TOOT YOUR PIPE

Background Information for Activity Leaders

Overview

Children will investigate how vibrations are involved in making sound by building a musical instrument using pieces of pipe of different lengths, a glove, and a straw.

Key Concepts

- Most wind instruments, as the name implies, work by blowing air into them. In most wind instruments, the air is blown into (or over) the instrument at or near one end of a tube and exits at the other end. The place where the air is blown in is called the mouthpiece. The sound vibration usually begins at the mouthpiece and continues as the column of air vibrates within the tube.

- Vibrating objects produce sound. In the glove pipe, the portion of the glove that lays over the opening of the top of the pipe vibrates. Air blowing through the top of the tube causes the surrounding air to vibrate.

- Changing the rate of vibration can vary the pitch of the sound. Pitch is the highness or lowness of sound, not the loudness.

- The pitch of the vibration is determined by the length of the tube. The shorter the tube the higher the frequency, the higher the pitch.

What to Expect

- Sounds are not intuitively associated with the characteristics of their source by younger K-4 children. That association can be developed by investigating a variety of musical instruments.

- Children should be encouraged to "make music." This provides an opportunity to introduce vibrations as a phenomenon they experience instead of an abstract theory. With a variety of musical instruments, including their vocal chords, they can feel the vibrations as they hear the sounds.

Common Misconceptions

- *Children may think, "Sounds come out of musical instruments."*

  Sounds are caused by vibration, whether it is a string vibrating, or the skin of a drum, which in turn cause the air surrounding it to form a sound wave.

- *Children may think, "Pitch refers to how loud a sound is."*

  Loudness refers to the amount of energy put into the sound, like increasing the volume of the sound on a radio. Pitch refers to high notes or low notes, not loudness.

TOOT YOUR PIPE

Data Collection Sheet

Name:_____ **Date:**_____

WONDER

I think wind instruments make sound by:

RECORD

What did you notice as you made sounds?

_____

Does each pipe in your group sound the same?

_____

What kind of sounds were you able to make?

_____

What part of the wind instrument vibrates as air passes through the pipe?

_____

CONCLUDE

What did you discover about how the glove pipe makes sound?

_____

_____

TOOT YOUR PIPE

Activity Leader's Guide

Group Size: 6 children
Time: 45 minutes

Set Up the Expedition

Materials:

For the activity leader:
- CD Player
- APEX Science CD: High-Pitch and Low-Pitch Sounds
- (3) different wind instruments such as kazoos, flutes and Pan pipes

For each group:
- ***Toot Your Pipe*** Learning Cards
- (2) rolls of masking tape

For each child:
- (1) ***Toot Your Pipe*** Data Collection Sheet
- (1) 20′ length of 1″ PVC pipe
- (1) drinking straw
- (1) non-latex disposable glove
- drawing paper
- crayons

Prepare the demonstration:
1. Place various wind instruments where children can gather around and see.
2. Place container of disinfectant solution at each station to sterilize the wind instruments after use.

Prepare the exploration:
1. Cut a 20′ (6 m) length of 1″ PVC pipe into pieces that are 6″ (15.2 cm), 8″ (20.3 cm), and 10″ (25.5 cm) long. Most hardware stores will cut the pipe for you when you buy it.
2. Place one of each length of pipe at each station.
3. Supply each station with tape, gloves, and straws.

Engage

1 Gather the children together. Make sounds with a variety of wind musical instruments.

Say:
"How do these wind instruments make sounds?" Listen to the children's ideas. Encourage them to notice the different sounds each instrument makes.

Say:
"Sounds can be high or low. This first sound is a high-pitched sound." Play the high-pitched sound from the APEX Science CD.

"This second sound is a low-pitched sound." Play the low-pitched sound from the APEX Science CD.

Say:
"The pitch of the sound is determined by how fast something vibrates or moves back-and-forth. Fast vibrations make high-pitched sounds and slow vibrations make low-pitched sounds."

2 **Say:**
"We can also make sounds with air when we whistle."
Encourage children to whistle.

APEX SCIENCE

Ask:
"How can you make a high-pitched whistle? How can you make a low-pitched whistle?" By changing the shape of the mouth and placement of the tongue.

Say:
"Turn to the person next to you and take turns whistling. Observe your partner's face, listen to the changes in pitch. Can you also notice changes in the loudness of the whistle?"
Note: Some children may not be able to whistle so team up whistlers and non-whistlers.

Explore

3. Distribute the Data Collection Sheets and the Learning Cards.

4. Show the children a variety of wind instruments.

Say:
"Today we are going to discover how wind instruments like these make music. You will build your own instrument."

5. Allow children enough time to complete the WONDER, EXPLORE, RECORD and CONCLUDE sections of their Learning Card.

Conclude

6. Gather the children together and ask the following questions:

"What did you need to do to make sounds with your pipe?" Air needs to make the glove over the opening of the pipe vibrate. The vibration of the glove causes the air around it to vibrate. The glove pipe operates much like a bagpipe.

