# Lesson 1 - Sound Stations

**Teacher Directions for Sound Center Activity**

Students will rotate through stations testing different principles related to sound. As students pass through each station, they will write down their noticings/wonderings in their science notebooks. Students will also create a visual depiction of the science behind each station.

Station 1 - Video Station

After watching the videos, students will choose one phenomena and create a visual in their notebook explaining their thinking.

**Materials**

Glass Singing - <https://www.youtube.com/watch?v=ULiNR-k4m70>

Thunder Drum - <https://www.youtube.com/watch?v=3MSh6i7IH1g>

Voice Shattering Glass - <https://www.youtube.com/watch?v=10lWpHyN0Ok>

Station 2 - DIY Guitar

Students will test different the effects of different rubber bands when plucked. Students should notice a change in sound and vibration.

**Materials**

Piece of wood with nails nailed in

Different sized rubber bands (length and width) stretched out between the nails

Station 3 - Drum and Paper Clips

Students will use the visual of the paper clips to make meaning of the vibrations created when a drum is struck. Students should test how the sound/vibration changes when hit harder or soft.

**Materials**

Drum (A large coffee can with top may used if no real drums are available) and Drum stick

Paper clips

Station 4 - Bottle Pitch

Students will note the change in pitch with each different bottle. Students should see a cause/effect relationship between the water and pitch. Review safety rules while using glass bottles during this test.

**Materials**

Glass soda bottles/mason jars filled with different amounts of water

Spoon

# Lesson 2 - Sound Design

**Teacher Directions for Sound Design Activity**

This design challenge will take place at the end of the unit, after students have an understanding of sound waves. Share the image of the Sydney Opera House <https://upload.wikimedia.org/wikipedia/commons/4/40/Sydney_Opera_House_Sails.jpg>

Ask students what they notice/wonder about the design of the building.

Play the video about Grand Central Station:

<https://www.youtube.com/watch?v=yUUAG3hIYGg>

Provide students with the following 2 scenarios:

1. You are at a family gathering and want to play music. Your speaker is not very loud. What can you do to make the sound louder?
2. Your brother is practicing his recorder in his room, but you are trying to read next door. What can you do to eliminate the sound?

Provide students with a variety of materials to test - foam, cardboard, cloth, aluminum, etc. Also have a small speaker that students can use to conduct tests of these materials. After allowing students to test different materials, they will design a solution to their scenario. The design should include labels stating which materials were used and describe how the sound waves move through their design.

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# Lesson 3 - Light Stations

**Teacher Directions for Light Centers Activity**

Watch the video: <https://www.youtube.com/watch?v=I0OPNOpU6SY>

Students will rotate through stations testing different principles related to light. As students pass through each station, they will write down their noticings/wonderings in their science notebooks. Students will also create a visual depiction of the science behind each station.

Station 1 - Bending Light

In this station, students will observe how the refraction of light affects the appearance of an object in water.

**Materials -** Cup filled halfway with water

Pencil or other straight, thin, solid object

Station 2 - Absorbing and Reflecting

In this station, students will observe how different materials either reflect or absorb light. Allow students opportunities to test objects of their choosing as well.

**Materials -** Flashlight and/or laser pen

A variety of materials to test.

Examples of reflective objects are aluminum, metallic rocks/minerals, white glossy paper

Examples of material that absorb light are black construction paper, blanket, wood

Station 3 - Transparent, Translucent, and Opaque

In this station, students will observe how light may or may not travel through different materials. Allow students opportunities to test objects of their choosing as well.

**Materials -** Flashlight

Examples of transparent objects are glasses, plastic wrap, and water

Examples of translucent objects are sunglasses, wax paper, vegetable oil

Examples of opaque objects are a book, aluminum foil, and thick fabric

Station 4 - Mixing Light

In this station, students will explore how different color light react when mixed.

**Materials -** 3 flashlights

Red, Blue, and Green cellophane sheets

Rubber bands

If you do not have cellophane, you may provide 3 clear cups of colored water (food dye added)

 Lesson 4 - Light Design

**Teacher Directions for Light Design Activity**

Show the following videos to the students.

Light House - <https://www.youtube.com/watch?v=XmBi1XeiqGg>

Morse Code Video - <https://www.youtube.com/watch?v=L6gxfX4GrbI>

Ask what both videos have in common. Lead students to the idea that people have used light and sound to communicate. Ask about other ways that sound and light communicate information. Examples may include traffic light colors representing stop, yield, and go, or different types of emergency vehicle sirens. In this design project, students will work in groups to develop a system, using sound or light, to communicate with another student across a long distance (a gym or outdoor area may work well).

Provide students with a list of several different commands that they may have to communicate to a person over a long distance. Examples may include “Jump”, “Sit Down”, and “Wave”.

Students should first design their idea in their science notebook, including a diagram with labeled materials and an explanation of the path of the light or sound. Along with the design, students should create a system for understanding their communication (refer students back to the idea of the morse code translator where different combinations of sound stand for different letters). Students will then provide and receive feedback on each other designs. If possible, have groups who choose opposite designs (light/sound) to provide feedback with each other. Students will then redesign their solution based on the feedback they receive. Students will then create their physical designs and test them with another group. Provide opportunities to redesign while testing.

When groups are ready, bring in a special guest to be the test subject to communicate with over a long distance. Students may provide the guest with a translator key. Once the guest is a far distance away, provide the group with the command they will communicate. This should be kept a secret until the very last moment to add suspense. Guests will attempt to follow the commands of each group and then provide feedback about the effectiveness of the designs.