Solve the equation $\log_{25}[\log_2(2x+3)] = \log_9 3$. PULAU PINANG [3 marks]

Selesaikan persamaan $\log_{25}[\log_2(2x+3) = \log_9 3$ [3 *markah*]

$\frac{29}{2}$

B2 : $2x + 3 = 32$

B1 : $\log_9 3 = \frac{1}{2}$ or $\log_2(2x + 3) = 25^{\frac{1}{2}}$

6. Given $\log_3 2 = p$ and $\log_3 7 = q$, express $\log_9 98$ in terms of p and q.

Diberi $\log_3 2 = p$ *dan* $\log_3 7 = q$, *ungkapkan* $\log_9 98$ *dalam sebutan p dan q.*

JOHOR

[3 marks]
[3 *markah*]

$$\frac{p+2q}{2} \; atau \; \frac{p}{2}+q$$

B2 : $\dfrac{2\log_3 7+\log_3 2}{2\log_3 3}$

B1 : $\dfrac{\log_3 98}{\log_3 9}$

Solve the equation

Selesaikan persamaan

$$\log_2 (3x+1) - \log_4 25 = \log_2 x$$

KEDAH

[3 marks]
[3 markah]

B2 : $\dfrac{3x+1}{\sqrt{25}} = x$

B1 : $\dfrac{\log_2 25}{\log_2 4}$

Satu persamaan dihubungkan oleh $\log_3 P - 2\log_9 Q = 4$, dengan keadaan P dan Q adalah pemalar.

KELANTAN

Ungkapkan P dalam sebutan Q.

[3 *markah*]

$$P = 81Q$$

$$B2 : \log_3 \frac{P}{Q} = 4$$

$$B1 : \frac{\log_3 Q}{\log_3 9}$$

Aisyah menyimpan RM50 000 di sebuah bank sebagai simpanan tetap. Selepas n tahun wang simpanannya menjadi $50\,000\left(\frac{5}{4}\right)^n$.

Cari bilangan tahun di mana wang simpanannya buat pertama kali melebihi 1.5 juta.

[4 *markah*]

$n = 16$

B3 : $n > 15.242$

B2 : $n > \dfrac{\log 30}{\log\left(\dfrac{5}{4}\right)}$

B1 : $50000\left(\dfrac{5}{4}\right)^n > 1\,500\,000$

It is given that $\log_2 K = 4$, find the value of

Diberi $log_2 K = 4$, *cari nilai*

a) K

b) $\log_K \left(\frac{1}{2}\right)$

[3marks]

[3*markah*]

(a)

$$\log_2 K = 4$$

$$K = 2^4 = 16$$

(b)

$$\log_K\left(\frac{1}{2}\right) = \frac{\log_2 \frac{1}{2}}{\log_2 K}$$

$$= \frac{\log_2 2^{-1}}{4}$$

$$= \frac{-1 \log_2 2}{4}$$

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

Without changing to base 10, solve the equation $\log_2[\log_3(2x-5)] = \log_4 16$

Tanpa menukar kepada asas 10, selesaikan persamaan $\log_2[\log_3(2x-5)] = \log_4 16$

[3marks]

[3 *markah*]

$$\log_2[\log_3(2x-5)] = \log_4 16$$
$$\log_2[\log_3(2x-5)] = \log_4 4^2$$
$$\log_2[\log_3(2x-5)] = 2$$
$$2^2 = \log_3(2x-5)$$
$$4 = \log_3(2x-5)$$
$$3^4 = 2x-5$$
$$x = 43$$

Given $\log_x 3 = h$ and $\log_x 5 = k$, express $\log_9 675$ in terms of h and k.

Diberi $\log_x 3 = h$ dan $\log_x 5 = k$, ungkapkan $\log_9 675$ dalam sebutan h dan k.

