DRILL

① Find the inverse of $f(x) = \sqrt{x+3} - 4$

$y = \sqrt{x+3} - 4$

$x = \sqrt{y+3} - 4$

$x + 4 = \sqrt{y+3}$

$(x+4)^2 = y+3$

$(x+4)^2 - 3 = y$

$f^{-1}(x) = (x+4)^2 - 3$

② Given: $y = 5^{x-3} + 4$

a) Is it growth or decay?

Base = 5

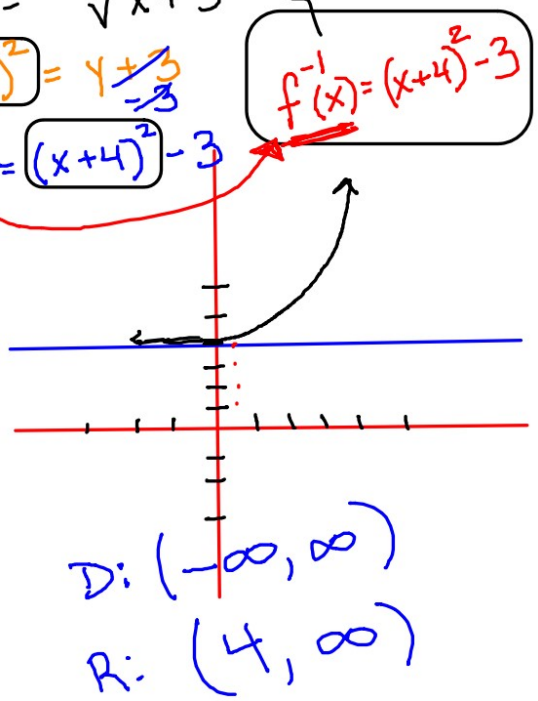
Base > 1

Growth

b) What is the horizontal asymptote

$y = k$

$y = 4$



D: $(-\infty, \infty)$

R: $(4, \infty)$

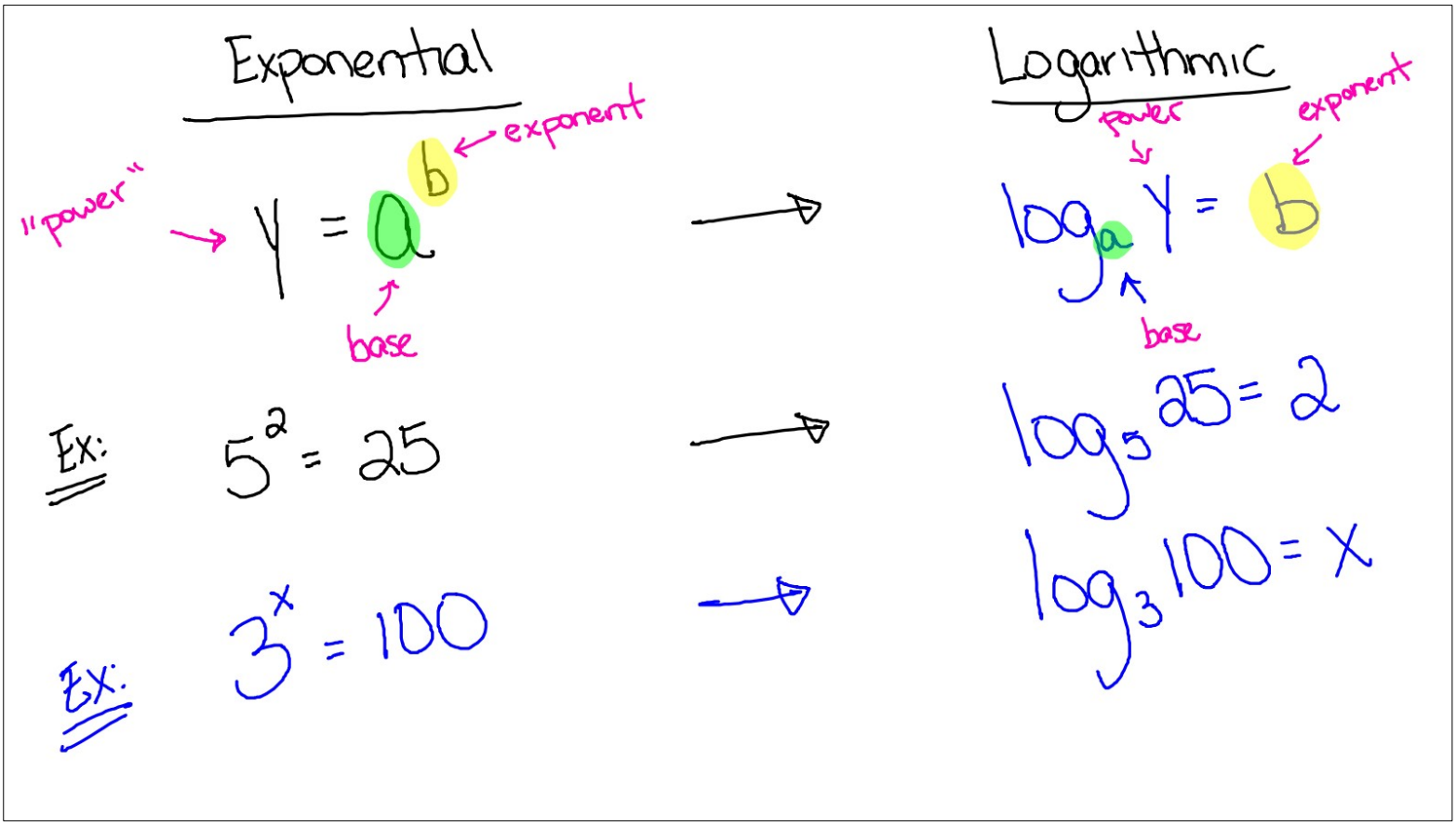
* Logarithms are used when we want to solve for an exponent *

Ex: $2^x = 8$

$x = 3$

Ex: $2^x = 20$

* Rewrite exponential equation into logarithmic form. *


Exponential
Logarithmic
"power"
$y = a^b$
exponent
base
power
exponent
base
$\log_a y = b$
Ex: $5^2 = 25$
$\log_5 25 = 2$
Ex: $3^x = 100$
$\log_3 100 = x$

Exp → Log

① $4^x = 128$ → $\log_4 128 = x$

② $a^3 = b$ → $\log_a b = 3$

③ $3^4 = x$ ← $\log_3 x = 4$ (base: 3, exp.: 4)

* Change of Base Formula *

Ex:

$\log_{10} 100 = 2 \rightarrow 10^2 = 100$

base, power, exponent

When no base is written we assume/use base 10.

$\log_{10} 1000 = 3 \rightarrow 10^3 = 1000$

Formula

* $\log_a b = \frac{\log b}{\log a}$

Evaluate: $\log_2 10 = \frac{\log 10}{\log 2} \approx 3.32$

$\log 10 / \log 2$ ↑ Exact value

≈ 3.32 ↑ Approx. value

Evaluate: $5^x = 100 \rightarrow \log_5 100 = x$

Rewrite into log form

$$x = \log_5 100 = \frac{\log 100}{\log 5} \approx 2.86$$

Exact value