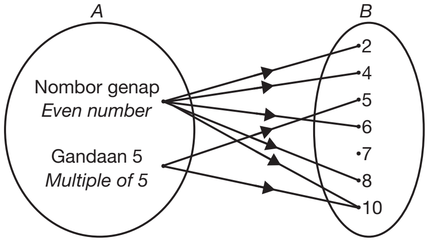
Jawapan

Kertas Model SPM

Kertas 1

1 (a) Bukan fungsi. Objek '5' tidak mempunyai imej.
Not a function. The object '5' does not have image.

(b)



(i) Hubungan banyak kepada banyak
Many-to-many relation

(ii) Julat/*Range* = {2, 4, 5, 6, 8, 10}

2 (a) $gf(x) = 25x^2 + 20x + 1$

$g(2 + 5x) = 25x^2 + 20x + 1$

Biar/*Let* $y = 2 + 5x$

$$x = \frac{y-2}{5}$$

$$g(y) = 25\left(\frac{y-2}{5}\right)^2 + 20\left(\frac{y-2}{5}\right) + 1$$
$$= y^2 - 4y + 4 + 4y - 8 + 1$$
$$= y^2 - 3$$
$$g(x) = x^2 - 3$$

(b) (i) $x - 6 = (x - 3) - 3$
$= k^2(x)$

(ii) $x^2 - 6 = [(x^2) - 3] - 3$
$= k^2h(x)$

(iii) Biar/*Let* $y = k^{-1}(x)$
$k(y) = x$
$y - 3 = x$
$y = x + 3$
$\therefore \quad k^{-1}(x) = x + 3$
$(x + 3)^2 = hk^{-1}(x)$

3 (a) Anggap/*Assume* $px^2 - 18x + 29 = 0$

$$b^2 - 4ac < 0$$
$$(-18)^2 - 4(p)(29) < 0$$
$$116p > 324$$
$$p > 2.79$$
$$p_{\min} = 3$$

(b)
$$h(x) = 3x^2 - 18x + 29$$
$$149 = 3x^2 - 18x + 29$$
$$3x^2 - 18x + 29 - 149 = 0$$
$$3x^2 - 18x - 120 = 0$$
$$x^2 - 6x - 40 = 0$$
$$(x - 10)(x + 4) = 0$$
$$x = -4, 10$$

Kedudukan hutan/*Position of the forest,* $x = -4 + 10$
$= 6$

Altitud pesawat/*The altitude of the aircraft*
$= h(6) = 3(6)^2 - 18(6) + 29$
$= 29$ m

Pesawat itu terselamat daripada terhempas di kawasan hutan kerana terbang pada altitud lebih tinggi daripada hutan.
The aircraft is saved from crashing into the forest as it flies at the altitude higher than the forest.

4 H – hitam/*black*
P – putih/*white*
K – kelabu/*gray*
Objek secaman/*Identical objects*: 3H, 2P, 2K

(a) $\dfrac{7!}{3!2!2!} - (1 \times {}^3P_3) = 210 - 6$
$= 204$

(b) $2 \times \dfrac{{}^2P_2 \times {}^5P_5}{3!2!2!} + \dfrac{{}^3P_2 \times {}^5P_5}{3!2!2!} = 20 + 30$
$= 50$

5 $(144p^4)^{\frac{3}{2}} \div (216p^{-3})^{-\frac{2}{3}} = [(2^2 \times 3)^2 p^4]^{\frac{3}{2}} \div [(2 \times 3)^3 p^{-3}]^{-\frac{2}{3}}$

$$2^x\, 3^y\, p^z = (2^2 \times 3)^3 p^6 \div (2 \times 3)^{-2} p^2$$
$$= 2^6 \times 3^3 \times p^6 \div (2^{-2} \times 3^{-2} \times p^2)$$
$$= 2^{6-(-2)} \times 3^{3-(-2)} \times p^{6-2}$$
$$= 2^8\, 3^5\, p^4$$

$\therefore x = 8, y = 5, z = 4$

6 (a)
$$y = ax^n$$
$$100 = a(1)^n$$
$$\therefore a = 100$$
$$2\,700 = 100(3)^n$$
$$3^n = 27$$
$$= 3^3$$
$$\therefore n = 3$$

(b)
$$y = 100x^3$$
$$Y = y$$
$$X = x^3$$
$$m = 100$$
$$c = 0$$
$$\therefore Y = 100X$$
$$10 = 100p$$
$$p = 0.1$$
$$q = 100(4)$$
$$= 400$$

7 (a) $a = \dfrac{10-4}{2}$
$= 3$

b = bilangan kitaran dalam 360°
number of cycles in 360°

$\frac{b}{2}$ = bilangan kitaran dalam 180°
number of cycles in 180°
= 4
$b = 8$
atau/*or*
Kala/*Period* $= \frac{180°}{4} = \frac{360°}{b}$
$b = 8$
c = translasi dari graf asas
translation from the basic graph
= 7

