 | 2 |
| 4 | 1 | 1 |
| | 0 | |

$\therefore 1200_4$

**4**
$$\begin{array}{r} 10\overset{3}{\cancel{4}}\overset{5}{3}_5 \\ -\quad 34_5 \\ \hline 1004_5 \end{array}$$

**5** $3130_4 = 3 \times 4^3 + 1 \times 4^2 + 3 \times 4^1 + 0 \times 4^0$
$= 220$

$\frac{220}{5} \times 7 = \text{RM}308$

Baki wang/*Money left* = RM330 – RM308
= RM22

**6** $1 - \frac{1}{3} - \frac{1}{5} - \frac{1}{10} = \frac{11}{30}$

$\frac{11}{30} \times 150 = 55$

| | | Baki *Remainder* |
|---|---|---|
| 4 | 55 | 3 |
| 4 | 13 | 1 |
| 4 | 3 | 3 |
| | 0 | |

$\therefore 313_4$

**7** $187_9 = 1 \times 9^2 + 8 \times 9^1 + 7 \times 9^0$
$= 160$

$\frac{80}{100} \times 160 = 128$

| | | Baki *Remainder* |
|---|---|---|
| 6 | 128 | 2 |
| 6 | 21 | 3 |
| 6 | 3 | 3 |
| | 0 | |

$\therefore 332_4$

**8** $110111101_2 \rightarrow 675_8$
$P = 6$
$R = 5$

$$\begin{array}{r} 6_8 \\ +\quad 5_8 \\ \hline 13_8 \end{array}$$

$13_8 = 1 \times 8^1 + 3 \times 8^0 = 11$

| | | Baki *Remainder* |
|---|---|---|
| 3 | 11 | 2 |
| 3 | 3 | 0 |
| 3 | 1 | 1 |
| | 0 | |

$\therefore 102_3$

**9** $301_5 = 3 \times 5^2 + 0 \times 5^1 + 1 \times 5^0$
$= 76$

Khadijah = 76 – 28
= 48

Nadhirah = 2(48)
= 96
$= 165_7$

| | | Baki *Remainder* |
|---|---|---|
| 7 | 96 | 5 |
| 7 | 13 | 6 |
| 7 | 1 | 1 |
| | 0 | |

## BAB 3 Penaakulan Logik *Logical Reasoning*

### LATIHAN INTENSIF

**Soalan Objektif**

**1** D **2** C **3** A **4** B **5** C

**Soalan Subjektif**

**1** (a) Antejadian: 48 ialah gandaan bagi 8.
*Antecedent*: 48 *is a multiple of* 8.
Akibat: 8 ialah gandaan 2.
*Consequent*: 8 *is multiple of* 2.

(b) Antejadian: *PQR* ialah segi tiga sama sisi.
*Antecedent*: *PQR is an equilateral triangle.*
Akibat: $PQ = QR = RQ$.
*Consequent*: $PQ = QR = RQ$.

**2** (a) Implikasi: Jika luas segi empat sama *JKLM* ialah 144 cm$^2$, maka panjang sisi segi empat sama *JKLM* ialah 12 cm. (Benar)
*Implication*: *If the area of square JKLM is* 144 cm$^2$, *then the side of square JKLM is* 12 cm. (*True*)
Akas: Jika panjang sisi segi empat sama *JKLM* ialah 12 cm, maka luas segi empat sama *JKLM* ialah 144 cm$^2$. (Benar)
*Converse: If the sides of square JKLM is* 12 cm, *then the area of square JKLM is* 144 cm$^2$. (*True*)
Songsangan: Jika luas segi empat sama *JKLM* bukan 144 cm$^2$, maka panjang sisi segi empat sama *JKLM* bukan 12 cm. (Benar)
*Inverse: If the area of square JKLM is not* 144 cm$^2$, *then the sides of square JKLM is not* 12 cm. (*True*)

Kontrapositif: Jika panjang sisi segi empat sama *JKLM* bukan 12 cm, maka luas segi empat sama *JKLM* bukan 144 cm$^2$. (Benar)
*Contrapositive: If the sides of square JKLM is not* 12 cm*, then the area of square JKLM is not* 144 cm$^2$. (*True*)

(b) Implikasi: Jika $x^2 + 5 = 21$, maka $x = 4$. (Benar)
*Implication*: *If* $x^2 + 5 = 21$*, then* $x = 4$. (*True*)
Akas: Jika $x = 4$, maka $x^2 + 5 = 21$. (Benar)
*Converse: If* $x = 4$*, then* $x^2 + 5 = 21$. (*True*)
Songsangan: Jika $x^2 + 5 \neq 21$, maka $x \neq 4$. (Benar)
*Inverse: If* $x^2 + 5 \neq 21$*, maka then* $x \neq 4$. (*True*)
Kontrapositif: Jika $x \neq 4$, maka $x^2 + 5 \neq 21$. (Benar)
*Contrapositive: If* $x \neq 4$*, then* $x^2 + 5 \neq 21$. (*True*)

**3** (a) Implikasi 1: Jika $4k + k = 5k$, maka $k = 5$.
*Implication* 1: *If* $4k + k = 5k$*, then* $k = 5$.
Implikasi 2: Jika $k = 5$, maka $4k + k = 5k$.
*Implication* 2: *If* $k = 5$*, then* $4k + k = 5k$.

(b) Implikasi 1: Jika *JKLM* ialah segi empat sama, maka $JK = KL = LM = MJ$.
*Implication* 1: *If JKLM is a square, then* $JK = KL = LM = MJ$.
Implikasi 2: Jika $JK = KL = LM = MJ$, maka *JKLM* ialah segi empat sama.
*Implication* 2: *If* $JK = KL = LM = MJ$*, then JKLM is a square.*

**4** (a) Premis 2 : *ABCD* ialah rombus.
*Premise* 2 : *ABCD is a rhombus.*

(b) Premis 1 : Semua oktagon mempunyai 8 sisi.
*Premise* 1 : *All octagons have* 8 *sides.*

**5** (a) Kesimpulan : $3 \times 5$ ialah nombor ganjil.
*Conclusion :* $3 \times 5$ *is an odd number.*

(b) Premis 1 : Jika $x = 3$, maka $2x - 1 = 5$.
*Premise* 1 : *If* $x = 3$*, then* $2x - 1 = 5$.

**6** (a) Kesimpulan : kos $x° \neq 0.5$
*Conclusion :* $\cos x° \neq 0.5$

(b) Premis 2 : $A \cap B \neq A$
*Premise* 2 : $A \cap B \neq A$

**7** Tidak sah dan tidak munasabah kerana tidak menepati hujah Bentuk II.
*Invalid and unsound because it does not comply the argument of Form* II.

**8** (a) $>$

(b) Implikasi 1: Jika *M* ialah gandaan 6, maka *M* ialah gandaan 2.
*Implication* 1: *If M is a multiple of* 6*, then M is multiple of* 2.
Implikasi 2: Jika *M* ialah gandaan 2, maka *M* ialah gandaan 6.
*Implication* 2: *If M is a multiple of* 2*, then M is multiple of* 6.

(c) (i) Premis 1: Semua nombor perdana mempunyai dua faktor.
*Premise* 1: *All prime numbers have two factors.*

(ii) Sah dan munasabah kerana menepati hujah Bentuk I.
*Valid and sound because it comply the argument of Form* I.

**9** Kuat tetapi tidak meyakinkan kerana Premis 3 adalah palsu.
*Strong but not cogent because Premise* 3 *is false.*

**10** (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: $m \leqslant 5$

(c) $3n + 2(n - 1)^2$, $n = 1, 2, 3, 4$ ...

**11** (a) Lemah dan tidak meyakinkan kerana kesimpulannya palsu.
*Week 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.

**12** (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 the conclusion is false.*

(e) $(10 - 2) \times 180°$.
$= 1\,440°$

## BAB 4 Operasi Set
## *Operations on Sets*

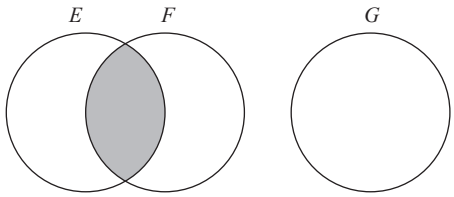
### LATIHAN INTENSIF

**Soalan Objektif**

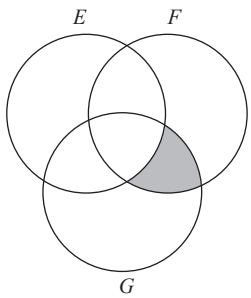
**1** B **2** C **3** B **4** C **5** A
**6** C

**Soalan Subjektif**

**1** (a)




(b)




**2** (a) $\{\ \}, \{k\}, \{m\}, \{n\}, \{k, m\}, \{k, n\}, \{m, n\}, \{k, m, n\}$

(b) $R' \cap S$

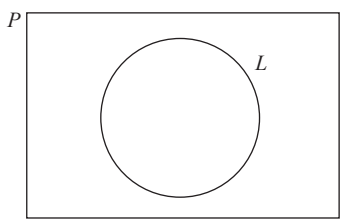
**3** (a) (i) $\{31, 37\}$

(ii) $\{32, 34, 40\}$

(b) $(P \cup Q \cap R') = \{31, 32, 34, 37, 40\}$

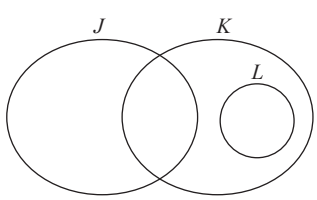
$n(P \cup Q \cap R') = 5$

**4** (a)

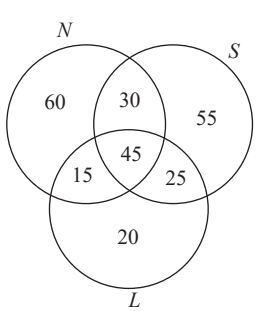



(b) $(X \cap Y)' \cup Z$

**5** (a)




(b)




