

# At A Glance

Learning Intentions	What's a Structure!	Stability of Structures	Holding the Load	Under Construction	Forces Causing Motion	Muscular Force	Gravitational Force	Magnetic Force	Friction	Invention Fair	Vibration and Pitch	Measuring Sound	Making Sound	Sound Travels	Sounding Fun
<b>Knowledge and Understanding Content</b>															
• identify shapes and features of natural and man-made structures	•														
• identify the stability of a structure as its ability to maintain balance and remain in one spot		•													
• identify the strength of a structure as its ability to support a load			•												
• demonstrate knowledge of structural designs by constructing strong and stable structures				•											
• identify a force as a push or pull that causes an object to start moving, stop moving, or change direction					•	•				•					
• describe how different forces can make an object to start, stop, attract, repel, or change direction						•	•	•	•	•					
• demonstrate the effects of increasing or decreasing the amount of force applied to an object						•	•	•	•	•					
• identify vibration and pitch; describe how the human ear senses vibration											•	•			
• describe how to measure loud sounds that pose a danger to the ear												•			
• demonstrate how sound is produced, and how it can be controlled in terms of loudness and quality													•		•
• demonstrate how sound travels, and that it travels in all directions														•	
• identify types of soundproofing materials, demonstrate knowledge by creating a soundproofing device															•
<b>Thinking Skills and Investigation Process</b>															
• make predictions, formulate questions, and plan an investigation			•	•	•		•	•	•	•		•		•	•
• gather and record observations and findings using drawings, tables, written descriptions	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
• recognize and apply safety procedures in the classroom	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<b>Communication</b>															
• communicate the procedure and conclusions of investigations using demonstrations, drawings, and oral or written descriptions, with use of science and technology vocabulary	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<b>Application of Knowledge and Skills to Society and the Environment</b>															
• identify the environmental impact of the construction of man-made and natural structures	•														
• identify ways that forces causing movement are used in our daily lives					•	•	•	•	•						
• identify ways we use sound in our every day lives to communicate												•	•	•	



# Table of Contents

At a Glance™ .....	2
Table of Contents .....	3
Teacher Assessment Rubric .....	5
Student Self-Assessment Rubric .....	6
Introduction .....	7
<b>What's a Structure?</b>	
Teacher Notes .....	8
Student Activities .....	9
<b>Stability of Structures</b>	
Teacher Notes .....	14
Student Activities .....	15
<b>Holding the Load</b>	
Teacher Notes .....	19
Student Activities .....	20
<b>Under Construction</b>	
Teacher Notes .....	26
Student Activities .....	27
<b>Forces Causing Motion</b>	
Teacher Notes .....	33
Student Activities .....	34
<b>Muscular Force</b>	
Teacher Notes .....	38
Student Activities .....	39
<b>Gravitational Force</b>	
Teacher Notes .....	43
Student Activities .....	45
<b>Magnetic Force</b>	
Teacher Notes .....	51
Student Activities .....	52
<b>Friction</b>	
Teacher Notes .....	56
Student Activities .....	57
<b>Invention Fair</b>	
Teacher Notes .....	61
Student Activities .....	62





# Table of Contents

## **Vibration and Pitch**

Teacher Notes .....	66
Student Activities .....	67

## **Measuring Sound**

Teacher Notes .....	73
Student Activities .....	74

## **Making Sound**

Teacher Notes .....	78
Student Activities .....	79

## **Sound Travels**

Teacher Notes .....	84
Student Activities .....	85

## **Sounding Fun**

Teacher Notes .....	92
Student Activities .....	93



Student's Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Teacher Assessment Rubric

