Senior High School

Lesson Exemplar in General Science

Quarter 1

Lesson Exemplar

3

Lesson Exemplar for General Science
Quarter 1: Unit 1

Development Team

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LESSON EXEMPLAR			
Learning Area	General Science	**Grade Level**	11
Semester	First	**Quarter**	First

I. OBJECTIVES *(Identifying the Goals)*	
Content Standard	The students learn an understanding of the properties of light and sound leads to their safe and productive application.
Performance Standard	By the end of the quarter, learners identify general physics principles and their applications in daily life. They use scientific principles to solve problems, make informed decisions, and illustrate the applications of physics for self, society, and the environment. They design simple and compound machines and hydraulic systems to demonstrate applications of force, torque, center of mass, and hydraulic-related principles. They evaluate energy-efficient practices in electricity supply and consumption at home, in local businesses and in exploring advantages and drawbacks of light and sound in medical imaging, security, communication and entertainment.
Learning Competencies	Identify innovations related to sound and light such as soundproofing, sound amplifiers, LED, holograms, and lasers.
II. REFERENCES and MATERIALS	References: ✓ Georgia Tech. 2017. Review of *Ben Klein: TECH + Knowledge + Y: What Is a Hologram?* Georgia Tech. April 14, 2017. https://www.youtube.com/watch?v=wHU1UVsuMxw. ✓ Gill, James. 2023. Review of *How Stethoscopes Amplify Sounds You Can't Hear*. @DrJamesGill. March 19, 2023. https://www.youtube.com/shorts/K4NRzbxcM4Q. ✓ NBC News Learn. 2020. Review of *Lasers in Our Everyday Life*. NBC News Learn. NBC Learn in partnership with Pearson. May 1, 2020. https://www.youtube.com/watch?v=cdRxQjrL744&t=17s.

	Materials: flashlight laser light bulb mobile phones glue tape pair of scissors foam
III. CONTENT	Understanding and using light and sound
IV. OBJECTIVES	1. Enumerate the different innovations related to light and sound. 2. Discuss how the different innovative technologies such as but not limited to LEDs, hologram, lasers, soundproofing, and sound amplifiers apply the properties of light and sound. 3. Recognize the significance of innovations related to light and sound in daily lives.

IV. PROCEDURES	**ANNOTATION**
A. Activating Prior Knowledge	1. Activating Prior Knowledge **Option 1: Light and Sound at Home and School** Directions: List down at least three (3) different technologies you have encountered today from your respective homes to the school that you think are related to light and sound. Write your answer on the corresponding column.
	*This part of the lesson makes the lesson **relevant** to the students right from the beginning. The answers being asked are part of the students' everyday lives.*

Technologies related to light and sound at…	
HOME	**SCHOOL**
1.	1.
2.	2.
3.	3.

Option 2: Taxonomy of Light and Sound

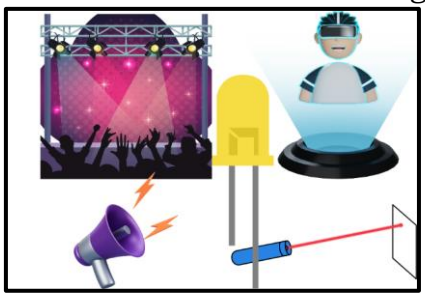
Directions: List down words that you know are related to light and sound with the first letter using the letters of the alphabet.

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

*This activity makes students **ideational** thinkers. They can generate and convey their ideas in general using the letters of the alphabet.*

Option 3: Word Cloud

Directions: Examine the pictures below. List down all the words related to the pictures to create a word cloud using any word cloud app.



The teacher may use the Mentimeter application to gather real-time responses from the students. The teacher may browse the application through this link: https://www.mentimeter.com.

	2. Establishing the purpose of the lesson **Option 1: The Show** The teacher may download and show to the students a short video or demonstration of a holographic display or a laser light show. Then, the teacher may pose this question: "How do you think these technologies work?" **Option 2: What if...?** Directions: Divide the class into four groups. Each group will be assigned into four different fields, namely: 1. Classroom Learning 2. Commuting or Travelling 3. Socializing or participating in group activities 4. Playing sports or games Each group will list down at least three (3) scenarios on what if there was no light or sound on their assigned fields. **Option 3: Mystery Box** The teacher will put objects on a box, then call out students to pick the items without looking at the objects and let them describe what they feel. Then, the teacher will ask the following questions: 1. What do you think that object is? 2. Does it involve light, sound, or both? 3. How is it connected to light and sound technology?	*This part makes the lesson **integrative** and **relevant**. The students could relate into the different activities mentioned and able to integrate their experiences in the topic being discussed.* *For the teacher, the following objects may be used in the mystery box activity:* ✓ flashlight ✓ light bulb ✓ mobile phones ✓ speaker ✓ digital camera ✓ headphone ✓ alarm clock
B. Instituting New Knowledge	*1. Presenting examples*	

