

Friday, 11/11, 2016

### Opener - Finish Properties of Logs

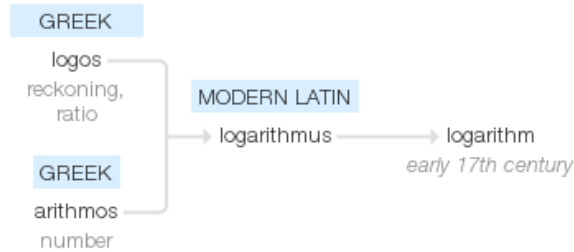
### Activity from yesterday

## 3.5 Solving Log and Exponential Equations

Have a great weekend!

## log·a·rithm

Origin



early 17th century: from modern Latin *logarithmus*, from Greek *logos* 'reckoning, ratio' + *arithmos* 'number.'

## 3.5 Solving Exponential and Logarithmic Equations

No Calc  
Get the Same Base.  
Go small or Go Home!

①  $8^x = 2^{x+1}$   
 $(2^3)^x = 2^{x+1}$   
 Bases = So  $3x = x+1$   
 $2x = 1$   
 $x = \frac{1}{2}$

②  $\frac{20}{20} \left(\frac{1}{2}\right)^{\frac{x}{3}} = \frac{5}{20}$   
 $\left(\frac{1}{2}\right)^{\frac{x}{3}} = \frac{1}{4}$  ← rewrite (still =  $\frac{1}{4}$ )  
 $\left(\frac{1}{2}\right)^{\frac{x}{3}} = \left(\frac{1}{2}\right)^2$   
 $\frac{x}{3} = 2$   
 $x = 6$

③  $5^{2x} = \left(\frac{1}{25}\right)^{x+1}$   
 $5^{2x} = (5)^{-2(x+1)}$   
 $2x = -2(x+1)$   
 $2x = -2x - 2$   
 $4x = -2$   
 $x = -\frac{1}{2}$

④  $81^{3x} = \left(\frac{1}{27}\right)^{x-1}$   
 $(3^4)^{3x} = (3^{-3})^{x-1}$   
 $12x = -3x + 3$   
 $15x = 3$   
 $x = \frac{1}{5}$

### Calc OK! Use Logs - Change of Base

①  $3^x = 11$   
 $\log_3 11 = x$   
 $x = \frac{\log 11}{\log 3} \approx 2.183$

②  $3^{2x} = 18$   
 $\log_3 18 = 2x$   
 $2x = \frac{\log 18}{\log 3}$   
 $x = \frac{\log 18}{\log 3} \div 2 \approx 1.315$

### Log Equations - No Calc

## Log Equations - No Calc

\* Change to Exponential Form

①  $\log_6(4x+12) = 2$       ②  $\log_2(4x-4) = 5$

exp. form:  $6^2 = 4x+12$        $2^5 = 4x-4$

$36 = 4x+12$        $32 = 4x-4$

$24 = 4x$        $36 = 4x$

$6 = x$        $9 = x$