

# SALTY SOUND WAVES

## ELEMENTARY SCHOOL LEVEL 1

It's something we take part in daily: listening to the world around us. But how do we explain this in a way that students will receive and understand? With salt vibrations, we can teach visually about sound waves as we watch them generated before our eyes.

### EDUCATIONAL STANDARDS:

#### NGSS CONNECTION:

**1-PS4-1.** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

#### COMMON CORE CONNECTION: ELA/Literacy

**W.1.7** Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).

**W.1.8** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

**SL.1.1** Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

#### DOK:

Level 2: Concept

### MATERIALS NEEDED:

- ☐ A balloon
- ☐ Salt
- ☐ Plastic cup or pail to fit your speaker
- ☐ Scissors
- ☐ A small speaker
- ☐ Rubber bands

### DIRECTIONS: using a cup

1. Cut the top off of the plastic cup. You will want a section about 4 inches tall.
2. Cut the top half of a balloon off and stretch it across the open top of the plastic cup. Attach with rubber bands.
3. Place a liberal amount of salt across the balloon membrane. Enough to coat the surface of the balloon.
4. Place your speaker next to the membrane and crank the music up loud!

### OBJECTIVE:

Students will be able to investigate sound and determine its interaction with objects.





### ESSENTIAL QUESTIONS:

- How might objects vibrate?
- How might we create sound?

### TAKE IT TO THE NEXT LEVEL:

- Try different types of music, how does that change the vibrations and movement of salt?
- What about different substances on the balloon? Try different types of liquid or gels. What about larger particles like beads?

### MATERIALS NEEDED:

- ☐ Two paper cups
- ☐ Smartphone
- ☐ Cardboard tube
- ☐ Paper towels
- ☐ Marker
- ☐ Paint



## FUN FACTS

- A. Roman Soldiers were at times paid in salt, which is where the word “salary” comes from.
- B. Salt was used to preserve Egyptian mummies.
- C. Sound waves cause vibration to your eardrums and to transmit sound a fluid, cochlea, moves through your inner ear.

## ENGAGE / EXPLORE:

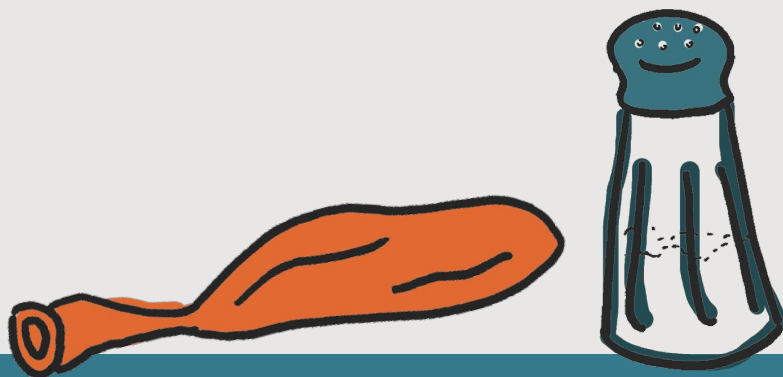
1. Students create with guidance their wave maker
2. Teacher asks students:
  - a. How might they use this device to make sounds?
    - i. Students experiment
      1. They may bang it against the table (both table and cup vibrate to make a sound—abstract)
      2. Or tap the balloon (this is the optimal way to show the vibrations make a sound)
    - ii. Record or state their observations
    - iii. Try and explain how the sounds are made
  - b. What happens when music is played near the device?
    - i. Use speakers to play music from the bottom of the cup
    - ii. Add salt to help students see the vibrations
      1. Students should record or state observations
      2. Students try to conclude what is making the salt vibrate
3. Evaluate
  - a. Students' pattern recognition
  - b. Identifying cause and effect

## EXPLAIN:

1. Teachers read with students:
  - a. Sounds All Around (ISBN-13: 978-0062386694)
    - i. Use literature to discuss vibrations
      1. Vocal cords make a good example
        - a. Students place their fingers gently on their throat and sing
        - b. They should feel their vocal cords vibrating to produce sound
2. Ask students for any other examples they know of things that vibrate to make sounds

## ELABORATE:

1. Have students explain the wave maker.
  - a. Assess students on their explanation of how sound is produced
  - b. Assess students on their explanation of what effect sound has on the object
2. Play a selection of instruments
  - a. Drums
  - b. String instrument
  - c. Wind
3. Ask students how these instruments are making sound
  - a. What is it that is vibrating



### **ALTERNATIVE ELABORATE:**

1. Students observe the smartphone speakers activity mentioned below
  - a. Provide evidence from observations to support why the sound is amplified
    - i. Identify material speakers are using to vibrate and produce sound
  - b. Students share their evidence with the class.

### **MATERIALS NEEDED:**

- Two paper cups
- Smartphone
- Cardboard tube (larger than your smartphone)
- Paper towels
- Marker
- Paint

These speakers are great on the go when you have no power source. The sound is produced by the smartphone and amplified in this easy-to-make speaker box. Create a color scheme you love and make your design a custom job just for you.

1. Trace the bottom of your phone onto the center of the cardboard tube.
2. Cut that shape out so your phone will fit into the tube.
3. Trace and cut out the shape of the tube ends on the sides of the paper cups.
4. Tear off 2 sheets of paper towel and bunch them up in a ball. Put that into the end of the cardboard tube. Repeat for the other side.
5. Push the ends of the tube through the holes in the paper cups.
6. Paint your speaker box and let it dry.
7. Place the phone in the dock stand and let it play.

The sound waves from your phone are played inside the cardboard tube. They bounce off the walls and are softened by the crumpled paper. This dampens the high end, but leaves the low, creating a warmer sound.