

# JAWAPAN

## BAB 6 HUKUM LINEAR

### Inkuiri 1 (Halaman 154)

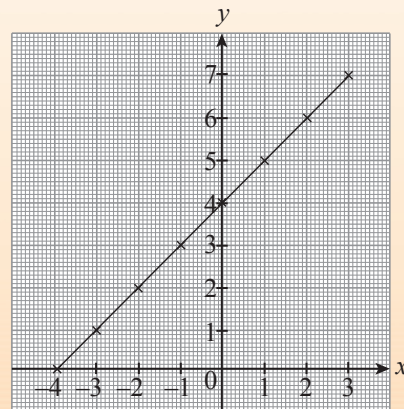
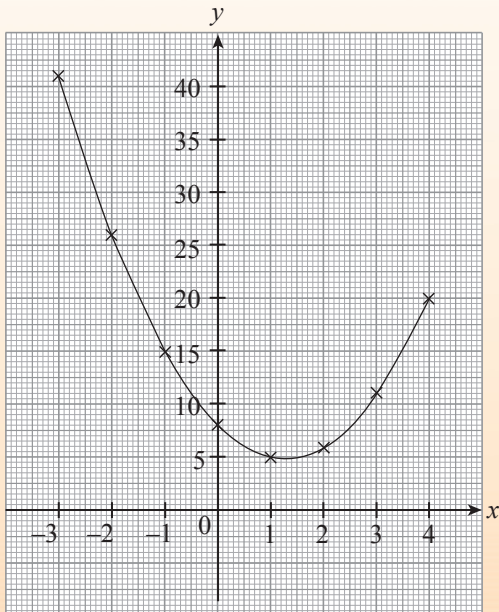
1. (a)

$x$	-3	-2	-1	0	1	2	3	4
$y$	41	26	15	8	5	6	11	20

(b)

$x$	-4	-3	-2	-1	0	1	2	3
$y$	0	1	2	3	4	5	6	7

2.



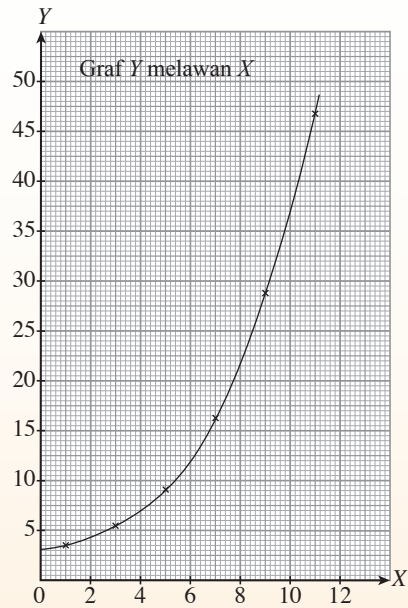
3. Bentuk graf 1(a) ialah lengkung manakala bentuk graf 1(b) ialah garis lurus. Suatu hubungan linear membentuk suatu garis lurus manakala suatu hubungan tak linear tidak membentuk garis lurus.

### Latih Diri 6.1 (Halaman 155)

1. Graf hubungan linear ialah Rajah 1(b). Graf Rajah 1(a) mewakili hubungan tak linear apabila bentuk graf yang diperolehi ialah lengkung manakala graf Rajah 1(b) mewakili hubungan linear apabila satu garis lurus diperolehi.

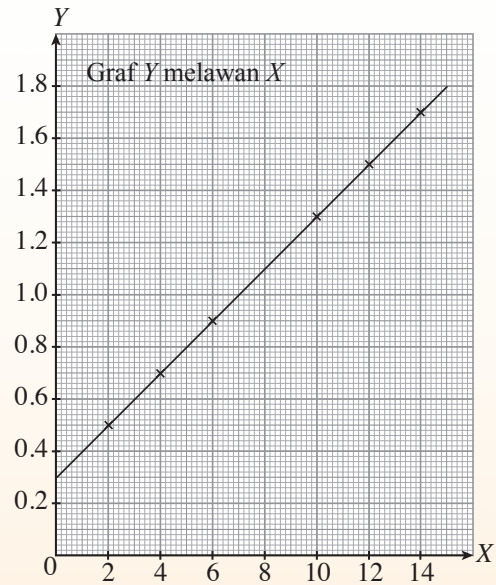
2. (a)

X	1	3	5	7	9	11
Y	3.16	5.50	9.12	16.22	28.84	46.77



(b)

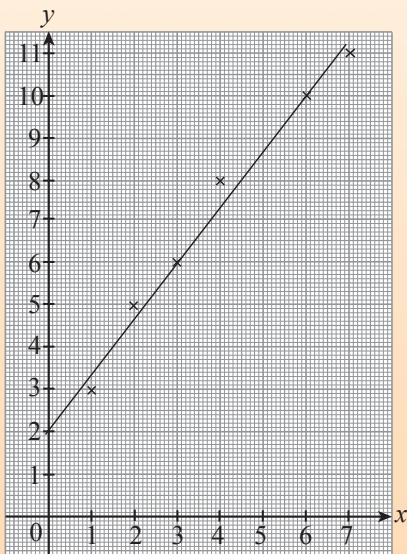
X	2	4	6	10	12	14
Y	0.5	0.7	0.9	1.3	1.5	1.7



