Senior High School

Lesson Exemplar in General Science

Quarter 1

Lesson Exemplar

6

Lesson Exemplar for General Science
Quarter 1: Unit 1

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Bureau of Learning Delivery
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LESSON EXEMPLAR			
Learning Area	GENERAL SCIENCE	**Grade Level**	11
Semester	1ST	**Quarter**	1

I. OBJECTIVES	
Content Standard	The learners learn that hydraulic systems exploit the relationship between pressure, force, and area to multiply forces and perform tasks;
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	The learners; 7. identify applications of Archimedes principle and Pascal's principle in various contexts, such as home, community, businesses, and transportation; 8. design simple practical activities or models to determine how variations in physical properties, such as shape, mass and volume, affect an object's ability to float in a fluid;
II. REFERENCES and MATERIALS (*Selecting Resources and Material*)	American Chemical Society. "Three Layer Float." *American Chemical Society*, https://www.acs.org/education/activities/three-layer-float.html. Accessed June 6, 2025. Hewitt, Paul G. *Conceptual Physics*, 12th ed. Pearson, 2019. Lumen Learning. "14.4 Archimedes' Principle and Buoyancy." *University Physics Volume 1*, https://courses.lumenlearning.com/suny-osuniversityphysics/chapter/14-4-archimedes-principle-and-buoyancy/. Accessed June 6, 2025. "Pascal's Principle Lab Activity SPH4C." *SharpSchool.* Accessed June 6, 2025. https://cdnsm5-ss9.sharpschool.com/UserFiles/Servers/Server_97729/Image/St.Thomas%20Aquinas%20Catholic%20Secondary%20School/Staff%20Sites/Mr.Eagan/SPH4C/jan%201dc%20Pascals-Principle-Lab-Activity1.pdf.

	PhET Interactive Simulations. "Density." University of Colorado Boulder. Accessed June 6, 2025. https://phet.colorado.edu/en/simulations/density. Serway, Raymond A., and John W. Jewett Jr. *Physics for Scientists and Engineers*. 9th ed. Boston, MA: Cengage Learning, 2013. Science Buddies. "How Much Weight Can Aluminum Foil Boats Float?" *Science Buddies*. Accessed June 6, 2025. https://www.sciencebuddies.org/stem-activities/aluminum-foil-boats-float. Spangler, Steve. "CARTESIAN DIVERS - Experiment Guide." *Sick Science® Teacher Training*. Accessed June 6, 2025. https://stevespangler.com/wp-content/uploads/2020/07/Cartesian-Divers-Experiment-Guide.pdf. TeachEngineering. "Fluid Power Basics." *TeachEngineering*. Accessed June 6, 2025. https://www.teachengineering.org/lessons/view/pur_fluidpower_less1. Vitruvius. *De Architectura*, Book IX, Chapter 3. As cited in "The Golden Crown (Sources)." Accessed June 6, 2025. https://math.nyu.edu/Archimedes/Crown/Vitruvius.html. "14.02: Icebergs." In *Introduction to Oceanography (Webb)*. Geosciences LibreTexts. Last modified 2024. Accessed June 6,2025. https://geo.libretexts.org/Bookshelves/Oceanography/Introduction_to_Oceanography_(Webb)/14%3A_Ice/14.02%3A_Icebergs.
(These shall be accomplished per topic)	
III. CONTENT *(Sequencing Content)*	***4. The physics of fluids***
IV. OBJECTIVES *(Setting Clear Objectives and Analyzing the Tasks)*	1. Identify examples of hydraulic systems in daily life and community settings. 2. describe the importance of Pascal's principle in various context such as home, community, businesses, and transportation. 3. Describe how the weight of displaced fluid relates to the buoyant force of an object. 4. Give examples of applications of Archimedes principle at home, in community, businesses, and transportation. 5. Identify the relationship between an object's mass, volume, and shape and its ability to float in a fluid. 6. design a simple experiment varying the shape, mass and volume to determine its effect on the objects ability to float in a fluid.