(b) (i) Kala/*Period* $= \frac{360°}{3}$
$= 120°$
(ii) Amplitud/*Amplitude* = 5

8 (a) Biar sebutan pertama dan beza sepunya bagi janjang aritmetik masing-masing ialah a dan d.
Let the first term and common difference for the arithmetic progression are a and d respectively.
Bagi janjang geometri/*For the geometry progression,*
$T_1 = a$
$T_2 = a + 3d$
$ar = a + 3d$ … ①
$T_3 = a + 12d$
$ar^2 = a + 12d$ … ②
Daripada/*From* ①: $r = \frac{a + 3d}{a}$ … ③
Gantikan ③ ke dalam ②/*Substitute* ③ *into* ②,

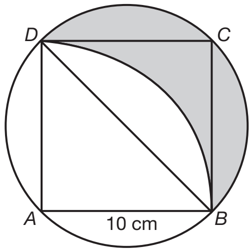
$$a\left(\frac{a+3d}{a}\right)^2 = a + 12d$$
$$a\left(\frac{a^2+6ad+9d^2}{a^2}\right) = a + 12d$$
$$a^2 + 6ad + 9d^2 = a^2 + 12ad$$
$$9d^2 = 6ad$$
$$9d = 6a$$
$$3d = 2a$$

Gantikan ke dalam ③/*Substitute into* ③,
$$r = \frac{a + 2a}{a} = 3$$

(b) $a = 6,\ d = \frac{2}{3}a$
$= 4$
$$S_{12} = \frac{12}{2}[2(6) + 11(4)] = 336$$

9 Jejari bulatan/*Radius of circle* $= \frac{1}{2}\sqrt{10^2 + 10^2}$
$= 5\sqrt{2}$

Luas semi bulatan/*Area of semicircle* $= \frac{\pi}{2}(5\sqrt{2})^2$
$= 25\pi$



Luas tembereng BD/*Area of segment BD*
$= \frac{1}{2}(10)^2\left(\frac{\pi}{2}\right) - \frac{1}{2}(10)^2$
$= 25\pi - 50$

Luas rantau berlorek/*The area of shaded region*
$= 25\pi - (25\pi - 50)$
$= 50\ \text{cm}^2$

10 Biar/*Let* $\sqrt{11 - 6\sqrt{2}} = \sqrt{a} - \sqrt{b}$
$$11 - 6\sqrt{2} = (\sqrt{a} - \sqrt{b})^2$$
$$11 - 6\sqrt{2} = a + b - 2\sqrt{ab}$$
$a + b = 11$
$b = 11 - a$ … ①
$-2\sqrt{ab} = -6\sqrt{2}$
$\sqrt{ab} = 3\sqrt{2}$
$ab = 18$ … ②
Gantikan ① ke dalam ②/*Substitute* ① *into* ②,
$$a(11 - a) = 18$$
$$11a - a^2 = 18$$
$$a^2 - 11a + 18 = 0$$
$$(a - 9)(a - 2) = 0$$
$a = 2$ atau/*or* 9
Daripada/*From* ①, $b = (11 - 2)$ atau/*or* $(11 - 9)$
$= 9$ atau/*or* 2
$\therefore\ a > b$
$$\sqrt{11 - 6\sqrt{2}} = \sqrt{a} - \sqrt{b} = \sqrt{9} - \sqrt{2} = 3 - \sqrt{2}$$

11 (a) $P(Z > k) = 0.5 - 0.3542$
$= 0.1458$
$k = 1.055$

(b) $\frac{X - 65}{\sqrt{12.25}} = 1.055$
$X - 65 = 3.6925$
$X = 68.6925$

12 (a) $\underset{x \to 3}{\text{had}} \frac{\sqrt{x+6} - 3}{4 - \sqrt{x+13}} / \lim_{x \to 3} \frac{\sqrt{x+6} - 3}{4 - \sqrt{x+13}}$
$$= \underset{x \to 3}{\text{had}} \frac{(\sqrt{x+6} - 3)(4 + \sqrt{x+13})}{16 - (x+13)}$$
$$\lim_{x \to 3} \frac{(\sqrt{x+6} - 3)(4 + \sqrt{x+13})}{16 - (x+13)}$$
$$= \underset{x \to 3}{\text{had}} \frac{(x + 6 - 9)(4 + \sqrt{x+13})}{(16 - x - 13)(\sqrt{x+6} + 3)}$$
$$\lim_{x \to 3} \frac{(4 + \sqrt{x+13})}{(16 - x - 13)(\sqrt{x+6} + 3)}$$

$= \text{had}_{x \to 3} \dfrac{(x-3)(4+\sqrt{x+13})}{(x-3)(\sqrt{x+6}+3)} / \lim_{x \to 3} \dfrac{(x-3)(4+\sqrt{x+13})}{(x-3)(\sqrt{x+6}+3)}$

$= \text{had}_{x \to 3} \dfrac{(x-3)(4+\sqrt{x+13})}{-(x-3)(\sqrt{x+6}+3)} / \lim_{x \to 3} \dfrac{(x-3)(4+\sqrt{x+13})}{-(x-3)(\sqrt{x+6}+3)}$

$= \dfrac{(4+\sqrt{3+13})}{-(\sqrt{3+6}+3)}$

$= \dfrac{4+4}{-(3+3)}$

$= -\dfrac{4}{3}$

(b) (i) $\dfrac{3}{1-2} = a + 3$

$a = -3 - 3$

$= -6$

(ii) Graf $f(x)$ bersambungan pada $x = 1$.
The graph $f(x)$ is continuous at $x = 1$.

