Name

# Logarithmic Scales - Magnitude Pair to Measured Value Ratio

**1**

$$pH = -\log[H^+]$$
$$pH_2 = 1.6$$
$$pH_1 = 9.5$$

If 2 solutions have pHs of 9.5 and 1.6 on the pH scale what is the ratio of their Hydrogen ion concentration measurements?

| A | B |
|---|---|
| $\frac{[H^+]_2}{[H^+]_1} = 7.94 \times 10^7$ | $\frac{[H^+]_2}{[H^+]_1} = 7.94 \times 10^9$ |

**2**

$$pH = -\log[H^+]$$
$$pH_2 = 2$$
$$pH_1 = 13.9$$

If 2 solutions have pHs of 13.9 and 2 on the pH scale what is the ratio of their Hydrogen ion concentration measurements?

| A | B |
|---|---|
| $\frac{[H^+]_2}{[H^+]_1} = 7.94 \times 10^{11}$ | $\frac{[H^+]_2}{[H^+]_1} = 2.51 \times 10^{13}$ |

**3**

$$M = \log\left(\frac{I}{I_0}\right)$$
$$M_2 = 5.4$$
$$M_1 = 1.6$$

If 2 earthquakes have magnitudes of 1.6 and 5.4 on the Richter scale what is the ratio of their wave size measurements?

| A | B |
|---|---|
| $\frac{I_2}{I_1} = 6,310$ | $\frac{I_2}{I_1} = 1,995$ |

**4**

$$dB = 10\log\left(\frac{I}{I_0}\right)$$
$$\beta_2 = 116dB$$
$$\beta_1 = 112dB$$

If 2 sounds have dB magnitudes of 112 and 116 on the decibel scale what is the ratio of their sound energy measurements?

| A | B |
|---|---|
| $\frac{I_2}{I_1} = 0.794$ | $\frac{I_2}{I_1} = 2.51$ |

**5**

$$M = \log\left(\frac{I}{I_0}\right)$$
$$M_2 = 5.1$$
$$M_1 = 1.5$$

If 2 earthquakes have magnitudes of 1.5 and 5.1 on the Richter scale what is the ratio of their wave size measurements?

| A | B |
|---|---|
| $\frac{I_2}{I_1} = 3,981$ | $\frac{I_2}{I_1} = 39.8$ |

**6**

$$dB = 10\log\left(\frac{I}{I_0}\right)$$
$$\beta_2 = 96dB$$
$$\beta_1 = 67dB$$

If 2 sounds have dB magnitudes of 67 and 96 on the decibel scale what is the ratio of their sound energy measurements?

| A | B |
|---|---|
| $\frac{I_2}{I_1} = 794$ | $\frac{I_2}{I_1} = 251$ |

**7**

$$dB = 10\log\left(\frac{I}{I_0}\right)$$
$$\beta_2 = 101dB$$
$$\beta_1 = 36dB$$

If 2 sounds have dB magnitudes of 36 and 101 on the decibel scale what is the ratio of their sound energy measurements?

| A | B |
|---|---|
| $\frac{I_2}{I_1} = 1 \times 10^7$ | $\frac{I_2}{I_1} = 3,162,278$ |

**8**

$$pH = -\log[H^+]$$
$$pH_2 = 2$$
$$pH_1 = 7$$

If 2 solutions have pHs of 7 and 2 on the pH scale what is the ratio of their Hydrogen ion concentration measurements?

| A | B |
|---|---|
| $\frac{[H^+]_2}{[H^+]_1} = 100,000$ | $\frac{[H^+]_2}{[H^+]_1} = 1,000,000$ |