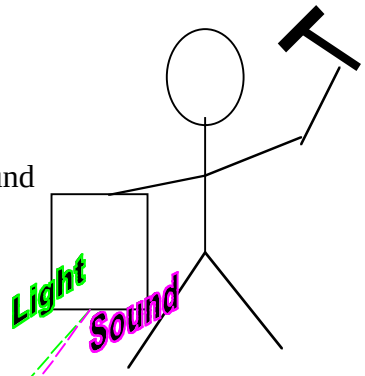
Lagging Sound

See and hear the speed of sound



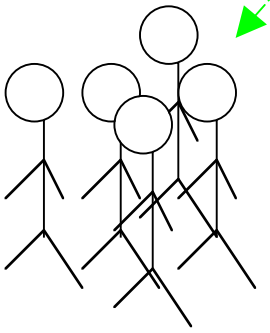
Materials: Hammer
Gong or piece of metal that will make a very loud sound
Meter stick
Stop watch
Red bandana
Earplugs
A long, uninterrupted straight away (at least 350 meters)

Assembly:

Choose a person to hit the gong, this will be your gonger. The gonger should insert earplugs and hit the gong once every second. Time the person hitting the gong to make sure their timing is correct. The gonger should make dramatic motions with his or her arm, raising it high above their head. To make sure their arm is visible from afar, tie a brightly colored scarf or bandana around the gonger's wrist.

To do and notice:

1. The gonger should hit the gong in a very regular pattern, once every second.
2. The rest of the class should walk away from the gonger. They should be listening and watching the gonger as they stroll. Distance away from the gonger should be measured. The group should note the position of the gonger's arm and when they hear the sound from the "hit."
3. The further the students walk away from the gonger, the more they will notice that there is a difference between when the gonger hits the gong and when the sound arrives. Notable events to listen and watch for:
   a. When the gonger's arm is furthest away from the gong (top of the swing).
   b. When the gong is heard, but is actually the sound from the previous hit.



What's going on:

The light traveling from the gonger to the group of students moves at the speed of light, virtually instantaneously at 299,792,458 meters per second. The sound travelling between the gonger and the group of students moves much slower at 343 m/s at 20˚ Celsius. So if the group of students is about 171 meters away from the gonger, they will hear the gong 1/2 second after the strike, but will see the gonger's arm extended well away from the gong. If the group of students is 343 m away from the gonger, they see a hit, but will hear the gong that was generated one second earlier.

By Eric Muller - 2002