<table>
<tr><td></td><td colspan="2"></td></tr>
<tr><td colspan="2">IV. PROCEDURES
(Selecting Strategies, Making Meaningful Content, Delivering Lesson and Assessing Learning)</td><td>ANNOTATION
*Instruction to the teacher on how to facilitate the activities.</td></tr>
<tr><td>A. Activating Prior Knowledge</td><td>Short Review
ACTIVITY A
Option A.1:
Think-Pair-Share : STEAM Vocabulary

Instructions:
THINK
1. Let the students reflect on the lessons, experiments, or videos they've seen about fluids, buoyancy, pressure, and related concepts.
2. Pick words that relate to fluid mechanics. They may use words from the lesson or new ones they've encountered.
3. Neatly write 5 chosen words in the first column of the worksheet.
4. In the second column, write a simple description or meaning of the word.

PAIR
1. Turn to a partner and take turns sharing words and definitions.
2. Discuss:
a. Did you choose any of the same words?
b. Are your definitions similar? Can you improve or simplify them?
3. If needed, they can revise or clarify their definitions based on their discussions.

SHARE
Ask the students to share 1–2 of their vocabulary words and definitions with the class or your group.

Worked Example:</td><td>Fluid Mechanics was already discussed in the previous competency. The teacher may choose from the two activity options under Activity A as a short review before discussing the applications of Pascal's principle.

In option A.1, the students will do the activity individually for the first 3 minutes. They will be given pieces of paper with the table as shown in the activity. Instruct them to write down at least 5 words or terms and its description or meaning. After 3 minutes, they will have to pair up with other students to share their answers and to further improve their answers. Afterwards, the teacher can call some students to share what they wrote in the activity. The teacher can also write the words on the board to build a class vocabulary bank. This activity helps assess students' understanding and uncover any misconceptions they might have.</td></tr>
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Words/Terms	Meaning or Description
Pressure	Pressure is how much force you put on something and how spread out that force is.

Option A.2:

"Fluid Mechanics Speed Round Quiz"

Instructions:

1. Form small groups (3–5 students each per group).
2. Give each group a set of flashcards or a worksheet with 5–10 quick questions.
3. Groups have 5 minutes to answer as many questions as possible.
4. Review the answers as a class and give a small prize or recognition to the group with the most correct answers.

Sample Questions:

1. What is the formula for pressure?
2. State Pascal's Principle in your own words.
3. What is the unit of pressure in the SI system?
4. True or False: Liquids are compressible like gases.
5. What happens to the pressure when the area of contact decreases but the force stays the same?
6. Give one real-life application of Pascal's Principle.
7. What is buoyant force?
8. Why do objects feel lighter in water?

Alternative:

If digital, you can use **Kahoot** or **Quizizz** to run a live review quiz.

These activities will serve as springboard in the discussion of Pascal's principle. Tell the class that the terms/ words they

For option A.2, the teacher can form small groups to foster collaboration among the students. It can also be done individually if the teacher wants to go digital by using apps like Kahoot, Quizizz or similar apps. You can use the sample questions provided or you can make your own set of questions.

	encountered in these activities will also be used in the topic to be discussed today. **ACTIVITY B** Option B.1 **Demonstration** Activity Title: "Why Do I Feel Lighter?" Materials: • A clear container with water • A heavy object (such as a large stone) • A spring scale (if available) Steps: 1. Ask: "Have you ever noticed how much easier it is to lift someone or something underwater than on land? Why do you think that happens?" 2. Demonstrate: Dip a heavy object into water and let students observe how it feels lighter or appears easier to lift. You can also use a spring scale to compare the weight in air vs. underwater. 3. Challenge Students to Predict: "What force could be pushing up on this object in water? Why doesn't it feel as heavy?" Option B.2 **Eureka Moment Storytelling**	Activity B can be done on the 2nd day prior to discussing the Archimedes principle. The teacher may choose from two options B.1 and B.2. These activities can be done to engage the students or to get them interested with the lesson. This will also be an avenue to get students prior knowledge on buoyancy. Possible Answers: 1. Water pushes against the object, making it easier to lift. 2. Possible observations: -The scale shows a smaller weight in water than in air. - It's not as heavy underwater even though it's the same object." 3. Buoyant Force - The water pushes back against the object." • Optional: If there is not enough time to do the activity, you can use a video clip of someone "floating" easily in water. Then, ask the same questions in the activity. Option B.2 uses the story of Eureka moment combined with images in order to retain the

