THE KITTEN
WHO COULDN'T PURR
By
Eve Titus

How and why cats purr isn't well understood, but they only purr when they are content or in pain. Mother cats purr to signal their kittens to nurse; the kittens, born blind, deaf and with no sense of smell feel the vibrations and know it is feeding time. Kittens begin to purr when they are about one week old, and, as adults, can purr at two or three pitches.

If you put your hand on a cat when it is purring, you can feel its whole body vibrating or trembling. Jonathan isn't able to purr, but he is able to find a way to say thank you. Use Jonathan's plight and all the sounds the other animals make to help your students learn to "see, hear, and feel" sound. Sound waves only travel through a state of matter such as a solid, liquid, or gas.

MATERIALS: crayons, paper, metal or cafeteria-style trays, Styrofoam cups, rubber bands, water, string, wire coat hanger, string, pennies (five per group)

ACTIVITY: See directions with each attached diagram. Students should record their results of each investigation in their journals.

SOURCE: SOUNDSATIONAL Workshop given at NSTA National Convention, Atlanta, GA April 1990 by William Badders and Norman Schmidt, Cleveland Public Schools.

WEBSITE: http://www.smm.org/sound/nocss/top.html This website links you to The Science Museum of Minnesota. It was created with the input and assistance of elementary classes in St. Paul and Minneapolis.

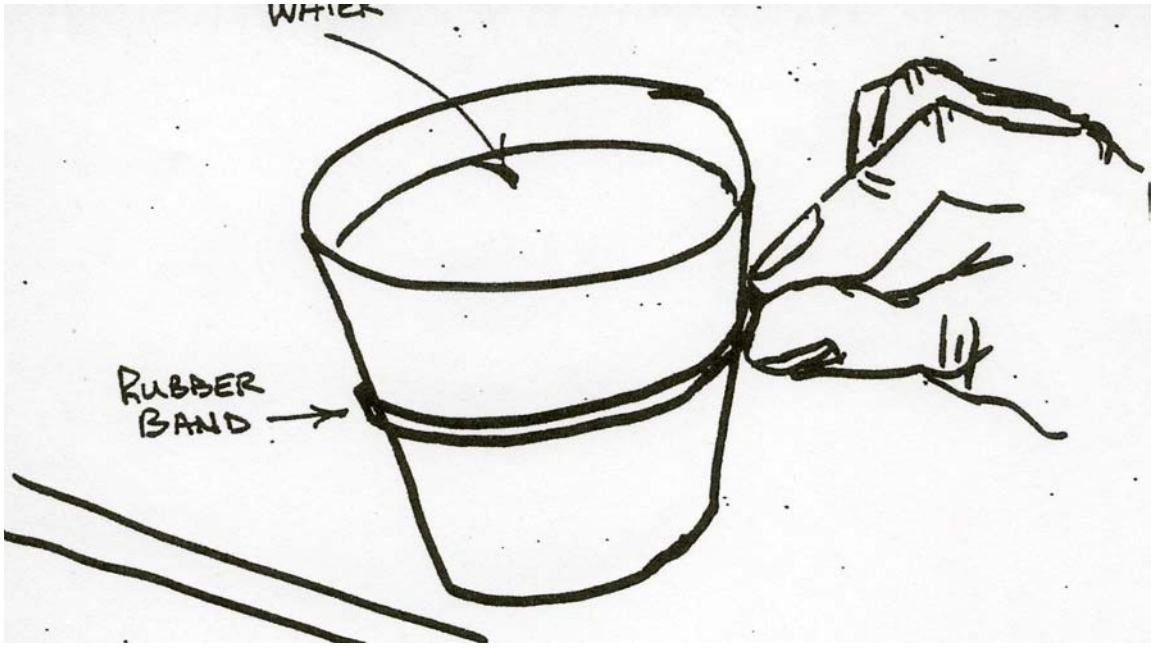
STANDARDS:
BSL: 1.1, 1.2, 1.3, 4.12, 6.1, 12.1, 12.5
NCTM: 2a, 3b
SCS: A1, A2, B1

Titus, Eve. The Kitten Who Couldn't Purr. Morrow Junior Books, c1988. ISBN#0-688-09363-9.

Seeing a Sound Wave

Materials: 1 Styrofoam cup, 1 rubber band, water, tuning fork (optional)

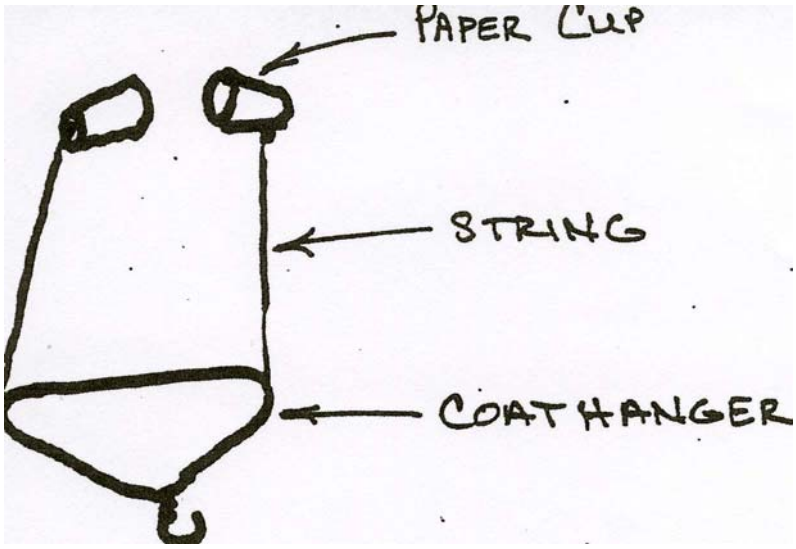
Place the rubber band around the outside of the cup. Fill the cup about ¾ full of water. While holding the cup on the bottom with one hand (to make sure it doesn't tip over), snap the ban lightly and look for the "sound" waves on the surface of the water. Caution: the *harder you snap* the rubber band, the *faster the waves will travel*. If you snap lightly, the waves will be easier to see.
If you have a tuning fork, try this. Strike the prongs of the tuning fork gently on your hand and lower the fork into the water, prongs first. "Sound" waves will be produced and water may splash out. Keep a towel handy.



