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ABSTRACT

This physical science activity module was designed to facilitate developing concepts related to sound. It is intended for use primarily in elementary grades but may be useful at higher grades. It provides students with hands-on experience and observational skill development. The package provides: (1) a teacher background sheet; (2) an activity cover sheet; (3) an activity sheet intended for use by teachers; and (4) a question and answer sheet for use in the upper grades. The activity cover sheet and the activity sheet have been designed like a lesson plan. (CW)

MAKING SOUNDS WITH RUBBER BANDS

By

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INTRODUCTION

Making Sounds with Rubber Bands is an activity useful to facilitate student conceptualization with a number of science behavioral objectives. It is intended for use primarily in the elementary grades but may also be useful in higher grades. Its use provides students not only a hands-on experience but also helps them with observational skill development. The package provides a teacher background sheet, an activity cover sheet, an activity sheet intended for use by teachers, and question and answer sheet for use in the upper grades. The activity cover sheet and the activity sheet itself have been designed much like a lesson plan. This approach reduces greatly the amount of time teachers must spend preparing to conduct such activities since all necessary information is provided in one place and in logical sequence. The activity is presently being used by some elementary teachers in DoD Schools (DoDDS), Pacific Region.

MAKING SOUNDS WITH RUBBER BANDS

TEACHER BACKGROUND

The question, how is sound created, is not easy to answer nor is it a concept, easy for young students to understand because it requires abstract ideas and to some extent, abstract thinking. Sound is created when something causes the matter of which air is composed (oxygen, nitrogen and so on) to move or vibrate. The vibrations are passed from atom-to-atom, molecule-to-molecule and atom-to-molecule depending upon the actual air composition in the area where the listener is located. Eventually, the vibrations are passed to air particles close to the listeners ears where they cause the ear drum or tympanic membrane to vibrate. These vibrations are then, via the ear mechanism and neural pathways, transferred to the brain. The force with which the vibrating particles hit the ear drum causes us to hear sounds as soft, loud or some volume in between. The number of vibrations effecting the ear drum in a given time period determines whether we hear a higher or lower pitched sound. Since we cannot see air particles the functioning of the inner ear or the electrical pulses transmitted along nerve pathways, the process is automatically abstract.

This activity is designed so that students can investigate the effects of causing three objects to vibrate; a thin rubber band, a thick rubber band and a ruler. Since the the student investigator hears sound when the objects are vibrating and the sound ceases when the objects cease to vibrate the implication is that something between the vibrating object and the ear must carry the vibrations to the ear. By inference, air must be composed of particles which carry the vibrations.

The activity is intended to help facilitate conceptualization with those objectives listed on the "Activity Cover Sheet."

MAKING SOUNDS WITH RUBBER BANDS

ACTIVITY COVER SHEET

WEEK/ACTIVITY NUMBER/TITLE: / /Making Sounds With Rubber Bands

GRADE LEVEL/S: K-10

PRESENTATION TIME: 20-30 minutes depending upon the length of dicsussion during/after the activity

PRESENTATION METHODS: Student Activity/Discussion

DoDDS "INSTRUCTIONAL" SCIENCE OBJECTIVES: This activity helps facilitate conceptualization with the following objectives:

1.1.1/K-4 OBSERVE and report about an object using more than one sense.

1.3.6/5-10 FORMULATE an hypothesis as an "if-then" statement.

1.4.1/K-8 GIVE examples of cause and effect relations.

1.4.3/4-8 FORMULATE a question that can be answered by science activity.

1.4.4/4-7 IDENTIFY a variable which is deliberately changed in an experiment.

2.9.1/k-4 DESCRIBED how sound is produced.

2.9.3/6-9 EXPLAIN how sound is transmitted through various media.

REFERENCES.
1. The Teacher Background sheet accompanying the activity.

MATERIALS REQUIRED:
1. One textbook for each student - the books should (if possible) all be the same size.

2. One ruler for each student - the rulers should (if possible) all be the same size

3. One thin rubber band for each student - all rubber bands should (if possible) be the same size.

4. One thick rubberband for each student -all rubber bands should (if possible) be the same size.

5. One copy of the activity question and answer sheet for each student in grades 5 and higher.

SAFETY PRECAUTIONS:
1. None.

PREPARATION DATE:
1. 88APR12

REVISION DATES:

TEACHER NOTES

ACTIVITY NOTES

I. INTRODUCTION

A. TITLE: Making Sounds With Rubber Bands.

B. OBJECTIVES:

1. OBSERVE and report about an object using more than one sense.

2. FORMULATE an hypothesis as an "if-then" statement.

3. GIVE examples of cause and effect relations.

4. FORMULATE a question that can be answered by science activity.

5. IDENTIFY a variable which is deliberately changed in an experiment.

6. DESCRIBED how sound is produced.

7. EXPLAIN how sound is transmitted through various media.

C. VALUE OF THE ACTIVITY: We hear sounds when our eardrums vibrate in response to vibrating air molecules. This activity helps us understand how air the around us is set in motion.

II. PRESENTATION

A. ACTIVITY DESCRIPTION:

TEACHER NOTES

ACTIVITY NOTES

B. PROCEDURES:

1. Method 1.

a. Give each student a book. All books should be the same size.

b. Give each student one rubberband of each size.

c. Give each student one ruler.

d. Stretch the rubberbands around the book, close to opposite ends of the book.

e. Slide the ruler between the rubberbands and the the book.

f. Stand the ruler on edge close to the middle of the book so that the face of the book, the ruler and the rubberband form a triangle.

g. Pluck the small rubber band and watch what happens.

h. Pluck the large rubberband and watch what happens.

i. Pluck the small rubberband and before it stops moving, touch it gently.

TEACHER NOTES

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j. Pluck the large rubberband and before it stops vibrating, touch it gently.

k. Pluck each rubber- twice as hard as was done the first and second times; watch and listen.

2. Method 2.

a. Set the ruler on the edge of the desk with one half extended over the edge.

b. Place one hand firmly on the half on the desk.

c. Hit the end of the ruler extended over the edge of the desk with the free hand; watch and listen.

d. Repeat step "c" but this time hit the ruler harder than the first time; watch and listen.

e. Repeat step "c" but this time touch the end of the ruler while it is still vibrating.

f. Move the ruler so that 1/4 is on the desk and 3/4 are extended over the edge of the desk and hit the ruler with the free hand; watch and listen.

TEACHER NOTES	ACTIVITY NOTES
	3. Class discussion of those events which happened during the activity.
	III. SUMMARY Briefly review the main points covered during the discussion.

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QUESTION AND ANSWER SHEET

Directions: Answer each question to the best of your ability based the observations you have while you were doing this activity.

Question/Statement	Answer
1. Did plucking the rubber bands make sounds?	
2. Did the rubber bands move back and forth?	
3. The sounds were louder when you pulled the bands harder.	
4. The sounds stopped when the rubber bands were touched.	
5. The thin band makes a higher sound than a thick rubber band.	
6. The thin band sounds lower than the thick band.	
7. Was there a sound when the band was not moving?	
8. The ruler moved up and down when you hit it.	
9. Does the ruler make a sound when it moves.	
10. The sound from the ruler stops when the movement stops.	
11. Sound from the ruler stops when when you touch the ruler.	
12. When is the sound softer? When you hit the ruler softly or hard?	
13. Vibrations causing the rulers soft sounds stop sooner that those causing loud sounds.	
14. The sound the ruler makes changes when you move the end farther out from the table.	

15. What kind of movements made sounds?

16. When did the ruler and the rubber bands make sounds?