Success Criteria	Level 1	Level 2	Level 3	Level 4
<b>Knowledge and Understanding Content</b>				
Demonstrate an understanding of the concepts, ideas, terminology definitions, procedures and the safe use of equipment and materials	Demonstrates limited knowledge and understanding of the content	Demonstrates some knowledge and understanding of the content	Demonstrates considerable knowledge and understanding of the content	Demonstrates thorough knowledge and understanding of the content
<b>Thinking Skills and Investigation Process</b>				
Develop hypothesis, formulate questions, select strategies, plan an investigation	Uses planning and critical thinking skills with limited effectiveness	Uses planning and critical thinking skills with some effectiveness	Uses planning and critical thinking skills with considerable effectiveness	Uses planning and critical thinking skills with a high degree of effectiveness
Gather and record data, and make observations, using safety equipment	Uses investigative processing skills with limited effectiveness	Uses investigative processing skills with some effectiveness	Uses investigative processing skills with considerable effectiveness	Uses investigative processing skills with a high degree of effectiveness
<b>Communication</b>				
Organize and communicate ideas and information in oral, visual, and/or written forms	Organizes and communicates ideas and information with limited effectiveness	Organizes and communicates ideas and information with some effectiveness	Organizes and communicates ideas and information with considerable effectiveness	Organizes and communicates ideas and information with a high degree of effectiveness
Use science and technology vocabulary in the communication of ideas and information	Uses vocabulary and terminology with limited effectiveness	Uses vocabulary and terminology with some effectiveness	Uses vocabulary and terminology with considerable effectiveness	Uses vocabulary and terminology with a high degree of effectiveness
<b>Application of Knowledge and Skills to Society and Environment</b>				
Apply knowledge and skills to make connections between science and technology to society and the environment	Makes connections with limited effectiveness	Makes connections with some effectiveness	Makes connections with considerable effectiveness	Makes connections with a high degree of effectiveness
Propose action plans to address problems relating to science and technology, society, and environment	Proposes action plans with limited effectiveness	Proposes action plans with some effectiveness	Proposes action plans with considerable effectiveness	Proposes action plans with a high degree of effectiveness





Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Student Self-Assessment Rubric

Put a check mark (✓) in the box that best describes you:

	<b>Always</b>	<b>Almost Always</b>	<b>Sometimes</b>	<b>Needs Improvement</b>
• I am a good listener.				
• I followed the directions.				
• I stayed on task and finished on time.				
• I remembered safety.				
• My writing is neat.				
• My pictures are neat and colored.				
• I reported the results of my experiment.				
• I discussed the results of my experiment.				
• I know what I am good at.				
• I know what I need to work on.				

1. I liked \_\_\_\_\_

\_\_\_\_\_

2. I learned \_\_\_\_\_

\_\_\_\_\_

3. I want to learn more about \_\_\_\_\_

\_\_\_\_\_



## Introduction

The activities in this book have two intentions: to teach concepts related to physical science and to provide students the opportunity to apply necessary skills needed for mastery of science and technology curriculum objectives.

Throughout the experiments, the scientific method is used. The scientific method is an investigative process which follows five steps to guide students to discover if evidence supports a hypothesis.

### 1. Consider a question to investigate.

For each experiment, a question is provided for students to consider.

For example, "Does the weight of an object affect the pull of gravity upon it?"

### 2. Predict what you think will happen.

A hypothesis is an educated guess about the answer to the question being investigated. For example, "I believe that all objects will fall to the ground at the same speed." A group discussion is ideal at this point.

### 3. Create a plan or procedure to investigate the hypothesis.

The plan will include a list of materials and a list of steps to follow. It forms the "experiment."

### 4. Record all the observations of the investigation.

Results may be recorded in written, table, or picture form.

### 5. Draw a conclusion.

Do the results support the hypothesis? Encourage students to share their conclusions with their classmates, or in a large group discussion format.

The experiments in this book fall under fifteen topics that relate to four aspects of physical science: **Strong and Stable Structures; Building With a Variety of Materials and Testing Designs; Forces Causing Movement; and Hearing and Sound.** In each section you will find teacher notes designed to provide you guidance with the learning intention, the success criteria, materials needed, a lesson outline, as well as provide some insight on what results to expect when the experiments are conducted. Suggestions for differentiation are also included so that all students can be successful in the learning environment.

## Assessment and Evaluation:

Students can complete the Student Self-Assessment Rubric in order to determine their own strengths and areas for improvement. Assessment can be determined by observation of student participation in the investigation process. The classroom teacher can refer to the Teacher Assessment Rubric and complete it for each student to determine if the success criteria outlined in the lesson plan has been achieved. Determining an overall level of success for evaluation purposes can be done by viewing each student's rubric to see what level of achievement predominantly appears throughout the rubric.





## What's a Structure?

### Learning Intention:

Students will learn about the shapes and features of natural and man-made structures, and assess the environmental impact of those structures.

