Introduction to Logarithms

To solve equations, we often use inverse operations to isolate a variable.

1. $2x + 5 = 9$

$-5 \quad -5$

$\frac{2x}{2} = \frac{4}{2}$ $\boxed{x = 2}$

2. $\cos x = .5$

$x = \cos^{-1}(0.5)$

3. $\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

But what if the variable is in the exponent? $4^x = 12$

We need a way to cancel out the base of 4. This inverse operation is called a logarithm.

If $y = b^x$, then $\log_b y = x$

[Remember two Things]: #1 base of exponent = base of log **#2** log = exponent

Exponential Form	Logarithmic Form
$y = b^x$ ← exponent; base	$\log_b y = x$ ← exponent; base
Example: $9^2 = 81$	Example: $\log_9 81 = 2$

Ex. Rewrite each equation in its equivalent exponential form:

1. $\log_5 x = 2$ 2. $\log_3 7 = r$ 3. $2 = \log_b 25$ 4. $\log_4 26 = m$

$5^2 = x$ $3^r = 7$ $b^2 = 25$ $4^m = 26$

Ex. Rewrite each equation in its equivalent logarithmic form:

1. $12^2 = x$ 2. $4^y = 9$ 3. $b^3 = 27$ 4. $5^6 = c$

$\log_{12} x = 2$ $\log_4 9 = y$ $\log_b 27 = 3$ $\log_5 c = 6$