

A Present for the Music Teacher Grade 4: Sound

Student Information:

Your music teacher has just introduced new musical instruments to the class. As everyone begins to practice with their instruments it becomes clear that your teachers needs some ear protection.

Challenge: Build a device that protects your music teacher's ears.

Teacher Information:

Outcomes addressed by this design challenge:

Thematic Cluster Outcomes	Cluster 0 Design Process Outcomes		
Grade 4, Cluster 3: Sound			
4-3-11	4-0-3d	4-0-4d	4-0-5a
4-3-14	4-0-3e	4-0-4e	4-0-5b
4-3-15	4-0-3f	4-0-4f	4-0-5c
	4-0-4b	4-0-4g	4-0-7b
	4-0-4c	4-0-4h	4-0-7c
			4-0-8c

Possible Criteria:

- muffles sound
- comfortable to wear
- aesthetically pleasing
- durable (would last for more than one class)

Students need to determine how they will "test" or evaluate each criteria, as they may be subjective or hard to evaluate. For example, the class may decide that "comfortable" means the device is lightweight, fits on the head easily, and doesn't restrict movement. Determining how to evaluate each of the criteria is an important part of the design process. Often, evaluation of aesthetics is left up to the students and as long as they can indicate what they did to make the product aesthetically pleasing they will be successful.

Possible Materials:

The classroom should already contain materials used for investigating how vibrations travel differently through solids, liquids, and gases and exploring the ability of materials to transmit or absorb sound. Students will already be familiar with these materials and have some idea of which are better at absorbing sound. These materials, plus other classroom supplies (paper, string, tape, etc.) can form the materials list for this project. You may want to augment this supply with other materials such as styrofoam cups. This would also be a good opportunity to allow students to supply additional materials (perhaps limited to one item).

Required prior experience:

In order to ensure student success with this design challenge, they must have the following prior experiences:

- experience in determining which materials absorb sound the best
- awareness of practices that help ensure protection of the ears and hearing (specifically different types of ear plugs, headphones)

Guiding Student Planning:

The following questions can be used to help students in their planning:

- What are all the different materials that can be used to absorb sound?
- What are all the different ways ear protection can be worn?
- What are all the different ways materials can be joined (this draws on experiences from previous grades)?

Assessment Suggestions:

Students can be asked to orally present their final product, including the following in their presentation:

- appropriate vocabulary, including sound, transmit, absorb
- explanation of why they chose the materials they did
- evidence of how the product met all criteria and how each criterion was evaluated (e.g. "our product muffles sound, we know this because...")
- explanation of how their plan changed from the original plan
- what they would do differently next time

The following rubric can be used to summarize the oral presentations.

Level 1	The presenters used appropriate vocabulary as they justified their choice of materials, explained how their product met the criteria laid out, and described how their plan changed and what they would do differently next time.
Level 2	With prompting, the presenters used appropriate vocabulary as they justified their choice of materials, explained how their product met the criteria laid out, and described how their plan changed and what they would do differently next time.
Level 3	The presenters explained most points related to their choice of materials, how their product met the criteria, how their plan changed and what they would do differently next time.
Level 4	The presenters had major gaps in their explanation of choice of materials, how their plan changed, or what they would do differently.

The Blackline Masters for general self and group assessments are also provided in *Kindergarten to Grade 4 Science: A Foundation for Implementation*.