



# Screaming String

Suggested Grades: 3-8

## Activity Overview

In this activity, you will see how sound waves can be focused to increase the volume of a noise.

*Note: For this activity you will be inserting a pin through the straws and into an eraser, as well as making a hole in the bottom of a cup. You may need to ask an adult to help you with this.*

**Time:** 30 minutes

### Materials

- Plastic cup
- 2'-3' long piece of string or yarn
- Paper clip
- 6"x6" piece of paper towel
- Water

## Steps

1. Begin by making a small hole in the bottom of the plastic cup as shown in figure 1. If needed, ask an adult to help you make the hole.



Figure 1. Make a small hole in the bottom of the cup



Figure 2. Put the string through the hole in the cup.

2. Feed one end of the piece of string or yarn through the hole in the cup as shown in figure 2.

3. Tie the end of the string that is outside the cup to the paper clip (see figure 3).



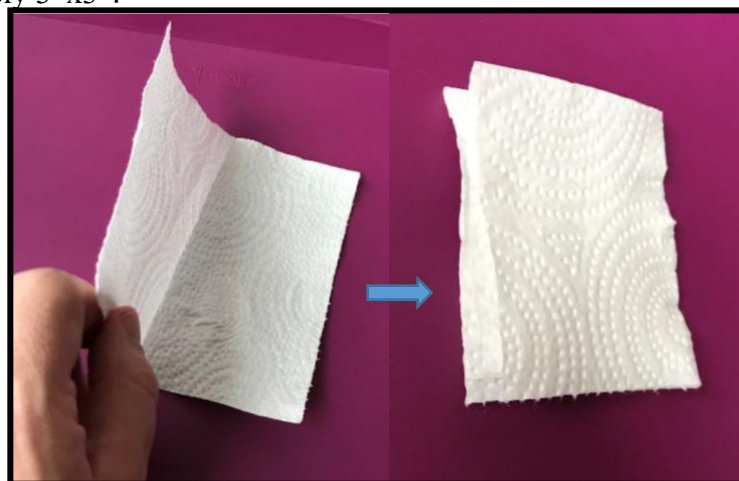
*Figure 3. Tie the string to the paper clip.*

4. Pull the string the rest of the way through the hole until the paper clip is resting on the bottom of the cup as shown in figure 4.



*Figure 4. The paper clip should sit on the outside of the bottom of the cup.*

5. Fold the paper towel in half twice as shown in figure 5 so it makes a square approximately 3"x3".



*Figure 5. Fold the paper towel in half twice.*

6. Use water to make the paper towel wet. It should be moist, but not wet enough to drip water.
7. Hold the cup upside down with one hand. With the other hand, wrap the wet paper towel around the string as shown in figure 6. Pull down on the string and paper towel while squeezing the towel against the string.



*Figure 6. Pull the paper towel down while squeezing it.*

As you pull the paper towel down, the friction of the paper towel rubbing against the string causes the string to vibrate. These vibrations are transferred to the cup. The shape of the cup focuses more sound waves in a small area, which increases the loudness.

8. Now, experiment with your screaming string machine. Try applying more or less force while pulling the paper towel down. You can also try pulling down at different speeds or pulling down a little bit at a time.

## Background Information

**What is sound?** All sounds are produced by vibrating objects. One of the reasons there are so many different sounds is that there is an endless variety of materials that can vibrate and produce them. If these vibrations are combined together, it can increase the loudness of the noise being created.

**X-59 (QueSST)** One of NASA's newest experimental aircraft, the X-59 (QueSST) is designed to lower the noise created by planes flying faster than the speed of sound. When planes fly supersonic (faster than the speed of sound), the pressure waves they create combine together and produce a very loud noise called a sonic boom. This noise is so loud that it can damage property and disturb animals.

The unique design of the X-59 is engineered to change the movement of the pressure waves so they don't combine and form the loud sonic boom. Instead, the plane creates a series of sonic thumps which are much quieter than the boom.



*Figure 7. The X-59 (QueSST) is designed to fly supersonic without creating a sonic boom.*