Section 1.7: Logarithmic Models

A logarithmic model is written in standard form: $y = \log_b(x)$

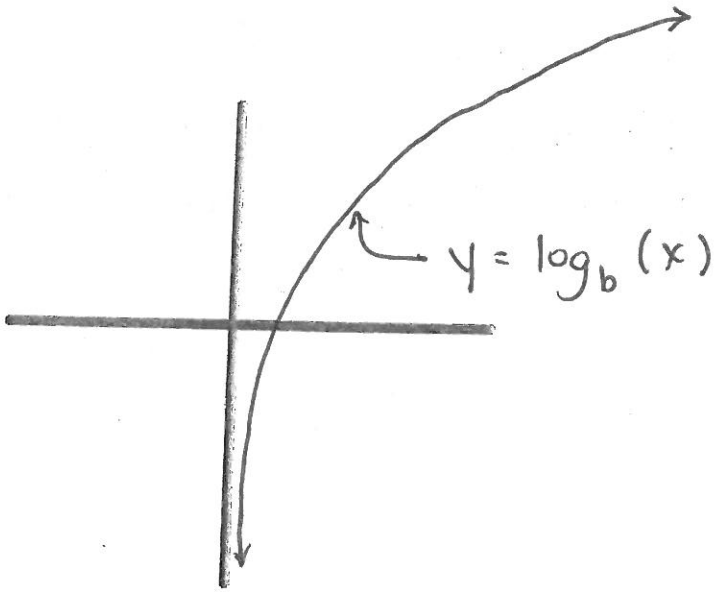
Translations of logarithmic models from exponential equivalent:

EXPONENT NOTATION: $6^2 = 36$

LOGARITHMIC NOTATION: $\log_6(36) = 2$

ENGLISH: THE LOGARITHM OF 36, BASE 6, IS 2.

Part I: The graph of a logarithmic model:



Part II: Complete the table below.

Exponential Notation	Logarithmic Notation
$5^3 = 125$	$\log_5(125) = 3$
$3^4 = 81$	$\log_3(81) = 4$
$10^2 = 100$	$\log_{10}(100) = 2$
$6^{-2} = \frac{1}{36}$	$\log_6\left(\frac{1}{36}\right) = -2$
$10^0 = 1$	$\log_{10}(1) = 0$

Part III: Calculator Evaluation of Logarithms

1. $\log_{10}(27) = 1.43$ $\quad 10^? = 27$

2. $\log_{10}(1723) = 3.24$ $\quad 10^? = 1723$

3. $\ln(7.6) = 2.03$ $\quad e^? = 7.6$

"THE NATURAL LOG OF 7.6"

4. $\ln(172) = 5.15$ $\quad e^? = 172$

Part IV: Logarithmic Examples (Application)

1. The approximate percent (P) of adult height for males is modeled by:

$$P = 16\log(x-12) + 84$$

where x represents years of age for males ($13 < x < 18$).

What is the percent of adult height of a 14 year old male according to the model?

$P = 16 \log (14-12) + 84$

$P = 16 \log (2) + 84$

$P = 16 (0.3) + 84$

$P = 4.8 + 84$

$P = 88.8\%$

What is the percent of adult height for a 17 year old male according to the model?

$P = 16 \log (17-12) + 84$

$P = 16 \log (5) + 84$

$P = 16 (0.7) + 84$

$P = 16.2 + 84$

$P = 95.2\%$

If a 17 year old male is 6 feet tall, what will be the final adult height of the male?

$$\text{FINAL ADULT HEIGHT} = \frac{6\text{ FT}}{0.952} = 6.30\text{ FT}$$

6 FT 3 INCHES

ACTUAL: 6FT 1 INCH