Yakin

Jawapan

Yakin Classroom

MATEMATIK

UNIT 1

SK 1.1

A

1

Bilangan buku, *x* *Number of books, x*	4	7	10
Denda (RM), *y* ***Penalty* (RM), *y***	4.80	8.40	12.00

(*a*) bertambah/*increase*
(*b*) berkurang/*decrease*
(*c*) bertambah dua kali ganda/*double*
(*d*) berkurang separuh/*decrease by half*
(*e*) ubahan langsung/*direct variation*

B

1

$\frac{y}{x}$
$\frac{2.0}{10} = 0.20$
$\frac{4.0}{20} = 0.20$
$\frac{6.0}{30} = 0.20$
$\frac{8.0}{40} = 0.20$
$\frac{10.0}{50} = 0.20$

$\frac{y}{x}$ ialah pemalar, maka y berubah secara langsung dengan x, iaitu $y \propto x$.
$\frac{y}{x}$ *is a constant, thus* y *varies directly as* x, $y \propto x$.

2

$\frac{y}{x}$
$\frac{0.15}{30} = 0.005$
$\frac{0.20}{40} = 0.005$
$\frac{0.25}{50} = 0.005$
$\frac{0.30}{60} = 0.005$
$\frac{0.50}{70} = 0.007$

$\frac{y}{x}$ bukan pemalar, maka y tidak berubah secara langsung dengan x.
$\frac{y}{x}$ *is not a constant, thus* y *does not varies directly as* x.

3

$\frac{y}{x}$
$\frac{0.08}{0.5} = 1.6$
$\frac{1.12}{0.7} = 1.6$
$\frac{1.44}{0.9} = 1.6$
$\frac{1.76}{1.1} = 1.6$
$\frac{2.40}{1.5} = 1.6$

$\frac{y}{x}$ ialah pemalar, maka y berubah secara langsung dengan x, iaitu $y \propto x$.
$\frac{y}{x}$ *is a constant, thus* y *varies directly as* x, $y \propto x$.

C

1 $y \propto x \rightarrow y = kx$
$10 = 5k$
$k = 2$
$\therefore y = 2x$

2 $y \propto x \rightarrow y = kx$
$5 = 2k$
$k = \frac{5}{2}$
$\therefore y = \frac{5}{2}x$

3 $m \propto n \rightarrow m = kn$
$10 = 25k$
$k = \frac{2}{5}$
$\therefore m = \frac{2}{5}n$

4 $y \propto x^2 \rightarrow y = kx^2$
$24 = 2^2k$
$24 = 4k$
$k = 6$
$\therefore y = 6x^2$

5 $y \propto \sqrt{x} \rightarrow y = k\sqrt{x}$
$50 = k\sqrt{25}$
$50 = 5k$
$k = 10$
$\therefore y = 10\sqrt{x}$

6 $j \propto l^3 \rightarrow j = kl^3$
$36 = 3^3k$
$36 = 27k$
$k = \frac{4}{3}$
$\therefore j = \frac{4}{3}l^3$

D

1 (*a*) $n \propto m \rightarrow n = km$
$21 = 3k$
$k = 7$
$\therefore n = 7m$

(*b*) $n = 7m$
$= 7(7)$
$= 49$

Kaedah alternatif
Alternative method

$n_1 = 21 \quad m_1 = 3 \quad m_2 = 7$
$\frac{n_1}{m_1} = \frac{n_2}{m_2}$
$\frac{21}{3} = \frac{n_2}{7}$
$n_2 = \frac{21 \times 7}{3}$
$= 49$

2 (*a*) $n \propto \sqrt{m} \rightarrow n = k\sqrt{m}$
$28 = k\sqrt{16}$
$28 = 4k$
$k = 7$
$\therefore n = 7\sqrt{m}$

(*b*) $n = 7\sqrt{m}$
$= 7\sqrt{25}$
$= 7(5)$
$= 35$

3 (*a*) $n \propto m^3 \rightarrow n = km^3$
$-8 = k4^3$
$-8 = 64k$
$k = -\frac{1}{8}$
$\therefore n = -\frac{1}{8}m^3$

(*b*) $n = -\frac{1}{8}m^3$
$= -\frac{1}{8}(-16)^3$
$= -\frac{1}{8}(-4\,096)$
$= 512$

4 (*a*) $n \propto m^{\frac{1}{3}} \rightarrow n = km^{\frac{1}{3}}$
$16 = 2k$
$k = 8$
$\therefore n = 8m^{\frac{1}{3}}$

(*b*) $n = 8m^{\frac{1}{3}}$
$40 = 8m^{\frac{1}{3}}$
$m^{\frac{1}{3}} = 5$
$m = 125$

E

	Menggunakan simbol ∝ ***Using symbol ∝***	**Persamaan** ***Equation***
1	$v \propto lhw$	$v = klhw$
2	$I \propto j^2t$	$I = kj^2t$
3	$S \propto PRT$	$S = kPRT$
4	$S \propto vt$	$S = kvt$
5	$v \propto j^2t$	$v = kj^2t$

F

1 $P \propto Ks^2 \rightarrow P = kKs^2$

$40 = k(5)(2)^2$

$40 = 20k$

$k = 2$

$\therefore P = 2Ks^2$

2 $y \propto xz \rightarrow y = kxz$

$20 = k(4)(3)$

$20 = 12k$

$k = \frac{5}{3}$

$\therefore y = \frac{5}{3}xz$

3 $L \propto a^2b \rightarrow L = ka^2b$

$-192 = k(4)^2(-2)$

$-192 = -32k$

$k = 6$

$\therefore L = 6a^2b$

4 $Y \propto xz \rightarrow Y = kxz$

$30 = k(2)(3)$

$30 = 6k$

$k = 5$

$\therefore Y = 5xz$

5 $M \propto n^2x \rightarrow M = kn^2x$

$36 = k(2)^2(3)$

$36 = 12k$

$k = 3$

$\therefore M = 3n^2x$

6 $b \propto f^2g \rightarrow b = kf^2g$

$48 = k(2)^2(3)$

$48 = 12k$

$k = 4$

$\therefore b = 4f^2g$

G

1 (*a*) $P \propto Qs^2$

$P = kQs^2$

$40 = k(5)(2)^2$

$40 = 20k$

$k = 2$

$\therefore P = 2Qs^2$

(*b*) $P = 2Qs^2$

$= 2(3)(5)^2$

$= 6(25)$

$= 150$

Kaedah alternatif
Alternative method

$P_1 = 40, Q_1 = 5, s_1 = 2, Q_2 = 3, s_2 = 5$

$\frac{P_1}{Q_1(s_1)^2} = \frac{P_2}{Q_2(s_2)^2}$

$\frac{40}{5 \times 2^2} = \frac{P_2}{3 \times 5^2}$

$P_2 = 150$

2 (*a*) $Y \propto xz$

$Y = kxz$

$20 = k(4)(3)$

$20 = 12k$

$k = \frac{5}{3}$

$\therefore Y = \frac{5}{3}xz$

(*b*) $Y = \frac{5}{3}xz$

$75 = \frac{5}{3}x(9)$

$75 = 15x$

$x = 5$

Kaedah alternatif
Alternative method

$Y_1 = 20, x_1 = 4, z_1 = 3, Y_2 = 75, z_2 = 9$

$\frac{Y_1}{x_1z_1} = \frac{Y_2}{x_2z_2}$

$\frac{20}{4 \times 3} = \frac{75}{x_2 \times 9}$

$x_2 = \frac{75 \times 12}{20 \times 9}$

$= 5$

3 (*a*) $h \propto mn^2$

$h = kmn^2$

$72 = k(2)(3)^2$

$72 = 18k$

$\frac{72}{18} = \frac{18}{18}k$

$k = 4$

$\therefore h = 4mn^2$

(*b*) $h = 4mn^2$

$80 = 4m(2^2)$

$80 = 16m$

$m = 5$

Kaedah alternatif
Alternative method

$h_1 = 72, m_1 = 2, n_1 = 3, h_2 = 80, n_2 = 2$

$\frac{h_1}{m_1(n_1)^2} = \frac{h_2}{m_2(n_2)^2}$

$\frac{72}{2 \times 3^2} = \frac{80}{m_2 \times 2^2}$

$m_2 = \frac{80 \times 2 \times 9}{72 \times 4}$

$= 5$

H

1 $S \propto t \rightarrow s = kt$

$k = \frac{s}{t}$

$= \frac{150}{3}$

$= 50$

$\therefore s = 50t$

Gantikan $k = 50$, $s = 100$ dalam persamaan $s = 50t$ untuk mencari nilai t.
Substitute $k = 50$, $s = 100$ into equation $s = 50t$ to find the value of t.

$s = 50t$

$100 = 50(t)$

$t = 2$

Kaedah alternatif
Alternative method

$\frac{s_1}{t_1} = \frac{s_2}{t_2}$

$\frac{150}{3} = \frac{100}{t}$

$t = 2$

2 $S \propto PT \rightarrow S = kPT$

$k = \frac{S}{PT}$

$= \frac{500}{10\,000 \times 2}$

$= 0.025$

$\therefore S = 0.025PT$

Gantikan nilai $S = 1\,250$, k dan $P = 10\,000$ dalam persamaan untuk mendapatkan nilai T.
Substitute the value of $S = 1\,250$, k and $P = 10\,000$ in the equation to find the value of T.

$S = 0.025PT$

$1\,250 = 0.025(10\,000)T$

$1\,250 = 250T$

$T = 5$ tahun/*years*

SK 1.2

A

1

Bilangan pekerja, *x* *Number of workers, x*	4	10
Tempoh (bilangan hari), *y* *Duration (number of days), y*	5	2

(*a*) berkurang dua kali ganda
reduced two times
(*b*) bertambah lima kali ganda
increase five times
(*c*) berkurang/*decrease*
(*d*) bertambah/*increase*
(*e*) ubahan songsang/*inverse variation*

B

1

xy	240	240	240	240

xy ialah pemalar, maka *y* berubah secara songsang dengan *x*.
xy is constant, thus y varies inversely as x.

$\therefore y \propto \frac{1}{x}$

2

xy	24	24	24	24

xy ialah pemalar, maka *y* berubah secara songsang dengan *x*.
xy is constant, thus y varies inversely as x.

$\therefore y \propto \frac{1}{x}$

3

xy	45	42	45	48

xy bukan pemalar, maka *y* tidak berubah secara songsang dengan *x*.
xy is not constant, thus y is not varies inversely as x.

4

xy	28	28	28

xy ialah pemalar, maka *y* berubah secara songsang dengan *x*.
xy is constant, thus y varies inversely as x.

$\therefore y \propto \frac{1}{x}$

5

xy	1 200	1 200	1 400	1 200	1 200

xy bukan pemalar, maka *y* tidak berubah secara songsang dengan *x*.
xy is not constant, thus y is not varies inversely as x.

C

	Menggunakan simbol ∝ *Using symbol ∝*	**Persamaan** *Equation*
1	$y \propto \frac{1}{x}$	$y = \frac{k}{x}$
2	$M \propto \frac{1}{n^2}$	$M = \frac{k}{n^2}$
3	$y \propto \frac{1}{\sqrt{x}}$	$y = \frac{k}{\sqrt{x}}$

D

1 $y \propto \frac{1}{x} \rightarrow y = \frac{k}{x}$

$k = xy$

$k = 5 \times 3$

$= 15$

$\therefore y = \frac{15}{x}$

2 $M \propto \frac{1}{t} \rightarrow M = \frac{k}{t}$

$k = Mt$

$k = (16)(2)$

$= 32$

$\therefore M = \frac{32}{t}$

3 $x \propto \frac{1}{z} \rightarrow x = \frac{k}{z}$

$k = xz$

$k = (8)(2)$

$= 16$

$\therefore x = \frac{16}{z}$

4 $Q \propto \frac{1}{R} \rightarrow Q = \frac{k}{R}$

$k = QR$

$k = (4)(3)$

$= 12$

$\therefore Q = \frac{12}{R}$

E

1 (*a*) $y \propto \frac{1}{x}$

$y = \frac{k}{x}$

$k = yx$

$= (25)(2)$

$= 50$

$\therefore y = \frac{50}{x}$

(*b*) $y = \frac{50}{x}$

$= \frac{50}{x}$

$= 10$

(*c*) $y = \frac{50}{x}$

$60 = \frac{50}{x}$

$x = \frac{50}{60}$

$= \frac{5}{6}$

2 $p \propto \frac{1}{q}$

$p = \frac{k}{q}$

$k = pq$

$= (5)(6)$

$= 30$

$\therefore p = \frac{30}{q}$

Kaedah alternatif
Alternative method

(*b*) Diberi/*Given*

$y_1 = 25, x_1 = 2, x_2 = 5$

$x_1y_1 = x_2y_2$

$2 \times 25 = 5 \times y_2$

$50 = 5y_2$

$\frac{50}{5} = \frac{5}{5}y_2$

$y_2 = 10$

(*c*) $y_1 = 25, x_1 = 2, y_2 = 60$

$x_1y_1 = x_2y_2$

$2 \times 25 = x_2 \times 60$

$50 = 50x_2$

$\frac{50}{60} = \frac{60}{60}x_2$

$x_2 = \frac{5}{6}$

Kaedah alternatif
Alternative method

(*a*) $p_1 = 5, q_1 = 6, q_2 = 10$

$p_1q_1 = p_2q_2$

$(5)(6) = 10p_2$

$30 = 10p_2$

$p_2 = 3$

(*b*) $p_1 = 5, q_1 = 6, p_2 = 2.5$

$p_1q_1 = p_2q_2$

$(5)(6) = 2.5q_2$

$30 = 2.5q_2$

$q_2 = 12$

(*a*) $p = \frac{30}{q}$

$= \frac{30}{10}$

$= 3$

(*b*) $p = \frac{30}{q}$

$2.5 = \frac{30}{q}$

$q = \frac{30}{2.5}$

$= 12$

3

H		4.5
g	2.5	

Diberi/*Given* $H_1 = 2, g_1 = 3, H_2 = 2.88$

$H_1(g_1)^2 = H_2(g_2)^2$

$(2)(9) = 2.88(g_2)^2$

$18 = 2.88(g_2)^2$

$(g_2)^2 = 6.25$

$g_2 = \sqrt{6.25}$

$= 2.5$

Diberi/*Given* $H_1 = 2, g_1 = 3, g_3 = 2$

$H_1(g_1)^2 = H_3(g_3)^2$

$(2)(9) = 4H_3$

$18 = 4H_3$

$H_3 = 4.5$

4 (*a*) $s \propto \frac{1}{\sqrt{t}}$

$s = \frac{k}{\sqrt{t}}$

$3 = \frac{k}{\sqrt{16}}$

$k = 12$

$\therefore s = \frac{12}{\sqrt{t}}$

(*b*) (i) $s = \frac{12}{\sqrt{t}}$

$= \frac{12}{\sqrt{36}}$

$= \frac{12}{6}$

$= 2$

(ii) $s = \frac{12}{\sqrt{t}}$

$5 = \frac{12}{\sqrt{t}}$

$\sqrt{t} = \frac{12}{5}$

$t = \frac{144}{25}$

$= 5.76$

F

1 $V = 1, P = 50$

$V \propto \frac{1}{P} \longrightarrow V = \frac{k}{P}$

$k = VP$

$= 1 \times 50$

$= 50$

$\therefore V = \frac{50}{p}$

$V = \frac{50}{1\,600}$

$= 0.03125$

Isi padu gas ialah 0.03125 dm^3. Isi padu gas dalam bentuk piawai ialah 3.125×10^{-2} dm^3.
The volume of gas is 0.03125 dm^3. *The volume of gas in standard form is* 3.125×10^{-2} dm^3.

2 $d = 16, P = 35$

$d \propto \frac{1}{P} \longrightarrow d = \frac{k}{P}$

$dP = k$

$k = 16 \times 35$

$= 560$

$d = \frac{560}{P}$

$14P = 560$

$P = \frac{560}{14}$

$= 40$

Kaedah alternatif
Alternative method

$d_1P_1 = d_2P_2$

$16 \times 35 = 14P$

$560 = 14P$

$P = 40$

SK 1.3

A

	Menggunakan simbol $\propto$ *Using symbol* $\propto$	Persamaan *Equation*
1	$j \propto l\sqrt{m}$	$j = kl\sqrt{m}$
2	$r \propto \frac{S^3}{t}$	$r = \frac{kS^3}{t}$
3	$A \propto \frac{C}{B}$	$A = \frac{kC}{B}$
4	$d \propto \frac{e^3}{\sqrt{f}}$	$d = \frac{ke^3}{\sqrt{f}}$
5	$P \propto \frac{Q}{R^3}$	$P = \frac{kQ}{R^3}$

B

1 (*a*) $m \propto \frac{l}{h} \rightarrow m = \frac{kl}{h}$

$5 = \frac{k(4)}{16}$

$80 = 4k$

$k = 20$

$\therefore m = \frac{20l}{h}$

(*b*) $m = \frac{20l}{h}$

$= \frac{20(5)}{20}$

$= 5$

2 (*a*) $s \propto \frac{j}{l}, s = \frac{kj}{l}$

$6 = \frac{k \times 3}{5}$

$30 = 3k$

$k = 10$

$\therefore s = \frac{10j}{l}$

(*b*) $s = \frac{10j}{1}$

$4 = \frac{10j}{6}$

$24 = 10j$

$j = 2.4$

3 (*a*) $y \propto \frac{x\sqrt{z}}{\sqrt[3]{t}} \longrightarrow y = \frac{kx\sqrt{z}}{\sqrt[3]{t}}$

$8 = \frac{k(2)\sqrt{4}}{\sqrt[3]{125}}$

$8 = \frac{4k}{5}$

$k = 10$

$\therefore y = \frac{10x\sqrt{z}}{\sqrt[3]{t}}$

(*b*) $y = \frac{10x\sqrt{z}}{\sqrt[3]{t}}$

$80 = \frac{10(x)\sqrt{16}}{\sqrt[3]{8}}$

$160 = 40x$

$x = 4$

4 $R \propto \frac{S}{\sqrt{T}}$ $\quad R = \frac{kS}{\sqrt{T}}$

$10 = \frac{k(5)}{\sqrt{4}}$

$20 = 5k$

$k = 4$

$\therefore R = \frac{4S}{\sqrt{T}}$

$R = \frac{4S}{\sqrt{T}}$

$16 = \frac{4(50)}{\sqrt{T}}$

$\sqrt{T} = 12.5$

$T = 156.25$

$\therefore x = 156.25$

C

1 $t \propto \frac{s}{p} \longrightarrow t = \frac{ks}{p}$

$32 = \frac{k(16)}{4}$

$128 = 16k$

$k = 8$

Gantikan nilai $s = 24$ dan $p = 8$ dalam persamaan.
Substitute $s = 24$ and $p = 8$ into the equation.

$t = \frac{8s}{p}$

$t = \frac{8(24)}{8}$

$t = 24$

2 $V \propto \frac{T}{P} \longrightarrow V = \frac{kT}{P}$

$42 = \frac{84k}{8}$

$336 = 84k$

$k = 4$

Gantikan nilai $T = 185$ dan $P = 10$ dalam persamaan.
Substitute $T = 185$ and $P = 10$ into the equation.

$V = \frac{4T}{P}$

$V = \frac{4(185)}{10}$

$V = 74$

D

1 $V \propto m^3 \longrightarrow V = km^3$

Nisbah jisim setiap kepingan
The ratio of the mass of each piece
$= 2 : 3 : 5$
$= 2m + 3m + 5m$
$= 10m$

Maka/*Then*,
$V = 15\,600$, $m = 10m$

$V = km^3$

$15\,600 = k(10m)^3$

$15\,600 = 1\,000km^3$

$km^3 = 15.6$

Katakan V_1, V_2 dan V_3 adalah nilai bagi jisim 3 kepingan barang antik $2m$, $3m$ dan $5m$.
Suppose V_1, V_2 and V_3 are the values of the mass of 3 pieces of $2m$, $3m$ and $5m$ antiques.

$V_1 = k(2m)^3 = 8m^3k$ $\quad V_2 = k(3m)^3 = 27m^3k$ $\quad V_3 = k(5m)^3 = 125m^3k$

Nilai barang antik selepas pecah
The value of broken antiques
$= (V_1 + V_2 + V_3)$
$= (8m^3k + 27m^3k + 125m^3k)$
$= 160m^3k$

Maka, nilai barang antik selepas pecah
Thus, the value of broken antiques
$= 160 \times 15.6$
$= 2\,496$

Jumlah kerugian/*Total of loss*
= RM15 600 – RM2 496
= RM13 104

% kerugian/% *of loss* $= \frac{13\,104}{15\,600} \times 100\%$
$= 84\%$

2 $A \propto bh \longrightarrow A = kbh$

k adalah pemalar $= \frac{1}{2}$, maka $A = \frac{bh}{2}$

k *is a constant* $= \frac{1}{2}$, *then* $A = \frac{bh}{2}$

Panjang tapak bertambah 20%, maka
Length of base increases by 20%, *then*
$b \times \frac{120}{100} = \frac{12b}{10}$

Tinggi berkurang 20%, maka $h \times \frac{80}{100} = \frac{8h}{10}$

Height decreases by 20%, *then*, $h \times \frac{80}{100} = \frac{8h}{10}$

Luas segi tiga baru/*Area of a new triangle*

$= \frac{1}{2} \times \frac{12b}{10} \times \frac{8h}{10}$

$= \left(\frac{96}{100}\right)\frac{bh}{2}$

$= \frac{96}{100}A$

Peratus perubahan/*Percentage of change*
= 100% – 96%
= 4%

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

1	**D**	**2**	**B**	**3**	**D**	**4**	**C**	**5**	**C**
6	**C**	**7**	**D**	**8**	**C**	**9**	**B**	**10**	**B**

Kertas 2/*Paper 2*

1 (*a*) $N \propto \frac{D}{P}$

$N = \frac{kD}{P}$

$480 = \frac{k(5\,000)}{80}$

$k = 7.68$

$N = \frac{7.68D}{P}$

(*b*) $D = 75\,000$, $P = 80$

$N = \frac{(7.68)(75\,000)}{80}$

$= 7\,200$

UNIT 2

SK 2.1

A

1 $\begin{bmatrix} 9 & 11 \\ 20 & 6 \\ 10 & 12 \end{bmatrix}$

2 $\begin{bmatrix} 140 & 110 & 120 \\ 143 & 105 & 130 \end{bmatrix}$

3 $\begin{bmatrix} 7 & 3 \\ 9 & 2 \\ 5 & 1 \end{bmatrix}$

4 $\begin{bmatrix} 10 & 21 & 9 \\ 13 & 18 & 8 \end{bmatrix}$

B

1 2×4
(*a*) 2
(*b*) 4

2 8
(*a*) 3 (*b*) 2 (*c*) 1 (*d*) 8
(*e*) 2 (*f*) 4 (*g*) 0 (*h*) 5

C

	Bilangan baris *Number of rows*	Bilangan lajur *Number of columns*	Peringkat matriks *Order of matrix*
1	2	2	2×2
2	3	2	3×2
3	3	1	3×1
4	2	3	2×3
5	1	3	1×3

D

1 3, –2, 1
2 4, 7, –5
3 –2, 7
4 1, –5
5 –2
6 –5
7 4

E

1 Matriks tidak sama kerana unsur sepadan tidak sama.
Different matrix because the corresponding element are different.

2 Matriks sama kerana unsur sepadan dan peringkat matriks adalah sama.
Equal matrix because the corresponding elements and order of matrix are equal.

3 Matriks tidak sama kerana unsur sepadan tidak sama.
Different matrix because the corresponding element are different.

4 Matriks tidak sama kerana peringkat matriks adalah tidak sama.
Different matrix because their matrix orders are different.