13 (a) $2\pi r(3h) = 270\pi$

$h = \dfrac{270\pi}{6\pi r}$

$= 45r^{-1}$

$V = \pi r^2(3h) + \dfrac{1}{3}\pi(r+3)^2(h)$

$= 3\pi r^2(45r^{-1}) + \dfrac{\pi(r^2+6r+9)(45r^{-1})}{3}$

$= 135\pi r + 15\pi r + 90\pi + 135\pi r^{-1}$

$= 150\pi r + 90\pi + 135\pi r^{-1}$

(b) V minimum apabila/*V is minimum when*

$\dfrac{dV}{dr} = 0$

$150\pi - 135\pi r^{-2} = 0$

$150\pi = \dfrac{135\pi}{r^2}$

$r^2 = 0.9$

$r = \dfrac{3}{10}\sqrt{10}$

$h = 45\left(\dfrac{3}{10}\sqrt{10}\right)^{-1}$

$= 15\sqrt{10}$

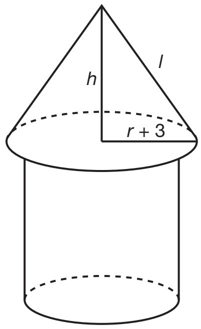
(c) Panjang condong kon/*The slant height of cone, l*

$l^2 = h^2 + (r+3)^2$

$= (15\sqrt{10})^2 + \left(\dfrac{3}{10}\sqrt{10} + 3\right)^2$

$= 2265.5921$

$l = 47.60$



Luas permukaan terdedah/*The exposed surface area*
= permukaan melengkung silinder + permukaan melengkung kon + permukaan tapak kon terdedah
curved surface of cylinder + curved surface of cone + exposed base of cone

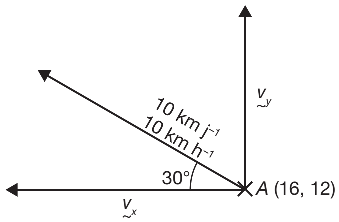
$= 2\pi r(3h) + \pi(r+3)(l) + \pi(r+3)^2 - \pi r^2$

$= 6\pi\left(\dfrac{3}{10}\sqrt{10}\right)(15\sqrt{10}) + \pi\left(\dfrac{3}{10}\sqrt{10}+3\right)(47.6)$
$+ \pi\left(\dfrac{3}{10}\sqrt{10}+3\right)^2 - \pi\left(\dfrac{3}{10}\sqrt{10}\right)^2$

$= 1\,485.06 \text{ cm}^2$

Kos mengecat/*The painting cost*
= RM0.10 × 1 485.06
= RM148.51
≈ RM149

14



(a) $\underset{\sim}{v}_x = -10 \text{ kos } 30°/10 \cos 30°$

$= -5\sqrt{3}$

$\underset{\sim}{v}_y = 10 \sin 30°$

$= 5$

Vektor halaju/*The velocity vector*, $\underset{\sim}{v} = \begin{pmatrix} p \\ 5 \end{pmatrix}$ km j^{-1}.

$\therefore \quad p = -5\sqrt{3}$

(b) Vektor kedudukan/*The position vector*

$= \begin{pmatrix} 16 \\ 12 \end{pmatrix} + \begin{pmatrix} -5\sqrt{3} \\ 5 \end{pmatrix} t$

(c) Vektor kedudukan/*The position vector* $= \begin{pmatrix} 0 \\ y \end{pmatrix}$

$\begin{pmatrix} 16 - 5\sqrt{3}t \\ 12 + 5t \end{pmatrix} = \begin{pmatrix} 0 \\ y \end{pmatrix}$

$\therefore \quad 16 - 5\sqrt{3}t = 0$

$t = 1.85$ j/1.85 h

= 1 jam 51 minit
1 hour 51 minutes

∴ Pada jam 1451/*At* 1451 *hours*

(d) Apabila/*When* $t = 1.85$, $y = 12 + 5(1.85)$

$= 21.25$ km

15 (a) $3y + x = -3$

$y = -\dfrac{1}{3}x - 1$

$m_{AB} = -\dfrac{1}{3}$

$m_{BC} = 3$

Persamaan garis lurus BC
The equation of straight line BC

$y = 3x + c$

$7 = 3(-4) + c$

$c = 19$

$\therefore \quad y = 3x + 19$

(b) $-\frac{1}{3}x - 1 = 3x + 19$

$-x - 3 = 9x + 57$

$10x = -60$

$x = -6$

$y = 3(-6) + 19$

$= 1$

$\therefore\ B(-6, 1)$

(c) $D(0, y)$

$\frac{y-(-2)}{0-3} = \frac{7-(-2)}{-4-3}$

$\frac{y+2}{-3} = \frac{9}{-7}$

$y = \frac{13}{7}$

Biar/*Let* $AD : DC = m : n$

$\left(0, \frac{13}{7}\right) = \left(\frac{3n-4m}{m+n}, \frac{-2n-7m}{m+n}\right)$