Hearing a Sound Wave/Stereophonic Headphones

Materials: 2 paper cups, 2 paper clips, 2 pieces of string @ 2 feet long, 1 wire coat hanger.

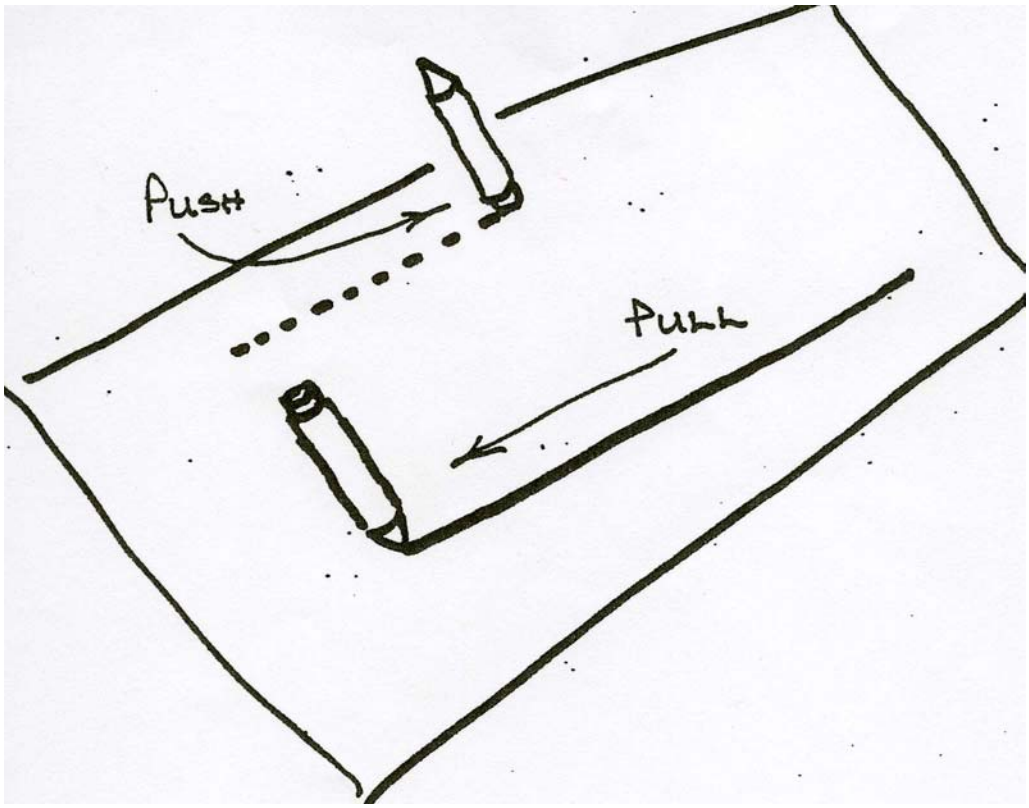
Punch a small hole in the bottom of each cup. Thread the end of each piece of string in the bottom of each cup. Tie the end of the string that is inside the paper cup to a paper clip. Now attach the other end of the strings to the outside corners of the coat hanger.
Hold both cups in your hands and bang the hanger against the edge of the desk. Now hold the cups to your ears and bang the hanger against the desk. Ask your students which way allows them to "hear" the sound better. This activity demonstrates that sound travels easier, faster, and better through a solid than through a gas.
A variation of this activity can be done by tying a metal spoon in the center of a four foot piece of string. Wrap the ends of each index finger around the ends of the string and gently place the index fingers in your ears. Then bang the spoon again the desk.



Slide and Skip: *Feeling and Drawing* a Sound Wave

Materials: 1 crayon, 1 piece of paper, one cafeteria-style tray

Place the paper on the tray that has been turned over. Hold the paper firmly and draw a line with the crayon in a normal manner. Then, using the flat end of the crayon, draw a line by pressing down hard on the crayon and pushing it away from you. You will "hear" and "feel" a vibrating sound as the crayon slides and skips across the paper.
You now have a drawing of a sound wave.



Sound and Density

Materials: 5 pennies

Sound waves only travel through matter. Electromagnetic waves such as light do not need matter. The pennies are a model for the molecules in the three common states of matter: solid, liquid and gas. *When your students are finished with the activity, see if they can arrange the states of matter in order from fastest to slowest.*

GAS: Gas molecules are in constant motion and are farther apart than those molecules in solids and liquids. Sound will travel more slowly. Line up the four pennies with about half a penny of space in between each penny. Strike the first penny in line with the other penny to see how well the "sound wave" travels. The striking penny represents a vibrating object.

LIQUID: Liquid molecules are slower moving and closer together than gas molecules. Line the four pennies up again leaving only about a quarter of a penny space between them and strike the first penny again with the striker penny. Does the "sound wave" travel farther?

SOLID: In solids the molecules are packed closely together. Line the four pennies up so that they are touching. Repeat the striking and observe how the "sound wave: travels.