F

1 $x = 2$ dan/*and* $5 = y + x$

Gantikan $x = 2$ ke dalam $5 = y + x$
Substitute $x = 2$ *into* $5 = y + x$
$5 = y + 2$
$y = 5 - 2$
$y = 3$

Maka/*Thus*,
$x = 2, y = 3$

2 $2x = 10$
$x = 5$

$y^2 - 3 = 13$
$y^2 = 16$
$y = \sqrt{16}$
$y = 4$

Maka/*Thus*,
$x = 5, y = 4$

3 $x = -3, y = 4$

$-2y + 1 = z$
$-2(4) + 1 = z$
$-8 + 1 = z$
$z = -7$

Maka/*Thus*,
$x = -3, y = 4$ dan/*and* $z = -7$

4 $2x^2 = 18$
$x^2 = 9$
$x = \sqrt{9}$
$= 3$

$y + 3 = 1$
$y = -2$

$\frac{x}{24} = z^3$

$z^3 = \frac{3}{24}$

$z^3 = \frac{1}{8}$

$z^3 = \sqrt[3]{\frac{1}{8}} = \frac{1}{2}$

Maka/*Thus*,
$x = 3, y = -2$, dan/*and* $z = \frac{1}{2}$

SK 2.2

A

1 $\begin{bmatrix} 2+(-3) & -1+5 \\ 4+9 & 3+2 \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 13 & 5 \end{bmatrix}$

2 $\begin{bmatrix} -1+(-3) & 4+5 \\ -2+2 & 0+(-1) \end{bmatrix} = \begin{bmatrix} -4 & 9 \\ 0 & -1 \end{bmatrix}$

3 $\begin{bmatrix} 2+(-5) & 3+9 \\ 1+0 & 0+2 \\ -1+(-1) & 4+7 \end{bmatrix} = \begin{bmatrix} -3 & 12 \\ 1 & 2 \\ -2 & 11 \end{bmatrix}$

4 $\begin{bmatrix} -3-(-1) & 5-3 \\ 4-9 & 2-8 \end{bmatrix} = \begin{bmatrix} -2 & 2 \\ -5 & -6 \end{bmatrix}$

5 $\begin{bmatrix} -2-(-5) & 7-3 \\ 15-9 & 8-(-2) \end{bmatrix} = \begin{bmatrix} 3 & 4 \\ 6 & 10 \end{bmatrix}$

6 $\begin{bmatrix} 3-(-2) & 0-1 & 4-2 \\ 9-6 & 8-(-6) & 7-5 \end{bmatrix} = \begin{bmatrix} 5 & -1 & 2 \\ 3 & 14 & 2 \end{bmatrix}$

B

1 $\begin{bmatrix} 9 \\ 8 \end{bmatrix} - \begin{bmatrix} 3 \\ -5 \end{bmatrix} = \begin{bmatrix} 9-3 \\ 8-(-5) \end{bmatrix}$
$= \begin{bmatrix} 6 \\ 13 \end{bmatrix}$

Kaedah alternatif
Alternative method
$= \begin{bmatrix} 7+2-3 \\ -2+10-(-5) \end{bmatrix}$
$= \begin{bmatrix} 6 \\ 13 \end{bmatrix}$

2 $\begin{bmatrix} -4 & 8 \\ 5 & 10 \end{bmatrix} + \begin{bmatrix} 2 & 7 \\ -2 & 5 \end{bmatrix} = \begin{bmatrix} -4+2 & 8+7 \\ 5+(-2) & 10+5 \end{bmatrix}$
$= \begin{bmatrix} -2 & 15 \\ 3 & 15 \end{bmatrix}$

3 $\begin{bmatrix} 13 & 2 & 11 \\ 3 & 4 & 10 \end{bmatrix} - \begin{bmatrix} 3 & 3 & 6 \\ -6 & 4 & 7 \end{bmatrix}$
$= \begin{bmatrix} 13-3 & 2-3 & 11-6 \\ 3-(-6) & 4-4 & 10-7 \end{bmatrix}$
$= \begin{bmatrix} 10 & -1 & 5 \\ 9 & 0 & 3 \end{bmatrix}$

4 $\begin{bmatrix} -2 & -8 \\ 6 & 6 \\ 2 & -11 \end{bmatrix} + \begin{bmatrix} -8 & 9 \\ 0 & 8 \\ -4 & 2 \end{bmatrix} = \begin{bmatrix} -10 & 1 \\ 6 & 14 \\ -2 & -9 \end{bmatrix}$

C

1 $\begin{bmatrix} -3+a \\ 4+2 \end{bmatrix} = \begin{bmatrix} 4 \\ 3b \end{bmatrix}$

Maka/*Thus*,
$-3 + a = 4$
$a = 4 + 3$
$a = 7$

$6 = 3b$
$b = \frac{6}{3}$
$b = 2$

2 $[5 + a - 4 \quad 5 - b \quad 6 - 3] = [1 \quad 3 \quad 3]$

Maka/*Thus*,
$5 + a - 4 = 1$
$a + 1 = 1$
$a = 0$

$5 - b = 3$
$-b = 3 - 5$
$-b = -2$
$b = 2$

3 $\begin{bmatrix} 2+2 & 3+a \\ 4+3 & -2-a+5 \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ 7 & b \end{bmatrix}$

Maka/*Thus*,
$3 + a = 5$
$a = 5 - 3$
$a = 2$

$-2 - a + 5 = b$
$-2 - (2) + 5 = b$
$b = 1$

4 $\begin{bmatrix} 2a+3 \\ 8+b-5 \\ 13+(-3) \end{bmatrix} = \begin{bmatrix} -1 \\ 5 \\ 10 \end{bmatrix}$

Maka/*Thus*,
$2a + 3 = -1$
$2a = -4$
$a = -2$

$8 + b - 5 = 5$
$b + 3 = 5$
$b = 2$

5 $\begin{bmatrix} 2+5 & -a+4+7 \\ b^2+4 & 3-(-6) \end{bmatrix} = \begin{bmatrix} 7 & 5 \\ 13 & -3 \end{bmatrix}$

Maka/*Thus*,
$-a + 11 = 5$
$-a = 5 - 11$
$-a = -6$
$a = 6$

$b^2 + 4 = 13$
$b^2 = 9$
$b = 3$

6 $\begin{bmatrix} \frac{a}{3} - 7 \\ 5 - (a+b) \end{bmatrix} = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$

Maka/*Thus*,
$\frac{a}{3} - 7 = -2$
$\frac{a}{3} = 5$
$a = 15$

$5 - (a + b) = 3$
$5 - 15 - b = 3$
$-10 - b = 3$
$-b = 13$
$b = -13$

D

1 $[6 \quad -15]$

2 $\begin{bmatrix} 8 & -8 \\ 20 & 12 \end{bmatrix}$

3 $\begin{bmatrix} 6 \\ -12 \\ -18 \end{bmatrix}$

4 $\begin{bmatrix} 4 & \frac{1}{4} & -2 \\ -2 & 1 & \frac{3}{4} \end{bmatrix}$

5 $\begin{bmatrix} -0.4 & 1.0 & 2.0 \\ 1.6 & -0.8 & 0.6 \end{bmatrix}$

6 $\begin{bmatrix} 3m & mx \\ my & -4m \end{bmatrix}$

7 $\begin{bmatrix} -20 & 8 \\ 0 & -12 \\ 2 & 3 \end{bmatrix}$

8 $\begin{bmatrix} 4 & -1 & 2 \\ \frac{1}{5} & 3 & 1 \\ -2 & \frac{2}{5} & 5 \end{bmatrix}$

9 $[a^2 \quad ab \quad -3a]$

10 $\begin{bmatrix} 1.2 \\ -0.8 \\ 2.0 \end{bmatrix}$

E

1 $\begin{bmatrix} 2 \\ -6 \end{bmatrix} + 3\begin{bmatrix} -1 \\ 4 \end{bmatrix} = \begin{bmatrix} 2 \\ -6 \end{bmatrix} + \begin{bmatrix} -3 \\ 12 \end{bmatrix}$
$= \begin{bmatrix} 2+(-3) \\ -6+12 \end{bmatrix}$
$= \begin{bmatrix} -1 \\ 6 \end{bmatrix}$

2 $\begin{bmatrix} 4 & -7 \\ 3 & -3 \end{bmatrix} - \begin{bmatrix} 4 & 2 \\ -1 & 3 \end{bmatrix} = \begin{bmatrix} 4-4 & -7-2 \\ 3-(-1) & -3-3 \end{bmatrix}$
$= \begin{bmatrix} 0 & -9 \\ 4 & -6 \end{bmatrix}$

3 $\begin{bmatrix} 3 & -4 \\ 1 & -2 \end{bmatrix} - \begin{bmatrix} -6 & 10 \\ 4 & 2 \end{bmatrix} = \begin{bmatrix} 3-(-6) & -4-10 \\ 1-4 & -2-2 \end{bmatrix}$
$= \begin{bmatrix} 9 & -14 \\ -3 & -4 \end{bmatrix}$

4 $\begin{bmatrix}4 & -5\\3 & 2\end{bmatrix}-\begin{bmatrix}-3 & 3\\6 & 12\end{bmatrix}+\begin{bmatrix}12 & -8\\-20 & 12\end{bmatrix}$

$=\begin{bmatrix}7 & -8\\-3 & -10\end{bmatrix}+\begin{bmatrix}12 & -8\\-20 & 12\end{bmatrix}$

$=\begin{bmatrix}7+12 & -8+(-8)\\-3+(-20) & -10+12\end{bmatrix}$

$=\begin{bmatrix}19 & -16\\-23 & 2\end{bmatrix}$

5 $\begin{bmatrix}-12 & 6\\9 & -3\end{bmatrix}+\begin{bmatrix}4 & -3\\2 & 5\end{bmatrix}-\begin{bmatrix}1 & -2\\5 & -4\end{bmatrix}$

$=\begin{bmatrix}-12+4-1 & 6-3+2\\9+2-5 & -3+5+4\end{bmatrix}$

$=\begin{bmatrix}-9 & 5\\6 & 6\end{bmatrix}$

6 $\begin{bmatrix}3\\-4\\5\end{bmatrix}-\begin{bmatrix}10\\-15\\5\end{bmatrix}+\begin{bmatrix}3\\2\\-1\end{bmatrix}=\begin{bmatrix}3-10+3\\-4+15+2\\5-5-1\end{bmatrix}$

$=\begin{bmatrix}-4\\13\\-1\end{bmatrix}$

F

1 $\begin{bmatrix}4a\\16\\26\end{bmatrix}+\begin{bmatrix}2\\b-5\\-2\end{bmatrix}=\begin{bmatrix}14\\13\\24\end{bmatrix}$

Maka/*Thus*,

$4a+2=14$
$4a=12$
$a=3$

$16+b-5=13$
$b+11=13$
$b=2$

2 $\begin{bmatrix}-9-2 & 7-\frac{1}{5}a\\2+1 & -3-3\end{bmatrix}=\begin{bmatrix}-11 & 8\\b & -6\end{bmatrix}$

Maka/*Thus*,

$7-\frac{1}{5}a=8$
$-\frac{1}{5}a=1$
$a=-5$

$b=2+1$
$b=3$

3 $\begin{bmatrix}2+6 & 3+3b\\-a+2 & 6+4\end{bmatrix}=\begin{bmatrix}8 & 12\\-7 & 10\end{bmatrix}$

Maka/*Thus*,

$3+3b=12$
$3b=9$
$b=3$

$-a+2=-7$
$-a=-9$
$a=9$

4 $\begin{bmatrix}-6\\4a\\-6b\end{bmatrix}-\begin{bmatrix}8\\-4\\-8b\end{bmatrix}=\begin{bmatrix}-14\\-4a\\8\end{bmatrix}$

Maka/*Thus*,

$4a+4=-4a$
$4a+4a=-4$
$8a=-4$
$a=-\frac{1}{2}$

$-6b+8b=8$
$2b=8$
$b=4$

G

	Peringkat matriks *Order of matrix*		Adakah *AB* wujud? *Does AB exist?*	Peringkat *AB* *Order of AB*
	A	*B*		
1	2 × 2	2 × 1	Ya/*Yes*	2 × 1
2	1 × 2	2 × 2	Ya/*Yes*	1 × 2
3	2 × 1	2 × 1	Tidak/*No*	–
4	1 × 3	1 × 2	Tidak/*No*	–
5	2 × 2	2 × 3	Ya/*Yes*	2 × 3

H

1 $[(4\times2)+(3\times4)]=(8+12)$
$=20$

2 $[(-5\times4)+(1\times7)]=(-20+7)$
$=-13$

3 $\begin{bmatrix}3\times1 & 3\times7\\-5\times1 & -5\times7\end{bmatrix}=\begin{bmatrix}3 & 21\\-5 & -35\end{bmatrix}$

4 $\begin{bmatrix}4\times2 & 4\times-3\\-2\times2 & -2\times(-3)\end{bmatrix}=\begin{bmatrix}8 & -12\\-4 & 6\end{bmatrix}$

5 $\begin{bmatrix}(2\times-1)+(1\times2)\\(4\times-1)+(0\times2)\end{bmatrix}=\begin{bmatrix}(-2+2)\\(-4)+0\end{bmatrix}$
$=\begin{bmatrix}0\\-4\end{bmatrix}$

6 $\begin{bmatrix}(2\times(-3)+(4\times2)\\[(-3)\times(-3)]+(1\times2)\end{bmatrix}=\begin{bmatrix}-6+8\\9+2\end{bmatrix}$
$=\begin{bmatrix}2\\11\end{bmatrix}$

7 $[(1\times1)+(3\times3)\quad(1\times2)+(3\times4)]$
$=[1+9\quad 2+12]$
$=[10\quad 14]$

8 $[-3+12\quad 0+(-4)]=[9\quad -4]$

9 $[0+4\quad 10+12]=[4\quad 22]$

10 $\begin{bmatrix}1 & 3\\2 & 4\end{bmatrix}\begin{bmatrix}-1 & 5\\-3 & 2\end{bmatrix}=\begin{bmatrix}-1+(-9) & 5+6\\-2+(-12) & 10+8\end{bmatrix}$
$=\begin{bmatrix}-10 & 11\\-14 & 18\end{bmatrix}$

11 $\begin{bmatrix}0+(-6) & 0+(-2)\\10+18 & -2+6\end{bmatrix}=\begin{bmatrix}-6 & -2\\28 & 4\end{bmatrix}$

12 $\begin{bmatrix}-2+(-6) & -6+15\\1+(-8) & 3+20\end{bmatrix}=\begin{bmatrix}-8 & 9\\-7 & 23\end{bmatrix}$

I

1 $\begin{bmatrix}4x-3\\8-y\end{bmatrix}=\begin{bmatrix}8\\5\end{bmatrix}$

Maka/*Thus*,

$4x-3=8$
$4x=11$
$x=\frac{11}{4}$

$8-y=5$
$-y=5-8$
$-y=-3$
$y=3$

2 $[3x-6x\quad xy+6]=[24\quad -6]$

Maka/*Thus*,

$3x-6x=24$
$-3x=24$
$x=-8$

$xy+6=-6$
$(-8)y=-6-6$
$-8y=-12$
$y=\frac{12}{8}$ atau/*or* $\frac{3}{2}$

3 $\begin{bmatrix}3+0 & 6+1\\-1+0 & -2+x\end{bmatrix}=\begin{bmatrix}y & 7\\-1 & 4\end{bmatrix}$

Maka/*Thus*,

$y=3$

$-2+x=4$
$x=4+2$
$x=6$

J

1 segi empat sama/*square matrix*

2 0 dan/*and* 1

3 $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}\begin{bmatrix}1 & 0 & 0\\0 & 1 & 0\\0 & 0 & 1\end{bmatrix}$

K

1 $\begin{bmatrix}-4 & 0\\2 & -5\end{bmatrix}$

2 $\begin{bmatrix}5 & -7\\2 & 4\\-1 & 3\end{bmatrix}$

L

	AB	*BA*	Ya/Tidak *Yes/No*
1	$\begin{bmatrix}2 & 0\\0 & 2\end{bmatrix}$	$\begin{bmatrix}2 & 0\\0 & 2\end{bmatrix}$	Tidak *No*
2	$\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$	$\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$	Ya *Yes*

M

1 Katakan/*Let* $A^{-1}=\begin{bmatrix}a & b\\c & d\end{bmatrix}$

$AA^{-1}=I$

$\begin{bmatrix}4 & 1\\3 & 1\end{bmatrix}\begin{bmatrix}a & b\\c & d\end{bmatrix}=\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$

$\begin{bmatrix}4a+c & 4b+d\\3a+c & 3b+d\end{bmatrix}=\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$

$4a+c=1$ ····· ①
$3a+c=0$ ····· ②

$4b+d=0$ ····· ③
$3b+d=1$ ····· ④

① – ② : $a=1$
Gantikan $a=1$ ke dalam ①,
Substitute $a=1$ *into* ①,

$4(1)+c=1$
$4+c=1$
$c=1-4$
$c=-3$

③ – ④ : $b=-1$
Gantikan $b=-1$ ke dalam ③,
Substitute $b=-1$ *into* ③,

$4(-1)+d=0$
$-4+d=0$
$d=4$

Maka/*Thus*, $A^{-1}=\begin{bmatrix}1 & -1\\-3 & 4\end{bmatrix}$

2 Katakan/*Let*, $B^{-1} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

$$\begin{bmatrix} 4 & -8 \\ 2 & -6 \end{bmatrix}\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 4a - 8c & 4b - 8d \\ 2a - 6c & 2b - 6d \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$4a - 8c = 1$ ..... ①
$2a - 6c = 0$ ..... ② × 2
$4a - 12c = 0$ ..... ③

$4b - 8d = 0$ ..... ④
$2b - 6d = 1$ ..... ⑤ × 2
$4b - 12d = 2$ ..... ⑥

① – ③ : $4c = 1$

$$c = \frac{1}{4}$$

Gantikan $c = \frac{1}{4}$ ke dalam ①,

Substitute $c = \frac{1}{4}$ *into* ①,

$$4a - 8\left[\frac{1}{4}\right] = 1$$
$$4a - 2 = 1$$
$$4a = 3$$
$$a = \frac{3}{4}$$

④ – ⑥ : $4d = -2$

$$d = -\frac{1}{2}$$

Gantikan $d = -\frac{1}{2}$ ke dalam ④,

Substitute $d = -\frac{1}{2}$ *into* ④,

$$4b - 8\left[-\frac{1}{2}\right] = 0$$
$$4b + 4 = 0$$
$$4b = -4$$
$$b = -1$$

Maka/*Thus*,

$$B^{-1} = \begin{bmatrix} \frac{3}{4} & -1 \\ \frac{1}{4} & -\frac{1}{2} \end{bmatrix}$$

N

1 $M^{-1} = \frac{1}{(1 \times 6) - [-3 \times (-4)]}\begin{bmatrix} 6 & 4 \\ 3 & 1 \end{bmatrix}$

$$= \frac{1}{6 - 12}\begin{bmatrix} 6 & 4 \\ 3 & 1 \end{bmatrix}$$
$$= -\frac{1}{6}\begin{bmatrix} 6 & 4 \\ 3 & 1 \end{bmatrix}$$
$$= \begin{bmatrix} -1 & -\frac{2}{3} \\ -\frac{1}{2} & -\frac{1}{6} \end{bmatrix}$$

2 $J^{-1} = \frac{1}{[(5 \times -4) - (3 \times -7)]}\begin{bmatrix} -4 & 7 \\ -3 & 5 \end{bmatrix}$

$$= \frac{1}{-20 + 21}\begin{bmatrix} -4 & 7 \\ -3 & 5 \end{bmatrix}$$
$$= 1\begin{bmatrix} -4 & 7 \\ -3 & 5 \end{bmatrix} = \begin{bmatrix} -4 & 7 \\ -3 & 5 \end{bmatrix}$$

3 $K^{-1} = \frac{1}{[(3 \times 2) - (1 \times -2)]}\begin{bmatrix} 2 & 2 \\ -1 & 3 \end{bmatrix}$

$$= \frac{1}{6 - (-2)}\begin{bmatrix} 2 & 2 \\ -1 & 3 \end{bmatrix}$$
$$= \frac{1}{8}\begin{bmatrix} 2 & 2 \\ -1 & 3 \end{bmatrix}$$
$$= \begin{bmatrix} \frac{1}{4} & \frac{1}{4} \\ -\frac{1}{8} & \frac{3}{8} \end{bmatrix}$$

O

1 $-6 - 5(2 - m) = 0$
$-6 - 10 + 5m = 0$
$-16 + 5m = 0$
$5m = 16$
$m = \frac{16}{5}$

2 $24 + 6m = 0$
$6m = -24$
$m = -4$

3 $2m - 12 = 0$
$2m = 12$
$m = 6$

P

1 $\begin{bmatrix} 2 & -2 \\ 4 & -3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 6 \\ -2 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-6 - (-8)}\begin{bmatrix} -3 & 2 \\ -4 & 2 \end{bmatrix}\begin{bmatrix} 6 \\ -2 \end{bmatrix}$$
$$= \frac{1}{2}\begin{bmatrix} -18 + (-4) \\ -24 + (-4) \end{bmatrix}$$
$$= \frac{1}{2}\begin{bmatrix} -22 \\ -28 \end{bmatrix}$$
$$= \begin{bmatrix} -11 \\ -14 \end{bmatrix}$$

Maka/*Thus*, $x = -11$, $y = -14$

2 $\begin{bmatrix} 5 & 4 \\ 3 & -6 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 12 \\ 24 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-30 - 12}\begin{bmatrix} -6 & -4 \\ -3 & 5 \end{bmatrix}\begin{bmatrix} 12 \\ 24 \end{bmatrix}$$
$$= -\frac{1}{42}\begin{bmatrix} -72 - 96 \\ -36 + 120 \end{bmatrix}$$
$$= -\frac{1}{42}\begin{bmatrix} -168 \\ 84 \end{bmatrix}$$
$$= \begin{bmatrix} 4 \\ -2 \end{bmatrix}$$

Maka/*Thus*, $x = 4$, $y = -2$

3 $\begin{bmatrix} 3 & -1 \\ 4 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-6 - (-4)}\begin{bmatrix} -2 & 1 \\ -4 & 3 \end{bmatrix}\begin{bmatrix} 1 \\ -2 \end{bmatrix}$$
$$= -\frac{1}{2}\begin{bmatrix} -2 - 2 \\ -4 - 6 \end{bmatrix}$$
$$= -\frac{1}{2}\begin{bmatrix} -4 \\ -10 \end{bmatrix}$$
$$= \begin{bmatrix} 2 \\ 5 \end{bmatrix}$$

Maka/*Thus*, $x = 2$, $y = 5$

Q

1 (*a*) Matriks songsang bagi $\begin{bmatrix} 2 & 5 \\ 1 & 2 \end{bmatrix}$

Inverse matrix of

$$= \frac{1}{4 - 5}\begin{bmatrix} 2 & -5 \\ -1 & 2 \end{bmatrix}$$
$$= -\frac{1}{1}\begin{bmatrix} 2 & -5 \\ -1 & 2 \end{bmatrix}$$

Maka/*Thus*, $m = -1$, $n = -5$

(*b*) $\begin{bmatrix} 2 & 5 \\ 1 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -3 \\ 5 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{4 - 5}\begin{bmatrix} 2 & -5 \\ -1 & 2 \end{bmatrix}\begin{bmatrix} -3 \\ 5 \end{bmatrix}$$
$$= -1\begin{bmatrix} -6 + (-25) \\ 3 + 10 \end{bmatrix}$$
$$= -1\begin{bmatrix} -31 \\ 13 \end{bmatrix}$$
$$= \begin{bmatrix} 31 \\ -13 \end{bmatrix}$$

Maka/*Thus*, $x = 31$, $y = -13$

2 (*a*) $6 - 5k = 0$
$-5k = -6$
$k = \frac{6}{5}$

(*b*) $A = \begin{bmatrix} 3 & 2 \\ 5 & 2 \end{bmatrix}$

$$A^{-1} = \frac{1}{6 - 10}\begin{bmatrix} 2 & -2 \\ -5 & 3 \end{bmatrix}$$
$$= -\frac{1}{4}\begin{bmatrix} 2 & -2 \\ -5 & 3 \end{bmatrix}$$
$$= \begin{bmatrix} -\frac{1}{2} & \frac{1}{2} \\ \frac{5}{4} & -\frac{3}{4} \end{bmatrix}$$

(*c*) $\begin{bmatrix} 3 & 2 \\ 5 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -12 \\ 10 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{6 - 10}\begin{bmatrix} 2 & -2 \\ -5 & 3 \end{bmatrix}\begin{bmatrix} -12 \\ 10 \end{bmatrix}$$
$$= -\frac{1}{4}\begin{bmatrix} -24 + (-20) \\ 60 + 30 \end{bmatrix}$$
$$= -\frac{1}{4}\begin{bmatrix} -44 \\ 90 \end{bmatrix}$$
$$= \begin{bmatrix} 11 \\ -\frac{45}{2} \end{bmatrix}$$

R

1 (*a*) $x + y = 46.50$
$2x + 3y = 120 - 6$
$2x + 3y = 114$

(*b*) $\begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 46.50 \\ 114.00 \end{bmatrix}$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{3 - 2}\begin{bmatrix} 3 & -1 \\ -2 & 1 \end{bmatrix}\begin{bmatrix} 46.50 \\ 114.00 \end{bmatrix}$$
$$= 1\begin{bmatrix} 139.50 - 114.00 \\ -93 + 114.00 \end{bmatrix}$$
$$= \begin{bmatrix} 25.50 \\ 21.00 \end{bmatrix}$$

Maka, harga bagi sebuah buku rujukan matematik ialah RM25.50 dan sebuah buku rujukan fizik ialah RM21.

