

Indeks dan Logaritma

Formula Indeks	
$a^m \times a^n$	
$\frac{a^m}{a^n}$	
$(a^m)^n$	
$\frac{1}{a^n}$	
$\sqrt[n]{a}$	
$\sqrt[n]{a^m}$	

Perhatikan sebelah kanan mempunyai bentuk

Kes khas :

$a =$	$\frac{1}{a} =$
$1 =$	$\sqrt{a} =$

Perhatikan

$a^m + a^n$
$a^m - a^n$

Asas 2 :

Asas 3 :

Asas 5 :

$$\frac{1}{8} =$$

$$\sqrt{27} =$$

$$\frac{1}{\sqrt[3]{4}} =$$

Jika $a^m = a^n$

\therefore

$3^x = 3^4$	$7^5 = 7^x$
\therefore	\therefore
$2^{\frac{x-5}{3}} = 2^{2-3x}$	
\therefore	

Jika

\rightarrow

\rightarrow

Selesaikan

a) $3^x = 27$ b) $5^x = 1$

c) $3^x = \frac{1}{81}$	d) $4^x = 8$
e) $2^x = \sqrt{8}$	f) $5^x = \frac{1}{\sqrt[3]{25}}$

Tukar kepada bentuk $3^?$

$3^x \times 3^2 =$	$3^x \times 3 =$
$\frac{3^x}{3^2} =$	$\frac{3^x}{3} =$
$(3^2)^x =$	$(3^x)^4 =$
$(3^x)(3^2) =$	$3^4(3^x) =$
$9^x =$	$\sqrt{3^x} =$
$\frac{1}{3^x} =$	$\frac{1}{\sqrt{3^x}} =$
$3^x \times 9 =$	$\frac{3^x}{\sqrt{3}} =$

$$9^{x+1} =$$

$$\frac{1}{3^{x+1}} =$$

$$\sqrt{3^{x+1}} =$$

$$\frac{1}{\sqrt{3^{x+1}}} =$$

Selesaikan

a) $81(3^x) = 9^x$

b) $3^x = 9^{x-1}$

Semua soalan "selesaikan" boleh

→ dengan menggantikan

ke dalam

c) $\frac{4^x}{8} = \frac{1}{16^{x-1}}$

d) $\sqrt{5^{x-2}} = 25^{x+1}$

Adakah betul?

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

$$3(3^x) = 9^x$$

$$(ab)^n =$$

$$\therefore 6^x =$$

$$\therefore 9^x =$$

$$3^x + 3^x = 6^x$$

$$3^x + 3^x = 3^{2x}$$

$$3^x + 3^x = 9^x$$

$$a + a =$$

$$u + u =$$

$$ab + ab =$$

$$a^2 + a^2 =$$

$$a^x + a^x =$$

$$5^x + 5^x =$$

$$2^x + 2^x =$$

$$9^x + 9^x =$$

$$3^x + 3^x =$$

$$u + u =$$

$$2(3^x) + 5(3^x) =$$

$$2u + 5u =$$

$$4(3^x) + 3^x =$$

$$4u + u =$$

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

$$6u - u =$$

Tukar ke dalam sebutan 3^x

$$3^{x+1} = \quad 3^{x+2} =$$
$$= \quad =$$

$$3^{x-1} = \quad 3^{x-2} =$$

Ringkaskan

$$5^{x+1} + 5^{x+2} =$$

$$3^{x+3} - 3^x =$$

$$2^x - 2^{x-1} =$$

Bonus : Tukar ke dalam sebutan 3^x

$$9^x =$$

$$27^x =$$

Ringkaskan

$$x + \frac{x}{2} = \quad 7x - \frac{x}{3} =$$

Kaedah hapuskan pecahan dari persamaan

$$x + \frac{x}{2} = 7 \quad \rightarrow$$

$$7x - \frac{x}{3} = 8 \quad \rightarrow$$

$$\frac{x}{4} + \frac{3x}{2} = 5 \quad \rightarrow$$

Selesaikan

a) $2^{x+3} + 2^x = 36$

b) $3^x + 3^{x+1} = 4$

c) $2^x - 2^{x-1} = 4$

$$d) 3^{x+2} - 3^{x-1} = \frac{26}{9}$$

$$a) 8(2^{x+2}) = 4^x$$

→ Tukar ke bentuk

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$$b) 2^x + 2^{x+2} = 10$$

→ Tukar ke bentuk

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$$3^? = 9 \quad \Leftrightarrow$$

$$2^? = 8 \quad \Leftrightarrow$$

$$a^x = N \quad \Leftrightarrow$$

$$2^3 = 8$$

$$\log_2 8 = 3$$

$$4^3 = 64$$

$$3 = 9^{\frac{1}{2}}$$

$$\log_2 x = 5$$

$$\log_x 2 = 5$$

$$x = \log_2 5$$

Nyatakan nilai

$$\log_3 9 =$$

$$\log_2 8 =$$

$$\log_3 \frac{1}{3} =$$

$$\log_9 3 =$$

$$\log_3 3 =$$

$$\log_3 1 =$$

$$\log_a a =$$

$$\log_a 1 =$$

Bandungkan jenis soalan

$$3^{2x} \times 3^{x+3} = 9$$

$$3^x + 3^{x+3} = 9$$

$$3^{2x} - 3^{x+3} = 0$$

Buktikan $\log_a(xy) = \log_a x + \log_a y$

Buktikan $\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$

Buktikan $\log_a x^n = n \log_a x$

Buktikan $\log_a b = \frac{\log_c b}{\log_c a}$

Buktikan $\log_a b = \frac{1}{\log_b a}$

Formula log

$\log_a(xy)$	
$\log_a\left(\frac{x}{y}\right)$	
$\log_a x^n$	

Perhatikan sebelah kiri mempunyai bentuk

Penukaran asas

$\log_a b =$ atau $\log_a b =$

Kes khas :

