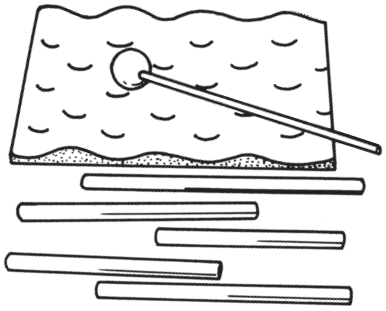
LETTER TO PARENTS

Cut here and paste onto school letterhead before making copies.

SCIENCE NEWS

Dear Parents,



Our class is beginning a new science unit using the **FOSS Physics of Sound Module.** In this unit your child will investigate the fundamental principles of sound generation, how sound travels, and some of the physical characteristics of the energy form we call sound. This is an exciting unit for students. Over the next 6 to 8 weeks they will engage in active investigations of vibrating systems and musical instruments to see what they can find out about pitch and volume, and how to control or modify systems to control the sounds they make. This is the basic premise of music.

Your child's interest in sounds, sound sources, and sound receivers can be increased by asking about the investigations at school and by providing additional experiences at home. Do you have a musical instrument at home? Study its design and figure out together how it makes sound, what is vibrating, and how the player controls the rate of vibration to create different pitches. Or you might want to make musical instruments by assembling a pot-and-pan orchestra, some kind of stringed (or rubber-band) instrument, or something you blow. Another activity that is fun for the whole family is listening to the sounds of silence—finding a quiet location and identifying the sounds that invade even the quietest places.

Watch for the Home/School Connections sheets I will be sending home with your child from time to time. These suggest even more ways for the whole family to tune up and tune in to the vibrations in the everyday environment that we know as sound.

We are looking forward to many weeks of investigations with our **Physics of Sound Module.** If you have any questions or comments, or have expertise you would like to share with the class, please drop me a note.

Comments _____

PROJECT IDEAS

- **INVENT A MUSICAL INSTRUMENT**
  Create an instrument that changes the pitch of the sound at its source. Vary the length, tension, or thickness.

  Use what you have found out about how sound travels to bring the sound to the sound receivers. Direct the sound through water, air, or a solid object.
- **TAKE THE MYSTERY OUT OF MUSICAL INSTRUMENTS**
  Research how different musical instruments vary the pitch of their sound. Prepare a slide show or poster display, or bring in real instruments to demonstrate how they work.
- **MAKE A DUCK FLUTE**
  Flatten a plastic straw at one end and cut it to make a double reed. Blow through the straw with the reed completely in your mouth to make a duck flute. Use what you know about sound vibrations to change the pitch of this flute. How can you use a second straw of a different diameter to make a slide duck flute?
- **RECORD SOUND EFFECTS**
  Sounds that are duplicated or altered for movies or television are called sound effects. Use a tape (or video) recorder to collect sound effects. Crumpled cellophane makes the sound of fire. Some grains of rice in an inflated balloon make nice rain sounds. What other effects can you make?
- **INVESTIGATE STRING TELEPHONES**
  Make new and improved phone systems. Try using a different kind of cup, or try using wire instead of string. Design a phone line for three or four listeners at a time. Try using a garden hose for a telephone. (Be sure that the water is drained out of the hose.)
- **COMPARE SOUND MUFFLERS**
  Research ways to muffle sound at the source and at the receiver. Building supply stores may be able to supply samples of acoustical tile for this project.
- **RESEARCH HEARING AIDS**
  Research the history of hearing aids. Why do people need them and how do they work?
- **MAKE AN AIR CANNON**
  Make an air cannon from an empty 20-liter (5-gallon) plastic bucket, a piece of tough fabric (like Naugahyde), and a drum beater. Find out what it can do and how it works.
- **EXPLAIN SOUND-MAKING TOYS**
  Many interesting devices that are sold at toy stores and science centers make sounds. Bring in a collection to class and explain how each device makes sound.
- **RESEARCH HEARING IMPAIRMENTS**
  Research different forms of hearing impairments. Find out how people with hearing impairments learn at school and communicate. Learn some sign language to teach the class.
- **RESEARCH HUMAN HEARING AND VOCAL CHORDS**
  Research your own sound receiver and producer. Find out ways to protect your hearing.
- **INVESTIGATE THE ADAM'S APPLE**
  What is that bump in the throat that moves as you speak? Why is it there? Research the Adam's apple to share with the class.
- **RESEARCH ANIMAL SOUNDS**
  Research the way that different types of animals make sounds. Suggested animals: crickets, frogs, hummingbirds, whales.
- **RESEARCH WHALE AND DOLPHIN COMMUNICATION**
  Prepare a report on how marine mammals communicate underwater. Use your understanding of sound's ability to travel through water.
- **RESEARCH BAT NAVIGATION**
  Prepare a report on how bats use sounds to find food and to navigate. Use your understanding of sound's ability to travel through air.
- **COMPARE ANIMAL EARS**
  Research and compare the shapes of animal ears. Why might some animals need large ear flaps while others have none? What kinds of outer ears do water dwellers have?