Thus, the price for the mathematics reference book is RM25.50 *and the physics reference book is* RM21.

2 $35x + 5y = 340$
$37x + 15y = 340$

(*a*)
$$\begin{bmatrix} 35 & 5 \\ 37 & 15 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 340 \\ 340 \end{bmatrix}$$
$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{525 - 185}\begin{bmatrix} 15 & -5 \\ -37 & 35 \end{bmatrix}\begin{bmatrix} 340 \\ 340 \end{bmatrix}$$
$$= \frac{1}{340}\begin{bmatrix} 5\,100 - 1\,700 \\ -12\,580 + 11\,900 \end{bmatrix}$$
$$= \frac{1}{340}\begin{bmatrix} 3\,400 \\ -680 \end{bmatrix}$$
$$= \begin{bmatrix} 10 \\ -2 \end{bmatrix}$$

Maka/*Thus*, $x = 10$, $y = -2$

(*b*) Pasukan Ibnu Sina/*Ibnu Sina's team*:
$7x + 2y = 7(10) + 2(-2)$
$= 70 - 4$
$= 66$

Pasukan Al-Ghazali/*Al-Ghazali's team*:
$8x + 6y = 8(10) + 6(-2)$
$= 80 - 12$
$= 68$

Pasukan Al-Ghazali yang memenangi pertandingan kuiz matematik tersebut.
Al-Ghazali's team that won the mathematics quiz competition.

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

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

Kertas 2/*Paper 2*

1 (*a*) $\frac{1}{21 - 32}\begin{pmatrix} 7 & -4 \\ -8 & 3 \end{pmatrix} = -\frac{1}{11}\begin{pmatrix} 7 & -4 \\ -8 & 3 \end{pmatrix}$

(*b*) $3x + 2y = 81.00$
$2x + y = 51.50$
$$\begin{pmatrix} 3 & 2 \\ 2 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 81.00 \\ 51.50 \end{pmatrix}$$
$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{3 - 4}\begin{pmatrix} 1 & -2 \\ -2 & 3 \end{pmatrix}\begin{pmatrix} 81.00 \\ 51.50 \end{pmatrix}$$
$$= -1\begin{pmatrix} 81.00 - 103.00 \\ -162.00 + 154.50 \end{pmatrix}$$
$$= -1\begin{pmatrix} -22.00 \\ -7.50 \end{pmatrix}$$
$$= \begin{pmatrix} 22.00 \\ 7.50 \end{pmatrix}$$

Maka, harga daging ialah RM22 sekilogram dan ikan ialah RM7.50 sekilogram.
Hence, the price of meat is RM22 *per kilogram and fish is* RM7.50 *per kilogram.*

2 (*a*) p = piza/*pizza*, c = kek cawan/*cupcake*

$3p + 6c = 45$ ····· ①
$7p = 45 + c$
$7p - c = 45$ ····· ②

$$\begin{bmatrix} 3 & 6 \\ 7 & -1 \end{bmatrix}\begin{bmatrix} p \\ c \end{bmatrix} = \begin{bmatrix} 45 \\ 45 \end{bmatrix}$$
$$\begin{bmatrix} p \\ c \end{bmatrix} = \frac{1}{3(-1) - 6(7)}\begin{bmatrix} -1 & -6 \\ -7 & 3 \end{bmatrix}\begin{bmatrix} 45 \\ 45 \end{bmatrix}$$
$$= \frac{1}{-45}\begin{bmatrix} -1(45) + (-6)(45) \\ -7(45) + 3(45) \end{bmatrix}$$
$$= \frac{1}{-45}\begin{bmatrix} -315 \\ -180 \end{bmatrix}$$
$$= \begin{bmatrix} 7 \\ 4 \end{bmatrix}$$

$p = 7$, $c = 4$

(*b*) Baucar ketiga/*Third voucher*
$= 125 - 45 - 45$
$= 35$
$$4p + 2c = (4 \quad 2)\begin{pmatrix} p \\ c \end{pmatrix}$$
$$= (4 \quad 2)\begin{pmatrix} 7 \\ 4 \end{pmatrix}$$
$$= 4(7) + 2(4)$$
$$= 36$$

Nilai belian ialah RM36 manakala nilai baucar ialah RM35.
The purchase value is RM36 *while the voucher value is* RM35.

∴ Nilai baucar tidak mencukupi.
Voucher value is insufficient.

UNIT 3

SK 3.1

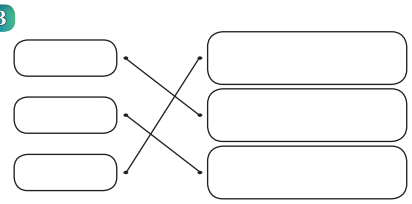
A

1 Risiko ialah kemungkinan berlakunya musibah yang tidak dapat dielakkan.
Risk is the possibility of an unavoidable disaster.

2 – Mengalami kemalangan ketika dalam perjalanan pergi ke sekolah.
Having an accident on the way to school.
– Mengalami kecederaan semasa dalam perlawanan bola sepak.
Injured during a football match.
– Terjatuh di tangga semasa dalam perjalanan ke perpustakaan sekolah.
Fell down the stairs on the way to the school library.
* Terima mana-mana jawapan yang munasabah.
Accept any reasonable answers.

B

1
2
3



C

1 Berdasarkan jadual, kadar premium ialah RM2.19.
Based on the table, the premium rate is RM2.19.

Premium tahunan/*Annual premium*
$= \frac{\text{RM95 000}}{\text{RM1 000}} \times \text{RM2.19}$
$=$ RM208.05

2 Berdasarkan jadual, kadar premium ialah RM1.81.
Based on the table, the premium rate is RM1.81.

Premium tahunan/*Annual premium*
$= \frac{\text{RM100 000}}{\text{RM1 000}} \times \text{RM1.81}$
$=$ RM181

3 Berdasarkan jadual, kadar premium ialah RM2.72.
Based on the table, the premium rate is RM2.72.
Premium tahunan/*Annual premium*
$= \frac{\text{RM50 000}}{\text{RM1 000}} \times \text{RM2.72}$
$=$ RM136

4 Berdasarkan jadual, kadar premium ialah RM2.15.
Based on the table, the premium rate is RM2.15.

Premium tahunan/*Annual premium*
$= \frac{\text{RM250 000}}{\text{RM1 000}} \times 2.15$
$=$ RM537.50

D

1 **Bagi polisi komprehensif:**
***For comprehensive policy*:**

RM1 000 yang pertama = RM305.50
The first RM1 000

$\frac{90\,000 - 1\,000}{1\,000} = 89$
RM26 × 89 = RM2 314

Premium asas/*Basic premium*
= RM305.50 + RM2 314
= RM2 619.50

NCD $= \frac{30}{100} \times$ RM2 619.50
$=$ RM785.85

Premium kasar/*Gross premium*
= RM2 619.50 – RM785.85
= RM1 833.65

Bagi polisi pihak ketiga, kebakaran dan kecurian:
***For third party, fire and theft policy*:**

Premium asas/*Basic premium*
$= \frac{70}{100} \times$ RM2 619.50
$=$ RM1 833.65

NCD = $\frac{30}{100}$ × RM1 833.65
= RM550.10

Premium kasar/*Gross premium*
= RM1 833.65 – RM550.10
= RM1 283.55

Bagi polisi pihak ketiga:
***For third party policy*:**

Premium asas/*Basic premium* = RM135

NCD = $\frac{30}{100}$ × RM135
= RM40.50

Premium kasar/*Gross premium*
= RM135 – RM40.50
= RM94.50

2 Bagi polisi komprehensif:
***For comprehensive policy*:**

RM1 000 yang pertama = RM196.20
The first RM1 000

$\frac{54\,000 - 1\,000}{1\,000}$ = 53

RM20.30 × 53 = RM1 075.90

Premium asas/*Basic premium*
= RM196.20 + RM1 075.90
= RM1 272.10

NCD = $\frac{45}{100}$ × RM1 272.10
= RM572.45

Premium kasar/*Gross premium*
= RM1 272.10 – RM572.45
= RM699.65

Bagi polisi pihak ketiga, kebakaran dan kecurian:
***For third party, fire and theft policy*:**

Premium asas/*Basic premium*
= $\frac{55}{100}$ × RM1 272.10
= RM699.66

NCD = $\frac{45}{100}$ × RM699.66
= RM314.85

Premium kasar/*Gross premium*
= RM699.66 – RM314.85
= RM384.81

Bagi polisi pihak ketiga:
***For third party policy*:**

Premium asas/*Basic premium* = RM67.50

NCD = $\frac{45}{100}$ × RM67.50
= RM30.38

Premium kasar/*Gross premium*
= RM67.50 – RM30.38
= RM37.12

3 Bagi polisi komprehensif:
***For comprehensive policy*:**

RM1 000 yang pertama = RM339.10
The first RM1 000

$\frac{150\,000 - 1\,000}{1\,000}$ = 149

RM26 × 149 = RM3 874

Premium asas/*Basic premium*
= RM339.10 + RM3 874
= RM4 213.10

NCD = $\frac{55}{100}$ × RM4 213.10
= RM2 317.21

Premium kasar/*Gross premium*
= RM4 213.10 – RM2 317.21
= RM1 895.89

Bagi polisi pihak ketiga, kebakaran dan kecurian:
***For third party, fire and theft policy*:**

Premium asas/*Basic premium*
= $\frac{45}{100}$ × RM4 213.10
= RM1 895.90

NCD = $\frac{55}{100}$ × RM1 895.90
= RM1 042.75

Premium kasar/*Gross premium*
= RM1 895.90 – RM1 042.75
= RM853.15

Bagi polisi pihak ketiga:
***For third party policy*:**

Premium asas/*Basic premium* = RM151.20

NCD = $\frac{45}{100}$ × RM151.20
= RM68.04

Premium kasar/*Gross premium*
= RM151.20 – RM68.04
= RM83.16

4 Bagi polisi komprehensif:
***For comprehensive policy*:**

RM1 000 yang pertama = RM273.80
The first RM1 000

$\frac{18\,000 - 1\,000}{1\,000}$ = 17

RM26 × 17 = RM442

Premium asas/*Basic premium*
= RM273.80 + RM442
= RM715.80

NCD = $\frac{25}{100}$ × RM715.80
= RM178.95

Premium kasar/*Gross premium*
= RM715.80 – RM178.95
= RM536.85

Bagi polisi pihak ketiga, kebakaran dan kecurian:
***For third party, fire and theft policy*:**

Premium asas/*Basic premium*
= $\frac{75}{100}$ × RM715.80
= RM536.85

NCD = $\frac{25}{100}$ × RM536.85
= RM134.21

Premium kasar/*Gross premium*
= RM536.85 – RM134.21
= RM402.64

Bagi polisi pihak ketiga:
***For third party policy*:**

Premium asas/*Basic premium* = RM120.60

NCD = $\frac{25}{100}$ × RM120.60
= RM30.15

Premium kasar/*Gross premium*
= RM120.60 – RM30.15
= RM90.45

E

1 Kerugian/*Loss* = RM600

Bayaran pampasan yang boleh dituntut
Claimable amount of compensation
= RM600 – RM400
= RM200

2 Kerugian/*Loss* = RM150

Bayaran pampasan yang boleh dituntut = Jumlah kerugian kurang daripada amaun deduktibel. Maka, tuntutan tidak boleh dibuat.
Claimable amount of compensation = The amount of the loss is less than the deductible amount. Hence, a claim cannot be made for this loss.

3 Kerugian/*Loss* = RM1 500

Bayaran pampasan yang boleh dituntut
Claimable amount of compensation
= RM1 500 – RM400
= RM1 100

F

1 Kos rawatan/*Treatment cost* = RM2 500

Jumlah yang perlu ditanggung oleh Wang Lee
Amount covered by Wang Lee
= RM500
Jumlah yang perlu dibayar oleh syarikat insurans
Amount paid by the insurance company
= RM2 500 – RM500
= RM2 000

2 Kos rawatan/*Treatment cost* = RM1 350

Jumlah yang perlu ditanggung oleh Puan Rama/*Amount covered by Madam Rama*
= RM1 350

Jumlah yang perlu dibayar oleh syarikat insurans = tiada kerana kos rawatan adalah kurang daripada nilai deduktibel.
Amount paid by the insurance company = none because the treatment cost is less than the deductible amount.

3 Kos rawatan/*Treatment cost* = RM12 000

Jumlah yang perlu ditanggung oleh Encik Ahmad/*Amount covered by Encik Ahmad*
= RM8 500

Jumlah yang perlu dibayar oleh syarikat insurans
Amount paid by the insurance company
= RM12 000 – RM8 500
= RM3 500

4 Kos rawatan/*Treatment cost* = RM850

Jumlah yang perlu ditanggung oleh Thiyya
Amount covered by Thiyya
= RM850

Jumlah yang perlu dibayar oleh syarikat insurans = tiada kerana kos rawatan adalah kurang daripada nilai deduktibel.
Amount paid by the insurance company = none because the treatment cost is less than the deductible amount.

G

1 (*a*) Jumlah insurans yang harus dibeli
Amount of insurance required
$= \frac{70}{100} \times$ RM25 800
= RM18 060

(*b*) Bayaran pampasan
Amount of compensation
= RM18 060 – RM1 500
= RM16 560

2 (*a*) Jumlah insurans yang harus dibeli
Amount of insurance required
$= \frac{65}{100} \times$ RM35 000
= RM22 750

(*b*) Bayaran pampasan
Amount of compensation
= RM22 750 – RM1 300
= RM21 450

3 (*a*) Jumlah insurans yang harus dibeli
Amount of insurance required
$= \frac{85}{100} \times$ RM100 000
= RM85 000

(*b*) RM75 000 < RM85 000

Bayaran pampasan
Amount of compensation
$= \frac{75\,000}{85\,000} \times$ RM6 500 – RM2 000
= RM3 735.29

Penalti ko-insurans
Co-insurance penalty
= RM6 500 – RM5 735.29
= RM764.71

H

1 Kos perubatan selepas deduktibel
Medical cost after deductible
= RM20 000 – RM350
= RM19 650

Kos yang ditanggung oleh syarikat insurans
The cost borne by the insurance company
$= \frac{80}{100} \times$ RM19 650
= RM15 720

Kos yang ditanggung oleh Encik Aizat
The cost borne by Encik Aizat
$= \left(\frac{20}{100} \times \text{RM19 650}\right) + \text{RM350}$
= RM4 280

2 Kos perubatan selepas deduktibel
Medical cost after deductible
= RM18 000 – RM1 000
= RM17 000

Kos yang ditanggung oleh syarikat insurans
The cost borne by the insurance company
$= \frac{75}{100} \times$ RM17 000
= RM12 750

Kos yang ditanggung oleh Suhaila
The cost borne by Suhaila
$= \left(\frac{25}{100} \times \text{RM17 000}\right) + \text{RM1 000}$
= RM5 250

3 Kos perubatan selepas deduktibel
Medical cost after deductible
= RM32 000 – RM500
= RM31 500

Kos yang ditanggung oleh syarikat insurans
The cost borne by the insurance company
$= \frac{65}{100} \times$ RM31 500
= RM20 475

Kos yang ditanggung oleh Hannah
The cost borne by Hannah
$= \left(\frac{35}{100} \times \text{RM31 500}\right) + \text{RM500}$
= RM11 525

4 Kos perubatan selepas deduktibel
Medical cost after deductible
= RM17 500 – RM850
= RM16 650

Kos yang ditanggung oleh syarikat insurans
The cost borne by the insurance company
$= \frac{75}{100} \times$ RM16 650
= RM12 487.50

Kos yang ditanggung oleh Encik Ramamoorthy
The cost borne by Encik Ramamoorthy
$= \left(\frac{25}{100} \times \text{RM16 650}\right) + \text{RM850}$
= RM5 012.50

I

1 Pelan polisi Syarikat *A* adalah lebih baik kerana premium tahunan bagi Syarikat *A* adalah lebih kecil berbanding dengan Syarikat *B*. Selain itu, faedah yang ditawarkan juga adalah lebih baik dari segi tempoh perlindungan, iaitu sepanjang tahun bagi bilik hospital dan makanan.
Company A policy plan is better because the annual premium for Company A is smaller than that of Company B. In addition, the benefits offered are also better in terms of the period of coverage, i.e. throughout the year for hospital rooms and food.

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

1 D **2** D

Kertas 2/*Paper 2*

1 (*a*) Jumlah insurans yang harus dibeli
Amount of insurance required
$= \frac{80}{100} \times$ RM500 000
= RM400 000

(*b*) Bayaran pampasan
Amount of compensation
= RM180 000 – RM2 000
= RM178 000

2 Kos perubatan selepas deduktibel
Medical cost after deductible
= RM18 500 – RM950
= RM17 550

Kos yang ditanggung oleh syarikat insurans
The cost borne by the insurance company
$= \frac{75}{100} \times$ RM17 550
= RM13 162.50

Kos yang ditanggung oleh Sulaiman
The cost borne by Sulaiman
$= \left(\frac{25}{100} \times \text{RM17 550}\right) + \text{RM950}$
= RM5 337.50

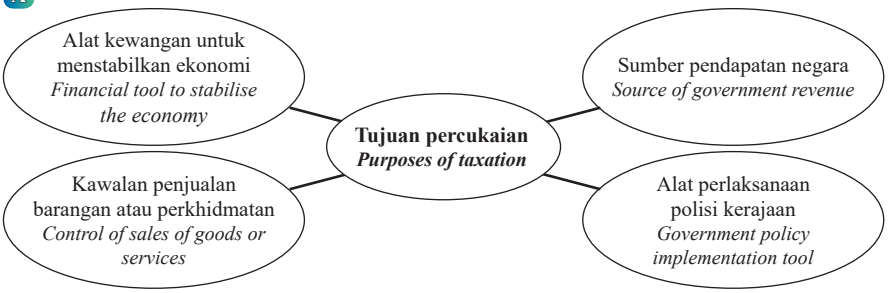
3 Kos perubatan selepas deduktibel
Medical cost after deductible
= 27 000 – 2 000
= RM25 000

Kos yang ditanggung oleh Athar
Cost borne by Athar
$= \frac{10}{100} \times$ RM25 000 + 2 000
= RM4 500

UNIT 4

SK 4.1

A



B

1 Cukai pintu/*Property assessment tax*
2 Cukai pendapatan/*Income tax*
3 Cukai tanah/*Quit rent*
4 Cukai jalan/*Road tax*
5 Cukai jualan/*Sales tax*
6 Cukai perkhidmatan/*Service tax*

C

1 Taksir sendiri/*Self-assessment*
(*a*) 2020
(*b*) 30 April
(*c*) 30 Jun/*June*

2 Simpan rekod/*Keep records*
(*a*) 7 tahun/7 *years*

3 Bayaran/*Payment*
(*a*) Lembaga Hasil Dalam Negeri (LHDN), potongan cukai bulanan (PCB)
Inland Revenue Board (IRB), *monthly tax deduction* (PCB)

D

1 Boleh didenda RM1 000 hingga RM20 000 atau penjara tidak lebih 3 tahun atau kedua-duanya dan penalti 300% atas cukai terkurang lapor.
Fine of RM1 000 *up to* RM20 000 *or imprisonment of not exceeding* 3 *years or both and penalty of* 300% *of the amount of tax which has been undercharged.*

2 Boleh didenda tidak melebihi RM2 000.
Fine of not exceeding RM2 000.

3 Tanah boleh dirampas atau dilucut hak.
The land can be seized.

E

1 Pendapatan bercukai/*Chargeable income*
= Jumlah pendapatan tahunan/*Total annual income* – pengecualian cukai/*tax exemption* – pelepasan cukai/*tax relief*
= RM95 400 − RM2 300 − RM11 200
= RM81 900

2 Pendapatan bercukai/*Chargeable income*
= Jumlah pendapatan tahunan/*Total annual income* – pengecualian cukai/*tax exemption* – pelepasan cukai/*tax relief*
= RM78 000 − RM7 500 − RM12 500
= RM58 000

3 Pendapatan bercukai/*Chargeable income*
= Jumlah pendapatan tahunan/*Total annual income* – pelepasan cukai/*tax relief*
= RM113 500 − (RM9 000 + RM6 850 + RM2 300)
= RM113 500 − RM18 150
= RM95 350

F

1 Cukai bagi 100 000 pertama = RM10 900
Tax on the first 100 000

Cukai atas baki berikutnya
Tax on the next balance
= (RM105 200 − RM100 000) × 24%
= RM1 248

Cukai pendapatan/*Income tax*
= RM10 900 + RM1 248
= RM12 148

2 Cukai bagi RM50 000 pertama = RM1 800
Tax on the first RM50 000

Cukai atas baki berikutnya
Tax on the next balance
= (RM51 250 – RM50 000) × 14%
= RM175

Cukai pendapatan/*Income tax*
= RM1 800 + RM175 − RM1 050
= RM925

3 Cukai bagi RM35 000 pertama = RM600
Tax on the first RM35 000

Cukai atas baki berikutnya
Tax on the next balance
= (RM35 380 − RM35 000) × 8%
= RM30.40

Cukai pendapatan/*Income tax:*
RM600 + RM30.40 − RM300 = RM330.40

G

1 Pendapatan bercukai/*Chargeable income* = jumlah pendapatan/*total annual income* – pengecualian cukai/*tax exemption* – pelepasan cukai/*tax relief*
= RM52 350 − RM400 − RM18 500
= RM33 450

Cukai bagi RM20 000 pertama = RM150
Tax on the first RM20 000

Cukai atas baki berikutnya
Tax on the next balance
= (RM33 450 − RM20 000) × 3%
= RM403.50

Rebat yang layak
Eligible rebate
= RM400

Cukai pendapatan yang perlu dibayar
Income tax payable
= RM150 + RM403.50 – RM400
= RM153.50

2 Pendapatan bercukai/*Chargeable income* = jumlah pendapatan/*total income* – pelepasan cukai/*tax relief*
= RM73 210 − RM18 200
= RM55 010

Cukai bagi RM50 000 pertama = RM1 800
Tax on the first RM50 000

Cukai atas baki berikutnya
Tax the next balance
= (RM55 010 − RM50 000) × 14%
= RM701.40

Rebat yang layak (Zakat) = RM600
Eligible rebate

Cukai pendapatan yang perlu dibayar
Income tax payable
= RM1 800 + RM701.40 − RM600
= RM1 901.40

Jumlah PCB yang dipotong
Total PCB *deduction*
= RM250 × 12
= RM3 000

Cukai yang perlu dibayar < PCB
Tax payable < PCB

Lebihan potongan
Excess deduction
= RM3 000 − RM1 901.40
= RM1 098.60

Maka, lebihan potongan PCB akan dipulangkan oleh LHDN ke dalam akaun bank Puan Ramlah sebanyak RM1 098.60.
Then, excess deduction of PCB *will be refunded by* IRB *to Puan Ramlah's bank account as much as* RM1 098.60.

