CHILDREN'S MUSEUM OF VIRGINIA PORTSMOUTH

Pre and Post-Visit Activities

Sounding Out

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Important Information for Teachers

Thank you for choosing *Sounding Out* for your students! This program will cover the following aspects of your SOL's:

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

i) inferences are made and conclusions are drawn;
j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
k) current applications are used to reinforce science concepts.

5.2 The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include

a) compression waves;
b) vibration, compression, wavelength, frequency, amplitude;
c) the ability of different media (solids, liquids, and gases) to transmit sound; and
d) uses and applications of sound waves.

**The focus of this program is to demonstrate the uses of sound, the types of sound, and how sound moves through different states of matter.*

Museum Manners

Please review with students and chaperones prior to your visit to the museum.

1. Please plan to arrive 15 minutes before your scheduled time to allow final counts and payment prior to your visit.
2. Remember to use walking feet.
3. Remember to use inside voices.
4. Teachers and chaperones must stay and explore with their students at all times throughout the museum.
5. Remember to share the exhibits and place items back where you found them.
6. Food and drink are not permitted in the museum.

Vocabulary

Sound- a form of energy produced and transmitted by vibrating matter.

Vibration- a fast, back and forth motion.

Compression- when molecules in a sound wave are pressed together.

Rarefaction- when molecules in a sound wave are spread out.

Wavelength- the distance between two compressions or between two rarefactions.

Frequency- the number of wavelengths in a given unit of time.

Amplitude- the amount of energy in a compression wave and is related to intensity and volume.

Longitudinal- type of wave in which sound travels.

Solid-has a defined shape and volume; molecules are tightly packed to create a solid.

Liquid- has a definite volume and takes the shape of the container, molecules are more loosely arranged than in a solid, but not as spread apart as in a gas.

Gas- will completely fill any closed container, take the shape of its container, and assume the volume of its container; molecules are very loosely arranged in a gas.

Pitch-the characteristic of sound that makes it sound high or low; determined by the frequency of vibrating objects.

Medium- any substance through which waves travel.

Hertz- unit used for measuring frequency of a sound wave.

Resonance- when the vibration in one element causes a matching vibration in another element.

Pre-Visit Activity

Try this activity before you visit the museum.

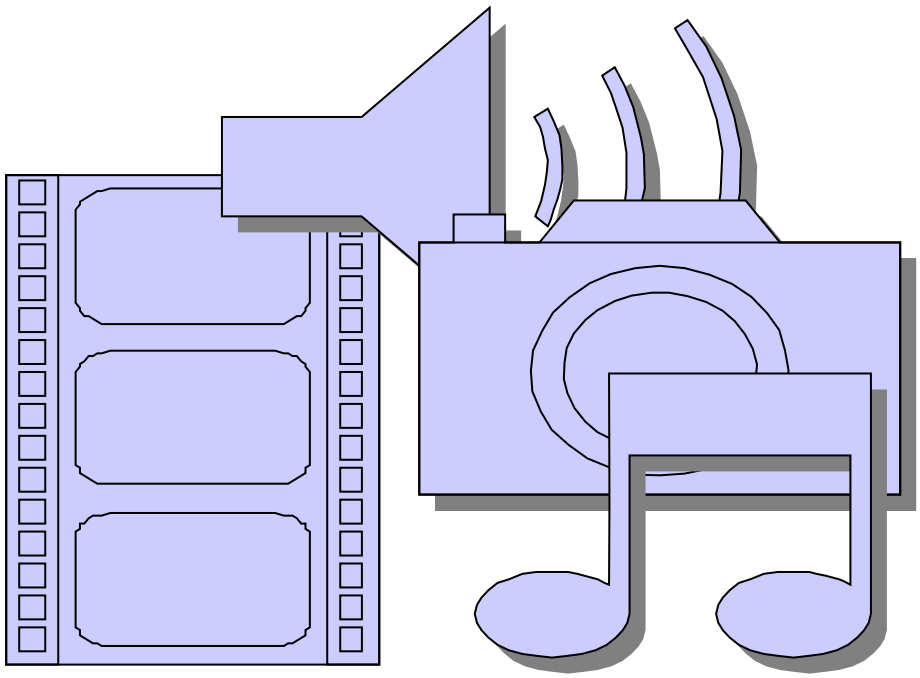
Sound through Matter

Objective: Students will be able to understand how sound travels through the different states of matter. SOL 5.2c

Materials: 3 Ziploc Bags; one filled with water, one with play sand, and one with air; pencil, a ticking watch, attached sheets with guided directions.

Investigation: Before the experiment, explain to students the details of scientific questions, hypotheses, methods, as well as independent and dependent variables.

Students will compare the amplitude of the sound as it travels through a liquid, solid and a gas. The matter that allows the sound to vibrate through it the fastest will have the loudest sound. Ask students to make a prediction of which form of matter will conduct sound the loudest and the quietist. Students will break into groups and go to each table with their data analysis sheets. Each student will place one bag of matter over their ear and the ticking watch against the other side of the bag. The students will observe and listen to the vibrations from the ticking which will travel through the 3 different states of matter. Students will come to a consensus about which state of matter is the best for carrying sound. Students should come to the conclusion that sound travels through these three states of matter differently.



