

Jawapan

Praktis 1

Praktis Formatif

- 1 (a) {3, 5, 7, 8}
 (b) Hubungan satu kepada banyak/One-to-many relation

- 2 (a) -2, 2
 (b) $f(x) = x^2$ atau/or $f: x \rightarrow x^2$

- 3 (a) $4x - 5 = 0$

$$x = \frac{5}{4}$$

$$\therefore p = \frac{5}{4}$$

(b) $f(2) = \frac{12}{4(2) - 5}$
 $= 4$

(c) $f(x) = -6$

$$\frac{12}{4x - 5} = -6$$

$$4x - 5 = -2$$

$$4x = 3$$

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

4 $f(x) = x^2 + px$

$$f(3) = -12$$

$$(3)^2 + p(3) = -12$$

$$9 + 3p = -12$$

$$3p = -21$$

$$p = -7$$

Gantikan ke dalam/Substitute into $f(x)$,

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

$$f(-2) = q$$

$$q = (-2)^2 - 7(-2)$$

$$q = 18$$

5 $g(x) = \frac{ax}{x - b}$

$$g(-1) = 1$$

$$\frac{a(-1)}{-1 - b} = 1$$

$$-a = -1 - b$$

$$a = b + 1 \dots \textcircled{1}$$

$$g(4) = 6$$

$$\frac{a(4)}{4 - b} = 6$$

$$2a = 12 - 3b \dots \textcircled{2}$$

Gantikan $\textcircled{1}$ ke dalam $\textcircled{2}$,

Substitute $\textcircled{1}$ into $\textcircled{2}$,

$$2(b + 1) = 12 - 3b,$$

$$2b + 2 = 12 - 3b$$

$$5b = 10$$

$$b = 2$$

Gantikan ke dalam $\textcircled{1}$ /Substitute into $\textcircled{1}$,

$$a = 2 + 1$$

$$= 3$$

6 (a) $w\left(\frac{1}{2}\right) = \left|4\left(\frac{1}{2}\right) - 11\right|$
 $= |-9|$
 $= 9$

(b) $w(x) = |4x - 11|$

$$w(x) = 5$$

$$|4x - 11| = 5$$

$$4x - 11 = -5,$$

$$4x - 11 = 5$$

$$4x = 6,$$

$$4x = 14$$

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

$$x = 4$$

7 (a) $f(x) = |3x - 5|$

Pada paksi-x/At x -axis, $f(x) = 0$,

$$3x - 5 = 0$$

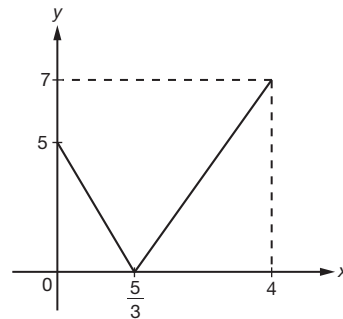
$$x = \frac{5}{3}$$

$$f(0) = |3(0) - 5|$$

$$= 5$$

$$f(4) = |3(4) - 5|$$

$$= 7$$



(b) Julat/Range: $0 \leq y \leq 7$

8 $f(x) = 5x - 2, h(x) = \frac{8}{3x + 4}$

(a) $fh(-2) = f\left(\frac{8}{3(-2) + 4}\right)$
 $= f(-4)$
 $= 5(-4) - 2$
 $= -22$

(b) $hf(x) = h(5x - 2)$
 $= \frac{8}{3(5x - 2) + 4}$
 $= \frac{8}{15x - 6 + 4}$
 $= \frac{8}{15x - 2}, x \neq \frac{2}{15}$