	Setup: Dramatically tell (or act out) the famous story of Archimedes discovering buoyancy while in the bath. *"Archimedes was trying to figure out whether a crown was made of pure gold without damaging it. While taking a bath, he noticed the water rising as he got in. Suddenly, he realized that the amount of water displaced could help measure volume—and therefore density—and prove if the crown was fake. He was so excited, he reportedly ran through the streets yelling 'Eureka!' which means 'I have found it!'"* **Questions:** 1. What important idea did Archimedes realize during his Eureka moment? 2. Why was this discovery important? 3. Can you think of everyday examples where this principle is used? For activities B.1 and B.2, the teacher may ask the questions in order to arrive at the idea that the water pushes back against the object - buoyant force. The teacher can also recall previous topics related to forces and motion. **ACTIVITY C** Option C.1 **P-O-E: "The Mystery Tower"** Set the Scene: 1. Prepare the Density Tower in advance (using honey, dish soap, water, oil, etc.) in a clear container. 2. Place several small objects (like a grape, a marble, a plastic bead, a piece of cork) next to the tower.	memory better than text alone. This means students are more likely to remember the principle in the long term. By asking the question on what particular elements Archimedes discovered, the teacher can guide the students in order to draw the answers buoyant force and displacement which are the key elements in the discussion of Archimedes principle. *Note: This story is AI generated. You may opt to change or use other sources.* Possible Answers: 1. The principle of buoyancy — the upward force equals the weight of the displaced fluid. 2. It allowed people to measure density and determine if objects would float or sink. 3. Boats, ships, submarines, floating bridges Activity C is designed for the 3rd day of the lesson. These activities will draw students' knowledge on density. The teacher can choose from options C.1 and C.2.

	Challenge the Class: ● Start the lesson by showing the colorful layered tower and holding up the objects. ● Ask: 1. *“What do you think will happen if I drop these objects into this tower?”* 2. *“Will they sink, float, or stop somewhere in between?Why?”* Let students predict and share their reasoning—don’t reveal the answer yet! The Big Reveal: ● Drop each object one at a time and watch as they settle at different levels in the tower. ● Allow the wow factor to sink in as students notice that some objects float in the middle! Option C.2 **P.O.E** **Activity:** ● Show the class the **Cartesian Diver** ● Ask the class what will happen to the diver if you press the bottle? ● The teacher will squeeze the bottle and the students will watch the diver sink and rise. ● The teacher will ask the students to explain how this happens.	Option C.2 is both a review of Pascal’s principle and a springboard for the new lesson in Archimedes principle.
B. Instituting New Knowledge	***Applications of Pascal’s Principle*** **ACTIVITY 1A** Option 1A : **Under Pressure!** **Activity:** 1. Let the students perform the activity in groups of 3. 2. Perform the activity in 15 minutes.	*The teacher can do Activity 1A and 1B in order to discuss Pascal's principle.* *See LAS and rubrics for activity 1A.* *Expected Concept in activity 1A:*

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<td>3. The students will present their outputs to the class. (If there is not enough time, the teacher can just ask the question and let them answer it in front of the class.

The teacher can ask the following questions in order to get the concept behind Pascal's principle.

Concept Discussion Questions:
Ask students to reflect and write or discuss:
1. When you pressed on the bag, did the pressure stay just under your finger or hand, or did it move through the whole bag?
2. Why do you think the water shifted or bulged in some spots? What caused that to happen?
3. What does this experiment help you understand about how liquids behave when you squeeze them inside something that’s closed?

Critical Thinking:
What do you think would happen if the plastic bag was much bigger or smaller? Would the water react the same way when you press it? Why do you think that?
Imagine there’s an air bubble inside the bag — how do you think that might change the way the pressure spreads when you push down? Would it still behave the same way?
<u>Option 1B</u>
Hydraulic System Model (Syringe Experiment)
Activity Overview:
In this hands-on activity, students connect two syringes using plastic tubing and fill the system completely with water (ensuring no air bubbles). When one plunger is pushed, the other moves —</td>
<td>Pressure in an enclosed fluid spreads in all directions equally, not just where it was applied — this demonstrates Pascal’s Principle.

