*Name*_____

***Consider a sound wave, which is a traveling fluctuation in the pressure of a medium.***

**1**. What does the front surface of a speaker do to the air molecules right in front of it that it can either "make" a sound wave with a small or large amplitude? (Is a sound wave a transverse or longitudinal wave?)

**2**. What does the front surface of a speaker do to the air molecules right in front of it such that it can either "make" a sound wave with a low or high frequency?

**3**. Describe in words/pictures what air molecules in a small volume (say, a 1 cm cube) in the middle of a room do as a sound wave "passes" through it. If you were looking at the air molecules in this volume, how would you know that there was a sound wave "in" it?

**4**. How is a sound wave "detected" when it reaches our ears? What do the air molecules do to the stuff in our ear?

**5**. Explain in words/pictures whether each of the following parameters of a (pulse) sound wave increase, decrease, or remain constant as this wave travels in all directions outwards from an ideal sound source.

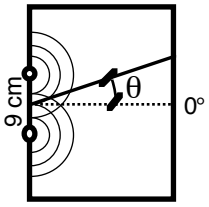
(a) Wave velocity $v$.
(b) Frequency $f$.
(c) The energy in the sound wavefront.
(d) The area of the sound wavefront.
(e) The intensity (energy per area) of the sound wavefront.

# Graphing Interference

Consider two coherent sources of waves, where a crest is red, and a trough is blue. The λ of these waves is 3 cm, so the crest (red circle) and trough (blue circle) wavefronts are 1.5 cm apart.

- *Place these two "sources" 9 cm apart on the long edge of your butcher paper.*
- Use the metal strip compasses to mark the locations of the crests (red) and troughs (blue) of these waves from these sources. Use all the holes (1.5 cm apart) on the strip compass.

**1**. Identify and measure all the angles θ from a line perpendicular to the row of sources where there is *constructive* interference (crests meeting crests, troughs meeting troughs).




**2**. Demonstrate that at any location along these θ angles, the difference between the paths to each source is a whole number of wavelengths. (Count the number of λ's from each source to a location. What is the difference in distance from each source to that location?)

**3**. Identify all the angles θ from a line perpendicular to the row of sources where there is *destructive* interference (crests meeting troughs, troughs meeting crests).

**4**. Demonstrate that at any location along these θ angles, the difference between the paths to each source is a whole number of wavelengths, plus a half-wavelength. (Count the number of λ's from each source to a location. What is the difference in distance from each source to that location?)