### Success Criteria:

- identify structures as either natural or man-made
- determine the shapes and features that are common in structures
- gather and record information using drawings and written descriptions
- make conclusions about the materials used to make objects
- make connections to people and places in the environment

### Materials Needed:

- clipboards (one for each student)
- a copy of "What's a Structure?" worksheet 1 and 2 for each student
- a copy of "Properties of Materials" worksheet 3 and 4 for each student
- a copy of "The Impact!" worksheet 5 for each student
- chart paper
- pencils, pencil crayons, markers

### Procedure:

1. Discuss with students the meaning of a structure. Lead students in a brainstorming activity/discussion about different structures that can be found in the natural and man-made environments. Give students worksheet 1 to complete.
2. Explain to students that they are going to take a walk around the neighborhood to observe natural and man-made structures. Instruct them to take note of the shapes of structures, the materials used to make them, and what makes them strong and stable. Give each student a clipboard and worksheet 2 to complete as they walk through the neighborhood.
3. Come together as a large group and have a discussion about the different materials that man-made structures and those in the natural environment are made of. (Prompt students to recall what they observed while on their walk through the neighborhood.) Make a list of their responses on chart paper. Discuss the meaning of properties of materials. Refer back to the list of materials on the chart paper, and ask students to name some properties of those materials. Give them worksheet 3 and 4 to complete.
4. Give students worksheet 5. They will work with a partner to think-pair-share answers to the questions. A next step would be to encourage students to share their responses to the large group. This would lead to some rich discussion/debate on the impact that land development has upon the environment.

### Differentiation:

Slower learners may benefit by recording only their own thinking after orally sharing with a partner on worksheet 5.

For enrichment, faster learners could write a Public Service Announcement to promote the preservation of conservation areas.



# What's a Structure?

A structure is a supporting framework that is made to hold a load or to enclose a space. There are many structures all around us. Some of them are made by people, like bridges and buildings. Some structures are found in nature, like a tree or a bee hive.

Look at the pictures below. Determine if the structure is man-made or if it is found in the natural environment. Label them either **"man-made"** or **"natural"**.



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_





List the kinds of materials that are used to make these structures found in nature:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



Use descriptive words to tell about the properties of the natural structures in the pictures above.

_____	_____
_____	_____
_____	_____



# The Impact!



With a partner, do some thinking and sharing of ideas about the questions below. Record your ideas in the chart.

“How do the purposes of animal structures compare to the purposes of man-made structures?”

**My Thinking**

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**My Partner's Thinking**

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“What is the impact on the environment of a dam built by a beaver?”

**My Thinking**

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**My Partner's Thinking**

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“What is the impact on the environment of a shopping plaza built by humans?”

**My Thinking**

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**My Partner's Thinking**

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## Sounding Fun

### Learning Intention:

Students will use problem solving skills and knowledge acquired from previous investigations to design and construct a soundproof device.

### Success Criteria:

- demonstrate how volume level can be controlled or decreased
- design and make a plan to construct a soundproof device
- test final product by using a decibel meter to measure and test for a decrease in volume level, record observations or outcomes using written descriptions
- making conclusions by evaluating the benefits of the design or ways to improve it in order to enhance the device's soundproofing feature

### Materials Needed:

- cardboard boxes, cardboard tubes, newspaper, construction paper, pieces of wood, pieces of cloth, popsicle sticks, straws, aluminum foil, Styrofoam trays or plates, foam pieces, margarine tubs or other plastic containers, egg cartons, wood glue, masking tape, duct tape, string, butterfly fasteners, pipe cleaners, scissors, strip magnets, elastics, pencils, pencil crayons, markers (or any other materials that you find suitable to include)
- radio, decibel meters
- a copy of "Soundproofing!" worksheet 1 and 2 for each student
- a copy of "Sound Crossword" worksheet 3 for each student
- a copy of "Sound Wordsearch" worksheet 4 for each student

### Procedure:

1. Students will plan, design, and build a soundproof device. Give each student a copy of "Soundproofing!" worksheet 1 and 2. Read through with the students, the section regarding the criteria needed to be fulfilled to make the device. Students will make a plan and draw a design of their soundproof device before they begin construction. Once their invention is completed, students will test it. They will need a radio and decibel meter to complete the test outlined on worksheet 2. Students will evaluate the benefits of their designs and ways to improve their soundproof device (a star = something done well, a wish = something that needs to be improved). An option at this point is to have a student/teacher conference to discuss with each of them how they would incorporate their wish in order to make adjustments to the design of their soundproof device.
2. Give each student a copy of "Sound Crossword" worksheet 3 and "Sound Wordsearch" worksheet 4, to complete on their own or with a partner.

### Differentiation:

Slower learners may benefit by working with a partner to plan and design a soundproof device. The construction of the device and testing of the device for soundproofing qualities could be completed as a team or independently.

For enrichment, faster learners could demonstrate the capabilities of their soundproofing device by demonstrating the sound testing process for another class in the school. This would require a previous arrangement to be made, but would provide a learning opportunity for other students in the school.