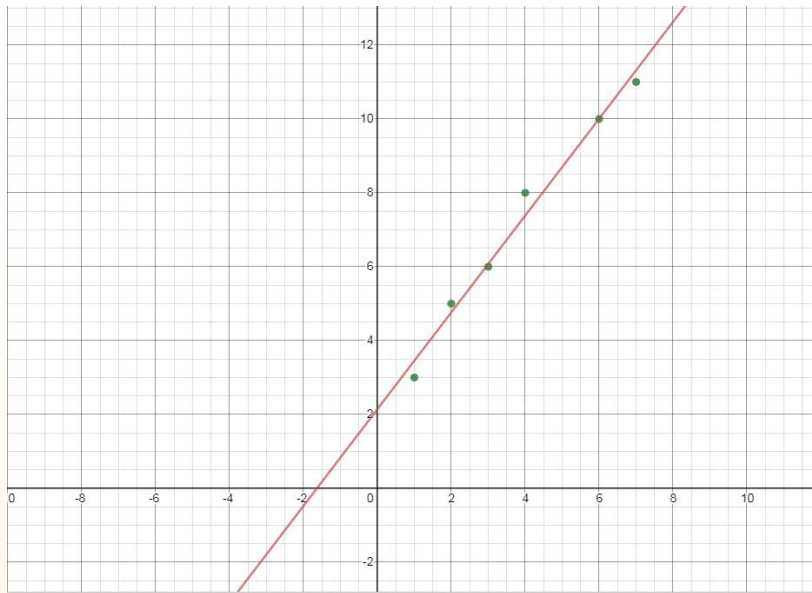
Graf (b) yang berbentuk garis lurus ialah graf hubungan linear.

### Inkuiri 2 (Halaman 156)

1.

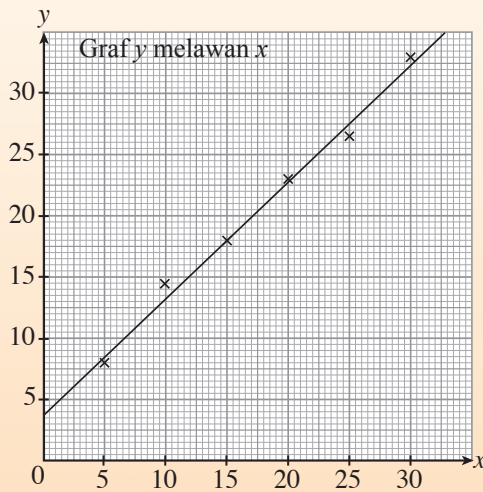


3.

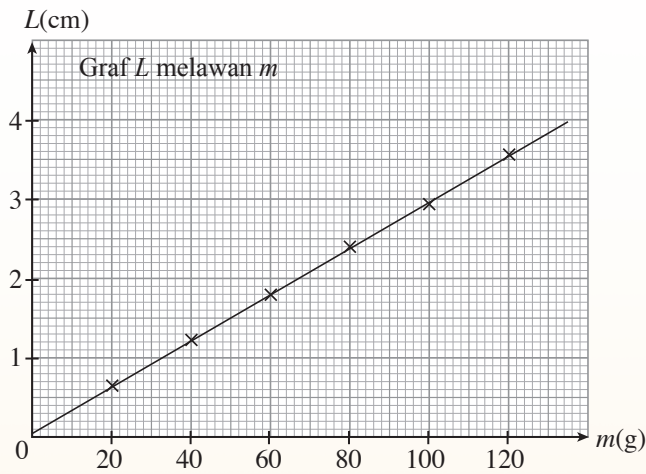


**Latih Diri 6.2** (Halaman 157)

1.



2.



**Latih Diri 6.3** (Halaman 158)

1.  $m = \frac{0.6 - 0.02}{0.32 - 0}$

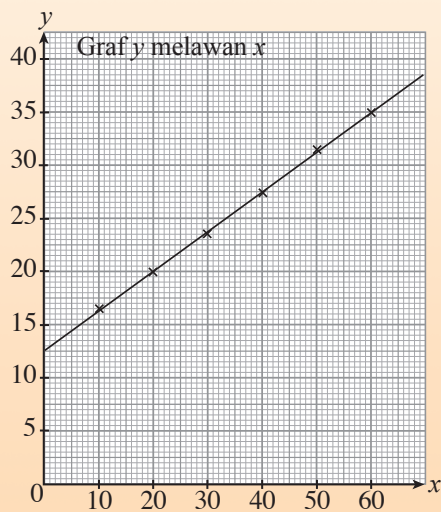
$= \frac{29}{16}$

$c = 0.02$

$= \frac{1}{50}$

$t = \frac{29}{16}x + \frac{1}{50}$

2. (a)

