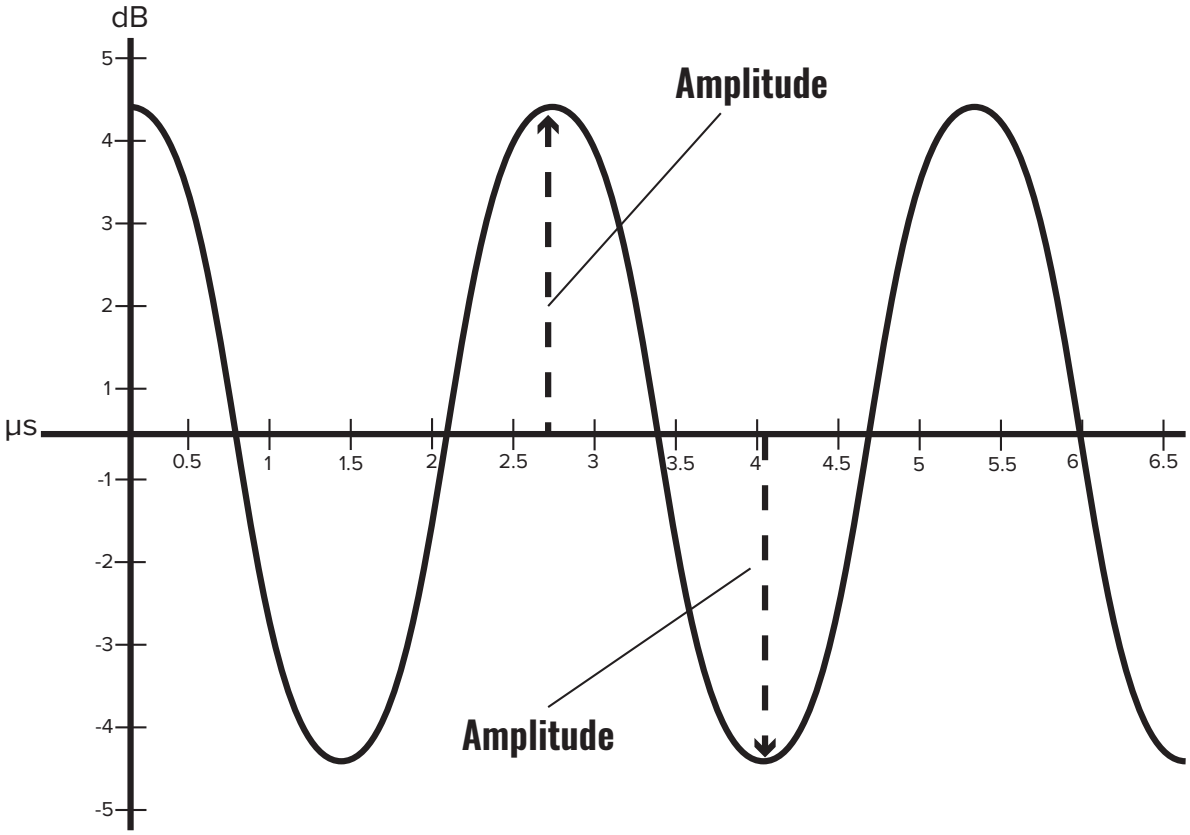
Handout - Amplitude



Amplitude measures the volume or loudness of a sound. More scientifically, it measures the displacement of air molecules vibrating or disturbed by the force of the wave. The greater the displacement of the molecules the greater the amplitude, and the louder the sound.

On a wave graph, amplitude is represented by **crests** and **troughs**—the uppermost point of the crest represents the point in peak compression, and lowermost point of the trough represents the point of peak rarefaction.

The amplitude of a sound is usually measured in decibels (abbreviated dB). Decibels are a logarithmic scale, meaning that every increase of 10dB on the scale is equivalent to a 10-fold increase in sound intensity. This means that a sound of 20dB is 10 times more intense than a sound of 10dB and a 30dB sound is 100 times more intense.

Decibels measure the ratio between a sound's intensity (I), and the "threshold sound," or a sound that can be barely perceived (I0). The decibel of a sound is calculated with the following formula:

$$\mathrm{dB} = 10\log_{10}\left(\frac{I}{I0}\right)$$

Musicians often refer to amplitude as **dynamics**. **Level meters** are often used as tools to measure the amplitude of a sound in decibels.

Activity

Using the decibel formula, the chart below shows the decibels and relative loudness of each of the four instruments instruments performed in Clip 1.

Instrument	Decibels at Peak Loudness	Times Louder than Quitest Perceptible Sound (*I0*)
Cymbals	76.8 db	6918
Piano	72.5 db	4217
Clarinet	73.6 db	4786
Bass Guitar	70.6 db	3388

Using the data above, create a bar graph detailing how many times louder each instrument is compared to a sound that can barely be percieved (*I0*)