(i) $30 + 15 + 25$

$= 70$

(ii) $60 + 30 + 55$

$= 145$

## BAB 5 Rangkaian dalam Teori Graf
*Network in Graph Theory*

**Soalan Objektif**

**1** B

**Soalan Subjektif**

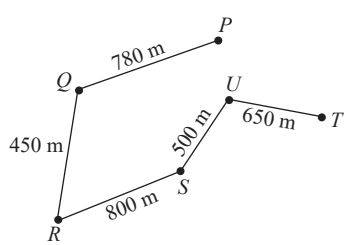
**1** (a)

| 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*

$= 780$ m $+ 450$ m $+ 800$ m $+ 500$ m $+ 650$ m

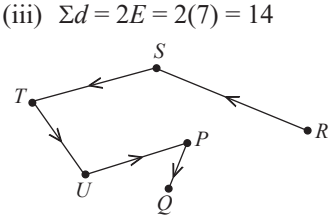
$= 3\ 180$ m

**3** (a) (i) $V = \{P, Q, R, S, T, U\}$; $n(V) = 6$

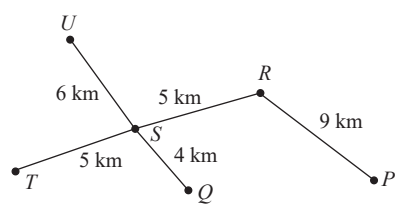
(ii) $E = \{(S, T), (T, U), (U, P), (P, Q), (Q, U), (Q, R), (R, S)\}$; $n(E) = 7$

(iii) $\Sigma d = 2E = 2(7) = 14$

(b)

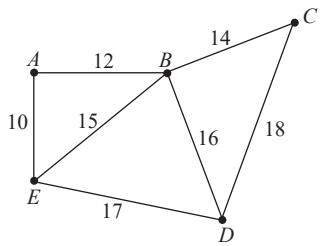



**4** (a)




(b) $10$ km $+ 7$ km $+ 5$ km $+ 5$ km $+ 9$ km $= 36$ km

**5** (a)




(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 minit/*minutes*

(b) Laju/*Speed* = 1.15 m $s^{-1}$
= 1.15 × 60
= 69 m $min^{-1}$

Jarak perjalanan terpendek
*Distance of shortest route*
= 69 × 36
= 2 484 m

## BAB 6 Ketaksamaan Linear dalam Dua Pemboleh Ubah
## *Linear Inequalities in Two Variables*

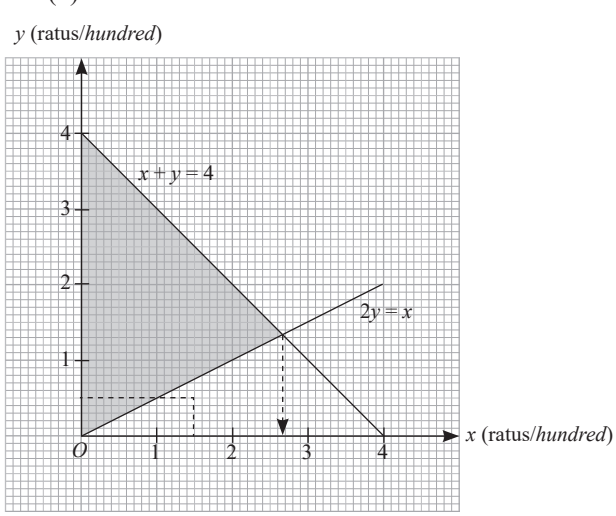
### LATIHAN INTENSIF

**Soalan Objektif**

**1** C **2** A **3** D **4** B **5** B
**6** C

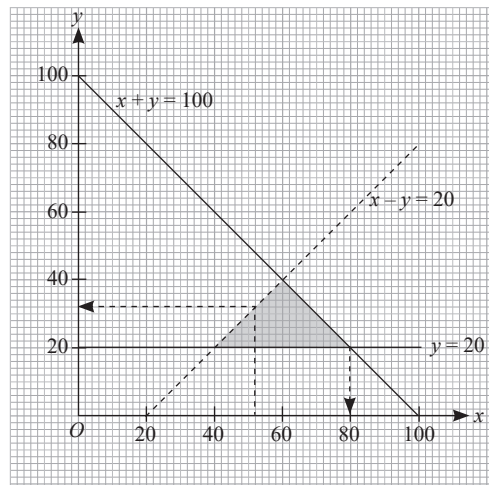
**Soalan Subjektif**

**1** (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* $x \leq 2y$.

**2** (a) $x + y \leq 100$
$y \geq 20$
$x - y > 20$
(b)




(c) (i) 80
(ii) 32

## BAB 7 Graf Gerakan
## *Graphs of Motion*

### LATIHAN INTENSIF

**Soalan Objektif**

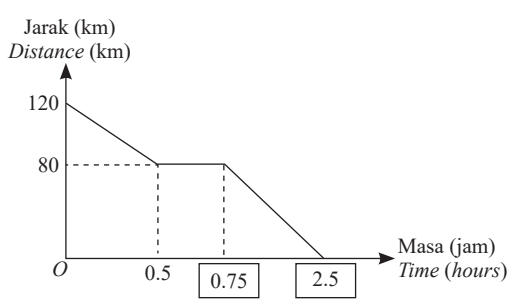
**1** D **2** B **3** B **4** C

**Soalan Subjektif**

**1** Laju purata/*Average speed*
$= \dfrac{\text{Jumlah jarak/}\textit{Total distance}}{\text{Jumlah masa/}\textit{Total time}}$
$= \dfrac{207 \text{ km}}{2.25 \text{ jam/}\textit{hours}}$
= 92 km $j^{-1}$/km $h^{-1}$

**2** (a) 0.5 jam/*hour*
(b) Laju/*Speed*
$= \dfrac{\text{jarak/}\textit{distance}}{\text{masa/}\textit{time}}$
$= \dfrac{12 - 6}{2}$
= 3 km $j^{-1}$/km $h^{-1}$
(c) Laju purata/*Average speed*
$= \dfrac{\text{Jumlah jarak/}\textit{Total distance}}{\text{Jumalah masa/}\textit{Total time}}$
$= \dfrac{12}{4}$
= 3 km $j^{-1}$/ km $h^{-1}$

**3** (a)



(b) Masa/*Time*
$= \frac{120}{75}$
$= 1.6$
= 1 jam 36 minit
1 *hour* 36 *minutes*

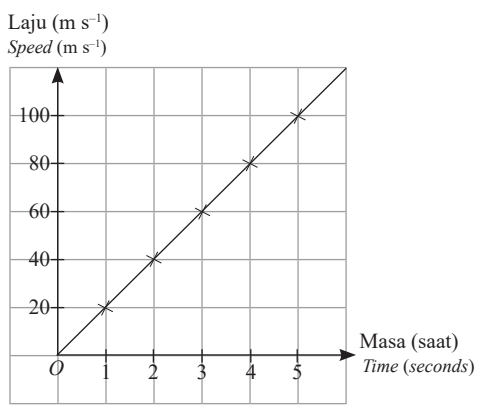
Masa bertolak dari Pusat Sains Negara
*Time departs from National Science Centre*
= 6 jam 25 minit – 1 jam 36 minit
6 *hours* 25 *minutes* – 1 *hour* 36 *minutes*
= 4 jam 49 minit
4 *hours* 49 *minutes*
= 4:49 p.m.

**4** (a) 0.5 jam/*hour* = 30 minit/*minutes*

(b) $\frac{260 - d}{3 - 0} = \frac{d - 0}{4 - 3}$
$d = 65$ km

(c) 260 – 65 = 195 km

**5**




**6** (a) Jumlah jarak/*Distance travelled*
= luas di bawah graf/*area under the graph*
$= \left[\frac{1}{2} \times \left(\frac{10}{60}\right) \times 72\right] + \left[\frac{1}{2} \times \left(\frac{10}{60}\right) \times (40 + 72)\right] + \left[\frac{1}{2} \times \left(\frac{20}{60}\right) \times (40 + 72)\right]$
$= 6 + 9\frac{1}{3} + 18\frac{2}{3}$
= 34 km

(b) Laju purata/*Average speed*
$= \frac{\text{Jumlah jarak/}\textit{Total distance}}{\text{Jumlah masa/}\textit{Total time}}$
$= \frac{34}{(40 \div 60)}$
$= 51 \text{ km j}^{-1}$

**7** (a) Kadar perubahan laju $= \frac{\text{Perubahan laju}}{\text{Perubahan masa}}$

Rate of change of speed $= \frac{\textit{Change of speed}}{\textit{Change of time}}$
$= \frac{(60 - 20)}{(15 - 0)}$
$= 2.67 \text{ m s}^{-1}$

(b) Kereta bergerak dengan laju seragam 60 m $s^{-1}$ untuk tempoh 15 saat.
*The car moves at a uniform speed of* 60 m $s^{-1}$ *for the period of* 15 *seconds.*

(c) Jumlah jarak/*Total distance travelled*
= luas di bawah graf/*area under the graph*
$= \left[\frac{1}{2} \times 15 \times (20 + 60)\right] + [(30 - 15) \times 60)] + \left[\frac{1}{2} \times (60 + 100) \times (45 - 30)\right]$
$= 600 + 900 + 1\,200$
$= 2\,700$ m
$= 2.7$ km

**8** (a) Laju purata/*Average speed*
$= \frac{\text{Jumlah jarak/}\textit{Total distance}}{\text{Jumlah masa/}\textit{Total time}}$
$= \frac{7}{1.25}$
$= 5.6 \text{ km j}^{-1}/\text{km h}^{-1}$

