8.1: Introduction to logarithms & solving log equations

- ex) $4^{x}=12$ ← exponent, ↳ base — we want to solve for variable in exponent

- the inverse operation of an exponential function is called a logarithm

If $b^{x}=a$, then $\log_b a = x$

Ex1) rewrite in exponential form.

a) $\log_5 x=2$ → $5^2=x$, $x=25$

b) $2=\log_b 25$ → $b^2=25$

c) $\log_3 7=r$ → $3^r=7$

Ex2) rewrite in logarithmic form.

a) $12^2=x$ → $\log_{12} x=2$

b) $b^3=27$ → $\log_b 27=3$

c) $4^y=9$ → $\log_4 9=y$

- The common log has a base of 10

($\log_{10} y=x \rightarrow \log y=x$)

- Ex3) Evaluate logarithmic expressions

* math, alpha, math

a) $\log_5 25=2$

b) $\log_4 64=3$

c) $\log_6 1296=4$

d) $\log 100=2$

Ex 4) Solve logarithmic equations

a) $\log_3(6x+3)=5$

$3^5=6x+3$

$243=6x+3$

$-3 \quad -3$

$\frac{240}{6}=\frac{6x}{6}$

$\boxed{x=40}$

b) $\log_x 47=2$

$\sqrt{x^2}=\sqrt{47}$

$\boxed{x=6.86}$

c) $\log_4(7x-5)=\log_4(5x+3)$

$7x-5=5x+3$

$+5 \quad +5$

$7x=5x+8$

$-5x \quad -5x$

$\frac{2x}{2}=\frac{8}{2}$

$\boxed{x=4}$

You try: 1) $\log_x 216=3$ (6)

2) $\log_9(11x+14)=3$ (5)

3) $\log_8(-5x+4)=\log_8(13x-5)$ ($\frac{1}{2}$)