


SOALAN RAMALAN

MATEMATIK TAMBAHAN

KERTAS 1

HUKUM LINEAR

LINEAR LAW

SIR VEN
(GURU ADIWIRA KEBANGSAAN 2019)

SPM 2023

Diagram 12 shows the straight line graph obtained by plotting y^2 against x.
Rajah 12 menunjukkan graf garis lurus yang diperoleh dengan memplot y^2 melawan x.

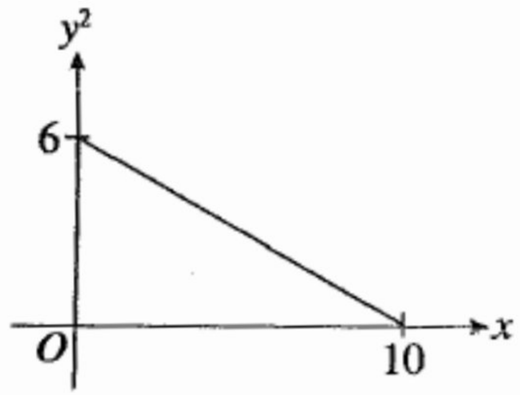


Diagram 12/*Rajah 12*

The variables x and y are related by the equation $y - \frac{r}{y} = \frac{(p-1)x}{y}$, where p and r are constants. Find the values of p and r.

Pemboleh ubah x dan y dihubungkan oleh persamaan $y - \frac{r}{y} = \frac{(p-1)x}{y}$, dengan keadaan p dan r ialah pemalar. Cari nilai p dan nilai r.

[4 marks/4 markah]

HUKUM LINEAR
LINEAR LAW

Pemboleh ubah x dan y dihubungkan oleh persamaan $2y = p - 4(x+1)^2$ dengan keadaan p ialah pemalar.

Variables x and y are related by the equation $2y = p - 4(x+1)^2$ *such that p is a constant.*

(a) Apabila diplotkan graf y melawan $(x + 1)^2$, suatu graf garis lurus yang memintas paksi-y pada titik (0, 3) diperoleh. Carikan nilai p. [2 *markah*]
When graph y against $(x + 1)^2$ *is plotted, a straight line graph that passes through the y-axis at the point* (0, 3) *is obtained. Find the value of p.* [2 *marks*]

(b) Seterusnya carikan kecerunan, m dan pintasan-y, c bagi garis lurus yang diperoleh dengan memplot graf $y + 4x$ melawan x^2. [3 *markah*]
Hence, find the gradient, m and y-intercept, c of the straight line obtained by plotting the graph $y + 4x$ *against* x^2. [3 *markah*]

The variables x and y are related by the equation $y = px^3 + qx^2$ where p and q are constants. Diagram 4.1 and Diagram 4.2 show the straight line graphs obtained by plotting the relations from the equation.
Pemboleh ubah x dan y dihubungkan oleh persamaan $y = px^3 + qx^2$ dengan keadaan p dan q ialah pemalar. Rajah 4.1 dan Rajah 4.2 menunjukkan graf garis lurus yang diperoleh dengan memplot hubungan daripada persamaan itu.