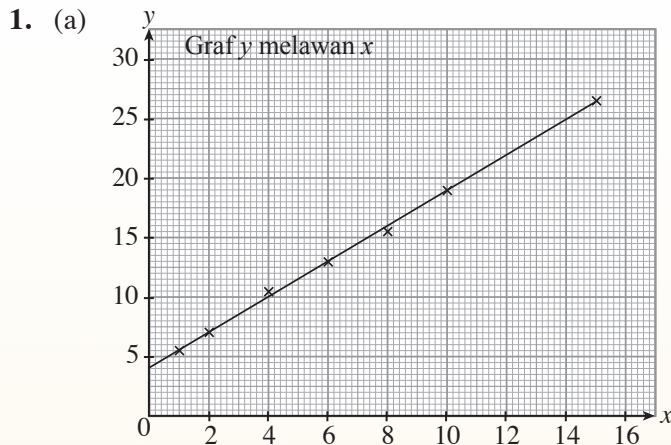


(b) Pintasan- $y = 12.5$

Kecerunan  $= \frac{35 - 12.5}{60 - 0}$   
 $= 0.375$

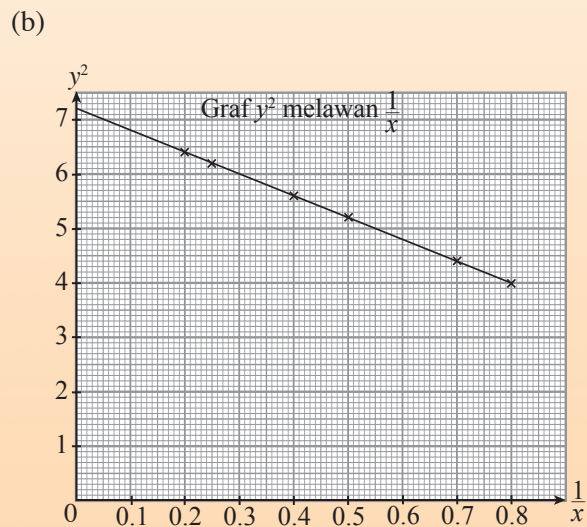
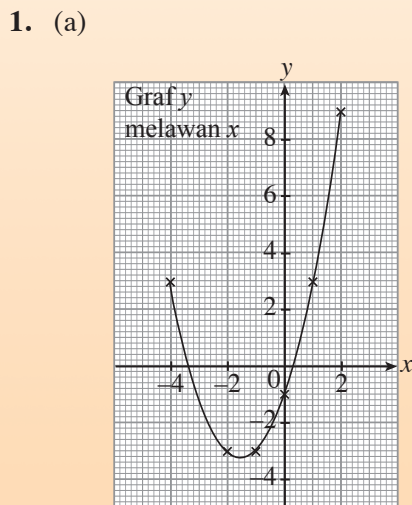
(c)  $y = 0.375x + 12.5$

**Latih Diri 6.4 (Halaman 160)**



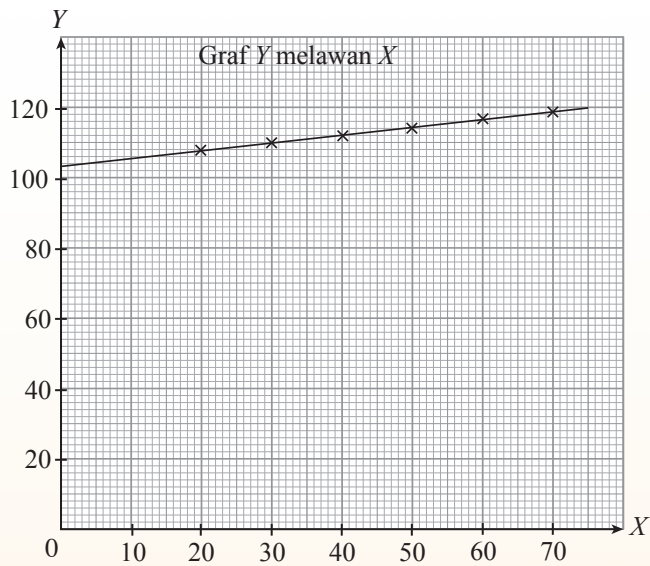
- (b) (i) Pintasan- $y = 4.0$   
 (ii) Apabila  $x = 12$ ,  $y = 22$   
 (iii) Kecerunan,  $m = \frac{26.5 - 4}{15 - 0}$   
 $= \frac{3}{2}$   
 (iv) Apabila  $y = 15$ ,  $x = 7.4$
- (c)  $y = \frac{3}{2}x + 4$   
 Apabila  $x = 28$ ,  $y = \frac{3}{2}(28) + 4$   
 $= 46$

**Latihan Intensif 6.1 (Halaman 161)**



Graf (a) ialah graf tak linear manakala graf (b) ialah graf linear. Bentuk graf (a) ialah lengkung manakala bentuk graf (b) ialah garis lurus.

2.



$$\begin{aligned} \text{Kecerunan, } m &= \frac{119 - 108}{70 - 20} \\ &= \frac{11}{50} \end{aligned}$$

$$Y = mX + c$$

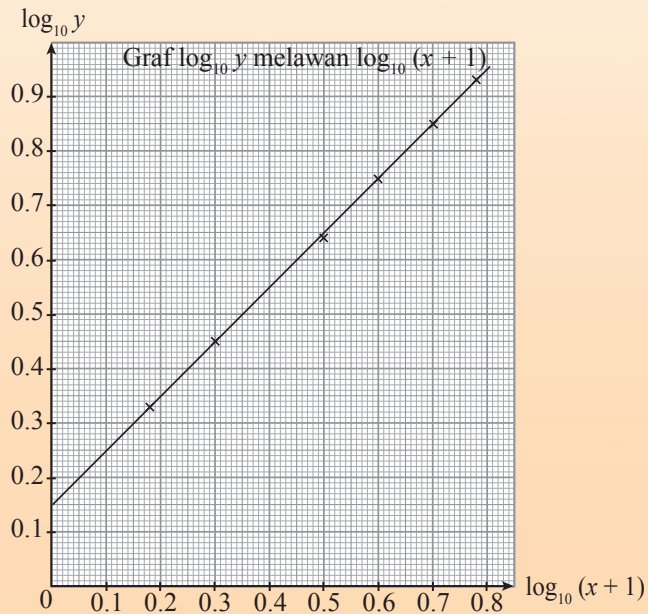
$$c = Y - mX$$

$$= 108 - \frac{11}{50}(20)$$

$$= \frac{518}{5}$$

$$\text{Persamaan garis lurus: } Y = \frac{11}{50}X + \frac{518}{5}$$

3. (a)



