

Sound

Physics

How sound intensity is measured, and why the scale is logarithmic.

Sound intensity level in decibels is ten times the logarithm of the intensity ratio.

$$L = 10 \log_{10}(I/I_0) \cdot I_0 = 10^{-12} \text{ W/m}^2$$

+10 dB

10× the intensity

+20 dB

100× the intensity

Doubling intensity

+3 dB

THE COMMON MISTAKE

× Adding decibels arithmetically

✓ Converting to intensity, adding, converting back

Two 60 dB sources give 63 dB, not 120 dB. The scale is logarithmic.

Intensity falls as an inverse square with distance from a point source: doubling the distance quarters the intensity.