The teacher can also include the following questions in order to target higher order thinking skills. This will lead students to recall concepts on properties of matter.

See LAS and Suggested rubric for Activity 1B.

Concept Explanation:
When one plunger is pushed, the pressure is transmitted through the incompressible water inside the tubing. According to Pascal’s Principle, this pressure spreads equally</td>
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	visually showing how pressure is transmitted through a confined fluid. Tips for Teachers: • Watch Out for Air Bubbles: Remind students to get rid of any air in the tubing. Air can be squished (compressed), but water can't — so leaving bubbles in the system can mess up how the syringes work together. • Use Clear Materials: Transparent syringes and tubing make it easier for students to actually *see* what's going on. Watching the water move helps them understand how pressure travels through a fluid. • Try Different Syringe Sizes: Let students mix and match syringe sizes. When they push the smaller one and the bigger one moves, it shows how a little force can create a bigger force — like in real hydraulic machines. **Suggested Questions to Ask Students:** -What did you notice when you pushed one plunger? -What does this tell you about how pressure behaves in a fluid? -Can you think of a real machine that works like this? Where might we use this kind of system in real life? -What do you think would happen if there was some air trapped inside the tubing? How might that change things? These types of questions encourage students to think more deeply about what they're observing and help them connect the activity to real-world applications. They're great for checking understanding and getting students to apply what they've learned! Option 1C **Pascal's Principle in Daily Life (Gallery Walk)** Instructions: 1. Introduction - Explain the Gallery Walk format: students will move in small groups through stations, observe, discuss, and write notes.	throughout the fluid and pushes on the second plunger. The force and movement vary depending on the surface area of each plunger (syringe size) — this is how real hydraulic systems can multiply force. *Options 1C and 1D can be used to deepen the understanding of the topic. The teacher may choose any of the two.*

2. Divide students into 4 groups.
3. Assign each group a starting station.
4. At each station, students:
   Observe the photo/model carefully.
   Read any information or guiding questions provided.
   Discuss within the group how Pascal's Principle is demonstrated in the example.
   Record their observations and explanations on the worksheet.

*After 5–7 minutes, groups rotate to the next station until all stations are visited.

5. Each group will present their starting station to the class.

After all the rotations, bring the class back together. Lead a discussion on the similarities and differences in how Pascal's Principle works in each system. Emphasize the real-life importance and applications of these examples.

Concept Questions for Stations:

Hydraulic Car Lift:
- How do you think the fluid pressure helps lift heavy cars safely?
- Why do you think the fluid has to stay trapped inside the system?

Brake System:
- When you press the brake pedal, how does that force get passed on to the brake pads?
- What part does fluid pressure play in helping the car stop?

Toothpaste Tube:
- When you squeeze a toothpaste tube, how does that pressure push the toothpaste out?
- How do you think the pressure moves through the toothpaste inside the tube?

Hydraulic Press:
- How can a small push on a little piston create a much bigger push on a larger piston?
- What role does the fluid play in making that bigger force happen?

The teacher should arrange stations around the classroom with clear labels and materials. Prepare a worksheet with spaces for notes on each station, including prompts like: What is the device or system?
How does Pascal's Principle apply here? What role does fluid pressure play? Why is this principle useful in this system?

Suggested rubric for gallery walk:

Criteria	*4- Excellent*	*3- Good*	*2- Developing*	*1- Needs Improvement*
Scientific Understanding	Clearly explains Pascal's Principle; accurately connects to the experiment.	Explains concept with minor errors or partial understanding.	Some understanding shown; explanation is vague or missing key ideas.	Little or no understanding shown; explanation is incorrect.
Observation & Data Recording	Detailed and accurate observations; differences in syringe sizes and force noted.	Basic observations noted with some detail; attempted comparison.	Limited observations; lacked specific details or accuracy.	Observations missing or not meaningful.
Teamwork & Engagement	Worked very well with partner/group; participa	Good participation; worked cooperatively	Participated with reminders; minimal contribu	Rarely participated; distracted or off-task.

		ted actively in all parts.	with some prompti ng.	tion to group.	