$\frac{13}{7} = \frac{-2n-7m}{m+n}$

$13m + 13n = -14n + 49m$

$27n = 36m$

$\frac{m}{n} = \frac{27}{36}$

$= \frac{3}{4}$

$\therefore AD : DC = 3 : 4$

Kertas 2

1 $x + 2y + 3z = 23 \ldots ①$

$x - y + 2z = 9 \ldots ②$

$3x + y - 6z = -21 \ldots ③$

① – ② $\quad 3y + z = 14 \ldots ④$

② × 3 $\quad 3x - 3y + 6z = 27 \ldots ⑤$

③ – ⑤ $\quad 4y - 12z = -48 \ldots ⑥$

④ × 12 $\quad 36y + 12z = 168 \ldots ⑦$

⑥ + ⑦ $\quad 40y = 120$

$y = 3$

Daripada/*From* ④: $z = 5$

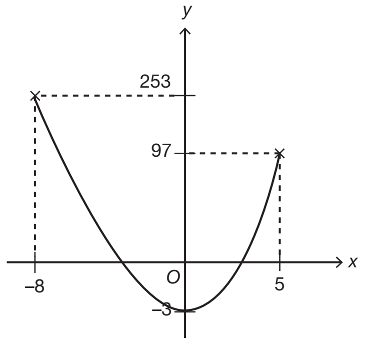
Daripada/*From* ②: $x = 2$

2 (a) $f(-8) = 4(-8)^2 - 3$

$= 253$

$f(5) = 4(5)^2 - 3$

$= 97$



$\therefore -3 \leqslant f(x) \leqslant 253$

(b) $x \geqslant 0$ (terima/*accept* $x \leqslant 0$)

(c) $ff(x) = 33$

$f(4x^2 - 3) = 33$

$4(4x^2 - 3)^2 - 3 = 33$

$4(4x^2 - 3)^2 = 36$

$(4x^2 - 3)^2 = 9$

$(4x^2 - 3) = \pm 3$

$4x^2 = \pm 3 + 3$

$x^2 = \frac{6}{4}, 0$

$x = \pm\sqrt{\frac{3}{2}}, 0$

3 (a) $f(x) = 4x^2 + 18x - 5$

$= 4\left(x^2 + \frac{9}{2}x\right) - 5$

$= 4\left[\left(x + \frac{9}{4}\right)^2 - \frac{81}{16}\right] - 5$

$= 4\left(x + \frac{9}{4}\right)^2 - \frac{81}{4} - 5$

$= 4\left(x + \frac{9}{4}\right)^2 - \frac{101}{4}$

(b) a positif/*is positive*,

$\therefore$ Titik minimum/*Minimum point*: $\left(-\frac{9}{4}, -\frac{101}{4}\right)$

(c) Pintasan-*y*/*y-intercept* $= -5$

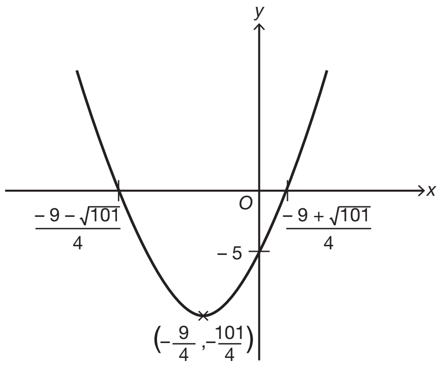
Punca/*Roots*, $f(x) = 0$

$4\left(x + \frac{9}{4}\right)^2 - \frac{101}{4} = 0$

$4\left(x + \frac{9}{4}\right)^2 = \frac{101}{4}$

$x = \pm\sqrt{\frac{101}{16}} - \frac{9}{4}$

$= \frac{-9 \pm \sqrt{101}}{4}$



(d) $f(x) = -4\left(x + \frac{9}{4}\right)^2 + \frac{101}{4}$

4 (a) $\text{kot } x - \frac{\text{kosek } x}{\text{sek}^3 x} = \frac{\text{kos } x}{\sin x} - \frac{\text{kos}^3 x}{\sin x}$

$= \frac{\text{kos } x - \text{kos}^3 x}{\sin x}$

$= \frac{\text{kos } x(1 - \text{kos}^2 x)}{\sin x}$

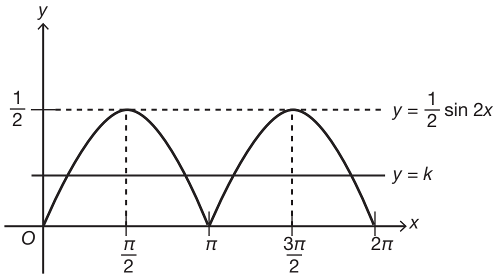
$= \frac{\text{kos } x \sin^2 x}{\sin x}$

