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Cup and String Phone Activity

Learning Objective: Students will be able to explain that sound travels as vibrations (waves) and requires a medium (solid, liquid, gas) to move through. They will observe that sound can travel more efficiently through a solid (the string) than through the air.

Key Vocabulary: Vibration, Sound Wave, Medium, Travel, Transmit

Materials Needed

For each phone: 2 paper or plastic cups (plastic solo cups work best)

For each phone: A long piece of cotton string or kite string (5-10 meters or 15-30 feet works well)

A metal paperclip or a toothpick for each student

Scissors

Optional: Wax, like from a candle or beeswax

Activity Procedure

1. Poke a Hole: Using a pencil or scissors (teacher-led), carefully poke a small hole in the bottom center of each cup.
2. Thread the String: Thread one end of the string through the hole in one cup.
3. Secure the End: Tie the end of the string to a paperclip inside the cup. If you don't have a paperclip, tie a knot and then slide a toothpick through the knot inside the cup to hold it in place. The goal is to create an anchor so the string cannot pull out of the cup.
4. Repeat: Do the exact same thing with the other end of the string and the second cup.

Tip: Rubbing the string with a little bit of wax can help reduce sound loss and make the phone work even better!

Test 1: The Basic Test

- Partners should walk apart until the string is taut (pulled tight).
- One student holds their cup to their ear (the Listener).
- The other student holds their cup to their mouth and speaks softly (the Talker).
- **Observation:** Can the Listener hear what the Talker said? How does it sound? (Quiet, muffled, clear?).
- Switch Roles: The Talker becomes the Listener and vice versa.

Test 2: The Loose String Test

- Now, try the same thing, but let the string go slack (loose and sagging).
- **Observation**: Can you still hear each other as well? What is the difference?

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Test 3: The "Touch" Test

- With the string tight, have the Talker speak while the Listener gently pinches the string.
- **Observation:** What do you feel with your fingers? (You should feel a buzzing or vibration!).

Test 4: The "Through the Air" Test

- Take the cups away from your ears and mouths, but stand at the same distance apart.
- **Observation:** Try to talk to each other at the same volume. Is it easier or harder to hear without the phone?

Guiding Questions:

1. When did the phone work the BEST? (When the string was tight).
2. What did you feel in the string when your partner was talking? (Vibrations).
3. Why do you think the phone didn't work when the string was loose? (The vibrations couldn't travel along a wiggly, loose string).
4. Was it easier to hear through the cups or just through the air? Why do you think that is?

Extension Activity: The Sound Wave Model

- Have students stand in a line, holding hands tightly. This is their "string."
- One student at the end gives a gentle hand squeeze.
- The next student feels it and passes the "vibration" (the squeeze) down the line.
- The last student feels the squeeze and raises their hand.
- Discussion: "This is like the sound vibration traveling down our tight string! Now, what if we were all wiggling and not holding hands tightly?" (The vibration/sound wouldn't make it). This is a great physical model of how the energy is transferred.