Name

Logarithmic Scales - Ratio and Magnitude to Magnitude

1

$$pH = -\log[H^+]$$

$$\frac{[H^+]_2}{[H^+]_1} = 1 \times 10^9$$

$$pH_1 = 10$$

If a solution has 1 x 10^9 times the Hydrogen ion concentration as one with a pH of 10 on the pH scale, what is it's pH?

A	B
$pH_2 = 2.5$	$pH_2 = 1$

2

$$M = \log\left(\frac{I}{I_0}\right)$$

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

$$M_1 = 3$$

If an earthquake has 1,000 times the wave size as one with a magnitude of 3 on the Richter scale, what is it's magnitude?

A	B
$M_2 = 6.5$	$M_2 = 6$

3

$$pH = -\log[H^+]$$

$$\frac{[H^+]_2}{[H^+]_1} = 10$$

$$pH_1 = 10$$

If a solution has 10 times the Hydrogen ion concentration as one with a pH of 10 on the pH scale, what is it's pH?

A	B
$pH_2 = 11$	$pH_2 = 9$

4

$$dB = 10\log\left(\frac{I}{I_0}\right)$$

$$\frac{I_2}{I_1} = 1 \times 10^{11}$$

$$\beta_1 = 20dB$$

If a sound has 1 x 10^11 times the sound energy as one with a dB magnitude of 20 on the decibel scale, what is it's dB magnitude?

A	B
$\beta_2 = 135dB$	$\beta_2 = 130dB$

5

$$dB = 10\log\left(\frac{I}{I_0}\right)$$

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

$$\beta_1 = 110dB$$

If a sound has 10 times the sound energy as one with a dB magnitude of 110 on the decibel scale, what is it's dB magnitude?

A	B
$\beta_2 = 120dB$	$\beta_2 = 114dB$

6

$$pH = -\log[H^+]$$

$$\frac{[H^+]_2}{[H^+]_1} = 1 \times 10^9$$

$$pH_1 = 11$$

If a solution has 1 x 10^9 times the Hydrogen ion concentration as one with a pH of 11 on the pH scale, what is it's pH?

A	B
$pH_2 = 2$	$pH_2 = 0.5$

7

$$M = \log\left(\frac{I}{I_0}\right)$$

$$\frac{I_2}{I_1} = 100$$

$$M_1 = 7$$

If an earthquake has 100 times the wave size as one with a magnitude of 7 on the Richter scale, what is it's magnitude?

A	B
$M_2 = 9$	$M_2 = 10.5$

8

$$pH = -\log[H^+]$$

$$\frac{[H^+]_2}{[H^+]_1} = 100,000$$

$$pH_1 = 12$$

If a solution has 100,000 times the Hydrogen ion concentration as one with a pH of 12 on the pH scale, what is it's pH?

A	B
$pH_2 = 7$	$pH_2 = 7.5$