$$9 \text{ (a) } f(x) = 2x + 3, g(x) = \frac{1}{4-x}$$

$$gf(x) = g(2x + 3)$$

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

$$= \frac{1}{1 - 2x}, x \neq \frac{1}{2}$$

$$(b) gf(x) = 2g(x)$$

$$\frac{1}{1 - 2x} = 2\left(\frac{1}{4 - x}\right)$$

$$4 - x = 2(1 - 2x)$$

$$4 - x = 2 - 4x$$

$$3x = -2$$

$$x = -\frac{2}{3}$$

$$10 \text{ (a) } g^2(3) = gg(3)$$

$$= g\left(\frac{4}{3-2}\right)$$

$$= g(4)$$

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

$$= 2$$

$$(b) g^2(x) = \frac{2}{3}$$

$$gg(x) = \frac{2}{3}$$

$$g\left(\frac{4}{x-2}\right) = \frac{2}{3}$$

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

$$\frac{4}{x-2} - 2 = 6$$

$$\frac{4}{x-2} = 8$$

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

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

$$11 f(x) = x - 3, g(x) = \frac{4}{x}$$

$$(a) gf(x) = g(x - 3)$$

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

$$(b) f^2(x) = f[f(x)]$$

$$= f(x - 3)$$

$$= x - 3 - 3$$

$$= x - 6$$

$$(c) fg(x) = f\left(\frac{4}{x}\right)$$

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

$$12 f(x) = \frac{6}{x}, fg(x) = \frac{2}{x-4}$$

Biar/Let $g(x) = y,$

$$f(y) = \frac{2}{x-4}$$

$$\frac{6}{y} = \frac{2}{x-4}$$

$$y = 3x - 12$$

$$\therefore g(x) = 3x - 12$$

$$13 g(x) = 5 - 2x, hg(x) = 19 - 8x$$

Biar/Let $g(x) = y,$

$$5 - 2x = y$$

$$2x = 5 - y$$

$$x = \frac{5 - y}{2} \dots \textcircled{1}$$

$$h(y) = 19 - 8x \dots \textcircled{2}$$

Gantikan $\textcircled{1}$ ke dalam $\textcircled{2},$

Substitute $\textcircled{1}$ into $\textcircled{2},$

$$h(y) = 19 - 8\left(\frac{5 - y}{2}\right)$$

$$= 19 - 20 + 4y$$

$$= 4y - 1$$

$$\therefore h(x) = 4x - 1$$

14 Hubungan banyak kepada satu, tiada songsangan

Many-to-one relation, no inverse

$$15 \text{ (a) } f(x) = 6x - 5$$

Biar/Let $f^{-1}(7) = y,$

$$f(y) = 7$$

$$6y - 5 = 7$$

$$6y = 12$$

$$y = 2$$

$$f^{-1}(7) = 2$$

$$(b) \text{ Biar/Let } f^{-1}(x) = y,$$

$$f(y) = x$$

$$6y - 5 = x$$

$$6y = x + 5$$

$$y = \frac{x + 5}{6}$$

$$f^{-1}(x) = \frac{x + 5}{6}$$

$$16 \text{ (a) } h^{-1}(x) = y$$

$$h(y) = x$$

$$\frac{4y}{5 - 3y} = x$$

$$4y = 5x - 3xy$$

$$3xy + 4y = 5x$$

$$y(3x + 4) = 5x$$

$$y = \frac{5x}{3x + 4}$$

$$h^{-1}(x) = \frac{5x}{3x + 4}, x \neq -\frac{4}{3}$$

$$(b) h^{-1}(m) = h(1)$$

$$h^{-1}(m) = \frac{4(1)}{5 - 3(1)}$$

$$h^{-1}(m) = 2$$

$$h(2) = m$$

$$\frac{4(2)}{5 - 3(2)} = m$$

$$m = -8$$

$$17 \text{ (a) } p = -2$$

$$(b) f^{-1}(x) = y$$

$$f(y) = x$$

$$9 - (y + 2)^2 = x$$

$$\begin{aligned}(y+2)^2 &= 9-x \\ y+2 &= \sqrt{9-x} \\ y &= \sqrt{9-x} - 2 \\ f^{-1}(x) &= \sqrt{9-x} - 2\end{aligned}$$

