

Get out a piece of paper and write down everything you remember about logarithms.

Inverse Function Review WKS

$$\ln x = \log_e x$$

$$e \approx 2.7$$

$$I = Pe^{rt}$$

$$\begin{aligned} (15) \quad y &= 2 \ln x \\ x &= \frac{2 \ln y}{2} \\ \frac{x}{2} &= \ln y \\ \frac{x}{2} &= \log_e y \end{aligned}$$

$$e^{x/2} = y$$

$$e^{x/2} = f^{-1}(x)$$

$$(19) \quad y = 2^x + 1$$

$$x = 2^y + 1$$

$$\begin{aligned} -1 & \quad -1 \\ \hline (x-1) &= 2^y \\ \log_2(x-1) &= y \\ \log_2(x-1) &= f^{-1}(x) \end{aligned}$$

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

$$\begin{aligned} \log_2(x-1) &= \log_2 2^y \\ \log_2(x-1) &= y \log_2 2 \\ \log_2(x-1) &= y \cdot 1 \\ \log_2(x-1) &= f^{-1}(x) \end{aligned}$$

$$\log_2 8 = 3$$

$$\log_2 4 = 2$$

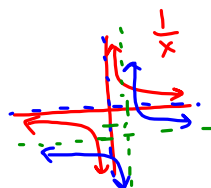
$$(13) \quad y = -7 \log_{1/2} x$$

$$x = \frac{-7 \log_{1/2} y}{-7}$$

$$y \rightarrow \frac{x}{-7} = \log_{1/2} y$$

$$\frac{1}{2} = y$$

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



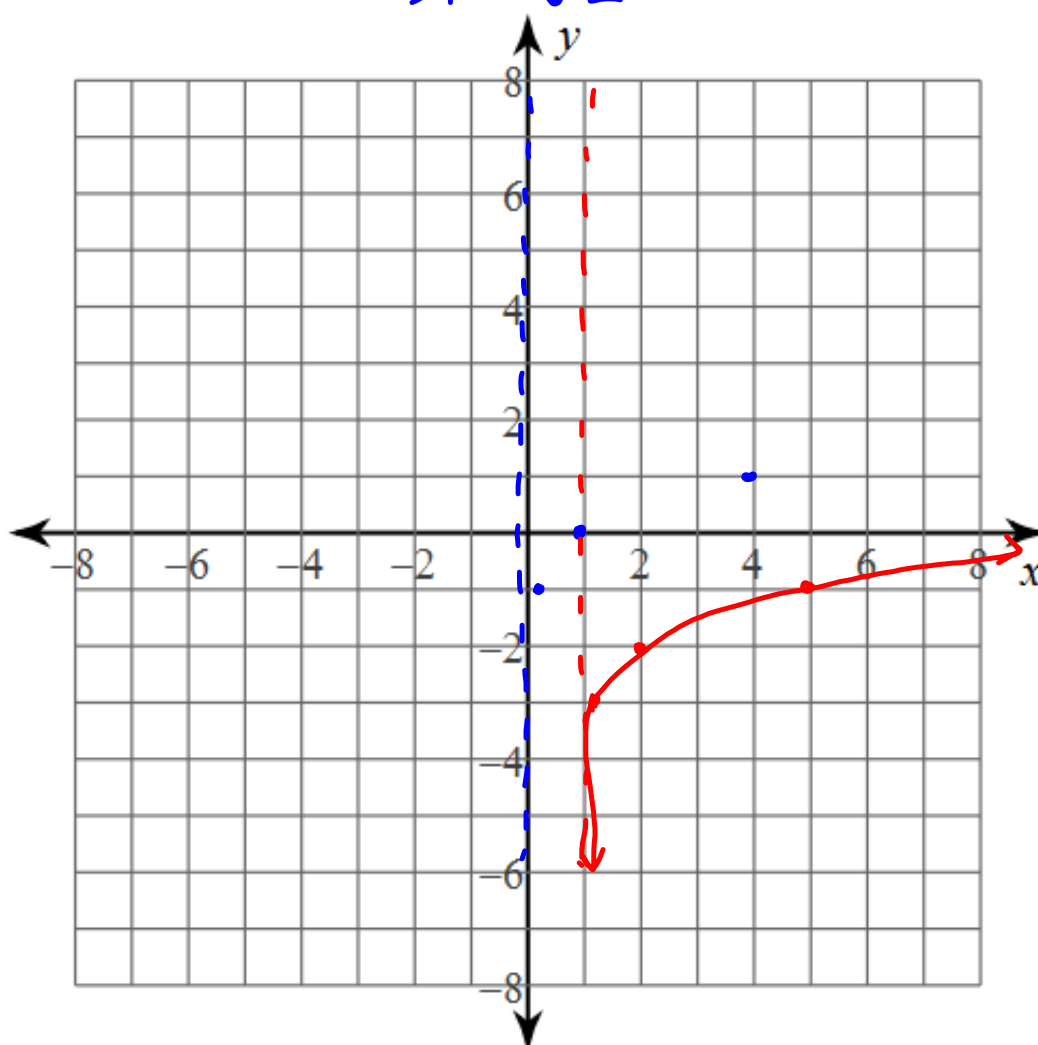
Logarithms

Graphing

$$y = \log_4 (x - 1) - 2$$

$\rightarrow 1$ $\downarrow 2$

$\log_4 x$



Condensing

Condense each expression to a single logarithm.

$$\log_8 a + \log_8 b + 4\log_8 c$$

$$\log_8 a + \log_8 b + \log_8 c^4 = \log_8 (a \cdot b \cdot c^4)$$

