

## Journal

What do you think?



Austin is evaluating the logarithmic expression  $\log_{27} 3$ . He thinks the answer is 3. Is he correct?

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## Warm up

Rewrite each equation in exponential form. Hint:  $b^x = a$ 

1)  $\log_{14} \frac{1}{196} = -2$

$$14^{-2} = \frac{1}{196}$$

2)  $\log_8 64 = 2$

$$8^2 = 64$$

3)  $\log_{361} 19 = \frac{1}{2}$

$$361^{\frac{1}{2}} = 19$$

4)  $\log_{14} 196 = 2$

$$14^2 = 196$$

Rewrite each equation in logarithmic form. Hint:  $\log_b a = x$ 

5)  $216^{\frac{1}{3}} = 6$

$$\log_{216} 6 = \frac{1}{3}$$

6)  $4^{\frac{1}{2}} = 2$

$$\log_4 2 = \frac{1}{2}$$

7)  $4^3 = 64$

$$\log_4 64 = 3$$

8)  $6^3 = 216$

$$\log_6 216 = 3$$

Evaluate each expression using the change of base formula. Round any decimal answers to 2 decimal places.

9)  $\log_7 343 = x$

$$3$$

10)  $\log_4 64$

$$3$$

11)  $\log_6 \frac{1}{216} = -3$

12)  $\log_3 9$

$$2$$

13)  $\log_{10} 37$

$$1.57$$

14)  $\log_{10} 70$

$$1.85$$

15)  $\log_3 17$

$$2.58$$

16)  $\log_2 3.9$

$$1.96$$

17)  $\log_7 32$

$$1.78$$

18)  $\log_{10} 17$

$$1.23$$

PROPERTIES OF LOGARITHMS		GRAPHIC ORGANIZER	
Name	Rule(s)	Example 1	Example 2
BASIC LOGARITHMS	$\log_b b = 1$ ; $\log_b 1 = 0$	<b>Simplify:</b> $\log_{14} 14 = 1$	<b>Simplify:</b> $\log_3 1 = 0$
PRODUCT RULE	$\log_b (m \cdot n) = \log_b m + \log_b n$	<b>Condense:</b> $\log_5 6 + \log_5 7 =$	<b>Expand:</b> $\log_2 63 =$ $\log_2 (9 \cdot 7) =$ $\log_2 9 + \log_2 7$
QUOTIENT RULE	$\log_b \left(\frac{m}{n}\right) = \log_b m - \log_b n$	<b>Condense:</b> $\log_4 84 - \log_4 12 =$	<b>Expand:</b> $\log_9 \frac{x}{y} =$ $\log x - \log y$
POWER RULE	$\log_b m^n = n \log_b m$	<b>Condense:</b> $2 \cdot \log_3 8 =$	<b>Expand:</b> $\log_2 6^{x-1} =$ $(x-1) \log_2 6$
CHANGE OF BASE FORMULA	$\log_b a =$	<b>Using a common base, evaluate the expression below.</b> $\log_7 32 =$	
<b>REMEMBER:</b> BASE 10 LOGS ARE COMMON LOGS AND WRITTEN WITHOUT A BASE! ( $\log x$ )			