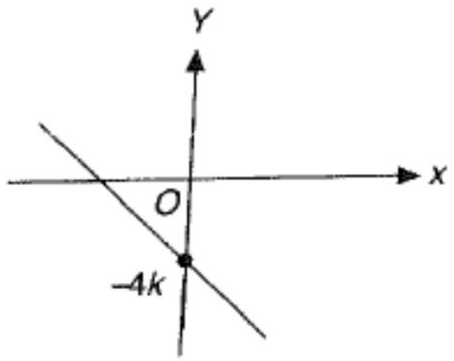


Diagram 4.1
Rajah 4.1

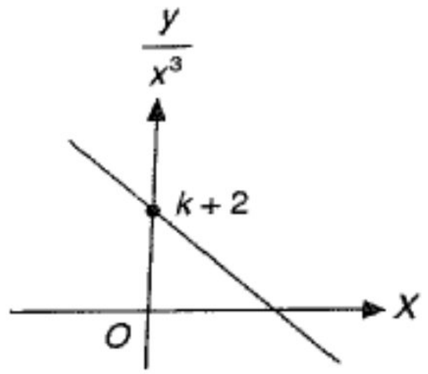


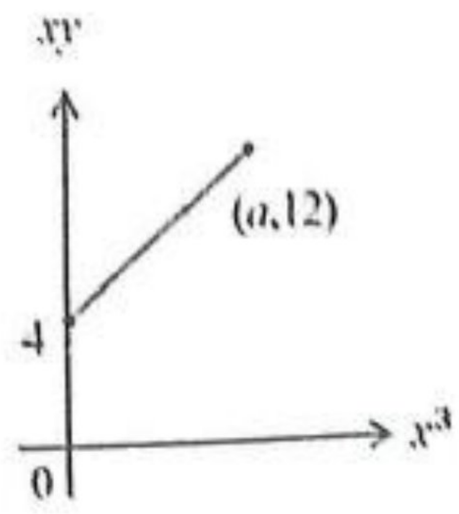
Diagram 4.2
Rajah 4.2

Express p in terms of q.
Ungkapkan p dalam sebutan q.

[3 *marks*]

Rajah 6 menunjukkan pemboleh ubah x dan y dihubungkan oleh persamaan $y = 4x^2 - \frac{b}{x}$ dengan keadaan a dan b ialah pemalar. Suatu garis lurus diperoleh dengan memplot xy melawan x^3.

Diagram 6 shows the variables x and y are related by the equation $y = 4x^2 - \frac{b}{x}$, *where a and b are constants. A straight line graph is obtained by plotting xy against* x^3.



Rajah 6 / *Diagram 6*

Cari nilai a dan b.
Find the value of a and of b.

[3 *markah*]

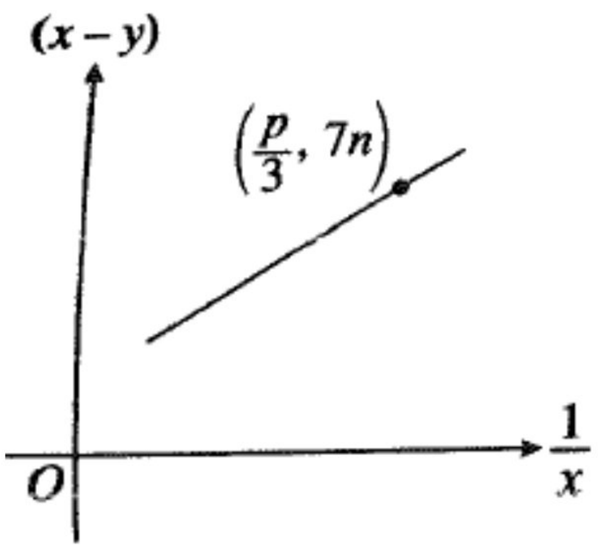


Diagram 18/*Rajah* 18

The variables x and y are related by the equation $x^2 = xy + k$, where k is a constant. Diagram 18 shows a straight line graph obtained by plotting $(x - y)$ against $\frac{1}{x}$. Express p in terms of k and n.

Pemboleh ubah x *dan* y *dihubungkan oleh persamaan* $x^2 = xy + k$, *dengan keadaan* k *ialah pemalar. Rajah* 18 *menunjukkan graf garis lurus yang diperoleh dengan memplot* $(x - y)$ *melawan* $\frac{1}{x}$. *Ungkapkan* p *dalam sebutan* k *dan* n.

[3 *marks*/3 *markah*]

Diagram 16 shows the straight line graph obtained by plotting $\frac{y}{x}$ against x^2.

Rajah 16 menunjukkan graf garis lurus yang diperoleh dengan memplot $\frac{y}{x}$ *melawan* x^2.

