

1/18/12 Definition of logarithms.

logarithms are inverses of exponential functions.  
you can go back and forth between logarithmic form and exponential form.

**Ex 1** Express in exponential form:

$$\log_7 \sqrt{7} = \frac{1}{2}$$

$$\boxed{7^{1/2} = \sqrt{7}}$$

**2**  $\log_3 \frac{1}{81} = -4$

$$\boxed{3^{-4} = \frac{1}{81}}$$

The base is always the

base!! Follow the

→ shape.

**Ex 3**  $16^{-3/4} = \frac{1}{8}$

$$\boxed{\log_{16} \frac{1}{8} = -\frac{3}{4}}$$

**4**  $2^2 = 4$

$$\boxed{\log_2 4 = 2}$$

Simplify the log.

**Ex 5**  $\log_2 \frac{1}{8} = x$

$$2^x = \frac{1}{8}$$

$$2^x = 2^{-3}$$

$$\boxed{x = -3}$$

**6**  $\log_4 \sqrt{2} = x$

$$4^x = \sqrt{2}$$

$$2^{2x} = 2^{1/2}$$

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

$$\boxed{x = \frac{1}{4}}$$

to simplify put in  $=x$  and change to exponential form.

Solve for x.

**Ex 7**  $\log_4 x = 3$

$$4^3 = x$$

$$\boxed{64 = x}$$

**8**  $\log_x 81 = 4$

$$(x^4)^{1/4} = (81)^{1/4}$$

$$x = \sqrt[4]{81}$$

$$\boxed{x = 3}$$