Name _____

Date _____

PROJECT PROPOSAL

1. What is the question or the project that you are proposing?

2. What materials or references will you need to complete the project?

3. What steps will you follow to complete the project?

Name _____

Date _____

PRESENTATION GUIDELINES

You will have exactly 3 minutes to present your project to the class. In those 3 minutes you should answer these questions.

- What were you trying to find out (your question)?
- What materials or references did you need to do your project?
- What procedure did you follow to complete your project?
- What did you learn from doing your project?

When you begin speaking, you will see the *green card* held up for 2 1/2 minutes. When you see the *yellow card,* you have 30 seconds left. When you see the *red card,* it means you can finish your sentence, but you must stop within the next few seconds.

Practice your presentation so you will be sure it is at least 2 1/2 minutes long, but not more than 3 minutes long. Be sure you have included all of the information asked for above.

Name _____

Date _____

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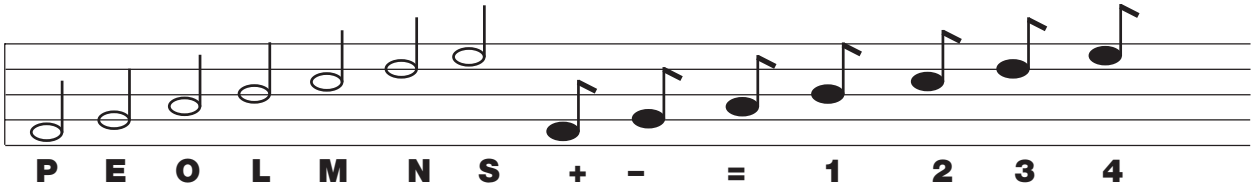
Date _____

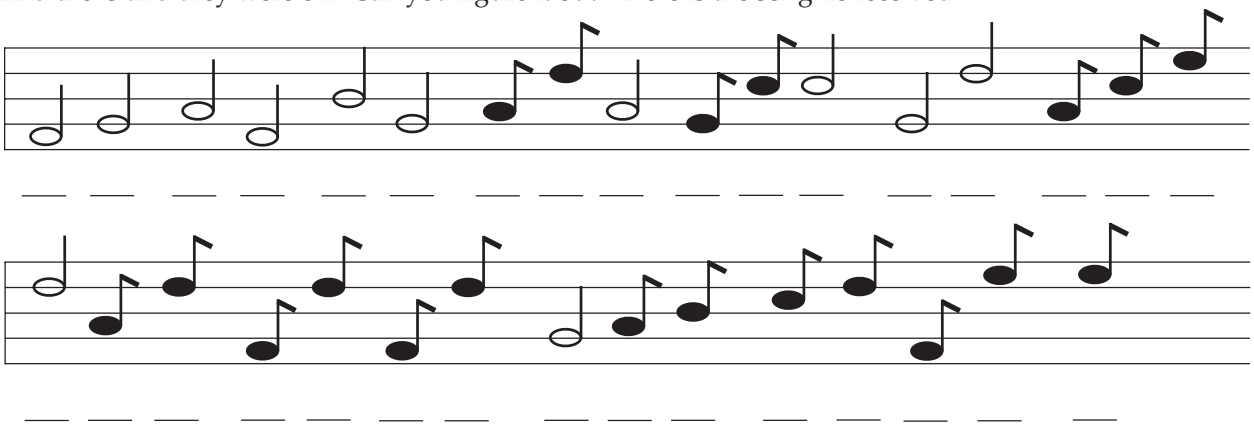
MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 1: DROPPING IN

Shipwrecked on an island! During World War II a small passenger ship hit a reef and washed up on an island in the Pacific Ocean. After the captain made sure everyone was safe, he called for help. But how did he keep the enemy from finding out where they were? He sent the message in code! He used music code to contact the navy. Here's the code.