[4 marks]

[4 markah]

TERENGGANU

$$\frac{2k+3h}{2h}$$

$$\frac{2\log_x 5+3\log_x 3}{2\log_x 3}$$

$$\frac{\log_x 5^2+\log_x 3^3}{\log_x 3^2}$$

$$\frac{\log_x 675}{\log_x 9}$$

$$\frac{\log_x (5^2\times 3^3)}{\log_x 3^2}$$

NEGERI SEMBILAN

Given that $x = \frac{p}{8}$, simplify

Diberi bahawa $x = \frac{p}{8}$, *permudahkan*

$$\frac{\log_2 16x^2}{3 - 3\log_2 p}$$

[3 *marks*]
[3 *markah*]

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

$$\frac{2\log_2 p - 2}{3 - 3\log_2 p}$$

$$\log_2 p^2 - \log_2 4$$

Simplify:
Ringkaskan:

(*a*) $\log_a 1$

SBP (ASRAMA)

(*b*) $\log_m \sqrt{m} + \log_n \sqrt[3]{n} + \log_4 2$

[3 *marks*]
[3 *markah*]

(a)	0
(b)	$\frac{4}{3}$ $\frac{1}{2}\log_m m$ or $\frac{1}{3}\log_n n$ or $\frac{\log_x 2}{\log_x 4}$ (accept $x = m$, n, 4, 10)

Diagram 9 shows a graph of $y = \log_{10} 3x$ which intersects the x-axis at q and passes through point $A(10, p)$.

Rajah 9 menunjukkan graf bagi $y = \log_{10} 3x$ *yang bersilang dengan paksi-x di q dan melalui titik* $A(10, p)$.

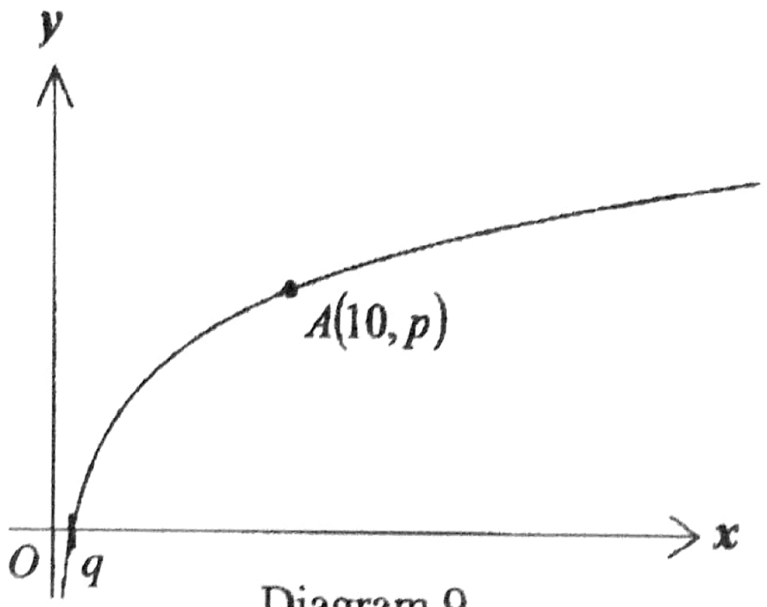

Diagram 9
Rajah 9

Find the value of p and of q.
Cari nilai p dan nilai q.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

$$p = 1.477 \quad \text{and} \quad q = \frac{1}{3}$$

$$p = 1.477 \quad \text{or} \quad q = \frac{1}{3}$$

$$p = \log_{10} 3(10) \quad \text{or} \quad \log_{10} 3q = 0$$

If a scientist counts 50 bacteria in an experimental culture and observes one hour later, the count is up to 100. The function $P(t) = 50(10)^{0.3t}$ model the situation.
What is $P(0)$ and when will the bacteria reach 1 000 000.

Dalam satu eksperimen kultur jika seorang saintis mengambil 50 *bakteria dan melakukan pemantauan 1 jam kemudian, jumlahnya meningkat kepada* 100. *Fungsi untuk model situasi tersebut ialah* $P(t) = 50(10)^{0.3t}$.