(b) (i) 20 m $s^{-1}$

(ii) Kadar perubahan laju/*Rate of change of speed*
$= \frac{\text{perubahan laju/}\textit{change of speed}}{\text{perubahan masa/}\textit{change of time}}$
$= \frac{0 - 20}{32 - 16}$
$= -1.25 \text{ m s}^{-2}$

## BAB 8 Sukatan Serakan Data tak Terkumpul
***Measures of Dispersion for Ungrouped Data***

**LATIHAN INTENSIF**

**Soalan Objektif**

**1** A **2** A **3** B **4** D **5** B
**6** B **7** B

**Soalan Subjektif**

**1** (a) 52, 57, 60, 64, 66, 68, 69, 71, 74, 75, 77, 80, 80, 82, 83

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

Julat/*Range* = 30 – 1 = 29
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:**

$\text{Min/}Mean = \dfrac{70 + 61 + 67 + 60 + 48 + 50}{6}$

$= 59.33$

Sisihan piawai/*Standard deviation*

$= \sqrt{\dfrac{70^2 + 61^2 + 67^2 + 60^2 + 48^2 + 50^2}{6} - 59.33^2}$

$= 8.10$

**Jason:**

Ujian/*Test* 1: $2002_3 = 2 \times 3^3 + 2 \times 3^0 = 56$

Ujian/*Test* 3: $132_4 = 1 \times 4^2 + 3 \times 4^1 + 2 \times 4^0$

$= 30$

Ujian/*Test* 4: $124_7 = 1 \times 7^2 + 2 \times 7^1 + 4 \times 7^0$

$= 67$

$\text{Min/}Mean = \dfrac{56 + 64 + 30 + 67 + 60 + 79}{6}$

$= 59.33$

Sisihan piawai/*Standard deviation*

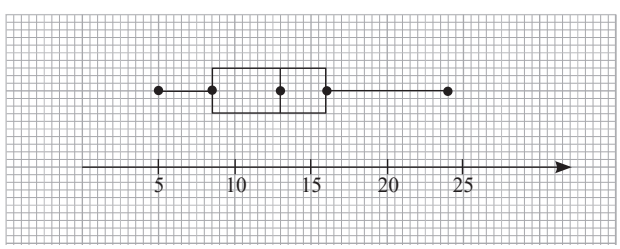
$= \sqrt{\dfrac{56^2 + 64^2 + 30^2 + 67^2 + 60^2 + 79^2}{6} - 59.33^2}$

$= 14.95$

(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)

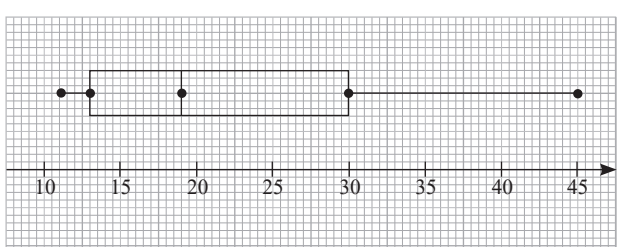



$\bar{x} = \dfrac{264}{20} = 13.2$

$\sigma = \dfrac{4\,172}{20} - 13.2^2 = 34.36$

$\sigma^2 = \sqrt{34.36} = 5.86$

(b)




$\bar{x} = \dfrac{330}{15} = 22$

$\sigma = \dfrac{8\,924}{15} - 22^2 = 110.93$

$\sigma^2 = \sqrt{110.93} = 10.53$

## BAB 9 Kebarangkalian Peristiwa Bergabung
***Probability of Combined Events***

**LATIHAN INTENSIF**

**Soalan Objektif**

**1** B **2** D **3** B **4** B **5** A
**6** A

**Soalan Subjektif**

**1** (a) $S = \{(E, U), (E, 1), (E, 4), (E, 9), (U, E), (U, 1), (U, 4), (U, 9), (1, E), (1, U), (1, 4), (1, 9), (4, E), (4, U), (4, 1), (4, 9), (9, E), (9, U), (9, 1), (9, 4)\}$

(b) (i) $\{(E, U), (E, 1), (E, 4), (E, 9), (U, 1), (U, 4), (U, 9), (1, 4), (1, 9), (4, 1), (4, 9), (9, 1), (9, 4)\}$

$P(A) = \dfrac{13}{20}$

(ii) $\{(U, 1), (U, 9), (1, U), (9, U)\}$

$P(A) = \dfrac{4}{20} = \dfrac{1}{5}$

**2** (a) $\{(A, 2), (A, 5), (A, 6), (E, 2), (E, 5), (E, 6), (C, 2), (C, 5), (D, 2), (D, 5)\}$

(b) $\{(A, 2), (A, 5), (E, 2), (E, 5)\}$

**3** (a) $\dfrac{37}{78} = \left(\dfrac{10}{12} \times \dfrac{M}{7 + M}\right) + \left(\dfrac{7}{7 + M} \times \dfrac{2}{12}\right)$

$\dfrac{37}{78} = \dfrac{10M + 14}{84 + 12M}$

$37(84 + 12M) = 78(10M + 14)$

$3\,108 + 444M = 780M + 1\,092$

$2\,016 = 336M$

$M = \dfrac{2\,016}{336}$

$M = 6$

(b) Kebarangkalian sekurang-kurangnya seorang atlet perempuan dipilih.

*The probability that at least one female athlete is selected.*

$= 1 - P(LA \text{ dan/}and\ LB)$

$= 1 - \left(\dfrac{10}{12} \times \dfrac{7}{13}\right)$

$= \dfrac{43}{78}$

**4** (a) $P(L_K) + P(P_L)$

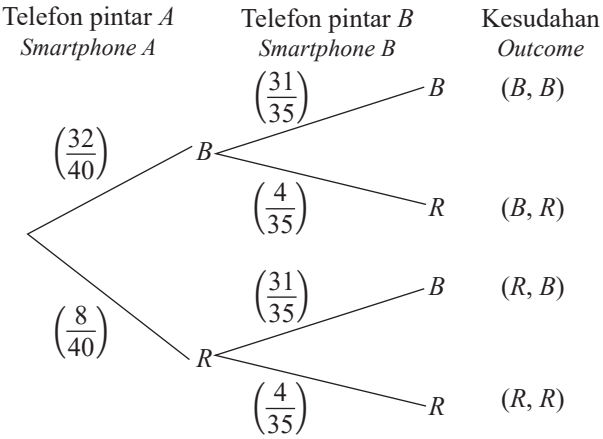
$= \dfrac{30}{160} + \dfrac{20}{160}$

$= \dfrac{5}{16}$

(b) $P(P) + P(\text{Jenama } K) - P(P \cap \text{Jenama } K)$
$= \frac{70}{160} + \frac{80}{160} - \frac{50}{160}$
$= \frac{5}{8}$

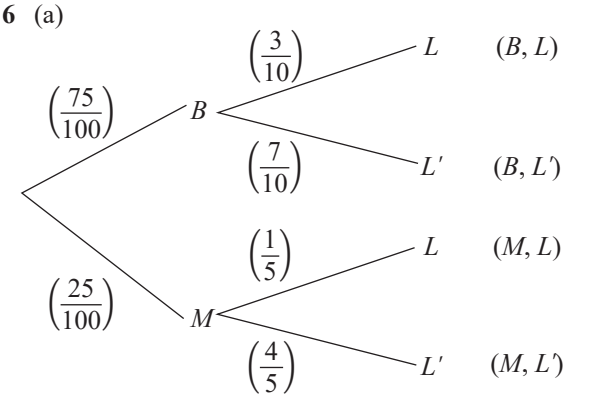
**5** (a) $x = \frac{31}{35}$
$y = \frac{8}{40}$

(b)




(c) $1 - P(B \text{ dan/}and\ B)$
$= 1 - \left(\frac{32}{40} \times \frac{31}{35}\right)$
$= \frac{51}{175}$

**6** (a)




(b) (i) $P(M \text{ dan/}and\ L)$
$= \left(\frac{25}{100} \times \frac{1}{5}\right)$
$= \frac{1}{20}$

(ii) $P(B \text{ dan/}and\ L) \text{ atau/}or\ P(M \text{ dan/}and\ L)$
$= \left(\frac{75}{100} \times \frac{3}{10}\right) + \left(\frac{25}{100} \times \frac{1}{5}\right)$
$= \frac{11}{40}$

(iii) $1 - P(L)$
$= 1 - \frac{11}{40}$
$= \frac{29}{40}$

## BAB 10 Matematik Pengguna: Pengurusan Kewangan
***Consumer Mathematics*: *Financial Management***

### LATIHAN INTENSIF

**Soalan Subjektif**

**1** RM3 750 – RM2 400 = RM1 350
$\frac{\text{RM15 600}}{12} = \text{RM1 300}$
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.*

**2** RM1 900 + RM1 187.60 – (RM2 850 + RM780)
= – RM542.40

Aliran tunai negatif/*Negative cash flow*

**3** $\text{RM9 000} + \text{RM1 300} - \left(\frac{10}{100} \times \text{RM9 000}\right)$
– RM5 430 – RM3 500
= RM470

Aliran tunai positif/*Positive cash flow*

**4** $R$ = RM2 500 + RM550
= RM3 050
$S$ = RM2 020 – RM350 – RM400 – RM380
= RM890
$Q - R - \text{RM2 020} = \text{RM1 580}$
$Q - \text{RM3 050} - \text{RM2 020} = \text{RM1 580}$
$Q = \text{RM6 650}$
$\text{RM7 000} - P = \text{RM6 650}$
$P = \text{RM350}$

# Tingkatan 5

## BAB 1 Ubahan
***Variation***

### LATIHAN INTENSIF

**Soalan Objektif**

**1** B **2** B **3** D **4** C **5** B
**6** D

**Soalan Subjektif**

**1** (a) $P \propto \sqrt{Q}$
$P = k\sqrt{Q}$
$15 = k\sqrt{9}$
$k = 5$
$P = 5\sqrt{Q}$
$P = 35$

(b) $55 = 5\sqrt{Q}$
$Q = 121$

**2** $n \propto 8m - 3$
$n = k(8m - 3)$

$270 = k(8(6) - 3)$
$k = 6$

$n = 6(8m - 3)$
Jika/*If* $n = 18$, maka/*then*
$18 = 6(8m - 3)$
$m = \frac{3}{4}$

