

Welcome to Class!!!

- All cell phones in holder.

Warm-up

What are my 3 beginning points?

$$\begin{array}{l|l} & \\ \hline \frac{1}{b} & -1 \\ 1 & 0 \\ b & 1 \end{array}$$

$\log_b x$





Properties of Logs

PROPERTY	EXAMPLE(S)	RULE
Foundations	$\log_3 1 = \underline{0}$ $\log_7 1 = \underline{0}$	$\log_b 1 = 0$
	$\log_3 3 = \underline{1}$ $\log_7 7 = \underline{1}$	$\log_b b = 1$
Exponential-Logarithmic Inverse	$\underline{5}^{\log_5 25} = \underline{25}$	$b^{\log_b M} = M$ $b^{\log_b M} = M$
	$\log_2 2^6 = 6$	$\log_b b^x = x$
Product	$\log_3 (8) = \log_3 2 + \log_3 4$	$\log_b (x \cdot y) = \log_b x + \log_b y$
Quotient	$\log_2 \frac{3}{5} = \log_2 3 - \log_2 5$	<i>*Based on the Product Property, can you determine what this equals?</i> $\log_b \frac{M}{N} = \log_b M - \log_b N$
Power	$\log_6 6^2 = 2 \log_6 6 = 2$ $\log 5^2 = 2 \log 5$ $\log \sqrt{x} = \log x^{\frac{1}{2}} = \frac{1}{2} \log x$	$\log_b x^y = y \log_b x$
One-to-One	$\log_2 x = \log_2 5$ then $x = 5$	$\log_b x = \log_b y$ $x = y$
Change of Base	$\log_3 57 = \frac{\log 57}{\log 3}$	$\log_b a = \frac{\log_n a}{\log_n b}$

$e^{x+2} = 7$

$\ln 7 = x+2$

$\ln_7 = x+2$   
 $\log_c 7 = x+2$

$$\textcircled{2} \quad \log_2 5 + \log_2 x - \log_2 10$$

$$\log_2 \frac{5x}{10}$$

$$\log_2 \frac{x}{2}$$

⑥

$$4 \log_b x + \frac{1}{2} \log_b y - 3 \log_b 2z$$

$$\log_b x^4 + \log_b y^{\frac{1}{2}} - \log_b (2z)^3$$

$$\log_3 x^5$$

$$\log_3 \sqrt[3]{x^5}$$

$$\log_b \frac{x^4 y^{\frac{1}{2}}}{(2z)^3}$$

$$\log_b \frac{x^4 \sqrt{y}}{8z^3}$$

⑨

$$\log_b \frac{b}{x}$$

$$\log_b b - \log_b x$$

$$\boxed{1 - \log_b x}$$

$$\log_3 81 = x$$

$$3^x = 81$$

$$3^x = 3^4$$

④

(11)

$$\log_4 4 \sqrt[3]{3x^3}$$

$$\log_4 4 \cdot 3^{\frac{1}{2}} \cdot x^{\frac{3}{2}}$$

$$\log_4 4 + \log_4 3^{\frac{1}{2}} + \log_4 x^{\frac{3}{2}}$$

$$1 + \frac{1}{2} \log_4 3 + \frac{3}{2} \log_4 x$$



(18)

$$\frac{1}{2} \log_5 15 - \log_5 \sqrt{75}$$

$$\log_5 15^{\frac{1}{2}} - \log_5 \sqrt{75}$$

$$\log_5 \frac{\sqrt{15}}{\sqrt{75}}$$

$$\log_5 \sqrt{\frac{15}{75}}$$

$$\log_5 \frac{1}{\sqrt{5}}$$

$$\log_5 \sqrt{\frac{1}{5}}$$

$$\log_5 1 - \log_5 \sqrt{5}$$

$$0 - \log_5 5^{\frac{1}{2}}$$

$$0 - \frac{1}{2}$$

$$= \left( -\frac{1}{2} \right)$$

$$\textcircled{18} \quad \frac{1}{2} \log_5 15 - \log_5 \sqrt{75}$$

$$\log_5 15^{\frac{1}{2}} - \log_5 \sqrt{75}$$

$$\log_5 \sqrt{15} - \log_5 \sqrt{75}$$

$$\log_5 \frac{\sqrt{15}}{\sqrt{75}}$$

$$\log_5 \sqrt{\frac{15}{75}}$$

$$\log_5 \frac{1}{\sqrt{5}}$$

$$\frac{1}{2} \log_5 5$$

$$\frac{1}{2} (1)$$

$$\downarrow$$

$$\log_5 1 - \log_5 \sqrt{5}$$

$$0 - \log_5 5^{\frac{1}{2}}$$

$$0 - \frac{1}{2}$$

$$\textcircled{-\frac{1}{2}}$$

$$\sqrt{\frac{1}{5}}$$

$$\sqrt[x]{y^p} = y^{\frac{p}{x}}$$