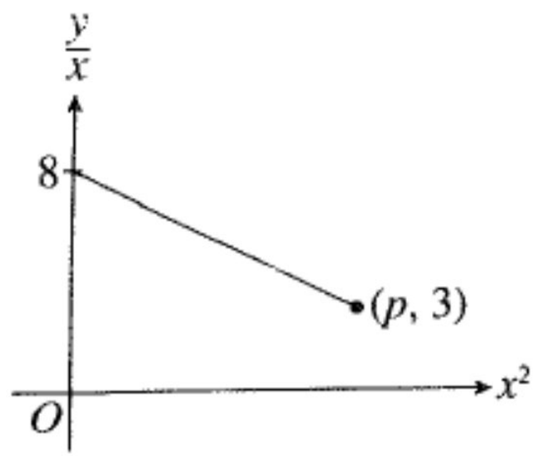


Diagram 16/*Rajah* 16

Given the variables x and y are related by the equation $y = ax - \frac{x^3}{2}$, where a is a constant. Find the values of a and p.

Diberi pemboleh ubah x dan y dihubungkan oleh persamaan $y = ax - \frac{x^3}{2}$, *dengan keadaan a ialah pemalar. Cari nilai a dan nilai p.*

[3 *marks*/3 *markah*]

Diagram 6 shows the graph of a straight line $\log_3 y$ against x.
Rajah 6 menunjukkan graf garis lurus $\log_3 y$ melawan x.

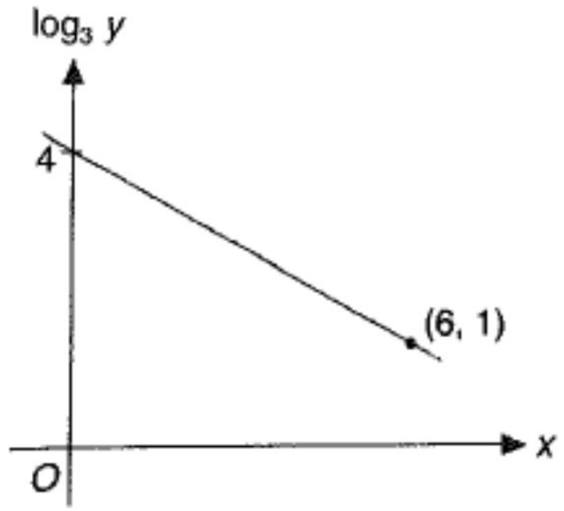


Diagram 6
Rajah 6

Based on Diagram 6, express y in terms of x.
Berdasarkan Rajah 6, ungkapkan y dalam sebutan x.

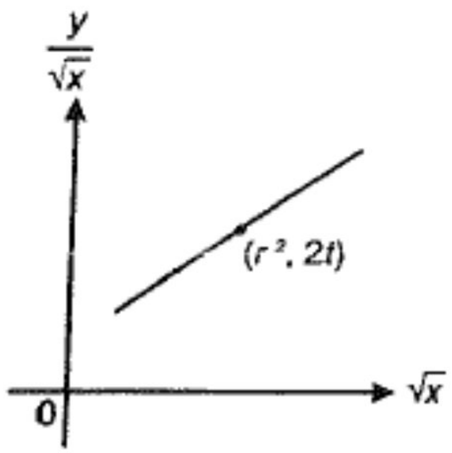


Diagram 12 / *Rajah* 12

The variables x and y are related by the equation $y = u\sqrt{x} + 3x$ where u is a constant. Diagram 12 shows a graph of straight line obtained by plotting $\frac{y}{\sqrt{x}}$ against $\sqrt{x}$. Express r in terms of u and t.

Pemboleh ubah x dan y dihubungkan oleh persamaan, $y = u\sqrt{x} + 3x$ dengan keadaan u ialah pemalar. Rajah 12 menunjukkan graf garis lurus yang diperoleh dengan memplotkan $\frac{y}{\sqrt{x}}$ melawan $\sqrt{x}$. Ungkapkan r dalam sebutan u dan t.

