



Curiosity Guide #608

Piano Science

Accompanies Curious Crew, Season 6, Episode 8 (#608)

Magnified Music Box

Investigation #2

Description

Play a little tune two ways. Do you hear what I hear? Why?

Materials

- Music box
- Wooden table
- A friend

Procedure

- 1) Wind up the music box.
- 2) Hold the music box in the air so that it plays for your friend.
- 3) While the music box is playing, lay it down on the table.
- 4) What do you and your friend notice?

My Results

Explanation

Placing the music box on the table makes the music louder. This is because the sound energy travels into the table and sends transverse waves through the wood particles. The transverse waves cause the wood particles in the table to vibrate. The surface area of the table is much larger than the box, so the sound vibrations impacting the air are amplified.

This is how the soundboard of a piano works. When the hammer strikes a piano string, the string vibrates and creates compression sound waves in the air. The string itself is thin so that it wouldn't produce a very loud sound. However, because the string is connected to the soundboard with the bridge, the string's vibrations transfer energy to the soundboard, and the entire piano starts to vibrate. The larger vibrating area hits many more air particles than the strings alone, which makes a much louder sound.

Investigate further. (You may want to locate photos or drawings of the following types of instruments: a dulcimer, clavichord, harpsichord, fortepiano, and a modern piano).

The history of the piano goes back many years. Engineers designed different ways to produce music by hitting tightly stretched strings. One of the earliest was the 14th century dulcimer in Europe, which inspired the design of the clavichord. After many more design changes, the harpsichord was produced in the 15th century, but the harpsichord could only play one volume. Then, in 1709, a harpsichord maker in Italy made the fortepiano, which could play the strings both loud and soft. Even after hundreds of years today's piano is very similar to the fortepiano. What a great design!

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