

Sound, Light, Mirrors & Lenses

Sound, Light, Mirrors, & Lenses Unit includes:

- Print and digital Interactive Notebooks
- Editable Resources including notes, PowerPoints, and test
- Instructional Videos
- Teacher-led Demos & Guided Inquiry Labs
- Task Cards & Digital Task Cards
- Study Guides



Suggested Pacing Guide



The following is a **suggested pacing guide** for my COMPLETE COURSES (Earth, Life or Physical Science) which are based on 50-minute class periods. There are three variations below. **Each variation is based on the number of sections in your SCIENCE INTERACTIVE NOTEBOOK chapter.**

Based on a **4-Section Chapter**

Day	Lesson/Activity	Engage	Explain	Explore	Elaborate	Evaluate
1	• Teacher Demo	x				
	• Section 1 Notes – INB input		x			
	• INB Activity – INB output (homework if not completed in class)			x		
2	• Mini-quiz					x
	• Section 2 Notes – use PowerPoint		x			
	• INB Activity			x		
3	• Mini-quiz					x
	• Guided Inquiry Lab – Student Led			x		
4	• Section 3 Notes – use PowerPoint		x			
	• INB Activity			x		
5	• Mini-quiz					x
	• Section 4 Notes – use PowerPoint		x			
	• INB Activity			x		
6	• Mini quiz					x
	• Science Stations				x	
7	• Science Stations				x	
8	• Final draft and testing for Creation Station (STEM)				x	x
9	• Task Card Review (game-style, full class, partner)				x	
10	• Chapter Test					x
	• Have students complete notes for next chapter*	x				

* **Note-taking option:** Once students are done with chapter test, they get the next set of notes and work quietly on completing them while other students finish up. All notes are to be completed when they return to class. Have students glue each page of notes into the next few pages of their INB (right side only). This way, when you go over the PowerPoint each day, they have already reviewed topic and are ready for class.

5 E Model

Engage – Teacher-led demos foster wonder and classroom discussion and serve as the hook for the lesson. Videos and images of natural phenomena also foster questioning and communication. NGSS phenomena are aligned to middle school NGSS standards.

Explain – PowerPoints, instructional videos, and guided notes (input side of interactive notebooks) provide definitions, explanations, and information through mini-lecture, text, internet, and other resources which encourages students to explain concepts and definitions in their own words.

Explore – Students investigate problems, events, or situations. As a result of their mental and physical involvement in these activities, students question events, observe patterns, identify and test variables, and communicate results.

Elaborate – It is important to involve students in further experiences that apply, extend, or elaborate the concepts, processes, or skill they are learning. Elaborate activities provide time for students to apply their understanding of concepts and skills. They might apply their understanding to similar phenomena or problems.

Evaluate – Use a variety of assessment to gather evidence of student's understanding and provide opportunities for them to assess their own progress.

Student Interactive Notebook

Each concept shares:

- Actual photos of both the INPUT and OUTPUT pages of Science Interactive Notebook
- Instructions on how to create/use/complete activity for OUTPUT side
- Mini-Quizzes for each concept to check students' understanding
- Answer Keys for all mini-quizzes
- Appendix with Teacher Notes for Interactive Notebook in LARGE print.

Section 1: Sound



Directions: Cut on dotted lines that separate the outer, middle and inner ear. Fold this paper on "fold" line and paste this side down into your Science Interactive Notebook. Under each flap, describe how a sound wave travels through the ear as it travels through that corresponding section.

Making the Band

Directions:

- Your group's task is to use the objects listed below and construct a musical instrument for each member. Using these instruments, you will compose a 30 second song. Waves that you will perform for your peers. In order to receive full credit, the band and song must be completed in the time allowed.

Materials (note - other materials may not be added to this list)

- 1 sheet of paper
- 2 paper plates
- 3 rubber bands
- 1 metal hanger
- 1 plastic container
- 2 plastic spoons
- ¼ cup of rice
- 2 styrofoam cups
- 4 straws
- 1 piece of foil
- 1 ruler
- 1 tape

2. Draw the picture of your instrument in your Science Interactive Notebook and write the words to your band's song.

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Name: _____ Date: _____

Quiz: Sound

Matching

1. Loudness

2. Subsonic

a. Part of ear that has three bones that amplify a sound wave.

b. Human perception of sound intensity.

c. Unit that measures loudness.

d. Sound travels slowest in this medium.

e. Part of ear that houses the organs on which that signal the brain.