**3** $S = kj^2$
$343 = k(3.5)^2$
$k = 28$
$S = 28j^2$
$j = 2 \times 3.5 = 7$

Maka/ *Hence*
$S = 28(7)^2$
$= 1\,372$

Perubahan luas permukaan sfera
*The change in surface area of sphere*
$= 1\,372 - 343$
$= 1\,029\ \text{cm}^2$

**4** (a) $x = \frac{k}{y + 10}$
$8 = \frac{k}{8 + 10}$
$k = 144$
$x = \frac{144}{y + 10}$
$x = \frac{144}{6 + 10}$
$x = 9$

(b) $-64 = \frac{144}{y + 10}$
$y = -12.25$

**5** (a) $10 = k\left(\frac{4.75}{5}\right)$
$k = 10.53$
$T = 10.53\frac{R}{S}$
Diberi $R = 24.3$, $T = 5$ dan $S = x$
*Given* $R = 24.3$, $T = 5$ *and* $S = x$
$5 = 10.53\left(\frac{24.3}{x}\right)$
$x = 51.18$

(b) Diberi $R = 7.5$, $S = 10$ dan $T = y$
*Given* $R = 7.5$, $S = 10$ *and* $T = y$
$y = 10.53\left(\frac{7.5}{10}\right)$
$y = 7.90$

**6** $G \propto \frac{1}{V}$, maka/*so* $G = \frac{k}{V}$,
$300 = \frac{k}{2}$
$k = 600$
$G = \frac{600}{V}$

(a) $G = \frac{600}{1.5}$
$= 400$
Bilangan gula-gula yang diperlukan ialah 400 biji.
*The number of sweets needed is* 400.

(b) Jika saiz setiap gula-gula semakin besar ($V$ bertambah):
*If the size of each sweet gets bigger* ($V$ *increases*):

- Oleh kerana $G \propto \frac{1}{V}$, apabila $V$ meningkat maka bilangan gula-gula, $G$ akan berkurang.
  *As* $G \propto \frac{1}{V}$, *when* $V$ *increases hence the number of sweets,* $G$ *will decrease.*
- Ini kerana gula-gula yang lebih besar mengisi ruang dengan lebih cepat.
  *This is because the larger sweets fill space faster.*

## BAB 2 Matriks
## *Matrices*

### LATIHAN INTENSIF

**Soalan Objektif**

| | | | | |
|---|---|---|---|---|
| **1** D | **2** B | **3** A | **4** D | **5** D |
| **6** A | **7** B | **8** C | **9** B | **10** B |
| **11** B | **12** B | | | |

**Soalan Subjektif**

**1** (a) $ad - bc = 0$
$(-3)(k) - 9(-1) = 0$
$-3k + 9 = 0$
$9 = 3k$
$\frac{9}{3} = k$
$k = 3$

(b) (i) $\frac{1}{-5(10) - 6(3)}\begin{bmatrix} 10 & -3 \\ -6 & -5 \end{bmatrix}$
$\frac{1}{-68}\begin{bmatrix} 10 & -3 \\ -6 & -5 \end{bmatrix} = \frac{1}{m}\begin{bmatrix} 10 & -3 \\ n & -5 \end{bmatrix}$
$\therefore m = -68, n = -6$

(ii) $\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-5(10) - 6(3)}\begin{bmatrix} 10 & -3 \\ -6 & -5 \end{bmatrix}\begin{bmatrix} -15 \\ 18 \end{bmatrix}$
$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-68}\begin{bmatrix} 10(-15) + (-3)(18) \\ -6(-15) + (-5)(18) \end{bmatrix}$
$= \frac{1}{-68}\begin{bmatrix} -204 \\ 0 \end{bmatrix}$
$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$
$x = 3, y = 0$

**2** $x + y = 10\,000$
$0.08x + 0.12y = 960$
$8x + 12y = 96\,000$

$$\begin{bmatrix}1 & 1\\ 8 & 12\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}10\,000\\ 96\,000\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \frac{1}{1(12) - 1(8)}\begin{bmatrix}12 & -1\\ -8 & 1\end{bmatrix}\begin{bmatrix}10\,000\\ 96\,000\end{bmatrix}$$

$$= \frac{1}{4}\begin{bmatrix}12(10\,000) + (-1)(96\,000)\\ -8(10\,000) + (1)(96\,000)\end{bmatrix}$$

$$= \frac{1}{4}\begin{bmatrix}24\,000\\ 16\,000\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}6\,000\\ 4\,000\end{bmatrix}$$

$x$ = RM6 000, $y$ = RM4 000

Nisbah jumlah wang yang dimasukkan ke dalam bank *P* kepada bank *Q* ialah 3 : 2.
*The ratio of the amount of money deposited in bank P to the amount deposited in bank Q is* 3 : 2.

**3** (a) $\frac{1}{-5(b) - 4(-1)}\begin{bmatrix}-5 & 1\\ -4 & b\end{bmatrix} = \frac{1}{a}\begin{bmatrix}-5 & 1\\ -4 & 3\end{bmatrix}$

$b = 3$
$-5(3) - 4(-1) = -11$
$a = -11$

(b) (i) $x + y = 550$
$20x + 50y = 20\,000$
$2x + 5y = 2\,000$

(ii) $$\begin{bmatrix}1 & 1\\ 2 & 5\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}550\\ 2\,000\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \frac{1}{1(5) - 1(2)}\begin{bmatrix}5 & -1\\ -2 & 1\end{bmatrix}\begin{bmatrix}550\\ 2\,000\end{bmatrix}$$

$$= \frac{1}{3}\begin{bmatrix}5(550) + (-1)(2\,000)\\ -2(550) + 1(2\,000)\end{bmatrix}$$

$$= \frac{1}{3}\begin{bmatrix}750\\ 900\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}250\\ 300\end{bmatrix}$$

$x = 250$, $y = 300$

Bilangan kupon RM20 yang telah dijual $x = 250$
*The number of* RM20 *coupons sold,* $x = 250$
Bilangan kupon RM50 yang telah dijual $y = 300$
*The number of* RM50 *coupons sold,* $y = 300$

**4** $x + y = 192$
$x = y + 50$
$x - y = 50$

$$\begin{bmatrix}1 & 1\\ 1 & -1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}192\\ 50\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \frac{1}{1(-1) - 1(1)}\begin{bmatrix}-1 & -1\\ -1 & 1\end{bmatrix}\begin{bmatrix}192\\ 50\end{bmatrix}$$

$$= \frac{1}{-2}\begin{bmatrix}-1(192) + (-1)(50)\\ -1(192) + (1)(50)\end{bmatrix}$$

$$= \frac{1}{-2}\begin{bmatrix}-242\\ -142\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}121\\ 71\end{bmatrix}$$

$x = 121$, $y = 71$

Bilangan biskut makmur, $x = 121$ dan biskut semperit, $y = 71$
*The number of makmur biscuits,* $x = 121$ *and semperit biscuits,* $y = 71$

**5** (a) $-5 = 7 + x$
$x = -12$

$2y = 12$
$y = \frac{12}{2}$
$y = 6$

$3z - 9 = 3$
$3z = 12$
$z = \frac{12}{3}$
$z = 4$

(b) (i) $15x + 69y = 600$
$10x + 38y = 380$

$$\begin{bmatrix}15 & 69\\ 10 & 38\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}600\\ 380\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \frac{1}{15(38) - 10(69)}\begin{bmatrix}38 & -69\\ -10 & 15\end{bmatrix}\begin{bmatrix}600\\ 380\end{bmatrix}$$

$$= \frac{1}{-120}\begin{bmatrix}38(600) + (-69)(380)\\ -10(600) + (15)(380)\end{bmatrix}$$

$$= \frac{1}{-120}\begin{bmatrix}-3\,420\\ -300\end{bmatrix}$$

$$\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}28.5\\ 2.5\end{bmatrix}$$

$x$ = RM28.50, $y$ = RM2.50

Harga seguni beras, $x$ = RM28.50 dan harga sekilogran gula, $y$ = RM2.50
*Price of one sack of rice,* $x$ = RM28.50 *and price one kilogram of sugar,* $y$ = RM2.50

(ii) $$\begin{bmatrix}10 & 10\end{bmatrix}\begin{bmatrix}28.50\\ 2.50\end{bmatrix}$$
$= 10(28.50) + 10(2.50)$
$=$ RM310
Encik Mizan tidak mempunyai wang yang mencukupi untuk membeli beras dan gula tersebut kerana dia kekurangan RM10 di mana RM310 > RM300.
*Mr. Mizan does not have enough money to buy the rice and sugar because he is short of* RM10 *where* RM310 > RM300.