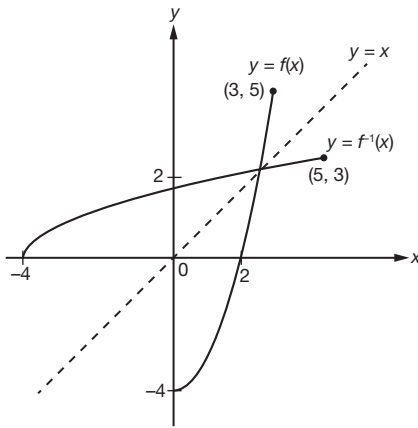
18 (a) $f(3) = 3^2 - 4$
 $= 5$

Biar/Let $g^{-1}(5) = y$,
 $g(y) = 5$
 $\frac{y}{2y-3} = 5$
 $y = 10y - 15$
 $9y = 15$
 $y = \frac{5}{3}$
 $g^{-1}f(3) = \frac{5}{3}$

19 $g(x) = \frac{1}{2}x - 3$, $h(x) = 7 - 4x$

Biar/Let $g^{-1}(x) = y$,
 $g(y) = x$
 $\frac{1}{2}y - 3 = x$
 $\frac{1}{2}y = x + 3$
 $y = 2x + 6$
 $g^{-1}(x) = 2x + 6$
 $hg^{-1}(x) = h(2x + 6)$
 $= 7 - 4(2x + 6)$
 $= -8x - 17$

20 (a)



(b) Domain bagi/Domain of $f^{-1}(x)$: $-4 \leq x \leq 5$
 Julat bagi/Range of $f^{-1}(x)$: $0 \leq f^{-1}(x) \leq 3$

Praktis Sumatif

Kertas 1

- 1 (a) B dan/and D
 Setiap objek (nilai x) mempunyai hanya satu imej (nilai y).
Every object (x -value) has only one image (y -value).
- (b) D
 Hubungan satu kepada satu/One to one relation

2 (a) Gantikan/Substitute ($p, 0$),
 $0 = |4p - 7|$
 $4p - 7 = 0$
 $p = \frac{7}{4}$

Gantikan/Substitute ($0, q$),
 $q = |4(0) - 7|$
 $= 7$

(b) $|4x - 7| = 7$
 $4x - 7 = -7$ $4x - 7 = 7$
 $4x = 0$ $4x = 14$
 $x = 0$ $x = \frac{7}{2}$

Domain: $0 \leq x \leq \frac{7}{2}$

3 (a) (i) $h(x) = 6(x - 12) + 150$
 $= 6x - 72 + 150$
 $= 6x + 78$
 (ii) $6x + 78 = 180$
 $6x = 102$
 $x = 17$

(b) Julat bagi/Range of $g(x)$: $-5 \leq g(x) \leq 11$
 Domain bagi/Domain of $g^{-1}(x)$: $-5 \leq x \leq 11$

4 (a) $gh(2) = 1$
 $g(2^2 + q) = 1$
 $p(4 + q) - 5 = 1$
 $p(4 + q) = 6$
 $4 + q = \frac{6}{p}$
 $q = \frac{6}{p} - 4$

(b) $f(x) = (\sqrt{x} + 1)^2$
 $f^2(x) = ff(x)$
 $= f((\sqrt{x} + 1)^2)$
 $= (\sqrt{(\sqrt{x} + 1)^2} + 1)^2$
 $= (\sqrt{x} + 1 + 1)^2$
 $= (\sqrt{x} + 2)^2$

$f^3(x) = ff^2(x)$
 $= f((\sqrt{x} + 2)^2)$
 $= (\sqrt{(\sqrt{x} + 2)^2} + 1)^2$
 $= (\sqrt{x} + 2 + 1)^2$
 $= (\sqrt{x} + 3)^2$

$f^n(x) = (\sqrt{x} + n)^2$

5 (a) $g^{-1}(x) = y$
 $g(y) = x$
 $\frac{1}{a}y + 2 = x$

$\frac{1}{a}y = x - 2$

$y = ax - 2a$
 $g^{-1}(x) = ax - 2a$
 $= mx + n$

Bandingkan pekali/Compare coefficient of x : $a = m$ ①
 Bandingkan pemalar/Compare constant: $n = -2a \dots$ ②