Section 2: Music and Uses of Sound

MAKING THE BAND

Directions:

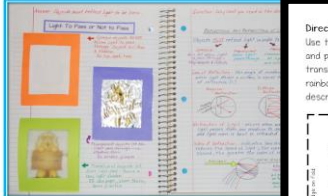
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Section 3: Reflection and Refraction of Light



Quiz: Musical Uses of Sound

1. The study of sound is known as _____.

2. A _____ is a hollow structure that makes a sound.

3. The study of antireflection waves is known as _____.

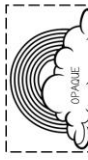
4. Every instrument has a natural frequency.

5. High frequency sound waves can harm your hearing.

6. Sound can be used to make a _____.

Directions: Cut out each image below (Frame template and three rainbows). Use the frame template to cut out three different frames (fold colored paper and place on fold to cut out). On the back of each frame paste the opaque, translucent or transparent paper that corresponds with each term. Paste each frame with matching lion in your Science Interactive Notebook and write the description of each term next to the frame.

CUT OUT CENTER ON FRONT OF FOLDABLE - PASTE OPAQUE, TRANSLUCENT, OR TRANSPARENT PAPER ON BACK



Directions: Cut out each image below (Frame template and three rainbows). Use the frame template to cut out three different frames (fold colored paper and place on fold to cut out). On the back of each frame paste the opaque, translucent or transparent paper that corresponds with each lion. Paste each frame with matching lion in your Science Interactive Notebook and write the description of each term next to the frame.


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CUT OUT CENTER ON FRONT OF FOLDABLE - PASTE OPAQUE, TRANSLUCENT, OR TRANSPARENT PAPER ON BACK



Materials:

- copy paper
- wax paper
- plastic wrap
- construction paper
- scissors

Instructions:

Have students create a frame for copy paper, wax paper, plastic wrap to understand the difference between opaque, translucent, and transparent.

The following pages include the activity Light Through a Lens to Pass along with a mini-quiz.

• Clipart has been updated and may not reflect examples in pictures.

Student Digital Notebook

The student notebook is on Google Drive and ready for you to share with your students. Here's a quick overview of the features:

Set up like a traditional interactive notebook with input and output sides.

Hyperlinked tabs so student can easily move through chapter for review

Students watch video < 6 min to complete notes.

Directions: Make your own instrument at home. Use the icon below for ideas. Once you've wrote a song, make a recording using your instrument and upload to your page.



MAKING A INSTRUMENT

Possible materials

- paper
- paper plates
- rubber bands
- plastic containers
- cups
- box
- rice/cereal
- straws
- foil
- ruler
- tape
- silverware

Insert music video here

MUSIC AND USES OF SOUND

Music -

Sound quality -

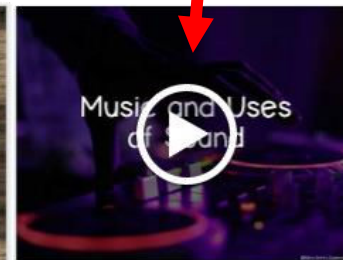
- > Each instrument has a set of natural frequencies at which it will vibrate, called _____ which produce an instruments distinct sound quality.
- > Instruments use _____ or hollow chambers, that amplify sound when air inside vibrates. Ex. _____

Acoustics -

Echolocation -

Sonar -

Ultrasound -



Digital Textbook

For further exploration, click button(s) below:

Music Lab

Encouraging independent learners. Directions for output side are here along with what they need to complete the activity.

Notes are chunked into manageable sections with large spaces for textboxes

Some pages have links so students can go deeper into the topic if they need.

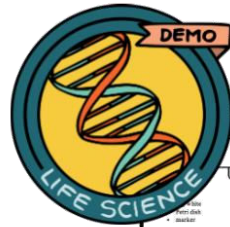
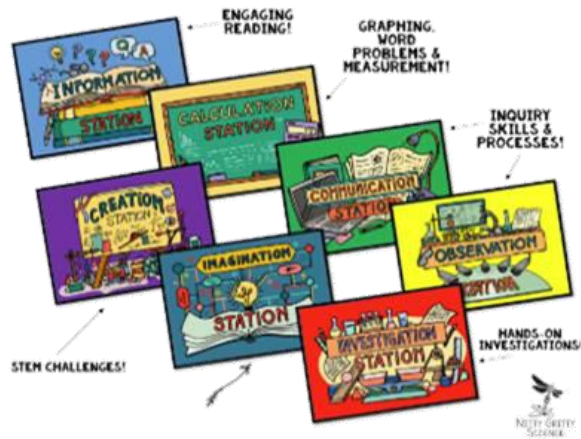
Demos, Labs, & Science Stations

Working in the lab and being engaged in science experiments is the most exciting part of science.