**6** (a) $4(r) - (-1)(12) = 0$
$4r = -12$
$r = \frac{-12}{4}$
$r = -3$

(b) $y = 4x$

$4x - y = 0$

$\frac{x+y}{2} = 40$

$x + y = 80$

$$\begin{bmatrix} 4 & -1 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 80 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{4(1)-1(-1)}\begin{bmatrix} 1 & 1 \\ -1 & 4 \end{bmatrix}\begin{bmatrix} 0 \\ 80 \end{bmatrix}$$

$$= \frac{1}{5}\begin{bmatrix} 1(0) + (1)(80) \\ -1(0) + (4)(80) \end{bmatrix}$$

$$= \frac{1}{5}\begin{bmatrix} 80 \\ 320 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 16 \\ 64 \end{bmatrix}$$

$x = 16, \quad y = 64$

Umur Azizi, $x$ = 16 tahun dan umur neneknya, $y$ = 64 tahun

*Azizi's age, x = 16 years old and his grandmother's age, y = 64 years old*

**7** $x + y = 15$

$6.90x - 8y = 14.10$

$$\begin{bmatrix} 1 & 1 \\ 6.90 & -8 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 15 \\ 14.10 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{1(-8)-1(6.90)}\begin{bmatrix} -8 & -1 \\ -6.90 & 1 \end{bmatrix}\begin{bmatrix} 15 \\ 14.10 \end{bmatrix}$$

$$= \frac{1}{-14.90}\begin{bmatrix} -8(15) + (-1)(14.10) \\ -6.90(15) + (1)(14.10) \end{bmatrix}$$

$$= \frac{1}{-14.90}\begin{bmatrix} -134.10 \\ -89.40 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \\ 6 \end{bmatrix}$$

$x = 9, y = 6$

Bilangan buku Sejarah, $x$ = 9

*The number of History books, x = 9*

Bilangan buku Bahasa Melayu, $y$ = 6

*The number of Bahasa Melayu books, y = 6*

## BAB 3 Matematik Pengguna: Insurans
***Consumer Mathematics*: *Insurance***

### LATIHAN INTENSIF

**Soalan Objektif**

**1** C **2** C **3** B **4** A **5** D
**6** B

**Soalan Subjektif**

**1** RM950 – RM670 = RM280

**2** $\frac{80}{100} \times 450\,000 = 360\,000$

$\left(\frac{320\,000}{360\,000} \times 35\,000\right) - 2\,000$

= RM29 111.11

**3** RM35 000 – RM800 = RM34 200

$\left(\frac{20}{100} \times 34\,200\right) + 800$

= RM7 640

**4** $\frac{350\,000}{1\,000} \times 1.56 + \left[\left(\frac{20 \times 350\,000}{1\,000}\right) \times 1.87\right]$

$= 546 + \frac{70\,000}{1\,000} \times 1.87$

= 546 + 130.90

= RM676.90

**5** $266.50 + \frac{120\,000 - 1\,000}{1\,000} \times 20.30 = 2\,682.20$

$2\,682.20 - \left(\frac{25}{100} \times 2\,682.20\right)$ = RM2 011.65

## BAB 4 Matematik Pengguna: Percukaian
***Consumer Mathematics*: *Taxation***

### LATIHAN INTENSIF

**Soalan Objektif**

**1** D **2** A **3** C **4** B **5** C
**6** D **7** B

**Soalan Subjektif**

**1** (a) Pendapatan bercukai/*Chargeable income*
= RM178 000 − RM10 000 − RM12 500
= RM155 500

(b) Cukai bagi RM100 000 pertama
*Tax on the first* RM100 000
= RM9 400
Cukai atas baki berikutnya
*Tax on the next balance*
= (RM155 500 – RM100 000) × 25%
= RM13 875
Cukai pendapatan yang perlu bayar
*Payable income tax*
= RM9 400 + RM 13 875
= RM23 275

**2** Cukai tanah/*Quit rent*
= RM0.90 × 240 $m^2$
= RM216.00

**3** Pendapatan bercukai/*Chargeable income*
= RM67 770 − RM9 000 − RM7 000 – RM1 800 – RM6 000
= RM43 970
Cukai bagi RM35 000 pertama
*Tax on the first* RM35 000
= RM600
Cukai atas baki berikutnya
*Tax on the next balance*
= (RM43 970 – RM35 000) × 6%
= RM538.20
Cukai pendapatan yang perlu bayar
*Payable income tax*
= RM600 + RM538.20
= RM1 138.20

**4** RM54 000 − RM19 000 – RM500
= RM34 500
Puan Liew layak untuk mendapat rebat cukai RM400 kerana pendapatan bercukai ⩽ RM35 000.
*Puan Liew is eligible for a tax rebate of* RM400 *because her chargeble income* ⩽ RM 35 000.

**5** (a) Pendapatan bercukai/*Chargeable income*
= RM80 000 − RM9 000 − RM6 500 – RM 1 800 – RM2 000
= RM60 700
Cukai bagi RM 50 000 pertama
*Tax on the first* RM50 000
= RM1 500
Cukai atas baki berikutnya
*Tax on the next balance*
= (RM60 700 – RM50 000) × 11%
=RM1 177
Cukai pendapatan yang perlu bayar
*Payable income tax*
= RM1 500 + RM1 177
= RM2 677

(b) Jumlah PCB yang dipotong
*Total deduction of PCB*
= RM200 × 12
= RM2 400
Cukai yang perlu bayar adalah lebih daripada potongan PCB
*Payable income tax more than deduction of PCB*
= RM2 677 – RM2 400
= RM277
Encik Andrew perlu buat bayaran baki cukai pendapatan sebanyak RM277.
*Encik Andrew needs to make a balance income tax payment total of* RM277.

**6** Cukai jalan kereta/*Car road tax* (1 797 cc)
= RM200 + (1 797 – 1 600) × RM0.40
= RM200 + 197 × RM0.40
= RM200 + RM78.80
= RM278.80
Jumlah wang disediakan untuk pembayaran cukai jalan ialah RM278.80.
*The total amount should be allocated for the road tax payment is* RM278.80.

**7** (a) Nilai/*Value x* = 150 × 0.546
= RM81.90

(b) Jumlah cukai perkhidmata/*Total service tax*
= RM81.90 × 6%
= RM4.91

(c) Jumlah bil elektrik/*Total electricity bill*
= RM43.60 + RM33.40 + RM154.80 + RM81.90 + RM4.91
= RM318.61

**8** Anas = RM30
Adib = RM40
Amal = RM42

## BAB 5 Kekongruenan, Pembesaran dan Gabungan Transformasi
***Congruency, Enlargement and Combined Transformations***

**LATIHAN INTENSIF**

**Soalan Objektif**

**1** A **2** B **3** C **4** A **5** B

**Soalan Subjektif**

**1** (a) (–1, 0)
(b) (3, –2) → (4, –5)

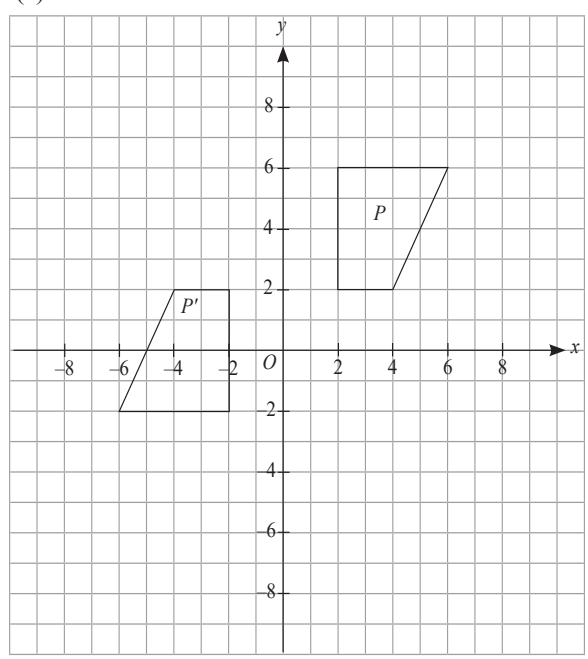
**2** (a) (i) (–4, 3) → (2, 3)
(ii) (–4, 3) → (0, –3)

(b) $3^2 = \frac{360}{x}$
$x = 40$
Luas kawasan berlorak
*Area of shaded region*
= 360 – 40
= 320 cm$^2$

**3** (a) Dua segi tiga kongruen mempunyai panjang sisi sepadan dan sudut sepadan yang sama.
*Two congruent triangles have equal correcponding sides and angles.*

(b) (–3, 7)

(c)




**4** (a) (i) **V**: Putaran 90° lawan arah jam pada pusat (–2, 2).
*A rotation of* 90° *anticlockwise at centre* (–2, 2).

(ii) **W**: Pembesaran dengan faktor skala 2 pada pusat *J*(2, 2).
*An enlargement with scale factor* 2 *at centre* *J*(2, 2).

(b) Luas/*Area of* Δ*JKL*
= $2^2 \times 26$
= 104 cm$^2$

**5** (a) Pola bagi bentuk berulang yang memenuhi suatu satah tanpa ruang kosong atau pertindihan.
*A pattern of recurring shapes that fills a plane without leaving empty or overlapping.*

(b) (i) ***W***: Putaran 90° ikut arah jam pada pusat (12, 7).
*A rotation of* 90° *clockwise at centre* (12, 7).

(ii) ***V***: Pembesaran dengan faktor skala 2 pada pusat $K(12, 10)$.
*An enlargement with scale factor* 2 *at centre* $K(12, 10)$.

