Western Upper Peninsula Center
for Science, Mathematics and Environmental Education

FAMILY SCIENCE/MATH NIGHT LESSON PLAN

Family Math & Science Lesson Plan from students in ED 3510 Communicating Science course (2-credits)
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Can You Hear Me Now??

Presenter's Name: Mae Ricci, senior, MTU Dept. of Biological Sciences
Age Group: K-2
Topic: Sound Travel
Michigan Content Standards addressed:

- Describe sounds in terms of their properties. (SCI.IV.4.Elem.1)
- Explain how sounds are made. (SCI.IV.4.Elem.2)

Lesson Overview: The lesson will begin with a brief discussion on waves and sound travel. Students will experiment with tin-can telephones, and telephones made of different materials including paper, foam, and plastic and record their results on an record sheet.

Sources Consulted:

1. Cottam, M. (2006, January) Waves on the fly. *ScienceScope*. Pp. 22-25.
2. University of Florida SPICE Program. *Waves*. Retrieved 17 March 2006 at <http://spice.ees.ufl.edu/lessons.asp>
3. VanCleave, J. *Physics for Every Kid: 101 Easy Experiments in Motion, Heat, Light, Machines, and Sound*. 1991. John Wiley & Sons Inc. United States.

Objectives
Students will be able to:

1. Explain how sound travels (waves).
2. Explain why size matters (amplifies sound).
3. Explain whether type of material makes a difference in sound travel.
4. Form a hypothesis and conclusion.

Materials Needed: Plastic, paper, and Styrofoam cups; pairs of tin cans of various sizes; multiple pieces of string, all the same length. Each phone needs a matching set of cups, instructor should make at least 3 sets of every type of phone, students can swap them out. Enough copies of activity sheet and tin-can phone instructions for each student.

For attention-getter: a candle
For Sound and Wave Discussion: Slinky (1) and rulers for every student
Filler: Tin-Can Phone with at least 30 foot string
Second Filler: Enough paper cups for every student to make a phone (pre-punch holes in the bottoms of each), string for each pair of cups, and markers to decorate the phone.

Room Arrangement: Arrange phones around the room so that it walks the students through the lesson. Start with paper, plastic, Styrofoam, medium tin can, small tin can, and large tin can.

Procedure:

I. Introduction (4 Minutes)

Welcome to Family Science Night, Family Science Night is put on by the Western U.P. Center for Science, Math, and Environmental Education. My name is Mae and I'm graduating from Michigan Technological University this spring with a degree in Biology. After graduation I'll be attending Eastern Carolina University in North Carolina to get my Doctorate of Physical Therapy, which is the study of exercise to make patients healthy. (If there's an assistant, introduce them here.) Even though I study exercise, I'm also interested in phones and sound, so today we're just going to talk on phones.

Attention-Getter: How does sound move? While students are thinking of answers, light a candle and ask for a volunteer. Have them blow candle out and explain that we can see that air moves. Sound moves air. We call this movement a 'sound wave.'

II. Discuss Sound Waves (2 -3 Minutes)

- Sound is produced when objects vibrate. (Have student place ruler on edge of desk and flick it to create vibration, explain that that is what produces sound.)
- When vibrations start air moving, the continuous ocean of air around you transfers energy to your ears, and you register that sound has been produced.
- Sound travels in waves. (Have two other volunteers come up and stretch out slinky to show wave shape.)

III. Activity (24 Minutes)

Today we're going to test different types of phones and see which one is best to talk on. Have students look at activity sheet, explain sheet and terms used in tables. Write volume and clarity on the board and say that we're going to learn two new words today. Also, it's helpful to relate volume to a TV remote.

Volume: How loud something is

Clarity: How easy it is to hear something

****For each of the activities, try to have at least 5 of every kind of phone.**

Part 1

Instructions: Students will use tin can phones for this test. Have students circle which phone they think will work best on their activity sheet. Students will stand apart, but keep slack in the string and whisper into can. They will record results on activity sheet. Advise students to use all of the spaces in the room to do their experiment. Next students will back up until string is taut and whisper into the can, they will have their parents record results. **Don't worry about students not being able to hear each other in the phones, students should be whispering, allowing everybody to hear their own partner in the phone.

