Penyelesaian Lengkap

PENTAKSIRAN SUMATIF

Kertas 1

1 (a) Bukan fungsi. Objek 5 mempunyai dua imej, 2 dan 6.
Not a function. Object 5 has two images, 2 and 6.

(b) (i)
$$g(x) = 3x + p$$
$$g^2(x) = 3(3x + p) + p$$
$$= 9x + 3p + p$$
$$= 9x + 4p$$

Diberi/*Given*, $g^2(x) = qx - 20$
Dengan perbandingan,
By comparison,
$q = 9$, $4p = -20$
$p = -5$

(ii)
$$g(x) = 3x - 5$$
$$g^{-1}(x) = \frac{x + 5}{3}$$
$$g^{-1}(7) = \frac{7 + 5}{3}$$
$$= 4$$

(iii)
$$g^2(x) = 9x - 20$$
$$g^2[g^2(x)] = 9(9x - 20) - 20$$
$$g^4(3) = 9[9(3) - 20] - 20$$
$$= 9(7) - 20$$
$$= 63 - 20$$
$$= 43$$

2 (a) $f(x) = \frac{1}{2}x + n$

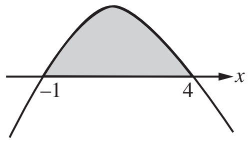
Biar/*Let* $f(x) = y$
$$y = \frac{1}{2}x + n$$
$$2y = x + 2n$$
$$x = 2y - 2n$$
$$\therefore f^{-1}(x) = 2x - 2n$$

Diberi/*Given* $f^{-1}(x) = px - 12$
Dengan perbandingan/*By comparison*,
$p = 2$, $-2n = -12$
$n = 6$

(b)
$$f(x) = \frac{1}{2}x + 6$$
$$f[g(x)] = \frac{1}{2}g(x) + 6$$

Diberi/*Given* $fg(x) = 4x - 7$
$$\frac{1}{2}g(x) + 6 = 4x - 7$$
$$\frac{1}{2}g(x) = 4x - 13$$
$$g(x) = 8x - 26$$

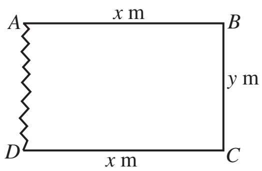
3 (a)
$$2x + 5 \geqslant x^2 - x + 1$$
$$2x + 5 - x^2 + x - 1 \geqslant 0$$
$$-x^2 + 3x + 4 \geqslant 0$$
$$(-x - 1)(x - 4) \geqslant 0$$



Daripada graf/*From the graph*,
$-1 \leqslant x \leqslant 4$

(b)
$$hx^2 + (h - 2)x + 4 = x - h + 7$$
$$hx^2 + hx - 2x + 4 - x + h - 7 = 0$$
$$hx^2 + hx - 3x + 4 + h - 7 = 0$$
$$hx^2 + (h - 3)x + h - 3 = 0$$
$$a = h,\ b = h - 3,\ c = h - 3$$
$$b^2 - 4ac = 0$$
$$(h - 3)^2 - 4(h)(h - 3) = 0$$
$$(h - 3)[(h - 3) - 4h] = 0$$
$$(h - 3)(-3 - 3h) = 0$$
$$-3(h - 3)(1 + h) = 0$$
$$h - 3 = 0,\ 1 + h = 0$$
$$h = 3, \quad h = -1$$

4



(a) Katakan/*Let* $BC = y$ m
Panjang pagar/*Length of fence*,
$$x + y + x = 52$$
$$y + 2x = 52$$
$$y = 52 - 2x \ldots ①$$
$$A = xy \ldots ②$$

Gantikan ① ke dalam ②,
Substitute ① *into* ②,
$$A = x(52 - 2x)$$
$$= 52x - 2x^2$$
$$= -2[x^2 - 26x]$$
$$= -2\left[x^2 - 26x + \left(-\frac{26}{2}\right)^2 - \left(-\frac{26}{2}\right)^2\right]$$
$$= -2[x^2 - 26x + (-13)^2 - (-13)^2]$$
$$= -2[(x - 13)^2 - 169]$$
$$= -2(x - 13)^2 + 338$$ [Tertunjuk/*Shown*]

(b) $p = -2$

(c) Nilai maksimum = $q = 338$
Maka, luas maksimum tanah ialah 338 m^2.

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Maximum value = q = 338
Thus, the maximum area of the land is 338 m^2.

5 $2x + v = x - \dfrac{4}{x}$

$2x^2 + vx = x^2 - 4$
$x^2 + vx + 4 = 0$
$a = 1, b = v, c = 4$
$b^2 - 4ac = 0$
$v^2 - 4(1)(4) = 0$
$(v + 4)(v - 4) = 0$
$v + 4 = 0, v - 4 = 0$
$v = -4, \quad v = 4$

6 (a) $\dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} \times \dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

$= \dfrac{(\sqrt{3})^2 + \sqrt{6} + \sqrt{6} + (\sqrt{2})^2}{(\sqrt{3})^2 - (\sqrt{2})^2}$

$= \dfrac{3 + 2\sqrt{6} + 2}{3 - 2}$

$= 5 + 2\sqrt{6}$

$\therefore m = 5, n = 2$

(b) $F = P \times (1 - r)^n$

$800 = 1\ 200 \times \left(1 - \dfrac{5}{100}\right)^n$

$800 = 1\ 200 \times 0.95^n$
$0.95^n = 0.6667$
$n \log_{10} 0.95 = \log_{10} 0.6667$
$n(-0.02228) = -0.1761$
$n = 7.904$
$n \approx 8$

