001 - Exponentials and Logarithms (Basics) and Logarithmic Rules.noteboo@ecember 25, 2016

# 18 / 2 / 16

Exponentials and Logarithms - Lesson 1

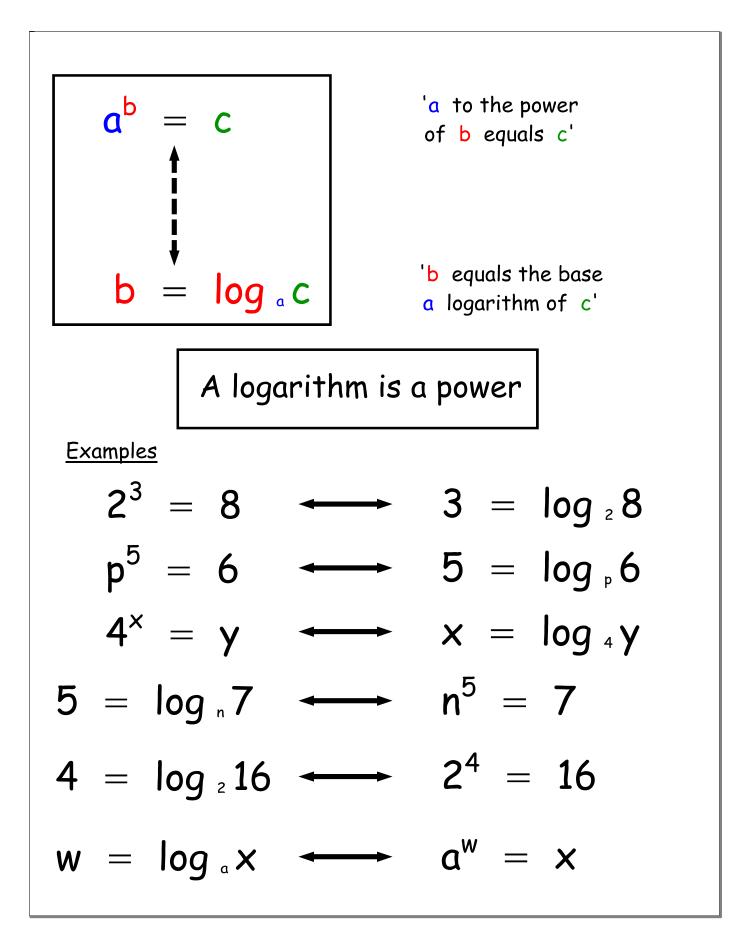
## Exponentials, Logarithms and Logarithmic Rules

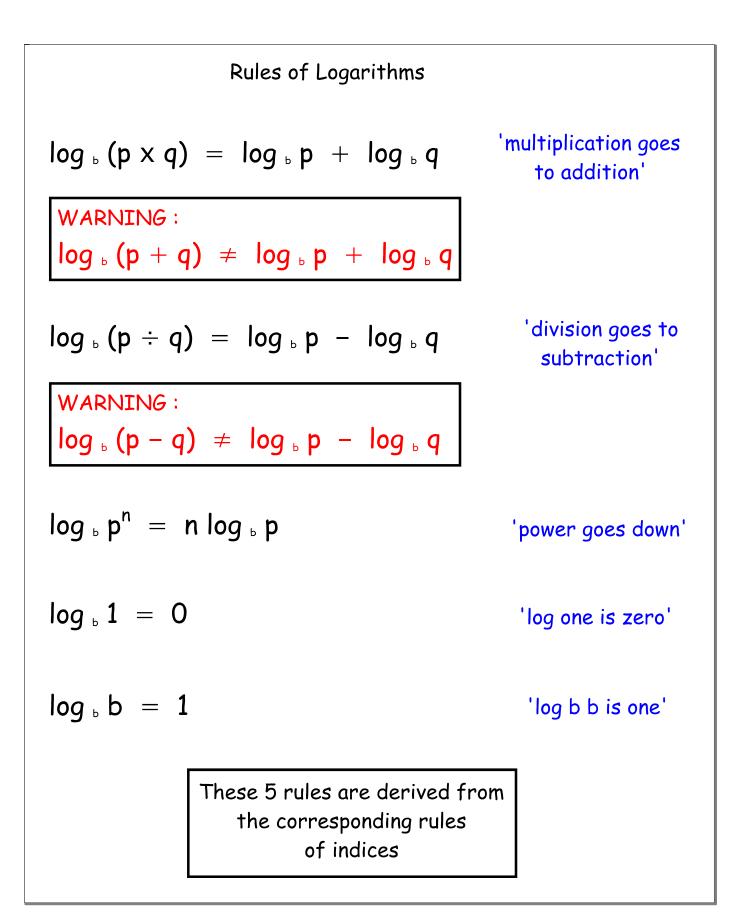
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- Know what a logarithm is and how it is related to an exponential.
- Know and use the Logarithmic Rules.

