

# Big Ears

**Overview:** How do you think animals know we're around long before they see us? Sure, most have a powerful sense of smell, but they can also hear us first. In this activity, we are going to simulate enhanced tympanic membranes (or ear drums) by attaching Styrofoam cups to your ears. This will increase the number of sound waves your ears are able to capture.

## Materials

- Styrofoam cups (2, small)
- Styrofoam cups,(2, large)
- scissors
- kitchen timer

## Experiment

1. Set the timer and put it on a table or desk. Walk about 6 feet away and face the timer. Listen for the ticking sound. Now, turn your back on the clock so that you are facing the other direction. How has your ability to hear the ticking changed? We can increase the sounds you hear by using the cups.
2. Get an adult to help with cutting the cups. They will hold one of the smaller cups with one hand and make a cut about an inch (3 cm) from the rim toward the bottom of the cup.
3. Draw a circle at the end of the cut that is about the size of your ear where it attaches to your head. Cut out the circle.
4. Repeat steps 2 and 3 with the other 12 oz. cup. Carefully put them on your ears with their openings pointing forward. You have just added to the size of your ears and they should be able to collect more sound vibrations. Try listening to the timer now with the cups on your ears.
5. Now repeat steps 2 through 4 with the larger cups. Set the timer one more time and listen to the timer. Compare what you hear with what you heard with your unenhanced ears, and what you hear with the 12 oz. ears.
6. On a scale of *0-10*, how much did the cups improve what you were able to hear? Note where you would place both the 12 oz. cups and the 32 oz. cups on the scale if *0* is the starting point equal to what you can hear with your own ears.

## Big Ears Data Table

Cup Size	Did One Ear or Both Ears Have Cups?	How Did You Hear? <i>(Scale of 0 – 10)</i>

### Reading

Hearing is based on movement. The initial process involves the actual waves coming toward your ear, which are funneled inside to your tympanic membrane.

In this experiment we are going to focus on the initial funneling process. This is done by the visible, external part of your ear, known as the pinna. By making the pinna larger, you also increased their ability to pick up sound vibrations. This enabled you to hear much more, and at louder levels.

The pinna also help to determine the direction from which sound is coming. If a sound is coming from the left, your left ear hears it a little bit before the right. This lets your brain know where the sound originates.

### Exercises

1. Which part of the ear is this experiment testing?
2. What happens when you change your variable in this experiment?
3. Did this experiment change your ability to detect which direction a sound came from?

**Answers to Exercises: Big Ears**

1. Which part of the ear is this experiment testing? (The pinna, or the funneling process.)
2. What happens when you change your variable in this experiment? (By making the pinna larger, you also increased their ability to pick up sound vibrations.)
3. Did this experiment change your ability to detect which direction a sound came from? (Yes – it makes it easier to detect sound direction.)