"How did the sounds change when different lengths of pipes were used?" Children may notice that different lengths of pipe produce a different pitched sound. Short pipes produce higher pitched sounds than longer pipes. The air vibrates faster.

Expand

7. Gather the children together. Ask the children to follow the EXPAND instructions on their Learning Card.

Say:
"Get together with your group and practice making sounds. You might be able to make a song! We'll have a pipe concert so that we can hear all the groups."

8. **Say:**
"Congratulations! You have earned your 'Ask Me About Sound' stamp. You are ready to tell people about sound. "

APEX SCIENCE

TOOT YOUR PIPE

Expedition Learning Card

How do wind instruments make sound?

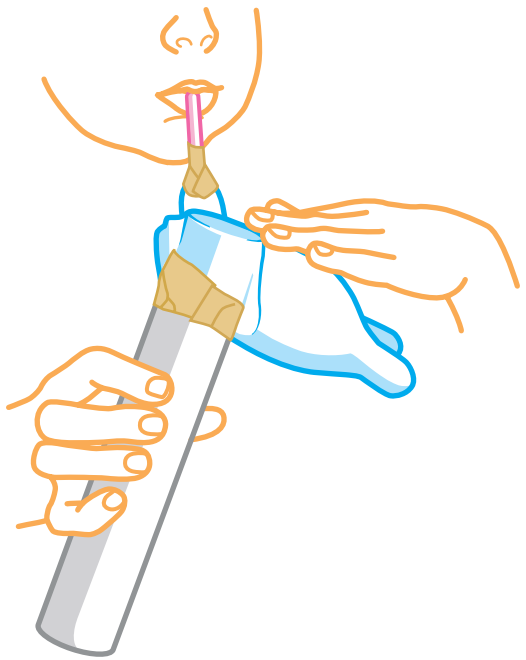
pitch
vibrate
wind instrument

Explore how instruments use air to make sounds.

1 WONDER How do you think wind instruments make sound?

Write or draw in your Data Collection Sheet what you know about making sounds with wind instruments.

2 EXPLORE Distribute a different length of pipe to each member of your group, and then build your glove pipes:



1. Tape the open end of the glove around one end of the pipe about 2.5 cm from the end. Be sure that air cannot escape from around the tape.
2. Use scissors to make a small cut on the end of the thumb.
3. Insert a straw 2.5 cm into the small opening.
4. Place tape around the place where the glove and the straw meet so that no air escapes.

Make music: Blow into the straw to fill the glove with air while folding the glove over one end of the pipe to keep the air from getting out. Release the fold once the glove is full.

APEX SCIENCE

TOOT YOUR PIPE

Expedition Learning Card

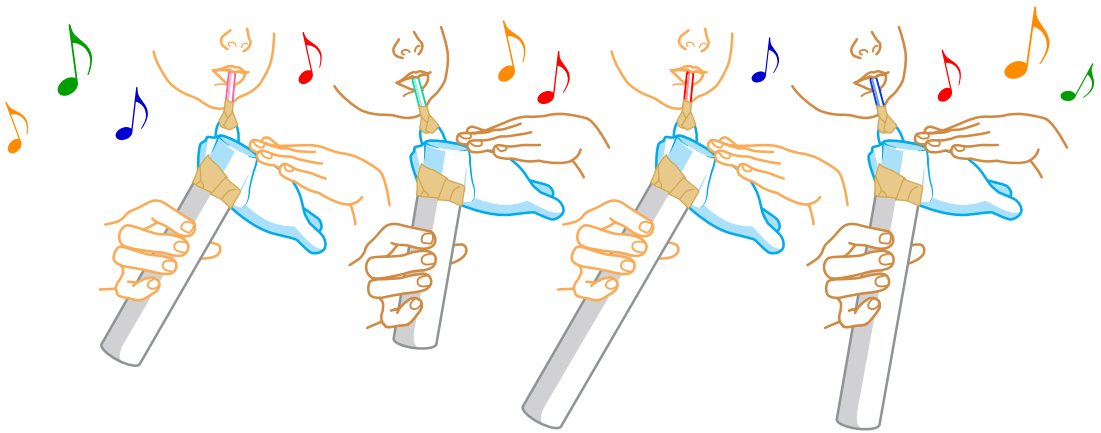
3 RECORD Notice everything you can about how sound was created. Does each pipe in your group sound the same? Can you make different pitched sounds? What part of the wind instrument vibrates as air passes through the pipe.

Draw or write on your Data Collection Sheet what you see and hear.

4 CONCLUDE Consider what you noticed. What do you think is causing the different sounds?

Make a drawing of how sound is made using the glove pipe.

5 EXPAND Practice with your group. Perform a concert for the other children.



Discovery

Why did we do that?

- Different lengths of pipe make different sounds.
- Vibrations create sounds.

Congratulations!

You have earned your "Ask Me About Sound" stamp! Now you are ready to tell people about sound!

ASK ME ABOUT

APEX SCIENCE