Matter and Materials

Grades 4-6

Written by Eleanor Summers
Illustrated by S&S Learning Materials

About the author:
Eleanor M. Summers is a retired teacher who continues to be involved at various levels of education. She loves to write educational materials to provide tools for teaching and learning.

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Table of Contents

Introduction

Teacher Notes

The activities in this book have two intentions:

- To teach concepts related to matter and materials.
- To provide students with the opportunity to apply necessary skills needed for the mastery of science and technology curricula.

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

1. **Consider a question to investigate.**
   It is important to choose a question that is clear and that the students are capable of answering.

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 matter will change when heated." 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 can be recorded in written, table (chart) or picture form.

5. **Draw a conclusion.**
   Do the results support the hypothesis? Encourage the students to share their conclusions with their classmates.

The experiments and activities in this book fall under three categories:

- **Materials that Transmit, Reflect or Absorb Light and Sound**
- **Properties of and Changes in Matter**
- **Properties of Air and Characteristics of Flight**

In each section you will find:

- **Teacher Notes**: ideas and suggestions for conducting experiments and completing activities.
- **Materials List:** items needed to carry out experiments and activities
- **Pre-assessment Quiz:** a quick overview of what students already know about the topic.
- **Activities and Experiments:** simply laid out instructions and worksheets.
- **What Have You Learned?:** A quick review of concepts covered and a check for student understanding.

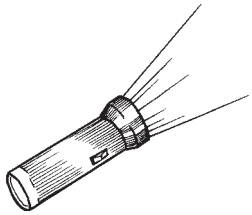
Materials that Transmit, Reflect or Absorb Light and Sound:

Teacher Notes

Building on their present knowledge base, students will begin to examine and explore a variety of materials that absorb, reflect or transmit light and sound. Through a variety of experiments and activities, students will have the opportunity to learn the following:

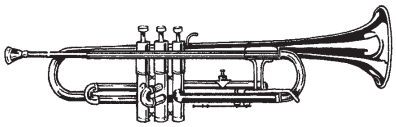
LIGHT:

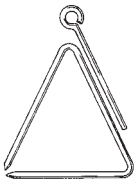
- Natural and man-made materials
- How different materials affect light
- Materials that reflect light
- Meaning of transparent, translucent, and opaque
- Identifying materials that are transparent, translucent or opaque
- Formation of shadows: their size, shape, and location
- Characteristics of indoor shadows
- How we see colors
- Changing colors
- Camouflage
- Light in our environment



SOUND:

- Sounds in daily life: messages, uses
- "Feeling" a sound
- Pitch, intensity, and measurement
- Properties of materials and changes in sound
- Materials that reflect or absorb sound
- Echoes: how they occur, applications to the animal and human world
- Categories of sounds and their applications to human life
- Making musical instruments from various materials and playing a song





WHAT HAVE YOU LEARNED?:

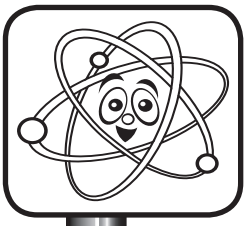
An activity to assess student understanding of light and sound energy concepts and terms.

Materials List for Experiments and Activities

Teacher Notes

Suggestions:
- Review the scientific method.
- Try any experiments in advance before students attempt them.
- Collect all materials required before beginning an activity or experiment. Ask students to contribute.
- Plan for modification for individual student needs.
- Discuss and practice safety rules and procedures.
- Student can perform experiments individually, in pairs or in teams.
- Supplement information in activities with audiovisual materials where available.

Experiment or Activity	Page #	For each child/pair or team, you will need
How Materials Affect Light Activity #2	11	• a clear glass filled ¾ of the way with water • a pencil • a book • a clipboard or piece of cardboard • a small mirror
Transparent or Opaque? Activity #4	13 - 14	A variety of paper and plastic products: colored construction paper, white art paper, tissue paper, newspaper, page from a magazine, plastic wrap, blue garbage bag, black garbage bag, plastic spoon, plastic glass • a flashlight
What Makes a Shadow?. Experiment #1	16 - 17	• a flashlight • a square of paper towel • a book • a sheet of clear plastic (the kind used for overhead transparencies) • a partner
Changing Indoor Shadows Experiment #2	18 - 19	• a flashlight • a partner
Making Shadows Experiment #3	20 - 21	• a flashlight • a solid colored plastic cup • a solid box (shoebox, Kleenex etc.) • a large sheet of white paper
Presto! Chango! Colors Experiment #4	23 - 24	• a sheet of white paper • a pencil • 2 plastic or acetate sheets • markers: red, light blue, yellow
Measuring Sounds Activity #6	33 - 34	• a decibel meter • a radio or CD player
Material Properties and Sound Experiment #1	35 - 36	• a medium sized container with a lid • a ruler • sand, rice, enough to fill your container.
Material Changes and Sound Experiment #2	37 - 38	• rubber band • tape
Materials and Sound Travel Experiment #3	39 - 40	• a plastic tub 3/4 filled with water • a toy tambourine • a ruler
Materials that Reflect or Absorb Sound Experiment #4	41 - 42	• 2 cardboard tubes (from paper towels) • a sheet of paper • a sheet of metal (tin foil rectangular pan with sides removed) • a piece of carpet (the same size as the paper and metal) • a loudly ticking clock or timer • masking tape • a partner
"Material Kids" Band Activity #9	46 - 47	Each instrument has its own material list. A suggestion is that students decide which instrument they wish to make and then bring in their own materials.



What Do You Know about Light and Sound?

Name: _____

Pre-assessment Quiz

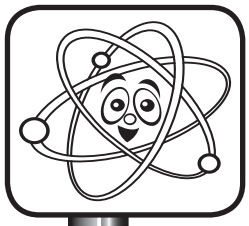
You are going to be learning about light and sound energy by doing all kinds of experiments and activities. However, you probably already know a few things about light and sound. Think about what you know, then complete the questions below.

A. TRUE or FALSE?

Read the statement then circle **True** or **False**

1. Light will pass through all materials.	**True**	**False**
2. Shadows are usually all the same size.	**True**	**False**
3. Night is really a shadow.	**True**	**False**
4. We see color as reflected light.	**True**	**False**
5. Sound will travel through air, but not through water or solids.	**True**	**False**
6. Extremely loud sounds can permanently damage your hearing.	**True**	**False**
7. Echoes can be fun, but they can also be useful.	**True**	**False**
8. It is not possible to measure the loudness of sound.	**True**	**False**

B. What are some things you would like to learn about the types of properties materials can have and how those properties are used in our everyday world?



Name: _____

Natural and Man-Made Materials

Activity #1

What are Materials?

To scientists, the word "material" means anything that objects are made from. Materials are either **"natural"** or **"man-made."**

1. **Natural** materials come from plants or animals, or they are found in the ground. Think of some everyday uses or some everyday objects that come from these **natural** materials.

Natural Material	Example	Everyday Use or Object Made From Natural Materials
wood	desk	
soil	gardens	
metal	tin cans	
clay	flower pots	
rocks	crushed to make gravel	
wool from sheep	mittens	

2. **Man-made** materials are made from combining natural materials and some chemicals. Think of some everyday uses or some everyday objects that come from these **man-made** materials.

Man-Made Material	Example	Everyday Use or Object Made From Man-Made Materials
nylon	rope	
paint	house paint	
soft plastic	baby toys	
hard plastic	forks, spoons	
paper	gift bag	
glass	coffee mug	