



Curiosity Guide #302

Sound Resonance

Accompanies Curious Crew, Season 3, Episode 2 (#302)

Resonant Rings

Investigation #4

Description

Do you have natural rhythm? All objects do!

Materials

- Construction paper, 20 inches long
- Scissors or a paper cutter
- Ruler
- Tape
- Cardboard, 12 inches by 3 inches

Procedure

- 1) Measure and cut a piece of cardboard into 12 inches by 3 inches.
- 2) Measure and cut five one-inch paper strips out of construction paper. Each strip should start out measuring 1 inch by 20 inches.
- 3) Trim each strip so that you have one of each of the following lengths: 8 inches, 10 inches, 12 inches, 16 inches, and 20 inches.
- 4) Loop each strip into a ring. Tape each ring together.
- 5) Place each ring, from smallest to largest, on the cardboard strip so that there is space between each ring.
- 6) Tape the rings to the cardboard so that each ring is standing upright.
- 7) Hold the cardboard in front of you so that you can easily see the rings.

- 8) Shake the cardboard side to side or up and down, slowly at first, and then with increasing speed. Observe.
- 9) What did you notice?

My Results

Explanation

Objects vibrate differently at different frequencies. The object's frequency is determined by how much mass the object has, as well as how stiff the material is. Objects that are stiffer, in this case the smaller rings, react more quickly with the applied force than the more massive large rings. At different frequencies of shaking, the ring may move more violently. That is the resonant frequency of the ring. The rings will also vibrate at different frequencies. In this case the rings begin to sway in their natural rhythm, which is determined by how stiff they are and their mass. However, when the sliding of the cardboard matches the natural sway of the rings, the sway gets bigger. Combining the shake with the sway amplifies the sway. This is called resonance.

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