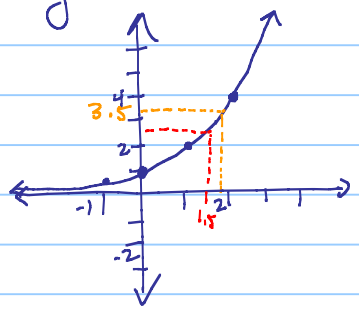
5.4 The Logarithm

Note Title 25/10/2012

Draw the graph of $y = 2^x$



What is the approximate value of

a) $2^{1.5}$ when $x=1.5$, $y \approx 2.5$

so $2^{1.5} \approx 2.5$

CALC: $2 \wedge 1.5 = 2.83$

b) $2^x = 3.5$ when $y = 3.5$

$x \approx 1.8$

CALC: $y_1 = 2^x$ $y_2 = 3.5$

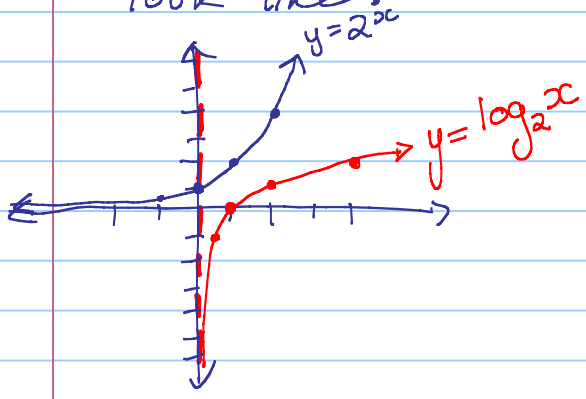
intersect: $x = 1.81$

How do you solve $x^2 = 4$

$x = \pm 2$ (by doing the square root)

Square root is the <u>inverse</u> of squaring

What would the inverse of $y = 2^x$ look like?



The logarithm is the inverse of an exponential.

$y = b^x$

power = base$^{\text{exponent}}$

exponent = $\log_{\text{base}}$ power

Evaluate.

a) $\log_2 4$

exponent: 2

so $\log_2 4 = 2$

b) $\log_2 \frac{1}{32}$

$= -5$

c) $\log_2 2\sqrt{2}$

$= \log_2 2^1 2^{1/2}$

$= \log_2 (2^{3/2})$

$= 3/2$

power (answer)

d) $\log_3 9\sqrt{27} = x$

base: 3 — exponent: x

$3^x = 9\sqrt{27}$

$3^x = 3^2 \cdot (3^3)^{1/2}$ BEDMAS!

$3^x = 3^2 \cdot 3^{3/2}$

$3^x = 3^{7/2}$

$x = 7/2$

$\therefore \log_3 9\sqrt{27} = \frac{7}{2}$

e) $\log_5 \sqrt[3]{625} = \frac{4}{3}$