

Lesson Plan

Assessment
Cross-curricular

AFL, questions
Arts

Big Ideas

- Sound is created by vibrations

Learning Goals

- Discover how every musical instrument creates sound from vibrations.
- Different shapes and ways of creating vibrations changes the type of sound an instrument makes.
- Think about the impact of music on people and the environment, particularly in the context of popular music concerts.

Specific Expectations

- 1.1** assess the impacts on personal safety of devices that apply the properties of light and/or sound and propose ways of using these devices to make our daily activities safer
- 1.2** assess the impacts on society and the environment of light and/or sound energy produced by different technologies, taking different perspectives into account
- 2.3** investigate the basic properties of sound
- 2.5** use scientific inquiry/research skills to investigate applications of the properties of light or sound
- 3.4** describe properties of sound, including the following: sound travels; sound can be absorbed or reflected and can be modified
- 3.5** explain how vibrations cause sound

Description

This is **lesson two** of a series of five lessons where we look at light and sound through the prism of creating a rock concert (or other light and sound show). Each lesson can be done on its own as well.

Materials

- A selection of stringed, wind, and percussion (drums, xylophones etc.) instruments.
- Different examples of ear protection (foam ear plugs, wax ear plugs, headphones, noise canceling headphones, cotton)

Safety Notes

See description in Action Section.

Introduction

If the instructions from lesson 1 were not given. Instruct students the day before this lesson:

- If you have an instrument at home, bring it to school. Particularly good ones are any stringed instruments, xylophones, drums, as well as wind instruments such as flutes.
 - It's not necessary that everyone bring an instrument as long as you have a good selection.
 - Students need not be able to play the instruments well.
 - Students will study the vibrations the instruments make and start thinking of how to incorporate instruments into a show.
- Organize some backup instruments, in case students forget to bring theirs or don't have many.

“Today we will explore musical instruments to learn more about how each one makes sounds. We may also want to use some of these instruments in our concert we are developing.”

Optional: Make your own instrument

If you don't have enough instruments then you will need to build a few for students to use. This can be a fun exercise. The instruments can still be augmented with an additional sound box, even though you are technically already building a sound box (to amplify the sound) when you build almost any instrument. Here are some ideas for which you can easily find resources online (see references):

- Coffee can drum
- Kalimba
- Matchbox guitar
- Various designs of guitars made with elastics (e.g. strummies below)
- Popsicle stick piano
- Pan flute
- Xylophone

Action

Playing with vibrations

- Students will study different instruments in groups and rotate to a new instrument after an appropriate time period.
- Group instruments together as you wish. You could put all similar instruments together for example.
- Have each group of students start at one of the activity stations. They should be given materials to take notes on each instrument.
- Instructions:
 - Remember to be gentle with ALL instruments.
 - Play with the instruments.
 - What vibrates in the instrument you play with? Does it still work if you dampen those vibrations (e.g. by putting your hand on the instrument)?

- How does the instrument amplify the sound (make it louder)?
 - Try to get them to see that every instrument has a resonance cavity of some sort.
 - Does it work as well if you block the part of the instrument that amplifies the sound (this is not always possible, for example in wind instruments)?
 - Can you make the instrument louder or less loud by placing it on different surfaces? (This works especially well for stringed instruments, where the resonance cavity easily transmits vibrations e.g. to a cardboard box, a table, etc. Being placed on a soft surface also dampens it).
- How does the instrument make different sounds? What do you notice?
- Take notes on your findings
- After an appropriate amount of time have the groups rotate to a different type of instrument
- Discuss your results as a class:
 - What did you observe? For example: longer strings make lower sounds, bigger drums have lower sound, bigger cavities amplify the sound more, dampening the vibrations stops the sound.

Safety discussion

This is a great time now to discuss the safety aspects of music. This is especially important, as they will continue to develop their concert.

- “You may have noticed that at times the music got quite loud as we played. Do you think music could get loud enough that it’s not safe anymore?”
 - What can happen when you listen to loud music?
 - Does it matter if you listen to loud music for just a short time or if you do it for a long time period?
 - Yes! You can damage your ears with one really loud noise, but you can also get ear damage from prolonged exposure to lower levels of sound.
 - Could loud music affect people/animals etc. around you?
 - How do you make sure music at a concert isn’t too loud? Or when you listen to it with your headphones?
 - Hold earphones at an arm’s length and have music at your normal level. If you can still hear your music it’s too loud. If you’re sitting next to someone and they can hear your music, it’s also too loud in most cases.
 - Can you still hear someone talking beside you? That is another good indicator.
 - Concerts employ sound engineers to measure the sound volume in different parts of the venue.
 - Do your ears ring after listening to music? Has anyone gone to a concert and had their ears ring afterward? That is a sign it was too loud and it would have been better to wear some ear protection.

- Is it fun to listen to loud music? Why?
 - Vibrations can be felt in our body! (Not just in ear drums)
 - We feel more immersed in the music
 - It's easier to hear (e.g. when there is a large crowd listening or we are in a noisy place with headphones)

Consolidation/Extension

- Conclusion: We always have to find a balance between enjoying the music and making sure it's safe. For example you may wear ear protection at a loud event such as a sports game or concert.
 - Show some examples of ear protection. Students will test some of these during their last lesson on this topic when they do their concert.
- Now that we have learned about different instruments we can start to think how we might use them in a concert.
- Next class we will start to build the components of our concert. We will need:
 - A light show
 - Music from instruments OR created with an app on your phone/iPod
- What might you want to work on? We will decorate lights and come up with special effects and we'll design an amplifier for either an instrument or a device you are going to use to make music.

Links

- Coffee can drum: <http://www.kinderart.com/multic/cofdrum.shtml>
- Kalimba: <http://herdingcatsgeorge.blogspot.ca/2010/08/d-popsicle-stick-and-paper-plate.html>
- Matchbox guitar: [http://www.marthastewart.com/265694/making-music?xsc=eml_crd_2012_04_25&om_rid=Dk7QuY&om_mid=BPI\\$dDB8d-68ih](http://www.marthastewart.com/265694/making-music?xsc=eml_crd_2012_04_25&om_rid=Dk7QuY&om_mid=BPI$dDB8d-68ih)
- Strummies: <http://www.teachpreschool.org/2013/03/diy-musical-strummies/>
- Popsicle stick piano: <http://deceptivelyeducational.blogspot.ca/2013/02/diy-craft-stick-piano.html>
- Pan flute: <http://www.philtulga.com/Panpipes.html>
- Xylophone (just one of many possible designs): <http://deceptivelyeducational.blogspot.ca/2013/07/diy-xylophone-out-of-wrenches.html>

French sites:

Tambour de boîte de lait : <http://www.commentfaiton.com/fiche/voir/359013/comment-fabriquer-un-tambour-pour-enfant>

Kalimba : <http://www.cabaneaidees.com/2015/05/fabriquer-instrument-musique-africain-piano-a-pouce/>

Guitare à boîte d'allumettes : <http://www.cabaneaidees.com/2012/05/une-guitare-avec-une-boite-dallumettes/>

Guitare à boîte de chaussures : <http://www.bluemarguerite.com/Loisirs-creatifs/tuto-6540-guitare-en-carton.deco>

Flûte de Pan : <https://www.youtube.com/watch?v=4MRSv1bY9F0>
http://www.alexcellier.ch/Duocd/Alex_files/fabriquer%20une%20flute%20de%20Pan.pdf

Xylophone à clés anglaises : <http://de-tout-et-de-rien-caroline.blogspot.ca/2013/02/xylophone-de-cles-anglaises-diy-wrench.html>

Bilingual site