

Quiet Helmet- An investigation of sound absorption

Grade 5

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References:

- CPS curriculum guide
- The Sound and Light Journal (CPS)
- <http://www.iit.edu/~smile/ph9106.html>

Benchmarks & Objectives:

ES-6: Describe and summarize observations of the transmission, reflection, and absorption of sound.

Sound Key Concept: Sound can be transmitted by materials.

Sound Key Concept: Sound can be absorbed by materials.

Key Definitions:

Sound- a wave that travels through the vibration of matter.

Absorption of sound- the conversion of sound energy into other forms of energy.

Reflection- to bounce off of something.

Transmission- to pass through something from one side to the other.

Materials:

- Two large cardboard boxes (I used printer boxes) that have a large hole cut in one side to allow a head to fit through.
- Soft materials to line the inside of the box with to absorb the sound. I used styrafoam, egg-crate padding, and cloth.
- Can-telephones (made in a previous lesson) made out of paper cups, a toothpick, and string.
- Tissue paper
- Worksheet from CPS Sound and Light Journal

Initial Demonstration:

Start a discussion about how materials affect sound. Are there some things that absorb sound better than others? (foam ear plugs, padded walls of a radio or music hall) Are there some things that reflect sound? (Yes) What is it called when sound is reflected? (echo) Try to get to the fact that soft things absorb sound better and hard things reflect sound better. (Actually, all materials do both, it's just some are better than others at reflection/absorption)

Procedure:

Present the following question to the class. Recall our Can- telephones we made in class. What would happen if we put a tissue in the cup? Then go through the steps. 1. Think about the problem. 2. Make predictions (hypothesis) 3. Test predictions (experiment) 4. Present Result. What happened? The tissue paper absorbed the sound waves in the cup and the phones did not work as well.

Present the following problem to the class. Explain that there are two students that are very loud in the class, that no matter how much you ask them, they keep talking and talking. So instead of asking them to stop repeatedly, could we just make something to put over their head to absorb the sound they make? I have two boxes, and a lot of soft material. Then split the class into two groups, each with their own 'loud kid'. (Check with the student before hand to make sure they are OK with it.) Give the groups the same materials and have them try and make the best Quiet Helmet.

They should discover that...

- the more material, the more absorption
- sound is able to 'bounce' out of holes (so be sure to cover up all holes by wrapping a towel around the students neck)
- the sound is not able to be completely blocked (some is still transmitted)

If there is still more time, then have the students work on the CPS Sound and Light Journal worksheet on page 19 titled 'sound and surfaces' or assign as homework.