

A. Lesson Objectives

- a. Understand the connection between logarithms and exponentials using numerical and graphical representations
- b. Understand the connection between logarithms and exponentials using algebraic representations
- c. Evaluate simple logarithmic expressions and solve simple logarithmic equations

B. 3-2-1 → Lesson 17 Reflection

3 thoughts/ideas from L17	2 questions from L17	1 extension of concepts from L17
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C. ToK Questions

- a. Did Columbus INVENT or DISCOVER North America?
- b. Did Sir Isaac Newton INVENT or DISCOVER gravity?
- c. Did Alexander Graham Bell INVENT or DISCOVER the telephone?
- d. Did mathematicians INVENT or DISCOVER exponential functions?
- e. Did mathematicians INVENT or DISCOVER logarithms?

D. Graphic & Numeric Representations of Exponential & Logarithmic Functions

$$f(x) = 2^x$$

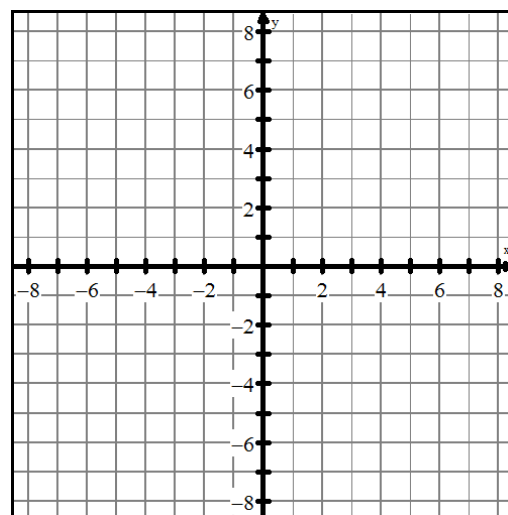
$$y = f^{-1}(x)$$

$$y = 2^x$$

$$x = 2^y$$

x	y

x	y



E. Exponents & Logarithms – Meanings

- a. MEANINGS → What does the mathematical statement $y = 2^5$ MEAN? What are you being asked to DO?

- b. MEANINGS → What does the mathematical statement $32 = 2^x$ MEAN? What are you being asked to DO?

- c. We can rewrite the mathematical statement $32 = 2^x$ in an equivalent form as $\log_2 32 = x$. So again, what does the mathematical statement $\log_2 32 = x$ MEAN? What are you being asked to DO?

F. Equivalence of Exponential & Logarithmic Statements

Exponential “form” → $y = b^x$	Logarithmic “form” → $y = \log_b x$
TERMS:	TERMS:
INPUT:	INPUT:
OUTPUT:	OUTPUT:
EXAMPLES:	EXAMPLES:

G. Practice → Converting Forms

a. Change each equation to logarithmic form:

$$5^2 = 25$$

$$2^{-4} = \frac{1}{16}$$

$$27^{\frac{1}{3}} = 3$$

b. Change each equation to exponential form:

$$\log_2 128 = 7$$

$$\log_4 8 = \frac{3}{2}$$

$$\log 0.01 = -2$$

H. Evaluating Simple Expressions & Solving Simple Equations Involving Logarithms

a. Evaluate the following without using a calculator. Show necessary work.

$$\log_2 8 =$$

$$\log_3 81 =$$

$$\log_3 9 =$$

$$\log 1 =$$

$$\log_{25} 5 =$$

$$\log_3 0 =$$

$$\log_3 (-3) =$$

$$\log_3 \left(\frac{1}{9} \right) =$$

$$\log_{\frac{1}{16}} 2 =$$

b. Solve for x. Give an exact answer.

$$\log_3 x = 3$$

$$\log_9 x = \frac{1}{2}$$

$$\log_{81} x = \frac{1}{4}$$

$$\log_x 81 = 2$$

$$\log_x 4 = \frac{1}{3}$$

$$\log_x \frac{16}{81} = -4$$

(I) Practice →

<http://www.kutasoftware.com/FreeWorksheets/Alg2Worksheets/Meaning%20of%20Logarithms.pdf>