Discussion: Ask students what kind of results they got, record on overhead. Ask students which phone worked best, they will say the tight string phone, remind that during the next two activities they will want to keep the strings on their phones tight, since that's what works best.

Part 2
Instructions: Students will test phones made out of different materials including: Styrofoam, plastic, paper, and tin. Have students circle which phone they think will work best on their activity sheet. Students will record results on activity sheet. Advise students to use all of the spaces in the room to do their experiment. **Don't worry about students not being able to hear each other in the phones, students should be whispering, allowing everybody to hear their own partner in the phone.

Discussion: Ask students what their results were, record on overhead. Tin can phone should be the best because of the metal, acts as a better amplifier. Say now that we've determined a phone with a tight cord made of tin is the best, let's test different sizes.

Part 3
Instructions: Students will test different sizes of tin cans to see what difference size makes. Have students circle which phone they think will work best on their activity sheet. Students will record results. Advise students to use all of the spaces in the room to do their experiment. **Don't worry about students not being able to hear each other in the phones, students should be whispering, allowing everybody to hear their own partner in the phone.

Discussion: Ask students what their results were, record on overhead.

IV. Discuss Results (5 Minutes)
Have students look at overheads of all activities. Ask students if they had to pick a phone to talk to their friends on, which one they would pick. Why would they pick that phone?

V. Assess Student Learning (4 Minutes)
Ask students:

- Does sound move? Yes
- What does sound move? Air
- Why is vibration important? Vibration produces sound
- What do we talk with? Our Mouths
- What do we hear with? Our Ears
- What does sound look like? Waves
- Why does size matter? Amplifies sound
- Explain whether type of material makes a difference in sound travel. Usually metal makes a difference in being able to hear, it's a better conductor.

Thank you for coming.

Filler:

(1) Sound scavenger hunt. (Attached)
(2) Make a tin-can phone ahead of time that has a long string (~30 feet) have students try phone, they can stand across room, out in the hall, etc.
(3) Have students make their own phones to bring home.

Take Home Handouts: Students can take activity sheet home and instructions for how to make their own tin can phones.

Clean-Up & Safety Considerations: None!!

How To Make Your Own Tin-Can Phone

1. Get 2 tin cans that are the same size and clean them thoroughly.

2. Have a parent either drill a hole in the bottom of the cans or poke a hole with a nail and hammer.

3. Thread a long piece of string through the cans and tie knots on each end so that your phones don't fall off.

4. Get a friend, pull the string tight, and have a conversation!! See how far away you can get and still hear your friend.

Can You Hear Me Now??

Name: _____ Date: _____

- Work in pairs, have your parents record your results for you.
- Make a prediction by answering Yes or No.
- Rate volume of your friend's voice: loud, medium, soft
- Put an "X" in the box that best describes the clarity (how clearly you can hear) of your partner's voice.

Activity 1: Does Sound Travel Better with a Tight String??

I think: YES NO Let's find out.....

String:	Volume: Loud, Medium, Soft	Clarity: Can Not Hear	Can Hear A Little	Easy To Hear
Loose String				
Tight String				

Activity 2: Do Some Materials Make Better Phones??

I think: YES NO Let's find out.....

Type of Phone:	Volume: Loud, Medium, Soft	Clarity: Can Not Hear	Can Hear A Little	Easy To Hear
Tin Can				
Plastic Cup				
Paper Cup				
Styrofoam Cup				

Activity 3: Do Bigger Cans Make Clearer Sounds??

I think: YES NO Let's find out.....

Size of Phone:	Volume: Loud, Medium, Soft	Clarity: Can Not Hear	Can Hear A Little	Easy To Hear
Small Can				
Medium Can				
Large Can				

Fun With Sound Scavenger Hunt

Find a person who:

_____ Has Talked on the Phone Today

_____ Owns an Old-Fashioned Phone

_____ Listens To Music

_____ Has Seen Waves in the Ocean or in Lake Superior

_____ Has Used Earplugs

_____ Has Played a Musical Instrument

_____ Has Used Headphones

_____ Owns A Record Player

_____ Talks a Lot!

_____ Whispers Very Quietly

_____ Yells Really Loud