Penyelesaian Lengkap

Praktis 2

Praktis Formatif

1 $(2x-3)(2x+3) = x(3x-5)$
$4x^2 - 9 = 3x^2 - 5x$
$x^2 + 5x - 9 = 0$
$x = \dfrac{-5 \pm \sqrt{5^2 - 4(1)(-9)}}{2(1)}$
$= \dfrac{-5 \pm \sqrt{61}}{2}$
$= 1.405, -6.405$

2 Punca-punca/*Roots*: $\dfrac{2}{3}, -\dfrac{1}{5}$

HTP/*SOR*: $\alpha + \beta = \dfrac{2}{3} - \dfrac{1}{5}$
$= \dfrac{7}{15}$

HDP/*POR*: $\alpha\beta = \left(\dfrac{2}{3}\right)\left(-\dfrac{1}{5}\right)$
$= -\dfrac{2}{15}$

$x^2 - \left(\dfrac{7}{15}\right)x - \dfrac{2}{15} = 0$
$\times 15$, $15x^2 - 7x - 2 = 0$

3 $x(1-x) = 3(x-5)$
(a) $x - x^2 = 3x - 15$
$x^2 + 2x - 15 = 0$
$(x+5)(x-3) = 0$
$x = -5, 3$
$\therefore m > n$, $\therefore m = 3, n = -5$

(b) Gantikan $m = 3$ dan $n = -5$,
Substitute $m = 3$ and $n = -5$,
Punca-punca/*Roots* $= \dfrac{3}{3}, 2 - (-5)$
$= 1, 7$
HTP/*SOR* $= 1 + 7$
$= 8$
HDP/*POR* $= 1 \times 7$
$= 7$
$x^2 - 8x + 7 = 0$

4 $(2x-3)^2 = 4x + 1$
$4x^2 - 12x + 9 = 4x + 1$
$4x^2 - 16x + 8 = 0$
$\div 4$, $x^2 - 4x + 2 = 0$

(a) HTP/*SOR*: $p + q = 4$

(b) HTP/*POR*: $pq = 2$

5 $4x^2 + 2x - 3 = 0$
Punca-punca/*Roots*: α, β

HTP/*SOR*: $\alpha + \beta = -\dfrac{2}{4}$
$= -\dfrac{1}{2}$

HDP/*POR*: $\alpha\beta = -\dfrac{3}{4}$

Punca-punca baharu/*New roots*: $\alpha + 1, \beta + 1$
HTP baharu/*New SOR* $= \alpha + 1 + \beta + 1$
$= -\dfrac{1}{2} + 2$
$= \dfrac{3}{2}$

HDP baharu/*New POR* $= (\alpha + 1)(\beta + 1)$
$= \alpha\beta + \alpha + \beta + 1$
$= -\dfrac{3}{4} + \left(-\dfrac{1}{2}\right) + 1$
$= -\dfrac{1}{4}$

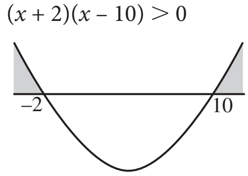
$x^2 - \left(\dfrac{3}{2}\right)x - \dfrac{1}{4} = 0$
$\times 4$, $4x^2 - 6x - 1 = 0$

6 $3x^2 - 12x + p - 7 = 0$

(a) HTP/*SOR*: $\alpha + \alpha + 6 = \dfrac{12}{3}$
$2\alpha + 6 = 4$
$\alpha = -1$

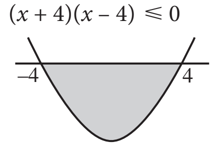
(b) HDP/*POR*: $(-1)(-1 + 6) = \dfrac{p-7}{3}$
$p - 7 = -15$
$p = -8$

7 $f(x) < 0$
$20 + 8x - x^2 < 0$
$x^2 - 8x - 20 > 0$
$(x+2)(x-10) > 0$



Julat/*Range*: $x < -2, x > 10$

8 $(x+1)(x-3) \leqslant 13 - 2x$
$x^2 - 2x - 3 \leqslant 13 - 2x$
$x^2 - 16 \leqslant 0$
$(x+4)(x-4) \leqslant 0$



