

EQUIPMENT BUILD PLAN SOUND & WAVES

Tin Can Telephone

Two large metal cans joined by a taut string carry a voice 100 feet or more. Talking into one can makes its bottom vibrate, the string carries those vibrations, and the far can turns them back into sound. It is an old project that still amazes students, and a good way to experiment with how sound travels through solids.

Written from Bruce's original workshop handout. Bruce's final review of this plan is in progress.



DIFFICULTY	BUILD TIME
Beginner	15 minutes
COST	SAFETY
Under \$5 (recycled cans)	Adult build / supervision
GOOD FOR	
Teachers, Families	

What it shows

No batteries, no bills, no signal bars: just two cans, a long string and vibrations.

Key ideas: sound, vibration, longitudinal waves, sound in solids

Safety (Adult build / supervision).

Opened cans can have sharp edges; an adult should check the rims and cover any rough spots with tape, and should punch the holes. Keep the stretched string away from walkways, stairs and necks.

CONSTRUCTION

Build it

Materials

- ☐ **Clean metal cans, one-gallon size** · 2
Bruce gets large cans from the school cafeteria; smaller cans and other containers can be compared
- ☐ **String** · 100 ft

Tools

Hammer and nail (adult)
Duct tape or electrical tape
Scissors

1

Prepare the cans

Wash and dry two one-gallon cans. Check the open rims for sharp edges and cover any rough spots with tape.

2

Punch the holes

An adult punches a small hole in the center of each can's bottom with a hammer and nail. The hole only needs to be big enough for the string.

3

Thread the first can

Push one end of the string through the bottom of the first can from the outside and tie a large knot on the inside so it cannot pull back through.

4

Thread the second can

Push the other end through the bottom of the second can from the outside and knot it on the inside.

5

Stretch it tight

Two people walk apart until the string is straight and taut. It must not touch anything or sag.

6

Talk and listen

One person talks into a can while the other holds the second can to an ear. Switch roles.

Experiment

Try different sizes of cans, plastic cups and other containers, different kinds of string, and different amounts of tension. Each type of container has its own best tension.

THE PHYSICS

How it works

When you talk into the can, the sound waves in the air make the bottom of the can vibrate back and forth. Because the string is tied to the bottom, it is pulled back and forth too, in vibrations far too small to see.

Those vibrations travel along the tight string to the other can and make its bottom vibrate in the same pattern. The second can bottom pushes on the air inside, which carries the sound to the listener's ear.

The string has to be tight to pass the vibrations along. A slack string, or one touching a fence or a person, absorbs the vibrations and the sound dies out. Sound often travels better through solids like a taut string than through the open air over the same distance.

Using it

- Before explaining, ask students to figure out how it works. What is vibrating at each step?
- Ask what kind of wave travels along the string, and how the string moves.
- Pinch the string partway along while someone talks. What happens, and why?
- Compare cans, cups and other containers, and different strings, in a fair test.
- Try a party line: tie a third can's string onto the middle of the main line.

GO FURTHER

Variations

- Plastic or paper cups make a quick, safe version for younger children.
- Compare string telephones with open sound tubes made from hose or pipe.

IF IT DOESN'T WORK

Troubleshooting

IF THIS HAPPENS

You cannot hear anything.

TRY THIS

Pull the string tighter and make sure it does not touch anything along its length.

IF THIS HAPPENS

The knot pulls through the hole.

TRY THIS

Tie a bigger knot, or tie the string around a small paper clip or button inside the can.

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