$= \sin x \text{ kos } x$

$= \frac{1}{2}\sin 2x$ (terbukti)

$$cot\ x - \frac{cosec\ x}{sec^3\ x} = \frac{cos\ x}{sin\ x} - \frac{cos^3\ x}{sin\ x}$$
$$= \frac{cos\ x - cos^3\ x}{sin\ x}$$
$$= \frac{cos\ x(1 - cos^2\ x)}{sin\ x}$$
$$= \frac{cos\ x\ sin^2\ x}{sin\ x}$$
$$= sin\ x\ cos\ x$$
$$= \frac{1}{2}\ sin\ 2x\ (proven)$$

(b) (i)



(ii) $\left|\text{kot}\ x - \frac{\text{kosek}\ x}{\text{sek}^3\ x}\right| = k$

$$\left|\frac{1}{2}\sin 2x\right| = k$$
$$y = k$$
$$\therefore\quad 0 < k < \frac{1}{2}$$

5 (a) $(\log_{2a} 4)(1 + \log_a 2) = \frac{\log_a 4}{\log_a 2a}(1 + \log_a 2)$
$$= \frac{\log_a 4}{\log_a 2 + \log_a a}(1 + \log_a 2)$$
$$= \frac{\log_a 4}{(\log_a 2 + 1)}(1 + \log_a 2)$$
$$= \log_a 4$$

(b) Biar/*Let* $y = 5^x$
$$(5^x)^2(5) - 5^x(5) + 2 = 2(5^x)$$
$$5y^2 - 5y + 2 = 2y$$
$$5y^2 - 7y + 2 = 0$$
$$(5y - 2)(y - 1) = 0$$
$$y = \frac{2}{5}, 1$$

$5^x = \frac{2}{5}$ atau/*or* $5^x = 5^0$

$x \lg 5 = \lg\frac{2}{5}$ $\quad x = 0$

$x = -0.5693, 0$

6 (a) $P = \left(\frac{-3 + 9}{2}, \frac{2 + 8}{2}\right)$
$= (3, 5)$

(b) $m_{AB} = \frac{8 - 2}{9 - (-3)}$
$= \frac{1}{2}$
$m_n = -2$
$y = -2x + c$
$5 = -2(3) + c$
$c = 11$
$\therefore\ y = -2x + 11$

(c) $Q(0, 11)$
$$A_{\Delta ABQ} = \frac{1}{2}\left|\begin{matrix} 0 & -3 & 9 & 0 \\ 11 & 2 & 8 & 11 \end{matrix}\right|$$
$$= \frac{1}{2}|(0 - 24 + 99) - (0 + 18 - 33)|$$
$= 45$ unit^2/*units*^{2}

7 $\overrightarrow{OP} = \mathbf{p}$; $\overrightarrow{OQ} = \mathbf{q}$

(a) (i) $\overrightarrow{RQ} = \overrightarrow{RO} + \overrightarrow{OQ}$
$$= -\frac{3}{4}\overrightarrow{OP} + \mathbf{q}$$
$$= \mathbf{q} - \frac{3}{4}\mathbf{p}$$

(ii) $\overrightarrow{OS} = \overrightarrow{OP} + \overrightarrow{PS}$
$$= \mathbf{p} + \frac{1}{2}\overrightarrow{PQ}$$
$$= \mathbf{p} + \frac{1}{2}(\overrightarrow{PQ} + \overrightarrow{OQ})$$
$$= \frac{1}{2}(\mathbf{p} + \mathbf{q})$$

(b) (i) $\overrightarrow{ST} = \lambda(\overrightarrow{RO} + \overrightarrow{OS})$
$$= \lambda\left(-\frac{3}{4}\mathbf{p} + \frac{1}{2}\mathbf{p} + \frac{1}{2}\mathbf{q}\right)$$
$$= \frac{1}{2}\lambda\ \mathbf{q} - \frac{1}{4}\lambda\ \mathbf{p}$$

(ii) $\overrightarrow{ST} = \overrightarrow{SQ} + \overrightarrow{QT}$
$$= \overrightarrow{SO} + \overrightarrow{OQ} + \mu\overrightarrow{OQ}$$
$$= -\frac{1}{2}\mathbf{p} - \frac{1}{2}\mathbf{q} + \mathbf{q} + \mu(\mathbf{q})$$
$$= -\frac{1}{2}\mathbf{p} + \left(\frac{1}{2} + \mu\right)\mathbf{q}$$
$$\frac{1}{2}\lambda\ \mathbf{q} - \frac{1}{4}\lambda\ \mathbf{p} = -\frac{1}{2}\mathbf{p} + \left(\frac{1}{2} + \mu\right)\mathbf{q}$$

Bandingkan pekali/*Compare the coefficients*:

$\mathbf{p}$: $-\frac{1}{4}\lambda = -\frac{1}{2}$
$\lambda = 2$

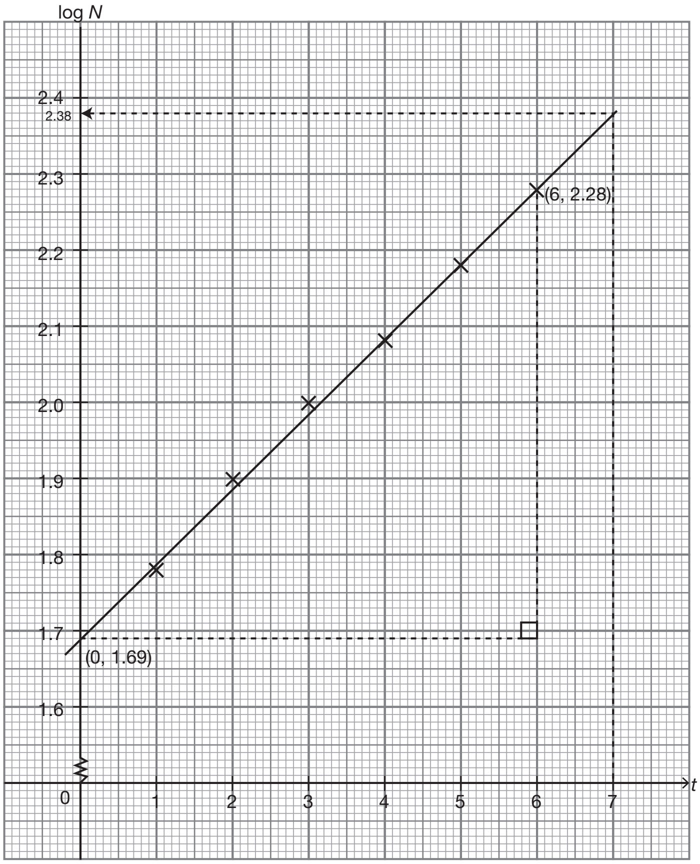
$\mathbf{q}$: $\frac{1}{2}\lambda = \frac{1}{2} + \mu$
$\mu = \frac{1}{2}$

8 $N = Ar^t$

$\log N = \log A + t \log r$

t	1	2	3	4	5	6
$\log N$	1.78	1.90	2.00	2.08	2.18	2.28

(a)



(b) (i) $c = 1.69$

$\log A = 1.69$

$A = 48.98$

(ii) $m = \dfrac{2.28 - 1.69}{6 - 0}$

$= 0.0983$

$\log r = 0.0983$

$r = 1.253$

(c) $t = 7$

$\log N = 2.38$

$N = 239.9$

≈ 240

9 (a) $y_1 = 1^2 - 9$

$= -8$

$y_2 = 3^2 - 9$

$= 0$

(b) $A_R = \int_0^1 x^2 - 9\, dx + \frac{1}{2}(8)(2)$

$= \left[\dfrac{x^3}{3} - 9x\right]_0^1 + 8$

$= \left|\left[\dfrac{1^3}{3} - 9(1)\right] - 0\right| + 8$

$= 16\frac{2}{3}$ unit^2/*units*^{2}

$A_S = \int_1^3 x^2 - 9\, dx - \frac{1}{2}(8)(2)$

$= \left[\dfrac{x^3}{3} - 9x\right]_1^3 - 8$

$= \left|\left[\dfrac{3^3}{3} - 9(3)\right] - \left[\dfrac{1^3}{3} - 9(1)\right]\right| - 8$

$= 1\frac{1}{3}$ unit^2/*units*^{2}

$\dfrac{A_R}{A_S} = \dfrac{16\frac{2}{3}}{1\frac{1}{3}}$

$= 12.5$

$A_R = 12.5A_S$ (tertunjuk/*shown*)

(c) $V = \pi\int_1^3 (x^2 - 9)^2\, dx - \frac{1}{3}\pi(8)^2(2)$

$= \pi\int_1^3 (x^4 - 18x^2 + 81)\, dx - 42\frac{2}{3}\pi$

$= \pi\left[\frac{x^5}{5} - 6x^3 + 81x\right]_1^3 - 42\frac{2}{3}\pi$

$= \pi\left\{\left[\frac{3^5}{5} - 6(3)^3 + 81(3)\right] - \left[\frac{1^5}{5} - 6\,(1)^3 + 81(1)\right]\right\}$
$- 42\frac{2}{3}\pi$

$= 54\frac{2}{5}\pi - 42\frac{2}{3}\pi$

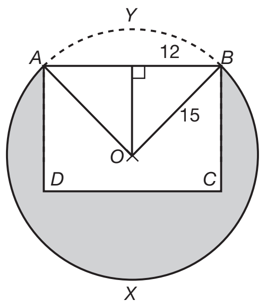
$= 11\frac{11}{15}\pi$ unit^3/*units*^{3}