Apakah $P(0)$ *dan bilakah bakteria akan mencapai* 1 000 000.

[4 marks/*markah*]

$$P = 50$$

$$14.37 \text{ jam}$$

$$50(10)^{0.3t} = 1000000$$

$$0.3t = \log_{10} 20000$$

Given $\log_x a = p$ and $\log_x b = q$, express $\log_x \frac{\sqrt{a}}{b^3}$ in terms of p and q. [3 marks]

Diberi $\log_x a = p$ *dan* $\log_x b = q$, *ungkapkan* $\log_x \frac{\sqrt{a}}{b^3}$ *dalam sebutan* p *dan* q. [3 markah]

Answer / *Jawapan:*

SARAWAK

$\log_x \sqrt{a} - \log_x b^3$ (Use quotient law)

$\frac{1}{2}\log_x a - 3\log_x b$ (Use quotient law and power law)

$\frac{1}{2}p - 3q$ or equivalent

Solve the equation $2+\log_3(x-2)=\log_3 3x$. [3 marks]

Selesaikan persamaan $2+\log_3(x-2)=\log_3 3x$. *[3 markah]*

SARAWAK

$\log_3(x-2) - \log_3 3x = -2$

$\log_3 \frac{x-2}{3x} = -2$ (Use quotient law or product law of logarithm)

$\frac{x-2}{3x} = 3^{-2}$ (Use law of logarithm then antilog)

$\frac{x-2}{3x} = \frac{1}{9}$

$9(x-2) = 3x$ (Cross-multiply)

$9x - 18 = 3x$

$6x = 18$

$x = 3$

Given $x = 5^a$ and $y = 25^b$, express $\log_{25}\left(\frac{625x}{\sqrt{y}}\right)$ in terms of a and b. [4 *marks*]

MRSM

Diberi $x = 5^a$ *dan* $y = 25^b$, *ungkapkan* $\log_{25}\left(\frac{625x}{\sqrt{y}}\right)$ *dalam sebutan a dan b.*

[4 *markah*]

$$2+\frac{a}{2}-\frac{b}{2} \quad \text{or} \quad \frac{4+a-b}{2}$$

$$\frac{\log_5 625+\log_5 5^a-\frac{1}{2}\log_5 25^b}{\log_5 25} \quad \text{or} \quad \frac{\log_5 625+a-\frac{1}{2}(2b)}{\log_5 25} \quad \text{or}$$

$$2+\frac{\log_5 5^a}{\log_5 5^2}-\frac{b}{2}$$

$$\log_{25} 625+\frac{\log_5 x}{\log_5 25}-\frac{1}{2}\log_{25} y \quad \text{or} \quad \frac{\log_5 625}{\log_5 25}+\frac{\log_5 x}{\log_5 25}-\frac{\log_5 y}{\log_5 25} \quad \text{or}$$

$$\log_{25} 25^2+\log_{25} 5^a-\log_{25}(25^b)^{\frac{1}{2}} \quad \text{or} \quad \frac{\log_5 5^{4+a-b}}{\log_5 5^2}$$

$$\frac{\log_5\left(\frac{625x}{\sqrt{y}}\right)}{\log_5 25} \quad \text{or} \quad \log_{25} 5^{4+a-b} \quad \text{or} \quad \log_{25}\left(\frac{625(5^a)}{\sqrt{25^b}}\right)$$

Given that $\log_3 x - \log_9 y = 2$, express y in terms of x. TERENGGANU (5) *[3 marks]*

Diberi $\log_3 x - \log_9 y = 2$, *ungkapkan* y *dalam sebutan* x. *[3 markah]*

Given that $\log_n 3 = r$ and $\log_n 4 = s$, express, in terms of r and s,

Diberi bahawa $\log_n 3 = r$ *dan* $\log_n 4 = s$, *ungkapkan, dalam sebutan* r *dan* s,

(*a*) $\log_n 9$,

TERENGGANU (5)

(*b*) $\log_9 \frac{64n^2}{27}$.