$\therefore -4 \leqslant x \leqslant 4$

9 $\dfrac{2x}{x+3} = x - 4$

$2x = x^2 - x - 12$

$x^2 - 3x - 12 = 0$

$b^2 - 4ac = (-3)^2 - 4(1)(-12)$

$= 57(>0)$

Punca nyata yang berbeza/*Real and distinct roots*

10
$$\begin{aligned} px^2 - 6x + 3q &= 0 \\ b^2 - 4ac &= 0 \\ (-6)^2 - 4(p)(3q) &= 0 \\ 36 - 12pq &= 0 \\ pq &= 3 \\ p &= \frac{3}{q} \end{aligned}$$

11
$$\begin{aligned} mx^2 + (2m-1)x + m - 2 &= 0 \\ b^2 - 4ac &< 0 \\ (2m-1)^2 - 4(m)(m-2) &< 0 \\ 4m^2 - 4m + 1 - 4m^2 + 8m &< 0 \\ 4m &< -1 \\ m &< -\frac{1}{4} \end{aligned}$$

12 $x - y + 3 = 0$

$y = x + 3$ … ①

$x^2 + y^2 = k$ … ②

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

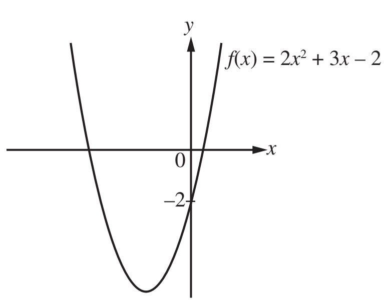
$$\begin{aligned} x^2 + (x+3)^2 &= k \\ x^2 + x^2 + 6x + 9 - k &= 0 \\ 2x^2 + 6x + 9 - k &= 0 \\ b^2 - 4ac &< 0 \\ (6)^2 - 4(2)(9-k) &< 0 \\ 36 - 72 + 8k &< 0 \\ 8k &< 36 \\ k &< \frac{9}{2} \end{aligned}$$

13 $y = 9x - 7 - 3x^2$

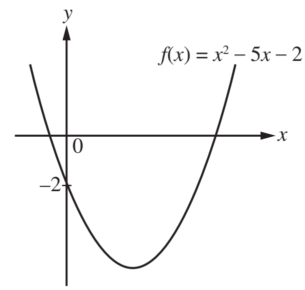
$$\begin{aligned} -3x^2 + 9x - 7 &= 0 \\ b^2 - 4ac &= (9)^2 - 4(-3)(-7) \\ &= -3 < 0 \end{aligned}$$

Tidak bersilang/*Does not intersect*

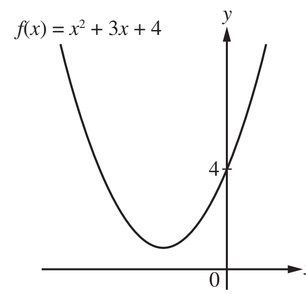
14 (a)



(b)



(c)



15 $y = \frac{1}{3}(x+p)^2 + 2$

(a) Paksi simetri/*Axis of symmetry*:

$x = \dfrac{0+6}{2}$

$x = 3$

(b) $y_{min} = 2$ apabila/*when* $x = -p$

Dengan perbandingan/*By comparison*,

$-p = 3$

$p = -3$

(c) Titik minimum/*Minimum point*: (3, 2)

16 $f(x) = hx^2 - 12x + k = 3(x+m)^2 - 5$

$hx^2 - 12x + k = 3(x^2 + 2mx + m^2) - 5$

$= 3x^2 + 6mx + 3m^2 - 5$

Bandingkan pekali bagi x^2:

Compare the coeficient of x^2:

$h = 3$

Bandingkan pekali bagi x:

Compare the coeficient of x:

$-12 = 6m$

$m = -2$

Bandingkan pemalar/*Compare the constant*:

$k = 3m^2 - 5$

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

$k = 7$

17
$$\begin{aligned} f(x) &= x^2 - 10x + 8 \\ &= x^2 - 10x + (-5)^2 - (-5)^2 + 8 \\ &= (x-5)^2 - 25 + 8 \\ &= (x-5)^2 - 17 \end{aligned}$$