	Light and sound are essential parts of our daily lives. Over the years, many innovations have been developed to use the properties of light and sound in new and exciting ways. Technologies such as LEDs, holograms, and lasers have transformed how we see and use light, while soundproofing materials and sound amplifiers have changed the way we manage and experience sound. Understanding these technologies helps us appreciate their significance in fields like communication, entertainment, medicine, and safety. **Option 1: LASERs in our everyday life** The students will watch a video entitled "**Lasers in our everyday life".** *Source:*  Guide Questions: 1. What does the word LASER stand for? 2. What are the things mentioned in the video that uses laser technology? 3. What are the different applications of laser mentioned in the video? **Option 2:** The students will watch a video entitled "**Ben Klein: TECH + knowledge + Y: What is a hologram?".** *Source:*  Guide Questions:	*This part makes the lesson **relevant** to the students by presenting real-life applications of the different concepts being discussed.*

	1. What technologies use optical fiber technology as mentioned in the video? 2. In what fields is optical fiber technology being applied and what is its important role in each field? **Option 3: Sound Amplification and Stethoscopes** The students will watch a video entitled "How Stethoscopes Amplify Sounds You Can't Hear" *Source:* Scan me! Guide Questions: 1. What is a stethoscope and what it is used for? 2. How is sound being amplified by the diaphragm of the stethoscope?	
	2. Discussing New Concept **Topic 1: Innovations Related to Sound** **Option 1. Testing Sound Insulation Materials** The objective of this activity is to test which kind/s of material block and dampen sounds effectively. The following are the materials needed in the activity: ✓ mobile phones (with installed decibel meter app) ✓ small speaker (optional) ✓ cardboard box or shoebox ✓ writing materials ✓ foam ✓ towels	*This part of the lesson encourages the students to perform simple experiments to visualize how are the properties of light and sound are applied to different innovations. The teacher may use alternative materials mentioned in the experiments if some materials are not readily available.* *This part also makes the lesson **responsive**, since students will apply technologies in performing the experiments and the materials to be used are replaceable with other materials available in their community for **contextualization** purposes.*

	✓ bubble wrap ✓ egg cartons ✓ cardboard ✓ felt paper ✓ plastic wrap ✓ aluminum foil **Option 2: Create a Soundproof Room Model** Have students build a small-scale model of a soundproof room using materials like foam, carpet, and cardboard. They can test the effectiveness of their designs by measuring sound levels inside and outside the model. **Option 3: DIY Sound Amplifier: Make a Smartphone Speaker** This activity will help the students understand how sound waves can be amplified using basic materials. **Topic 2: Innovations Related to Light** **Option 1. Make your own hologram** This activity will help the students build their own hologram and create a 3D image using simple materials. The materials needed are: ✓ plastic bottle ✓ graph paper or ruler ✓ pen or marker ✓ scissors or craft knife ✓ tape or glue ✓ smartphone or tablet with a YouTube hologram video (search for "hologram pyramid video") **Option 2. LED Art Exhibit**	*Note: This activity could be done by group. The materials could be replaced by other readily household materials.* *Note: To make this activity inquiry-based, the teacher will the ask the students to bring the materials below and let them discover how to construct a smartphone speaker by amplifying the sounds produced by the gadget.* *Note: The teacher may watch a video tutorial for making a DIY hologram. Available at https://www.youtube.com/watch?v=Xx-NMX9-1Wg&t=5s* *Note: The teacher is advised to monitor the students while doing the activity. Note also that this could be done by group.*

