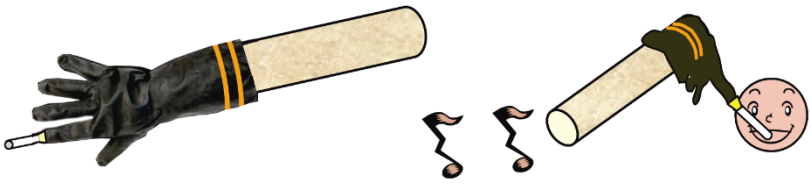
GLOVE-A-PHONE

A noteworthy activity for the family!



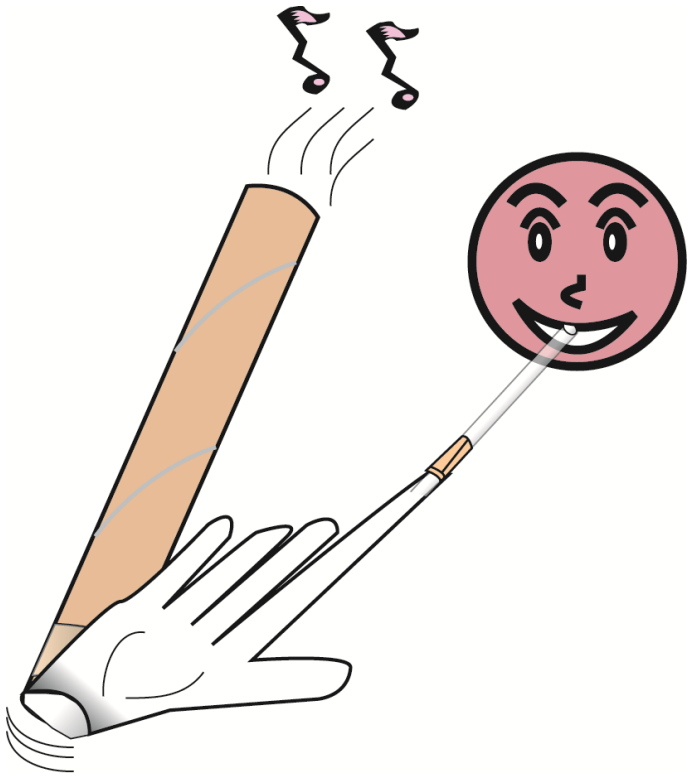
Curriculum topics:

- Sound
- Vibration
- Musical Instruments
- Properties of Materials

Subject:
Art, Physical Science

Grade range: K – 8

How can a glove, a straw, and a tube be combined to make a “musical” instrument? Prepare to be creative as you build a Glove-a-Phone and explore how to make the glove vibrate and make sounds of different pitches (frequencies). Once you learn the proper technique, your instrument can be heard a surprisingly long way off. In time you’ll be ready to form a band!



Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience by inspiring joy through hands-on learning.

For more ideas visit
https://raft.net/resources-2/

Materials required

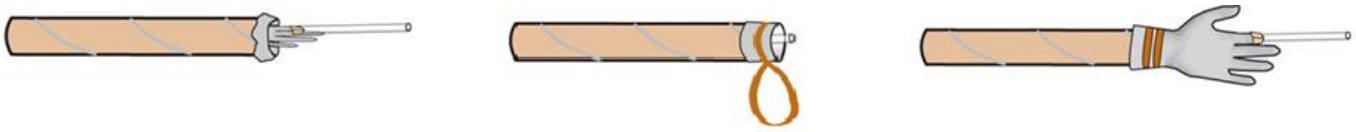
- Rubber or latex glove, powder free (x1)
- Cardboard or plastic tube (x1)
- Plastic straw (x1)
- Rubber band (x1)
- Tape
- Scissors

Set-Up

1 Poke or cut a small hole in the end of the pointer finger of the glove. Push the straw section through the hole from the inside of the glove, leaving about 1” within the glove (see below).

2 Tape the straw and glove junction, making an airtight seal. Check that the straw is firmly connected to the glove.

3 Place the wrist of the glove over the tube and tuck the rest of the glove into the tube, as shown below. Use the rubber band to secure the glove to the tube. Gently pull out the straw and glove from inside the tube, as shown below.



To do and notice

1 Hold the tube in one hand and gently pull the straw-glove junction with the other hand. Pull and angle the glove so the palm area covers the tube opening completely and makes a tight seal against the round end of the tube. Create a tight membrane with no wrinkles (see title page).

2 Blow through the straw to inflate the glove. What do you hear? What do you notice happening to the glove material covering the tube?

3 Troubleshooting: 1) If the glove does not inflate, smooth out any wrinkles and pull the glove more tightly over the opening, 2) If the glove inflates but there is still no sound, adjust the angle between the tube and the glove. After some practice, anyone can play this instrument!

4 Explore ways to make sounds of various frequencies, or pitches. How might you do that using this instrument? Try to relate the pitch you observe with the loudness (volume). How does this relationship depend on how hard you blow air into the instrument? Why?

Content Standards:

NGSS

Wave Properties:
1-PS4-1

Information Technologies and Instrumentation:
1-PS4-4

Definitions, Conservation, Transfer of Energy:
4-PS3-2

Developing & Evaluating Possible Solutions:
3-5-ETS1-2
MS-ETS1-2

The science behind the activity

The part of the glove covering the tube opening forms a membrane like the covering on a drum. As the glove is inflated, the air pressure inside increases to lift the glove material momentarily from the tube's circular edge. This allows air to move over the edge and escape out of the opposite end of the tube. When the air escapes, the glove contacts the tube edge again. This happens repeatedly and very fast if you keep blowing through the straw. For a given size tube there will be certain frequencies that resonate, or build, within the tube producing a specific sound.

The Glove-a-Phone is an interesting instrument because it works like a combination of a drum and a flute. These two instruments are called membranophones and aerophones, respectively. The frequency (pitch) of the sound is affected by the tube diameter and length. A large diameter tube allows a larger piece of the rubber glove to vibrate. The large piece of rubber vibrates slowly and creates a low pitch. When a tube with a smaller diameter is used, the area of rubber that is vibrating is smaller, and vibrates more quickly. This creates a higher pitch. If two tubes are made with the same diameter and different lengths, the longer tube will create a slightly lower pitch.

Learn more

- Experiment with a variety of Glove-a-Phone designs. Try using tubes of different lengths and diameters and compare resulting sounds.
- Modify the design by making finger holes in the tube and cover/uncover them to change the sound.
- Conduct research on air-based instruments (aerophones) and find other modifications for the Glove-A-Phone design.
- Learn about another culture where instruments like the Glove-A-Phone are commonly used to make music.

Visit **https://raft.net/resources-2/** to view the following related activities!

2-Tubaphones
Finger-Phones
Cap Maracas
Straw Noisemakers
Tongue Depressor Harmonica
Buzz Off!

Resources

See these websites for more information on the following topics:

- **Video: Playing bagpipes and drums** - http://bit.ly/2uUnBvH
- **Aerophones** - http://bit.ly/3bZBOrS
- **Wave properties image** - http://bit.ly/37MR87Y