(b) (i) Kecerunan,  $m = \frac{0.75 - 0.15}{0.6 - 0}$

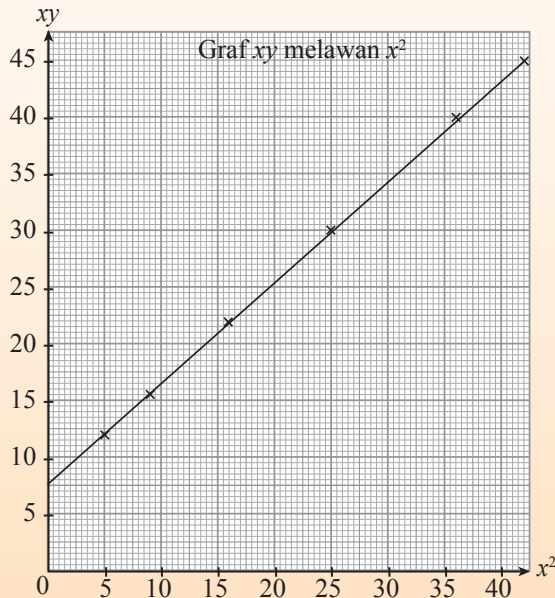
(ii) Pintasan- $\log_{10} y = 0.15$

(iii) Apabila  $\log_{10} y = 0.55$ ,  $\log_{10} (x + 1) = 0.4$   
 $10^{0.4} = x + 1$   
 $2.512 = x + 1$   
 $x = 1.512$

(c) (i)  $\log_{10} y = \log_{10} (x + 1) + 0.15$   
 $= \log_{10} (3.5) + 0.15$   
 $= 0.6941$   
 $y = 4.944$

(ii)  $\log_{10} (1.5) = \log_{10} (x + 1) + 0.15$   
 $\log_{10} (x + 1) = 0.0261$   
 $x + 1 = 10^{0.0261}$   
 $x + 1 = 1.0619$   
 $x = 0.0619$

4. (a)



(b) (i) Kecerunan,  $m = \frac{45 - 12}{42 - 5}$   
 $= \frac{33}{37}$

(ii) Pintasan- $Y = 7.5$

(iii) Apabila  $xy = 16.5$ ,  $x^2 = 10$

(iv) Apabila  $x = 2.5$ ,  $x^2 = 6.25$

Apabila  $x^2 = 6.25$ ,  $xy = 13$

$2.5y = 13$

$y = 5.2$

(c) Persamaan garis lurus:  $xy = \frac{33}{37}x^2 + 7.5$

Apabila  $xy = 100$ ,  $100 = \frac{33}{37}x^2 + 7.5$

$$x^2 = 103.7$$

$$x = 10.18$$

**Latih Diri 6.5 (Halaman 165)**

1. (a)  $y = px^2 - q$

$$\frac{y}{x^2} = p - \frac{q}{x^2}$$

Melalui perbandingan,

$$Y = \frac{y}{x^2}, X = \frac{1}{x^2}, m = -q, c = p$$

(b)  $y = hx^2 + x$

$$\frac{y}{x} = hx + 1$$

Melalui perbandingan,

$$Y = \frac{y}{x}, X = x, m = h, c = 1$$

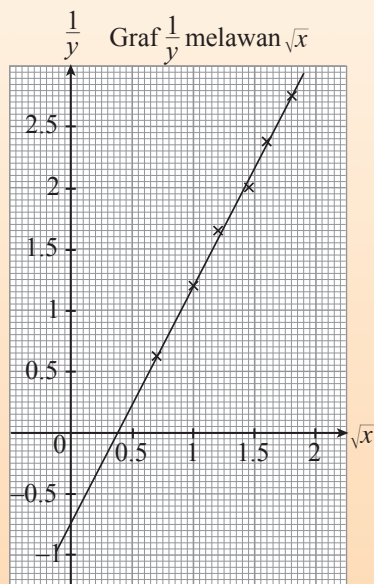
(c)  $y = \frac{p}{x^2} + q$

$$yx^2 = p + qx^2$$

Melalui perbandingan,

$$Y = yx^2, X = x^2, m = q, c = p$$

2. (a)



(b) (i)  $q = -0.75$

(ii)  $p = \frac{2.75 - 1.20}{1.8 - 1.00}$   
 $= \frac{31}{16}$



(iii) Apabila  $x = 1.21$ , maka  $\sqrt{x} = 1.10$

$$\frac{1}{y} = 1.40$$

$$y = \frac{5}{7}$$

**Latihan Intensif 6.2 (Halaman 165)**

1. (a)  $y = 5x^2 + 3x$

$$\frac{y}{x^2} = 5 + \frac{3}{x}$$

Melalui perbandingan,

$$Y = \frac{y}{x^2}, X = \frac{1}{x}, m = 3, c = 5$$

(b)  $y = p\sqrt{x} + \frac{q}{\sqrt{x}}$

$$y\sqrt{x} = px + q$$

Melalui perbandingan,

$$Y = y\sqrt{x}, X = x, m = p, c = q$$

(c)  $y = ax^b$

$$\log_{10} y = \log_{10} a + b \log_{10} x$$

Melalui perbandingan,

$$Y = \log_{10} y, X = \log_{10} x, m = b, c = \log_{10} a$$

(d)  $x = mxy + ny$

$$\frac{x}{y} = mx + n$$

Melalui perbandingan,

$$Y = \frac{x}{y}, X = x, m = m, c = n$$

(e)  $yp^x = q$

$$\log_{10} y = -\log_{10} px + \log_{10} q$$

Melalui perbandingan,

$$Y = \log_{10} y, X = x, m = -\log_{10} p, c = \log_{10} q$$

(f)  $y(b - x) = ax$

$$yb - yx = ax$$

$$b - x = \frac{ax}{y}$$

$$\frac{x}{y} = -\frac{x}{a} + \frac{b}{a}$$

Melalui perbandingan,

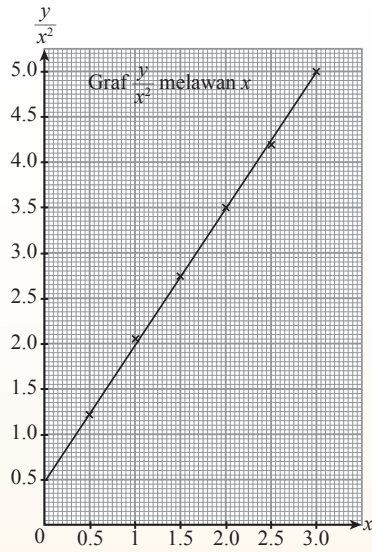
$$Y = \frac{x}{y}, X = x, m = -\frac{1}{a}, c = \frac{b}{a}$$