Gantikan ① ke dalam ②/Substitute ① into ②,
 $n = -2m$

(b) (i) $f^{-1}: x \rightarrow \frac{\sqrt{x+7}}{2}$

Biar/Let $f(x) = y,$

$$f^{-1}(y) = x$$

$$\frac{\sqrt{y+7}}{2} = x$$

$$\sqrt{y+7} = 2x$$

$$y + 7 = 4x^2$$

$$y = 4x^2 - 7$$

$$f(x) = 4x^2 - 7$$

(ii) $ff^{-1}(4) = g(k)$

$$4 = \frac{1}{3}k^2 - 8$$

$$k^2 = 36$$

$$k = \pm 6$$

6 (a) $h(x) = mx + 7, h^2(x) = 16x + n$

$$h^2(x) = h[h(x)]$$

$$= h(mx + 7)$$

$$= m(mx + 7) + 7$$

$$16x + n = m^2x + 7m + 7$$

Bandungkan pekali x :

Compare coefficient of x :

$$m^2 = 16$$

$$m = 4$$

Bandungkan pemalar/Compare constant:

$$n = 7m + 7$$

$$m = 4, n = 7(4) + 7$$

$$= 35$$

(b) (i) $g^{-1}(x) = y$

$$g(y) = x$$

$$2y + 3 = x$$

$$y = \frac{x-3}{2}$$

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

(ii) Kaedah/Method 1:

$$fg(x) = 6x - 5$$

Biar/Let $g(x) = y,$

$$2x + 3 = y$$

$$x = \frac{y-3}{2}$$

$$f(y) = 6\left(\frac{y-3}{2}\right) - 5$$

$$= 3y - 9 - 5$$

$$= 3y - 14$$

$$\therefore f(x) = 3x - 14$$

Kaedah/Method 2:

$$fg[g^{-1}(x)] = 6g^{-1}(x) - 5$$

$$f(x) = 6\left(\frac{x-3}{2}\right) - 5$$

$$= 3x - 9 - 5$$

$$f(x) = 3x - 14$$

Kertas 2

1 (a) $f(x) = \frac{x+b}{3x-2}, x \neq a$

$$3x - 2 = 0$$

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

$$\therefore a = \frac{2}{3}$$

(b) (i) $ff(-1) = -1$

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

$$\frac{-1+b}{-5} = -1$$

$$-1+b = 5$$

$$b = 6$$

(ii) $f(x) = x$

$$\frac{x+6}{3x-2} = x$$

$$x+6 = 3x^2 - 2x$$

$$3x^2 - 3x - 6 = 0$$

$$x^2 - x - 2 = 0$$

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

$$x \neq -1 \therefore x = 2$$

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

(a) $gf(1) = g[(1)^2 - 6(1) + 2]$

$$= g(-3)$$

$$= 3 - 2(-3)$$

$$= 9$$

(b) $fg(x) = f(3 - 2x)$

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

$$= 9 - 12x + 4x^2 - 18 + 12x + 2$$

$$= 4x^2 - 7$$

(c) $fg(x) = gf(1)$

$$4x^2 - 7 = 9$$

$$4x^2 = 16$$

$$x^2 = 4$$

$$x = \pm 2$$

3 $h: x \rightarrow \frac{p}{x+q}, x \neq -q, h^{-1}: x \rightarrow \frac{5-4x}{x}, x \neq 0$