(c) Luas/*Area of JKLM*
$= \frac{130}{4}$
$= 32.5 \text{ cm}^2$
Luas kawasan berlorek
*Area of shaded region*
$= 130 - 32.5$
$= 97.5 \text{ cm}^2$

## BAB 6 Nisbah dan Graf Trigonometri
***Ratios and Graphs of Trigonometric Functions***

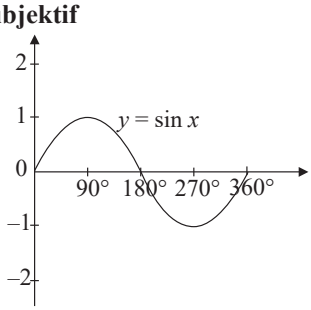
### LATIHAN INTENSIF

**Soalan Objektif**

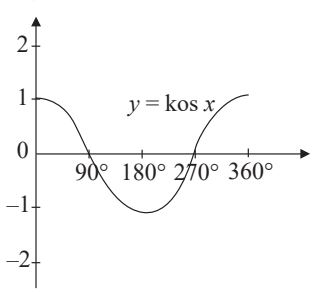
| | | | | |
|---|---|---|---|---|
| **1** C | **2** B | **3** B | **4** D | **5** C |
| **6** B | **7** A | **8** C | **9** D | |

**Soalan Subjektif**

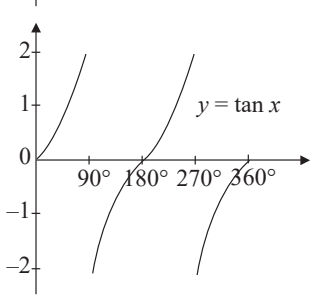
**1** (a)



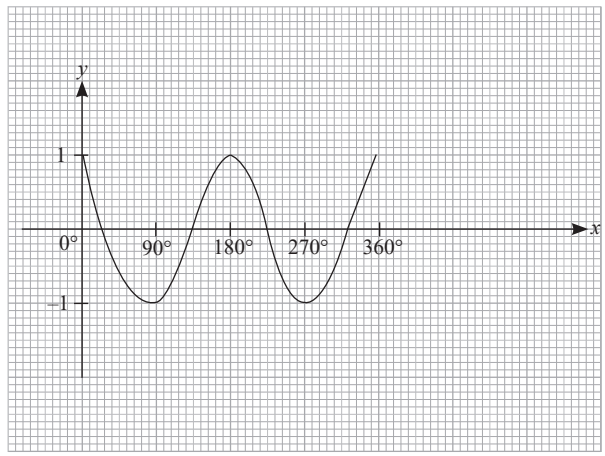

(b)



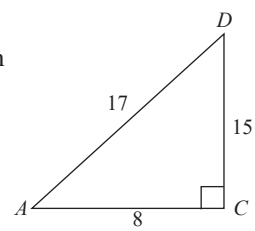

(c)




**2**

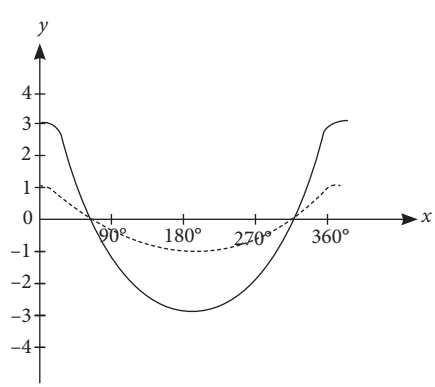



**3** $EF = 4 \times 3 = 12$ cm
$EB = CD = 12 + 3 = 15$ cm
$BC = 3 \times 2 = 6$ cm
$AC = 6 + 2 = 8$ cm
$\sin \angle CAD = \frac{CD}{AD}$
$= \frac{15}{17}$

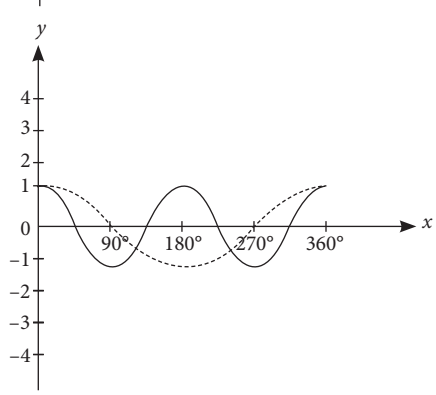



**4** $\sin \theta$ = koordinat-*y*/*y-coordinate*
$= 0.583$
kos/cos $\theta$ = koordinat-*x*/*x-coordinate*
$= -0.864$
$\tan \theta = \frac{\text{koordinat-}y/y\text{-coordinate}}{\text{koordinat-}x/y\text{-coordinate}}$
$= -\frac{0.583}{0.864}$
$= -0.6748$

**5** (a)




(b)



**6** (a) $\tan x = \frac{d}{600}$

$d = 600 \tan x$

(b) Tiada amplitud/*No amplitude*
Tempoh/*Period* = 180°

BAB 7

## Sukatan Serakan Data Terkumpul
***Measures of Dispersions for Grouped Data***

**LATIHAN INTENSIF**

**Soalan Subjektif**

**1** (a)

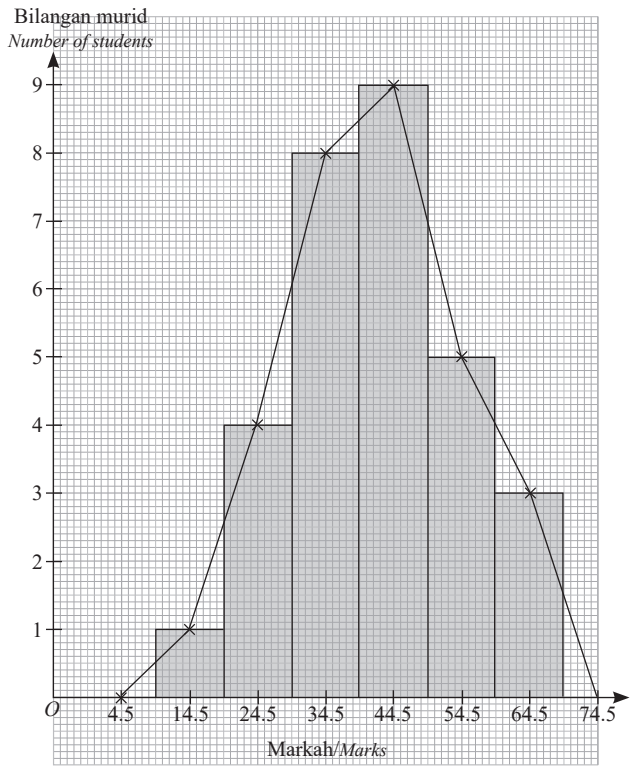
| **Markah** *Marks* | **Kekerapan** *Frequency* | **Titik tengah** *Midpoint* |
|---|---|---|
| 0 – 9 | 0 | 4.5 |
| 10 – 19 | 1 | 14.5 |
| 20 – 29 | 4 | 24.5 |
| 30 – 39 | 8 | 34.5 |
| 40 – 49 | 9 | 44.5 |
| 50 – 59 | 5 | 54.5 |
| 60 – 69 | 3 | 64.5 |
| 70 – 79 | 0 | 74.5 |

(b)

| **Kekerapan** *Frequency* | **Titik Tengah** *Midpoint* | $f \times x$ |
|---|---|---|
| 1 | 14.5 | 14.5 |
| 4 | 24.5 | 98.0 |
| 8 | 34.5 | 276.0 |
| 9 | 44.5 | 400.5 |
| 5 | 54.5 | 272.5 |
| 3 | 64.5 | 193.5 |
| 0 | 74.5 | 0 |
| Jumlah *Total* 30 | | 1 255 |

Min/*Mean* $= \frac{1\,255}{30} = 41.83$

(c) (d)




**2** (a)

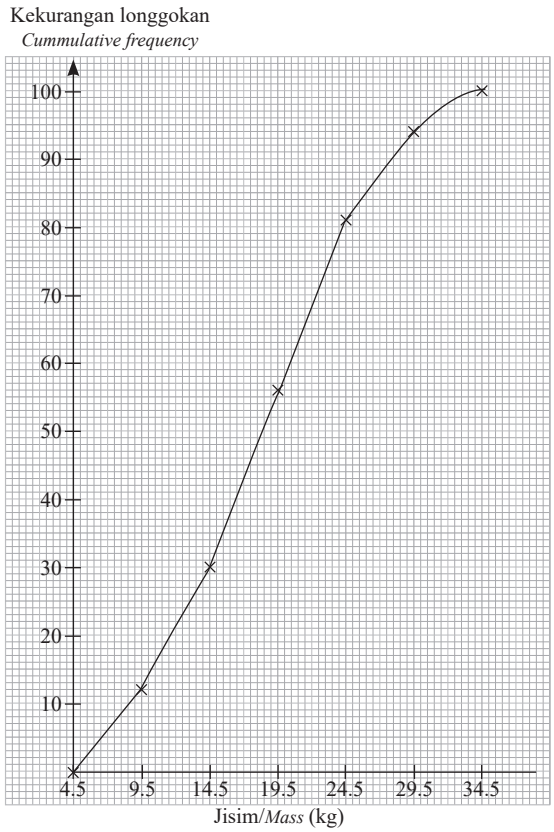
| **Jisim** *Mass* **(kg)** | **Kekerapan** *Frequency* | **Titik tengah** *Midpoint* | **Sempadan atas** *Upper boundary* | **Kekerapan longgokan** *Cumulative frequency* |
|---|---|---|---|---|
| 0 – 4 | 0 | 2 | 4.5 | 0 |
| 5 – 9 | 12 | 7 | 9.5 | 12 |
| 10 – 14 | 18 | 12 | 14.5 | 30 |
| 15 – 19 | 26 | 17 | 19.5 | 56 |
| 20 – 24 | 25 | 22 | 24.5 | 81 |
| 25 – 29 | 13 | 27 | 29.5 | 94 |
| 30 – 34 | 6 | 32 | 34.5 | 100 |

(b)

| $f$ | $x$ | $fx$ |
|---|---|---|
| 0 | 2 | 0 |
| 12 | 7 | 84 |
| 18 | 12 | 216 |
| 26 | 17 | 442 |
| 25 | 22 | 550 |
| 13 | 27 | 351 |
| 6 | 32 | 192 |
| Jumlah/*Total* 100 | | 1 835 |

Min/*Mean* $= \frac{1\,835}{100} = 18.35$

(c)




**3** (a) Nabil $= \dfrac{11.5 + 11.3 + 10.8 + 11.9 + 10.5}{5}$

$= 11.2$

Jihan $= \dfrac{11.3 + 11.8 + 10.9 + 10.3 + p}{5} = 11.2$

$p = 11.7$

(b)