18
$$\begin{aligned} f(x) &= k + 8x - x^2 \\ &= -[x^2 - 8x] + k \\ &= -[(x-4)^2 - 16] + k \\ &= -(x-4)^2 + 16 + k \end{aligned}$$

$f(x)_{max} = 16 + k$

$16 + k = 7$

$k = -9$

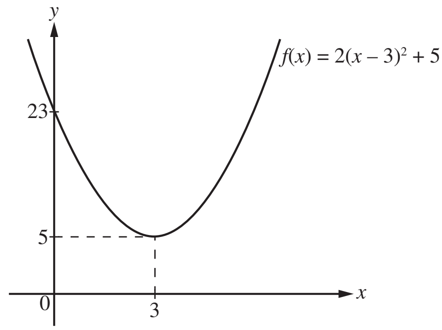
19 $f(x) = 2(x - 3)^2 + 5$

$f(x)_{min} = 5$ apabila/*when* $x = 3$

Pada paksi-y/*At* y-axis, apabila/*when* $x = 0$,

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

$= 23$



Julat/*Range*: $f(x) \geqslant 5$

20 (a) $y = 6 - 4x - 2x^2$

$= -2[x^2 + 2x] + 6$

$= -2[x^2 + 2x + 1^2 - 1^2] + 6$

$= -2[(x + 1)^2 - 1] + 6$

$= -2(x + 1)^2 + 2 + 6$

$y = -2(x + 1)^2 + 8$

(b) $y_{max} = 8$ apabila/*when* $x = -1$

Pada paksi-y/*At* y-*axis*, $x = 0$, $y = 6$

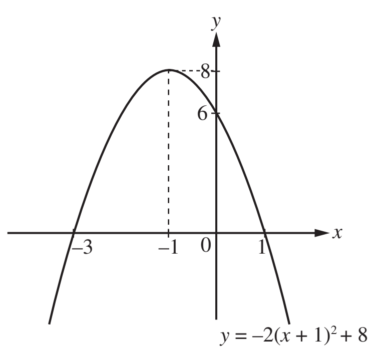
Pada paksi-x/ *At* x-axis, $y = 0$,

$-2(x + 1)^2 + 8 = 0$

$(x + 1)^2 = 4$

$x + 1 = -2, x + 1 = 2$

$x = -3, x = 1$



Praktis Sumatif

Kertas 1

1 (a) $f(x) = 2x^2 - 4x + k + 3$

$= 2[x^2 - 2x] + k + 3$

$= 2[x^2 - 2x + (-1)^2 - (-1)^2] + k + 3$

$= 2[x - 1]^2 - 2 + k + 3$

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

(b) $f(x)_{min} = k + 1$ apabila/*when* $x = 1$

Titik minimum/*Minimum point*: $(1, k + 1) = (2h, -6)$

Dengan perbandingan/*By comparison*,

$2h = 1$

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

$k + 1 = -6$

$k = -7$

2 (a) $f(x) = a(x + p)^2 + q$

$f(x)_{min} = q$ apabila/*when* $x = -p$

$-p = 3$

$p = -3$

$q = -7$

$f(x) = a(x - 3)^2 - 7$

Gantikan/*Substitute* (0, 5),

$5 = a(0 - 3)^2 - 7$

$9a = 12$

$a = \frac{4}{3}$

$f(x) = \frac{4}{3}(x - 3)^2 - 7$

(b) $f(x) = \frac{4}{3}(x - 3 + 2)^2 - 7 + 5$

$f(x) = \frac{4}{3}(x - 1)^2 - 2$

3 $f(x) = (2p - 3)x^2 + 6x + p$

$a > 0$

$2p - 3 > 0$

$p > \frac{3}{2}$ … ①

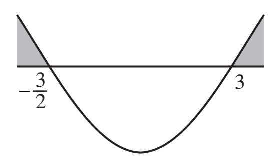
$b^2 - 4ac < 0$

$6^2 - 4(2p - 3)(p) < 0$

$36 - 8p^2 + 12p < 0$

$2p^2 - 3p - 9 > 0$

$(2p + 3)(p - 3) < 0$



$p < -\frac{3}{2}, p > 3$ … ②

Gabungkan ① dan ②,

Combining ① *and* ②,

$p > 3$

4 (a) $f(x) = x^2 + px - 15$

Kaedah/*Method* 1:

