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Light and Sound Curriculum Map

The activities in this topic have two intentions: not only to teach students about light and sound, but also to teach general science and technology curriculum objectives through the theme of light and sound.

Introduction & Assessments Include:

- At A Glance – Skill List
- Teacher Rubric
- Student Rubric
- Introduction
- Materials List

Activities and Experiments fall under these nine topics:

In each section, you will find teacher notes designed to provide you guidance with the materials needed, as well as provide some insight on what results to expect when the experiments are conducted, plus an answer key.

1. What is Sound?

- Where does sound come from? - Activity
- I know how sound is produced. - Activity

2. Pitch and Intensity

- Make a Xylophone – Experiment
- What is a Decibel Meter? - Activity
- A Scientific Investigation – Activity
- Sound Patrol - Activity

3. How does Sound Travel?

- How does sound travel? - Part 1 and Part 2 Teacher Directed Experiment
- Slinky Sound - Activity

- Where does sound go? - Teacher Directed Experiment
- Blocking Sound – Experiment
- Sound, Just Passing Through! - Experiment
- Speed of Sound - Experiment
- Sound at the movies. - Activity
- Echos and bats – Activity
- Bat and Mosquito game – Teacher Directed Activity
- Would you be a good bat? - Activity

4. **Humans and Sound**

- How do humans make sound? - Activity
- How do humans hear sound? - Activity
- Why do we have two ears? - Teacher Directed Activity

5. **Sound Machines**

- How does a speaker work? - Activity
- Telephone Workshop – Teacher Directed Activity
- Make a Tin Can Telephone - Activity
- Make a Pan Flute – Activity
- Make a Guitar – Activity

6. **What is Light?**

- Where does Light come from? - Experiment
- What can you see? - Activity
- Light Travels Fast – Activity

7. **Brightness and Reflections**

- Changing Shadows – Experiment
- Shadows and Light - Experiment
- Transparent, Translucent or Opaque? - Activity
- How much light goes through? - Experiment

- It's play time! - Activity
- Make a reflectometer – Activity
- What does a reflectometer measure? - Experiment
- How does light spread out? - Activity
- Brightness – Experiment
- Which materials reflect light? - Experiment
- Mirror Maze - Activity

8. Color

- The Rainbow – Activity
- Mix and Match! - Experiment
- TV Time - Experiment
- How do humans see? - Activity

9. Light and Energy

- Light- Detecting Plants – Teacher Directed Activity
- Light and Heat – Experiment
- Black and White – Activity

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Activities and Experiments

What is Light?

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Answer Key

At Glance

Learning Expectations									
	What is Sound?	Pitch and Intensity	How does Sound Travel?	Humans and Sound	Sound Machines	What is Light?	Brightness and Reflection	Color	Light and Energy
Understanding concepts									
Share preliminary knowledge about light and sound				•		•			
Understand how light and sound originate	•			•	•	•		•	•
Understand how light and sound travel			•	•	•	•	•	•	
Understand how humans use light and sound				•	•			•	•
Understand the characteristics of light and sound		•	•				•	•	•
Skills of inquiry, design, and communication									
Demonstrate an awareness of the scientific method		•	•	•	•	•	•	•	•
Classify and sort objects			•						
Observe with their senses	•	•	•	•	•	•	•	•	•
Work with others	•	•	•	•	•	•	•	•	•
Listen, record and compare to others' observations	•	•	•	•	•	•	•	•	•
Make predictions	•	•	•	•	•	•	•	•	•
Record observations, findings, and measurements using drawings, tables, and written descriptions	•	•	•	•	•	•	•	•	•
Communicate the procedure and results of investigations using drawings and written descriptions	•	•	•	•	•	•	•	•	•
Design experiments to test ideas		•							
Relating science and technology to the outside world									
Relate scientific concepts to objects in their environment	•		•	•	•	•	•	•	•
Create new inventions based on scientific concepts			•		•				