Demo, Labs, and Science Stations Includes:

1. **SCIENCE STATION SIGNAGE** for all 7 stations is provided in color and in black and white (see preview) and all student answer sheets have icons that correspond with each station for ease of use.
2. **DEMONSTRATION** (teacher-led) allows teachers to invite scientific discussions and can help uncover misconceptions and, most importantly, lead to heightened curiosity and interest in the topic being studied.
3. **GUIDED INQUIRY LAB** which is a traditional lab that allows students to perform an investigation in order to solve a problem. Students will hypothesize, collect and analyze data and communicate their results.
4. **TEACHER GUIDES to DEMOS & SCIENCE STATIONS** help get you started and give you background information to make your science lessons engaging.
5. **7 SCIENCE STATIONS** which are designated locations in the classroom with activities that challenge students to extend their knowledge and elaborate on their science skills by working independently of the teacher in small groups or pairs. Stations included are:
 - **INFORMATION STATION** – Group members will read an interesting and relevant science passage then complete a task to help increase science literacy and deepen their understanding of the science concept.
 - **OBSERVATION STATION** – Group members will have images, illustrations, or actual samples at this station that show applications or processes of the science topic. Using what they've learned, they will need to apply their observation skills to complete the questions attached to each.
 - **CALCULATION STATION** – Group members use their math skills to complete the station challenge. Skills may include graphing, analyzing data, using models, measurement, and calculating formulas or word problems.
 - **INVESTIGATION STATION** – Group members will work with one another to explore the concept through hands-on activities so they may practice specific inquiry process skills as they learn.
 - **COMMUNICATION STATION** – There are three different options for this station: interviews, video, group essay. Depending on the option you choose, group members will communicate what they know by answering questions in creative ways.
 - **CREATION STATION** – Group members will work together to solve a STEM (Science, Technology, Engineering, Math) challenge by creating models or designs that demonstrate their understanding of the science topic being taught.
 - **IMAGINATION STATION** – This station makes science concepts relevant for students by asking them to imagine scenarios that will bring about discussion and critical thinking.
6. **INQUIRY PROCESS SKILLS CHECKLIST** is provided with each set to show teachers and administrators the inquiry skills used by students in each activity. These skills include, but are not limited to, communicating, creating models, inferring, classifying, identifying variables, measuring, observing, predicting, gathering and organizing data, comparing and contrasting, interpreting data, and manipulating materials.

SCIENCE STATIONS



Eye Safety

SCIENCE SKILLS AND LAB SAFETY

Procedure:

1. Draw an eye on the underside of the Petri dish and display for class using the projector.
2. Crack open the egg and place the egg white only in the Petri dish.
3. Explain that the proteins in egg whites are similar to those found in the protective layer of the eye.
4. Tell them that someone was not being cautious and has splashed acid into their eye - add drops of acid to the egg white.
5. Ask students to make observations of what is happening to the egg white.
6. Try adding water to reverse the effects. Have students make observations.

What's Happening?

The proteins in the egg white become cloudy when the acid is causing a denaturation of the proteins. This can't be reversed chemically because acid at this level is so strong that it is altering the way these proteins behave in their eyes or skin if not used properly. Students must be made aware of the safety procedures associated with such as wearing goggles, gloves and aprons. Make sure they are aware of safety equipment - eye wash station, shower, fire blanket, etc.

Discussion:

Q: What happened to the "eye"?

A: The protective layer became cloudy and damaged the eye.

Q: What types of safety equipment must be worn when doing Lab?

A: goggles, apron, lab kit, gloves

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Discussion questions and teacher set-up included!

Teacher guide and answer key offered for every lab!

Easy-to-get materials!



Measure with SI Units

SCIENCE SKILLS AND LAB SAFETY

The standard system of measurement used by scientists around the world is known as the International System of Units, which is abbreviated as SI. SI units are easy to use because they are based on multiples of 10. Each unit is ten times larger than the next smallest unit and one-tenth the size of the next largest unit. The following table lists the prefixes used to name the most common SI units.