$(x + 5)(x - q) < 0$

$x^2 + (5 - q)x - 5q < 0$

$x^2 + px - 15 < 0$

Bandingkan/*Compare* x: $p = 5 - q$ … ①

Bandingkan pemalar/*Compare constant*:

$-5q = -15$

$q = 3$

Gantikan ke dalam ①/*Substitute into* ①,

$p = 5 - 3$

$p = 2$

Kaedah/*Method* 2:

Biar/*Let* $f(x) = 0$, $x^2 + px - 15 = 0$

Punca-punca/*Roots*: $-5, q$

HTP/*SOR*: $-5 + q = -p$

$p = 5 - q$ … ①

HDP/*POR*: $-5q = -15$

$q = 3$

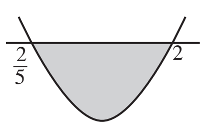
Gantikan ke dalam ①/*Substitute into* ①,

$p = 5 - 3$
$= 2$

(b) $m(x^2 + 1) = 3nx$
$mx^2 + m - 3nx = 0$
$mx^2 - 3nx + m = 0$
$b^2 - 4ac = 0$
$(-3n)^2 - 4(m)(m) = 0$
$9n^2 - 4m^2 = 0$
$4m^2 = 9n^2$
$\sqrt{4m^2} = \sqrt{9n^2}$
$2m = 3n$
$\frac{m}{n} = \frac{3}{2}$
$m : n = 3 : 2$

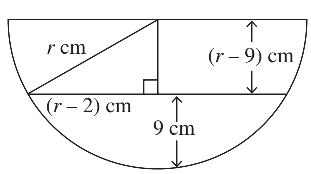
5 (a) $f(x) = 3 + q - (x - 2p)^2$
$f(x) = -(x - 2p)^2 + 3 + q$
$f(x)_{max} = 3 + q$ apabila/*when* $x = 2p$
Titik maksimum/*Maximum point*:
$(2p, 3 + q) = (4k, k)$
Dengan perbandingan/*By comparison*:
$2p = 4k$ … ①
$k = 3 + q$ … ②
Gantikan ② ke dalam ①/*Substitute* ② *into* ①,
$2p = 4(3 + q)$
$p = 2q + 6$

(b) $px(x - 3) + 6 = 2x - p$
$px^2 - 3px - 2x + p + 6 = 0$
$px^2 - (3p + 2)x + p + 6 = 0$
$b^2 - 4ac < 0$
$[-(3p + 2)]^2 - 4(p)(p + 6) < 0$
$9p^2 + 12p + 4 - 4p^2 - 24p < 0$
$5p^2 - 12p + 4 < 0$
$(5p - 2)(p - 2) < 0$



Julat/*Range*: $\frac{2}{5} < p < 2$

6 (a)



$(r - 2)^2 + (r - 9)^2 = r^2$
$r^2 - 4r + 4 + r^2 - 18r + 81 = r^2$
$r^2 - 22r + 85 = 0$
$(r - 5)(r - 17) = 0$
$r = 5, r = 17$
$r > 9, r = 17$ cm

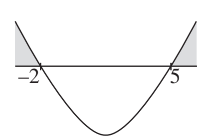
(b) $3x + 2px + p + 9 = 0; \alpha + \beta = h, \alpha\beta = k$
HTP/*SOR*: $2\alpha + 2\beta = -\frac{2p}{3}$
$\alpha + \beta = -\frac{p}{3}$
$h = -\frac{p}{3}$
$p = -3h$ … ①
HDP/*POR*: $2\alpha \times 2\beta = \frac{p + 9}{3}$
$4\alpha\beta = \frac{p + 9}{3}$
$12\alpha\beta = p + 9$
$12k = p + 9$ … ②
Gantikan ① ke dalam ②,
Substitute ① *into* ②,
$12k = -3h + 9$
$3h = 9 - 12k$
$h = 3 - 4k$

