

$$Q \text{ P.T. } \frac{\log_3 12}{\log_3 36} - \frac{\log_3 4}{\log_3 108} = 2$$

$$\log_3 12 \times \log_3 36 - \log_3 4 \times \log_3 108$$

$$\log_3 (2^2 \times 3) \times \log_3 (2^2 \times 3^2) - \log_3 2^2 \times \log_3 (2^2 \times 3^3)$$

$$(\log_3 2^2 + \log_3 3) \times (\log_3 2^2 + \log_3 3^2) - (2 \log_3 2) \times (\log_3 2^2 + \log_3 3^3)$$

$$(2 \log_3 2 + 1) \times (2 \log_3 2 + 2) - (2 \log_3 2) \times (2 \log_3 2 + 3)$$

$$(2t+1)(2t+2) - (2t)(2t+3) = (4t^2 + 6t + 2) - (4t^2 + 6t) = 2 \text{ RHS}$$

11<sup>th</sup> = ShABash

Funda:-

$$Q \quad Y = \sqrt{\log_2 3 \cdot \log_2 12 \cdot \log_2 48 \cdot \log_2 192 + 16} - \boxed{\log_2 12 \cdot \log_2 48} + 10 = ?$$

$$= \sqrt{\log_2 3 \cdot \log_2 (2^2 \times 3) \times \log_2 (2^4 \times 3) \cdot \log_2 (2^6 \times 3) + 16} - \log_2 (2^2 \times 3) \times \log_2 (2^4 \times 3) + 10$$

$$= \sqrt{\log_2 3 \times (\log_2 2^2 + \log_2 3) \times (\log_2 2^4 + \log_2 3) \times (\log_2 2^6 + \log_2 3) + 16} - \{(\log_2 2^2 + \log_2 3) \times (\log_2 2^4 + \log_2 3)\} + 10$$

$$= \sqrt{\log_2 3 \times (2 \times 1 + \log_2 3) \times (4 + \log_2 3) \times (6 + \log_2 3) + 16} - \{(2 + \log_2 3) \times (4 + \log_2 3)\} + 10$$

$$= \sqrt{t \cdot (2+t) \cdot (4+t) \cdot (6+t) + 16} - \{(2+t)(4+t)\} + 10$$

$$= \sqrt{(t^2 + 6t)(t^2 + 6t + 8) + 16} - \{t^2 + 6t + 8\} + 10 = \sqrt{(u)(u+8) + 16} - \{u + 8\} + 10$$

$$= \sqrt{u^2 + 8u + 16} - (u + 2) = \sqrt{(u+4)^2} - u - 2 = (u+4) - u - 2 = 6$$

log me  
hr taraf  
No. hi No

⇒ Prime No.  
metodo

Funda

$\log_2 3$

Bar-Bar

Arohahi

et manna

Padeeg

# log Qs Containing Variable

Q  $\log_{x-1} 3 = 2$  Solve?

$$3 = (x-1)^2$$

$$(x-1)^2 - 3 = 0$$

$$(x-1)^2 - (\sqrt{3})^2 = 0$$

$$(x-1-\sqrt{3})(x-1+\sqrt{3}) = 0$$

$$x = 1 + \sqrt{3}, 1 - \sqrt{3}$$

$$\log_{x+\sqrt{3}} 3 = 2 \quad \bigg| \quad \log_{\underbrace{x-\sqrt{3}}_{-ve}} 3 = 2$$

Base +ve  
Base  $\neq 1$   
fxn  $> 0$

Hmex tk Janah  
logo Kohatqoo. Solve

Q2  $\log_4 (2 \log_3 (1 + \log_2 (1 + 3 \log_3 x))) = \frac{1}{2}$

$$\cancel{2} \log_3 (1 + \log_2 (1 + 3 \log_3 x)) = 4^{1/2} = \cancel{2} 1$$

$$1 + \log_2 (1 + 3 \log_3 x) = 3^1 = 3$$

$$\log_2 (1 + 3 \log_3 x) = 2$$

$$1 + 3 \log_3 x = 2^2 = 4$$

$$\cancel{x} \log_3 x = \cancel{x} 1$$

$$x = 3^1 = 3 \checkmark$$

Solve.