2. (a)  $y = ax^3 + bx^2$

$$\frac{y}{x^2} = ax + b$$

(b)

$x$	0.5	1.0	1.5	2.0	2.5	3.0
$\frac{y}{x^2}$	1.24	2.05	2.75	3.50	4.21	5.00



$$(c) a = \frac{5.0 - 1.24}{3.0 - 0.5}$$

$$= 1.504$$

$$b = 0.5$$

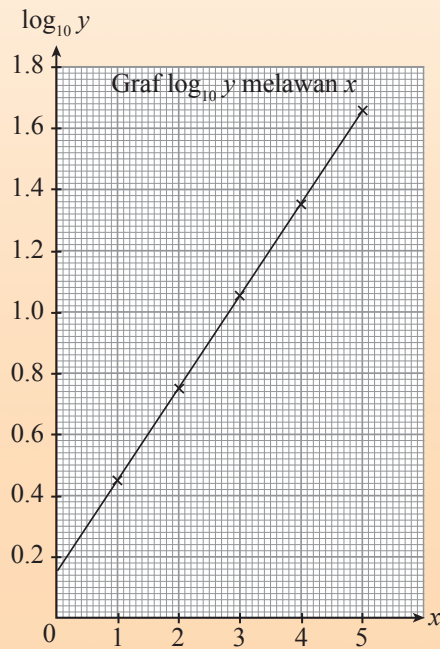
3. (a)  $y = a^{b+x}$

$$\log_{10} y = (b+x) \log_{10} a$$

$$= b \log_{10} a + x \log_{10} a$$

(b)

$x$	1	2	3	4	5
$\log_{10} y$	0.45	0.75	1.05	1.35	1.66

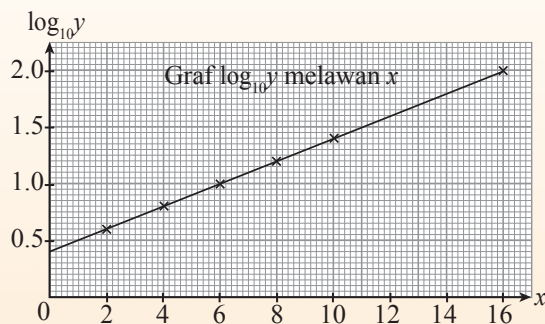


$$\begin{aligned}
 \text{(c) } \log_{10} a &= \frac{0.75 - 1.66}{2 - 5} \\
 &= \frac{91}{300} \\
 a &= 2.011 \\
 b \log_{10} a &= 0.16 \\
 b\left(\frac{91}{300}\right) &= 0.16 \\
 b &= 0.5275
 \end{aligned}$$

**Latih Diri 6.6 (Halaman 167)**

1. (a)  $y = pq^x$   
 $\log_{10} y = \log_{10} p + x \log_{10} q$

$x$	2	4	6	8	10	16
$\log_{10} y$	0.6	0.8	1.0	1.2	1.4	2.0



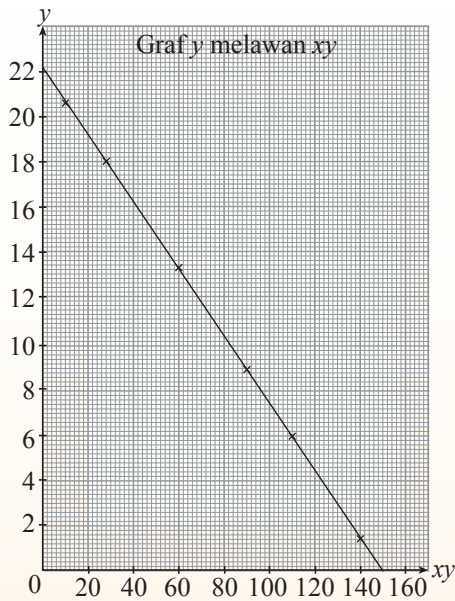
(b) (i)  $\log_{10} p = c$   
 $= 0.4$   
 $p = 2.512$

