

Sound Waves

● Characteristics of sound

1. Pitch

- Pitch describes how's the frequency of sound... High pitch means high frequency while low pitch means low frequency.

2. Loudness and Intensity

- This depends on the amplitude of the sound... In the other words loudness define how strong or how much energy the wave has.

3. Timbre (Tone Quality)

- Even 2 music instruments play the same pitch and intensity, you can recognize what's the instrument is. That's because of Timbre.

- **Sound Intensity**

$$\text{Sound Intensity}(I) = \frac{P}{A}$$

P = Power of the source

A = Area of the Sphere

So,
$$I = \frac{P}{4\pi r^2}$$

- **Sound Intensity Level**

$$\beta = \log_{10} \left(\frac{I}{I_0} \right)$$

β = Sound intensity level

I_0 = Threshold of hearing ($1 \times 10^{-12} \text{ Wm}^{-2}$)

Note : By this formula, you get the answer from “Bel”. In order to get the answer in decibel, you have to multiply the answer from 10.