$$\frac{\log_4 x}{3} + \frac{\log_4 y}{3} + \frac{\log_4 z}{3} =$$

$$\frac{1}{3} \log_4 x + \frac{1}{3} \log_4 y + \frac{1}{3} \log_4 z =$$

$$\log_4 x^{1/3} + \log_4 y^{1/3} + \log_4 z^{1/3} = \log_4 \sqrt[3]{x \cdot y \cdot z}$$

$$16\log_3 8 - 4\log_3 11 = \log_3 \frac{8^{16}}{11^4}$$

Expanding

Expand each logarithm.

$$\log_9 (w^6 \cdot \sqrt[3]{u})$$

$$\log_9 w^6 + \log_9 u^{1/3} =$$

$$6 \log_9 w + \frac{1}{3} \log_9 u$$

$$\log_7 (xy^2)^4$$

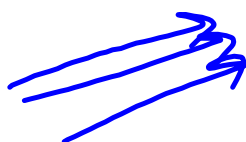
$$\log \left(\frac{x^5}{y} \right)^2$$

$$\log_4 \frac{3^7}{10^2}$$

Rewriting

$$\log_{\frac{1}{8}} \frac{1}{64} = 2$$

Handwritten annotations: a blue arrow points from the letter 'b' to the base $\frac{1}{8}$; a blue arrow points from the letter 'x' to the argument $\frac{1}{64}$; a blue arrow points from the letter 'y' to the result '2'.



$$b^y = x$$
$$\left(\frac{1}{8}\right)^2 = \frac{1}{64}$$

$$\log_9 81 = 2$$

Solving Equations

Solve each equation.

$$\ln(6 - m) = \ln(m + 10)$$

$$\cancel{e^{\ln(6-m)}} = \cancel{e^{\ln(m+10)}}$$

$$(6 - m) = (m + 10)$$

$$\log_6 2x^2 - \log_6 8 = 4$$

$$\log_6 \frac{2x^2}{8} = 4$$

$$4 \cdot 6^4 = \frac{x^2}{4} \cdot 4$$

$$4(1296) = x^2$$

$$\sqrt{5184} = x$$

$$\pm 72 = x$$

Homework

Finish Logarithms Review WKS