



Acoustical Society of America

Exploring Sound Index

The following inquiry lessons have all been tested with students and reviewed by experienced middle and high school teachers, middle and high school curriculum experts and physics education researchers.

Sound and Music *This is a stand-alone activity.* [.doc](#), [.pdf](#), [PowerPoint](#), [slides.pdf](#), [videos](#)

Students explore the physics of sound, how the ear hears and how musical instruments work through interactive demonstrations and student activities. Video clips are included for teachers to watch a section at a time if interested.

Pre/post conceptual test of sound and music [.doc](#), [.pdf](#)

Multiple-choice test designed to measure learning from the *Sound and Music* lesson. This test has been reviewed by multiple experts and master teachers as well as used with several different populations of students.

The science of Music Unit *This unit is designed to use all 3 lessons:*

Musical Instruments Part I *Designed to follow Sound and Music.* [.doc](#), [.pdf](#)

Students investigate how to make music by creating their own “straw instruments” and exploring water bottles.

Musical Instruments Part II *Designed to follow Musical Instruments Part I.* [.doc](#), [.pdf](#)

Students investigate how stringed instruments make music including constructing and testing their own “cup instruments”.

Generalizing How Musical Instruments Work *Designed to follow Musical Instruments Part I & II.* [.doc](#), [.pdf](#)

Small group and whole class discussion lesson designed to guide students in creating a generalization about how instruments make music – source of vibration, way to change pitch, mechanism to amplify the music including resonance and sympathetic vibration.

Wave Basics *Designed as homework but would also make a nice class lesson.* [.doc](#), [.pdf](#)

Students explore the PhET Interactive Simulation “Wave on a String” focusing on amplitude and frequency as well as wave travel.

Anatomy of a Wave *Stand-alone activity; however, I use Wave Basics HW as prep.* [.doc](#), [.pdf](#), [.ppt](#)

Students take on the roles of reporters and artists to draw and describe the nature of transverse waves. Activity is followed up with an interactive presentation of longitudinal and transverse wave characteristics including resonance.

Tuning Fork Discovery *Stand-alone activity* [.doc](#), [.pdf](#)

Students study a brief history of sound, examine the role of tuning forks in this history and then conduct experiments with tuning forks.

The Doppler Effect *Stand-alone activity* [.doc](#), [.pdf](#)

Students explore the PhET Interactive simulation “Sound” and then experience the Doppler effect through watching videos and teacher demonstrations. Then students invent an explanation of why the Doppler effect happens.

Echolocation and SONAR Part I Stand alone activity done outdoors [.doc](#), [.pdf](#)

Speed of Sound

Students explore the speed of sound by experiencing the delay for sound to reach them after they see it occur.

Identification from a distance

Students will try to identify objects from a variety of distances that dolphins and bats can successfully echolocate from.

Fish finding game

Students will explore what it feels like to find objects without sight by playing a game modeled after dolphin's food-finding behavior.

Echolocation and SONAR, Part II Stand alone activity [.doc](#), [.pdf](#)

Echolocation and SONAR Homework

Students examine what echolocation is and how it is used by humans and dolphins.

Sound rather than Sight

In this activity students explore the idea of how it feels to use sound only to locate objects.

3-D Location

Students experience having to search for objects above and below them, rather than only side-to-side, similar to how bats and dolphins find food.

Echolocation pre and post quiz [.doc](#), [.pdf](#)

This is a combination open-ended and likert-scale quiz covering many of the learning goals from the two echolocation activities. I used it with pre-service elementary teachers but it has not been reviewed by others.

Sound Measures Stand alone lesson [pdf](#)

Students use a sound level meter to measure, compare and graph sound levels in different environments.

How Loud is Too Loud? Stand alone lesson [.pdf](#)

Students explore sound levels and exposure time for a variety of sources.

Loud Sounds Book Marks Student Project [doc](#), [pdf](#)

Two sided full color bookmarks show sound level for certain sound and safe exposure times for different levels.

Physics of Sound Resource material [doc](#), [pdf](#)

Description of the physics of sound presented at a straight-forward conceptual level.

Dangerous Decibels Educator Resource Guide [pdf](#)

Complete set (105 pages) of Dangerous Decibels materials.

The following activities are traditionally done in high school but are at an appropriate level for middle school students. We do not recommend using the same activities at both levels. An activity should only be used once with students, the next time they see the same activity/materials they disengage because they "already know this". "We already did this in Mr. so and so's class!"

Sound Waves Stand alone activity [lesson](#), [teacher notes](#)

Students use the *Sound* simulation from the PhET Interactive Simulations to understand how different sounds are modeled, described and produced. They also design ways to determine the speed, frequency, period and wavelength of a sound.

Sound Lab using LabPro Stand alone activity [lesson](#), [teacher notes](#)

Sound Lab using Xplorer GLX Stand alone activity [lesson](#), [teacher notes](#)

These two lessons each use a sound probe to investigate how wave patterns from different sounds look, including their voices and their straw instruments.

Peer-Instruction type questions for sound clicker questions related to the above activities [ppt](#)