$$Q_3 \log_3 (1 + \log_3 (2^x - 7)) = 1$$

$$1 + \log_3 (2^x - 7) = 3^1 = 3$$

$$\log_3 (2^x - 7) = 3 - 1 = 2$$

$$2^x - 7 = 3^2 = 9$$

$$2^x = 9 + 7 = 16$$

$$2^x = 2^4$$

$$x = 4 \checkmark$$

Practice  
yourself  
Again

Q4

$$\log_3 (3^x - 8) = (2 - x)$$

$$3^x - 8 = 3^{2-x} = \frac{3^2}{3^x}$$

$$3^x - 8 = \frac{9}{3^x}$$

$$t - 8 = \frac{9}{t}$$

$$t^2 - 8t = 9$$

$$t^2 - 8t - 9 = 0$$

$$(t - 9)(t + 1) = 0$$

$$t = 9, t = -1$$

$$3^x = 9$$

$$3^x = 3^2$$

$$\boxed{x = 2}$$

$$3^t = -1$$

$$\oplus \neq -ve$$

$$x = \emptyset$$

Funda

1)  $(\text{const})^{\text{variable}} = \text{Exp. fn}$

2) Exp. fn they are always +ve

Solve

$$Q \log_{5-x} (x^2 - 2x + 65) = 2$$

$$x^2 - 2x + 65 = (5-x)^2$$

$$x^2 - 2x + 65 = 25 + x^2 - 10x$$

$$8x = -40$$

$$\boxed{x = -5} \checkmark$$

$$\log_{\substack{5-(-5) \\ \oplus}} (\underbrace{25+10+65})$$

$$Q6 \log_3 (\log_9 x + \frac{1}{2} + 9^x) = 2x \text{ Solve.}$$

$$\log_9 x + \frac{1}{2} + 9^x = 3^{2x}$$

$$\log_9 x + \frac{1}{2} + \cancel{9^x} = \cancel{9^x}$$

$$\log_9 x = -\frac{1}{2}$$

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

Fundo

$$\boxed{3^{2x} = (3^2)^x = 9^x}$$

Solve.

$$Q \log_3(x+1) + \log_3(x+3) = 4 \quad | \quad Q \log_7(2^x-1) + \log_7(2^x-7) = 1 \quad \text{Solve.}$$

$\rightarrow \log A + \log B = \log$

$$\log_3(x+1)(x+3) = 4$$

$$(x+1)(x+3) = 3^4$$

$$x^2 + 4x + 3 = 81$$

$$x^2 + 4x - 78 = 0$$

$$x = \frac{-4 \pm \sqrt{16 + 312}}{2 \times 1}$$

$$x = \frac{-4 + \sqrt{328}}{2}, \quad \text{---} \quad \frac{-4 - \sqrt{328}}{2} \quad \text{---} \quad \text{---}$$

$$\log_7(2^x-1)(2^x-7) = 1$$

$$(2^x-1)(2^x-7) = 7^1 = 7$$

$$(t-1)(t-7) = 7$$

$$t^2 - 8t + 7 = 7$$

$$(t)(t-8) = 0$$

$$t = 0, t = 8$$

$$\textcircled{2^x} = 0 \quad \text{---} \quad \text{---} \quad \text{---}$$

$$2^x = 8 = 2^3$$

$$\boxed{x = 3}$$

$2^x = \text{const}$  Variable  
= Exp. fcn  
are always  
+ve

Q  $1 - \log_{10} 5 = \frac{1}{3} (\log_{10} \frac{1}{2} + \log_{10} x + \log_{10} 5)$   $\frac{1}{3}$  hataye bgr  $\log A + \log B + \log C$  nh lagaye

find x?

$$1 - \log_{10} 5 = \frac{1}{3} (\log_{10} \frac{1}{2} + \log_{10} x + \log_{10} 5^{\frac{1}{3}})$$

$$1 - \log_{10} 5 = \frac{1}{3} (\log_{10} (\frac{1}{2} \times x \times 5^{\frac{1}{3}}))$$

$\frac{1}{3}$  hataye bgr  $\log A + \log B$  nh lagaye

$$1 = \left( \frac{1}{3} \log_{10} \left( \frac{5^{\frac{1}{3}} x}{2} \right) + \log_{10} 5 \right)$$

$$1 = \log_{10} \left( \frac{5^{\frac{1}{3}} x}{2} \right)^{\frac{1}{3}} + \log_{10} 5$$

$$1 = \log_{10} \left\{ \frac{5^{\frac{1}{3}} \cdot x^{\frac{1}{3}} \cdot 5^1}{2^{\frac{1}{3}}} \right\}$$

$$10^1 = \frac{5^{1+\frac{1}{3}} \cdot x^{\frac{1}{3}}}{2^{\frac{1}{3}}}$$

$$10 \times 2^{\frac{1}{3}} = 5^{\frac{10}{3}} \cdot x^{\frac{1}{3}}$$

$$\frac{10 \times 2^{\frac{1}{3}}}{5^{\frac{10}{3}}} = x^{\frac{1}{3}} \quad \text{Cube}$$

$$\frac{10^3 \times 2}{(5^{\frac{10}{3}})^3} = x \Rightarrow x = \frac{2000}{5^{\frac{10}{3}}}$$

Q  $9^{\log_3(1-2x)} = 5x^2 - 5$  Solve.

$3^{2\log_3(1-2x)} = 5x^2 - 5$

$$3^{\log_3(1-2x)^2} = 5x^2 - 5$$

$$(1-2x)^2 = 5x^2 - 5$$

$$4x^2 - 4x + 1 = 5x^2 - 5$$

$$x^2 + 4x - 6 = 0$$

$$x = \frac{-4 \pm \sqrt{16 + 24}}{2}, \quad \frac{-4 \pm 2\sqrt{10}}{2} \begin{matrix} \nearrow -2 + \sqrt{10} \\ \searrow -2 - \sqrt{10} \end{matrix}$$