Kertas 2

1 $x^2 + 5x - 2p = 0$
HTP/*SOR*: $\alpha + \beta = -5$ … ①
HDP/*POR*: $\alpha\beta = -2p$ … ②
$x^2 - qx + 4x + 18 = 0$
$x^2 + (4 - q)x + 18 = 0$
HTP/*SOR*: $3\alpha + 3\beta = -(4 - q)$
$3(\alpha + \beta) = q - 4$ … ③
Gantikan ① ke dalam ③/*Substitute* ① *into* ③,
$3(-5) = q - 4$
$q = -11$
HDP/*POR*: $3\alpha \times 3\beta = 18$
$\alpha\beta = 2$ … ④
Gantikan ② ke dalam ④,
Substitute ② *into* ④,
$-2p = 2$
$p = -1$

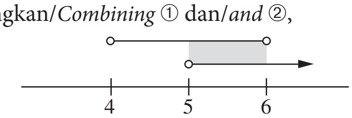
2 (a) (i) Perimeter $= 2x + 2(x - 3)$
$= 4x - 6$
$10 < 4x - 6 < 18$
$16 < 4x < 24$
$4 < x < 6$ … ①

(ii) $x(x - 3) > 10$
$x^2 - 3x - 10 > 0$
$(x + 2)(x - 5) > 0$
$x = -2, x = 5$



Julat/*Range*: $x > 0, x > 5$ … ②

(b) Gabungkan/*Combining* ① dan/*and* ②,



Julat/*Range*: $5 < x < 6$

3 $x^2 + (2p - 1)x + 14 = 0$
(a) Biar punca-punca/*Let the roots*: $\alpha, \alpha - 5$
HTP/*SOR*: $\alpha + \alpha - 5 = \frac{-(2p - 1)}{1}$

$2\alpha - 5 = 1 - 2p$
$2p = 6 - 2\alpha$
$p = 3 - \alpha \ldots ①$

HDP/*POR*: $\alpha(\alpha - 5) = \frac{14}{1}$
$\alpha^2 - 5\alpha - 14 = 0$
$(\alpha + 2)(\alpha - 7) = 0$
$\alpha = -2, 7$
$\alpha = -2$, Punca-punca/*Roots* $= -2, -7$
$\alpha = 7$, Punca-punca/*Roots* $= 2, 7$

(b) Gantikan ke dalam ①,
Substitute into ①,
$\alpha = -2, p = 3 - (-2)$
$p = 5$
$\alpha = 7, p = 3 - 7$
$p = -4$

4 (a) Daripada graf, garis $y = 7$ menyilang $y = f(x)$ pada dua titik,
∴ persamaan itu mempunyai punca nyata yang berbeza.
From the graph, line $y = 7$ intersects $y = f(x)$ at two points,
∴ the equation has real and distinct roots.

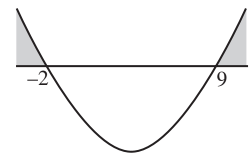
(b) $f(x) = p(x - 2)^2 + q$
$y_{max} = q$ apabila/*when* $x = 2$
Titik maksimum/*Maximum point*: $(2, q) = (k, 8)$
Dengan perbangdingan/*By comparison*:
$k = 2$
$q = 8$
$y = p(x - 2)^2 + 8$
Gantikan/*Substitute* (0, 6), $6 = p(0 - 2)^2 + 8$
$4p = -2$
$p = -\frac{1}{2}$

(c) $y = -\frac{1}{2}(x - 2)^2 + 8$
$x = 6, y = -\frac{1}{2}(6 - 2)^2 + 8$
$= 0$
Julat/*Range*: $0 \leqslant y \leqslant 8$

5 (a) Graf itu dianjakkan ke sebelah kiri paksi-y.
The graph is shifted to the left side of the y-axis.

(b) $y = x^2 + mx - 7$
$y = \left(x + \frac{m}{2}\right)^2 - \frac{m^2}{4} - 7$
$y_{\min} = -\frac{m^2}{4} - 7$ apabila/*when* $x = -\frac{m}{2}$
$-\frac{m}{2} = 3$
$m = -6$
$n = -\frac{(-6)^2}{4} - 7$
$n = -16$

(c) $y = x^2 - 6x - 7$
$x^2 - 6x - 7 \geqslant x + 11$
$x^2 - 7x - 18 \geqslant 0$
$(x + 2)(x - 9) \geqslant 0$



