

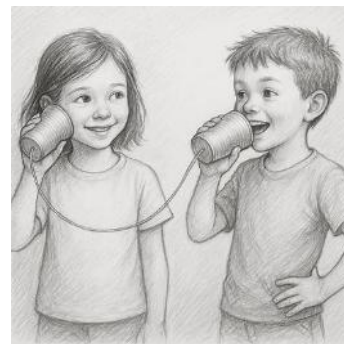
String Telephone Showdown: A Sound Investigation

Learning Objective: Students will conduct a controlled experiment to determine how different types of string (medium) affect the efficiency of sound transmission. They will learn that sound travels as vibrations and that the physical properties of a medium change how well sound can travel through it.

Key Vocabulary: Vibration, Sound Wave, Medium, Hypothesis, Variable, Data, Conclusion, Insulator, Conductor (in terms of sound)

Materials Needed

- For each group: 2 paper or plastic cups (identical)
- Different String Types (Cut to the same length for a fair test!):
 - ◇ Cotton String (e.g., kitchen twine)
 - ◇ Nylon String (e.g., fishing line)
 - ◇ Wool Yarn
 - ◇ Thin Metal Wire (e.g., beading wire, picture hanging wire - ensure ends are safe to handle)
 - ◇ Hemp or Jute Twine
- Scissors
- Paperclips or toothpicks (to secure strings)
- Student Worksheet (template provided below)
- A quiet space to test



Activity Procedure

Part 1: The Question and Hypothesis (10 minutes)

1. Introduce the Challenge: "We know a cup phone works, but are all strings created equal? Our mission is to find out which type of string makes the clearest and most effective telephone."
2. Brainstorm: Have students feel the different strings. Discuss their properties: Is it smooth or rough? Thin or thick? Stretchy or firm?
3. Form a Hypothesis: Students will write or circle their prediction on their worksheet.
 - Example Hypothesis: "I predict that the fishing line will work best because it is smooth and doesn't stretch, so the vibrations can travel faster."

Part 2: Building and Testing (20 minutes)

1. Build the Phones: Each group will construct one phone for each type of string, using the same method:
 - Poke a hole in the bottom of each cup.
 - Thread the string through and secure the end inside the cup with a paperclip or toothpick.
 - Repeat for all string types.
2. Controlled Variables: Emphasize the importance of a fair test.
 - "What must we keep the same for every test?" (The cups, the length of the string, the distance between partners, the volume of the speaker's voice).
 - "What is the one thing we are changing?" (The type of string). This is the independent variable.

Name _____

3. Testing Protocol:

- Partners stand apart, pulling the string taut.
- The Talker will say the same pre-determined phrase for every test (e.g., "The sun is shining!").
- The Listener will rate the sound quality on their worksheet.
- Switch roles and test again to confirm the results.

Part 3: Data Collection and Analysis (10 minutes)

- Students use the worksheet to record their observations for each string type.
- They can use a simple 1-5 star rating system or descriptive words.

Name _____

Student Worksheet: String Telephone Showdown

Team Members: _____

Our Investigation Question: Which type of string works best for a cup phone?

Our Hypothesis: We predict that _____ will work the best because _____.

Data Collection Table

Type of String	Sound Rating (1-5 Stars)	Type of Sound (clear, muffled, fuzzy, silent)	Did the string vibrate a lot? (Yes / No)
Cotton String			
Nylon Fishing Line			
Wool Yarn			
Metal Wire			
Hemp/Jute Twine			

Conclusion and Analysis

1. Which string was the winner? According to our data, _____ transmitted sound the best.

2. Why do you think that string won? (Think about its properties: smooth, rough, stretchy, firm?)

3. Which string was the worst? _____

4. Why do you think that string didn't work well? _____

5. Was your hypothesis correct? _____

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Discussion Questions to Debrief:

- "What did you feel in the string when it was working well?" (Strong, clear vibrations).
- "Why do you think the wool yarn might not have worked as well?" (It is soft and fuzzy, which absorbs the sound vibrations instead of transmitting them. It might also be stretchy).
- "How did the fishing line compare to the cotton string?" (Fishing line is often smoother and less stretchy, allowing vibrations to travel with less loss of energy).
- "What was surprising about the metal wire?" (It often works very well because metal is a excellent conductor of vibrational energy).

Simple Explanation for Students:

"Sound is a vibration that needs a path to travel along. A tight, solid, and smooth path is like a superhighway for vibrations—the energy zips right along (like on fishing line or wire). A soft, fuzzy, or stretchy path is like a bumpy dirt road—the vibrations get absorbed or lost, making the sound quiet and muffled (like on wool yarn)."

Differentiation & Extensions

- For Younger Students: Simplify the worksheet to a simple coloring or smiley-face rating system. Focus on the comparison between just two strings (e.g., yarn vs. fishing line).
- For Older Students: Introduce more variables to test:
 - ◇ String Length: Does the phone work over a longer distance?
 - ◇ Cup Material: Try paper cups vs. plastic cups vs. styrofoam cups.
 - ◇ Tension: Test the same string when it's taut vs. slack.
- Art Connection: Allow students to decorate their "winning" cup phone design.