Sound is simply a traveling wave of pressure rarefactions and compressions
\[ \Delta p = \Delta p_m \sin(kx - \omega t + \phi) \]

where \( \Delta p_m \) is the maximum pressure deviation, \( k \) is the wave number, \( \omega \) is the angular frequency, and \( \phi \) is a phase shift. The speed of sound \( v \) is related to these parameters by \( v = \omega/k \). The intensity of this sound wave is proportional to the square of the maximum amplitude of the pressure deviation emitted by the source. A simple derivation can show that the intensity \( I = \text{power}/\text{area} \) of a wave (sound or light) emitted by a point source varies as the inverse square of the distance from the source, \( I \propto 1/r^2 \).

If a sound wave is reflected from a surface, the two oppositely traveling waves will interfere, however there will usually never be complete destructive interference because of this \( 1/r^2 \) variation of the amplitude and the fact that surfaces are rarely 100% reflective.

You will have two ultrasonic emitter/microphones, an optical rail, a function generator to drive the emitter and an oscilloscope to measure the sound detected at the microphone. Devise an experiment to determine how the intensity of sound varies as a function of distance from these, admittedly, non-ideal point sources. Does the intensity variation behave as expected from our understanding of ideal point sources? Does the emitter really act like a point source? Remember to take into account the superposition of traveling waves.