

Sound Whackers

Overview: Have you ever held a ruler over the edge of a desk or table and whacked the end of it? If so, you would notice a funny sound. This sound changes if you change the length of the ruler that is hanging over the edge. The sound you hear is made by the ruler's vibrations.

Materials

- desk (or table, or countertop)
- metric ruler

Experiment

1. Place the ruler on the desk at the 20 centimeter mark. Hold the portion of the ruler that's still on the desk down very firmly with one hand. Press down the portion of the ruler hanging off the desk with the other hand. Now let it go. The ruler should begin to vibrate up and down while producing a strange sound.
2. Now rearrange the ruler so that it is placed at the 15 centimeter mark and give it a thump. What happens to the pitch this time? Is it higher or lower now that the overhanging portion is shorter?
3. Make sure you try the ruler at 5 centimeters, 10 centimeters, 15 centimeters, 20 centimeters, and 25 centimeters. Listen each time and place the lengths in order from highest to lowest pitch.
4. Finally, put the ruler at the 25 centimeter mark, with just 5 centimeters on the table and the rest hanging over the edge. Give it a whack and while it's vibrating, slide the ruler back across the edge of the table to make the overhanging portion shorter and shorter. What happens to the sound?

Sound Whackers Data Table

Ruler length	Pitch <i>(1 is highest, 10 is lowest)</i>

Reading

In this lab, we begin to learn about sound. You know it is collected and deciphered by your ears, but did you also know that all sound is made when something vibrates? It could be a guitar string, vocal chords in your throat, or a ruler that is hanging over the edge of the desk: Vibrations make sound.

The overhanging portion of the ruler is the portion allowed to vibrate. This determines the sound's pitch. When a short piece is hanging over the edge, a high pitch is made. And when the length is longer, the pitch is lower. This is what happens with all vibrating objects and is a function of their wavelengths.

Exercises

1. How is sound made?
2. How do you change the pitch of the ruler?

Answers to Exercises: Sound Whackers

1. How is sound made? (All sound is made when something vibrates.)
2. How do you change the pitch of the ruler? (When a short piece is hanging over the edge, a high pitch is made. And when the length is longer, the pitch is lower.)