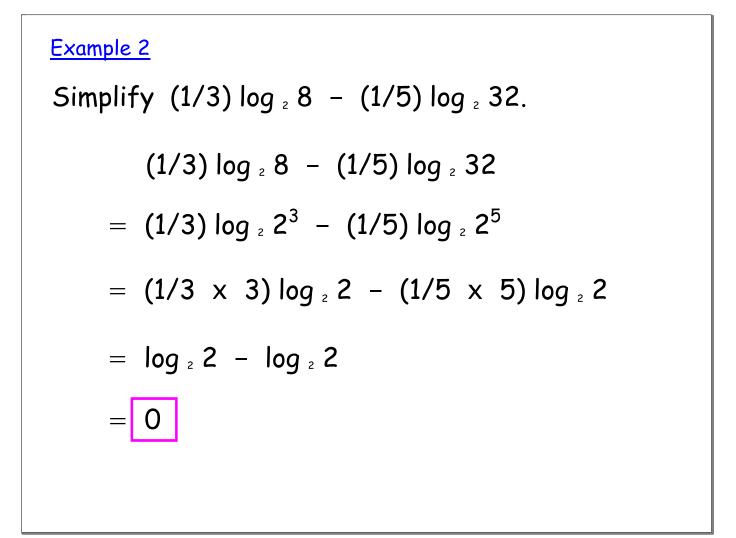
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• Rules of indices.





Example 1  
Simplify 
$$\log_7 3 + \log_7 21$$
.  
 $\log_7 3 + \log_7 21 = \log_7 3 + \log_7 (3 \times 7)$   
 $= \log_7 3 + \log_7 3 + \log_7 7$   
 $= 2 \log_7 3 + 1$ 



Example 3  
Simplify 
$$2 \log_{3} 9 + \log_{3} 27 - 4 \log_{3} 81$$
.  
 $2 \log_{3} 9 + \log_{3} 27 - 4 \log_{3} 81$   
 $= 2 \log_{3} 3^{2} + \log_{3} 3^{3} - 4 \log_{3} 3^{4}$   
 $= 4 \log_{3} 3 + 3 \log_{3} 3 - 16 \log_{3} 3$   
 $= -9 \log_{3} 3$   
 $= -9 (1)$   
 $= -9$ 

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Example 4  
If 
$$\log_{a} y = \log_{a} 7 + 4 \log_{a} x$$
,  
express y in terms of x.  

$$\log_{a} y = \log_{a} 7 + 4 \log_{a} x$$

$$\Rightarrow \log_{a} y = \log_{a} 7 + \log_{a} x^{4}$$

$$\Rightarrow \log_{a} y = \log_{a} (7 x^{4})$$

$$\therefore \qquad y = 7 x^{4}$$

Example 5  
If 
$$\log_F w = \log_F r - 17 \log_F N$$
,  
express w in terms of r and N.  

$$\log_F w = \log_F r - 17 \log_F N$$

$$\Rightarrow \log_F w = \log_F r - \log_F N^{17}$$

$$\Rightarrow \log_F w = \log_F (r / N^{17})$$

$$\therefore \qquad w = r / N^{17}$$

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