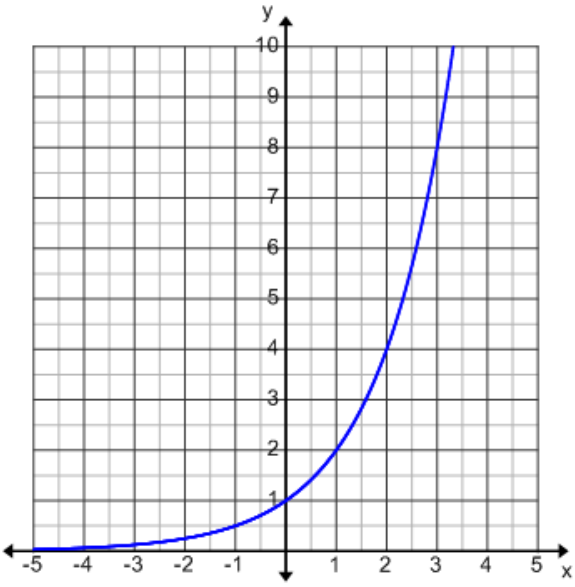
MHF 4UI - EXAM REVIEW

Chapter 4
Exponential and Logarithmic Functions

BASIC GRAPHS

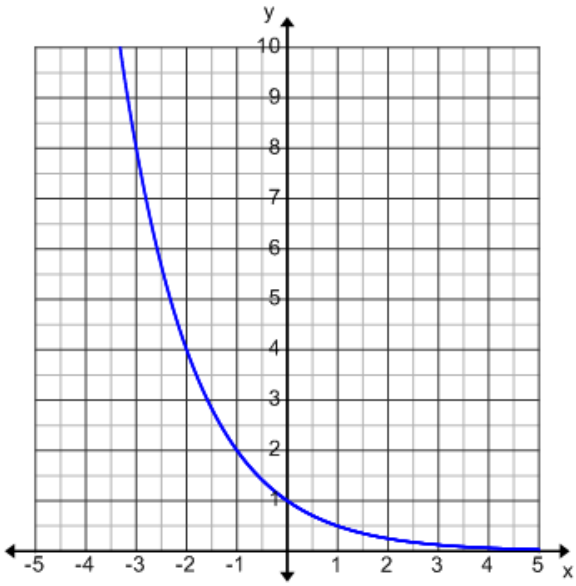
$y = a^x$, $a > 1$

Example: $y = 2^x$



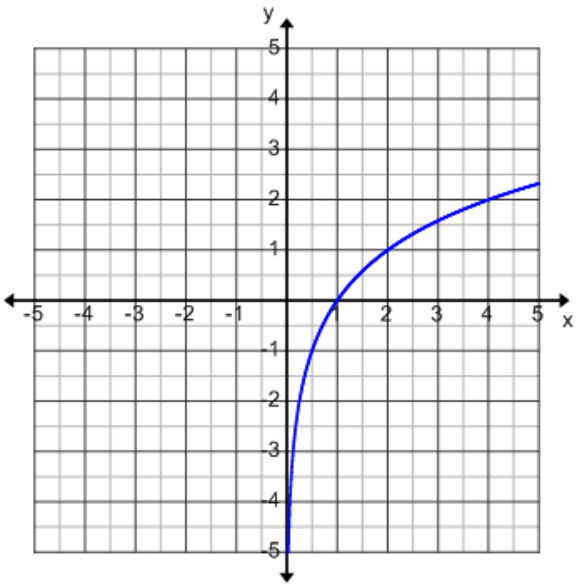
$y = a^x$, $0 < a < 1$

Example: $y = 2^{-x}$ OR $y = ½^x$

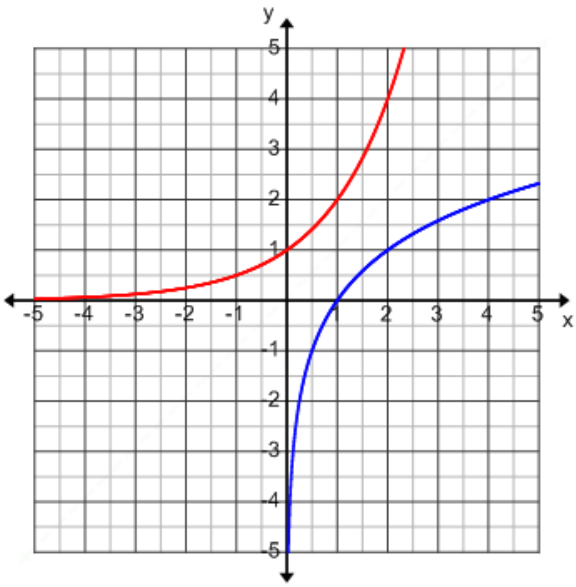


$y = \log_a x$

Example: $y = \log_2 x$

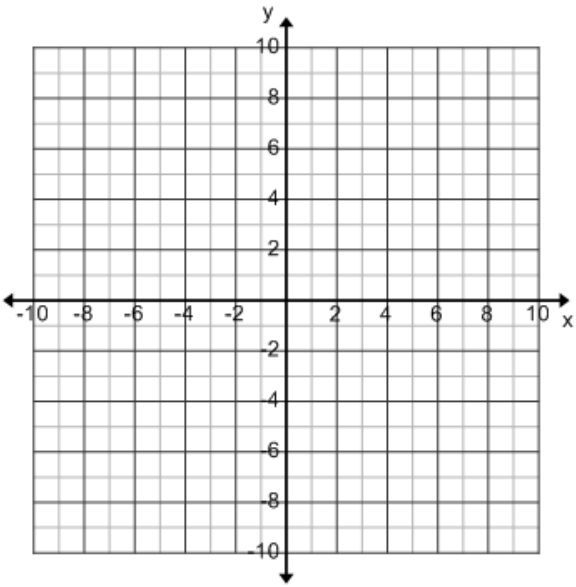


RECALL: $\log_2 x$ is a reflection of 2^x in the line $y=x$



GRAPHING TRANSFORMATIONS

Example: Graph the function $y = 3\log_2(x - 1) + 5$ and state the transformations:



Laws of Logarithms

$\log_a(pq) = \log_a p + \log_a q$

$\log_a(p \div q) = \log_a p - \log_a q$

$\log_a(p^c) = C\log_a p$

Change of Base Formula: $\log_b x = \frac{\log_a x}{\log_a b}$

Example: $\log_2 5$

Examples: Solve the following Exponential Equations:

a) $12^x = 196$

b) $-\log_3 1 = \log_3 7 - \log_3 x$

c) $\log_{11}(x - 4) + \log_{11}(x + 6) = 1$

Logarithmic Scales

Loudness: $L = 10\log\left(\frac{I}{I_0}\right)$

Earthquakes: $M = \log\left(\frac{I}{I_0}\right)$

pH: $\boxed{pH = \log\frac{1}{[H^+]} \quad or \quad pH = -\log[H^+]}$

**** You DO NOT need to memorize these formulas... just make sure you know how to use them!!**