

## mobius

## **Logarithmic Scales - Measured Value** (Power) to Magnitude



$$extstyle M = extstyle \log (rac{ extstyle I}{ extstyle I_0})^{rac{ extstyle What is the mag scale when the mich scale when$$

What is the magnitude on the Richter scale when the wave height is 10^6 micrometers?

$$egin{array}{c|c} \mathsf{I}_0 = \mathsf{1} \mu \mathsf{m} & \overset{ ext{A}}{\mathsf{M}} = \mathsf{6} \overset{ ext{B}}{\mathsf{M}} = \mathsf{7} \end{array}$$

$$\stackrel{\scriptscriptstyle\wedge}{\mathsf{M}}=6\stackrel{\scriptscriptstyle\mathsf{B}}{\mathsf{M}}=7$$

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$${
m pH} = -\log{
m [H^+]} \ {
m [H^+]} = 10^{-100,000,000} {
m mL/mol} {
m [A}$$

What is the pH on the pH scale when the hydrogen ion concentration is 10^-100,000,000 mL/mol?

$$[H^+]=10^{-100,000,000} \mathrm{mL/mol}^{\mathrm{A}} \ \mathrm{pH}=8$$

$$^{\scriptscriptstyle \mathsf{B}}$$
 pH  $=$  7.5

$$\mathsf{M} = \mathsf{log}\left(\frac{\mathsf{I}}{\mathsf{I}_0}\right)^{\mathsf{What is the magnitude on the Richter}}_{\mathsf{scale when the wave height is 10^9}}_{\mathsf{micrometers?}}$$

$$egin{array}{c|c} \mathsf{I}_0 = 1 \mu \mathsf{m} & egin{array}{c|c} \mathsf{A} & \mathsf{B} & \\ \mathsf{I} = 10^9 \mu \mathsf{m} & \mathsf{M} = 9 \mathsf{M} = 9.5 \end{array}$$

$$M = 9M = 9.5$$

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$$\mathsf{M} = \log\left(\frac{\mathsf{I}}{\mathsf{I}_0}\right)$$

$$I_0=1 \mu \mathsf{m}$$

$$egin{aligned} \mathsf{I}_0 &= \mathsf{1} \mu \mathsf{m} \ \mathsf{I} &= \mathsf{10}^4 \mu \mathsf{m} \end{aligned} egin{aligned} \mathsf{M} &= \mathsf{4} \mathsf{M} = \mathsf{4.5} \end{aligned}$$

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$$ext{dB}=10\log{(rac{ ext{I}}{ ext{I}_0})}^{ ext{What is the dB magnitude on the decibel scale when the sound energy is 10^38 W/m^2?}} \ ext{I}_0=10^{-12} ext{W/m}^2 ext{A} ext{B} \ ext{J}=10^{38} ext{W/m}^2 ext{B} eta=52 ext{dB} eta=50 ext{dB}$$

6 What is the pH on the pH scale when the hydrogen ion concentration is 10^-2,147,483,647 mL/mol?

$$\begin{array}{c} {\rm pH} = -\log{\rm [H^+]} \\ {\rm [H^+]} = 10^{-2,147,483,647} {\rm mL/mol} \end{array}$$

$${
m \hat{p}H}=11^{
m 
ho}\,{
m pH}=9$$

$$pH = 9$$

$$\mathsf{dB} = 10\log\left(\frac{\mathsf{I}}{\mathsf{I}_0}\right)$$

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What is the dB magnitude on the decibel scale when the sound energy is 10^58 W/m^2?

$$I_0 = 10^{-12} \text{W/m}^2$$

$$m \widetilde{I}=10^{58}W/m^2$$

$$|\mathbf{I}| = 10^{58} \mathrm{W/m}^2 \left|_{eta = 77 \mathrm{dB}} eta = 70 \mathrm{dB} \right|$$

 $M = \log \left(\frac{1}{I_0}\right)$ 

$$I_0=1\mu ext{m}$$
  
 $I=10^1\mu ext{m}$ 

What is the magnitude on the Richter scale when the wave height is 10^1

$$egin{array}{c|c} \mathsf{I}_0 = \mathsf{1} \mu\mathsf{m} & \mathsf{M} = \mathsf{1}^{\mathsf{B}} \ \mathsf{I} = \mathsf{10}^{\mathsf{1}} \mu\mathsf{m} & \mathsf{M} = \mathsf{10}^{\mathsf{5}} \end{array}$$