Bilangan tikus akan kurang daripada 800 ekor dalam 8 tahun.
The number of mice will be less than 800 *in* 8 *years.*

7 (a) $3^x = 30 - 3^x$

$3^x + 3^x = 30$
$2(3^x) = 30$
$3^x = 15$
$\log_{10} 3^x = \log_{10} 15$
$x \log_{10} 3 = \log_{10} 15$
$x = \dfrac{\log_{10} 15}{\log_{10} 3}$
$x = 2.465$

(b) $\ln \sqrt[5]{en} + \ln \dfrac{e}{\sqrt[5]{n}}$

$= \dfrac{1}{5}\ln en + (\ln e - \ln \sqrt[5]{n})$

$= \dfrac{1}{5}(\ln e + \ln n) + \ln e - \dfrac{1}{5}\ln n$

$= \dfrac{1}{5}\log_e e + \dfrac{1}{5}\log_e n + \log_e e - \dfrac{1}{5}\log_e n$

$= \dfrac{1}{5}(1) + \dfrac{1}{5}(n) + 1 - \dfrac{1}{5}(n)$

$= \dfrac{1}{5} + 1$

$= \dfrac{6}{5}$

8 Luas ΔABC + Luas ΔADC = 59
Area of ΔABC + *Area of* ΔADC = 59

$\dfrac{1}{2} \times x \times y + \dfrac{1}{2}(x + 2)(y - 1) = 59$

$xy + (x + 2)(y - 1) = 118$
$xy + (xy - x + 2y - 2) = 118$
$2xy - x + 2y = 120 \ldots ①$

Dengan menggunakan teorem Pythagoras,
By using Pythagoras' theorem,
bagi/*for* ΔABC, $AC^2 = x^2 + y^2$
bagi/*for* ΔADC, $AC^2 = (x + 2)^2 + (y - 1)^2$

$(x + 2)^2 + (y - 1)^2 = x^2 + y^2$
$x^2 + 4x + 4 + y^2 - 2y + 1 = x^2 + y^2$
$2y - 4x = 5$
$y = \dfrac{1}{2}(4x + 5) \ldots ②$

Gantikan ② ke dalam ①,
Substitute ② *into* ①,

$2x\left[\dfrac{1}{2}(4x + 5)\right] - x + 2\left[\dfrac{1}{2}(4x + 5)\right] = 120$

$x(4x + 5) - x + 4x + 5 = 120$
$4x^2 + 5x - x + 4x + 5 - 120 = 0$
$4x^2 + 8x - 115 = 0$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \dfrac{-8 \pm \sqrt{(8)^2 - 4(4)(-115)}}{2(4)}$

$= \dfrac{-8 \pm \sqrt{1\ 904}}{8}$

$x = -6.454, x = 4.454$

Oleh sebab/*Since* $x > 0$, $\quad \therefore x = 4.454$

Apabila/*When* $x = 4.454$,

$y = \dfrac{1}{2}[4(4.454) + 5 = 11.408$

9 $m + 3n + p = 3 \ldots ①$
$3m - n + 2p = 11 \ldots ②$
$m - n - p = -1 \ldots ③$

① – ③: $4n + 2p = 4$
$2n + p = 2 \ldots ④$

① × 3 – ②: $10n + p = -2 \ldots ⑤$

Daripada/*From* ④,

$p = 2 - 2n \ldots ⑥$

Gantikan ⑥ ke dalam ⑤,
Substitute ⑥ *into* ⑤,

$10n + (2 - 2n) = -2$
$8n = -4$
$n = -\dfrac{1}{2}$

Daripada/*From* ⑥,

$p = 2 - 2\left(-\dfrac{1}{2}\right)$

$p = 3$

Daripada/*From* ①,

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

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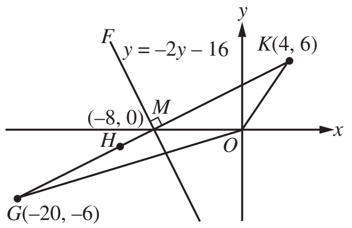
$$m = \frac{3}{2}$$

$$\therefore m = \frac{3}{2}, n = -\frac{1}{2}, p = 3$$

10



(a) $m_{GK} = \frac{6-(-6)}{4-(-20)}$

$= \frac{12}{24}$

$= \frac{1}{2}$

$m_{GK} \times m_{FM} = -1$

$\therefore m_{FM} = -2$

Titik tengah/*Midpoint*, M

$= \left(\frac{-20+4}{2}, \frac{-6+6}{2}\right)$

$= (-8, 0)$

Persamaan pembahagi dua sama serenjang GK:

Equation of the perpendicular bisector of GK:

$$\frac{y-0}{x-(-8)} = -2$$

$$y = -2(x+8)$$

$$y = -2x - 16$$

(b) Koordinat titik H

Coordinates of point H

$= \left(\frac{2(-20)+1(4)}{1+2}, \frac{2(-6)+1(6)}{1+2}\right)$

$= (-12, -2)$

(c) Katakan h ialah jarak terdekat dari O ke GK.