[3 *marks* / *markah*]

Answer / *Jawapan* :

S

Diagram 9 shows a straight line graph when $\log_{10} y$ against $\log_{10} x$ is plotted. Express y in terms of x.
Rajah 9 menunjukkan suatu garis lurus yang telah diplotkan untuk paksi-paksi $\log_{10} y$ *dan* $\log_{10} x$. *Ungkapkan y dalam sebutan x.*

[3 *marks / markah*]

Answer / *Jawapan* :

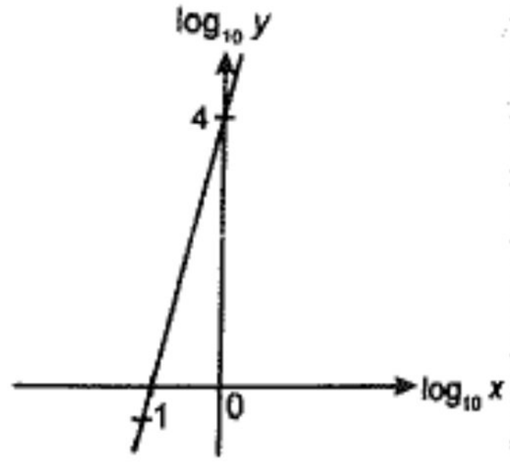


Diagram 9 / *Rajah 9*

Express v in terms of u and w.
Ungkapkan v dalam sebutan u dan w.

[3 *marks / markah*]

Diagram 19 / *Rajah 19*

$$y - \frac{r}{y} = \frac{(p-1)x}{y}$$

$$y = \frac{(p-1)x}{y} + \frac{r}{y}$$

$$y^2 = (p-1)x + r$$

Gradient = $(p-1)$ and y^2-intercept = r.

$$(p-1) = -\frac{6}{10}$$

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

$$r = 6$$

3 (a)

$$2(3) = p - 4(0) \quad atau \quad y = \frac{p}{2} - 2(x+1)^2$$

$$p = 6$$

(b)

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

$$m = -2$$

$$c = 1$$

$$y = px^3 + qx^2$$

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

$$q = -4k$$

$$k = -\frac{q}{4} \ldots ①$$

$$y = px^3 + qx^2$$

$$\frac{y}{x^3} = p + q\left(\frac{1}{x}\right)$$

$$p = k + 2 \ldots ②$$

Substitute ① into ②

$$p = -\frac{q}{4} + 2$$

$$p = 2 - \frac{1}{4}q$$

$$xy = 4x^3 - b$$

$$\frac{12 - 4}{a - 0} = 4$$

$$a = 2$$

$$b = -4$$

HUKUM LINEAR
LINEAR LAW

$$x^2 = xy + k$$
$$x^2 - xy = k$$
$$x - y = \frac{k}{x}$$
$$7n = k\left(\frac{p}{3}\right)$$
$$p = \frac{21n}{k}$$

$$y = ax - \frac{x^3}{2}$$
$$\frac{y}{x} = a - \frac{x^2}{2}$$
$a = \frac{y}{x}$ -intercept
$= 8$
$$\frac{8-3}{0-p} = -\frac{1}{2}$$
$$p = 10$$

Gradient, $m = \frac{1-4}{6-0} = -\frac{1}{2}$

$$Y = mX + c$$
$$\log_3 y = -\frac{1}{2}x + 4$$
$$y = 3^{-\frac{1}{2}x+4}$$

$$y = u\sqrt{x} + 3x$$
$$\frac{y}{\sqrt{x}} = \frac{u\sqrt{x}}{\sqrt{x}} + \frac{3x}{\sqrt{x}}$$
$$\frac{y}{\sqrt{x}} = 3\sqrt{x} + u$$

At $(r^2, 2t)$,
$2t = 3(r^2) + u$
$r^2 = \frac{2t-u}{3}$
$r = \sqrt{\frac{2t-u}{3}}$

HUKUM LINEAR
LINEAR LAW

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

$$y - 2x = (2x - x) + \left(\frac{3u}{x^2} - x\right)$$

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

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

At $\left(\frac{v}{2}, 3w\right)$, $3w = \frac{v}{2}(3u)$

$$v = \frac{2w}{u}$$

$$\text{Gradient} = -\frac{4}{-1} = 4$$

Equation,

$$\log_{10} y = 4 \log_{10} x + 4$$

$$\log_{10} y = \log_{10} x^4 + \log_{10} 10^4$$

$$\log_{10} y = \log_{10} (x^4)(10^4)$$

$$y = (10x)^4$$