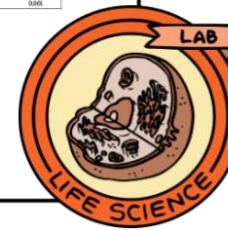
Prefix	Symbol	Abbreviation
Milli-	m	1/1000
Centi-	c	1/100
Deci-	d	1/10
Deci-	d	0.1
Centi-	c	0.01
Milli-	m	0.001

Materials:

- scattered seeds
- tape
- balance
- postage scale
- capsaicin (spicy) small milk cartons
- fertilizer solution
- metric ruler
- 50 mL graduated cylinder
- colored pencils

Safety:

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Drip, Drop, Splat!

How does the density of a liquid and drop height affect the size and shape of droplet splatters?

Materials:

- colored water (graduated cylinder A)
- colored syrup (graduated cylinder B)
- eye dropper
- paper
- metric ruler
- meter stick

Procedure:

1. Make a hypothesis of how density of a liquid will affect splatter size on your lab sheet.
2. Place the piece of paper down on the lab table in order to catch splatters.
3. Measure the heights listed in the data table using a meter stick. Place meter stick with end starting at zero on paper and move up stick when increasing height of drop.
4. Use the eye dropper to drop ONE drop of colored water and ONE drop of colored syrup. Make sure to drop on different places on paper.
5. Measure the size of the splatter in MILLIMETERS. Record in data table on answer sheet.
6. Repeat for each height.
7. Use the collected data to graph the splatter size versus drop height for each liquid.

Analyze and Conclude

1. Was your hypothesis correct? Explain.
2. What are two controls in your experiment that helped you collect the most accurate data possible?

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USER-FRIENDLY PAGES:
Students easily recognize which answer sheet to use at each station by matching station icons located on each page!!

Name _____ Date _____

Hypothesis

Drop Height (cm)

	3	25	50	75	100
Colored Water					
Colored Syrup					

Height of Drop vs. Splatter Size

Number of Drops (mm)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
--	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----

Size of Splatter (mm)

Legend:

- Water
- Syrup

Analyze and Conclude:

1. _____
2. _____

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TEACHERS SAVE TIME:
Laminate station pages and reuse for each class and for years to follow!
Inquiry skills used are timeless!

Instructional Videos

The Intro to Life Science Instructional Videos and Digital Assessments are designed to help teachers move instruction from the group learning space to the individual learning space. Not only does this give students independence in their learning, but it also allows more time for dynamic and interactive learning when teachers meet with students in a group setting.

This resource is perfect for:

- Flipped Classroom
- Absent students
- 1:1 Classrooms
- Sub Plans
- Hybrid Schedules
- Teachers who want more time to guide students as they apply concepts and engage creatively in the subject matter

Features of this resource include:

- Instructional videos which are six minutes or less to keep students focus
- Videos and assessments can be completed independently
- Auto grading and reporting in Google Forms
- Share link with students through educational platforms or email
- Quizzes are editable with 5 – 8 questions per quiz
- Information in video pairs with Nitty Gritty Science Interactive Notebooks

Task Cards & Digital Task Cards

Task cards are a great tool for concept review that can be used in a variety of ways - pairs, small groups, team games, or individually. The reason they are so effective is there is only ONE task per card, allowing students to focus on that single task until they have successfully completed it. Answers sheet and answer key for teachers are included.

The digital, self-checking task cards are hosted at Boom Learning™ and are compatible with Google Classroom. These are perfect for displaying on your interactive whiteboard and leading class games or review sessions.

Print Task Cards

The print task cards are arranged in a stack, showing various question types. Each card has a circular icon with the number and the title 'Sound, Light, Mirrors, and Lenses'. The tasks include:

- DECIDE 1:** _____ is the highness or lowness of a sound.
a. Loudness
b. Pitch
c. Frequency
d. Intensity
- COMPLETE 2:** _____ is used to locate objects under water by the reflection of sound waves.
- DECIDE 5:** _____ is used to locate objects under water by the reflection of sound waves.
- COMPLETE 6:** _____ is an example of _____.
- DECIDE 9:** The change in pitch or wave frequency due to a moving source is called the _____.
a. loudness effect
b. pitch effect
c. Doppler effect
d. speeding effect
- COMPARE 11:** Compare the differences between music and noise.
- DECIDE 13:** The primary pigment colors are _____.
a. magenta, cyan, and yellow
b. yellow, blue and green
c. red, blue and green
d. red, white and blue
- DECIDE 14:** The image formed by a plane mirror is _____.
a. real and upright
b. virtual and upright
c. real and reversed
d. virtual and inverted
- EXPLAIN 15:** Explain why placing your hand on a ringing bell will stop the sound immediately.
- DECIDE 16:** What part of a musical instrument amplifies sound waves?
a. string
b. mallet
c. resonator
d. mouthpiece