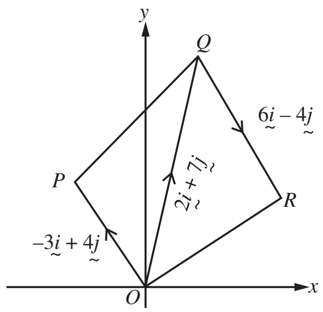
Let h be shortest distance from O to GK.

$$\frac{1}{2} \times 12\sqrt{5} \times h = 48$$

$$h = \frac{48}{6\sqrt{5}}$$

$$h = \frac{8}{\sqrt{5}} \text{ unit/}\textit{units}$$

11



(a) (i) $\overrightarrow{PQ} = \overrightarrow{OQ} - \overrightarrow{OP}$

$= (2\underset{\sim}{i} + 7\underset{\sim}{j}) - (-3\underset{\sim}{i} + 4\underset{\sim}{j})$

$= 2\underset{\sim}{i} + 7\underset{\sim}{j} + 3\underset{\sim}{i} - 4\underset{\sim}{j}$

$= 5\underset{\sim}{i} + 3\underset{\sim}{j}$

(ii) $\overrightarrow{OR} = \overrightarrow{OQ} + \overrightarrow{QR}$

$= (2\underset{\sim}{i} + 7\underset{\sim}{j}) + (6\underset{\sim}{i} - 4\underset{\sim}{j})$

$= 8\underset{\sim}{i} + 3\underset{\sim}{j}$

$\therefore R(8, 3)$

(b) Diberi $\underset{\sim}{u}$ dan $\underset{\sim}{w}$ adalah selari, maka $\underset{\sim}{u} = \lambda\underset{\sim}{w}$ dengan keadaan λ ialah pemalar.

Given $\underset{\sim}{u}$ *and* $\underset{\sim}{w}$ *are parallel, then* $\underset{\sim}{u} = \lambda\underset{\sim}{w}$ *where* λ *is a constant.*

$4\underset{\sim}{i} + (3h-2)\underset{\sim}{j} = \lambda(6\underset{\sim}{i} + 2\underset{\sim}{j})$

$4\underset{\sim}{i} + (3h-2)\underset{\sim}{j} = 6\lambda\underset{\sim}{i} + 2\lambda\underset{\sim}{j}$

Bandingkan pekali bagi $\underset{\sim}{i}$,

Compare coefficients of $\underset{\sim}{i}$,

$6\lambda = 4$

$\lambda = \frac{2}{3}$

Bandingkan pekali bagi $\underset{\sim}{j}$,

Compare coefficients of $\underset{\sim}{j}$,

$3h - 2 = 2\lambda$

$3h - 2 = 2\left(\frac{2}{3}\right)$

$3h - 2 = \frac{4}{3}$

$3h = \frac{10}{3}$

$h = \frac{10}{9}$

12 $y = \frac{u^x}{d}$

$\log_e y = \log_e \frac{u^x}{d}$

$\ln y = \ln u^x - \ln d$

$\ln y = (\ln u)x - \ln d \ldots$ ①

$m = \frac{12-4}{2-6} = -\frac{8}{4} = -2$

$\ln y = -2x + c$

Pada/*At* $F(2, 12)$,

$12 = -2(2) + c$

$c = 16$

$\ln y = -2x + 16$

Daripada/*From* ①,

$-\ln d = 16$

$\ln d = -16$

$d = e^{-16}$

$\ln u = -2$

$u = e^{-2}$

$u = \frac{1}{e^2}$

13 (a) (i) $d = T_2 - T_1 = T_3 - T_2$

$10 - (p-1) = 2p - 10$

$10 - p + 1 = 2p - 10$

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$-3p = -21$
$p = 7$

(ii) Tiga sebutan yang pertama:
The first three terms:
$7 - 1, 10, 2(7)$
$6, 10, 14$
$a = 6, d = 10 - 6 = 4$

Hasil tambah dari sebutan ke-10 hingga sebutan ke-20
Sum of the 10^{th} *term to the* 20^{th} *term*
$= S_{20} - S_9$
$= \frac{20}{2}[2(6) + (20 - 1)(4)] - \frac{9}{2}[2(6) + (9 - 1)(4)]$
$= 880 - 198$
$= 682$

(b) (i) $T_1 + T_2 = 20$
$a + ar = 20 \dots ①$
$T_5 = 9T_3$
$ar^4 = 9 \times ar^2$
$ar^4 - 9ar^2 = 0$
$ar^2(r^2 - 9) = 0$
$(r + 3)(r - 3) = 0$
$r = -3, r = 3$

Oleh sebab $r > 0$, maka $r = 3$
Since $r > 0$, *thus* $r = 3$

Daripada/*From* ①,
$a + a(3) = 20$
$4a = 20$
$a = 5$

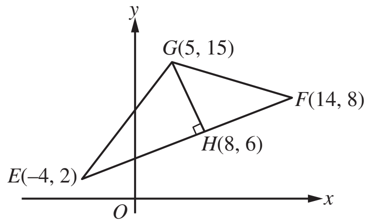
(ii) $S_n = \frac{a(r^n - 1)}{r - 1}$
$S_7 = \frac{5(3^7 - 1)}{3 - 1}$
$= 5\ 465$

14 (a) $EF : HF = 3 : 1 \Rightarrow EH : HF = 2 : 1$
Koordinat H/*Coordinates of H*
$= \left(\frac{1(-4) + 2(14)}{2 + 1}, \frac{1(2) + 2(8)}{2 + 1}\right)$
$= (8, 6)$

(b) $m_{EF} = \frac{8 - 2}{14 - (-4)} = \frac{1}{3}$
$m_{EF} \times m_{GH} = -1$
$\therefore m_{GH} = -3$

Persamaan garis GH:
Equation of GH:
$y = mx + c$
$6 = (-3)(8) + c$
$c = 30$
$y = -3x + 30 \dots ①$

