

Solve for the Unknown (Using Logarithms) Problems - Guided Lesson Explanation

In all these problems you need to remember the following two properties of logs:

$$\log_a a = 1$$

&

$$\log_b x = y \quad \Leftrightarrow \quad x = b^y$$

Explanation#1

Given that:

$$\log_5 3125 - \log_4 x = 3$$

Step 1: Let's simplify $\log_5 3125$ first.

$$\begin{aligned}\log_5 3125 &= \log_5 5^5 \\ &= 5 \log_5 5 \\ &= 5\end{aligned}$$

Step 2: Substitute the value of $\log_5 3125$ in the given equation.

$$\log_5 3125 - \log_4 x = 5 - \log_4 x = 3$$

Step 3: Solve.

$$\log_4 x = 5 - 3 = 2$$

$$x = 4^2$$

$$x = 16 \quad (\text{You can verify the answer by putting } x = 16 \text{ in the original equation and check either L.H.S} = \text{R.H.S or not})$$

Answer: $x = 16$

Explanation#2

Given that:

$$\log_2 b + \log_2 256 = 10$$

Step 1: Let's simplify $\log_2 256$ first.



Name _____

Date _____

$$\begin{aligned}\log_2 256 &= \log_2 2^8 \\ &= 8 \log_2 2 \\ &= 8\end{aligned}$$

Step 2: Substitute the value of $\log_2 256$ in the given equation.

$$\log_2 b + \log_2 256 = \log_2 b + 8 = 10$$

Step 3: Solve.

$$\log_2 b = 10 - 8 = 2$$

$$b = 2^2$$

$$b = 4$$

Answer: $b = 4$

Explanation#3

Given that:

$$\log_2 1024 - \log_4 x = 7$$

Step 1: Let's simplify $\log_2 1024$ first.

$$\begin{aligned}\log_2 1024 &= \log_2 2^{10} \\ &= 10 \log_2 2 \\ &= 10\end{aligned}$$

Step 2: Substitute the value of $\log_2 1024$ in the given equation.

$$\log_2 1024 - \log_4 x = 10 - \log_4 x = 7$$

Step 3: Solve.

$$\log_4 x = 10 - 7 = 3$$

$$x = 4^3$$

$$x = 64$$