H

1

Perkara *Item*	Taksiran cukai bersama *Joint tax assessment*	Taksiran cukai berasingan *Separate tax assessment*	
	Suami dan isteri/*Husband and wife*	Suami/*Husband*	Isteri/*Wife*
Jumlah pendapatan/*Total income*	RM81 600 + RM66 000 = RM147 600	RM81 600	RM66 000
Jumlah pengecualian (derma) *Total exemption* (*donation*)	RM1 000	RM500	RM500
Pelepasan cukai/*Tax relief*			
Individu/*Individual*	RM9 000	RM9 000	RM9 000
Gaya hidup (Had RM2 500) *Lifestyle* (*Limited to* RM2 500)	RM2 500	RM2 500	RM2 500
Insurans hayat (Had RM7 000) *Life insurance* (*Limited to* RM7 000)	RM7 000	RM4 500	RM3 800
Insurans perubatan (Had RM3 000) *Medical insurance* (*Limited to* RM3 000)	RM3 000	RM2 500	RM1 850
Pendapatan bercukai/*Chargeable income*	RM125 100	RM62 600	RM48 350
Cukai dasar *Base tax*	RM10 900 (100 000 pertama) (*On the first* 100 000)	RM1 800 (50 000 pertama) (*On the first* 50 000)	RM600 (35 000 pertama) (*On the first* 35 000)
Cukai atas baki *Tax on the next balance*	Baki/*Balance* RM125 100 − RM100 000 = RM25 100 RM25 100 × 24% = RM6 024	Baki/*Balance* RM62 000 − RM50 000 = RM12 600 RM12 600 × 14% = RM1 764	Baki/*Balance* RM48 350 − RM35 000 = RM13 350 RM13 350 × 8% = RM1 068
Rebat cukai/*Tax rebate*	RM0	RM0	RM0
Cukai pendapatan yang perlu dibayar *Income tax payable*	RM10 900 + RM6 024 = RM16 924	RM1 800 + RM1 764 = RM3 564	RM600 + RM1 068 = RM1 668
		RM5 232	

2

Perkara *Item*	Taksiran cukai bersama *Joint tax assessment*	Taksiran cukai berasingan *Separate tax assessment*	
	Suami dan isteri/*Husband and wife*	Suami/*Husband*	Isteri/*Wife*
Jumlah pendapatan tahunan/*Annual income*	RM62 400 + RM55 000 = RM117 400	RM62 400	RM55 000
Pelepasan cukai/*Tax relief*			
Individu/*Individual*	RM9 000	RM9 000	RM9 000
Gaya hidup (Had RM2 500) *Lifestyle* (*Limited to* RM2 500)	RM2 500	RM2 200	RM2 500
Tabung bersih/*Net deposit in* SSPN (Had/*Limited to* RM8 000)	RM8 000	RM5 500	RM5 000
Insurans hayat dan KWSP (Had RM7 000) *Life insurance and EPF* (*Limited to* RM7 000)	RM7 000	RM6 600	RM5 500
Pendapatan bercukai/*Chargeable income*	RM90 900	RM39 100	RM33 000
Cukai dasar *Base tax*	RM4 600 (RM70 000 pertama) (*On the first* RM70 000)	RM600 (RM35 000 pertama) (*On the first* RM35 000)	RM150 (RM20 000 pertama) (*On the first* RM20 000)
Cukai atas baki *Tax on the next balance*	Baki/*Balance* RM90 000 − RM70 000 = RM20 900 = RM20 900 × 21% = RM4 389	Baki/*Balance* RM39 100 − RM35 000 = RM4 100 × 8% = RM328	Baki/*Balance* RM33 000 − RM20 000 = RM13 000 = RM13 000 × 3% = RM390
Rebat cukai/*Tax rebate* (zakat)	RM1 000	RM500	RM500
Cukai pendapatan yang perlu dibayar *Income tax payable*	RM4 600 + RM4 389 − RM1 000 = RM7 989	RM600 + RM328 − RM500 = RM428	RM150 + RM390 − RM500 = RM40
		RM468	

I

1 Cukai jalan motosikal/*Road tax for motorcycle* (153 cc) = RM30.00

Cukai jalan kereta/*Road tax for car* (1 650 cc)
= RM200 + (1 650 – 1 600) × RM0.40
= RM200 + RM20
= RM220

2 Jumlah cukai pintu/*Property assessment tax*
= kadar cukai pintu/*property assessment tax rate* × nilai tahunan/*annual value*
= 5% × (RM1 600 × 12)
= RM960 setahun/*per year*

3 Jumlah cukai tanah/*Quit rent* = kadar cukai tanah setiap unit keluasan/*quit rent rate per unit area* × jumlah keluasan tanah/*total land area*
= RM0.50 × 145
= RM72.50

4 Cukai perkhidmatan/*Service tax*
= RM54.50 × 6%
= RM3.27

Jumlah yang perlu dibayar/*Amount to be paid*
= RM54.50 + RM3.27
= RM57.77

J

1 (*a*) Jumlah rebat cukai/*Total tax rebate*
= RM400 + RM100
= RM500

(*b*) Pendapatan bercukai = RM33 050
Chargeable income

Cukai bagi RM20 000 pertama = RM150
Tax on the first RM20 000

Cukai atas baki berikutnya
Tax on the next balance
= (RM33 050 − RM20 000) × 3%
= RM391.50

Cukai pendapatan/*Income tax*
= RM150 + RM391.50 − RM500
= RM41.50

2 (*a*) Pendapatan bercukai/*Chargeable income*
= (RM5 100 × 12) − (RM9 000 + RM2 500 + RM4 000 + RM6 000 + RM5 300)
= RM34 400

(*b*) Pendapatan bercukai < RM 35 000, Encik Firdaus layak mendapat rebat cukai RM400.
Chargeable income < RM35 000, *Encik Firdaus eligible to receive tax rebate* RM400.

Jumlah rebat cukai/*Total tax rebate*
= RM400 + RM150
= RM550

(*c*) Cukai dasar/*Base tax* = RM150

Cukai atas baki/*Tax on the next balance*
= (RM34 400 − RM20 000) × 3%
= RM432

Cukai pendapatan/*Income tax*
= RM150 + RM432 − RM550
= RM32

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

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

Kertas 2/*Paper 2*

1 (*a*) Cukai dasar/*Base tax* = RM150

Cukai atas baki/*Tax on the next balance*
= (RM33 000 − RM20 000) × 3%
= RM390

Cukai pendapatan/*Income tax*
= RM150 + RM390 − RM100 − RM400
= RM40

(*b*) Pendapatan bercukai < RM35 000, Encik Salman layak diperolehi Encik Salman mendapat rebat cukai RM400.
Chargeable income < RM35 000, *Encik Salman eligible to receive tax rebate* RM400.

Jumlah rebat yang layak diperolehi Encik Salman ialah RM500.
Tax rebate obtained by Encik Salman is RM500.

(*c*) Ya, lebihan cukai yang telah dibayar Encik Salman ialah (RM768 − RM40) = RM728
Yes, excess tax has been paid by Encik Salman is (RM768 − RM40) = RM728

2 Cukai pendapatan/*Income tax* = cukai dasar/ *base tax* + cukai atas baki/*tax on the next balance*

$$5\,314 = 4\,600 + (X - 70\,000) \times 0.21$$

$$X - 70\,000 = \frac{5\,314 - 4\,600}{0.21}$$

$$X - 70\,000 = \text{RM}3\,400$$

$$X = \text{RM}73\,400$$

3 Gaji/*Salary* = RM56 000

Derma/*Donation* = RM200

Pendapatan bercukai/*Chargeable income*
= 56 000 – 200 – 9 000 – 1 800 – 3 000
= RM42 000

UNIT 5

SK 5.1

A

1 Bukan kongruen. Saiz dan bentuk adalah berbeza.
Not congruent. The size and shape are different.

2 Kongruen. Saiz dan bentuk adalah sama.
Congruent. The size and shape are same.

3 Kongruen. Saiz dan bentuk adalah sama.
Congruent. The size and shape are same.

4 Bukan kongruen. Saiz adalah berbeza.
Not congruent. The size is different.

5 Bukan kongruen. Saiz dan bentuk adalah berbeza.
Not congruent. The size and shape are different.

6 Kongruen. Saiz dan bentuk adalah sama.
Congruent. The size and shape are same.

B

1 *A* dan/*and F*
2 *B* dan/*and E*
3 *C* dan/*and H*
4 *D* dan/*and G*

C

1 Sisi-Sisi-Sisi/*Side-Side-Side*
2 Sudut-Sisi-Sudut/*Angle-Side-Angle*
3 Sisi-Sudut-Sisi/*Side-Angle-Side*
4 Sudut-Sudut-Sisi/*Angle-Angle-Side*
5 Sudut-Sudut-Sudut/*Angle-Angle-Angle*
6 Sisi-Sisi-Sudut/*Side-Side-Angle*

D

1 $\angle CDE = 540° - 290° - 100° - 90° - 35°$
$= 25°$
$\angle CDE = \angle FDI = 25°$
$\angle JDE = \angle KDI = 55°$
$\angle CDF = 180° - 55° - 55° - 25° - 25°$
$= 20°$

2 Oleh kerana ΔPQR dan ΔABC adalah kongruen, maka:
Since ΔPQR *and* ΔABC *is congruent, hence*:
(*a*) $AB = PQ = 4.6$ cm
(*b*) $BC = QR = 7.8$ cm
(*c*) $\angle P = \angle A = 94°$
(*d*) $\angle C = \angle R = 36°$
(*e*) $\angle B = \angle Q = 50°$

3 (*a*) Kongruen/*Congruent*
(*b*) $180° - 35° - 35° = 110°$
$y = 360° - 110° - 110°$
$= 140°$

4 $NQ = \sqrt{6^2 + 8^2}$
$= \sqrt{100}$
$= 10$ cm

$$\tan x = \frac{6}{8}$$

$$x = 36.87°$$

5 (*a*) $6x + 5x + 4x = 180°$
$x = 12°$
$D = 6x$
$= 6(12°)$
$= 72°$

(*b*) Tidak kongruen kerana $\angle B \neq \angle D$.
Not congruent because $\angle B \neq \angle D$.

SK 5.2

A

1 $\frac{2}{6}, \frac{1}{3}, \frac{5}{15} = \frac{1}{3}, \frac{6}{18} = \frac{1}{3}$
Serupa/*Similar*

2 Jika/*If* $\Delta GHI = \Delta JKL$, maka/*hence*
$\angle G = \angle K$
$\angle I = \angle L$
$\angle H = \angle J$

$\angle H = 180° - 52° - 26°$
$= 102°$
$\angle J = 103°$
$\angle H \neq \angle J$
Tidak serupa/*Not similar*

3 $\frac{2}{8} = \frac{1}{4}, \frac{4}{16} = \frac{1}{4}$
Serupa/*Similar*

4 $\angle B = 50°$
$\angle E = \frac{180° - 80°}{2}$
$= 50°$
Serupa/*Similar*

5 $\frac{5}{10} = \frac{1}{2}, \frac{8}{24} = \frac{1}{3}$
Tidak serupa/*Not similar*

B

1 $\frac{x}{6} = \frac{15}{9}$
$x = \frac{15}{9} \times 6$
$x = 10$ cm

2 $\frac{x}{8} = \frac{16}{4}$
$x = \frac{16}{4} \times 8$
$x = 32$ cm

3 $\frac{x}{6} = \frac{10}{12}$
$x = \frac{10}{12} \times 6$
$x = 5$ cm

4 $\frac{y+5}{5} = \frac{12}{6}$
$y + 5 = 2(5)$
$y = 10 - 5$
$y = 5$

C

1 Saiz sisi/*Side ratio* $= \frac{6}{3} = \frac{4}{2} = 2$

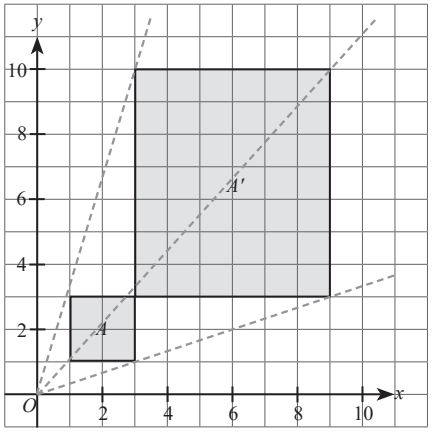
Pembesaran, kerana kedua-dua bentuk adalah serupa dan nisbah sisi sepadan adalah sama.
Enlargement, because both shapes are similar and the ratios of the corresponding sides are equal.

2 Nisbah sisi/*Side ratio* $= \frac{6}{3} \neq \frac{5}{3}$

Bukan pembesaran kerana nisbah sisi sepadan tidak sama.
Not an enlargement because the ratios of the corresponding sides are not equal.

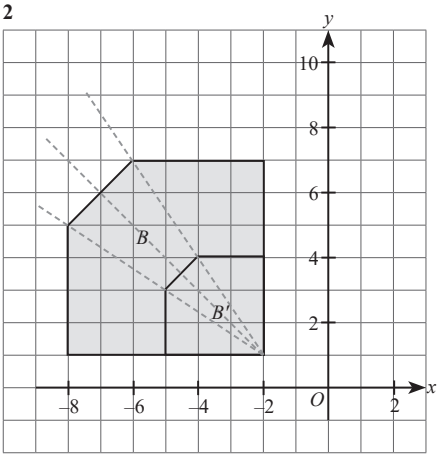
D

1



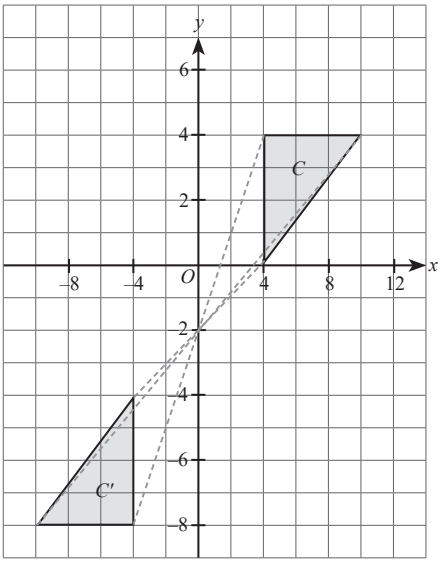
Titik-titik persilangan bertemu pada asalan. Maka, pusat pembesaran ialah pada asalan, (0, 0).
The intersecting points meet at the origin. Thus, the center of enlargement is at the origin, (0, 0).

2



Titik-titik persilangan bertemu pada koordinat (−2, 1). Maka, pusat pembesaran ialah pada koordinat (−2, 1).
The intersecting points meet at coordinates (−2, 1). *Thus, the enlargement center is at coordinates* (−2, 1).

3



Titik-titik persilangan bertemu pada koordinat (0, −2). Maka, pusat pembesaran ialah pada koordinat (0, −2).
The intersecting points meet at coordinates (0, −2). *Thus, the enlargement center is at coordinates* (0, −2).

E

1 Faktor skala/*Scale factor*, $k = \frac{A'B'}{AB}$
$= \frac{4}{2}$
$= 2$

2 Faktor skala/*Scale factor*, $k = \frac{6}{2}$
$= 3$

3 Faktor skala/*Scale factor*, $k = \frac{AB}{AC}$
$= \frac{5}{10}$
$= \frac{1}{2}$

4 Faktor skala/*Scale factor*, $k = -\frac{6}{3}$
$= -2$

5 Faktor skala/*Scale factor*, $k = \frac{6}{3}$
$= 2$

6 Faktor skala/*Scale factor*, $k = \frac{3}{9}$
$= \frac{1}{3}$

7 Faktor skala/*Scale factor*, $k = \frac{18}{12}$
$= \frac{3}{2}$

8 Faktor skala/*Scale factor*, $k = \frac{4}{4}$
$= 1$

9 $\sqrt{36} = 6$
$\sqrt{324} = 18$
Faktor skala/*Scale factor*, $k = \frac{18}{6}$
$= 3$

F

1 $1.5 = \frac{x}{6}$
$x = 9$ cm

Tinggi/*Height* $= 9$ cm

2 Luas/*Area*, $A = 18$ cm^2

$\frac{1}{2} \times$ Tapak/*Base* $\times$ Tinggi/*Height* $= 18$ cm^2

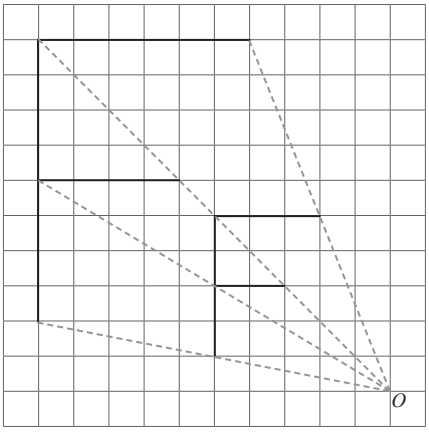
$\frac{1}{2} \times 3$ cm $\times$ Tinggi/*Height* $= 18$ cm

Tinggi/*Height* $= 12$ cm

Jika tinggi *A* ialah 12 cm, maka tinggi *A'*
If the height of A is 12 cm, *hence the height of A'*
$= 12$ cm $\times 2$
$= 24$ cm

G

1



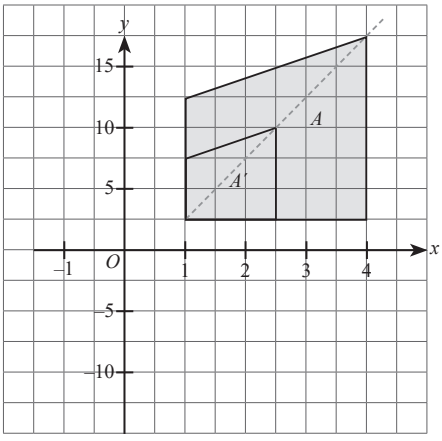
$k = \frac{8}{4}$

$= \frac{6}{3}$

$= 2$

Imej terbentuk di bawah pembesaran, berpusat di O, pada faktor skala, $k = 2$.
Images are formed under enlargement, centered at O, on a scale factor, k = 2.

2



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

$= \frac{2}{4}$

$= \frac{1}{2}$

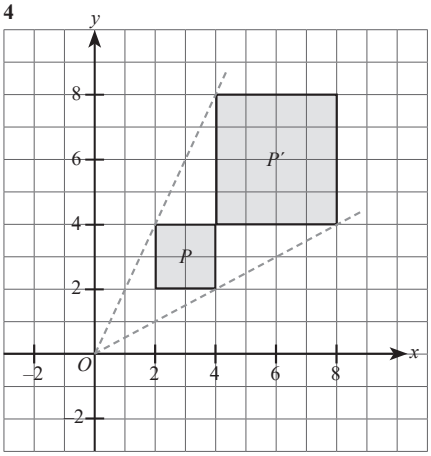
Imej iaitu A' terbentuk di bawah pembesaran, pada pusat pembesaran (1, 2.5), faktor skala, $k = \frac{1}{2}$.
The image of A′ is formed under enlargement, at the enlargement center (1, 2.5)*, the scale factor,* $k = \frac{1}{2}$.

3 $k = \frac{4}{8}$

$= \frac{1}{2}$

Pembesaran pada pusat P dengan faktor skala, $k = \frac{1}{2}$.
Enlargement at center P with scale factor, $k = \frac{1}{2}$.

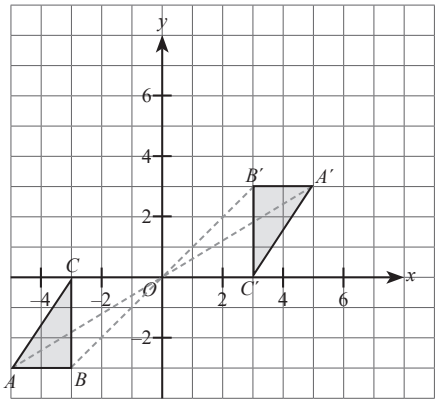
4



$k = \frac{4}{2} = 2$

Pembesaran pada pusat asalan dengan faktor skala, $k = 2$.
Enlargement at the center of origin with a scale factor, $k = 2$.

5

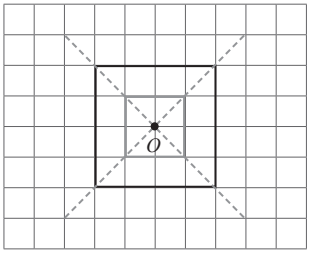


$k = \frac{-1}{1} = -1$

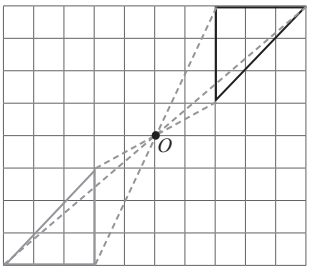
Pembesaran pada pusat asalan dengan faktor skala, $k = -1$.
Enlargement at the center of origin with a scale factor, $k = -1$.

H

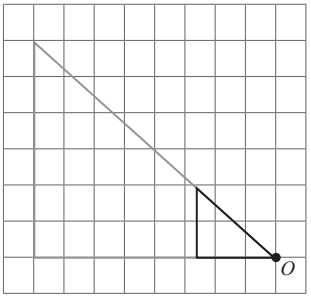
1



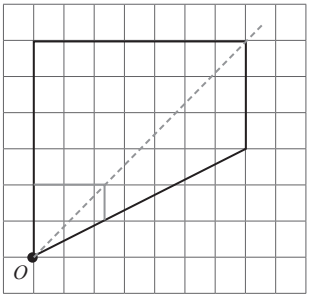
2



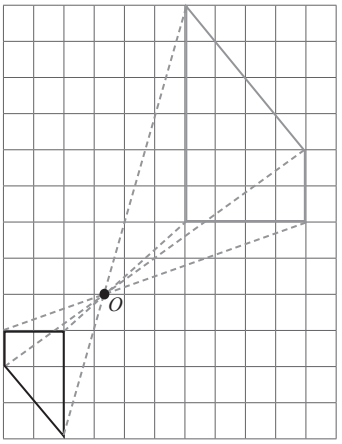
3



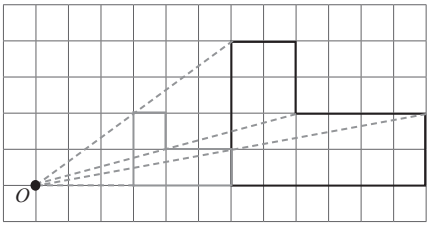
4



5



6



I

1 108
2 28
3 200
4 4
5 1
6 81
7 90

J

1 Segi empat tepat *OABC* dan *OFED* adalah serupa.
The OABC and OFED rectangle are similar.

Faktor skala/*Scale factor*, $k = \frac{4}{2} = 2$

Luas imej/*Area of image*
$= k^2 \times$ Luas objek/*Area of object*
$= 2^2 \times (3 \times 2)$
$= 4 \times 6$
$= 24 \text{ cm}^2$

2 Segi tiga *ABC* dan *BDE* adalah serupa.
The triangles ABC and BDE are similar.

Faktor skala/*Scale factor*, $k = \frac{12}{24} = \frac{1}{2}$

Luas imej/*Area of image*
$= k^2 \times$ Luas objek/*Area of object*
$= \left(\frac{1}{2}\right)^2 \times \left(\frac{1}{2} \times 24 \times 7\right)$
$= \frac{1}{4} \times 84$
$= 21 \text{ cm}^2$

K

1 (*a*) $k = \frac{12}{6}$
$= 2$

(*b*) $2 = \frac{B'C'}{5}$
$B'C' = 10 \text{ cm}$

(*c*) $t = \sqrt{10^2 - 6^2}$
$= 8$
Luas/*Area* $= \frac{1}{2} \times 12 \times 8$
$= 48 \text{ cm}^2$

2 (*a*) $k = \frac{3}{9}$
$= \frac{1}{3}$

(*b*) $\frac{1}{3} = \frac{P'R'}{15}$
$P'R' = \frac{1}{3} \times 15$
$= 5 \text{ cm}$

(*c*) $\frac{1}{3} = \frac{P'Q'}{27}$
$P'Q' = 9 \text{ cm}$
Luas/*Area* $= \frac{1}{2} \times (3 + 5) \times 9$
$= 36 \text{ cm}^2$

L

1 Luas imej/*Area of the image*
$= k^2 \times$ Luas objek/*Area of the object*
$= k^2 \times 18$
$= 2^2 \times 18$
$= 72 \text{ m}^2$

Luas kawasan berlorek/*Area of the shaded region* = Luas imej/*Area of the image* – Luas objek/*Area of the object*
$= 72 - 18$
$= 54 \text{ m}^2$

2 Luas imej/*Area of the image*
$= k^2 \times$ Luas objek/*Area of the object*
$= k^2 \times 18$
$= 4^2 \times 18$
$= 288 \text{ cm}^2$

Luas kawasan berlorek/*Area of the shaded region* = Luas imej/*Area of the image* – Luas objek/*Area of the object*
$= 288 - 18$
$= 270 \text{ cm}^2$

SK 5.3

A

1 (*a*) M **R** M' **P** M''
$(2, 3) \longrightarrow (2, -3) \longrightarrow (5, -5)$

Koordinat bagi imej *M* selepas gabungan transformasi **PR** ialah (5, −5).
The coordinates of the M image under the combined transformation **PR** *is* (5, −5).