Diberi persamaan EG:
Given the equation of EG:
$y = 2x + 5 \dots ②$
① = ②:
$2x + 5 = -3x + 30$
$5x = 25$
$x = 5$
$y = 2(5) + 5 = 15$
$\therefore G(5, 15)$



(c) Luas/*Area of* ΔEHG
$= \frac{1}{2}\begin{vmatrix} -4 & 8 & 5 & -4 \\ 2 & 6 & 15 & 2 \end{vmatrix}$
$= \frac{1}{2}|[(-4)(6) + (8)(15) + (5)(2)] - [(2)(8) + (6)(5) + (15)(-4)]|$
$= \frac{1}{2}|106 - (-14)|$
$= \frac{1}{2}(120)$
$= 60$ unit/*units*

15 (a) $T_1 + T_2 + T_3 + T_4 = 60$
$a + (a + 4) + (a + 8) + (a + 12) = 60$
$4a + 24 = 60$
$4a = 36$
$a = 9$

(b) (i) $S_n = 1\ 365$ cm, $a = 195$ cm, $n = 13$ cm
$S_n = \frac{n}{2}[2a + (n - 1)d]$
$1\ 365 = \frac{13}{2}[2(195) + (13 - 1)d]$
$210 = 390 + 12d$
$12d = -180$
$d = -15$

Tiga bahagian tali yang pertama:
The first three parts of the string:
195 cm, (195 – 15) cm, (195 – 15 – 15) cm
195 cm, 180 cm, 165 cm

(ii) $T_n = a + (n - 1)d$
$= 195 + (n - 1)(-15)$
$= 195 - 15n + 15$
$= 210 - 15n$

Panjang bahagian ke-n tali itu ialah $(210 - 15n)$ cm.
The length of the n^{th} *part of the string is* $(210 - 15n)$ cm.

(iii) $T_{13} = 210 - 15(13) = 15$
$T_{12} = 210 - 15(12) = 30$
$T_{11} = 210 - 15(11) = 45$
$T_{10} = 200 - 15(10) = 60$

Hasil tambah panjang empat bahagian tali yang terakhir
Sum of the length of the last four parts of the string
$= 15 + 30 + 45 + 60$
$= 150$ cm

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Kertas 2

1 $x - y = 2 \ldots ①$

$\frac{4}{x} + \frac{1}{y} = 3 \ldots ②$

Daripada/*From* ①,

$x = y + 2 \ldots ③$

② × (xy),

$\frac{4}{x}(xy) + \frac{1}{y}(xy) = 3(xy)$

$4y + x = 3xy \ldots ④$

Gantikan ③ ke dalam ④,

Substitute ③ *into* ④,

$4y + (y + 2) = 3y(y + 2)$

$4y + y + 2 = 3y^2 + 6y$

$3y^2 + 6y - 4y - y - 2 = 0$

$3y^2 + y - 2 = 0$

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

$y + 1 = 0, 3y - 2 = 0$

$y = -1, \quad y = \frac{2}{3}$

Apabila/*When* $y = -1$,

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

Apabila/*When* $y = \frac{2}{3}$,

$x = \left(\frac{2}{3}\right) + 2 = \frac{8}{3}$

$\therefore x = -1, y = 1$ dan/*and* $x = \frac{8}{3}, y = \frac{2}{3}$

2 Bilangan tiket dewasa yang dijual = x

Number of adult tickets sold = x

Bilangan tiket pelajar yang dijual = y

Number of student tickets sold = y

Bilangan tiket kanak-kanak = z

Number of children tickets sold = z

$40x + 20y + 10z = 16\,400 \ldots ①$

$x + y + z = 700 \ldots ②$

$(x + y) - z = 460 \ldots ③$

② – ③: $2z = 240$

$z = 120$

Daripada/*From* ①,

$40x + 20y + 10(120) = 16\,400$

$40x + 20y = 15\,200 \ldots ③$

Daripada/*From* ②,

$x + y + 120 = 700$

$x + y = 580 \ldots ④$

Daripada/*From* ④,

$y = 580 - x \ldots ⑤$

Gantikan ⑤ ke dalam ③,

Substitute ⑤ *into* ③,

$40x + 20(580 - x) = 15\,200$

$40x + 11\,600 - 20x = 15\,200$

$20x = 3\,600$

$x = 180$

Daripada/*From* ④,

$y = 580 - (180) = 400$

3 (a) $r = \frac{1}{2}(4) = 2$

$T_1 = \pi(2)^2(3.5) = 14\pi$

$T_2 = \pi(2)^2(6) = 24\pi$

$T_3 = \pi(2)^2(8.5) = 34\pi$

$T_2 - T_1 = 24\pi - 14\pi = 10\pi$

$T_3 - T_2 = 34\pi - 24\pi = 10\pi$

Maka, isi padu silinder mengikut satu janjang aritmetik dengan beza sepunya, $d = 10\pi$ cm^3.

Thus, the volume of the cylinders follows an arithmetic progression with common difference, $d = 10\pi$ cm^3.

