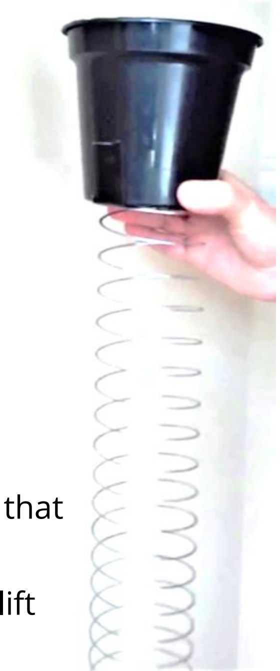
Sci-Fi Slinky Sounds

The University of Manchester

You will need:

- A metal slinky
- A plastic flowerpot or cup
- Duct tape



What to do

1. Hold the slinky at the top and let it extend down to the floor.
2. Lift up a few coils so that they bunch together and release them. Or try gently striking the coils with a metal spoon.
3. Listen to the sound.
4. Tape the base of the flowerpot to the top coil of the slinky so that the opening of the flowerpot faces away from the slinky.
5. Holding the flowerpot so that the slinky extends to the floor, lift and release or strike the coils as before.
6. How does the sound change with the flowerpot attached?

Explore Further

Listen carefully to the sound with the flowerpot. You might notice that it quickly drops from high to lower pitch. This gives it that "*pew pew*" noise, like a laser blaster from a sci-fi movie.

The pitch of a sound depends on the **frequency,** or the number of vibrations per second. The higher the frequency, the higher the pitch of the sound. In air, sound travels at the same speed regardless of frequency, but In the slinky coils, the higher frequency vibrations travel faster than the lower, so they reach the flowerpot first, causing that familiar descending tone.

What is going on?

Sounds occur when a vibrating object causes the stuff around it, such as air, to vibrate. The noise made by the slinky alone is quiet because the slinky has only a small vibrating surface area acting on the air around it.

The flowerpot has a large surface area and a large volume of air inside. The vibrations travel down the slinky, are reflected back up and reach the pot. The pot vibrates, causing the air inside and around it to vibrate. The vibrations build up, making the sound much louder than with the slinky alone. This is called *amplification*.

What we do

We are a research group at the University of Manchester. We use mathematics to model and test the properties of materials and waves. Examples of our research include understanding and reducing noise; modelling the behaviour of ligaments and tendons; and the design of *metamaterials*: special materials with extraordinary properties.

Mathematics of Waves and Materials