$\log_a a =$ $\log_a 1 =$

Adakah betul?

$$\frac{\log_a x}{2} = \log_a \left(\frac{x}{2} \right)$$

$$\frac{\log_a x}{\log_a 2} = \log_a \left(\frac{x}{2} \right)$$

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

$$\frac{\log_a x}{\log_a 2} = \log_a (x - 2)$$

$$\log_a (2x) = (\log_a 2)(\log_a x)$$

$$\log_a \left(\frac{xy}{z} \right) = \frac{\log_a x + \log_a y}{\log_a z}$$

Perhatikan

$$\log_a (x + y)$$

$$\log_a (x - y)$$

Diberi $p = \log_a x$, $q = \log_a y$ dan

$$r = \log_a z$$

Ungkapkan yang berikut dalam sebutan

p, q dan r

a) $\log_a (xyz) =$

b) $\log_a \left(\frac{xy}{z} \right) =$

c) $\log_a \left(\frac{x}{yz} \right) =$

d) $\log_a x^4 =$

e) $\log_a x^2 y =$

f) $\log_a xy^3 =$

g) $\log_a (xy)^4 =$

h) $\log_a \left(\frac{x^3}{y^2} \right) =$

$\log_a (xyz)$	$\log_a x + \log_a y + \log_a z$
	$\log_a x + \log_a y - \log_a z$
	$\log_a x - \log_a y - \log_a z$
	$\log_a x - \log_a y + \log_a z$
	$-\log_a x - \log_a y$

Cari nilai (guna formula)

$$\log_3 9 =$$

$$\log_2 8 =$$

$$\log_3 \frac{1}{3} =$$

$$\log_4 8 =$$

$$\log_9 3 =$$

Diberi $m = \log_2 3$, $n = \log_2 5$ dan

$$p = \log_2 x$$

Ungkapkan yang berikut dalam sebutan m, n dan p

$$\text{a) } \log_2 15 =$$

$$\text{b) } \log_2 3x =$$

$$\text{c) } \log_2 9 =$$

$$\text{d) } \log_2 45 =$$

$$\text{e) } \log_2 6 =$$

$$\text{f) } \log_2 30 =$$

$$\text{g) } \log_2 0.3 =$$

$$\text{h) } \log_2 2.5 =$$

$$\text{i) } \log_4 3 =$$

$$\text{j) } \log_4 10x^3 =$$

$$\text{Jika } \log_a N = x$$

\therefore

Selesaikan

$$\text{a) } \log_3 x = 2$$

$$\text{b) } \log_2 16 = x$$

$$\text{c) } \log_x 8 = 3$$

Untuk menyemak dengan kalkulator, guna log asas 10

$$\log_3 9 = \frac{\log_{10} 9}{\log_{10} 3}$$

Tukar kepada bentuk \log_3 ?

$$\log_3 x + \log_3 y =$$

$$\log_3 5x - \log_3(x+1) =$$

$$2\log_3 x =$$

$$4\log_3 x - 3\log_3 y =$$

Bentuk Indeks	Bentuk Log
$3^2 = x + 6$	
$\frac{x+1}{x} = 2^5$	
	$\log_4\left(\frac{x}{x-3}\right) = 3$
	$\log_5[x(x+1)] = 0$
	$1 = \log_3\left(\frac{x+1}{3x}\right)$
	$2 = \log_7\left(\frac{3x^2}{y}\right)$

Jika

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Selesaikan

a) $\log_2 x - \log_2 3 = 1$

b) $2 + \log_3 x = \log_3(x+1)$

Ungkapkan x dalam sebutan y , jika

$$\log_5 x = 3 - 2\log_5 y$$

Jika $\log_a p = \log_a q$

∴

Selesaikan

a) $\log_2 x = 3\log_2 5$

b) $\log_9 x = \log_3 4$

Jika

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Bandingkan

a) Diberi $p = \log_2 x$, ungkapkan

$\log_2(16x)$ dalam sebutan p

→ log

b) Selesaikan $\log_2(16x) - \log_2 4 = 1$

→ susun ke bentuk

→ log

c) Diberi $\log_2(16x) = 3\log_2 p$, ungkapkan
 x dalam sebutan p

→ mula dengan

→ susun ke bentuk

Persamaan indeks dengan asas berlainan

Selesaikan (jawapan betul kepada 3 t.p.)

a) $4^x = 3$

b) $2^{x+3} = 7$

c) $2^{x+1} = 3^x$

Bandingkan jenis soalan

$$3^{x+3} = 9$$

$$3^{x+3} = 4$$

$$3^x + 3^{x+1} = 4$$

$$2^x - 2^{x-1} = 4$$