(b) $T_n = a + (n - 1)d$

$T_{13} = (14\pi) + (13 - 1)(10\pi)$

$= 14\pi + 120\pi$

$= 134\pi$ cm^3

(c) $S_n = \frac{n}{2}[2a + (n - 1)\, d]$

$1\,598\pi = \frac{n}{2}[2(14) + (n - 1)(10)]$

$1\,598 = n[2(7) + (n - 1)(5)]$

$1\,598 = n(14 + 5n - 5)$

$1\,598 = n(9 + 5n)$

$1\,598 = 5n^2 + 9n$

$5n^2 + 9n - 1\,598 = 0$

$(5n + 94)(n - 17) = 0$

$n = -\frac{94}{5}, \quad n = 17$

Oleh sebab/*Since* $n > 0$, $\therefore n = 17$

4 (a) $NQ : PQ = 4 : 1 \Rightarrow NP : PQ = 3 : 1$

Katakan/*Let* $Q(h, k)$

$8 = \frac{1(-4) + 3(h)}{3 + 1}$

$32 = -4 + 3h$

$36 = 3h$

$h = 12$

$6 = \frac{1(3) + 3(k)}{3 + 1}$

$24 = 3 + 3k$

$21 = 3k$

$k = 7$

$\therefore Q(12, 7)$

(b) $m_{NQ} = \frac{6 - 3}{8 - (-4)} = \frac{3}{12} = \frac{1}{4}$

$m_{PT} = -\frac{1}{m_{NQ}} = -4$

Persamaan garis lurus PT:

Equation of straight line PT:

$y - 6 = -4(x - 8)$

$y - 6 = -4x + 32$

$y = -4x + 38$

Pada/*At* $T(u, -2)$,

$-2 = -4(u) + 38$

$4u = 40$

$u = 10$

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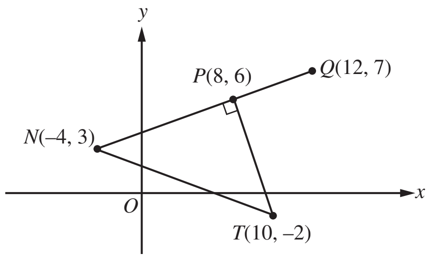
(c)



Luas/*Area of* ΔNPT

$= \frac{1}{2}\begin{vmatrix} -4 & 10 & 8 & -4 \\ 3 & -2 & 6 & 3 \end{vmatrix}$

$= \frac{1}{2}|[(-4)(-2) + (10)(6) + (8)(3)] - [(3)(10) + (-2)(8) + (6)(-4)]|$

$= \frac{1}{2}|(92) - (-10)|$

$= \frac{1}{2}(102)$

$= 51$ unit²/*units*²

5 (a) Katakan/*Let* $y = \log_a b$

$a^y = b$

$\log_x a^y = \log_x b$

$y \log_x a = \log_x b$

$y = \frac{\log_x b}{\log_x a}$

$\log_a b = \frac{\log_x b}{\log_x a}$ [Tertunjuk/*Shown*]

$\log_8 32 = \frac{\log_2 32}{\log_2 8}$

$= \frac{\log_2 2^5}{\log_2 2^3}$

$= \frac{5}{3}$

(b) $2^x - 3 = 4 - \frac{12}{2^x}$

$2^x - 7 + \frac{12}{2^x} = 0$

$(2^x)2^x - 7(2^x) + 12 = 0$

$2^{2x} - 7(2^x) + 12 = 0$

$(2^x - 3)(2^x - 4) = 0$

$2^x = 3, 2^x = 4$

Apabila/*When* $2^x = 3$,

$\log_{10} 2^x = \log_{10} 3$

$x = \frac{\log_{10} 3}{\log_{10} 2} = 1.585$

Apabila/*When* $2^x = 4$,

$2x = 2^2$

$x = 2$

6 (a) $f(x) = 6 + 5x - 2x^2$

$= -2x^2 + 5x + 6$

$= -2\left[x^2 - \frac{5}{2}x - \frac{6}{2}\right]$

$= -2\left[x^2 - \frac{5}{2}x - 3\right]$

$= -2\left[x^2 - \frac{5}{2}x + \left(-\frac{5}{4}\right)^2 - \left(-\frac{5}{4}\right)^2 - 3\right]$

$= -2\left[\left(x - \frac{5}{4}\right)^2 - \frac{25}{16} - 3\right]$

$= -2\left[\left(x - \frac{5}{4}\right)^2 - \frac{73}{16}\right]$

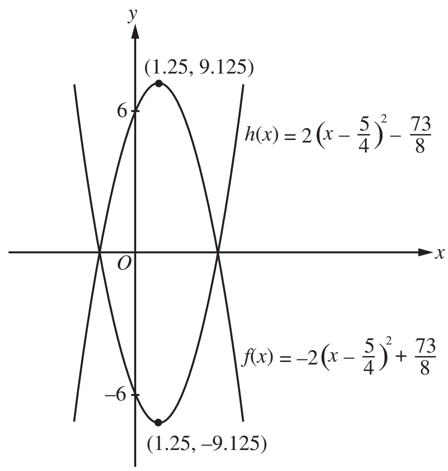
$= -2\left(x - \frac{5}{4}\right)^2 + \frac{73}{8}$

Nilai maksimum $= \frac{73}{8}$

Maximum value $= \frac{73}{8}$

(b) $h(x) = 2\left(x - \frac{5}{4}\right)^2 - \frac{73}{8}$

(c)



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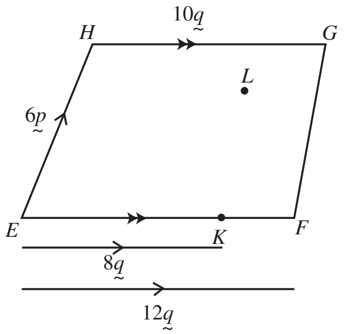