	This activity will help students create any art showcasing light emitting diodes (LED) and their role in the crafts such as electronic puzzles, wearable fashion, greeting cards, lanterns, etc. The materials needed for this activity are LEDs, dry cells, and copper wires/speaker wires. **Option 3. LASER** This activity will help the students identify and describe the components and operations of a laser. *3. Developing mastery* **Option 1: Light and Sound Saves the Day** 1. Divide the class into four groups. Give each group a scenario card. *Example scenario cards:* •A hearing aid helps a person hear better. •A pedestrian crosses the street using visual and sound cues from a traffic light. •A doctor performs laser eye surgery. •A blind person uses a cane with a sound sensor for navigation.	*Note: The teacher must emphasize safety precautions in using laser.* *Laser Safety Precautions* ✓ *Never point a laser at your eyes or others.* ✓ *Do not aim lasers at reflective surfaces.* ✓ *Use appropriate laser safety goggles.* ✓ *Use lasers in controlled areas.* ✓ *Avoid skin exposure to high-powered lasers.* ✓ *Turn off lasers when not in use.* ✓ *Read and follow the manufacturer's instructions.* *This part of the lesson helps the students realize the application and importance of light and sound in daily lives. Let the students present their outputs so others could have wider learning experience.*

2. State whether light, sound, or both play a key role in the assigned scenario.

3. Then, answer the following questions:

   a. What technology is used?
   b. Why such technology is important the given scenario?
   c. What problem does it solve?

Option 2. Innovation and their Uses

Directions: Complete the table below by filling out where the innovation is being used. Write your answer on the corresponding column.

Innovation	What it does	Where it is used
Soundproofing	Block or absorb sound waves	
Sound Amplification	Makes a sound louder by increasing its energy.	
Light Emitting Diodes (LEDs)	Energy-efficient lighting	
LASER cutting	Cuts materials with high precision	

Option 3. Wrap it Up!

Instructions:

1. Divide students into small groups and assign each group one technology (LEDs, holograms, lasers, soundproofing, sound amplifiers).
2. Provide each group with printed handouts detailing their assigned technology's principles, applications, and impact.
3. Allow groups to research further using their mobile phones or laptops.
4. Each group should prepare a brief presentation (5 minutes) on their technology, focusing on its properties, applications, and significance.

C. Demonstrating Knowledge and Skills

1.Finding practical application

Option 1: Recent Advancements in Light and Sound Technology

Search on the recent advancements in light and/or sound technology and summarize their implications in today's society.

How to score:

Criterion	***Rating***			
	9-10	***7-8***	***5-6***	***3-4***
Content	*The ideas are written in extraordinary style and voice.*	*The ideas are written in interesting style and voice.*	*The ideas are written in little style and voice.*	*No style or voice.*
Presentation and Organization of ideas	*Very informative and well organized*	*Informative and organized*	*Somewhat informative and organized*	*Less informative and poorly organized*
Spelling and Grammar	*No spelling and grammatical errors*	*Little spelling and grammatical errors*	*Some spelling and grammatical errors*	*Many spelling and grammatical errors*

*The lesson becomes **research-based** since students are given the opportunity to search on the latest advancements in light and sound technology.*

*This part of the lesson uses the **innovative** IDF concept. While the whole lesson talks about innovation, this part gives the learners the opportunity to become innovative themselves using what they have learned from the lesson.*

Option 2: Be an *InnoVentor!*

If you could invent something using light or sound, what would it do? Describe your new invention that uses light, sound, or both to solve a real-world problem.

• Name of your invention/innovation:

_____

•What does it do? Who does it help?

_____

_____

•What technology does it use (light, sound, or both)? How?

*In this part, the students make connection of the lesson to real-world applications adhering to the IDF concept of **Relevant** instruction.*

_____

_____

**Draw and label your new invention on a separate page.*

*This part uses strategies to gather **feedback** from students for **continuous improvement** of the delivery of the lesson.*

How to score:

Points	**50**	**40**	**30**	**20**
Relevance of Innovation (50%)	*The innovation is highly relevant to the theme.*	*The innovation is relevant to the theme.*	*The innovation is somewhat relevant to the theme.*	*The innovation is less relevant to the theme.*
Points	**30**	**25**	**20**	**15**
Creativity (30%)	*The innovation shows high creativity.*	*The innovation shows creativity.*	*The innovation shows moderate creativity.*	*The innovation shows low creativity.*
Points	**20**	**15**	**10**	**5**
Originality (20%)	*The innovation shows high originality.*	*The innovation shows originality.*	*The innovation shows moderate originality.*	*The innovation shows low originality.*

Option 3: Level up your Classroom Setting

If given the chance, what innovative device could you invent to help solve one problem that affects your leaning inside the classroom?

