



Solving log equations by switching forms

$$\log_2 x = -3$$

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

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

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

$$\log_{27} 3 = x$$

$$27^x = 3$$

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

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

$$3x = 1$$

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

Solving log equations by switching forms

$$\log_x 4 = \frac{1}{2}$$

$$(x^{\frac{1}{2}})^2 = (4)^2$$

$$x = 16$$

$$\log_5 \frac{1}{25} = x$$

$$5^x = \frac{1}{25}$$

$$5^x = \frac{1}{5^2}$$

$$5^x = 5^{-2}$$

$$x = -2$$

Inverse properties of logs

$$\cancel{a^{\log_a x} = x} \quad 3^{\log_3 5} = 5$$
$$\log_b x = \log_b y \text{ then } \underline{x = y}$$

$$\cancel{\log_a a^x = x} \quad \log_5 5^{10} = 10$$

Ex.

1. $3^{\log_3 5} =$

2. $\log_6 6^4 = 4$

3. $\log_{10} 10 = 1$

4. $\log_3 x = \log_3 10$
 $x = 10$

Solving simple log equations

Ex. ~~$\log_5(p^2 - 2) = \log_5 p$~~ check sol.

$$p^2 - 2 = p$$

$$p^2 - p - 2 = 0$$

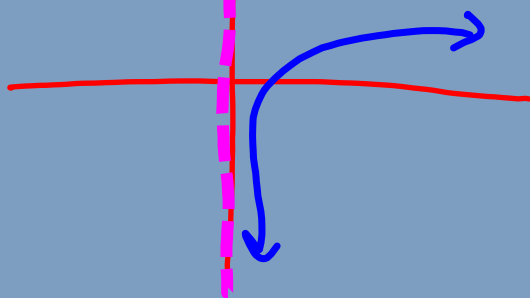
$$(p - 2)(p + 1) = 0$$

$$p = 2, \text{ } \times$$

$$\log_5(2^2 - 2) = \log_5 2$$

$$\log_5((-1)^2 - 2) = \log_5 1$$

$-\log()$



Solving simple log equations

Ex. $\log_3 3^{x+5} = 10$ check sol.

$$x+5=10$$

$$x=5$$

Properties of Logs

- #1 Product Property

Condensed \longleftrightarrow expanded

$$\log_b(x \bullet y) = \log_b x + \log_b y$$

Properties of Logs

- #1 Product Property

$$\log_2(4 \cdot 16) =$$

$$\log_2(4 \cdot 16)$$

$$\log_2 4 + \log_2 16$$

$$\log_3(9 \cdot 81) =$$

Properties of Logs

- Write as a single log

$$\log_5 19 + \log_5 3 =$$

$$\log_5 (19 \cdot 3)$$
$$\log_5 57$$

Properties of Logs

- Write as a single log

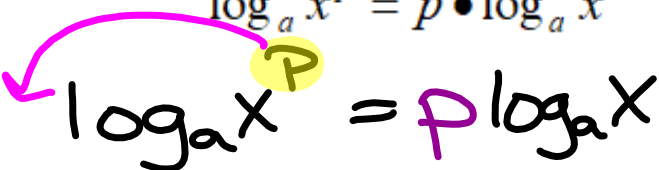
$$\log 2 + 3 =$$

Properties of Logs

- #2—Power Property

$$\log_a x^p = p \cdot \log_a x$$

$\log_a x^p = p \log_a x$



Properties of Logs

• #2—Power Property

$$\begin{array}{l} \log_b 9^{-5} = \\ \log_b 9^{-5} \\ -5 \log_b 9 \end{array}$$

$$\begin{array}{l} \log_a 5^{\frac{1}{4}} = \\ \log_a 5^{\frac{1}{4}} \\ \frac{1}{4} \log_a 5 \end{array}$$

$$\sqrt[4]{5} = 5^{\frac{1}{4}}$$

Properties of Logs

- #3—Quotient property

$$\log_b \left(\frac{m}{n} \right) = \log_b m - \log_b n$$

Properties of Logs

- #3—Quotient property

$$\log_2 \left(\frac{2}{8} \right) =$$

$$\log_2 2 - \log_2 8$$