(a) $\overrightarrow{EG} = \overrightarrow{EH} + \overrightarrow{HG}$

$\overrightarrow{EG} = \overrightarrow{EH} + \frac{5}{6}\overrightarrow{EF}$

$\overrightarrow{EG} = 6\underset{\sim}{p} + \frac{5}{6}(12\underset{\sim}{q})$

$= 6\underset{\sim}{p} + 10\underset{\sim}{q}$

(b) (i) $2\overrightarrow{KL} = \beta\overrightarrow{EH}$

$2\overrightarrow{KL} = \beta(6\underset{\sim}{p})$

$\overrightarrow{KL} = 3\beta\underset{\sim}{p}$

$\overrightarrow{EL} = \overrightarrow{EK} + \overrightarrow{KL}$

$= \frac{2}{3}\overrightarrow{EF} + \overrightarrow{KL}$

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$= \frac{2}{3}(12\underset{\sim}{q}) + 3\beta\underset{\sim}{p}$
$= 3\beta\underset{\sim}{p} + 8\underset{\sim}{q}$

(ii) $\overrightarrow{EL} = \lambda\overrightarrow{EG}$
$3\beta\underset{\sim}{p} + 8\underset{\sim}{q} = \lambda(6\underset{\sim}{p} + 10\underset{\sim}{q})$
$3\beta\underset{\sim}{p} + 8\underset{\sim}{q} = 6\lambda\underset{\sim}{p} + 10\lambda\underset{\sim}{q}$

Bandingkan pekali bagi $\underset{\sim}{q}$,
Compare coefficients of $\underset{\sim}{q}$,
$10\lambda = 8$
$\lambda = \frac{4}{5}$

Bandingkan pekali bagi $\underset{\sim}{p}$,
Compare coefficients of $\underset{\sim}{p}$,
$3\beta = 6\lambda$
$3\beta = 6\left(\frac{4}{5}\right)$
$3\beta = \frac{24}{5}$
$\beta = \frac{8}{5}$

8 (a) $5^m \times \frac{25^n}{5} = 1$
$5^m \times \frac{(5^2)^n}{5} = 5^0$
$5^m \times 5^{2n-1} = 5^0$
$m + 2n - 1 = 0$
$m = 1 - 2n \ldots ①$
$\log_3 6 - \log_9 (m - n) = 1$
$\log_3 6 - \frac{\log_3 (m-n)}{\log_3 3^2} = 1$
$\log_3 6 - \frac{\log_3 (m-n)}{2} = 1$
$2\log_3 6 - \log_3 (m - n) = 2$
$\log_3 6^2 - \log_3 (m - n) = 2$
$\log_3 36 - \log_3 (m - n) = 2$
$\log_3 \frac{36}{(m-n)} = 2$
$\frac{36}{(m-n)} = 3^2$
$9(m - n) = 36$
$m - n = 4 \ldots ②$

Gantikan ① ke dalam ②,
Substitute ① into ②,
$(1 - 2n) - n = 4$
$3n = -3$
$n = -1$

Daripada/*From* ①,
$m = 1 - 2(-1)$
$= 3$

(b) $\frac{3^x}{3^{2y}} = 9 \Rightarrow 3^{x-2y} = 3^2$
$\therefore x - 2y = 2 \ldots ①$
$\log_y (x - 3) = 2$
$\therefore x - 3 = y^2 \ldots ②$

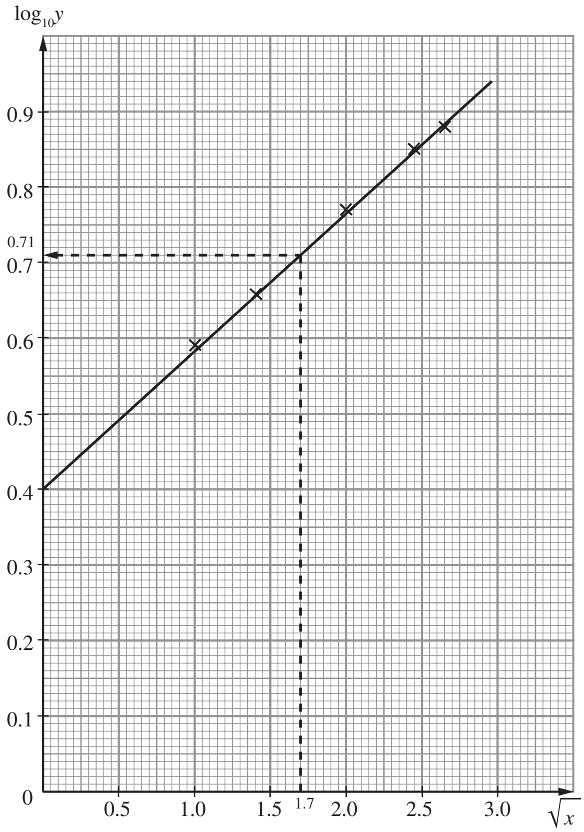
Daripada/*From* ①, $x = 2y + 2 \ldots ③$

Gantikan ③ ke dalam ②,
Substitute ③ into ②,
$(2y + 2) - 3 = y^2$
$2y - 1 = y^2$
$y^2 - 2y + 1 = 0$
$(y - 1)^2 = 0$
$y = 1$

Daripada/*From* ③,
$x = 2(1) + 2$
$= 4$
$\therefore x = 4, y = 1$

9 (a) $y = pq^{\sqrt{x}}$
$\log_{10} y = \log_{10} pq^{\sqrt{x}}$
$\log_{10} y = \log_{10} p + \sqrt{x}\,\log_{10} q$
$\log_{10} y = (\log_{10} q)\sqrt{x} + \log_{10} p$