10 (a) $\angle AOB = 2\sin^{-1}\frac{12}{15}$

$= 106.26° \times \frac{\pi \text{ rad}}{180°}$

$= 1.8546$ rad

≈ 1.855 rad (tertunjuk/*shown*)



(b) Luas tembereng *ABY*/*The area of segment ABY*

$= \frac{1}{2}(15)^2(1.855) - \frac{1}{2}(15)^2(\sin 106.26°)$

$= 100.69$ cm^2

(c) $A_{AXBCDA} = \pi(15)^2 - (24)(13) - 100.69$

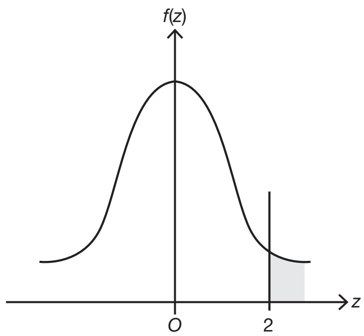
$= 294.17$ cm^2

(d) Peratusan isi padu kayu yang tertinggal
The percentage of wood remaining

$= \frac{294.17\, h}{\pi(15)^2\, h} \times 100\%$

$= 41.62\%$

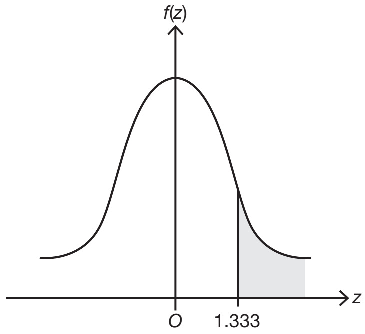
11 (a) $X \sim N(90, 15^2)$



(i) $P(X > 120) = P\left(Z > \frac{120 - 90}{15}\right)$

$= P(Z > 2)$

$= 0.02275$



(ii) $P(X > 110) = P\left(Z > \frac{110 - 90}{15}\right)$

$= P\,(Z > 1.333)$

$\frac{n(X > 110)}{n(S)} = 0.09127$

$n(X > 110) = 82\,143$

(b) (i) $n = 2$

$p = 0.5$

(ii) $P(X = 1) = {}^2C_1(0.5)^1(0.5)^1$

$= 0.5$

12 (a) $s_K = \int 2t - 8\, dt$

$= t^2 - 8t + c$

$t = 0$, s_K (dari/*from P*) = 60 (terima juga s_K dari Q
accept s_K from Q)

$\therefore\ s_K = t^2 - 8t + 60$ atau/*or* $s_{K(Q)} = t^2 - 8t$

Ketika mereka bertemu/*The moment they meet*

$s_S = s_K$ atau/*or* $s_S - 60 = s_{K(Q)}$

$t^2 + 4t = t^2 - 8t + 60$

$12t = 60$

$t = 5$

$s_S = 5^2 + 4(5)$

$= 45$ m

Mereka berada pada 45 m ke kanan dari titik *P*.
They are at 45 m to the right from point P.

(b) $v_K = 0$

$2t - 8 = 0$

$t = 4$

$s_K = (4)^2 - 8(4) + 60$ atau/*or* $s_{K(Q)} = (4)^2 - 8(4)$

$= 44$ m $\qquad = -16$ m

Khalid berada pada 44 m ke kanan dari titik *P*
(16 m ke kiri dari titik *Q*).
Khalid is at 44 m to the right from point P
(*at 16 m to the left from point Q*).

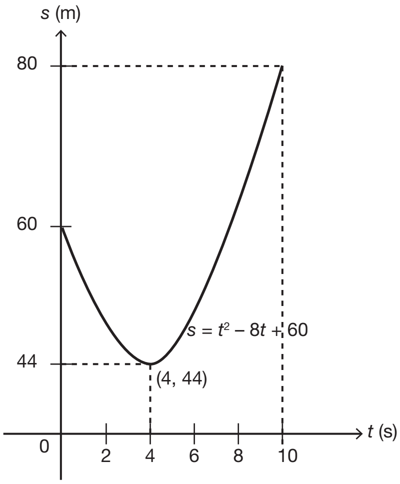
(c) $v_S = \frac{ds_s}{dt}$

$= 2t + 4$

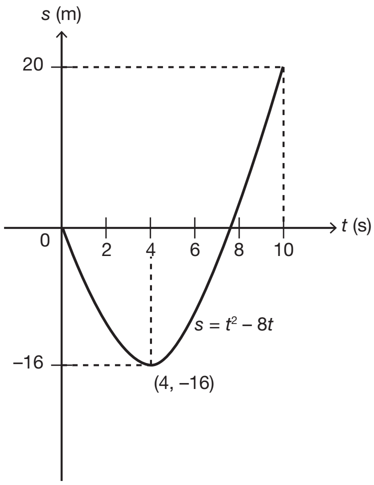
$t = 4$, $v_S = 2(4) + 4$

$= 12$ ms^{-1}

(d)



