

Sound Explorations

Teacher Lesson Plan



Background Information

Sound is energy vibrating through substances. It is a mechanical wave caused by the back and forth vibrations of the particles of the medium through which the sound wave is moving. The motion of the particles is parallel to the direction of the energy movement. Sound waves are longitudinal or compression waves.

- Sound waves are a unique type of kinetic energy. That energy can be transferred to other substances through the vibrations.
- The molecules of the substances collide with each other and pass on the energy as a moving wave.

All sounds travel at the same speed at the same temperature in air. Different wavelengths have different frequencies. A shorter wavelength will have a higher frequency and a longer wavelength will have a lower frequency.

- Wave speed = frequency x wavelength

Tuning forks of different notes have tines of different lengths. Each length tuning fork has a different wavelength producing different frequencies. This results in the different pitch that we hear.

Content Standards

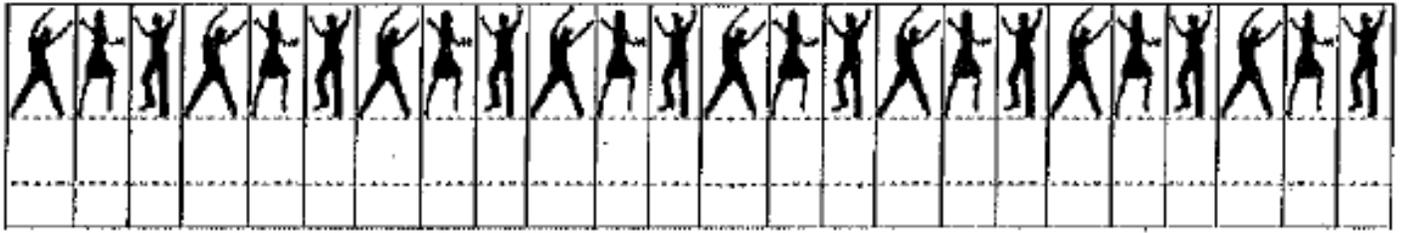
- Physical Science
 - Light and sound are forms of energy that behave in predictable ways.

Student Activities – Vibrations & Pitch

LESSON 1: Phone Disco or the Dancing Pepper

Lesson Materials:

- Clear drinking glass, mason jar or vase (tall and wide enough to hold a cell phone)
- Clear cling wrap to cover drinking glass
- Rubber band
- Mobile phone with vibration alert off and ringtone turned on
- Pepper or Salt
- Tiny dancers, cut out and folded



Procedure:

- Turn off the vibrate alert. Turn ringtone up to high and place a mobile phone in a tall glass.
- Stretch a small piece of cling wrap over the glass and tighten. Secure with rubber band.
- Sprinkle pepper (or salt) on the cling wrap.
- Use a second phone to call the phone in the glass.
- Repeat with tiny dancers.

LESSON 2: Tuning Fork Explorations

Lesson Materials:

- Three tuning forks – Musical notes: C, E and G
- Rubber stopper (not included in classroom kit)
- Bowl or drinking glass filled half way with water
- Paper towels
- Ping pong ball on string

Procedure:

- To produce a sound with a tuning fork, hold the handle and strike tines on a rubber stopper or your knee. Strike each tuning fork and observe the sound.
- Strike a tuning fork and place in a dish of water.
- Tap the tuning fork and place it on the bone behind your ear.
- Have a partner hold a string attached to a ping pong ball. Strike a tuning fork. Bring the tuning fork near the ping pong ball.
- Piano and guitar musicians play several notes at a time to form a chord. Strike the three tuning forks together – Notes: C, E and G create a C Major chord.
- Resonance is a property of materials that allows them to vibrate at a certain frequency. Strike all three tuning forks at the same time and place them together on various surfaces (your desk, the wall, glass in a picture frame) and observe the sounds created.

LESSON 3: Duck Call with a Straw

Lesson Materials:

- Drinking straws
- Scissors

Procedure:

- Use your fingers to flatten the end of a straw.
- Cut flattened end to a point.
- Flatten again with your teeth.
- Blow into flattened end causing the straw to vibrate and “quack like a duck”.
- Optional: Cut off the end of the straw to change the length and blow to compare the sound.

**LESSON 4: Water Whistle****Lesson Materials:**

- Drinking straws
- Scissors
- Cup or glass
- Water

Procedure:

- Using your scissors, cut partially through the straw 1/3 of the way down the straw. The cut should be ALMOST all the way through the straw but leave a small piece uncut to keep the two straw sections attached.
- Bend the straw into a right angle at the cut being careful not to break the straw segments clean of each other.
- Fill a cup or glass $\frac{3}{4}$ full of water. Slide the longer section of straw into the water.
- Keeping the straw at a 90° angle, place your lips on the shorter end of the straw and blow with a light, constant breath. If you are having trouble producing a whistling sound, try pinching the top of the long end of the straw. Once you’ve got your Water Whistle making a constant, steady sound, try raising and lowering the straw within the water.

LESSON 5: Craft Stick Harmonica

Air moving can cause objects to vibrate. The vibrations cause pressure waves that travel to our ear drums and we interpret that as sound. Students will assemble a Craft Stick Harmonica to create “music”.

Lesson Materials:

- Two craft sticks-tongue depressor size work best
- Two rubber bands
- Strip of paper the size as the craft stick
- Two toothpicks cut the width of the craft stick

Procedure:

- Sandwich the paper strip between the two craft sticks.
- Wrap a rubber band around one end until it is snug.

- Slide a toothpick to the inside of the rubber band placed OVER the paper strip.
- Sandwich the last toothpick at the other end of the craft stick UNDER the paper strip.
- Wrap with a rubber band at the other end.
- To play, place lips on the edge of the craft stick harmonica and gently blow air. The paper will vibrate producing sound.
- Vary the length of the vibrating paper by moving the rubber bands closer to the center. Does the sound change?

DIY POPSICLE STICK Harmonica

