• **Amplitude**: sound pressure displacement, above and below equilibrium.
  - air pressure change (eg. psi, pounds per square inch)
  - can be voltage for electric analog signals

• Sound pressure is very small. If atmospheric pressure is 15 psi, then a loud sound causes a deviation from 14.999 to 15.001 psi.

• But human ear is very sensitive. Ratios between amplitudes for soft and loud sounds is in the millions.

• A decibel (dB) scale is used:
  - decibels = 20 log\(_{10}\) R: where R are measurements of sound pressures
  - logarithm converts large-scale unit measurements into smaller, linear scale: easier to use.

• There is a zero reference for dB:
  - 0 dB = 0.0002 dyne/cm\(^2\)
  - This is a very quiet environment.
  - Then sounds can be measured by their relative increase in decibels from this value.
  - This use of dB is called SPL (acoustic Sound Pressure Level).

• Example:
  - You have a motorcycle that has an SPL of 80 dB. You then add another motorcycle. This means the ratio R = 2.
  - Then 20 log (2) = 6.02 decibel.

• Note that measuring amplitude is complicated by many factors: units of measurement, ambient temperature, altitude (barometric pressure), etc.

• The main thing to note: adding 6dB means the sound seems twice as loud.

• Example:
  - A busy street has a SPL of 70 dB. A Motorhead concert has an average SPL of 130 dB. Therefore, Motorhead seems about \((130 – 70) / 6 = 10\) times louder than the busy street.

References