ALGEBRA 4

Day 74

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7.3 Logarithmic Functions as Inverses
7.4 Properties of Logarithms

- Objectives:

  To write and evaluate logarithmic expressions

  To use the properties of logarithms

7.3 Logarithmic Functions as Inverses
Objective: To write and evaluate logarithmic expressions

Logarithmic Function with Base a:

$f(x) = \log_b(x - h) + k$
where $x > 0, b > 0, b \neq 1$

Common Log:

log with a base 10
$\boldsymbol{log_{10}\, x = \log x}$

Rewrite from Exponential to Logarithmic:

$$\boldsymbol{log_b\, y = x \;\; <=> \;\; b^x = y}$$

Rewrite: From log to exponential or exponential log

$$\log_2 8 = 3$$

$$5^3 = 125$$

Evaluate

$\log_7 49$

$\log_{12} 12$

$\log_2 64$

7.4 Properties of Logarithms

Objective: To use the properties of logarithms

Properties of Logarithms

$\log_a 1 = 0 \qquad \rightarrow a^0 = 1$

$\log_a a = 1 \qquad \rightarrow a^1 = a$

$\log_a a^x = x \qquad \rightarrow a^{\log_a x} = x$

$\log_a x = \log_a y => x = y$

More Properties

$$\log_a x = \frac{\log_b x}{\log_b a}$$

Product Property

$$\log_a(uv) = \log_a(u) + \log_a(v)$$

Quotient Property

$$\log_a(u/v) = \log_a(u) - \log_a(v)$$

Power Property

$$\log_a u^n = n \log_a(u)$$

Rewrite:

$$\log_b y = x \quad <=> \quad b^x = y$$

Examples

Expand:

$\log_5 25x^3$

Condense:

$5 \log_6 x + 2 \log_6 7 - 3 \log_6 w$

Simplify:

$\log_4 4$ $\qquad$ $\log_3 81$ $\qquad$ $\log_8 1$

$9^{\log_9 4x}$

$\log_7 49^{3x}$

For Next Time...

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