How Loud is Too Loud?

*Students create wheel that will show them various sound sources, the decibels produced by that sound, and allowable time they can be exposed to that level of sound*

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**TIME REQUIRED**

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**MATERIALS**

- Scissors (1 per group)
- Glue or Scotch tape (1 per group)
- How Loud Wheel Part 1 and 2
- Thumb tack or brad (1 per person)

**INTRODUCING THE ACTIVITY**

Ask the students the following questions in bold. Possible student answers are shown in italics.

**What is a decibel?**

*A decibel is a measurement of sound.*

**Is sound dangerous?**

*Yes, sounds can damage the inner ear hair cells if it is too loud for too long. If too many hairs cells are damaged and lost, hearing loss can be a result.*

**CLASSROOM ACTIVITY**

Procedure:

Make the How Loud Wheel as follows:

Cutting on the dashed lines only, use scissors to cut out the circle of Piece “1”.

Piece “1” - Cut out the box under the word “Sound”.

Piece “1” - Cut three sides of the box under “How many decibels?” leaving the top as a flap to serve as a window shade for the information below.
Cutting on the dashed lines only, use scissors to cut out the circle of Piece “2”. Put the two circles together with “1” on top of “2”. Join the black dots in the middle of each circle with a thumb tack or brad. If using a thumb tack, tack the How Loud is Too Loud Wheel to a bulletin board. Keep the top circle in place so you can read the words on it – hold it still with your hand. While holding circle “1”, turn circle ”2” until a picture can be seen through the “Sound” window. Directly across from it, you can see how many decibels are produced, on average, by the sound source. It also tells you how long you can listen to it before damage can occur. Anytime at or above this amount has the potential of damaging your hearing.

EXPLANATION

Noise Pollution
Noise is defined as “unwanted sound” and it is America's most widespread nuisance. It is not a new problem. In the first century BC, Caesar banned chariots in Rome to cut down the deafening sound of chariot wheels on stone roads. Throughout the ages people have complained that they can't “hear themselves think” due to loud sounds. In America, some people talk of “moving to the country” to get away from the noise of the city. Despite our knowledge that loud sound is damaging to our health, the sound levels in our environments continue to rise. The Acoustical Society of America indicates that since 1950, the volume of loud sound in daily life has doubled every ten years.
Measuring Sound/Decibels
How Loud is Too Loud?
The pressure of a sound is measured in decibels (dB) sound pressure level (SPL). Like a temperature scale, the decibel scale goes below zero, which is the lowest level an average person can hear.
The average person can hear sounds down to about 0 dB, the level of rustling leaves. Some people with extremely good hearing can hear sounds down to -15 dB.
If a sound reaches 85 dB or stronger and lasts for 8 hours, it can cause permanent damage to your ears.
The amount of time you listen to a sound affects how much damage it will cause. The quieter the sound, the longer you can listen to it safely. If the sound is very quiet, it will not cause damage even if you listen to it for a very long time; however, exposure to some common sounds can cause permanent damage. Loud sounds that reach a decibel level of 85 for 8 hours or more can cause permanent damage to the hair cells in the inner ear, leading to hearing loss.
Many common sounds may be louder than you think.
A typical conversation occurs at about 65 dB, not loud enough to cause damage.
A bulldozer that is idling (note that this is idling, not actively bulldozing) is loud enough at over 85 dB that it can begin to cause permanent damage after only 1 work day (8 hours).
When listening to music on earphones at maximum volume level, the sound generated reaches a level of over 100 dB, loud enough to begin to cause permanent damage after just 15 minutes per day!
A clap of thunder from a nearby storm (120 dB) or a gunshot (140-190 dB, depending on weapon) can cause immediate damage.
How Loud Wheel Part 1

SOUND

Protect Your Ears

Turn It Down

Walk Away

How many decibels?*

How much time before damage?

* Decibels are approximations according to NIOSH standards using dB(A) time weighted averages.

www.dangerousdecibels.org

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Dangerous Decibels® - Oregon Health & Science University, Portland, Oregon
How Loud Wheel Part 2
Sound “Thermometer” of Common Sounds