(ii)  $\log_{10} q = \frac{2.0 - 1.4}{16 - 10}$   
 $= 0.1$   
 $q = 1.259$

(c) Apabila  $x = 5$  jam,  
 $\log_{10} y = 0.9$   
 $y = 7.943$

2. (a)  $xy - yb = a$   
 $yb = xy - a$   
 $y = \frac{1}{b}xy - \frac{a}{b}$

$xy$	10	28	60	90	110	140
$y$	20.60	18.00	13.25	8.80	6.00	1.40



$$(b) \frac{1}{b} = \frac{1.4 - 20.6}{140 - 10}$$

$$\frac{1}{b} = -0.14769$$

$$b = -6.771$$

$$\frac{a}{b} = 22.2$$

$$a = 22.2 \times -6.77094$$

$$= -150.31$$

(c) Kaedah alternatif

$$xy - yb = a$$

$$y(x - b) = a$$

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

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

<b>x</b>	0.485	100
<b><math>\frac{1}{y}</math></b>	$\frac{5}{103}$	$\frac{5}{7}$

$$m = \frac{\frac{5}{7} - \frac{5}{103}}{100 - 0.485}$$

$$= 0.0066899$$

$$Y = 0.0066899x + c$$

$$\frac{5}{103} = 0.0066899(0.485) + c$$

$$c = 0.0452991$$

Kecerunan,  $m = 0.006690$

Pintasan-Y = 0.04530

**Latihan Intensif 6.3 (Halaman 168 –169)**

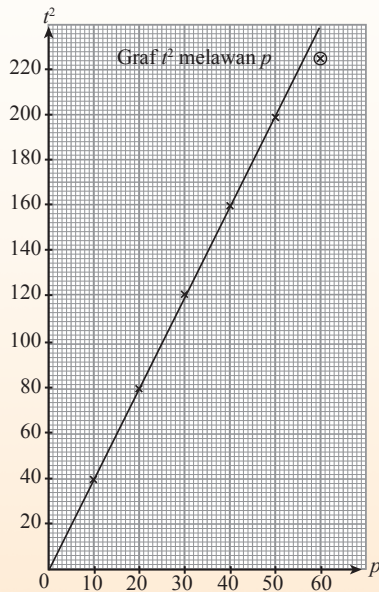
1. Rajah (a),  $p = 10$

Rajah (b),  $y = 10\frac{1}{\sqrt{x}}$

$$p = 10(2) = 20$$

2. (a)(b)

$p$	10	20	30	40	50	60
$t^2$	40	81	121	159	199	225



$$t^2 = 240$$

$$t = 15.5$$

(c)  $\sqrt{p} = \frac{t}{k}$

$$p = \frac{1}{k^2}t^2$$

$$t^2 = k^2p$$

$$k^2 = \frac{121 - 81}{30 - 20}$$

$$k^2 = 4$$

$$k = 2$$

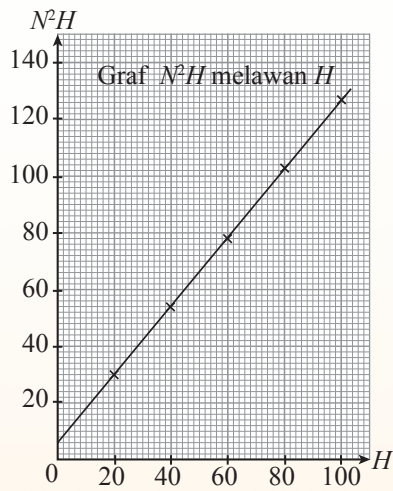
3. (a)  $2N^2H - aH = b$

$$2N^2H = b + aH$$

$$N^2H = \frac{b}{2} + \frac{a}{2}H$$

Melalui perbandingan,  $Y = N^2H$ ,  $X = H$ ,  $m = \frac{a}{2}$ ,  $c = \frac{b}{2}$ .

$H$	20	40	60	80	100
$N^2H$	30	54	78	103	127



$$(b) \frac{a}{2} = \frac{127 - 30}{100 - 20}$$

$$= 1.2125$$

$$a = 2.425$$

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

$$b = 12$$

$$(c) N^2H = 18$$

$$N^2(10) = 18$$

$$N^2 = 1.8$$

$$N = 1.3416$$

$$(d) N^2H = 1.213H + 6$$

$$(1.1183)^2H = 1.213H + 6$$

$$H \approx 159.6$$

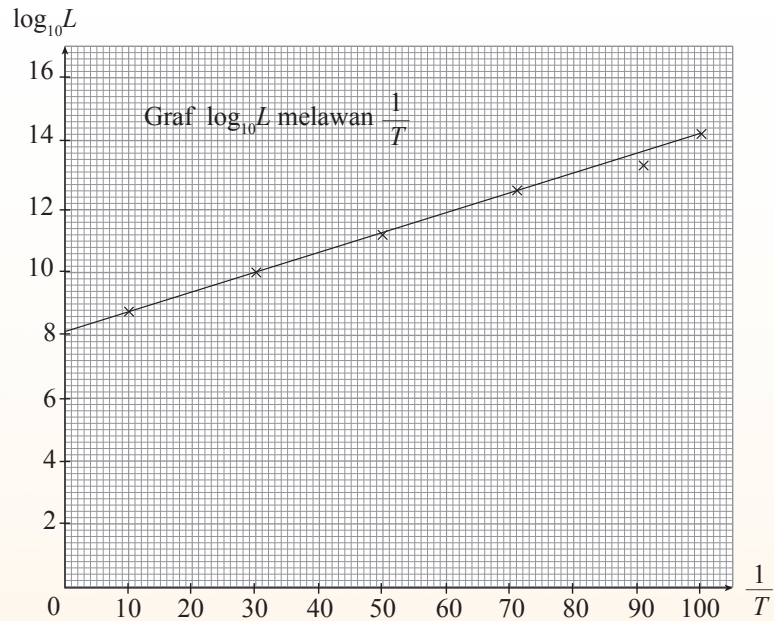
$$\therefore H = 160, \text{ Bilangan pekerja} = \frac{160}{8} = 20 \text{ orang}$$

$$4. (a) L = A(3)^{\frac{b}{T}}$$

$$\log_{10} L = \log_{10} A + \frac{1}{T} \log_{10} 3^b$$

$$\text{Melalui perbandingan, } Y = \log_{10} L, X = \frac{1}{T}, m = \log_{10} 3^b, c = \log_{10} A$$

$\frac{1}{T}$	10	30	50	71	91	100
$\log_{10} L$	8.8	10	11.2	12.6	13.4	14.2



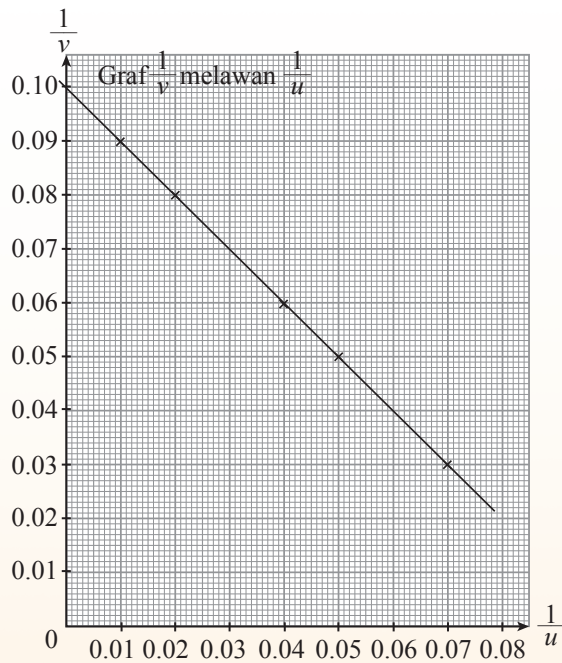
(b) (i)  $\log_{10} A = 8.2$   
 $A = 1.585 \times 10^8$