2. Making Generalizations

Option 1: The teacher may ask the following questions:

	1. How do you think these technologies that involves light and sound improve our daily lives?" 2. How can understanding these technologies help in solving real-world problems? **Option 2: Think-Pair-Share** The teacher will pose the question below and students find their pair and exchange their ideas. Afterwards, some students may share their ideas to the whole class. *"Which light or sound innovation do you think has changed the world the most? Why?"* **Option 3: Innovations in a Map** Create a concept map showing the impact of the different innovations in light and sound in our daily lives. 3. Evaluating Learning **Option 1:** The teacher may ask the following questions: 1. Which innovation do you find most interesting and why? 2. What's something you'd like to learn more about from today's activity? **Option 2: One-Word Summary** What one word best summarizes today's lesson?" Explain it in 2-3 sentences**.** **Option 3: Sticky Note Summary** On a sticky note, write one takeaway or summary sentence from the lesson you learned. On another sticky note, write down the concept or topic you want to learn more. Post your notes on the designated areas on the board. 4. Additional activities: **Option 1: Design a Smart Lighting System** Students will design a smart lighting system for a specific environment, such as a classroom or auditorium. They should	*Students are given chance to assess the impact of the different innovations in their daily lives. In this process, they learn to keep track on their learning. Thus,* ***reflective instruction*** *occurs.*

consider factors like energy efficiency, user control, and aesthetic appeal.

Option 2: It's time to Reflect!

Create an essay about the impact of these innovations in light and sound in your daily life.

How to score:

Criterion	***Rating***			
	9-10	***7-8***	***5-6***	***3-4***
Content	*The ideas are written in extraordinary style and voice.*	*The ideas are written in interesting style and voice.*	*The ideas are written in little style and voice.*	*No style or voice.*
Presentation and Organization of ideas	*Very informative and well organized*	*Informative and organized*	*Somewhat informative and organized*	*Less informative and poorly organized*
Spelling and Grammar	*No spelling and grammatical errors*	*Little spelling and grammatical errors*	*Some spelling and grammatical errors*	*Many spelling and grammatical errors*

Option 3: Create your own pamphlet!

Create your own pamphlet summarizing the different innovations in light and sound and their uses and impacts in our daily lives.

How to score:

CRITERION	***RATING***			
	4	***3***	***2***	***1***
Accuracy of Content	*The content included in the diagram*	*At least 90% of the content included*	*At least 75% of the content included in the*	*Less than 75% of the content included in*

	is 100% accurate.	*in the diagram is accurate*	*diagram is accurate*	*the diagram is accurate*	
Creativity	*The diagram shows high creativity.*	*The diagram shows moderate creativity.*	*The diagram shows low creativity.*	*The diagram shows no creativity.*	
Appearance	*The diagram is very appealing in terms of design, layout, and neatness.*	*The diagram is appealing in terms of design, layout, and neatness.*	*Some elements of the diagram are appealing in terms of design, layout, and neatness.*	*The diagram is not appealing in terms of design, layout, and neatness.*	

V. ASSESSMENT

Option 1. Multiple Choice

Directions: Choose the letter of the best answer. Write your answer on the space provided before each number.

_____1. Which property of light allows LEDs to emit different colors?

A. Reflection B. Refraction C. Polarization D. Wavelength

_____2. Which of the following differentiates LEDs from incandescent bulbs as more energy-efficient? LEDs_____.

A. contain moving parts.
B. use mirrors to reflect light.
C. produce light using sound waves.
D. convert most energy directly into light.

_____3. Which property of light enables holography to create 3D images?

A. Reflection and Refraction
B. Absorption and Coherence
C. Coherence and Interference
D. Dispersion and Interference

_____4. To create a hologram, which kind of light is usually required?

A. Infrared light
B. Polarized light
C. Coherent laser light
D. Dispersed white light

_____5. Which feature makes laser light different from regular light?
A. It contains all wavelengths.
B. It is incoherent and scattered.
C. It cannot travel in a straight line.
C. It is coherent and monochromatic.

_____6. Which of the following BEST describes why lasers are used in surgery?
A. Reflect all light
B. Produce sound waves
C. Absorbs and reflects energy
D. Can focus energy precisely

_____7. Which material property is MOST useful for soundproofing a room?
A. Electrical insulation
B. Transparency to light
C. Magnetic conductivity
D. High density and porosity

_____8. Which of the following describes how soundproofing works?
A. Reflecting sound waves
B. Increasing wave frequency
C. Absorbing and blocking sound waves
D. Decreasing amplitude of sound waves

_____9. What is the purpose of a sound amplifier?
A. To reduce sound pollution
B. To convert light into sound
C. To filter out background noise
D. To increase the amplitude of sound waves

_____10. Which physical property of sound is directly increased by amplification?
A. Amplitude B. Frequency C. Speed D. Wavelength

Option 2. Completion

Directions: Complete the sentences with the correct term from the list: **Soundproofing, Sound Amplifiers, LEDs, Holograms, Lasers.** Write your answer on the space provided after each number.

