

Harmonica - Sound Activity

Georgia Standards of Excellence:

S1P1. Obtain, evaluate, and communicate information to investigate light and sound.

d. Construct an explanation supported by evidence that vibrating materials can make sound and that sound can make materials vibrate.

e. Design a signal that can serve as an emergency alert using light and/or sound to communicate over a distance.

S4P2. Obtain, evaluate, and communicate information about how sound is produced and changed and how sound and/or light can be used to communicate.

- a. Plan and carry out an investigation utilizing everyday objects to produce sound and predict the effects of changing the strength or speed of vibrations.

S8P4. Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves.

e. Analyze and interpret data to predict patterns in the relationship between density of media and wave behavior.

Objective: Students will construct a suspension system to hold a hanger and listen to the sound produced when it is briskly struck with a pencil or other similar object. The students will listen to the sound produced by different diameter hangers and draw conclusions about the sound of the hanger and the sound that is produced.

Materials:

- Two tongue depressors
- Two small rubber bands
- One large rubber band
- One non-flex straw
- Scissors

Discussion:

As an object, such as a piano string, woodwind instrument, or taut rubber band vibrates, the air around it begins to vibrate as well. The vibrations of the air alternately pack together (compressed) and spread apart (rarefies). These compression/rarefaction waves then move out from the source in three dimensions at the local speed of sound. The density of the medium in which the waves move, causes the waves to move at different speeds. Thicker or more dense the medium, faster the sound waves will travel. So, sound travels much faster in water than it does in air because water is denser than air.



Procedure:

1. Gather and organize your supplies.
2. Place the larger rubber band around one of the tongue depressors end-to-end.
3. Cut a straw into 4 small pieces that are longer than the tongue depressor is wide, a little more than an inch.
4. Slide two pieces of the straw under the taught rubber band so they are at either end of the tongue depressor, about an inch or more from the ends.
5. Loosely place the remaining straw pieces on top of the taught rubber and so they are toward the middle, from the first two straw pieces.
6. Now, sandwich the four (4) pieces of straw between the original tongue depressor and a second one, on top of the first one. See illustration although it only shows two pieces of straw, not the four (4) we will be using.
7. Take the two small rubber bands and secure each end of the tongue depressors by wrapping them around the pair of tongue depressors (see the illustration)
8. The second pair of straws will cause the heavy rubber band to be suspended between the two (2) tongue depressors rather than having it rest against the top one, as in this picture.
9. Take the apparatus and gently hold it to your lips and blow. Notice the sound that you produce.
10. You can change the pitch of your harmonica by moving the inner straw pieces back or forth changing the distance between them between each trial.

This lacks the second pair of straw pieces