*Let's Test It!*

Turn on a radio at **medium** volume. Take five big steps from the radio. Hold the decibel meter.

**What is the number on the meter?** \_\_\_\_\_

Place the radio inside your soundproof device and close it. Take five big steps from the soundproof device. Hold the decibel meter.

**What is the number on the meter?** \_\_\_\_\_

Describe what happened.

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**LET'S EVALUATE!**

My thoughts about my soundproof device...



A star:

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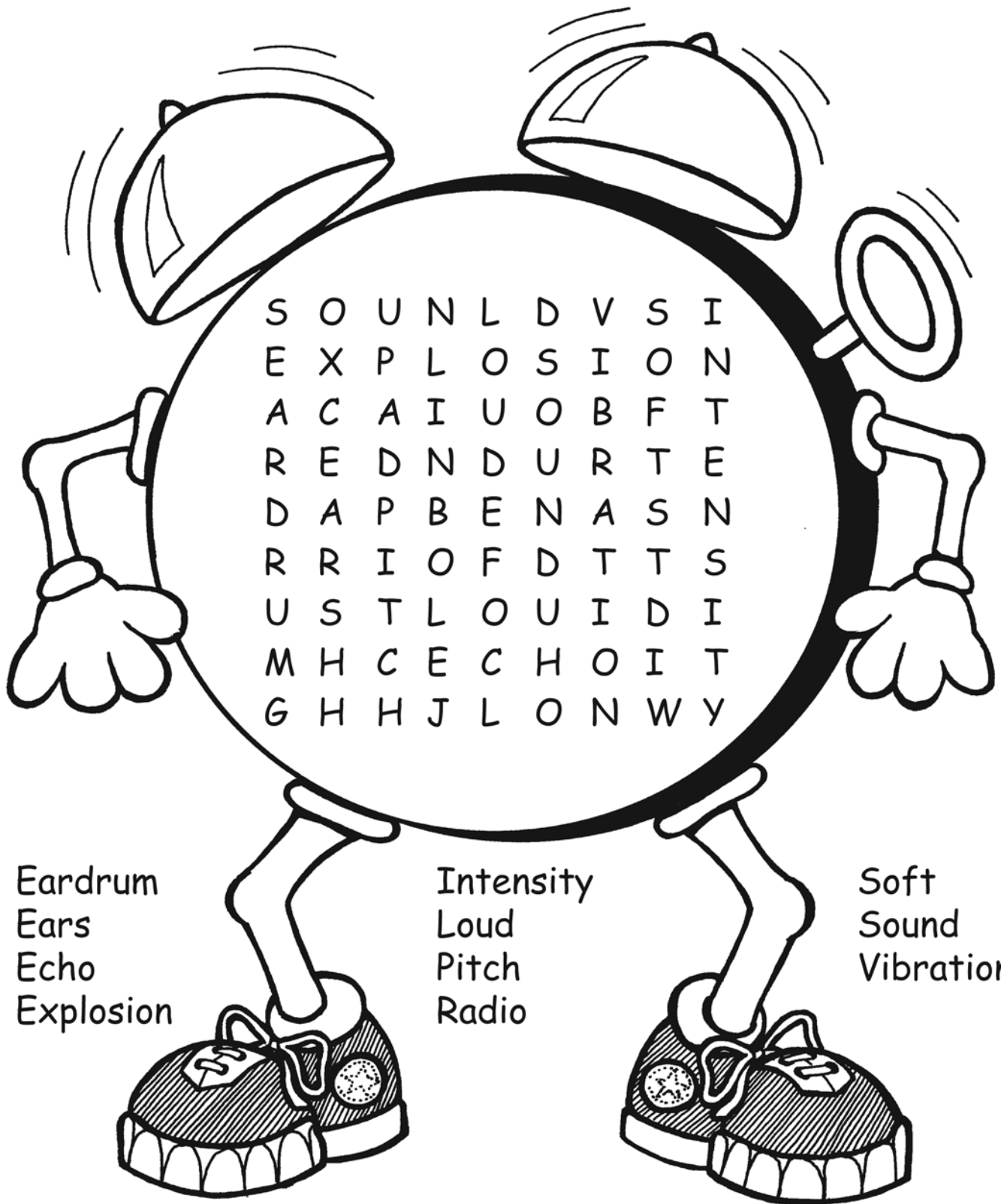
A wish:

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# Sound Word Search



Eardrum  
Ears  
Echo  
Explosion

Intensity  
Loud  
Pitch  
Radio

Soft  
Sound  
Vibration