

SOUND VIBRATIONS

SECTION 12: SOUND INSULATORS

From *Science in a Nutshell*



Westminster College

OBJECTIVE:

To investigate properties of materials that muffle sound.

MATERIALS:

paper cups
Journal page for Activity 12
newspaper
Nutshell box and lid
portable radio
shoe box
sound insulators such as yarn, foam, rags, bubble wrap

BACKGROUND:

Some sounds are just annoying and some sounds are so loud that they can damage your ears. The ground crews at airports wear ear protectors, devices that protect their ears from the loud noise of aircraft engines.

A *sound insulator* is a material that absorbs sound waves. Sound insulators are used to “deaden” or muffle annoying or damaging sounds. Where do you think using a sound insulator would be helpful? Can you think of other places besides airports where sound insulators would be necessary?

Some materials make better sound insulators than other materials. In this activity, you will experiment with different materials and test their sound insulating properties. Before you get started, collect a variety of materials that you can test. Look for newspapers, yarn, scraps of carpet, a large box, plastic foam, cardboard, bubble wrap, cloth rags, a pillow or towels.

EXPERIMENT:

1. Adjust the volume of a small portable radio so that you can easily hear it from across the room. Place the radio inside the empty Nutshell box (or a shoe box) and cover the box. Can the sounds from the radio still be heard from across the room?
2. Place crushed newspapers around the radio inside the box. Do not change the volume. Put the lid on the box. Can the sounds from the radio now be heard from across the room?
3. Try wrapping the radio with other materials. Put the lid on the box and listen from the same distance as before. Can you find a material that completely muffles the sound so that you cannot hear the radio from across the room?

4. Experiment with different materials to find the best sound insulators. On your Journal page for Activity 12, make a list of the best sound insulating materials. What properties do the best insulators have in common?
5. Remove the radio from the box and increase the volume. Cover each ear with an empty paper cup. Can you still hear the radio from across the room?
6. Make yourself a pair of ear protectors by filling the paper cups with sound insulating materials. Experiment with different materials until you cannot hear the radio when wearing your ear protectors.
7. Draw a picture of your ear protectors in your journal. Show the sound insulating material that you used.

SAFETY NUT:

Do not use any material that is small enough to go in your ears.

IN A NUTSHELL:

Soft or rough materials generally make the best sound insulators. Soft materials do not vibrate well. Rough, uneven surfaces provide little area from which sound waves can bounce off.

CRACKING THE NUT:

Why is it dangerous to ride a bicycle wearing stereo headphones, even with the sound turned off?