(a) $h^{-1}(x) = y$

$$h(y) = x$$

$$\frac{p}{y+q} = x$$

$$p = xy + qx$$

$$xy = p - qx$$

$$y = \frac{p-qx}{x}$$

$$h^{-1}(x) = \frac{p-qx}{x}$$

$$\frac{5-4x}{x} = \frac{p-qx}{x}$$

Bandungkan pemalar/Compare constant: $p = 5$

Bandungkan pekali x /Compare coefficient of x : $q = 4$

(b) $h^{-1}(x) = \frac{5-4x}{x}$

$$(h^{-1})^2(x) = h^{-1}h^{-1}(x)$$

$$= h^{-1}\left(\frac{5-4x}{x}\right)$$

$$= \frac{5-4\left(\frac{5-4x}{x}\right)}{\frac{5-4x}{x}}$$

$$= \frac{5-4x}{x}$$

$$= \frac{5x - 20 + 16x}{5 - 4x}$$

$$= \frac{21x - 20}{5 - 4x}, x \neq \frac{5}{4}$$

4 (a) $f(y) = \frac{y+m}{3}, g(y) = \frac{m}{2y+n}$

$$f(7) = 4$$

$$\frac{7+m}{3} = 4$$

$$7+m = 12$$

$$m = 5$$

$$g(-2) = -1$$

$$\frac{5}{2(-2)+n} = -1$$

$$\frac{5}{n-4} = -1$$

$$-n+4 = 5$$

$$n = -1$$

(b) $f(y) = \frac{y+5}{3}$

Biar/Let $f^{-1}(x) = y,$
 $f(y) = x$
 $\frac{y+5}{3} = x$
 $y+5 = 3x$
 $y = 3x-5$
 $\therefore f^{-1}(x) = 3x-5$

(c) $g(y) = \frac{5}{2y-1}$
 $gf^{-1}(x) = g(3x-5)$
 $= \frac{5}{2(3x-5)-1}$
 $= \frac{5}{6x-11}, x \neq \frac{11}{6}$

5 (a) (i) $f^{-1}(x) = \frac{4-x}{k}, g(x) = 3x^2 + p$

Biar/Let $f(x) = y,$
 $f^{-1}(y) = x$
 $\frac{4-y}{k} = x$
 $4-y = kx$
 $y = 4-kx$
 $f(x) = 4-kx$

(ii) $f(x^2) = 2g(x)$
 $4-kx^2 = 2(3x^2+p)$
 $-kx^2+4 = 6x^2+2p$

Bandingkan pekali x /Compare coefficient of x :

$$-k = 6$$

$$k = -6$$

Bandingkan pemalar/Compare constant:

$$4 = 2p$$

$$p = 2$$

(b) $f(x) = 4 + 6x$
 $y = |f(x)|$
 $y = |4 + 6x|$

Pada paksi- x /At x -axis, $y = 0,$
 $4 + 6x = 0$

$$x = -\frac{2}{3}$$

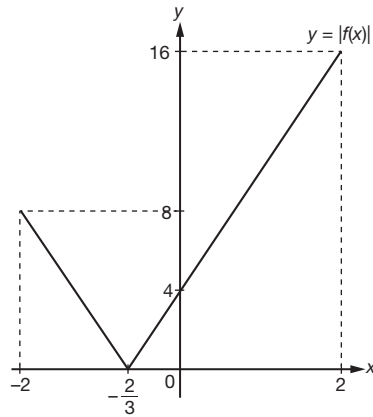
Pada paksi- x /At y -axis, $x = 0, y = 4$

$$x = -2, y = |4 + 6(-2)|$$

$$= 8$$

$$x = 2, y = |4 + 6(2)|$$

$$= 16$$



Julat/Range: $0 \leq y \leq 16$

6 (a) (i) $f(x) = px - q$

Biar/Let $f^{-1}(x) = y,$
 $f(y) = x$
 $py - q = x$
 $y = \frac{x+q}{p}$
 $\therefore f^{-1}(x) = \frac{x+q}{p}$

(ii) $f^{-1}(-1) = 2$

$$\frac{-1+q}{p} = 2$$

$$q = 2p + 1 \dots \textcircled{1}$$

$$f(4) = 5$$

$$4p - q = 5 \dots \textcircled{2}$$

Gantikan $\textcircled{1}$ ke dalam $\textcircled{2}$ /Substitute $\textcircled{1}$ into $\textcircled{2},$

$$4p - (2p + 1) = 5$$

$$2p - 1 = 5$$

$$2p = 6$$

$$p = 3$$

Gantikan ke dalam $\textcircled{1}$ /Substitute into $\textcircled{1},$

$$q = 2(3) + 1$$

$$= 7$$

(b) (i) $g(x) = 1 - 3x$

Biar/Let $g^{-1}(x) = y,$
 $g(y) = x$
 $1 - 3y = x$
 $3y = 1 - x$
 $y = \frac{1-x}{3}$
 $\therefore g^{-1}(x) = \frac{1-x}{3}$

