Precalc 11.5

Find common logs and antilogs
Solve log equations and inequalities
Change bases using logs

base

exponent

logarithm

common log

$\log 6^{3x} = \log 81$

$3x(.7782) = 1.9085$

$\frac{2.3346x}{2.3346} = \frac{1.9085}{2.3346}$

$x = 0.8175$

7 Solve $6^{3x} = 81$.

✓ $6^{3(.8175)} \stackrel{?}{=} 81$

$6^{2.4525}$

Can I write them on the same base?

$2^{3x} = 16^{x+1}$

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

$3x = 4x + 4$

$-3x \quad -3x$

$-4 = x$

8 Solve $5^{x-1} = 2^x$ by graphing.

Desmos
Solve using logs

$\log(\quad) = \log(\quad)$

$(x-1)(0.6990) = x(0.3010)$

$0.6990x - 0.6990 = 0.3010x$
$-.6980x \qquad -0.6980x$

$-0.6990 = -0.3980x$

$1.7563 = x$



Alaska earthquake 1964 9.2
SD earthquake 2011 3.4

Richter magnitudes [edit]

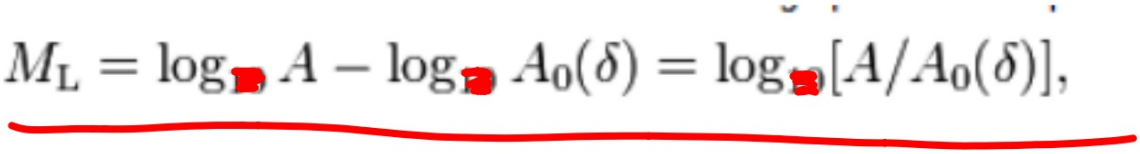
The Richter magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs (adjustments are included to compensate for the variation in the distance between the various seismographs and the epicenter of the earthquake). The original formula is:[14]

$$M_{\mathrm{L}} = \log_{10} A - \log_{10} A_0(\delta) = \log_{10}[A/A_0(\delta)],$$

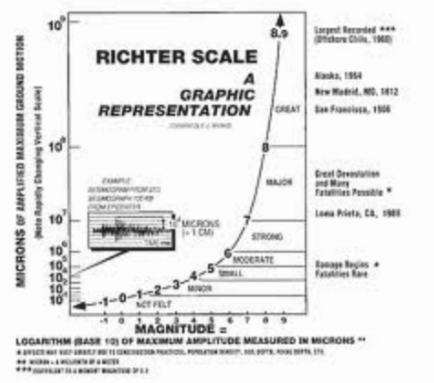
where A is the maximum excursion of the Wood-Anderson seismograph, the empirical function A_0 depends only on the epicentral distance of the station, δ. In practice, readings from all observing stations are averaged after adjustment with station-specific corrections to obtain the M_L value.

Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; in terms of energy, each whole number increase corresponds to an increase of about 31.6 times the amount of energy released, and each increase of 0.2 corresponds to a doubling of the energy released.

Events with magnitudes greater than 4.5 are strong enough to be recorded by a seismograph anywhere in the world, so long as its sensors are not located in the earthquake's shadow.



Richter s





Value	Potential Hazard
10	Extraordinary
9	Outstanding
8	Far-reaching
7	High
6	Noteworthy
5	Intermediate
4	Moderate
3	Minor
2	Low
1	Insignificant

Change of base...

$\log_8 297 = x$ $\quad \log 8^x = \log 297$

$\log_{12} 913 = x$ $\quad X(.9031) = (2.4728)$

$.9031 \qquad .9031$

$8^{2.7381} = 297$ $\quad \boxed{X = 2.7381}$

$\log 12^x = \log 913$