

**Algebra II Warm Up** 2-6-15

Solve the following system of equations.

$$\begin{array}{r} 2x - 3y = 2 \\ x + y = 6 \\ \hline -x \quad -x \\ \hline y = -x + 6 \end{array}$$

$$\begin{array}{r} 2x - 3(-x + 6) = 2 \\ 2x + 3x - 18 = 2 \\ 5x - 18 = 2 \\ \quad +18 \quad +18 \\ \hline 5x = 20 \\ \frac{5x}{5} = \frac{20}{5} \\ x = 4 \end{array}$$

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Today we will be looking at the inverse of an exponential function. It is called a **Logarithm**. We will be converting from exponential form to logarithmic form.

$$y = b^x \Leftrightarrow \log_b y = x$$

$$8 = 2^3 \Rightarrow \log_2 8 = 3$$

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$y = b^x \Leftrightarrow \log_b y = x$

1.  $64 = 4^3$       $\log_4 64 = 3$
2.  $625 = 5^4$       $\log_5 625 = 4$
3.  $10^2 = 100$       $\log_{10} 100 = 2$
4.  $3^{-2} = \frac{1}{9}$       $\log_3 \frac{1}{9} = -2$
5.  $64 = \left(\frac{1}{4}\right)^{-3}$       $\log_{\frac{1}{4}} 64 = -3$

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$y = b^x \Leftrightarrow \log_b y = x$

1.  $2^5 = 32$       $\log_2 32 = 5$
2.  $6^2 = 36$       $\log_6 36 = 2$
3.  $10^3 = 1000$       $\log_{10} 1000 = 3$
4.  $5^3 = 125$       $\log_5 125 = 3$
5.  $10^1 = 10$       $\log_{10} 10 = 1$

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There are two special types of logarithms.

1. Common Log

$$\log_{10} = \log$$

2. Natural Log

$$\log_e = \ln$$

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$$y = b^x \Leftrightarrow \log_b y = x$$

1.  $54.6 = e^4$

$$\ln 54.6 = 4$$

2.  $100000 = 10^5$

$$\log 100,000 = 5$$

3.  $e^{-2} = .135$

$$\ln .135 = -2$$

4.  $10^{-6} = 0.000001$

$$\log 0.000001 = -6$$

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$$y = b^x \Leftrightarrow \log_b y = x$$

1.  $10^{-3} = 0.001$      $\log 0.001 = -3$

2.  $e^2 = 7.39$      $\ln 7.39 = 2$

3.  $10^4 = 10000$      $\log 10000 = 4$

4.  $e^{-3} = 0.0498$      $\ln 0.0498 = -3$

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Graph

$$y = \log_2 x$$

Alpha window  
5

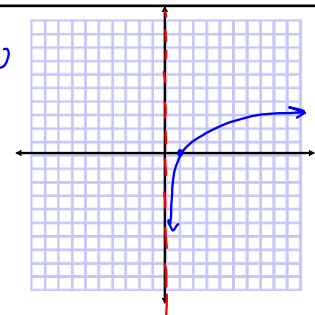
x-int:  $(1, 0)$

y-int: none

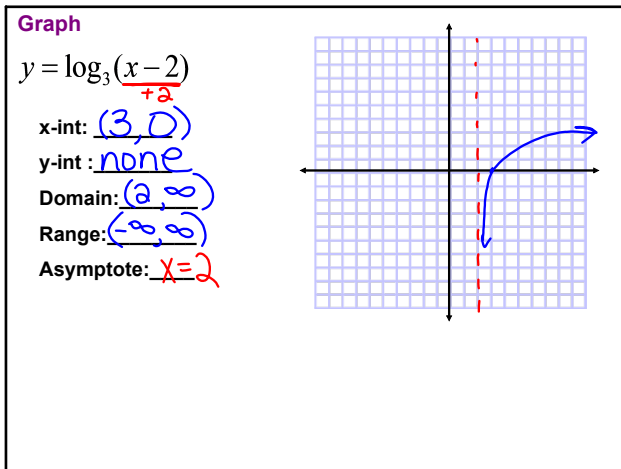
Domain:  $(0, \infty)$

Range:  $(-\infty, \infty)$

Asymptote:  $x = 0$



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- Conclusion**
1. What is the common log?  $\log_{10}$
  2. What is the natural log?  $\log_e$
  3. How do you switch from exponential to log form?  
 $2^3=8$   $\log_2 8=3$
  4. What type of asymptote does a log graph have?  
vertical
  5. What buttons do you push to graph a log function?  
Alpha  
window  
5
  6. Question????

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Day 4  
**Logarithms**  
**Wkst**

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