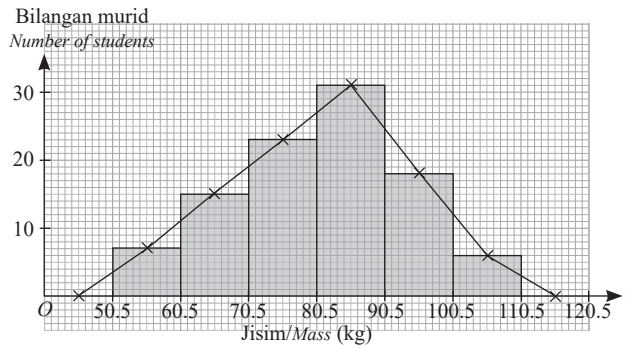
| Nabil | | Jihan | |
|---|---|---|---|
| $x$ | $x^2$ | $x$ | $x^2$ |
| 11.5 | 132.25 | 11.3 | 127.69 |
| 11.3 | 127.69 | 11.8 | 139.24 |
| 10.8 | 116.64 | 10.9 | 118.81 |
| 11.9 | 141.61 | 10.3 | 106.09 |
| 10.5 | 110.25 | 11.7 | 136.89 |
| $\Sigma x = 56$ | $\Sigma x^2 = 628.44$ | $\Sigma x = 56$ | $\Sigma x^2 = 628.72$ |

$\sigma_{Nabil} = \sqrt{\dfrac{628.44}{5} - 11.2^2} = 0.4980$

$\sigma_{Jihan} = \sqrt{\dfrac{628.72}{5} - 11.2^2} = 0.5514$

(c) Nabil adalah atlet yang terbaik, kerana catatan masanya lebih konsisten ($\sigma_{Nabil} < \sigma_{Jihan}$).
*Nabil is the best athlete because his time record is more consistent* ($\sigma_{Nabil} < \sigma_{Jihan}$).

**4** (a)




(b) Bentuk loceng
*Bell-shaped*

(c)

| Jisim *Weight* (kg) | Bilangan murid *Number of students* | Titik tengah *Midpoint* | $fx$ | $fx^2$ |
|---|---|---|---|---|
| 51 – 60 | 7 | 55.5 | 388.5 | 21 561.75 |
| 61 – 70 | 15 | 65.5 | 982.5 | 64 353.75 |
| 71 – 80 | 23 | 75.5 | 1 736.5 | 131 105.75 |
| 81 – 90 | 31 | 85.5 | 2 650.5 | 226 617.75 |
| 91 – 100 | 18 | 95.5 | 1 719 | 164 164.5 |
| 101 – 110 | 6 | 105.5 | 633 | 66 781.5 |
| | $\Sigma f = 100$ | | $\Sigma fx = 8\ 110$ | $\Sigma fx^2 = 674\ 585$ |

(d) Min/*Mean* $= \dfrac{\Sigma fx}{\Sigma f} = \dfrac{8\ 110}{100} = 81.1$

(e) Sisihan piawai/*Standard deviation*

$= \sqrt{\dfrac{\Sigma fx^2}{\Sigma f} - \bar{x}^2}$

$= \sqrt{\dfrac{674\ 585}{100} - 81.10^2}$

$= 12.99$

## BAB 8 Pemodelan Matematik
## *Mathematical Modelling*

### LATIHAN INTENSIF

**Soalan Objektif**

**1** C **2** C **3** B **4** A **5** A
**6** D **7** D **8** D **9** A

**Soalan Subjektif**

**1** kefahaman secara kualitatif; kualitatif; masalah dunia sebenar
*qualitative; quantitative understanding; real-world problems*

**2** (a) Mengenal pasti dan mendefinisi masalah
*Identifying and defining problems*
(b) Mengaplikasi matematik untuk menyelesaikan masalah
*Applying mathematics to solve problems*
(c) Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan
*Verifying and interpreting solution in the context of the problem*
(d) Memurnikan model matematik
*Refining the mathematical model*
(e) Melaporkan dapatan
*Reporting the findings*

## Kertas Model SPM

**Kertas 1**

| | | | | |
|---|---|---|---|---|
| **1** B | **2** A | **3** A | **4** B | **5** A |
| **6** C | **7** C | **8** B | **9** B | **10** B |
| **11** B | **12** D | **13** C | **14** C | **15** A |
| **16** B | **17** C | **18** C | **19** C | **20** C |
| **21** D | **22** B | **23** C | **24** C | **25** D |
| **26** D | **27** C | **28** A | **29** A | **30** A |
| **31** B | **32** A | **33** B | **34** D | **35** C |
| **36** A | **37** D | **38** C | **39** B | **40** A |

**Kertas 2**
**Bahagian A**

**1** (a) $P = km$
$12 = k(2)$
$k = 6$

$P = 6m$

(b) (i) $P = 6m$
$x = 6(5)$
$= 30$

(ii) Harga beras baru
*Price of new rice*
$= 30 + (30 \times 0.2)$
$= \text{RM}36$

$3 \text{ kg} = \frac{5}{2} \times 3$
$= \text{RM}21.60$

**2** (a) $x = \frac{-b}{2a}$
$= \frac{-6}{2(-3)}$
$= 1$

$\therefore (1, 12)$

$y = -3(1)^2 + 6(1) + 9$
$= 12$

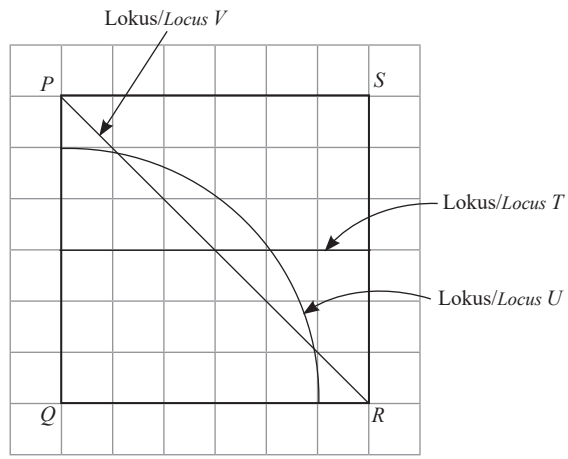
(b) $3x^2 - 6x - 9 = 0$
$x^2 - 2x - 3 = 0$
$(x - 3)(x + 1) = 0$
$x = 3 , x = -1$

**3** (a) Palsu/*False*
(b) Jika $k$ boleh dibahagi tepat dengan 2, maka $k$ adalah nombor genap.
*If k is divisible by 2, then k is an even number.*
(c) Tidak sah/*Not valid*
Tidak munasabah/*Unsound*

**4** $(4\,200 - 2\,800)12$
$= 1\,400 \times 12$
$= \text{RM}16\,800$

Farel akan berjaya mencapai matlamat kewangannya.
*Farel will achieve his financial goal.*

**5**

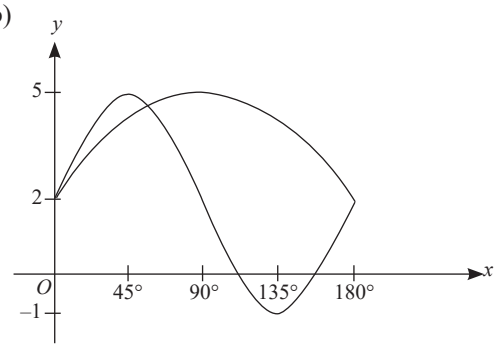



**6** (a) $\frac{80}{100} \times 320\,000$
$= \text{RM}256\,000$

(b) $\left(\frac{200\,000}{256\,000} \times 30\,000\right) - 2\,500$
$= \text{RM}20\,937.50$

**7** (a) Amplitud/*Amplitude* = 3
Tempoh/*Period* = 180°

(b)



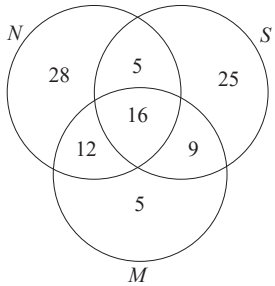

**8** (a) Laju/*Speed* = 12 m s$^{-1}$
Tempoh/*Period* = 19 s

(b) $(43 - 24)12 + \frac{1}{2}(12 + v)5 = 268$
$228 + 30 + 2.5v = 268$
$2.5v = 10$
$v = 4$

**9** (a) $-x + 2y = 16$ atau/*or* $x - 2y = -16$

(b) $\frac{k}{4} = \frac{1}{2}$
$\therefore k = 2$
$y = \frac{5x}{2} - 5$
$\therefore h = -\frac{5}{2}$

**10**




$12 + 5 + 9 = 26$

**Bahagian B**

**11** (a) Pendapatan tahunan tolak elaun
*Annual income subtracted allowance*
= (RM7 800 – RM1 200) × 12
= RM79 200
Pendapatan bercukai
*Chargeable income*
= RM79 200 – RM9 000 − RM7 000 – RM2 800 – RM2 000 – RM450
= RM57 950

(b) Cukai bagi RM50 000 pertama
*Tax on the first* RM50 000
= RM1 500
Cukai atas baki berikutnya
*Tax on the next balance*
= (RM57 950 – RM50 000) × 11%
= RM874.50
Cukai pendapatan yang perlu dibayar
*Payable income tax*
= (RM1 500 + RM874.50) – RM500
= RM1 874.50

(c) Jumlah PCB yang dipotong
*Total deduction of PCB*
= RM390 × 12
= RM4 680

Jumlah PCB melebihi cukai pendapatan yang perlu dibayar
*Total PCB more than payable income tax*
= RM4 680 – RM1 874.50
= RM2 805.50

Encik Abdullah akan menerima pulangan lebihan bayaran cukai pendapatan sebanyak RM2 805.50.
*Mr. Abdullah will receive a refund of excess income tax payment of* RM2 805.50.

