

A Little Drop in the Bucket

Can a Paper Cup Improve Your Hearing?

Materials Needed

- Paper drinking cup
- 1-inch square of brightly colored paper
- A partner to serve as “paper dropper”
- Scissors

Grade Range

3-5

Topics/Skills

Sound
Energy
Body Structures & Systems

Learning Standards

NGSS: [Life Science](#); [Physical Science](#)

Duration

10-20 mins

Prep Time

5 minutes

How well can you hear a piece of paper land when it is dropped into a cup? Can the paper be cut to a small enough size that cannot be heard when it lands in the cup? This quick activity demonstrates a simple way to hear very quiet sounds!

Activity Challenge

The listener holds a paper cup to an ear while a partner drops a piece of paper into the cup adjusting the paper size with each drop.

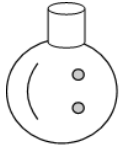
Preparation

Cut a 1-inch square from a sheet of paper and grab a paper cup. If no paper cup can be found, consider using paper and tape to make a cup-shaped vessel.

To Do

1. Guess (hypothesize) the smallest size paper that can be dropped into a cup and still be heard by the listener.
2. The listener tilts their head and holds the bottom of the cup firmly against their ear (as shown).
3. The partner tightly folds the 1-inch paper square and drops the tightly folded paper into the cup. The listener indicates if they can hear the paper when it lands on the bottom of the cup.
4. Unfold, cut the paper in half, and re-fold it tightly.
5. Repeat steps 2 to 4 until the paper is too small to hear.
6. Switch listener and paper dropper roles and repeat.

Cup on tilted head
open-side-up



Observations

- Did the cup make the sound louder than you expected?
- Was it possible to cut the paper to a small enough size so that the listener couldn't hear it land? What size was this piece of paper?

Extensions

- Repeat steps 3 to 6 above, except hold the bottom of the cup about 12 inches above the listener's ear. What size piece of paper could not be heard when dropped into the cup? Compare with size of paper when the cup was held against the listener's ear.
- Hold the cup against your ear and ask your partner to whisper from about 3 feet away and just loud enough for you to hear through the cup.
- Remove the cup and whisper another phrase at the same distance and loudness. Can the listener hear as well without the cup?

The Science Behind the Activity

When the paper strikes the bottom of the cup, the bottom vibrates. If the cup is against the ear, the vibrations efficiently travel into the ear. When vibrations strike our eardrums, the signal is transmitted by the auditory nerve to the part of the brain that processes sound. Sound travels in pressure waves that push and pull against our eardrums, making them also vibrate. The shape of the cup amplifies the sound, making the cup act like a simple hearing aid.