## 6-1: Properties of Logarithms

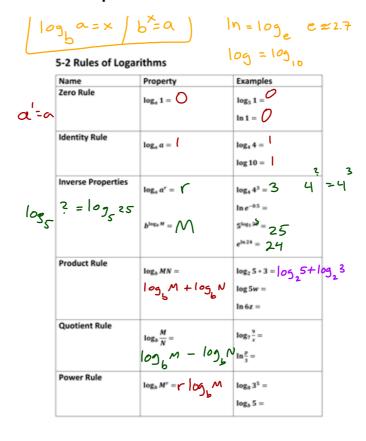
6-1a: I can use the properties of exponents to simplify and evaluate logarithms.

6-1b: I can use the properties of logarithms to simplify and evaluate logarithms.

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EXPONENT ROLES		Graphic Onganizer
Name	Rule	Examples
ADDING & SUBTRACTING MONOMIALS	(DO NOT CHANGE common variables and exponents!)	<ol> <li>9x²y-10x²y =</li> <li>Subtract 6w from 8w.</li> </ol>
PRODUCT RULE	$x^a \cdot x^b = X$	<b>1.</b> $h^2 \cdot h^6 =$ <b>2.</b> $(-2a^2b) \cdot (7a^3b) =$
POWER RULE	$(x^a)^b = \times^{ab}$	1. $(x^2)^3 =$ 2. $(-2m^5)^2 \cdot m^3 =$
QUOTIENT RULE	$\frac{x^a}{x^b} = X$	1. $\frac{27x^5}{42x} =$ 2. $\frac{(y^2)^2}{y^4} =$
NEGATIVE EXPONENT RULE	$x^{-a} = \frac{1}{x}$	1. $-5x^{-2} =$ 2. $\frac{4k^2}{8k^5} =$
ZERO EXPONENT RULE	$x^0 = 1$	1. $7x^0 =$ 2. $\frac{(w^4)^2}{w^8} =$



Find the value of each logarithm without using a calculator.

- 1.  $\log_7 7$
- $2. \log_{18} 18$
- $3. \log_5 1$
- 4. log<sub>9</sub>1

$$\log_a 1 = 0 \qquad \log_a a = 1$$

 $\log_5 1$ 

ln 1

 $log_4 4$ 

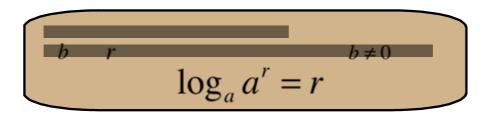
log 10

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- $\log_3 3^2$
- $\log_5 5^8$

Without evaluating, predict what the following logs equal:

- $\log_2 2^{10}$
- $\log_{20} 20^7$



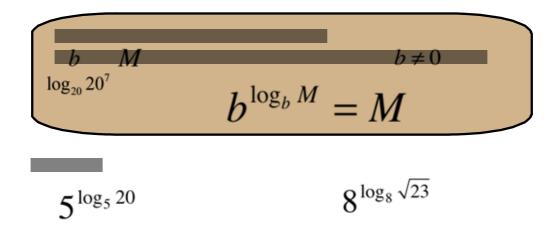
$$\log_4 4^3$$

$$\ln e^{-0.5}$$

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Recall: 
$$b^x = a \iff \log_b a = x$$

$$5^{\log_5 20}$$



$$12^{\log_{12}\sqrt{2}} \qquad \qquad 10^{\log 0.2}$$

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$$\log_b(MN) = \log_b M + \log_b N$$

$$\log_2(5\cdot 3)$$

ln(6z)

Find 3 ways to expand  $\log_3 24$  using this rule

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$$\log_b \frac{M}{N} =$$

$$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$$

$$\log_2\left(\frac{5}{3}\right) \qquad \qquad \log\left(\frac{y}{5}\right)$$

## Find 3 ways to expand $\log_5 3$ using this rule

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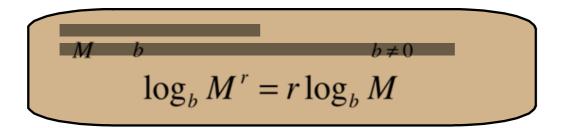
$$\log_3\left(\frac{4x}{y}\right) = \log_3 4 + \log_3 x - \log_3 y$$

$$\log_3\left(\frac{3m}{n}\right) = 1 + \log_3 m - (o_3)^n$$

$$\log_3\left(\frac{q}{3p}\right) = \log_3\left(\frac{q}{3p}\right) =$$

$$\log_2(4)^3 = 3 \cdot \log_2 4$$

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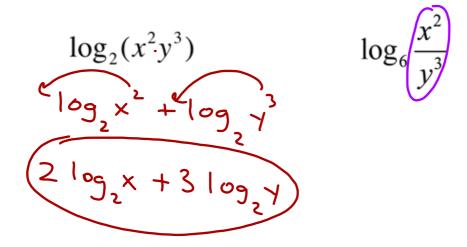


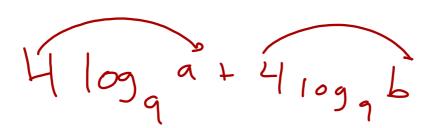
$$\log_8 3^5$$

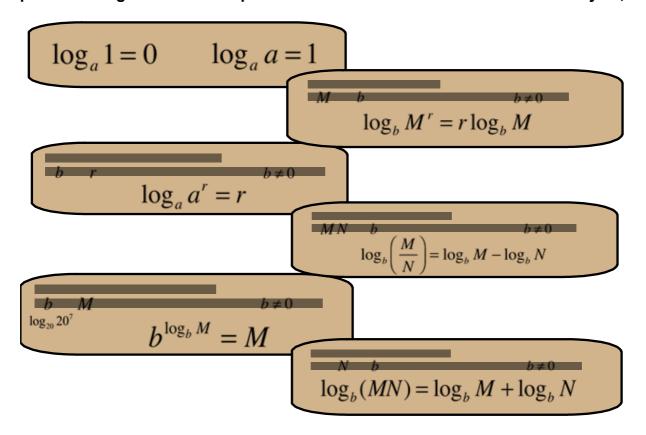
$$\ln x^{\sqrt{3}}$$

$$log_5 25$$

$$\log b^5$$







Nov 12-12:42 PM

$$\frac{109_{3}^{2}}{3} = \frac{1}{3} \log_{3}^{2} \times = \log_{3}^{\frac{2}{3}}$$

$$\chi = \sqrt[3]{\chi^{2}}$$

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$$\log_{5}\left(a^{-2}bc^{3}\right)^{2} \qquad \log\left(\frac{100x}{\sqrt{y}}\right)$$

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$$\log_{5} a^{2} - \log_{5} b^{2} + \log_{5} c^{6}$$
 $4 \log_{5} a - 2 \log_{5} b + 6 \log_{5} c$ 

$$\log(a^{2} \sqrt{bc})$$

$$\log a^{2} + \log_{5} \sqrt{bc}$$

$$2 \log_{5} a + \log_{5} (bc)^{2}$$

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$$2 \log_{5} a + \log_{5} (bc)^{2}$$



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$$\log_6 3 + \log_6 12$$

$$\log(x-2) - \log x$$

$$\log_5 x - 3\log_5 2$$

$$\log(x-1) + \log(x+1) - 3\log x$$