Decibel (dB)

- Decibel: a logarithmic unit used to measure sound level - difference as a ratio

- Example: One loudspeaker plays a sound with power P_1, and another plays a louder version of the same sound with power P_2, but everything else (how far away, frequency) kept the same

$$10\log(P_2/P_1)\text{dB}$$

  - P_2 is twice as much power than P_1

$$10\log(P_2/P_1) = 10\log(2) \approx 3\text{dB}$$

  - P_2 has ***a million times*** the power of P_1

$$10\log(P_2/P_1) = 10\log 1{,}000{,}000 \approx 60\text{dB}$$

Loudness = volume?

- Loudness is the noise level perceived by an individual, whereas volume is an absolute noise level that can be scientifically measured. For example, if your family is watching a movie together, the TV volume is the same for everyone in the room. However, the TV's loudness may be much less for a person with a hearing impairment than it is for a person with normal hearing.

- If you increase the volume on a television, it will also incrementally increase the loudness of the noise. However, increasing the volume will not increase the loudness to the same degree for every person.