Digital Task Cards

The digital task cards are displayed in a stack, showing interactive elements. Each card has a colorful border and the title 'Sound, Light, Mirrors, and Lenses'. The tasks include:

- DECIDE:** _____ is used to locate objects under water by the reflection of sound waves.
Buttons: So, Dop, eff
- DECIDE:** Which light waves are bent most when passing through a prism?
Buttons: red waves, blue waves, green waves, yellow waves
- DECIDE:** What occurs when parallel rays of light hit a rough or bumpy surface?
Buttons: regular reflection, diffuse reflection, refraction, diffraction

Study Guides: Includes **print** or **digital** options

Nitty Gritty Science Study Guides are directly aligned to the notes and assessments offered by Nitty Gritty Science and include a variety of review strategies which meet the needs of your learners for independent study and indirect instruction.

Each study guide provides a combination of strategies which may include:

- Graphic organizers
- Vocabulary building
- Compare and contrast
- Problem solving
- Concept mapping
- Interpreting data
- Critical thinking
- Theme connection
- Matching
- Fill-in-the-blank
- Short answer
- Real world application
- QR videos with accompanying questions

STUDY GUIDE
SOUND, LIGHT, MIRRORS & LENSES

Name: _____ Date: _____

SECTION 1

Directions: Read each statement and write true or false. If false, rewrite it to be true.

_____ Sound travels through a vacuum.
_____ Sound travels faster in water than in air.
_____ The speed of sound is constant in all media.

SECTION 2

Directions: Explain the four stages of human hearing in the graphic organizer below.

Outer Ear Middle Ear Inner Ear
Ear Drum Eardrum

SECTION 3

Directions: Explain in your own words what music is and include the terms *sound quality*, *overtones*, and *resonators*.

SECTION 4

Directions: Give the definition and an example for each.

Property	Definition	Example
Opaque		
Transparent		
Translucent		

SECTION 5

Directions: Write the letter of the correct lens type on the line provided.

Column A	Column B
_____ Plane Mirror	a. m
_____ Convex Mirror	b. f
_____ Concave Mirror	c. r
_____ Convex Lens	d. r
_____ Concave Lens	e.

Directions: Identify each type of lens. Draw a line below the picture.

A	B

SECTION 6

Directions: Answer the questions below about your eyes.

1. Explain how your cornea and retina allow you see.

2. What is nearsightedness?

3. What is farsightedness?

4. Why do you think people become farsighted as they get older?

Directions: Pick *one* of the pictures below and explain how it uses mirrors and lenses.

Assessments:

Teachers can use a variety of assessments to evaluate student progress throughout the unit. The curriculum provides mini-quizzes for each Interactive Notebook chapter and an online assessments that goes with the instructional videos. The chapter test includes multiple choice, short answer, interpreting diagrams, and an essay.

The image displays three overlapping assessment documents. On the left, two identical 'Quiz Music and Uses of Sound' forms are shown. Each form has a header for 'Name' and 'Date', followed by six numbered multiple-choice questions. The questions cover topics such as the study of sound, hollow chambers, underwater sound waves, natural frequencies of instruments, high-frequency sound waves during pregnancy, and sound patterns. The rightmost document is a 'CHAPTER TEST' page, also with 'Name' and 'Date' fields. It features a 'Multiple Choice' section with 12 questions, a 'Fill in the Blank' section with 3 questions, and a 'Short Answer' section with 2 questions. A red-bordered box at the top right of the test page contains the text: 'EDITABLE CHAPTER TEST INCLUDES MULTIPLE CHOICE, FILL IN THE BLANK, INTERPRETING DIAGRAMS, & SHORT ANSWERS QUESTIONS'. At the bottom of the test page, another red-bordered box states: 'ANSWER KEY INCLUDED — IMAGES ARE BLURRED FOR COPYRIGHT REASONS'.

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<https://www.teacherspayteachers.com/Store/Nitty-Gritty-Science-Jr>

