Name

Logarithmic Scales - Magnitude Difference to Measured Value Ratio

1

$$pH = -\log[H^+]$$
$$pH_2 - pH_1 = -3$$

If a solution has a pH 3 lower on the pH scale what is the ratio of their Hydrogen ion concentration measurements?

A $\frac{[H^+]_2}{[H^+]_1} = 31,623$

B $\frac{[H^+]_2}{[H^+]_1} = 1,000$

2

$$M = \log\left(\frac{I}{I_0}\right)$$
$$M_2 - M_1 = 3$$

If an earthquake has a magnitude 3 higher on the Richter scale what is the ratio of their wave size measurements?

A $\frac{I_2}{I_1} = 31,623$

B $\frac{I_2}{I_1} = 1,000$

3

$$dB = 10\log\left(\frac{I}{I_0}\right)$$
$$\beta_2 - \beta_1 = 30$$

If a sound has a dB magnitude 30 higher on the decibel scale what is the ratio of their sound energy measurements?

A $\frac{I_2}{I_1} = 1,000$

B $\frac{I_2}{I_1} = 631$

4

$$dB = 10\log\left(\frac{I}{I_0}\right)$$
$$\beta_2 - \beta_1 = 50$$

If a sound has a dB magnitude 50 higher on the decibel scale what is the ratio of their sound energy measurements?

A $\frac{I_2}{I_1} = 100,000$

B $\frac{I_2}{I_1} = 199,526$

5

$$M = \log\left(\frac{I}{I_0}\right)$$
$$M_2 - M_1 = 1$$

If an earthquake has a magnitude 1 higher on the Richter scale what is the ratio of their wave size measurements?

A $\frac{I_2}{I_1} = 1$

B $\frac{I_2}{I_1} = 10$

6

$$dB = 10\log\left(\frac{I}{I_0}\right)$$
$$\beta_2 - \beta_1 = 100$$

If a sound has a dB magnitude 100 higher on the decibel scale what is the ratio of their sound energy measurements?

A $\frac{I_2}{I_1} = 3.16 \times 10^{10}$

B $\frac{I_2}{I_1} = 1 \times 10^{10}$

7

$$dB = 10\log\left(\frac{I}{I_0}\right)$$
$$\beta_2 - \beta_1 = 40$$

If a sound has a dB magnitude 40 higher on the decibel scale what is the ratio of their sound energy measurements?

A $\frac{I_2}{I_1} = 3,162$

B $\frac{I_2}{I_1} = 10,000$

8

$$M = \log\left(\frac{I}{I_0}\right)$$
$$M_2 - M_1 = 7$$

If an earthquake has a magnitude 7 higher on the Richter scale what is the ratio of their wave size measurements?

A $\frac{I_2}{I_1} = 1 \times 10^7$

B $\frac{I_2}{I_1} = 3.16 \times 10^7$