Teacher Assessment Rubric

Student's Name: _____

Criteria	Level 1	Level 2	Level 3	Level 4
Understanding Concepts				
Demonstrated understanding of the basic concepts of light and sound	Limited understanding	Some understanding	General understanding	Thorough understanding
Demonstrated misconceptions	Significant misconceptions	Minor misconceptions	No significant misconceptions	No misconceptions
Quality of explanations given	Shows limited understanding of concepts	Gives only partial explanations	Usually gives complete or almost complete explanations	Always gives complete and accurate explanations
Inquiry, design, and communication skills				
Ability to question, predict, carry out a procedure, observe, and conclude as it relates to the scientific method	Limited ability	Some ability	Good ability	Consistent ability
Use of the correct vocabulary relating to light and sound, and clarity and precision of communication	Limited communication	Some communication	Good communication	Consistent, effective communication
Awareness and use of safety procedures in the classroom	Limited awareness	Some awareness	Good awareness	Consistent awareness
Relating science and technology to each other and the world outside of school				
Demonstrated understanding of the connection between science and technology of light and sound in familiar contexts	Limited understanding	Some understanding	Good understanding	Good understanding in both familiar and unfamiliar contexts
Demonstrated understanding of the connections between science and technology of light and sound and the world	Limited understanding	Some understanding	Good understanding	Good understanding of connections and their implications

Student Self-Assessment Rubric

Name: _____

Date: _____

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

	Needs improvement	Sometimes	Almost Always	Always
✓ I am a good listener.				
✓ I followed the directions.				
✓ I stayed on task and finished on time.				
✓ I worked safely.				
✓ My writing is neat.				
✓ My pictures are neat and colored.				
✓ I know what I am good at.				
✓ I know what I need to work on.				
✓ I understand light and sound.				
✓ I reported the results of my experiments.				
✓ I discussed the results of my experiments.				

I liked _____

I learned _____

I already knew _____

I want to learn more about _____



Introduction

Teacher Notes

The activities in this book have two intentions: not only to teach students about light and sound, but also to teach general science and technology curriculum objectives through the theme of light and sound.

Throughout the experiments, the scientific method is used. The scientific method is an investigative process which follows five steps to discover if 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. For example, “Does air take up space?”

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 air does take up space.” 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 or picture form.

5. **Draw a conclusion.** Do the results support the hypothesis? A group discussion is ideal here as well.

The experiments in this book fall under nine topics: “**What is Sound?**,” “**Pitch and Intensity**,” “**How Does Sound Travel?**,” “**Humans and Sound**,” “**What is Light?**,” “**Brightness and Reflections**,” “**Color**,” and “**Light and Energy**.” A ninth section on “**Sound Machines**” provides an excellent way to integrate the material and introduce a technology component to the curriculum.

In each section, you will find teacher notes designed to provide you guidance with the materials needed, as well as provide some insight on what results to expect when the experiments are conducted.



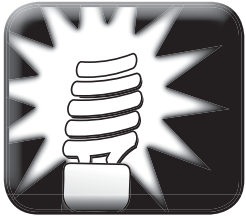
All About Light

Teacher Notes

In the **Where Does Light Come From?** activity (page 53), students will learn that light is produced by light sources.

In the **What Can You See?** experiment (page 54), they will learn that humans see objects not only when they are light sources, but also when they reflect light. The concept of “reflecting light” can be explained as “light bouncing off objects.”

In the **Light Travels Fast** activity (page 56), students will learn that light travels very fast but not instantaneously. The teacher can use this opportunity to talk about the fact that the starlight we see in the night sky is the light that was emitted by stars a long time ago, and not the light that they are emitting now. It takes a long time for light to travel from the stars to earth because the stars are very far away.



Where Does Light Come From?