$\sqrt{x}$	1	1.41	2	2.45	2.65
$\log_{10} y$	0.59	0.66	0.77	0.85	0.88



(b) (i) Daripada graf,
From the graph,
$\log_{10} p = 0.4$
$p = 2.512$

(ii) Kecerunan/*Gradient*
$= \frac{0.88 - 0.4}{2.65 - 0}$
$\log_{10} q = 0.1811$
$q = 1.517$

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(iii) Apabila/*When* $x = 3$,

$\sqrt{x} = 1.732$

$\log_{10} y = 0.71$

$y = 5.129$

10 (a) $m_{EF} = \dfrac{6-0}{9-(-3)} = \dfrac{1}{2}$

$m_{EF} \times m_{FG} = -1, \therefore m_{FG} = -2$

Persamaan FG:

Equation of FG:

$y - 6 = -2(x-9)$

$y - 6 = -2x + 18$

$y = -2x + 24$

(b) $y = -2x + 24 \ldots$ ①

$4x - 3y + 12 = 0 \ldots$ ②

Gantikan ① ke dalam ②,

Substitute ① into ②,

$4x - 3(-2x + 24) + 12 = 0$

$4x + 6x - 72 + 12 = 0$

$10x - 60 = 0$

$x = 6$

Daripada/*From* ①,

$y = -2(6) + 24 = 12$

Koordinat kedudukan bank ialah (6, 12).

The coordinates of the location of the bank is (6, 12).

(c) Katakan nisbah jarak antara rumah Qistina dan gim = $m : n$

Let the ratio of distance between Qistina's house and gym = $m : n$

$\dfrac{n(-3) + m(9)}{m+n} = 5$

$-3n + 9m = 5(m+n)$

$-3n + 9m = 5m + 5n$

$4m = 8n$

$\dfrac{m}{n} = \dfrac{2}{1}$

$\therefore m : n = 2 : 1$

$p = \dfrac{1(0) + 2(6)}{1+2}$

$= \dfrac{12}{3}$

$= 4$

(d) $(x-9)^2 + (y-6)^2 = 1^2$

$x^2 - 18x + 81 + y^2 - 12y + 36 = 1$

$x^2 + y^2 - 18x - 12y + 116 = 0$

11 (a) (i) $\overrightarrow{LF} = \overrightarrow{LP} + \overrightarrow{PF}$

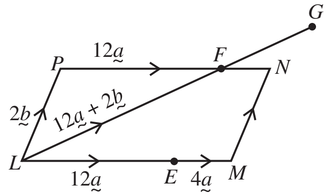
$= 12\underset{\sim}{a} + 2\underset{\sim}{b}$

(ii) $\overrightarrow{EN} = \overrightarrow{EM} + \overrightarrow{MN}$

$= \dfrac{1}{3}\overrightarrow{LE} + \overrightarrow{LP}$

$= 4\underset{\sim}{a} + 2\underset{\sim}{b}$

$= 2(2\underset{\sim}{a} + \underset{\sim}{b})$



Daripada/*From* (ii),

$2\underset{\sim}{a} + \underset{\sim}{b} = \dfrac{1}{2}\overrightarrow{EN}$

$\overrightarrow{EG} = \overrightarrow{EL} + \overrightarrow{LG}$

$= -12\underset{\sim}{a} + \overrightarrow{LF} + \overrightarrow{FG}$

$= -12\underset{\sim}{a} + 12\underset{\sim}{a} + 2\underset{\sim}{b} + 6\underset{\sim}{a} + \underset{\sim}{b}$

$= 6\underset{\sim}{a} + 3\underset{\sim}{b}$

$= 3(2\underset{\sim}{a} + \underset{\sim}{b})$

$= \dfrac{3}{2}\overrightarrow{EN}$

Maka, titik E, N dan G adalah segaris.

Thus, points E, N and G are collinear.

(b) (i) $\overrightarrow{EN} = 4\underset{\sim}{a} + 2\underset{\sim}{b}$

$= 4(6\underset{\sim}{i}) + 2(4\underset{\sim}{i} + 10\underset{\sim}{j})$

$= 24\underset{\sim}{i} + 8\underset{\sim}{i} + 20\underset{\sim}{j}$

$= 32\underset{\sim}{i} + 20\underset{\sim}{j}$

(ii) $|\overrightarrow{EN}| = \sqrt{32^2 + 20^2}$

$= \sqrt{1\,424}$

$= 4\sqrt{89}$

Vektor unit dalam arah $\overrightarrow{EN}$

Unit vector in the direction of $\overrightarrow{EN}$

$= \dfrac{1}{|\overrightarrow{EN}|}(\overrightarrow{EN})$

$= \dfrac{1}{4\sqrt{89}}(32\underset{\sim}{i} + 20\underset{\sim}{j})$

$= \dfrac{1}{\sqrt{89}}(8\underset{\sim}{i} + 5\underset{\sim}{j})$

12 (a) (i) $\dfrac{\sin EFH}{12} = \dfrac{\sin 96}{15.73}$

$\sin \angle EFH = \dfrac{12 \times \sin 96}{15.73}$

$= 0.7587$

$\angle EFH = 49.35°$

(ii) $\angle FEG = 180° - 2(49.35°)$

$= 81.3°$

$FG^2 = 9^2 + 9^2 - 2(9)(9) \text{ kos } 81.3°$

$FG^2 = 9^2 + 9^2 - 2(9)(9) \cos 81.3°$

$= 137.496$

$FG = 11.726$ cm

Kaedah alternatif

Alternative method

$\dfrac{\sin 81.3}{FG} = \dfrac{\sin 49.35°}{9}$

$FG = \dfrac{9 \times \sin 81.3°}{\sin 49.35°}$

$= 11.726$ cm

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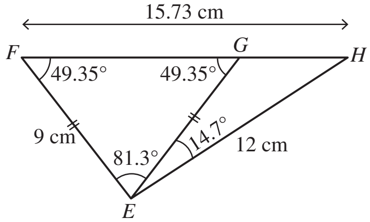
(iii)