[4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

TERENGGANU (7)

Solve the equation $3+\log_2(x-1)=\log_2 x$.

Selesaikan persamaan $3+\log_2(x-1)=\log_2 x$.

[3 marks]
[3 markah]

Given $\log_2 a = x$ and $\log_2 b = y$, express $\log_4 \frac{16a}{b}$ in terms of x and y.

Diberi $\log_2 a = x$ *dan* $\log_2 b = y$, *ungkapkan* $\log_4 \frac{16a}{b}$ *dalam sebutan x dan y.*

[4 *marks*]
[4 *markah*]

TERENGGANU (7)

Given that $\log_4 x - \log_{16} y = 3$, express y in terms of x. [3 *marks*]

SELANGOR (1)

Diberi $\log_4 x - \log_{16} y = 3$, *ungkapkan* y *dalam sebutan* x. [3 *markah*]

$$y = \frac{x^2}{4096}$$

$$\log_4 \frac{x^2}{y} = 6$$

$$2\log_4 x - \log_4 y = 6$$

Given $\log_3 2 = m$ and $\log_3 5 = n$, express $\log_9 80$ in terms of m and n .

Diberi $\log_3 2 = m$ *dan* $\log_3 5 = n$, *ungkapkan* $\log_9 80$ *dalam sebutan* m *dan* n.

[3 marks]
[3 *markah*]

SELANGOR (2)

$$2m + \frac{n}{2}$$

B2 : $\dfrac{4 \log_3 2 + \log_3 5}{2 \log_3 3}$

B1 : $\dfrac{\log_3 80}{\log_3 9}$

Solve the equation:
Selesaikan persamaan:

SELANGOR (3)

$$1 + \log_3 x = \log_3 (x + 6)$$

[3 marks]
[3 markah]

$$x = 3$$

Solve :
Selesaikan:

$$\log_2 m - \log_4 8 = \frac{5}{2}$$

[3 marks]
[3 *markah*]

SELANGOR (4)

$$m = 16$$

$$B2: \log_2 m = 4$$

$$B1: \log_2 m - \frac{\log_2 8}{\log_2 4} = \frac{5}{2}$$

Solve the equation $\log_2 3p - 1 = \log_2(4p - 10)$. SELANGOR (5) [3 marks]

Selesaikan persamaan $\log_2 3p - 1 = \log_2(4p - 10)$. *[3 markah]*

$$p = 4$$

$$B2 : \frac{3p}{4p-10} = 1$$

$$B1 : \log_2 \frac{3p}{4p-10} = 1$$

Find the value:

Cari nilai:

$$\log_8 32 - \log_8 2 + \frac{1}{2}\log_8 16$$

SELANGOR (6)

[3 marks]
[3 markah]

$$\log_8 32 - \log_8 2 + \log_8 16^{\frac{1}{2}}$$

$$\log_8 \left(\frac{32 \times 4}{2} \right)$$

$$2$$

SELANGOR (8)

Solve the equation :
Selesaikan persamaan :

$$4 + \log_3 x = \log_9 81$$

[3*marks/markah*]

$$x = \frac{1}{9}$$

$$\log_3 x = -2$$

$\log_9 9^2$ seen

Given that $\log_3 x = h$ and $\log_3 y = k$, express $\log_3 \frac{81x}{y}$ in terms of h and k.

Diberi $\log_3 x = h$ *dan* $\log_3 y = k$, *ungkapkan* $\log_3 \frac{81x}{y}$ *dalam sebutan* h *dan* k.

SELANGOR (9)

[3 *marks* / 3 *markah*]

$4 + h - k$

$\log_3 81 + \log_3 x - \log_3 y$

$\log 81x - \log y \quad or \quad \log 81 + \log x$

. *Simplify* $1 - 2 \log_5 25 + 3 \log_5 125$.

SELANGOR (10)

[3 *marks*]