(ii)  $\log_{10} 3^b = \frac{14.2 - 8.8}{100 - 10}$   
 $= 0.06$   
 $3^b = 1.14815$   
 $b = \frac{\log_{10} 1.14815}{\log_{10} 3}$   
 $= 0.1258$

(c)  $Y = 0.06X + 8.2$   
 $21.5 = 0.06X + 8.2$   
 $X = 221.7^\circ\text{C}$

5. (a)

$\frac{1}{u}$	0.07	0.05	0.04	0.02	0.01
$\frac{1}{v}$	0.03	0.05	0.06	0.08	0.09



(b) (i)  $m = \frac{0.09 - 0.03}{0.01 - 0.07}$

$$m = -1$$

$$\frac{1}{v} = -\frac{1}{u} + \frac{1}{10}$$

$$\frac{1}{v} = \frac{-10 + u}{10u}$$

$$10u = -10v + uv$$

$$10v - uv = -10u$$

$$v(10 - u) = -10u$$

$$v = \frac{-10u}{10 - u}$$

(ii) Apabila  $\frac{1}{u} = 0$ ,  $\frac{1}{v} = 0.1$

$$\frac{1}{v} = 0.1$$

$$\frac{1}{f} = 0.1$$

$$f = 10$$

**Latihan Pengukuhan (Halaman 171 – 173)**

1. (a)  $y = 3x + \frac{4}{x^2}$

$$yx^2 = 3x^3 + 4$$

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



$$(b) \quad y = px^3 + qx^2$$

$$\frac{y}{x^2} = px + q$$

$$\frac{y}{x^3} = p + \frac{q}{x}$$

$$(c) \quad y = \frac{p}{x} + \frac{q}{p}x$$

$$xy = p + \frac{q}{p}x^2$$

$$\frac{y}{x} = \frac{p}{x^2} + \frac{q}{p}$$

$$(d) \quad y = pk^{\sqrt{x}}$$

$$\log_{10} y = \log_{10} p + \sqrt{x} \log_{10} k$$

$$(e) \quad y = pk^{x-1}$$

$$\log_{10} y = \log_{10} p + (x-1)\log_{10} k$$

$$(f) \quad y = \frac{kx^2}{p}$$

$$\log_{10} y = x^2 \log_{10} k - \log_{10} p$$

$$2. (a) \quad y = px^2 + qx$$

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

$$(b) \quad p = \frac{5-3}{1-9}$$

$$= -0.25$$

$$5 = -0.25(1) + q$$

$$q = 5.25$$

$$3. (a) \quad y = pq^{\frac{x}{4}}$$

$$\log_{10} y = \log_{10} p + x^2 \log_{10} q^{\frac{1}{4}}$$

$$\log_{10} q^{\frac{1}{4}} = \frac{5-4}{6-4}$$

$$= 0.5$$

$$\frac{1}{4} \log_{10} q = 0.5$$

$$\log_{10} q = 2$$

$$q = 10^2$$

$$= 100$$

$$c = 4 - 0.5(4)$$

$$\log_{10} p = 2$$

$$p = 10^2$$

$$p = 100$$

$$4. \quad y = 5x - 3x^2$$

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

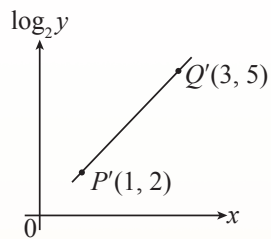
$$k = 5 - 3(2)$$

$$= -1$$

$$h = \frac{5-3}{3}$$

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

5. (a)



$$\text{Apabila } x = 1, \log_2 y = \log_2 4 \\ = 2$$

Maka,  $P'(1, 2)$

$$\text{Apabila } x = 3, \log_2 y = \log_2 32 \\ = 5$$

Maka,  $Q'(3, 5)$

(b)  $y = ab^x$

$$\log_2 y = \log_2 ab^x$$

$$\log_2 y = \log_2 a + x \log_2 b$$

$$\log_2 b = \frac{5 - 2}{3 - 1}$$

$$= 1.5$$

$$b = 2^{1.5}$$

$$= 2.828$$

$$\log_2 a = 2 - 1.5$$

$$= 0.5$$

$$a = 2^{0.5}$$

$$= 1.414$$

6. (a)  $x^2y = 8x + c$

$$19 = 8(2) + c$$

$$c = 3$$

$$x^2y = 8x + 3$$

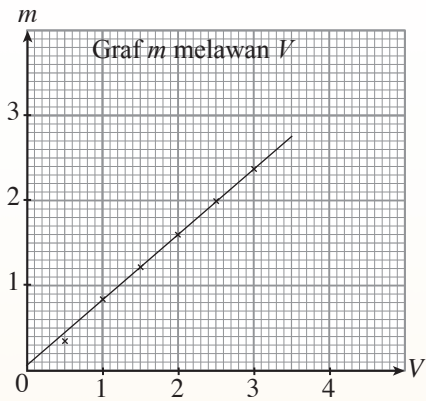
$$y = \frac{8x + 3}{x^2}$$

(b) Apabila  $x = 9.4$

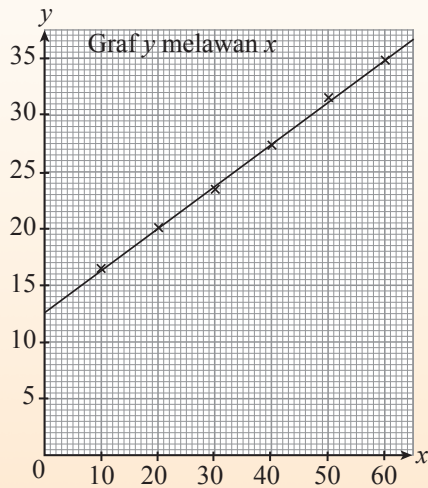
$$y = \frac{8(9.4) + 3}{(9.4)^2}$$

$$y = 0.8850$$

7.