1. _____ is/are commonly used in theaters and recording studios to prevent external noise interference.
2. _____ is/are used in barcode scanners, laser pointers, and surgical instruments.
3. _____ is/are energy-efficient lighting solutions that have a long lifespan.
4. _____ is/are used in concerts and presentations to project 3D images.
5. _____ is/are used in public address systems to ensure clear and loud sound delivery.
6. _____ is/are often found in flashlights, traffic lights, and electronic billboards because they use less power.
7. _____ is/are used in art installations to create realistic 3D projections.
8. _____ is/are installed in walls and ceilings to reduce echo and block outside noise.
9. _____ is/are devices that increase the loudness of audio signals for large crowds or individuals with hearing difficulties.
10. _____ is/are produce a focused beam of light and are used in precise cutting tools and medical equipment.

Option 3: True or False

Directions: Indicate whether the statement is correct or not. Write TRUE if the statement is correct and FALSE if not. Write your corresponding answer on the line provided before each number.

_____1. Soundproofing materials are designed to enhance the volume of sound in a room.

_____2. LEDs consume more power than traditional incandescent bulbs.

_____3. Holograms require special glasses to be viewed.

_____4. Lasers are used in various fields, including medicine and communication.

_____5. Sound amplifiers can be used to increase the volume of sound in a room.

_____6. The speed of light that allows LEDs to emit different colors is its speed.

_____7. Holography depends on dispersion and absorption property of light to create 3D images.

	_____8. Laser light is coherent and monochromatic that makes it different from regular light. _____9. Lasers are used in surgery because they can focus energy precisely. _____10. Soundproofing works by absorbing and blocking sound waves.
VI. REFLECTION	

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APPENDIX

Key to Correction

Assessment: Multiple Choice

Correct Answer	Rationalization
1. D. Wavelength	The color of light emitted by LEDs depends on the wavelength of the light. Different wavelengths correspond to different colors in the visible spectrum.
2. D. convert most energy directly into light.	LEDs are more energy-efficient because they convert most of the electrical energy directly into light with very little wasted as heat.
3. C. Coherence and Interference	Holography relies on the coherence of laser light (light waves having a constant phase relationship) and interference patterns created when two coherent light beams overlap. These interference patterns encode 3D information to create holograms.
4. C. Coherent laser light	Creating a hologram requires coherent laser light because the light waves need to have a fixed phase relationship to produce clear and stable interference patterns necessary for holography.
5. D. It is coherent and monochromatic.	Laser light is coherent (all waves have a fixed phase relationship) and monochromatic (consists of a single wavelength/color), which makes it very different from regular light that is usually incoherent and contains multiple wavelengths.
6. D. Can focus energy precisely	Lasers are used in surgery because they can focus energy very precisely on a small area, allowing surgeons to cut or treat tissue with minimal damage to surrounding areas.
7. D. High density and porosity	Materials that are dense and porous are most effective for soundproofing because they can absorb and block sound waves, preventing noise from passing through walls or ceilings.
8. C. Absorbing and blocking sound waves	Soundproofing works by absorbing sound waves to reduce their energy and blocking them from passing through walls or barriers, preventing noise from traveling between spaces.
9. D. To increase the amplitude of sound waves	A sound amplifier increases the amplitude of sound waves, making sounds louder so they can be heard more clearly.
10. A. Amplitude	Amplification increases the amplitude of sound waves, which corresponds to the loudness or volume of the sound.

Assessment : **Completion**

1. Soundproofing
2. Lasers
3. LEDs
4. Holograms
5. Sound amplifiers
6. LEDs
7. Holograms
8. Soundproofing
9. Sound Amplifiers
10. Lasers

Assessment: True or False

1. FALSE (Soundproofing reduces volume or blocks sound.)
2. FALSE (LEDs consume less power than incandescent bulbs.)
3. FALSE (Holograms can often be viewed without special glasses.)
4. TRUE
5. TRUE
6. FALSE (Wavelength/color, not speed, allows LEDs to emit different colors.)
7. FALSE (Holography depends on coherence and interference.)
8. TRUE
9. TRUE
10. TRUE