Maka imej bagi *M* ialah *B*.
Therefore, the image of M is B.

(*b*) M **Q** M' **R** M''
$(2, 3) \longrightarrow (-3, 2) \longrightarrow (-3, -2)$

Koordinat bagi imej *M* selepas gabungan transformasi **RQ** ialah (−3, −2).
The coordinates of the M image under the combined transformation **RQ** *is* (−3, −2).

Maka imej bagi *M* ialah *C*.
Therefore, the image of M is C.

2 (*a*) Segi tiga I ialah imej bagi segi tiga berlorek di bawah transformasi **M**. Segi tiga *B* ialah imej bagi segi tiga I di bawah transformasi **M**. Maka, *B* adalah imej di bawah gabungan transformasi **M²**.
Triangle I *is the image of a shaded triangle under the transformation of* **M**. *Triangle B is the image of triangle* I *under transformation* **M**. *Thus, B is the image under the combined transformation of* **M²**.

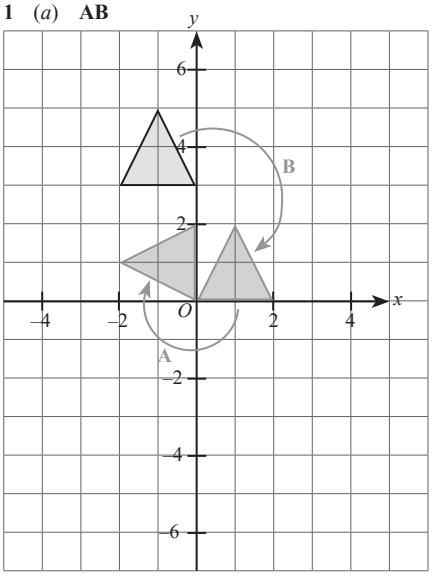
(*b*) Segi tiga II ialah imej bagi segi tiga berlorek di bawah transformasi **O**. Segi tiga *D* ialah imej bagi segi tiga II di bawah transformasi **M**. Maka, *D* ialah imej di bawah gabungan transformasi **MO**.
Triangle II *is an image of a shaded triangle under transformation* **O**. *Triangle D is the image of triangle* II *under transformation* **M**. *Thus, D is the image under the combined transformation of* **MO**.

(*c*) Segi tiga II ialah imej bagi segi tiga berlorek di bawah transformasi **O**. Segi tiga *C* ialah imej bagi segi tiga II di bawah transformasi **N**. Maka, *B* ialah imej di bawah gabungan transformasi **NO**.
Triangle II *is an image of a shaded triangle under transformation* **O**. *Triangle C is the image of triangle* II *under transformation* **N**. *Thus, C is the image under the combined transformation of* **NO**.

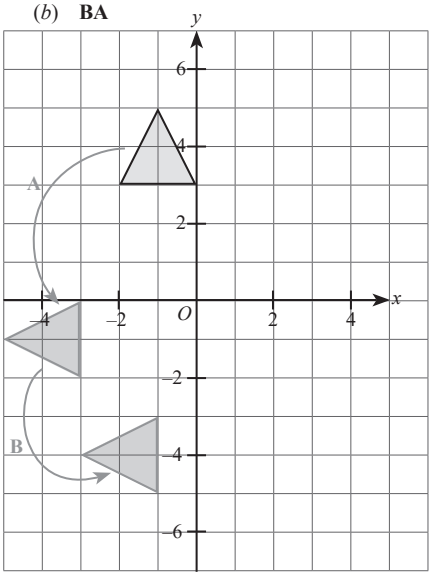
3 (*a*) *P* (*b*) *S* (*c*) *Q*
4 (*a*) III (*b*) I (*c*) IV (*d*) II
5 (*a*) *P* (*b*) *Q* (*c*) *S*

B

1 (*a*) **AB**

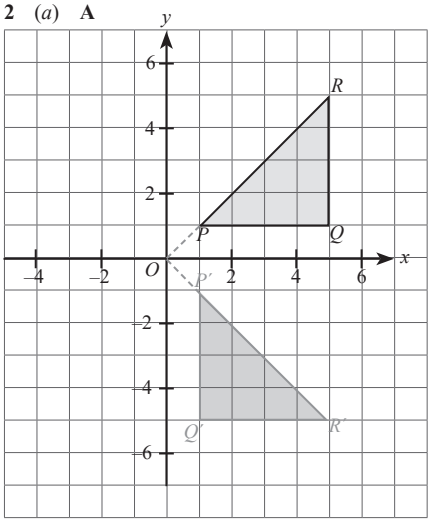


(*b*) **BA**

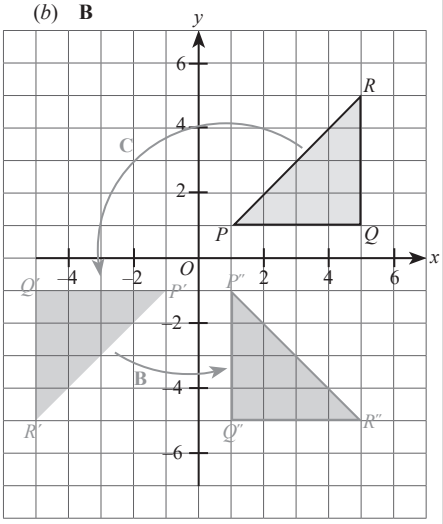


Imej di bawah gabungan transformasi **AB** tidak sama dengan imej di bawah gabungan transformasi **BA**. Oleh itu, **AB** tidak setara dengan **BA**.
The image under the combined transformation of **AB** *is not the same as the image under the combined transformation of* **BA**. *Therefore,* **AB** *is not equivalent to* **BA**.

2 (*a*) **A**



(*b*) **B**



Transformasi **A** setara dengan transformasi **BC**.
Transformation **A** *is equivalent to the transformation of* **BC**.

C

1 (*a*) Imej yang terhasil selepas gabungan transformasi **PR** dan **RP** adalah tidak sama kedudukannya.
The resulting images after the combined transformation of **PR** *and* **RP** *are not in the same position.*

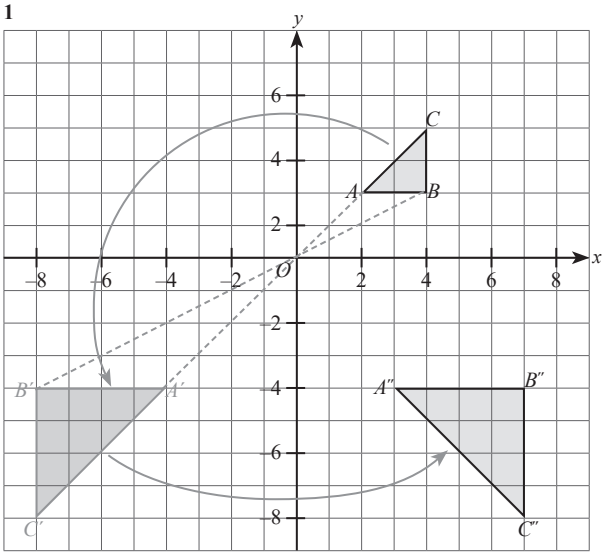
(*b*) Imej yang terhasil selepas gabungan transformasi **PQ** dan **QP** adalah tidak sama kedudukannya.
The resulting images after the combined transformation of **PQ** *and* **QP** *are not in the same position.*

2 (*a*) Imej yang terhasil selepas gabungan transformasi **UT** dan transformasi tunggal **V** adalah sama kedudukannya.
The resulting images after the combined transformation of **UT** *and single transformation of* **V** *is in the same position.*

(*b*) Imej yang terhasil selepas gabungan transformasi **TU** dan **UT** adalah sama kedudukannya.
The resulting images after the combined transformation of **TU** *and* **UT** *are in the same position.*

D

1



Segi tiga *A″B″C″* ialah imej bagi segi tiga *ABC* di bawah pembesaran pada asalan dengan faktor skala, $k = -2$ dan diikuti oleh pantulan pada paksi-*y*.
The triangle A″B″C″ is the image of the triangle ABC under an enlargement at the origin with the scale factor, $k = -2$ *and followed by thereflection on the y-axis.*

2 (*a*) Translasi/*Translation* $\begin{pmatrix} 6 \\ 4 \end{pmatrix}$.

(*b*) Pembesaran berpusat (1, −1) dengan faktor skala 2.
Enlargement at centre (1, −1) *with scale factor* 2.

E

1 (*a*) *ABCD* → *EFGH* : Pantulan pada garis $x = -2$./*Reflection on line* $x = -2$.
EFGH → *JKLM* : Pembesaran pada pusat (0, 4) dengan faktor skala 3.
Enlargement at centre (0, 4) *with scale factor* 3.

(*b*) Luas/*Area of EFGH*
= Luas/*Area of ABCD* = 18 m²
Luas/*Area of JKLM*
= k^2 × Luas/*Area of EFGH*
= 32 × 18
= 162 m²
Kawasan berlorek/*Area of the shaded region* = Luas/*Area of JKLM* – Luas/*Area of EFGH*
= 162 m² – 18 m²
= 144 m²

SK 5.4

A

1 ✓ **2** ✗ **3** ✓ **4** ✗

B

Terima apa-apa corak yang memenuhi syarat teselasi.
Accept any pattern that meets tessellation requirements.

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

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

Kertas 2/*Paper 2*

1 (*a*) (i) **S**: Pantulan pada garis *BC*.
Reflection on the line BC.
(ii) **T**: Pembesaran pada pusat *B* dengan faktor skala 2.
Enlargement at centre B with scale factor 2.

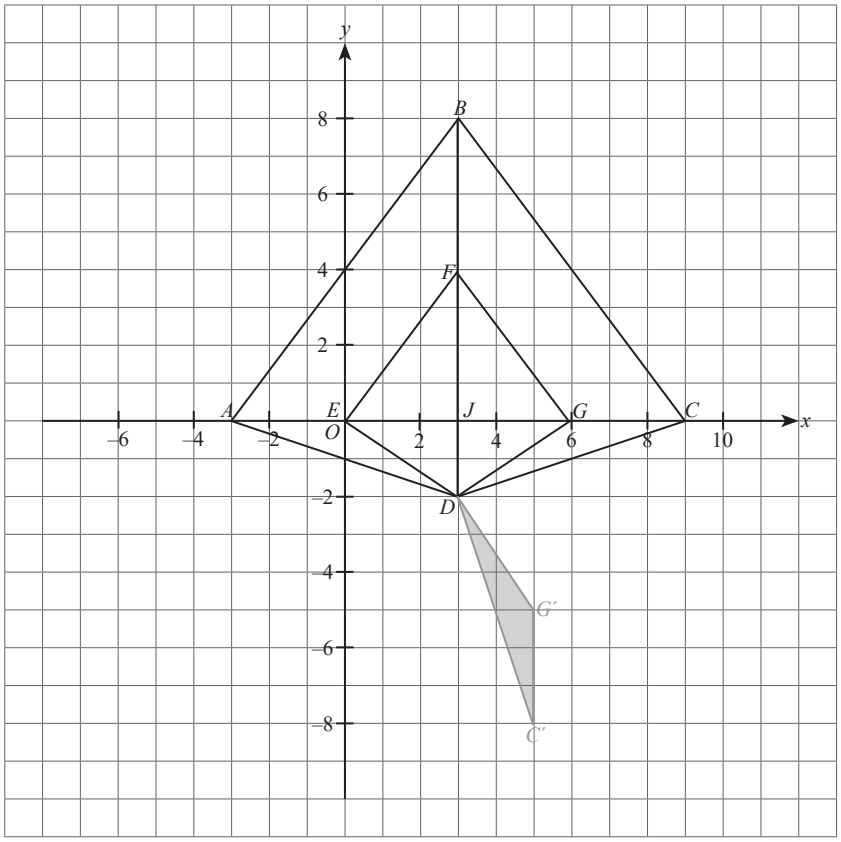
(*b*) Luas kawasan yang berlorek
Area of the shaded region
= 36 cm² × 6
= 216 cm²

2 (*a*) 12 cm ÷ 2 = 6 cm

(*b*) $\angle BAK = 180° - 58° - 90°$
$= 32°$
$\angle BAH = 32° \times 3$
$= 96°$

3 (*a*) *EFJ* dan/*and GFJ* atau/*or*
ABJ dan/*and CBJ* atau/*or*
ABFE dan/*and CBGF* atau/*or*
DEJ dan/*and DGJ* atau/*or*
DEF dan/*and DGF* atau/*or*
ADJ dan/*and CDJ* atau/*or*
ADE dan/*and CDG*
(Terima mana-mana pasangan jawapan yang munasabah)
(*Accept any reasonable pair answers*)

(*b*)



(*c*) (i) **Q**: Pantulan pada garis $x = 3$.
Reflection on line $x = 3$.

(ii) $k = \frac{6}{3}$
$= 2$

P: Pembesaran pada titik J dengan faktor skala, $k = 2$.
Enlargement at point J with the scale factor, $k = 2$.

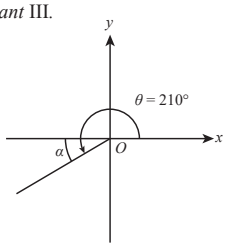
UNIT 6

SK 6.1

A

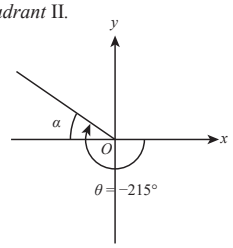
1 $\theta = 210°$ berada pada sukuan III.
$\theta = 210°$ *is in quadrant* III.

$\alpha = 210° - 180°$
$= 30°$



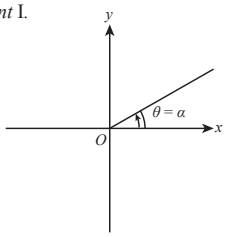
2 $\theta = -215°$ berada pada sukuan II.
$\theta = -215°$ *is in quadrant* II.

$\alpha = 215° - 180°$
$= 35°$



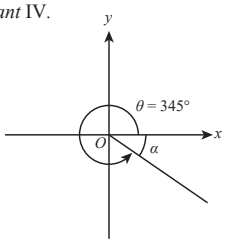
3 $\theta = 35°$ berada pada sukuan I.
$\theta = 35°$ *is in quadrant* I.

$\alpha = 35°$



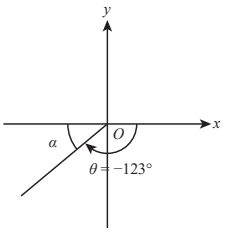
4 $\theta = 345°$ berada pada sukuan IV.
$\theta = 345°$ *is in quadrant* IV.

$\alpha = 360° - 345°$
$= 15°$



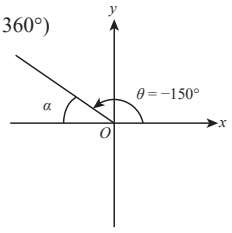
5 $\theta = -123°$ berada pada sukuan III.
$\theta = -123°$ *is in quadrant* III.

$\alpha = 180° - 123°$
$= 57°$



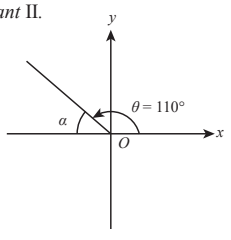
6 $\theta = 510°$ berada pada sukuan III.
$\theta = 510°$ *is in quadrant* III.

$\alpha = 180° - (510° - 360°)$
$= 180° - 150°$
$= 30°$



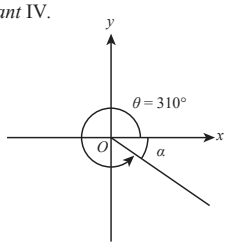
7 $\theta = 110°$ berada pada sukuan II.
$\theta = 110°$ *is in quadrant* II.

$\alpha = 180° - 110°$
$= 70°$



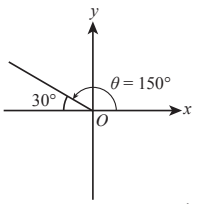
8 $\theta = 310°$ berada pada sukuan IV.
$\theta = 310°$ *is in quadrant* IV.

$\alpha = 360° - 310°$
$= 50°$



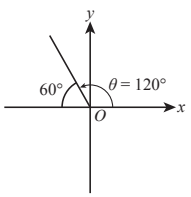
B

1



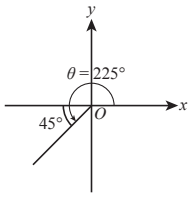
$\sin 150° = \sin 30° = \frac{1}{2}$

2



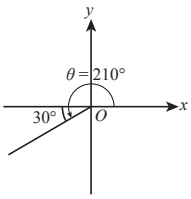
$\sin 120° = \sin 60° = 0.866$

3



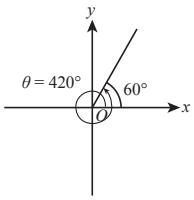
kos/*cos* 225° = –kos/*cos* 45° = –0.707

4



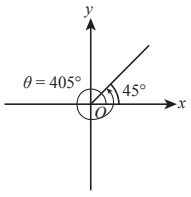
kos/*cos* 210° = –kos/*cos* 30° = –0.866

5



tan 420° = tan 60° = 1.73

6



tan 405° = tan 45° = 1

C

1 110° berada pada sukuan II.
110° *is in quadrant* II.

$\alpha = 180° - 110° = 70°$
sin 70° = *m*
kos/*cos* 70° = –*m*
tan 70° = –*m*

2 230° berada pada sukuan III.
230° *is in quadrant* III.

$\alpha = 230° - 180° = 50°$

kos/*cos* 50° = *p*
sin 230° = –*p*
tan 230° = –*p*

3 340° berada pada sukuan IV.
340° *is in quadrant* IV.

$\alpha = 360° - 340° = 20°$.

tan 20° = –*r*
sin 340° = –*r*
kos/*cos* 340° = *r*

D

1 sin $\theta = 0.643$
$\theta = \sin^{-1}(0.643)$
$= 40°$

θ berada pada sukuan I dan II.
θ is in quadrants I *and* II.

Sukuan/*Quadrant* I
$\theta = 40°$

Sukuan/*Quadrant* II
$\theta = 180° - 40° = 140°$

2 kos/*cos* $\theta = -0.3$
$\theta = \text{kos}^{-1}/cos^{-1}(0.3)$
$= 72.5°$

θ berada pada sukuan II dan III.
θ is in quadrants II *and* III.

Sukuan/*Quadrant* II
$\theta = 180° - 72.5° = 107.5°$

Sukuan/*Quadrant* III
$\theta = 180° + 72.5° = 252.5°$

3 tan $\theta = 6.314$
$\theta = \tan^{-1}(6.314)$
$= 81°$

θ berada pada sukuan II dan IV.
θ is in quadrants II *and* IV.

Sukuan/*Quadrant* II
$\theta = 180° - 81° = 99°$

Sukuan/*Quadrant* IV
$\theta = 360° - 81° = 279°$

$\theta = 99°$ memenuhi syarat $90° \leqslant \theta \leqslant 270°$
$\theta = 99°$ *meet the requirements* $90° \leqslant \theta \leqslant 270°$

E

1 tan θ = tan α

$\tan \alpha = \frac{8}{6}$

$\alpha = 53.13$

$\theta = 360° - 53.13°$
$= 306.87°$

2 tan θ = tan α

$\tan \alpha = \frac{21}{20}$

$\alpha = 46.4°$

$\theta = 46.4° + 180°$
$= 226.4°$

3 tan θ = tan α

$\tan \alpha = \frac{7}{24}$

$\alpha = 16.26°$

$\theta = 180° - 16.26°$
$= 163.74°$

SK 6.2

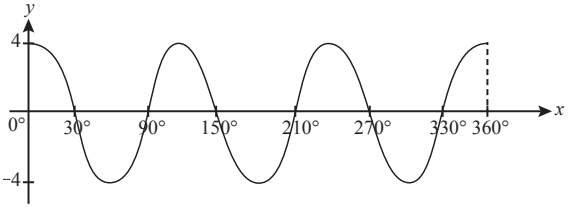
A

1 Nilai maksimum/*Maximum value*: 4
Nilai minimum/*Minimum value*: –2
Pintasan-*x*/*x-intercept*: $\frac{1}{2}\pi$ dan/*and* $\frac{3}{2}\pi$
Pintasan-*y*/*y-intercept*: 4

2 Nilai maksimum/*Maximum value*: 3
Nilai minimum/*Minimum value*: –3
Pintasan-*x*/*x-intercept*: 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°, 360°
Pintasan-*y*/*y-intercept*: 0°

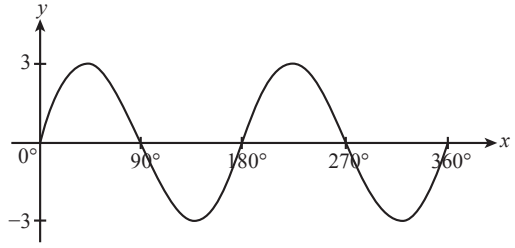
B

1



Amplitud/*Amplitude*: 4
Tempoh/*Period*: 120°

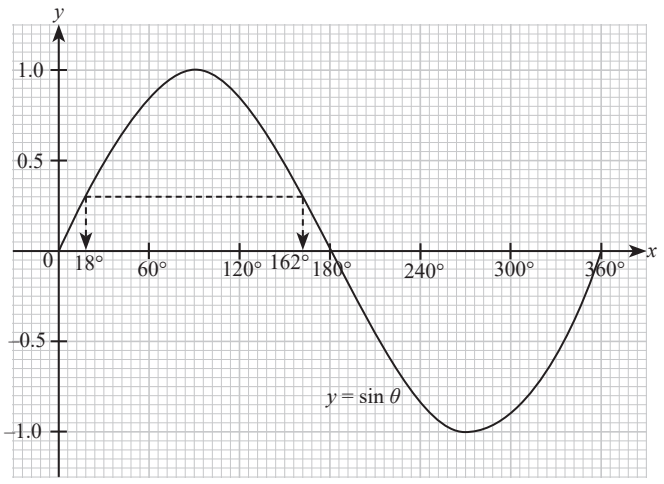
2



Amplitud/*Amplitude*: 3
Tempoh/*Period*: 180°

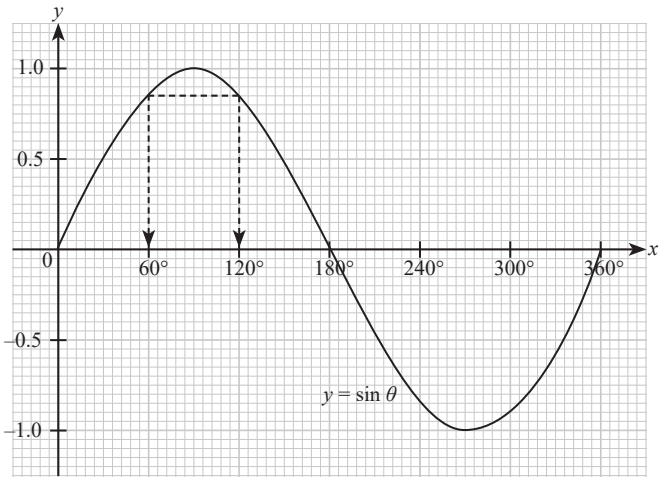
C

1



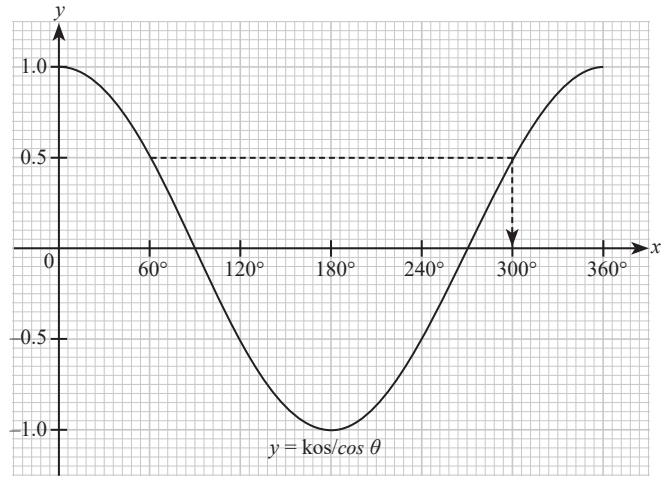
sin positif berada pada sukuan I dan II./*Positive sin is in quarters* I *and* II.
$\therefore \theta = 18°$ dan/*and* $162°$

2



sin positif berada pada sukuan I dan II./*Positive sin is in quarter* I *and* II.
$\therefore \theta = 60°$ dan/*and* $120°$

3



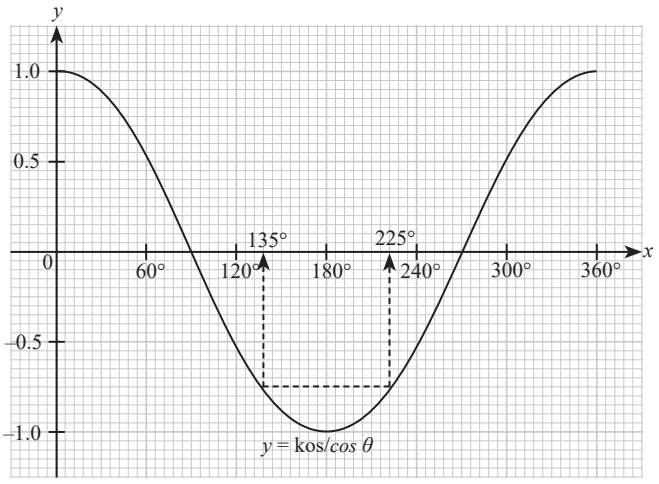
$2 \text{ kos/}\cos\theta - 1 = 0$

$\text{kos/}\cos\theta = \frac{1}{2}$

kos positif berada pada sukuan I dan IV. Walaubagaimanapun, hanya sudut pada sukuan IV yang diambil kira bagi memenuhi $180° \leqslant \theta \leqslant 360°$.
Positive cos is in quarters I *and* IV. *However, only the angle of quarter* IV *is taken into account to meet* $180° \leqslant \theta \leqslant 360°$.