That night the navy communications officer received an interesting musical message. When he decoded it, he knew how many men and women were stranded on the island, and by looking on his map, he could find the island they were on. Can you figure it out? Here is the song he received.



How many people are on the island? _____

How many of them are men? _____

How many of them are women? _____

Which island are they on? _____

The navy could not rescue the people right away, so they flew over and dropped enough supplies for 10 days. They planned the following:

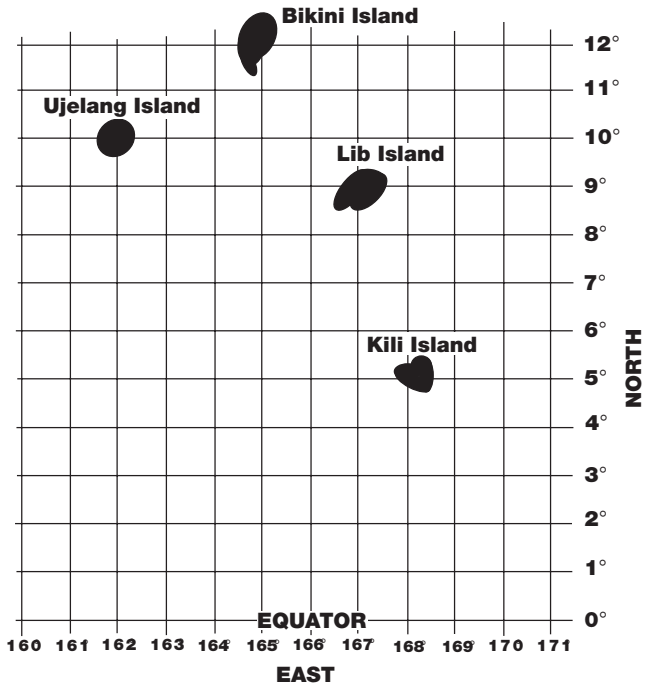
1 Tent for 4 people to be shared.

2 Potatoes per day for each person.

1 Lemon for each person every other day.

1 Gallon of water for two people to share each day.

How much of each item was included?
(Use the back of this paper to show your work.)



Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 2: GOOD VIBRATIONS

Nancy, Andrea, and Michael are forming a musical group. They are hoping to play a piece for back-to-school night. The three students are all in different grades at school, third through fifth. From the clues below, figure out what musical instrument each student plays and what grade each is in.

1. A girl plays the guitar.
2. Nancy is in a higher grade than the violin player.
3. The flute player is not in third grade.
4. The girl in fourth grade takes private lessons.
5. Michael is not in fifth grade.
6. Andrea is in a lower grade than the flute player.

Use this chart to organize information from the clues. Put an X in the grid when you discover something that is not a possibility. For instance, the first clue tells us that a girl plays the guitar. Therefore it is not possible for Michael to play the guitar, because he is a boy. Put an X in the Michael/guitar grid cell.

Put a dot in the grid when you know something is true.

	3rd	4th	5th	Guitar	Violin	Flute
Nancy						
Andrea						
Michael				X		
Guitar						
Violin						
Flute						

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 3: HOW SOUND TRAVELS

Ms. Trujillo's class is making string telephones, minigutbuckets, and FOSS-uleles for a sound and music festival. All 24 students will be playing minigutbuckets and FOSS-uleles or listening on the string telephone at the same time. These are the instruments that Ms. Trujillo's students chose.

- Eight students playing FOSS-uleles. (Remember, two students work with each FOSS-ulele.)
- Eight students playing minigutbuckets. (Remember, one student works with each minigutbucket.)
- Eight students listening with string phones. (Remember, two students work with each string telephone.)

Here are the materials lists for the instruments.

FOSS-ulele	**Minigutbucket**	**String Telephone**
1 String, 2 meters long	1 String, 1.5 meters long	1 String, 4 meters long
1 Cup	1 Cup	2 Cups
1 Paper clip	1 Paper clip	2 Paper clips
1 Pencil		

1. How much string is needed to make the instruments for the festival?

2. How many cups are needed to make the instruments?

3. How many paper clips are needed to make the instruments?

4. How many pencils are needed to make the instruments?

5. Sixteen students from Mr. Olsen's class want to join the festival. The students looked to see what materials they still had to make additional instruments. They found plenty of cups, pencils, and paper clips, but they weren't sure if they had enough string. They had only the remains of the original ball of string, which had 52 meters when it was new. Can 16 more students join the fun? If so, what instruments should they make?