$x \leqslant -2, x \geqslant 9$

6 (a) $t = 0, h(0) = 3$ m

(b) $h(t) = 3 + 10t - 5t^2$
$= -5[t^2 - 2t] + 3$
$= -5[(t - 1)^2 - 1] + 3$
$= -5(t - 2)^2 + 5 + 3$
$= -5(t - 1)^2 + 8$
$h(t)_{\max} = 8, t = 1$

(c) Kaedah/*Method* 1:
$-5(t - 1)^2 + 8 = 0$
$(t - 1)^2 = \frac{8}{5}$
$t - 1 = \pm\sqrt{\frac{8}{5}}$
$t = 1 \pm \sqrt{\frac{8}{5}}$
$t > 0, t = 2.26$ s

Kaedah/*Method* 2:
$3 + 10t - 5t^2 = 0$
$t = \frac{-10 \pm \sqrt{10^2 - 4(-5)(3)}}{2(-5)}$
$t = \frac{-10 \pm \sqrt{160}}{-10}$
$t > 0, t = 2.26$ s

7 (a) $2x^2 + 4x - 5 = 0$
HTP/*SOR*: $\alpha + \beta = -\frac{4}{2}$
$\alpha + \beta = -2 \ldots ①$
HDP/*POR*: $\alpha\beta = -\frac{5}{2} \ldots ②$
Punca-punca baharu/*New roots* $= \frac{\alpha}{\beta}, \frac{\beta}{\alpha}$
HTP baharu/*New SOR* $= \frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
$= \frac{\alpha^2 + \beta^2}{\alpha\beta}$
$= \frac{(\alpha + \beta)^2 - 2\alpha\beta}{\alpha\beta}$
$= \frac{(\alpha + \beta)^2}{\alpha\beta} - 2$
$= \frac{(-2)^2}{-\frac{5}{2}} - 2$
$= -\frac{18}{5}$
HDP baharu/*New POR* $= \frac{\alpha}{\beta} \times \frac{\beta}{\alpha}$
$= 1$
Persamaan baharu/*New equation*:
$x^2 - \left(-\frac{18}{5}\right)x + 1 = 0$

$\times 5,\ 5x^2 + 18x + 5 = 0$

(b) $y = x - 2k \ldots$ ①

$y = x^2 - kx + 2 \ldots$ ②

① = ②, $x - 2k = x^2 - kx + 2$

$x^2 - kx - x + 2 + 2k = 0$

$x^2 - (k + 1)x + 2 + 2k = 0$

$b^2 - 4ac = 0$

$[-(k + 1)]^2 - 4(1)(2 + 2k) = 0$

$k^2 + 2k + 1 - 8 - 8k = 0$

$k^2 - 6k - 7 = 0$

$(k + 1)(k - 7) = 0$

$k = -1, 7$

8 (a) $y = p(x^2 + 6x - 7)$

Pada/*At* $(0, -14)$, $-14 = p(-7)$

$p = 2$

(b) $y = 2(x^2 + 6x - 7)$

$= 2[x^2 + 6x + (3)^2 - (3)^2 - 7]$

$= 2[(x + 3)^2 - 16]$

$= 2(x + 3)^2 - 32$

$y_{min} = -32$ apabila/*when* $x = -3$

Titik minimum/*Minimum point* = $(-3, -32)$

(c) Memplot titik minimum $(-3, -32)$,

Plotting minimum point $(-3, -32)$,

Pada paksi-x/*At x-axis*, $y = 0$,

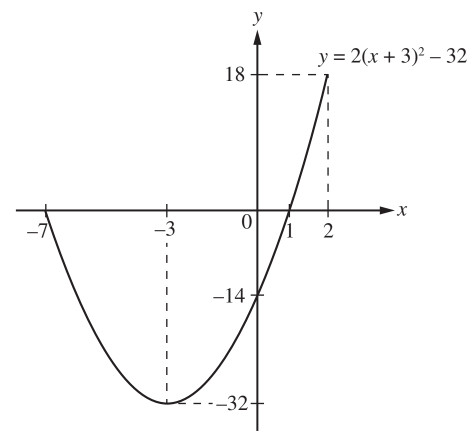
$2(x^2 + 6x - 7) = 0$

$2(x + 7)(x - 1) = 0$

$x = 1, x = -7$

$x = 2, y = 2(2 + 3)^2 - 32$

$y = 18$



Julat/*Range*: $-32 \leqslant y \leqslant 18$