$\therefore \theta = 300°$

4

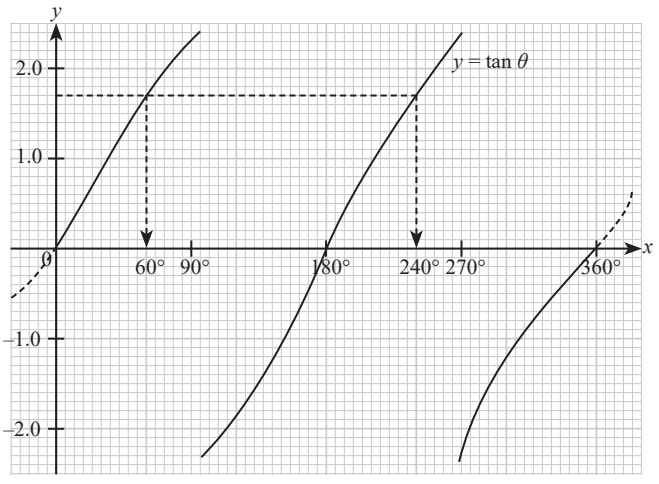


$\text{kos/}\cos\theta + 0.7 = 0$

$\text{kos/}\cos\theta = -0.7$

kos negatif berada pada sukuan II dan III.
Negative cos is in quarters II *and* III.
$\therefore \theta = 135°$ dan/*and* $225°$

5



$\tan^2\theta = 3$

$\tan\theta = \sqrt{3}$

tan positif berada pada sukuan I dan III.
Positive tan is in quarters I *and* III.

$\therefore \theta = 60°$ dan/*and* $240°$

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

1 B **2** A **3** C

Kertas 2/*Paper 2*

1 (*a*) $\tan\theta = 1$

tan positif berada pada sukuan I dan III.
Positive tan is in quarters I *and* III.

$\theta = \tan^{-1}(1)$
$\theta = 45°$

Sukuan I/*Quarter* I
$\theta = 45°$

Sukuan III/*Quarter* III
$\theta = 180° + 45°$
$= 225°$

(*b*) $\sin\theta = \left(\frac{1}{2}\right)$

sin positif berada pada sukuan I dan II.
Positive sin is in quarters I *and* II.

$\theta = \sin^{-1}\left(\frac{1}{2}\right)$
$= 30°$

Sukuan I/*Quarter* I
$\theta = 30°$

Sukuan II/*Quarter* II
$\theta = 180° - 30°$
$= 150°$

(*c*) kos/*cos* $\theta = \left(\frac{3}{10}\right)$

kos positif berada pada sukuan I dan IV.
Positive cos is in quarters I *and* IV.

$\theta = \text{kos}^{-1}/cos^{-1}\left(\frac{3}{10}\right)$
$= 72.5°$

Sukuan I/*Quarter* I
$\theta = 72.5°$

Sukuan IV/*Quarter* IV
$\theta = 360° - 72.5°$
$= 287.5°$

UNIT 7

SK 7.1

A

1

11 – 15	16 – 20	21 – 25

2

14 – 17	18 – 21

3

7 – 12	13 – 18	19 – 24		31 – 36	37 – 42

B

1 Saiz selang kelas / *Size of class interval* $= \frac{78 - 41}{4}$

$= 9.25 \approx 10$

Had bawah *Lower limit*	Had atas *Upper limit*	Titik tengah *Midpoint*	Sempadan bawah *Lower boundary*	Sempadan atas *Upper boundary*
40	49	$\frac{40 + 49}{2} = 44.5$	$\frac{39 + 40}{2} = 39.5$	$\frac{49 + 50}{2} = 49.5$
50	59	$\frac{50 + 59}{2} = 54.5$	$\frac{49 + 50}{2} = 49.5$	$\frac{59 + 60}{2} = 59.5$
60	69	$\frac{60 + 69}{2} = 64.5$	$\frac{59 + 60}{2} = 59.5$	$\frac{69 + 70}{2} = 69.5$
70	79	$\frac{70 + 79}{2} = 74.5$	$\frac{69 + 70}{2} = 69.5$	$\frac{79 + 80}{2} = 79.5$

2 Saiz selang kelas / *Size of class interval* $= \frac{98 - 51}{6}$

$= 7.8 \approx 8$

Jisim (kg) *Mass* (kg)	Kekerapan *Frequency*	Had bawah *Lower limit*	Had atas *Upper limit*	Titik tengah *Midpoint*	Sempadan bawah *Lower boundary*	Sempadan atas *Upper boundary*
51 – 58	7	51	58	$\frac{51 + 58}{2} = 54.5$	$\frac{50 + 51}{2} = 50.5$	$\frac{58 + 59}{2} = 58.5$
59 – 66	1	59	66	$\frac{59 + 66}{2} = 62.5$	$\frac{58 + 59}{2} = 58.5$	$\frac{66 + 67}{2} = 66.5$
67 – 74	7	67	74	$\frac{67 + 74}{2} = 70.5$	$\frac{66 + 67}{2} = 66.5$	$\frac{74 + 75}{2} = 74.5$
75 – 82	6	75	82	$\frac{75 + 82}{2} = 78.5$	$\frac{74 + 75}{2} = 74.5$	$\frac{82 + 83}{2} = 82.5$
83 – 90	5	83	90	$\frac{83 + 90}{2} = 86.5$	$\frac{82 + 83}{2} = 82.5$	$\frac{90 + 91}{2} = 90.5$
91 – 98	4	91	98	$\frac{91 + 98}{2} = 94.5$	$\frac{90 + 91}{2} = 90.5$	$\frac{98 + 99}{2} = 98.5$

C

1

Kekerapan longgokan *Cumulative frequency*	2	5	11	16	20

2

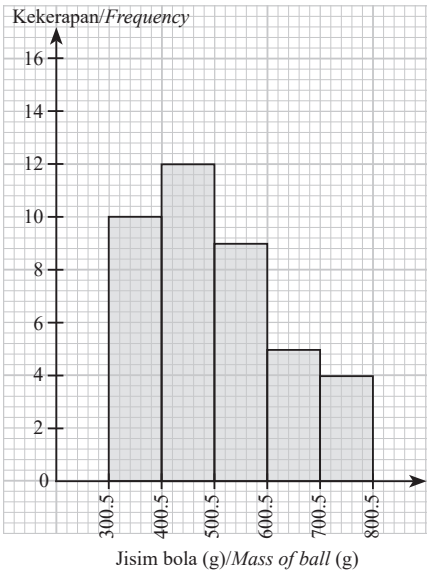
Kekerapan longgokan *Cumulative frequency*	10	22	30	37	42	45

D

1

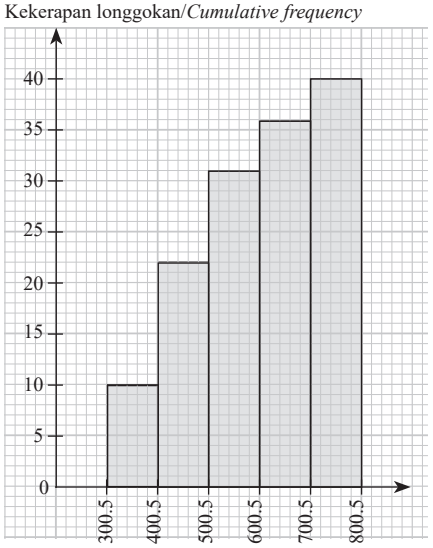
Sempadan bawah *Lower boundary*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
300.5	400.5	10
400.5	500.5	22
500.5	600.5	31
600.5	700.5	36
700.5	800.5	40

Histogram:



Histogram longgokan/*Cumulative histogram*:

Kekerapan longgokan/*Cumulative frequency*

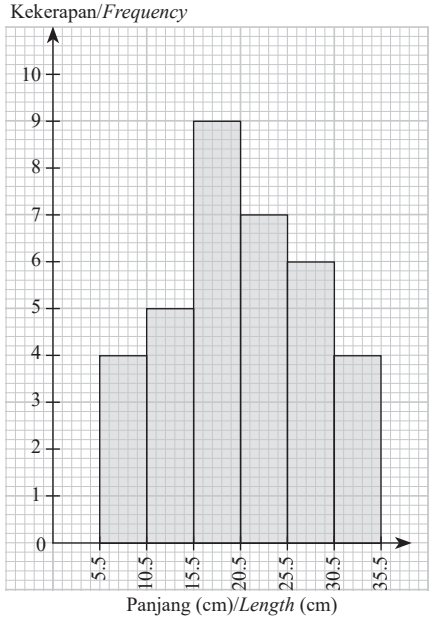


2

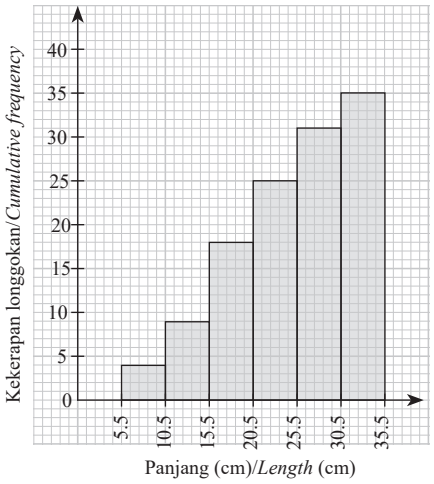
Sempadan bawah *Lower boundary*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
5.5	10.5	4
10.5	15.5	9
15.5	20.5	18
20.5	25.5	25
25.5	30.5	31
30.5	35.5	35

Histogram:

Kekerapan/*Frequency*



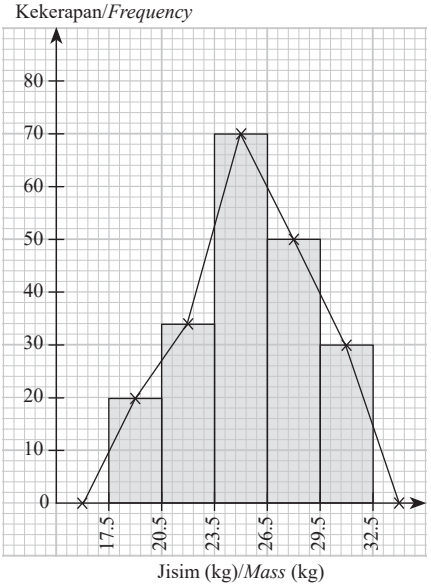
Histogram longgokan/*Cumulative histogram*:



E

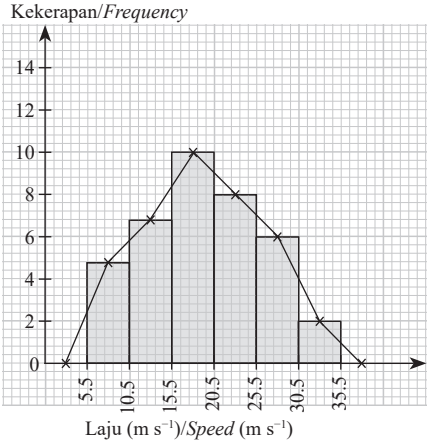
1

Kekerapan/*Frequency*



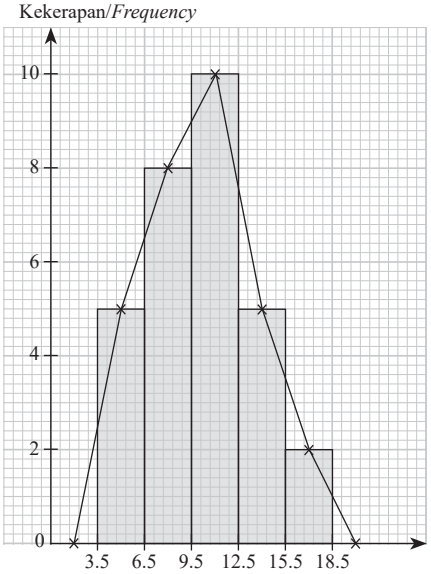
2

Kekerapan/*Frequency*



3

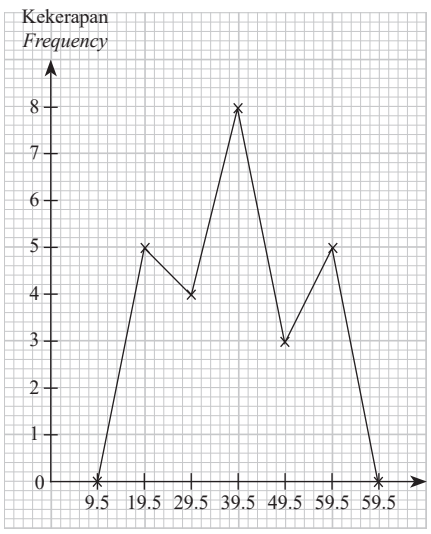
Kekerapan/*Frequency*



F

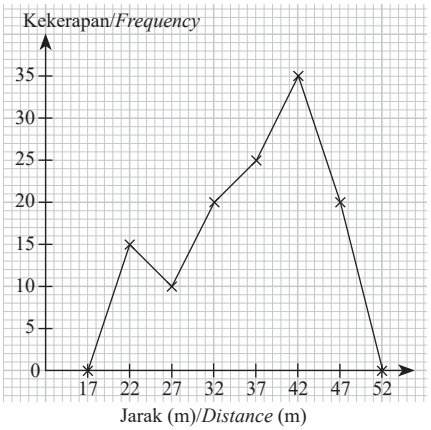
1

Masa (s) *Time* (s)	Kekerapan *Frequency*	Titik tengah *Midpoint*
5 – 4	0	9.5
15 – 24	5	19.5
25 – 34	4	29.5
35 – 44	8	39.5
45 – 54	3	49.5
55 – 64	5	59.5



2

Jarak (m) *Distance* (m)	Kekerapan *Frequency*	Titik tengah *Midpoint*
15 – 19	0	17
20 – 24	15	22
25 – 29	10	27
30 – 34	20	32
35 – 39	25	37
40 – 44	35	42
45 – 49	20	47
50 – 54	0	52



G

1 (*a*) Bentuk taburan histogram bagi kelas 5S ialah pencong kiri manakala bagi kelas 5K ialah pencong ke kanan.
The shape of distribution for class 5S *is skew to the left whereas for class* 5K *is skew to the right.*

(*b*) Serakan markah kelas 5S lebih luas daripada kelas 5K kerana beza markahnya adalah lebih besar iaitu (92 – 66) = 26.
The dispersion of marks of class 5S *is wider than class* 5K *because the difference of the marks is larger, which is* (92 – 66) = 26.

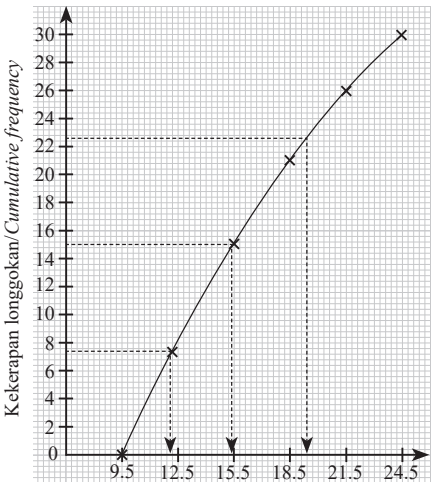
2 (*a*) Bentuk taburan data bagi kelas 2S ialah pencong ke kiri manakala bagi kelas 2G ialah pencong ke kanan.
The shape of data distribution in class 2S *is skew to the left whereas in class* 2G *is skew to the right.*

(*b*) Serakan jumlah wang saku yang dibawa oleh murid kelas 2G adalah lebih luas daripada kelas 2S.
The dipersion of amount of pocket money brought by the pupils of class 2G *is wider than class* 2S.

H

1

Panjang (cm) *Length* (cm)	Kekerapan *Frequency*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
7 – 9	0	9.5	0
10 – 12	8	12.5	8
13 – 15	7	15.5	15
16 – 18	6	18.5	21
19 – 21	5	21.5	26
22 – 24	4	24.5	30



(*a*) $\frac{1}{4} \times 30 = 7.5$

Daripada ogif/*From the ogive*,
$Q_1 = 12.2$

(*b*) $\frac{1}{2} \times 30 = 15$

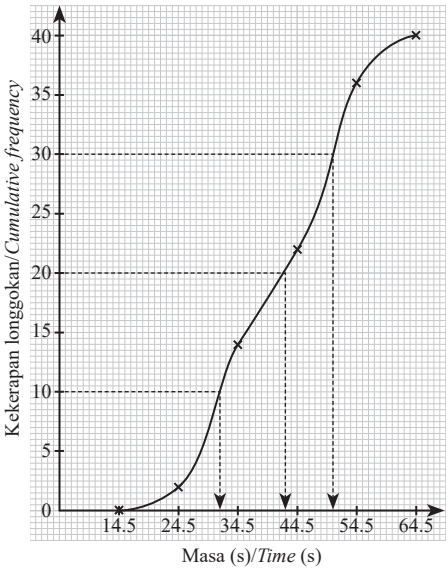
Daripada ogif/*From the ogive*,
$Q_2 = 15.5$

(*c*) $\frac{3}{4} \times 30 = 22.5$

Daripada ogif/*From the ogive*,
$Q_3 = 19.4$

2

Masa (s) *Time* (s)	Kekerapan *Frequency*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
5 – 14	0	14.5	0
15 – 24	2	24.5	2
25 – 34	12	34.5	14
35 – 44	8	44.5	22
45 – 54	14	54.5	36
55 – 64	4	64.5	40



(*a*) $\frac{1}{4} \times 40 = 10$

Daripada ogif/*From the ogive*, $Q_1 = 31.5$

(*b*) $\frac{1}{2} \times 40 = 20$

Daripada ogif/*From the ogive*, $Q_2 = 42.5$

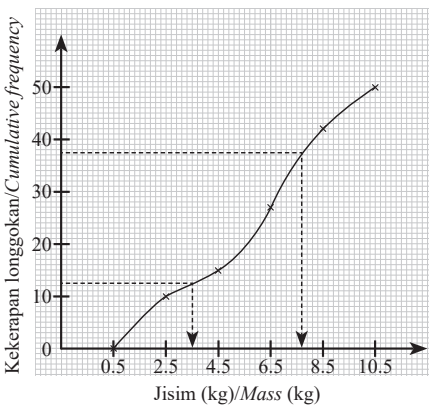
(*c*) $\frac{3}{4} \times 40 = 30$

Daripada ogif/*From the ogive*, $Q_3 = 50$

SK 7.2

A

1

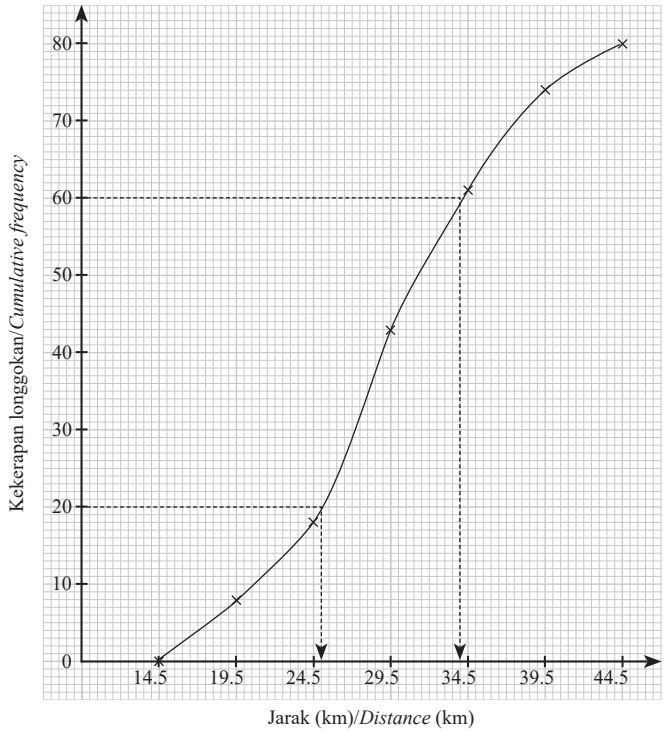


Julat/*Range* $= \frac{9 + 10}{2} - \frac{1 + 2}{2}$
$= 9.5 - 1.5$
$= 8$

Daripada ogif/*From the ogive*
$Q_1 = 3.5$
$Q_3 = \frac{3}{4} \times 50 = 37.5$
$Q_3 = 7.7$

Julat antara kuartil/*Interquartile range*
$= 7.7 - 3.5 = 4.2$

2



Julat/*Range* $= \frac{40 + 44}{2} - \frac{15 + 19}{2}$

$= 42 - 17$

$= 25$

Daripada ogif/*From the ogive*

$Q_1 = \frac{1}{4} \times 80 = 20$

$Q_1 = 25$

$Q_3 = \frac{3}{4} \times 80 = 60$

$Q_3 = 34$

Julat antara kuartil/*Interquartile range*

$= 34 - 25 = 9$

B

1

Jisim (kg) *Mass* (kg)	Kekerapan *Frequency*	Titik tengah, x *Midpoint, x*	fx	fx^2
2.0 – 2.4	2	2.2	4.4	9.68
2.5 – 2.9	6	2.7	16.2	43.74
3.0 – 3.4	8	3.2	25.6	81.92
3.5 – 3.9	12	3.7	44.4	164.28
4.0 – 4.4	2	4.2	8.4	35.28
	$\Sigma f = 30$		$\Sigma fx = 99$	$\Sigma fx^2 = 334.9$