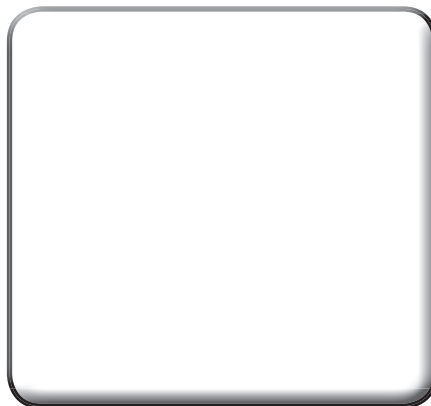
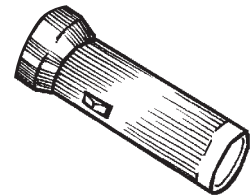
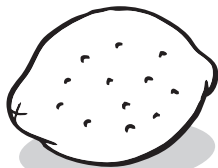
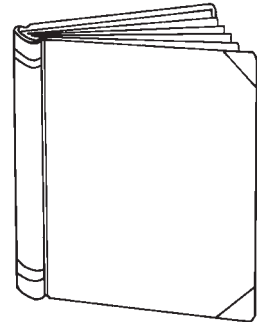
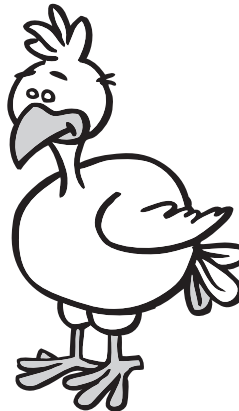
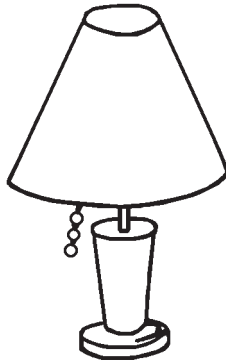
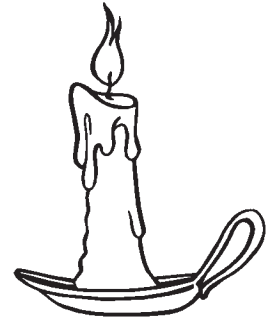
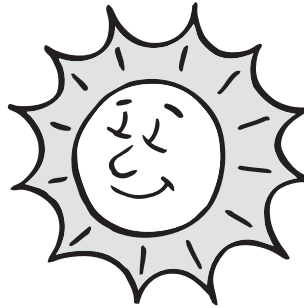
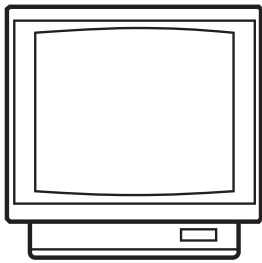
Name: _____

Light Activity I

Light is very bright, like the sun or a light bulb. Objects that are very bright and provide their own light are called light sources. There are a lot of different sources of light in the world around us.

In the pictures below, circle the light sources.

Draw three additional light sources.





What Can You See? Name: _____

Light Experiment I

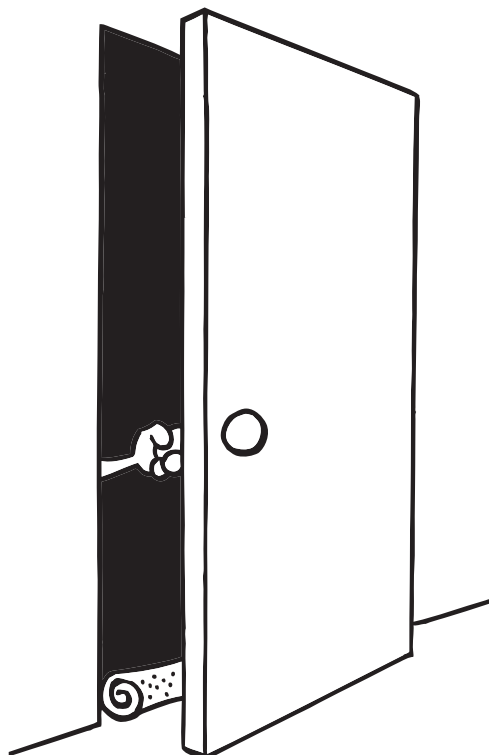
Light is what allows us to see things around us.



- a closet or other room without windows
- a flashlight with batteries
- a tennis ball
- a partner



1. Do you think you will be able to see the tennis ball inside the closet if the flashlight is off? How about if the flashlight is on?
2. Record your predictions on the worksheet.
3. Enclose yourself in the closet with your partner, the flashlight, and the tennis ball.
4. Make sure the flashlight is turned off.
5. What do you see?
6. Answer the questions on the worksheet.
7. Turn on the flashlight.
8. What do you see?
9. Answer the questions on the worksheet.





What Can You See?