atau/*or*



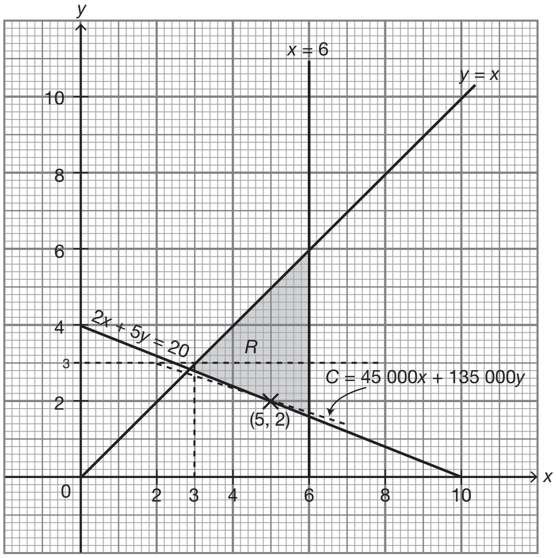
13 (a) I $12\,000x + 30\,000y \geqslant 120\,000$

$2x + 5y \geqslant 20$

II $y \leqslant x$

III $x \leqslant 6$

(b)



(c) (i) $y = 3,\ 3 \leqslant x \leqslant 6$

(ii) $C = 45\,000x + 135\,000y$

$= 45\,000(5) + 135\,000(2)$

$=$ RM495 000

14 (a) $x = \dfrac{1\,800}{2\,000} \times 100$

$= 90$

$\dfrac{3\,021}{y} \times 100 = 106$

$y = \dfrac{3\,021}{106} \times 100$

$= 2\,850$

$\dfrac{z}{1\,200} \times 100 = 125$

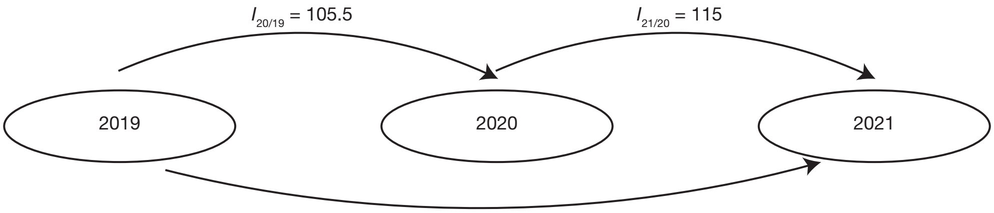
$z = 1\,500$

(b) $\bar{I}_{2019} = \dfrac{\sum I_W}{\sum_W}$

$= \dfrac{90(20) + 100(18) + 106(32) + 125(8) + 125(12)}{20 + 18 + 32 + 8 + 12}$

$= 105.5$

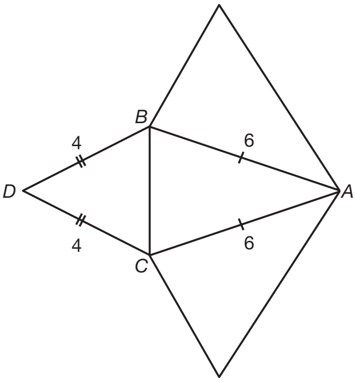
(c)



$\bar{I}_{2019} = \dfrac{105.50 \times 115}{100}$

$= 121.325$

15



(a) $A_{\Delta ABC} = 14.7$

$\frac{1}{2}(6)(6)\sin \angle BAC = 14.7$

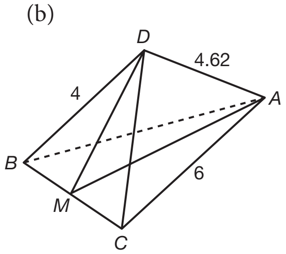
$\sin \angle BAC = 0.8167$

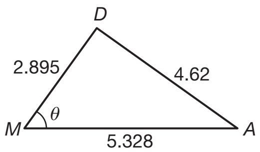
$\angle BAC = 54.76°$

$BC = \sqrt{6^2 + 6^2 - 2(6)(6)\text{ kos}/cos\ 54.76°}$

$= 5.52$ cm

(b)





$BM = \frac{1}{2}(5.52)$

$= 2.76$

$AM = \sqrt{6^2 - 2.76^2}$ $\qquad$ $DM = \sqrt{4^2 - 2.76^2}$

$= \sqrt{28.3824}$ $\qquad$ $= \sqrt{8.3824}$

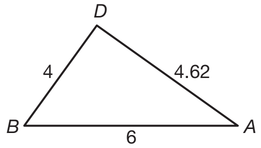
$= 5.328$ $\qquad$ $= 2.895$

$4.62 = 8.3824 + 28.3824 - 2(2.895)(5.328)\text{ kos}/cos\ \theta$

$\text{kos}/cos\ \theta = 0.4999$

$\theta = 60°$

(c)



$s = \frac{1}{2}(4 + 6 + 4.62)$

$= 7.31$

$A_{\Delta ABD} = \sqrt{7.31(7.31 - 4)(7.31 - 4.62)(7.31 - 6)}$

$= 9.234\text{ cm}^2$