**12** (a) $\begin{pmatrix}65 & 80\\70 & 85\end{pmatrix}\begin{pmatrix}0.3\\0.7\end{pmatrix}$

$= \begin{pmatrix}65(0.3) + 80(0.7)\\70(0.3) + 85(0.7)\end{pmatrix}$

$= \begin{pmatrix}75.5\\80.5\end{pmatrix}$

Mata pelajaran terbaik = Sains
*The best subject = Sciences*

(b) $R - 20 = Q + 20$
$R - Q = 40$ ····· ①

$R + 22 = 2(Q - 22)$
$R - 2Q = -66$ ····· ②

$\begin{pmatrix}1 & -1\\1 & -2\end{pmatrix}\begin{pmatrix}R\\Q\end{pmatrix} = \begin{pmatrix}40\\-66\end{pmatrix}$

$\begin{pmatrix}R\\Q\end{pmatrix} = \frac{1}{1(-2) - 1(-1)}\begin{pmatrix}-2 & 1\\-1 & 1\end{pmatrix}\begin{pmatrix}40\\-66\end{pmatrix}$

$= \frac{1}{-1}\begin{pmatrix}-2(40) + 1(-66)\\-1(40) + 1(-66)\end{pmatrix}$

$= \frac{1}{-1}\begin{pmatrix}-146\\-106\end{pmatrix}$

$\begin{pmatrix}R\\Q\end{pmatrix} = \begin{pmatrix}146\\106\end{pmatrix}$

$R = 146, Q = 106$

Wang saku Raisha, $R$ = RM146 dan wang saku Qistina, $Q$ = RM106
*The pocket money of Raisha,* $R$ = RM146 *and the pocket money of Qistina,* $Q$ = RM106

**13** (a) (i) (–3, 0)
(ii) (5, 6) → (9, 5)

(b) (i) **V**: Putaran 90° lawan arah jam pada pusat (1, 2).
*A rotation* 90° *anticlockwise at centre* (1, 2).

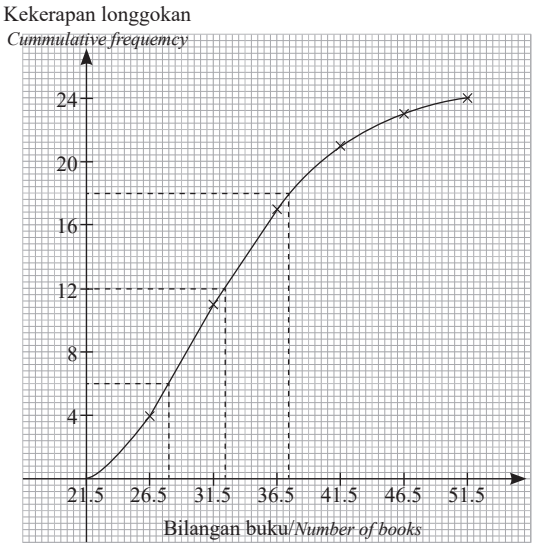
(ii) **W**: Pembesaran dengan faktor skala $\frac{1}{2}$ pusat $G(13, 2)$.
*An enlargement with scale factor* $\frac{1}{2}$ *at centre* $G(13, 2)$.

**14** (a)

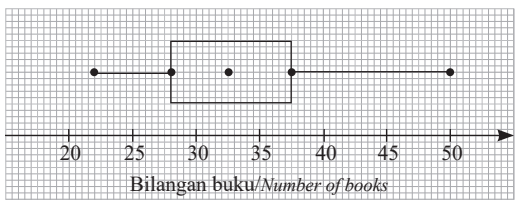
| **Selang kelas** *Class interval* | **Kekerapan** *Frequency* | **Sempadan atas** *Upper boundary* | **Kekerapan longgokan** *Cummulative frequency* |
|---|---|---|---|
| 17 – 21 | 0 | 21.5 | 0 |
| 22 – 26 | 4 | 26.5 | 4 |
| 27 – 31 | 7 | 31.5 | 11 |
| 32 – 36 | 6 | 36.5 | 17 |
| 37 – 41 | 4 | 41.5 | 21 |
| 42 – 46 | 2 | 46.5 | 23 |
| 47 – 51 | 1 | 51.5 | 24 |

(b) 27 – 31

(c)




(d)

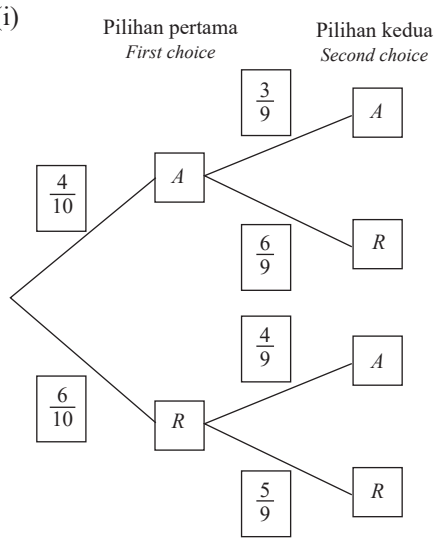



**15** (a) (i) $\{(P, S), (P, K), (P, O), (P, R), (A, S), (A, K), (A, O), (A, R), (S, S), (S, K), (S, O), (S, R), (T, S), (T, K), (T, O), (T, R), (I, S), (I, K), (I, O), (I, R)\}$

(ii) $\{(T, S), (T, K), (T, O), (T, R), (P, S), (P, K), (P, R), (A, S), (A, K), (A, R), (S, S), (S, K), \{(S, R), (I, S), (I, K), (I, R)\}$

$\frac{16}{20} = \frac{4}{5}$

(b) (i)




(ii) $\frac{4}{10} \times \frac{6}{9}$ atau/*or* $\frac{6}{10} \times \frac{4}{9}$ atau/*or* $\frac{6}{10} \times \frac{5}{9}$

$\frac{4}{10} \times \frac{6}{9} + \frac{6}{10} \times \frac{4}{9} + \frac{6}{10} \times \frac{5}{9}$

$= \frac{13}{15}$

(iii) $\frac{4}{10} \times \frac{3}{9}$ atau/*or* $\frac{6}{10} \times \frac{5}{9}$

$\frac{4}{10} \times \frac{3}{9} + \frac{6}{10} \times \frac{5}{9}$

$= \frac{7}{15}$

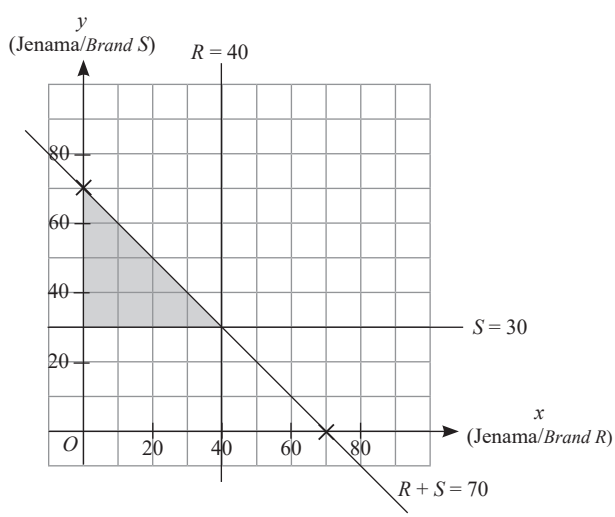
**Bahagian C**

**16** (a) Jenama/*Brand A* : 1167
Jenama/*Brand B* : 1199
Jenama/*Brand C* : 1168

Jenama *C* paling murah.
*Brand C has the cheapest price.*

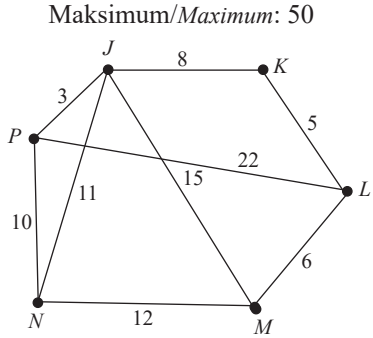
(b) (i) $R + S \leqslant 70$
$R \leqslant 40$
$S \geqslant 30$

(ii)

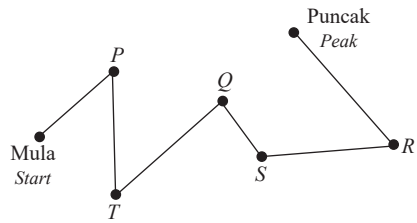



(iii) Minimum/*Minimum*: 30
Maksimum/*Maximum*: 50

(c)



**17** (a) (i)




(ii) Jumlah jarak minimum
*Total minimum distance*
= 144 + 180 + 156 + 135 + 200 + 126
= 941 m

(iii) Jumlah masa/*Total time*
= 9 + 10 + 12 + 15 + 10 + 14
= 70 minit/*minutes*
Laju purata/*Average speed*
$= \frac{941}{70}$
= 13.4 m/min

(b)

| **Selang kelas (umur)** *Class interval (age)* | **Kekerapan, *f*** *Frequency, f* | **Titik tengah, *x*** *Midpoint, x* | ***fx*** | ***fx*²** |
|---|---|---|---|---|
| 11 – 15 | 0 | 13 | 0 | 0 |
| 16 – 20 | 3 | 18 | 54 | 972 |
| 21 – 25 | 8 | 23 | 184 | 4 232 |
| 26 – 30 | 9 | 28 | 252 | 7 056 |
| 31 – 35 | 6 | 33 | 198 | 6 534 |
| 36 – 40 | 4 | 38 | 152 | 5 776 |
| 41 – 45 | 0 | 43 | 0 | 0 |
| | | Jumlah/ *Total* | 840 | 24 570 |

$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{840}{30} = 28$

$\sigma = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2} = \sqrt{\frac{24\,570}{30} - 28^2} = 5.92$

(c) $2x + 2.5y = 492.5$ ····· ①
$x + 2y = 304$
$x = 304 - 2y$ ····· ②

$2(304 - 2y) + 2.5y = 492.5$
$1.5y = 115.5$
$y = 77$

$x = 304 - 2(77)$
$x = 150$

$\therefore y = 77$ kcal, $x = 150$ kcal