Varians/*Variance*, $\sigma^2 = \frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2$

$= \frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2$

$= \frac{334.9}{30} - \left(\frac{99}{30}\right)^2$

$= 11.16333 - 10.89$

$= 0.2733$

Sisihan piawai, σ
Standard deviation, σ

$= \sqrt{0.2733}$

$= 0.5228$ kg

2

Panjang (cm) *Length* (cm)	Kekerapan *Frequency*	Titik tengah, x *Midpoint, x*	fx	fx^2
5 – 9	7	7	49	343
10 – 14	10	12	120	1 440
15 – 19	12	17	204	3 468
20 – 24	6	22	132	2 904
25 – 29	5	27	135	3 645
	$\Sigma f = 40$		$\Sigma fx = 640$	$\Sigma fx^2 = 11\ 800$

Varians/*Variance*, $\sigma^2 = \frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2$

$= \frac{\Sigma fx^2}{\Sigma f} - \left(\frac{\Sigma fx}{\Sigma f}\right)^2$

$= \frac{11\ 800}{40} - \left(\frac{640}{40}\right)^2$

$= 295 - 256$

$= 39$

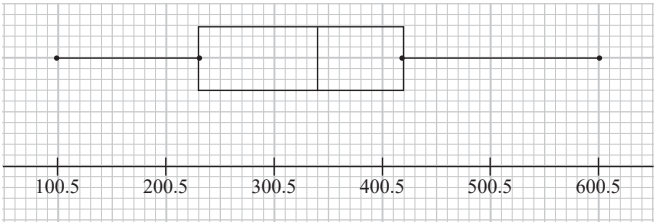
Sisihan piawai, σ
Standard deviation, σ

$= \sqrt{39}$

$= 6.245$

C

1



Nilai minimum/*Minimum value* = 100.5

Nilai maksimum/*Maximum value* = 600.5

Kuartil pertama/*First quartile* $= \frac{1}{4} \times 40 = 10$

$Q_1 = 230.5$

Median/*Median* $= \frac{1}{2} \times 40 = 20$

$Q_2 = 340.0$

Kuartil ketiga/*Third quartile* $= \frac{3}{4} \times 40 = 30$

$Q_3 = 420.5$

D

1

Tinggi (cm) *Height* (cm)	Titik tengah, x *Midpoint, x*	Kekerapan *Frequency*	fx	fx^2
16 – 20	18	3	54	972
21 – 25	23	5	115	2 645
26 – 30	28	6	168	4 704
31 – 35	33	x	$33x$	$1\ 089x$
36 – 40	38	4	152	5 776
41 – 45	43	2	86	3 698
Jumlah/*Total*		$20 + x$	$575 + 33x$	$17\ 795 + 1\ 089x$

Diberi varians, $\sigma^2 = 55.16$
Given the variance, σ^2

Min/*Mean* = 29.46

Maka/*Hence*,

$\frac{17\ 795 + 1\ 089x}{20 + x} - (29.46)^2 = 55.16$

$165.95x = 666.032$

$x = 4.01 \approx 4$

2 Bagi kumpulan *A*/*For group A*,

Markah *Marks*	Kekerapan *Frequency*	Titik tengah, x *Midpoint, x*	fx	fx^2
50 – 54	6	52	312	16 224
55 – 59	4	57	228	12 996
60 – 64	5	62	310	19 220
65 – 69	12	67	804	53 868
70 – 74	5	72	360	25 920
75 – 79	8	77	616	47 432
	$\Sigma f = 40$		$\Sigma fx = 2\,630$	$\Sigma fx^2 = 175\,660$

Min/*Mean*,

$\bar{x} = \frac{2\,630}{40} = 65.75$

Sisihan piawai/*Standard deviation*,

$\sigma = \sqrt{\frac{175\,660}{40} - \left(\frac{2\,630}{40}\right)^2} = 8.27$

Bagi kumpulan *B*/*For group B*,

Markah *Marks*	Kekerapan *Frequency*	Titik tengah, x *Midpoint, x*	fx	fx^2
50 – 54	5	52	260	13 520
55 – 59	6	57	342	19 494
60 – 64	10	62	620	38 440
65 – 69	8	67	536	35 912
70 – 74	8	72	576	41 472
75 – 79	3	77	231	17 787
	$\Sigma f = 40$		$\Sigma fx = 2\,565$	$\Sigma fx^2 = 166\,625$

Min/*Mean*,

$\bar{x} = \frac{2\,565}{40} = 64.125$

Sisihan piawai/*Standard deviation*,

$\sigma = \sqrt{\frac{166\,625}{40} - \left(\frac{2\,565}{40}\right)^2} = 7.32$

Kumpulan *B* akan dipilih mewakili sekolah ke peringkat daerah kerana sisihan piawainya adalah lebih kecil berbanding kumpulan *A*. Prestasi kumpulan *B* adalah lebih baik dan konsisten.

Group B will be selected to represent the school to the district level because its standard deviation is smaller than group A. Group B performance is better and consistent.

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

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

Kertas 2/*Paper 2*

1 (*a*)

Kekerapan/*Frequency*	Titik tengah/*Midpoint*
0	8
3	13
4	18
6	23
7	28
4	33
3	38
2	43
1	48
0	53

(*b*) Min/*Mean*

$= \frac{3(13) + 4(18) + 6(23) + 7(28) + 4(33) + 3(38) + 2(43) + 1(48)}{30}$

$= 27.5$

2 (*a*)

$\frac{(42 \times 3) + (47 \times 6) + (52 \times m) + (57 \times 16) + (62 \times 10) + (67 \times 4)}{3 + 6 + m + 16 + 10 + 4} = 55.6$

$\frac{2\,208 + 52m}{39 + m} = 55.6$

$2\,208 + 52m = 2\,168.4 + 55.6m$

$2\,208 - 2\,168.4 = 55.6m - 52m$

$39.6 = 3.6m$

$m = 11$

(*b*)

$\sigma^2 = \frac{(3 \times 42^2) + (6 \times 47^2) + (11 \times 52^2) + (16 \times 57^2) + (10 \times 62^2) + (4 \times 67^2)}{3 + 6 + 11 + 16 + 10 + 4} - 55.6^2$

$= \frac{156\,670}{50} - 55.6^2$

$= 42.04$

3 (*a*)

Titik tengah *Midpoint*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
62	64.5	0
67	69.5	7
72	74.5	21
77	79.5	49
82	84.5	79
87	89.5	94
92	94.5	100

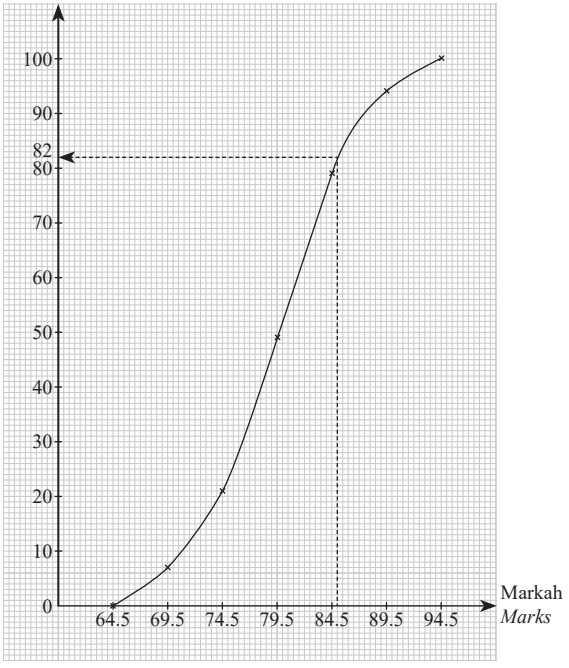
(*b*) Min/*Mean* $= \frac{62(0) + 67(7) + 72(14) + 77(28) + 82(30) + 87(15) + 92(6)}{100}$

$= \frac{7\,950}{100}$

$= 79.5$

(*c*) Kekerapan longgokan

Cumulative frequency

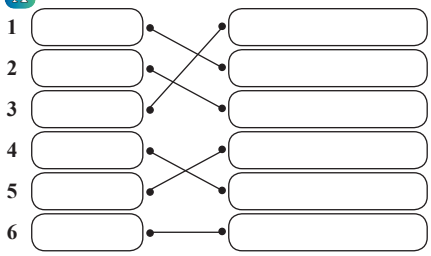


(*d*) 100 – 82 = 18 orang murid/*pupils*

UNIT 8

SK 8.1

A



B

1 (*a*) Rahmat perlu mengetahui sekiranya dia ingin memandu sejauh 100 km, kenderaan dari syarikat yang manakah lebih berbaloi disewa.
Rahmat needs to know if he wants to drive 100 km, *which vehicle from which company is more worth renting.*

(*b*) Andaian: Kos minyak bagi kenderaan dari kedua-dua syarikat adalah sama.
Assumption: *The cost of fuel for vehicles from both companies is the same.*

Rumus bagi jumlah kadar sewaan/*Formula for total rental rate* = jarak/*distance* × kadar sewaan per kilometer/*rental rate per kilometer* + bayaran pendahuluan/*down payment*.

Pemboleh ubah: Kadar sewaan, jarak, kadar sewaan per kilometer, bayaran pendahuluan.
Variables: *Rental rate, distance, rental rate per kilometer, advance payment.*

2 (*a*) Zhun Man perlu mengetahui sekiranya dia ingin menunggang kuda selama 6 bulan, kelab rekreasi yang manakah lebih berbaloi disertai.
Zhun Man needs to know if he wants to ride a horse for 6 months, which recreational club is more worth joining.

(*b*) Andaian: Tiada kos tambahan akan dikenakan selain kos yang dinyatakan.
Assumption: *No additional costs will be charged other than the stated costs.*

Rumus bagi jumlah kos/*Formula for total cost* = jumlah jam/*total hours* × kadar sewaan per jam/*rental rate per hour* + yuran pendaftaran/*registration fee*

Pemboleh ubah: jumlah kos, jumlah jam, kadar sewaan per jam dan yuran pendaftaran.
Variables: *total cost, total hours, hourly rental rate and registration fee.*

C

1 Mengenal pasti dan mendefinisikan masalah:
***Identify and define problems*:**
- Tentukan kadar sewaan bagi setiap kilometer untuk perjalanan sejauh 100 km.
Determine the rental rate per kilometer for a 100 km *journey.*
- Diketahui bahawa lebih jauh perjalanan, lebih tinggi jumlah sewaan.
It is known that the longer the trip, the higher the rental amount.

Membuat andaian dan mengenal pasti pemboleh ubah/*Make assumptions and identify the variables*:
- Andaikan kadar sewaan kenderaan per kilometer adalah sama.
Assume the vehicle rental rate per kilometer is the same.
- x mewakili jarak perjalanan dan y mewakili jumlah kadar sewaan.
x represents the distance travelled and y represents the total rental rate.
- y berubah secara langsung dengan x, maka $y = kx$ dengan keadaan k ialah pemalar.
y changes directly with x, so $y = kx$ with the condition k is a constant.

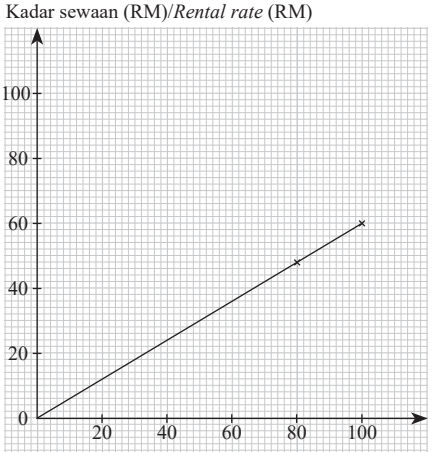
Mengaplikasi matematik untuk menyelesaikan masalah:
***Apply mathematics to solve the problems*:**
$y = kx$
$48 = k(80)$
$k = 0.6$
$\therefore y = 0.6x$

Bagi 100 km perjalanan/*For* 100 km *journey*,
$y = 0.6(100)$
$= 60$

Maka, bagi 100 km perjalanan, kadar sewaan ialah RM60./*Hence, for* 100 km *journey, the rental rate is* RM60.

Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan:
***Verify and interpret solutions in the context of the problem*:**
$y = 0.6x$

Kadar sewaan (RM)/*Rental rate* (RM)



Jarak perjalanan (km)/*Distance travelled* (km)

Memurnikan model matematik:
***Refine the mathematical model*:**
- Disebabkan maklumat yang diberikan adalah terhad, kita tidak dapat memurnikan model ini.
Because the information provided is limited, we cannot refine this model.

Melaporkan dapatan:
Report findings:
- Laporan penuh dibuat berdasarkan struktur rangka kerja pemodelan di atas.
The full report is made based on the structure of the modelling framework above.

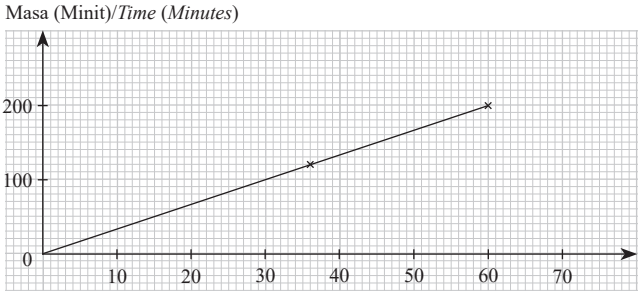
2 Mengenal pasti dan mendefinisikan masalah:
***Identify and define problems*:**
- Tentukan caj yang dikenakan bagi setiap minit panggilan bagi 200 minit.
Determine the charge for each minute of call for 200 *minutes.*
- Diketahui bahawa semakin lama tempoh perbualan, semakin tinggi caj yang akan dikenakan.
It is known that the longer the duration of the conversation, the higher the charges that will be imposed.

Membuat andaian dan mengenal pasti pemboleh ubah:
***Make assumptions and identify variables*:**
- Andaikan kadar caj panggilan yang dikenakan adalah sama.
Assume that the call charge rates are the same.
- x mewakili jumlah masa dan y mewakili jumlah caj yang dikenakan.
x represents the amount of time and y represents the total charges imposed.
- y berubah secara langsung dengan x, maka $y = kx$ dengan keadaan k ialah pemalar.
y varies directly with x, then $y = kx$ with the condition that k is a constant.

Mengaplikasi matematik untuk menyelesaikan masalah:
***Apply mathematics to solve problems*:**
$y = kx$
$36 = k(120)$
$k = 0.3$
$\therefore y = 0.3x$

Bagi penggunaan 200 minit,
For 200 *minutes usage*,
$y = 0.3(200)$
$= 60$
Maka, bagi 200 minit panggilan, caj yang dikenakan ialah RM60.
Hence, for 200 *minutes of calls, the charge is* RM60.

Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan:
***Verify and interpret solutions in the context of the problem*:**
$y = 0.3x$



Memurnikan model matematik/*Refine the mathematical model*:
Disebabkan maklumat yang diberikan adalah terhad, kita tidak dapat memurnikan model ini.
Because the information provided is limited, we cannot refine this model.

Melaporkan dapatan/*Report findings*:
Laporan penuh dibuat berdasarkan struktur rangka kerja pemodelan di atas./*The full report is made based on the structure of the modelling framework above.*

D

1 Mengenal pasti dan mendefinisikan masalah:
***Identify and define problems*:**
Bagaimana menentukan tempoh masa yang diambil untuk guli itu mendarat atas permukaan tanah?
How to determine the length of time it takes for the marble to land on the ground surface?

Membuat andaian dan mengenal pasti pemboleh ubah:
***Make assumptions and identify variables*:**
- Geseran udara diabaikan bagi kes ini.
  Air friction is ignored for this case.
- t adalah masa dalam saat./*t is time in second.*
- h adalah jarak guli dari permukaan atas tanah.
  h is a distance of marble from the top surface of the ground.

Jarak/*Distance*: 4 m
Laju/*Speed*: 15 m s^{-1} atau/*or* 15t

Mengaplikasi matematik untuk menyelesaikan masalah:
***Apply math to solve problems*:**
Daya graviti menariknya ke bawah, menukar kedudukannya dengan kira-kira 4.9 m s^{-2}.
The force of gravity pulls it down, changing its position by about 4.9 m s^{-2}.

Pecutan graviti/*Gravitional acceleration*:
$g = -\frac{1}{2}at^2$; $a = 9.8$ m s^{-2}
$g = -4.9t^2$

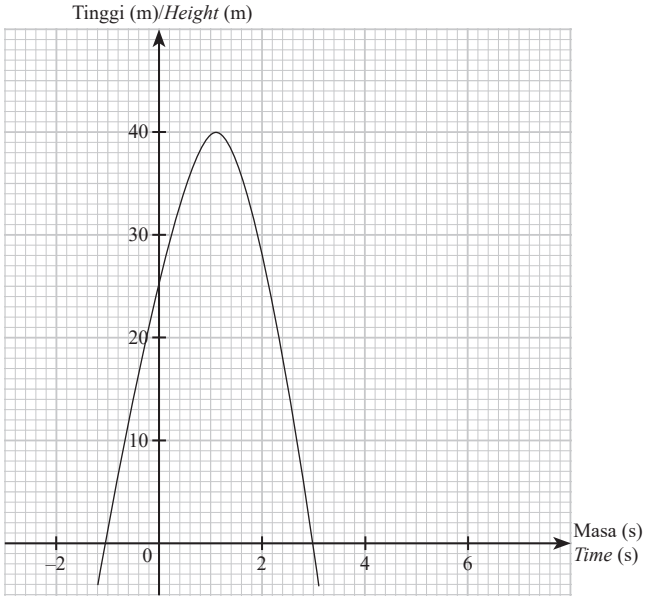
Ketinggian paras guli itu adalah bergantung kepada masa.
The height of the marble level is depending on time.

Persamaan pada bila-bila masa: $4 + 15t - 4.9t^2 = h$
Equation at any time:

Dalam bentuk umum, fungsi kuadratik: $-4.9t^2 + 15t + 4 = h$
In general form, a quadratic function:

Persamaan ketika guli berada di atas permukaan tanah: $4 + 15t - 4.9t^2 = 0$
Equation when the marble is on the ground:

Dalam bentuk umum fungsi kuadratik: $-4.9t^2 + 15t + 4 = 0$
In general form, a quadratic function:



Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan/*Verify and interpret solutions in the context of the problem*:

$-4.9t^2 + 15t + 4 = 0$

Cari punca-punca bagi persamaan di atas,
Find the roots for the above equation,
$a = -4.9$, $b = 15$, $c = 4$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{-15 \pm \sqrt{(15)^2 - 4(-4.9)(4)}}{2(-4.9)}$$

Maka/*Hence*, $t = -0.2$ dan/*and* $t = 3.3$.

Masa tidak boleh negatif, maka apabila $h = 0$, $t = 3.3$ s
Time cannot be negative, hence when $h = 0$, $t = 3.3$ s

Memurnikan model matematik/*Refine the mathematical model*:
Model baharu mungkin diperlukan bagi jenis dan jisim bola yang berbeza. Ketepatan jawapan akan bertambah jika lebih maklumat mengenai jenis dan jisim bola serta jenis permukaan tempat bola melantun diambil.
New model maybe required for different type and mass of balls. The accuracy of the answer will increase if more information about the type and mass of the ball as well as the type of surface where the ball bounces is taken.

Melaporkan dapatan/*Report findings*:
Laporan penuh dibuat berdasarkan struktur rangka kerja pemodelan di atas.
The full report is made based on the structure of the modeling framework above.

2 Mengenal pasti dan mendefinisikan masalah:
***Identify and define problems*:**
Bagaimana untuk menentukan pada saat ke berapakah ketinggian roket itu berada di permukaan tanah?
How to determine at what height the rocket is above the ground?

Membuat andaian dan mengenal pasti pemboleh ubah:
***Make assumptions and identify variables*:**
Jarak roket dari permukaan tanah = 30 m
The distance of rocket from the ground surface

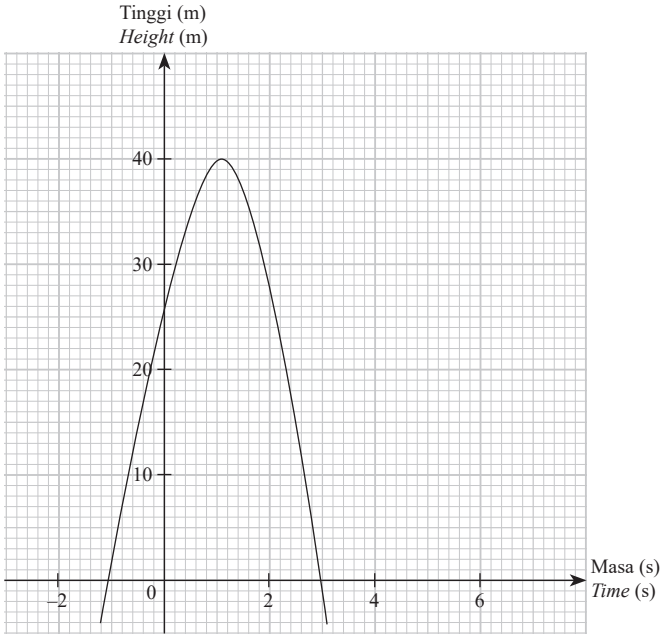
$h(t) = -10t^2 + 20t + 30$

Mengaplikasi matematik untuk menyelesaikan masalah:
***Apply math to solve problems*:**
Ketinggian roket itu adalah bergantung kepada masa.
The height of the rocket is depending on time.

Persamaan pada bila-bila masa: $h(t) = -10t^2 + 20t + 30$
Equation at any time:

Ketika roket itu berada di atas permukaan tanah: $0 = -10t^2 + 20t + 30$
When the rocket is on the ground:

Persamaan dalam bentuk umum fungsi kuadratik:
Equation in the general form of quadratic functions:



Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan/*Verify and interpret solutions in the context of the problem*:

$-10t^2 + 20t + 30$

Cari punca-punca bagi persamaan di atas, /
Find the roots for the above equation,
$a = -10$, $b = 20$, $c = 30$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$t = \frac{-20 \pm \sqrt{(20)^2 - 4(-10)(30)}}{2(-10)}$$

Maka/*Hence*, $t = -1$ dan/*and* $t = 3$

Masa tidak boleh negatif, maka apabila $h = 0$, $t = 3$ s
Time cannot be negative, hence when $h = 0$, $t = 3$ s

Memurnikan model matematik/*Refine the mathematical model*:
Model baharu mungkin diperlukan bagi jisim roket air yang berbeza. Ketepatan jawapan akan bertambah jika lebih maklumat mengenai berat roket air diambil./*New model maybe required for different mass of the water rocket. The accuracy of the answer will increase if more information about the mass of water rocket is taken.*

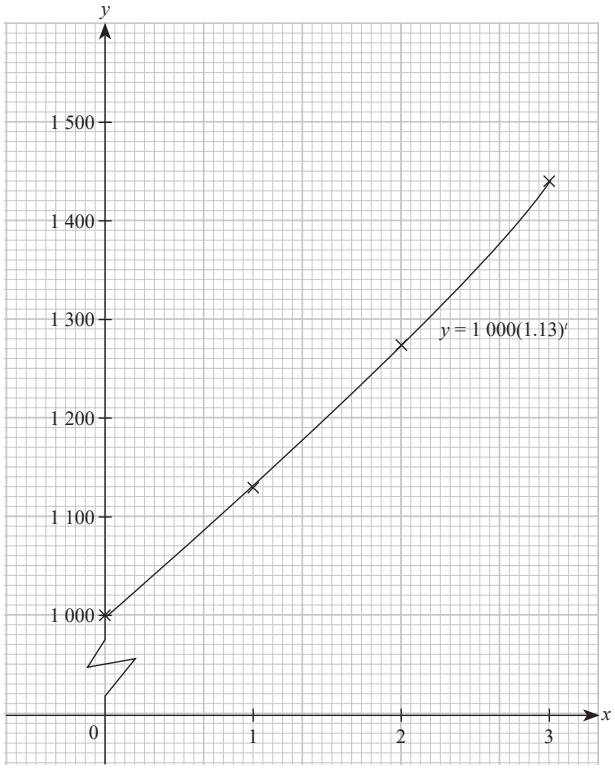
Melaporkan dapatan/*Report findings*:
Laporan penuh dibuat berdasarkan struktur rangka kerja pemodelan di atas./*The full report is made based on the structure of the modelling framework above.*

E

1 Mengenal pasti dan mendefinisikan masalah:
***Identify and define problems*:**
- Jumlah awal simpanan/*Initial amount of savings*: RM1 000
- Kadar faedah: 1.13% setahun/*Interest rate*: 1.13% *per year*
- Terbitkan satu model matematik bagi mengetahui pada tahun ke berapakah wang simpanannya akan menjadi RM1 200.
  Derive a mathematical model to find out in which year the savings will be RM1 200.