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 4: SOUND CHALLENGES

Your group has just been awarded the PUBA (President's Unbelievably Brainy Award). You get to spend $10.00. But you can't buy candy with it! Your challenge is to make and name a musical instrument. It must play *at least* three pitches. You can use only materials that you purchase from the list. The shop will drill holes or cut materials for you. But you have to pay the shop, too.

Price	Item	Quantity
$0.50	thin wire	1 meter
$0.60	medium wire	1 meter
$0.70	thick wire	1 meter
$1.45	wood	1 meter long
$0.89	nails	10
$0.20	hooks	each
$2.30	glue	1 bottle
$1.25	metal can	25 centimeters wide
$1.50	metal can	50 centimeters wide
$1.75	metal can	1 meter wide
$1.00	can lid	each
$2.75	metal pipe	1 meter long
$1.25	paint	each color
$0.50	each cut made	
$0.50	each hole drilled	

(Remember, 1 meter = 100 centimeters.)

What will you buy?

How much will it all cost?

How much money will you have left over?

Draw a picture of your instrument and explain how it makes sounds.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 1: DROPPING IN

PART 1: THE SOUNDS OF SILENCE

Find the quietest place you can. It might be in a room at home, in your yard, or in front of your home, or someplace else. Sit back-to-back with a partner and listen. How quiet is the quietest place you can find?

PART 2: NAME THAT SOURCE

Find a noisy place. Get paper and pencils for each partner. Write down the sounds that you hear in 5 minutes. Compare notes. Did you both hear the same things? What was the source of each sound? Was something vibrating there? What do you think it was?

PART 3: MODIFIED HEARING

Does a family member or friend have to modify their hearing in some way to do their job effectively and safely? Some people work in noisy places and use protective devices to prevent damage to hearing. Other people use hearing aids or stethoscopes to make sounds louder. Can you find any examples of hearing modification among your family or friends? How do the devices they use work?

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 2: GOOD VIBRATIONS

Put together a tinker's band with family and friends. Make as many different kinds of sounds and as many pitches as you can with everyday objects around the house. Try to make a diatonic scale.

do, re, mi, fa, sol, la, ti, do.

Things to try out for the band might include

- Bottles, with and without water.
- Bowls, glasses, and pitchers.
- Tin cans.
- Cook pots and fry pans.
- Lids for cook pots and fry pans.
- Nails or bolts or pieces of pipe hanging from strings.
- Pieces of wood.
- Strings, wires, or ropes pulled tight.
- Rubber bands, inner tubes, or bungee cords pulled tight (be very careful).

Play some tunes, either solo or in a combo with friends and family. Turn on the radio or some recorded music and play along. Make a sound recording of your own musical efforts. Bring the recording to class and have other students analyze the different sounds they hear and record them on a chart.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 3: HOW SOUND TRAVELS

If you have a chance to swim in a pool, take a few minutes to find out a little more about how sound travels underwater and about underwater hearing.

Safety Note: Students should always swim with adult supervision.

- Above the water, close your eyes and have a friend click spoons together. Try to locate the sound source as your friend moves it around.

  Now take a breath and duck under the water, eyes still closed. Have your friend click spoons together underwater, moving them from place to place. Can you locate the sound source? Which is easier to locate, a source in air or a source underwater? Why do you think so?

- Put your fingers in your ears while your friend clicks two spoons together in air. Then remove your fingers from your ears and listen to the clicking sound. How does it sound? Was it different with and without your fingers in your ears? How can you explain this observation?

  Put your fingers in your ears and duck under the water while your friend clicks the two spoons together underwater. Was it different with and without your fingers in your ears? How can you explain this observation?

- With your head below water, have your friend say words that sound the same, like "top," "pop," "mop," "cot," and "pot." How does it sound? What do you think is going on?

- Have your friend sing to you as you lie underwater. Encourage your friend to really ham it up, with lots of high and low pitches, and loud and soft sounds. Try listening with your ears open and with your fingers in your ears. Does it sound different or not?