Post-Visit Activities

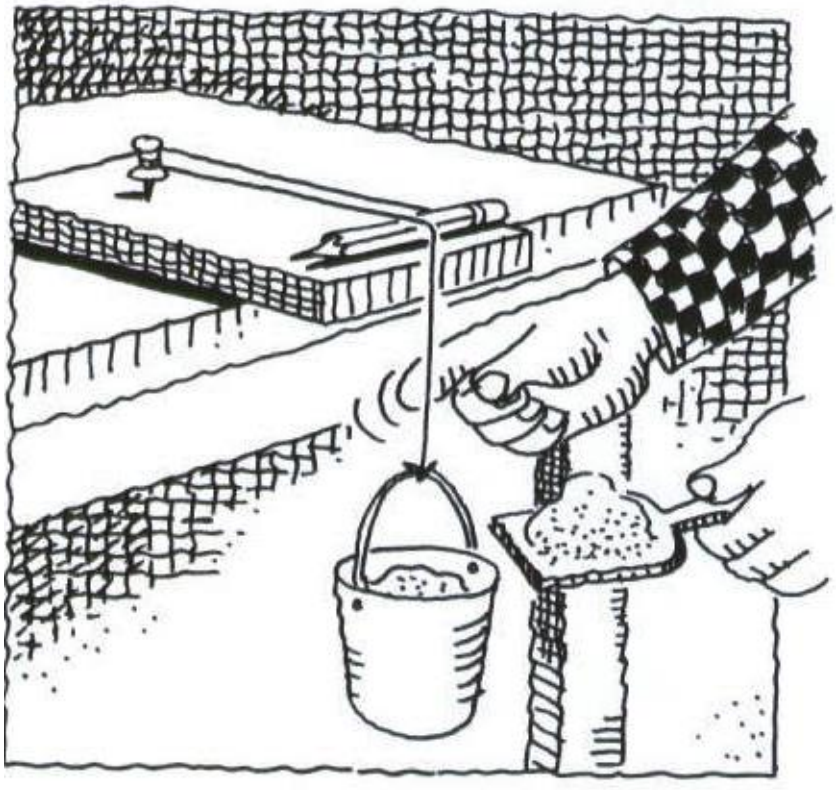
Try these activities after you visit the museum.

String Sounds

Objective: Students will be able to understand how string tension in an object affects the vibration and pitch. The pitch of the string depends on the tension. As weight is added, more tension is put upon the string. The increase of tension produces a higher-pitched sound. SOL 5.2b

Materials: (per group) wooden board (about 2 ft.), pushpins, 2 ft. of fishing line, small pail, marbles, pencil

Investigation: Press the pushpins into the end of the board. Have the other end of the board hang off the edge of the table. Attach the fishing line to the pushpin. Tie the free end to the pail. Let the pail hang and insert a pencil under the fishing line near the edge. Pluck the string. Add marbles to the pail and pluck again. Continue until the pail is full. What happens to the sound as more marbles are added?



Review Vocabulary

Objective: Student will be able to review and understand the key terms used in the program and by the Virginia Standards of Learning.

Materials: Word Search on following page, pencil

Investigation/Practice: Students will review the terms in the puzzle and state the definitions of the terms as they find them.

CHILDREN'S MUSEUM OF VIRGINIA PORTSMOUTH

SOUND

Name: _____

Date: _____

V P R D Z E X K U M G B G C X Q D Q C S
L G C I R W S Q H B L R W I R O H O A L
R C J O R A L E V Z N W M B X P T X H N
A X T Y C V O K Y Y O P W Y E L G Q S D
T O F I H E N C K E I P I S S B N M E F
F Y H R P S G A D U T H I H D T E S C O
N G F M E E I U P W A Z I W O A L O N C
I R J L C Q T X N T R I T U X F E L A O
N E J M D I U M D H B Y D G M J V I N M
O N T G L Y D E N B I N F F R Y A D O P
I E J P M S I Q N S V U A V A U W V S R
T Q M F U E N O O C E P K V E V Q U E E
C A Z Y K J A F U A Y X P C U I M B R S
A K N C K H L G U T H U Z G S F I X S S
F T F W C S H E R T Z W Y Y A N Y L M I
E R U T S P Q H N J Z D F N D F C W U O
R P I Q Y H L X P U G N M N E K P L I N
A P C M T R U Z E V R U W B J B A R D L
R T Z A W P F S J G Z O V G F M Z D E A
X W R U J O K U B T O S D I U Q I L M F

AMPLITUDE
COMPRESSION
FREQUENCY
GAS
HERTZ
LIQUID
LONGITUDINAL
MEDIUM
PITCH
RAREFACTION
RESONANCE
SOLID
SOUND
VIBRATION
WAVELENGTH

Sound Through Matter Data Analysis Sheet

Name: _____ Date: _____

Question: (What question were you trying to investigate?)

_____
_____

Hypothesis: (What did you think was going to happen?)

_____
_____

Method: (How did you test your question?)

_____
_____
_____
_____
_____

Observations/Results: (What did you discover?)

_____
_____
_____
_____

Conclusion: (Was your hypothesis correct? Why do you think things turned out the way they did?)

_____
_____
_____

Sound Through Matter
Supplemental Questions

Name: _____ Date: _____

A. 1. After pressing your ear to the bag with the sand and the air, record which did your group think was louder and therefore allows sound waves to travel better?

_____

2. Repeat the process above tapping and listening through the bag filled with water and then the air. Record your results. Which does your group think carries the sound waves better?

_____

3. Which of the bags allowed the sound to travel better, the sand or the water?

_____

4. Which of the states of matter solid, liquid, or gas allowed the sound waves to travel through it the easiest?

_____

5. Why does your group think this happened? Was your groups' prediction correct?

_____
_____
_____

B. Create something new. Drawings are accepted with an explanation.

6. What does your group think now about how sound waves travel? Using what you found out, how could you make the sound of a guitar louder? Why would it work?

_____
_____
_____

7. What could you do in class to hear what your neighbor is saying without getting in trouble? What kind of invention could you create and why would it work?

_____
_____
_____

8. What could a Mom do if she wants to reduce the noise of children playing? Why would it work?

_____