

$$Q \text{ P.T. } \frac{\log_3 12}{\log_3 36} - \frac{\log_3 4}{\log_{100} 3} = 2$$

$$\log_3 [12] \times \log_3 36 - (\log_3 4 \times \log_3 100)$$

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

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

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

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

Funda: $Q_4 = \sqrt{\log_2 3 \cdot \log_2 12 \cdot \log_2 48 \cdot \log_2 192 + 16} - \boxed{\log_2 12 \cdot \log_2 48} + 10 = ?$

$\log m^p$
hr taraf
No. hi No
 \Rightarrow Prime No
metodo

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

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

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

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

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

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

Funda
Bqr-Bar
Aroha hai
ctmanna
Padegq

Log Qs containing Variable

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

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

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

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

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

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

$$\log_{x+\bar{3}} x^3 = 2$$

~~$x-1$~~ ✓ $\log_{x-\bar{3}} x^3 = 2$
-ve

Base +ve
Base ≠ 1
 $f(x) > 0$

Hm ex tk Janah
logo Kohatqoo. Solve

$$\underline{\underline{\log_2 \left(2 \log_3 (1 + \log_2 (1 + 3 \log_3 x)) \right)}} = \frac{1}{2}$$

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

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

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

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

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

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

Solve.

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

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

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

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

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

$$2^x = 2^4$$

$$x = 4$$

Practice
yourself
Again

$$Q_4 \log_3(3^t - 8) = (2 - t)$$

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

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

$$t - 2 = \frac{9}{t}$$

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

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

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

Fundaq

1) ((const)^{variable}) = Exp fm

2) Exp fxn they are
always +ve

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

$$3^t = 9 \quad | \quad 3^t = -1$$

$$3^t = 3^2 \quad | \quad \text{④ } \neq -\text{ve} \\ t = 2 \quad | \quad x = 4$$

$$\boxed{x=2}$$

Solve

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

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

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

$$8x = -40$$

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

$$\log_{\frac{5-(-5)}{4}} (25 + 10 + 65)$$

$$Q_6 \quad \log_3 (\log_9 x + \frac{1}{2} + 9^x) = 2x \quad \text{Solve}$$

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

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

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

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

Funda

$$\begin{cases} 3^{2x} = (3^2)^x \\ = 9^x \end{cases}$$

Solve:

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

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

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

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

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

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

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

④

⑤

 $\log A + \log B$ is eq

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

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

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

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

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

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

$$t=0, t=8$$

$$\begin{cases} ④ \\ ⑤ \end{cases}$$

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

$$\boxed{x=3}$$

Solve.

2^x = const Variable
 $= \text{Exp. fcn}$
 one always
 true

$$Q \quad 1 - \log_{10} 5 = \frac{1}{3} \left(\log_{10} \frac{1}{2} + \log_{10} x + \underbrace{\log_{10} 5}_{\frac{1}{3} \text{ hataye bgr log A + log B + log C nh lagre}} \right)$$

frnd x?

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

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

$\frac{1}{3}$ htaye
bgr log A + log B
nh lagre

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

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

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

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

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

$$\frac{10 \cdot 2^{\frac{1}{3}}}{5^{\frac{10}{3}}} = x^{\frac{1}{3}} \quad \text{Cela}$$

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

$$\text{Q} \quad g^{\log_3(1-2x)} = 5x^2 - 5 \quad \text{Solve.}$$
$$3^{2 \log_3(1-2x)} = 5x^2 - 5$$

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

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

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

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

$$x = \frac{-4 \pm \sqrt{16+24}}{2}, \quad \frac{-4 \pm 2\sqrt{10}}{2} \rightarrow -2 \pm \sqrt{10}$$