Name: _____

Light Experiment I Worksheet

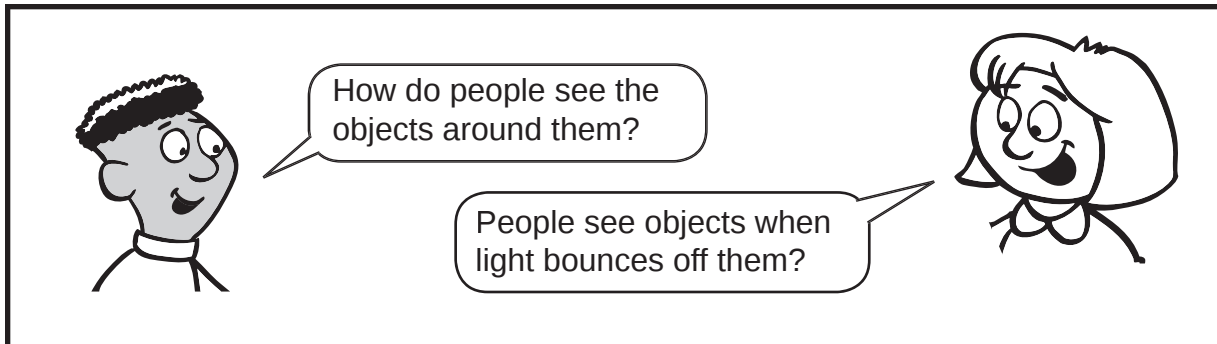


1. Do you think you will be able to see the tennis ball inside the closet if the flashlight is off? _____
2. How about if the flashlight is on? _____



1. When the flashlight is off, what do you see? _____
2. When the flashlight is on, can you see the flashlight? _____
3. Can you see the tennis ball if you point the flashlight at it? _____
4. Can you see the tennis ball if you point the flashlight away from it? _____

Read the cartoon below and complete the following activity.



Connect each sentence to its proper end.

I can see the flashlight because...

- it is not a light source.

I can't see the tennis ball when the flashlight is pointing away from it because...

- it is a light source.

I can see the tennis ball when the flashlight is pointing at it because...

- the light from the flashlight bounces off of it.



Light Travels Fast!

Name: _____

Light Activity 2



- a flashlight
- a partner



1. Shine a flashlight towards the ceiling.
2. Turn it on and off a few times.
3. What happens?
4. When you turn on the flashlight, does it take a long time for the light to get to the ceiling?

Circle your answer.

It takes a long time

It happens quickly

5. So, do you think light travels very fast or does it travel very slow?

Light travels very fast

Light travels very slowly

6. Did you know that light travels at about 186,411 miles (300,000 km) per second! Albert Einstein discovered that light is the fastest thing in the universe! The distance that light travels in a year is called a light-year. If light travels at 186,411 miles (300,000 km) per second, can you estimate how long would it take for the light from your flashlight to get to the Moon?

Circle your answer.

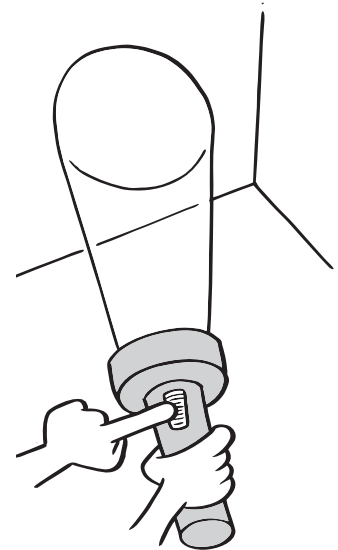
Hint: the Moon is 238,856 miles (384,403 km) away from the Earth.

Less than one second

More than ten seconds

Between one and two seconds

Between two and ten seconds



Answer Key

Sound Activity #14: Telephone Workshop

Light Activity #1: Where Does Light Come From? (Page 54)

The following pictures should be colored: sun, candle, lightning, flashlight, TV, lamp, firefly.

Light Experiment #1: What Can You See? (Page 55)

Predict: 1. & 2. Answers may vary.

Observe: 1. Nothing 2. Yes 3. Yes 4. No or very little.

Conclude: I can see the flashlight because it is a light source. I can't see the tennis ball when the flashlight is pointing away from it because it is not a light source. I can see the tennis ball when the flashlight is pointing at it because the light from the flashlight bounces off of it.

Light Activity #2: Light Travels Fast! (Page 56)

4. It happens quickly 5. Light travels very fast
7. Between one and two seconds