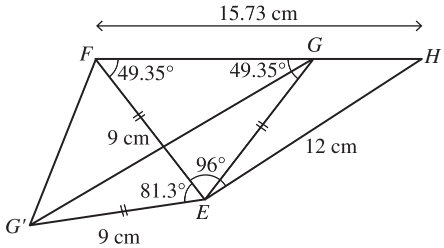


$\angle GEH = 96° - 81.3° = 14.7°$

Luas/*Area of* $\Delta EGH = \frac{1}{2} \times 9 \times 12 \times \sin 14.7°$

$= 13.703 \text{ cm}^2$

(b)



$\angle G'EG = 2 \times 81.3° = 162.6°$

$(G'G)^2 = 9^2 + 9^2 - 2(9)(9) \text{ kos } 162.6°$

$(G'G)^2 = 9^2 + 9^2 - 2(9)(9) \cos 162.6°$

$= 316.587$

$G'G = 17.793$ cm

13 (a) (i) $QS^2 = 12^2 + 7^2 - 2(12)(7) \text{ kos } 65°$

$QS^2 = 12^2 + 7^2 - 2(12)(7) \cos 65°$

$= 122$

$QS = \sqrt{122} = 11.045$ cm

(ii) $\angle QRS = 180° - 65° = 115°$

$\frac{\sin QSR}{4.6} = \frac{\sin 115°}{11.045}$

$\sin \angle QSR = \frac{4.6 \sin 115°}{11.045}$

$= 0.3775$

$\angle QSR = 22.18°$

$\angle SQR = 180° - 115° - 22.18°$

$= 42.82°$

(b) (i) Luas $PQRS$ = Luas ΔQPS + Luas ΔSQR

Area of $PQRS$ = *Area of* ΔPQS + *Area of* ΔSQR

$= \frac{1}{2} \times 12 \times 7 \times \sin 65°$

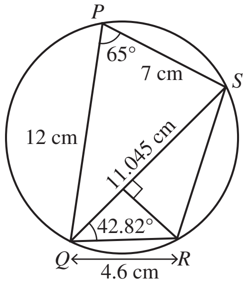
$+ \frac{1}{2} \times 11.045 \times 4.6 \times \sin 42.82°$

$= 38.065 \text{ cm}^2 + 17.267 \text{ cm}^2$

$= 55.332 \text{ cm}^2$

(ii) Katakan h ialah jarak terpendek dari R ke QS

Let h be the shortest distance from R to QS



Luas/*Area of* $\Delta QRS = \frac{1}{2} \times h \times QS$

$17.267 = \frac{1}{2} \times h \times 11.045$

$h = \frac{2 \times 17.267}{11.045}$

$= 3.127$ cm

14 (a) $x = \frac{5.40}{4.00} \times 100 = 135$

$\frac{y}{3.50} \times 100 = 140$

$y = \frac{140 \times 3.50}{100}$

$= 4.90$

$\frac{6.25}{z} \times 100 = 125$

$z = \frac{6.25 \times 100}{125}$

$z = 5.00$

(b) $I = \frac{P_{2020}}{P_{2016}} \times 100$

$= \frac{2.40}{1.60} \times 100$

$= 150$

(c) $360° - 140° - 110° - 30° = 80°$

$\bar{I} = \frac{\sum I_i w_i}{\sum w_i}$

$= \frac{135(30) + 140(110) + 125(80) + 200(140)}{360}$

$= \frac{57\,450}{360}$

$= 159.58$

(d) $\frac{120}{P_{2020}} \times 100 = 159.583$

$P_{2020} = 75.196$

Harga pai strawberi pada tahun 2020 ialah RM75.20.

The price of the strawberry pie in the year 2020 *was* RM75.20.

15 (a) $u = \frac{62.5}{50} \times 100$

$= 125$

$\frac{105.00}{v} \times 100 = 140$

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$$v = \frac{105.00}{140} \times 100$$
$$= 75$$

$$\frac{w}{55} \times 100 = 130$$
$$w = \frac{55 \times 130}{100}$$
$$= 71.50$$

(b) (i) $\frac{120(3) + 125(n) + 140(6) + 130(4)}{3 + n + 6 + 4} = 129.75$

$$\frac{125n + 1\,720}{n + 13} = 129.75$$
$$125n + 1\,720 = 129.75(n + 13)$$
$$125n + 1\,720 = 129.75n + 1\,686.75$$
$$33.25 = 4.75n$$
$$n = 7$$

(ii) Katakan h = hasil jualan pada tahun 2018
Let h = total sales in the year 2018

$$\frac{h}{24\,000} \times 100 = 129.75$$
$$h = \text{RM}31\,140$$

(c) $I_{2024/2023} = 129.75 \times \frac{100 + 4}{100}$
$$= 129.75 \times 1.04$$
$$= 134.94$$

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