

HARMONICA HARMONY

Understanding Sound

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Tennessee 4-H Youth Development

Harmonica Harmony

Understanding Sound

Skill Level

Beginner

Learner Outcomes

The learner will be able to:

Understand how vibrations are important for sound to be produced

Educational Standard(s) Supported

4.PS4.1, 4.ETS2.1

Success Indicator

Learners will be successful if they:

Describe how sound is produced

Describe how sound travels to where we can hear it

Time Needed

30-45 minutes

Materials List

2 popsicle sticks per 4-H member

2 mini black rubber bands per 4-H member

1 regular size rubber band per 4-H member

2 straws cut into 1-1 ½ inch pieces

Introduction to Content

This lesson will expand upon 4-H youths' understanding that sound results from a vibration that travels as a wave.

Introduction to Methodology

This lesson uses student participation as a means of talking through the elements of sound then applying those elements to create their own harmonica. There is a short recap activity you can complete with your students to gauge overall comprehension.

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Tips for Engagement

Mention to youth other 4-H projects that involve music to get them more engaged outside of this lesson.

This might lead to an interest in learning more about a specific subject area, like engineering/safety science, performing arts, outdoor recreation, or creative arts and design.

Terms and Concepts Introduction

Decibels — A unit of measurement for the intensity of sound; degree of loudness

Frequency — The number of sound vibrations that occur over a unit of time

Pitch — The highness or lowness of a sound (flute = high pitch, tuba = low pitch; high pitch = high frequency)

Sound — A series of vibrations traveling in waves

Volume — The loudness of a sound measured in decibels (most quiet sounds humans can hear are near 0, and unsafe sounds are over 100 decibels)

Setting the Stage and Opening Questions

Ask students: What is **sound**?

Lead a small discussion on what is sound. What makes a sound? How is sound produced? *Sound is a series of vibrations traveling in waves. These vibrations are the back and forth movements of an object.*

Ask students: What is an example of a sound that is pleasant? Or unpleasant? *Students might mention music, laughter, metal screeching, nails on a chalkboard.*

Ask students to describe **pitch**. *Pitch is the highness or lowness of a sound.* Using some of their examples of pleasant and unpleasant sounds, have students identify the sounds' pitch.

- Chalkboard being scratched, Flute, Scream = high pitch
- Bass drum, Thunder = low pitch

Explain to students that pitch and frequency work together. If something is high pitched there are more air particles vibrating meaning, they have a high pitch. Therefore, the flute is producing more air particles and more sound waves per second than thunder. This tells us that a flute has a higher frequency and pitch than thunder.

Tell students: Today you are going to build your own harmonica to better understand how sound is created and experiment with pitch.

Experience

Each student will build their own harmonica. Provide each member with the supplemental handout on how to build the harmonica.

As students put together their own harmonica, demonstrate how to blow into the harmonica. It will begin to vibrate the rubber bands producing sound waves.

Put the harmonica together slowly to demonstrate how the sound waves need something to vibrate against to produce a sound. When a sound is produced, the vibrations are happening so fast, we can rarely see the vibrations. Particles in the air carry the sound, making the particles vibrate, too.

Share

Ask students: Is the sound of your harmonica a high or low pitch? What happens when you move your mouth along the harmonica? Does it change the sound?

Encourage students to share their responses with a partner and to experiment with different strategies to change the pitch.

Ask students to share with the group which strategies for changing pitch were most successful.

Process

Post the following questions on a board, then partner up students and have them answer the questions.

1. Why is it important that you understand sound?
2. Why do you see construction workers or musicians wearing ear protection?
3. Why is understanding sound important for musicians?

Generalize

Ask student pairs to volunteer to share their responses with the group. Lead a brief discussion about their responses.

Given what students have learned today, pose the following challenge questions:

- Can sound travel under the water?
 - *Yes, it moves faster in water and for longer distances. For example, whales are known to hear each other hundreds of miles apart.*
- Is there sound on the moon?
 - *No, because there is no air to move the sound.*

Apply

Engage students in a review activity. **Tell students:** I am going to ask you a series of questions. If you think the answer is yes, then stand up and raise your arms up and expand your hands up to the sky. If you think the answer is no, then stand up and keep your arms down and expand your hands down to the ground. Demonstrate the motions for your students.

- Is thunder a low pitch?
- Does sound require vibrations?
- Sound is measured in inches.
- A cow's moo is a low pitch.
- A low decibel sound requires ear protection.
- The higher frequency of a sound, the lower the pitch.
- We can hear sound in space.
- We cannot hear sound under water.
- Sound measured at 0 decibels is considered unsafe.

Life Skill(s)

4th Grade Head

Understand what it means to be a 4-H member.

Identify at least four project areas to consider as a project area for future 4-H work.

4th Grade Heart

Improve communication skills and develop a sense of belonging.
Follow instructions.

4th Grade Hands

Demonstrate the characteristics of leadership, citizenship, and teamwork.

See the perspective of others and their value by summarizing other points.

4th Grade Health

Demonstrate characteristics of good character.

Show use of good judgment.

Supplemental Information

Educational Standards Met

4. PS4.1

Plan and conduct investigations to demonstrate the cause and effect relationship between vibrating materials (tuning forks, water, bells) and sound.

4.ETS2.1

Use appropriate tools and measurements to build a model.



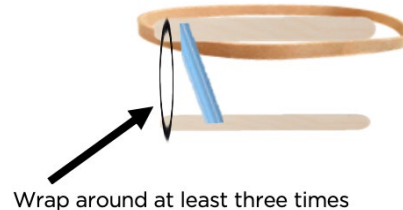
Harmonica Harmony Worksheet

How to Make a Harmonica

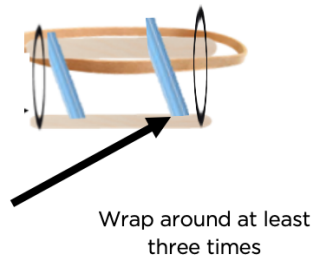
1. Take 1 popsicle stick and stretch the regular sized rubber band on the stick. Try and play your harmonica. Is there any produced sound? Why do you think this is happening?



2. Take the other popsicle stick, rubber banded stick, 1 straw, and 1 mini rubber band and make a sandwich. Try to play your harmonica, does it produce any sound?



3. Repeat Step #2 on the other side of the harmonica. As a group, we will play together once everyone is finished for about 1 minute. Listen for differences in pitch and frequency each time you or your neighbor plays their harmonica.



4. Don't worry! You can play your harmonica when you leave, but we will not continue to play them during our time together unless you are given permission.

If you need any additional websites below:



resources, visit the



Harmonica Harmony Worksheet

<https://frugalfun4boys.com/sound-science-kids-make-craft-stick-harmonica/>

<http://www.funkidslive.com/learn/waves/sound-waves/#>

http://www.sciencekidsathome.com/science_topics/what_is_sound.html#:~:text=Sound%20is%20a%20type%20of,bump%20into%20more%20air%20particles.&text=If%20your%20ear%20is%20within,vibrations%2C%20you%20hear%20the%20sound.