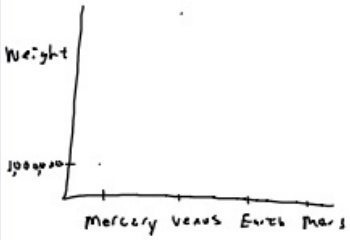
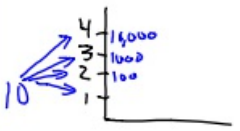
4-24-18 1st. Trig



Logarithms $10^{\square}$



Where do we use logs in real life?

① Richter Scale

4.8
6.2 10^6
7.1 10^7 10 times stronger

Difference from a 5 to a 7.
↑
100 times stronger

② Sound - Decibels

③ pH scale

④ Light intensity

① $\underset{\text{base}}{10}^{3 \leftarrow \text{exponent}} = 1000$

$\log_{10} 1000 = 3$

② $2^3 = 8$

$\log_2 8 = 3$

③ $5^2 = 25$

$\log_5 25 = 2$

(4) $\log_3 9 = \underline{2}$ $3^{\square} = 9$

(5) $\log_2 8 = \underline{3}$ $2^{\square} = 8$

(6) $\log_2 32 = \underline{5}$ $2^{\square} = 32$

(7) $\log_4 16 = \underline{2}$ $4^{\square} = 16$

(8) $\log_2 \frac{1}{4} = \underline{-2}$ $2^{\square} = \frac{1}{4}$

(9) $\log_2 \frac{1}{8} = \underline{-3}$ $2^{\square} = \frac{1}{8}$

(10) $\log_5 1 = \underline{0}$ $5^{\square} = 1$

(11) $\log_7 7 = \underline{1}$ $7^{\square} = 7$

Approximate the answer

(12) $\log_{10} 153 = 2.$ $10^{\boxed{2.}} \approx 153$

(13) $\log_{10} 1824 = 3.$

4-24-18 3rd Trig

Shrink down by using a logarithmic scale.

① Richter Scale

10^6
10^7 ← 10 times stronger

6
9 — 1000 times stronger

② Sound - decibels

③ pH scale

$3^2 = 9 \rightarrow \log_3 9 = 2$ (exponent; base)

$5^3 = 125 \rightarrow \log_5 125 = 3$

$10^4 = 10{,}000 \rightarrow \log_{10} 10{,}000 = 4$

① $\log_3 9 = \underline{2}$ $\quad 3^{\square} = 9$

② $\log_2 8 = \underline{3}$ $\quad 2^{\square} = 8$

③ $\log_4 16 = \underline{2}$ $\quad 4^{\square} = 16$

④ $\log_5 5 = \underline{1}$ $\quad 5^{\square} = 5$

⑤ $\log_2 \frac{1}{4} = \underline{-2}$ $\quad 2^{\square} = \frac{1}{4}$

⑥ $\log_{10} \frac{1}{1000} = \underline{-3}$ $\quad 10^{\square} = \frac{1}{1000}$

⑦ $\log_{\frac{1}{2}} \frac{1}{8} = \underline{3}$ $\quad \left(\frac{1}{2}\right)^{\square} = \frac{1}{8}$

⑧ $\log_2 32 = \underline{5}$ $\quad 2^{\square} = 32$

Approximate the answers

⑨ $\log_{10} 128 \approx \underline{2.1}$ $\quad 10^2 = 100$, $10^3 = 1000$

⑩ $\log_{10} 2458 \approx \underline{3.}$ $\quad 10^3 = 1000$, $10^4 = 10{,}000$

4-24-18 4th Trig

Logarithms

where do we see this in real life?

① Richter Scale

10^4
10^5 ← 10 times stronger

6
8 ← 100 times stronger

② Sound- decibels

③ pH Scale

$\underbrace{5}_{\text{base}}^{\overset{\text{exponent}}{2}} = 25 \rightarrow \log_5 25 = 2$

$4^3 = 64 \rightarrow \log_4 64 = 3$

$10^5 = 100{,}000 \rightarrow \log_{10} 100{,}000 = 5$

① $\log_2 8 = \underline{3}$ $2^{\square} = 8$

② $\log_3 9 = \underline{2}$ $3^{\square} = 9$

③ $\log_2 16 = \underline{4}$ $2^{\square} = 16$

④ $\log 1000 = \underline{3}$ $10^{\square} = 1000$

⑤ $\log_2 \frac{1}{8} = \underline{-3}$ $2^{\square} = \frac{1}{8}$

⑥ $\log_7 7 = \underline{1}$ $7^{\square} = 7$

⑦ $\log_5 1 = \underline{0}$ $5^{\square} = 1$

⑧ $\log_{\frac{1}{2}} \frac{1}{4} = \underline{2}$ $\frac{1}{2}^{\square} = \frac{1}{4}$

Give an approximation

⑨ $\log_{10} 212 = 2.3$ $10^{\square} = 212$
$10^2 = 100$
$10^7 = 1000$

⑩ $\log_{10} 1250 \approx 3.1$