8. (a)

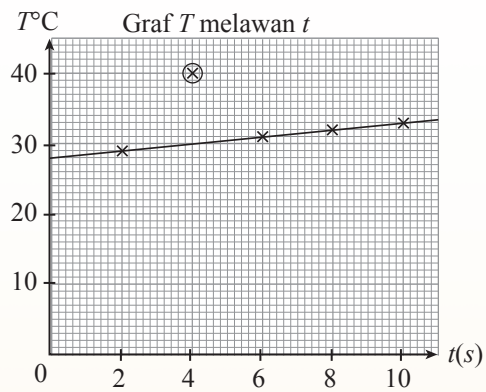


$$(b) m = \frac{35.0 - 20.0}{60 - 20}$$
$$= \frac{3}{8}$$
$$c = \frac{25}{2}$$

Persamaan garis lurus,  $y = mx + c$

$$y = \frac{3}{8}x + \frac{25}{2}$$

9. (a)



(b) 30.0

(c) (i) Apabila  $t = 0$ ,  $T = 28^{\circ}\text{C}$

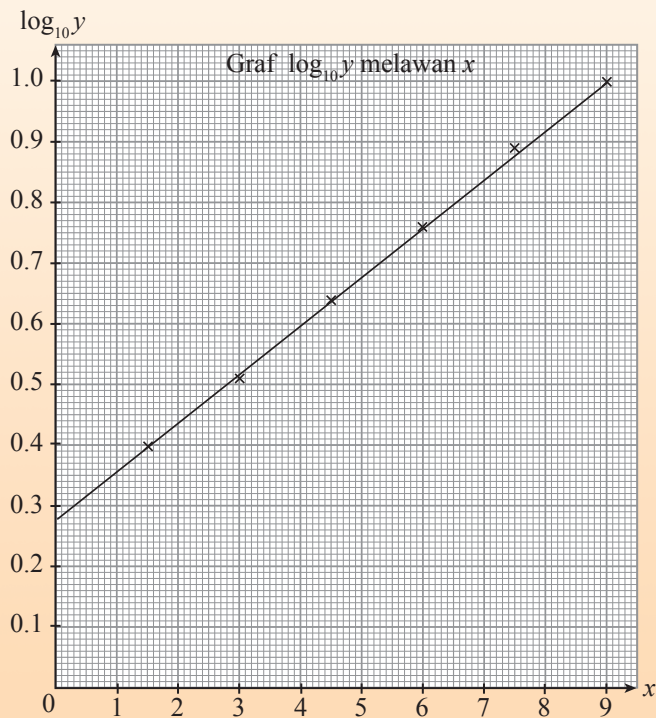
(ii) Selepas  $t = 9$ ,  $T = 32.5^{\circ}\text{C}$

(iii) Apabila  $T = 30.5^{\circ}\text{C}$ ,  $t = 5$  s

10. (a)  $y = st^x$

$$\log_{10} y = \log_{10} s + x \log_{10} t$$

$x$	1.5	3.0	4.5	6.0	7.5	9.0
$\log_{10} y$	0.40	0.51	0.64	0.76	0.89	1.00



(b) (i)  $\log_{10} s = 0.28$   
 $s = 1.905$

$$(ii) \log_{10} t = \frac{1 - 0.4}{9 - 1.5}$$

$$= 0.08$$

$$t = 1.202$$

$$(iii) y = 4, \log_{10} y = 0.60$$

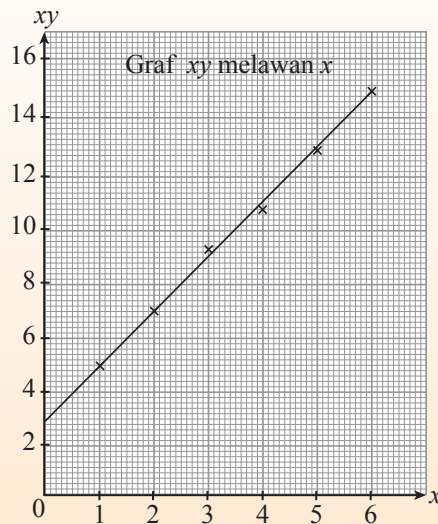
Maka,  $x = 4$

$$11. (a) \quad 2y - p = \frac{q}{x}$$

$$2xy - px = q$$

$$xy = \frac{p}{2}x + \frac{q}{2}$$

<b>x</b>	1	2	3	4	5	6
<b>xy</b>	5	7	9.3	10.8	13	15



$$(b) (i) \quad \frac{p}{2} = \frac{15 - 5}{6 - 1}$$

$$p = 4$$

$$(ii) \quad \frac{q}{2} = 3$$

$$q = 6$$

$$(iii) \text{ Apabila } x = 3.5, xy = 10$$

$$y = \frac{10}{3.5}$$

$$= 2.857$$

$$(c) \quad xy = 2x + 3$$

$$x(50) = 2x + 3$$

$$48x = 3$$

$$x = 0.0625$$