Membuat andaian dan mengenal pasti pemboleh ubah:
***Make assumptions and identify variables*:**
- Noraida tidak mengeluarkan atau menambah wang simpanannya sepanjang tempoh penyimpanannya./*Noraida does not withdraw or replenish her savings during the savings period.*
- Jumlah wang simpanan akan meningkat apabila tempoh wang disimpan meningkat.
  The amount of savings will increase as the period of saving money increases.
- y adalah jumlah simpanan dalam tahun./*y is the total savings in year.*
- t adalah tempoh wang disimpan dalam tahun.
  t is a period of money saved in year.
- $MV = P$

Mengaplikasikan matematik untuk menyelesaikan masalah:
***Apply math to solve problems*:**
$y = 1\,000(1.13)^t$



Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan/*Verify and interpret solutions in the context of the problem*:

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

$$y = 1\,000\left(1 + \frac{0.13}{1}\right)^{(1)t}$$

Maka/*Hence*, $y = 1\,000(1.13)^t$

Apabila y = RM1 200, t adalah 1.49 tahun.
When y = RM1 200, t *is* 1.49 *years.*

Oleh itu, wang Noraida akan menjadi RM1 200 selepas 1.49 tahun.
Therefore, Noraida's money will be RM1 200 *after* 1.49 *years.*

Memurnikan model matematik:
***Refine the mathematical model*:**
Model baharu diperlukan sekiranya bilangan kekerapan faedah dikompoun dalam setahun berubah.
A new model is required if the number of compounded interest frequencies in a year changes.

Melaporkan dapatan:
***Report findings*:**
Laporan penuh dibuat berdasarkan struktur rangka kerja pemodelan di atas.
The full report is made based on the structure of the modelling framework above.

PRAKTIS SPM/*SPM PRACTICE*

Kertas 1/*Paper 1*

1 B 2 C 3 A

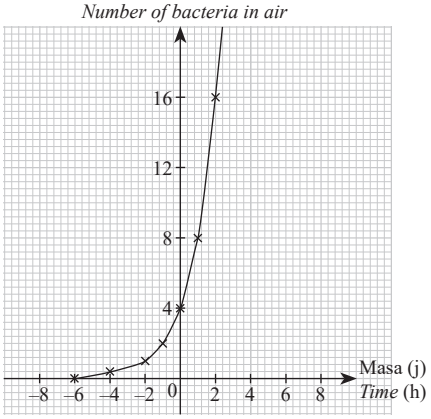
Kertas 2/*Paper 2*

1 Mengenal pasti dan mendefinisikan masalah/*Identify and define problems*:
- Bilangan bakteria di udara, $y = 4(2^t)$.
  Number of bacteria in the air, $y = 4(2^t)$.
- Terbitkan satu model matematik bagi mengetahui berapakah bilangan bakteria di udara di awal pemerhatian dan tempoh masa yang diambil untuk bilangan bakteria itu ditambah menjadi 100.
  Derive a mathematical model to find out the number of bacteria in the air at the beginning of the observation and the time taken for the number of bacteria to be increased to 100.

Membuat andaian dan mengenal pasti pemboleh ubah:
***Make assumptions and identify the variables*:**
- Bilangan bakteria di udara meningkat apabila tempoh masa meningkat.
  The number of bacteria in the air increases as the period of time increases.
- y adalah bilangan kuman di udara.
  y is a number of bacteria in air.
- t adalah tempoh masa dalam jam bakteria tersebut diperhatikan.
  t is a period of time in which the period of time is observed.
- $y = 4(2^t)$

Mengaplikasikan matematik untuk menyelesaikan masalah:
***Apply math to solve problems*:**
$y = 4(2^t)$

Bilangan bakteria di udara
Number of bacteria in air



Pada $y = 100$, t adalah 4.64 jam.
On $y = 100$, t *is* 4.64 *hours.*

Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan:
***Verify and interpret solutions in the context of the problem*:**
$y = 4(2^t)$

Gantikan nilai/*Substitute the value of* $t = 4.64$
$t = 4.64$
$y = 4(2^{4.64})$
$y = 100$

Memurnikan model matematik:
***Refine the mathematical model*:**
Model baharu diperlukan sekiranya jenis bakteria yang dikaji berubah.
New model is required if the type of bacteria studied changes.

Melaporkan dapatan/*Report findings*:
Laporan penuh dibuat berdasarkan struktur rangka kerja pemodelan di atas.
The full report is made based on the structure of the modelling framework above.

PRAKTIS TOPIKAL OBJEKTIF
OBJECTIVE TOPICAL PRACTICE

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

PRAKTIS TOPIKAL STRUKTUR
STRUCTURE TOPICAL PRACTICE

1 (*a*) $m = kn$
$3 = k[2(3) - 4]$
$3 = k(2)$
$k = \frac{3}{2}$

(*b*) $A \propto \frac{1}{B^2}$
$A = \frac{k}{B^2}$
$3 = \frac{k}{2^2}$
$k = 12$
$\therefore A = \frac{12}{B^2}$

$m = \frac{3}{2}n$
$15 = \frac{3}{2}n$
$n = 10$
$n = 2q - 4$
$10 = 2q - 4$
$q = \frac{10 + 4}{2}$
$q = 7$

2 $t \propto \frac{s}{p^2}$
$t = \frac{ks}{p^2}$
$25 = \frac{k(20)}{p^2}$
$25 \times 4 = \frac{20k}{4} \times 4$
$100 = 20k$
$k = \frac{100}{20}$
$k = 5$

$t = \frac{5s}{p^2}$
$t = \frac{5(25)}{25}$
$= 5$ minit/*minutes*

3 $\begin{bmatrix} 10 & 5 \\ 18 & 20 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 33.50 \\ 79.00 \end{bmatrix}$
$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{10(20) - 5(18)}\begin{bmatrix} 20 & -5 \\ -18 & 10 \end{bmatrix}\begin{bmatrix} 33.50 \\ 79.00 \end{bmatrix}$
$= \begin{bmatrix} 2.50 \\ 1.70 \end{bmatrix}$

Satu bungkus nasi lemak/*A pack of nasi lemak*, x = RM2.50
Satu bungkus bihun goreng/*A pack of fried bee hoon*, y = RM1.70

4 (*a*) $\begin{bmatrix} n & 2 \\ -1 & 1 \end{bmatrix}^{-1} = \frac{1}{n+2}\begin{bmatrix} 1 & -2 \\ 1 & n \end{bmatrix}$
$= \begin{bmatrix} \frac{1}{n+2} & \frac{-2}{n+2} \\ \frac{1}{n+2} & \frac{n}{n+2} \end{bmatrix}$
$\begin{bmatrix} \frac{1}{n+2} & \frac{-2}{n+2} \\ \frac{1}{n+2} & \frac{n}{n+2} \end{bmatrix} = \begin{bmatrix} \frac{1}{3} & \frac{m}{3} \\ \frac{1}{3} & \frac{n}{3} \end{bmatrix}$
$\frac{1}{n+2} = \frac{1}{3}$
$n = 1$
$\frac{-2}{n+2} = \frac{m}{3}$
$\frac{-2}{1+2} = \frac{m}{3}$
$m = -2$

(*b*) $\begin{bmatrix}2 & 3\\1 & -2\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}12\\-1\end{bmatrix}$

$\begin{bmatrix}x\\y\end{bmatrix}=\frac{1}{-4-3}\begin{bmatrix}-2 & -3\\-1 & 2\end{bmatrix}\begin{bmatrix}12\\-1\end{bmatrix}$

$=-\frac{1}{7}\begin{bmatrix}-21\\-14\end{bmatrix}$

$=\begin{bmatrix}3\\2\end{bmatrix}$

Maka/*Thus*, $x = 3, y = 2$

5 Kos selepas deduktibel/*Cost after deductible* = RM21 220 – RM650
= RM20 570

Kos yang ditanggung oleh syarikat insurans = $\frac{80}{100}$ × RM20 570
Cost borne by the insurance company
= RM16 456

Kos yang ditanggung oleh Puan Ong/*Cost borne by Puan Ong*
= $\frac{20}{100}$ × RM20 570
= RM4 114

6 (*a*) RM170 × 3 × 7.5% = RM38.25

(*b*) Pendapatan bercukai/*Taxable income*
= RM72 500 – RM12 125 – RM700
= RM59 675

Mengikut Jadual Kadar Cukai Pendapatan Individu untuk Tahun Taksiran 2020:
According to the Individual Income Tax Rate Schedule for Assessment Year of 2020:

Banjaran Pendapatan Bercukai *Chargeable Income* **(RM)**	**Pengiraan** *Calculations* **(RM)**	**Kadar** *Rate* **(%)**	**Cukai** *Tax* **(RM)**
50 001 – 70 000	50 000 pertama *On the first* 50 000 20 000 berikutnya *Next* 20 000	14	1 800 2 800

Cukai bagi RM50 000 pertama/*Tax for the first* RM50 000
= RM1 800

Cukai atas baki berikutnya/*Tax on the next balance*
= (RM59 675 – RM50 000) × 14%
= RM1 354.50

Tiada rebat kerana pendapatan bercukai > RM35 000
No rebate due to taxable income > RM35 000

Cukai pendapatan yang perlu dibayar/*Income tax payable*
= RM1 800 + RM1 354.50
= RM3 154.50

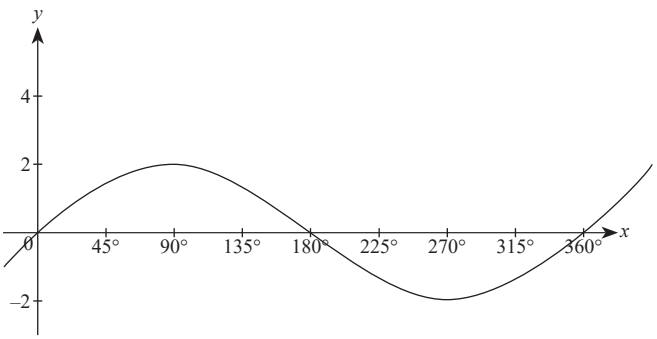
7 (*a*) $x = 110°$, $y = 12$ (*b*) (–3, 3)

8 (*a*) $\sin\theta = 0.9397$
$\theta = \sin^{-1} 0.9397$
$= 70°$

Sukuan I/*Quarter* I, $\theta = 70°$

Sukuan II/*Quarter* II, $\theta = 180° - 70°$
$= 110°$

(*b*)



Nilai maksimum/*Maximum value* = 2

Nilai minimum/*Minimum value* = −2

Pintasan-*x*/*x-intercept* = 180°, 360°

Pintasan-*y*/*y-intercept* = 0

9

Nilai wang/*The value of money* **(RM)**	**Bilangan murid** *Number of pupils*
1 – 3	5
4 – 6	25
7 – 9	8
10 – 12	2

Nilai wang (RM) *The value of money* **(RM)**	**Bilangan murid** *Number of pupils*	**Titik tengah, *x*** *Midpoint, x*	***fx***	***x*²**	***fx*²**
1 – 3	5	2	10	4	20
4 – 6	25	5	125	25	625
7 – 9	8	8	64	64	512
10 – 12	2	11	22	121	242
	$\sum f = 40$		$\sum fx = 221$	$\sum x^2 = 214$	$\sum fx^2 = 1\,399$

Min/*Mean* = $\frac{221}{40}$
= 5.525

Sisihan piawai/*Standard deviation* = $\sqrt{4.449}$
= 2.109

Varians/*Variance* = $\frac{1\,399}{40} - 5.525^2$
= 4.449

10 Mengenal pasti dan mendefinisikan masalah:
***Identify and define problems*:**

- Tentukan jumlah petrol yang diperlukan untuk memandu sejauh 300 km.
  Determine the amount of petrol needed to drive 300 km.
- Diketahui bahawa semakin jauh jarak pemanduan, semakin banyak petrol diperlukan.
  It is known that the farther the driving distance, the more petrol is needed.

Membuat andaian dan mengenal pasti pemboleh ubah:
***Make assumptions and identify variables*:**

- Andaikan kadar harga petrol per liter adalah sama.
  Assume the price of petrol per litre is the same.
- *x* mewakili jumlah isi padu petrol dan *y* mewakili jarak perjalanan.
  x represents the total volume of petrol and y represents the distance travelled.

- y berubah secara langsung dengan x, maka $y = kx$ dengan keadaan k ialah pemalar.
  y changes directly with x, then $y = kx$ with condition k is a constant.

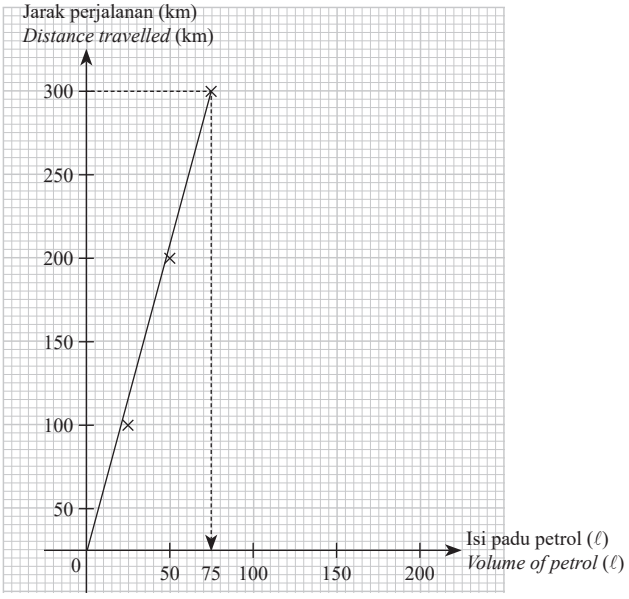
Mengaplikasi matematik untuk menyelesaikan masalah:
***Apply math to solve problems*:**

$y = kx$
$20 = k(5)$
$k = 4$
$\therefore y = 4x$

Bagi 300 km perjalanan/*For* 300 km *journey,*
$300 = 4(x)$
$x = 75$

Maka, bagi 300 km perjalanan, sebanyak 75 ℓ petrol diperlukan.
Hence, for a 300 km *journey,* 75 ℓ *of petrol is needed.*

Menentusahkan dan mentafsir penyelesaian dalam konteks masalah berkenaan/*Verify and interpret solutions in the context of the problem*:



Memurnikan model matematik/*Refine the mathematical model*:
Disebabkan maklumat yang diberikan adalah terhad, kita tidak dapat memurnikan model ini.
Due to the limited information provided, we are unable to refine this model.

Melaporkan dapatan/*Report findings*:
Laporan penuh dibuat berdasarkan struktur rangka kerja pemodelan di atas./*The full report is made based on the modelling framework structure above.*

11 (*a*) (i) $s \propto \frac{1}{\sqrt[3]{t}}$

$s = \frac{k}{\sqrt[3]{t}}$

$7 = \frac{k}{\sqrt[3]{125}}$

$k = 35$

$\therefore s = \frac{35}{\sqrt[3]{t}}$

(ii) $s = \frac{35}{\sqrt[3]{343}}$

$= \frac{35}{7}$

$= 5$

(*b*) $d = 18, P = 33$

$d \propto \frac{1}{p}$ $\qquad d = \frac{k}{P}$

$dP = k$

$k = 18 \times 33$
$k = 594$

$d = \frac{594}{P}$

$dP = 594$
$11P = 594$
$P = \frac{594}{11}$
$P = 54$

12 (*a*) (i) Matriks songsang bagi/*Inverse matrix of* $\begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}$

$= \frac{1}{4 - 12}\begin{bmatrix} 2 & -3 \\ -4 & 2 \end{bmatrix}$

$= -\frac{1}{8}\begin{bmatrix} 2 & -3 \\ -4 & 2 \end{bmatrix}$

Maka/*Thus*, $m = -8$, $n = -3$

(ii) $\begin{bmatrix} 2 & 5 \\ 3 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 24 \\ 10 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{2 - 15}\begin{bmatrix} 1 & -5 \\ -3 & 2 \end{bmatrix}\begin{bmatrix} 24 \\ 10 \end{bmatrix}$

$= -\frac{1}{13}\begin{bmatrix} -26 \\ -52 \end{bmatrix}$

$= \begin{bmatrix} 2 \\ 4 \end{bmatrix}$

Maka/*Thus*, $x = 2$, $y = 4$

(*b*) (i) $x + y = 6$
$2x + 3y = 14$

(ii) $\begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 6 \\ 14 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{3 - 2}\begin{bmatrix} 3 & -1 \\ -2 & 1 \end{bmatrix}\begin{bmatrix} 6 \\ 14 \end{bmatrix}$

$= 1\begin{bmatrix} 4 \\ 2 \end{bmatrix}$

$= \begin{bmatrix} 4 \\ 2 \end{bmatrix}$

Maka, harga bagi sebatang pen ialah RM4 dan sebatang pembaris ialah RM2.
Thus, the price for a pen is RM4 *and a ruler is* RM2.

13 (*a*) Kos perubatan selepas deduktibel/*Medical cost after deductible*
= RM18 000 – RM1 050
= RM16 950

Kos yang ditanggung oleh syarikat insurans
Cost borne by the insurance company

$= \frac{80}{100} \times$ RM16 950

= RM13 560

Kos yang ditanggung oleh Hani/*Cost borne by Hani*

$= \left(\frac{20}{100} \times \text{RM16 950}\right) + \text{RM1 050}$

= RM4 440

(*b*) (i) Jumlah insurans yang harus dibeli
Total insurance to be purchased

$= \frac{75}{100} \times$ RM450 000

= RM337 500

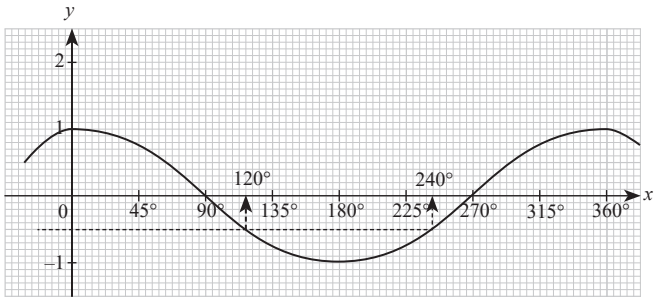
(ii) Bayaran pampasan/*Compensation payment*
= RM160 000 – RM3 000
= RM157 000

14 (*a*) 2 kos/*cos* $\theta + 1 = 0$

kos/*cos* $\theta = -\frac{1}{2}$

kos negatif berada pada sukuan II dan III.
Negative cos is in quarters II *and* III.

Walaubagaimanapun, hanya sudut pada sukuan III yang diambil kira bagi memenuhi $180° \leqslant \theta \leqslant 360°$.
However, only the angle of quarter III *is taken into account to meet* $180° \leqslant \theta \leqslant 360°$.



$\therefore \theta = 240°$

(*b*) $y = \frac{1}{2} \sin 2x + 1$

15 (*a*) Segi tiga *ABC* dan *DBE* adalah serupa.
The triangles ABC and DBE are similar.

Faktor skala/*Scale factor*, $k = \frac{6}{18} = \frac{1}{3}$

Luas imej = $k^2 \times$ luas objek
Area of image = $k^2 \times$ *area of object*

$= \left(\frac{1}{3}\right)^2 \times 24$

$= \frac{1}{9} \times 24$

= 2.7 cm²

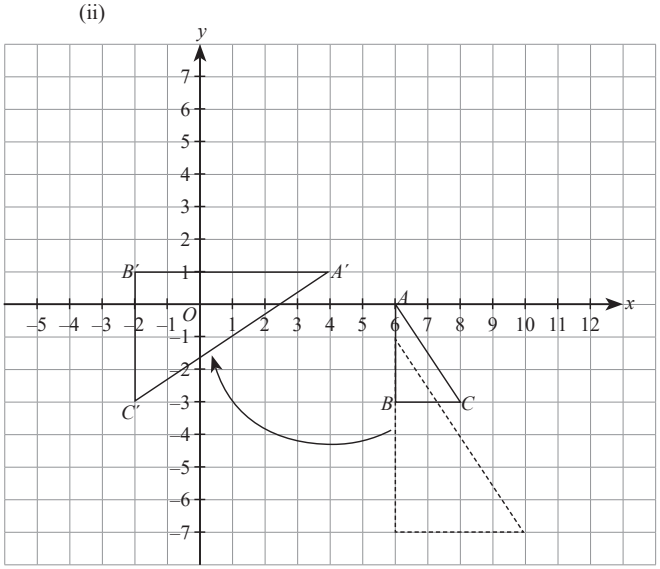
(*b*) Luas imej = $k^2 \times$ luas objek
Area of image = $k^2 \times$ *area of object*
= $k^2 \times 18$
= $2^2 \times 18$
= 72 cm²

Luas kawasan berlorek = luas imej – luas objek
Area of the shaded region = *area of image* – *area of object*
= 72 – 18
= 54 cm²

16 (*a*) (i) (10, –3)
(ii) (3, 2)

(*b*) (i) **X**: Pembesaran pada pusat (6, 1) dengan faktor skala, $k = 2$.
The enlargement at centre (6, 1) *with the scale factor,* $k = 2$.
Y: Putaran 90° ikut arah jam pada pusat (6, 1).
Rotate 90° *clockwise at the centre* (6, 1).

(ii)



(iii) $k^2 = \frac{\text{luas imej/}\textit{area of image}}{\text{luas objek/}\textit{area of object}}$

$2^2 = \frac{\text{luas imej/}\textit{area of image}}{72}$

Luas imej/*Area of image* = 72 × 4
= 288 m²

17 (*a*) (i) kos/*cos* $\theta = -0.883$
$\theta =$ kos/*cos*$^{-1}(-0.883)$
$\theta = 152°$

Sukuan II/*Quarter* II
$\theta = 152°$

Sukuan III/*Quarter* III
$\alpha = 180° - 152° = 28°$
$\theta = 180° + 28° = 208°$

$\theta = 152°$ memenuhi syarat $0° \leqslant \theta \leqslant 180°$.
$\theta = 152°$ *meet the requirements* $0° \leqslant \theta \leqslant 180°$.

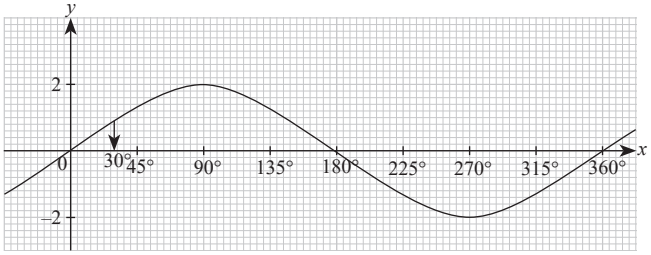
(ii) tan $\theta =$ tan α

$\tan \alpha = \frac{8}{10}$

$\alpha = 38.7°$

$\theta = 38.7° + 180°$
$= 218.7°$

(*b*) (i)



(ii) Nilai maksimum/*Maximum value* = 2
Nilai minimum/*Minimum value* = −2
(iii) $x = 30°$