(ii) $hg(x) = 9x^2 - 6x - 4$

$$hg[g^{-1}(x)] = 9\left(\frac{1-x}{3}\right)^2 - 6\left(\frac{1-x}{3}\right) - 4$$

$$h(x) = 9\left(\frac{1-2x+x^2}{9}\right) - 2(1-x) - 4$$

$$= 1 - 2x + x^2 - 2 + 2x - 4$$

$$\therefore h(x) = x^2 - 5$$

$$\begin{aligned}
 7 \text{ (a) (i) } g^2(x) &= gg(x) \\
 &= g\left(\frac{1+x}{1-x}\right) \\
 &= \frac{1 + \frac{1+x}{1-x}}{1 - \frac{1+x}{1-x}} \\
 &= \frac{1-x+1+x}{1-x-1-x} \\
 &= \frac{2}{-2x} \\
 &= -\frac{1}{x}, x \neq 0
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } g^3(x) &= g^2g(x) \\
 &= g^2\left(\frac{1+x}{1-x}\right) \\
 &= -\frac{1}{\frac{1+x}{1-x}} \\
 &= -\left(\frac{1-x}{1+x}\right) \\
 &= \frac{x-1}{x+1}, x \neq -1
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) } g^4(x) &= g^2g^2(x) \\
 &= g^2\left(-\frac{1}{x}\right) \\
 &= -\frac{1}{\left(-\frac{1}{x}\right)} \\
 &= x
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) (i) } g^{15}(x) &= g^3g^4g^4g^4(x) \\
 &= g^3(x) \\
 &= \frac{x-1}{x+1}, x \neq -1
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } g^{4n-3}(x) &= g^{4n-4+1}(x) \\
 &= g^{4(n-1)}g(x) \\
 &= g(x) \\
 &= \frac{1+x}{1-x}, x \neq 1
 \end{aligned}$$

$$\begin{aligned}
 8 \text{ (a) Biar/Let } g^{-1}(x) &= y, \\
 g(y) &= x
 \end{aligned}$$

$$\frac{6-3y}{2} = x$$

$$6-3y = 2x$$

$$3y = 6-2x$$

$$y = \frac{6-2x}{3}$$

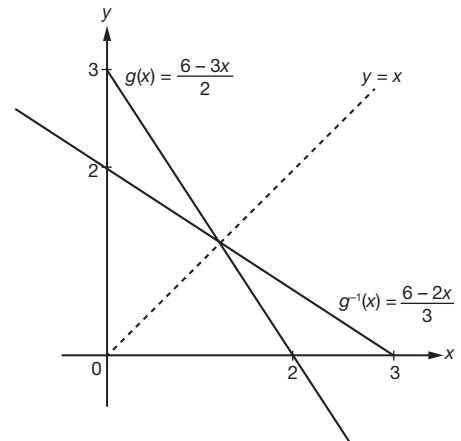
$$g^{-1}(x) = \frac{6-2x}{3} \text{ atau/or } g^{-1}(x) = 2 - \frac{2}{3}x$$

$$\text{(b) Bagi/For } y = \frac{6-3x}{2},$$

$$x=0, y = \frac{6-0}{2} = 3$$

$$y=0, 6-3x = 0$$

$$x = 2$$



$$\text{(c) Bagi/For } g(x):$$

$$\text{Domain: } x \geq 0, \text{ Julat/Range: } g(x) \geq 0$$

$$\text{Bagi/For } g^{-1}(x):$$

$$\text{Domain: } x \leq 3, \text{ Julat/Range: } g^{-1}(x) \geq 0$$

$$\text{(d) } g(x) = g^{-1}(x)$$

$$\frac{6-3x}{2} = \frac{6-2x}{3}$$

$$18-9x = 12-4x$$

$$5x = 6$$

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