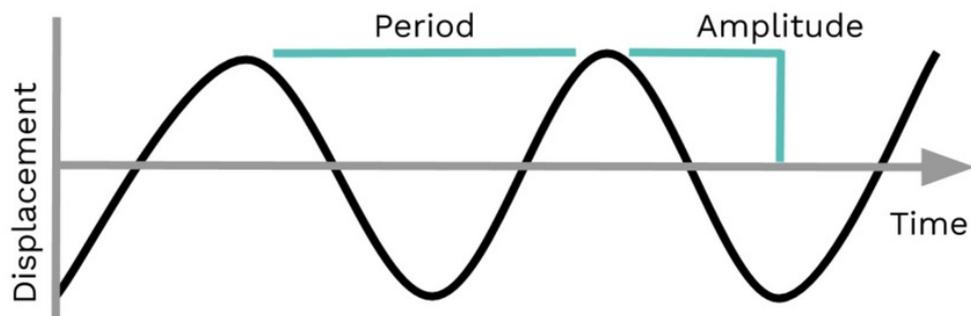


Waveform Graphs

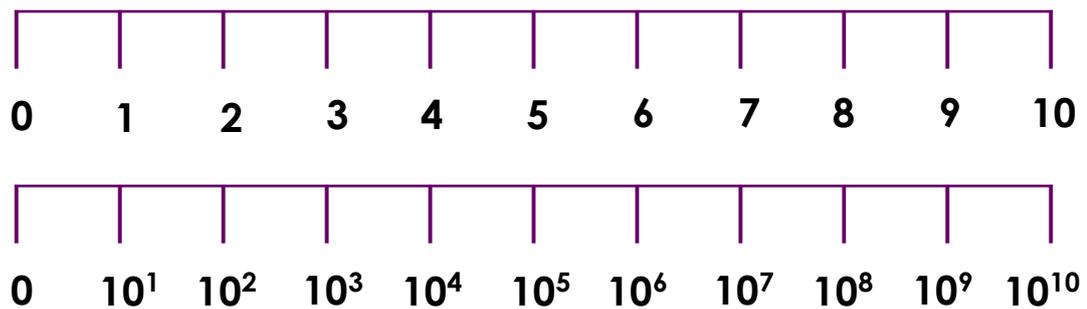
- Shows the **displacement** of a sound wave over time



- Amplitude (volume) has both positive and negative values around 0
- Period = the time it takes for a wave to complete one cycle
 - Period and frequency are directly correlated
 - $F = 1/T$
 - $T = 1/f$

Logarithmic Scales

- Used to represent orders of magnitude as a linear change



- Examples include frequency values on EQ filters and the decibel scale
- EQ is represented this way due to our greater sensitivity to lower frequencies
 - The doubling of a frequency moves the note an octave higher

Decibel Scales

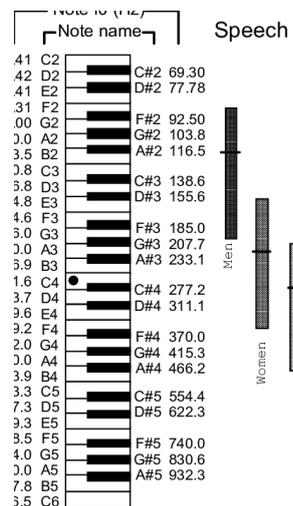
- Decibels (dB) are usually measured either by **peak** levels or **RMS** levels
- Peak measurements give a **temporary** measure of **the highest volume** of the signal
- RMS measurements are an **average** measure of loudness



- Peak values are used to help avoid distortion or create pumping effects of compressors
- RMS is useful for when looking at the overall volume of a track

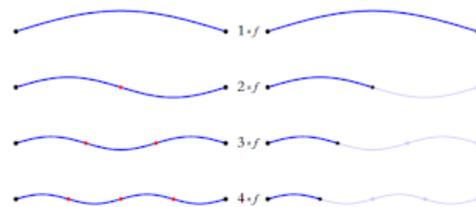
Frequency and Musical Intervals

Frequency	Interval
Octave Higher	$f = n \times 2$
Octave Lower	$f = n \div 2$
Perfect 5 th Higher	$f = n \times 1.5$
Perfect 4 th Lower	$f = n \div 0.75$

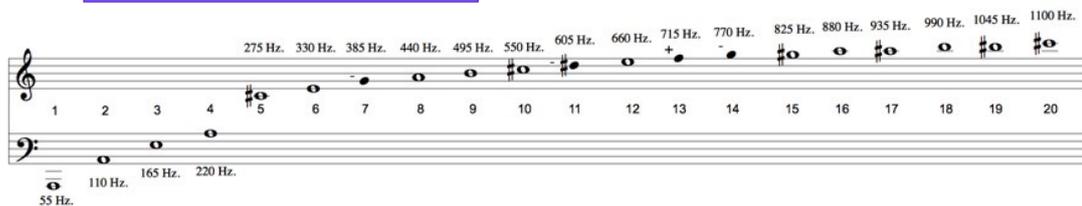


The Harmonic Series

- Acoustic instruments are often based on a type of **acoustic resonator**
- This sequence is based on a **fundamental frequency**



$$f_h = f_f \times n$$



- Examples of acoustic resonators include columns of air (wind instruments) and strings (string instruments)
- All higher frequencies are a multiple of the fundamental