Option 1D

Hydraulic Lift STEM Challenge

Students will apply Pascal's Principle to design and build a functional hydraulic lift that can raise a small toy car at least 10 cm**.** This encourages understanding of how fluid pressure is transmitted and applied in real-world systems like car lifts and machinery.

Challenge Task:

• Divide the class in 5 groups. The students will build a stable hydraulic lift that can raise a toy car at least 10 cm high.
• Compete to:
Lift the **heaviest weight**, or
Reach the **tallest height**
• The design must use syringe pressure as the lifting mechanism—no hands or levers to help!

Reflection Questions:

1. Which design worked best in your group, and why do you think it was successful?
2. What problems did you run into, and how did you fix them?
3. How does your hydraulic lift show Pascal's Principle in action?
4. If you had the chance to build it again, what would you change or improve?

Checkpoint question: How would daily tasks be harder without hydraulic systems? Identify a real-world scenario where Pascal's Principle is used.

For this activity, the teacher may ask for students' insights on how they will be graded. Some of the suggestions are:

- Engineering design & creativity
- Understanding of Pascal's Principle
- Teamwork & effort
- Functionality of the lift
- Completeness of the activity sheet

Applications of Archimedes Principle

ACTIVITY 2

Option 2A : **Archimedes principle Activity**

Students will explore **Archimedes' Principle** by comparing the loss of weight of an object submerged in water with the weight of the water it displaces.

1. Divide the class in 6 groups. The students can perform the activity in 15-20 minutes.
2. Each group be given 1 minute to present the results of their activity.

Analysis Questions:
1. What do you observe about the **weight loss** and the **displaced water's weight**?
2. What **force** is responsible for the weight loss underwater?
3 How does this activity show Archimedes' Principle in action?

As you discuss your results, point out that the "missing" weight of the submerged object matches exactly the weight of the water it pushed aside. This one-to-one relationship is exactly what Archimedes discovered.

Option 2B

Phet Simulation on density

Link: https://phet.colorado.edu/en/simulations/density

Students can also use the simulation and investigate how the weight of displaced fluid is related to the weight loss of the object submerged in water using this Phet simulation.

Checkpoint Question:

How would you compare the weight of the displaced fluid to the weight loss of the object?

The teacher may choose from Option 2A and Option 2B in conducting the experiment.

See LAS and rubric for Activity 2A.

Reflection questions for the students:

How did you find the activity? Can you share and describe your experience?

If there is limited device or internet connection, the students can work in pairs or in groups of 3 for Phet simulation.

Option 2C

The Tip of the Iceberg: Floating Giants

The students will observe how much of an iceberg (ice cube) floats above water and understand why, using Archimedes' Principle**.**
Divide the class in 6 groups. Let them perform the activity in 15 minutes.
Afterwards, let the students discuss their results in front of the class.
In this case, the students should be able to explain how buoyancy and density determine the floating behavior.

Option 2C can be done in order to deepen their understanding of the topic discussed.

Investigating the effects of varying the physical properties (shape, mass and volume) to the objects' ability to float in fluid

The teacher can do option 3A and any from option 3B and 3C.

ACTIVITY 3

Option 3A

POE: "Will It Float?" Prediction Chart

Students record predictions about whether each item will float or sink. They can write their answers on the prediction chart. The teacher then test their prediction. After testing, let them right the reason why the object sink or float.

The teacher can add or change the sample objects depending on the availability of materials.

Sample objects	**Sink or Float**	**Why do you think so?**
Crumpled foil ball		
Flat foil sheet		
Hollow plastic ball		
Solid rubber ball (same size)		

Small rock		
Plastic spoon		
Wooden block		

This POE chart helps correct misconceptions and supports scientific explanation building, making it an excellent introductory activity for teaching Archimedes' Principle and buoyancy.

Option 3B

Floating Frenzy: Sink or Swim?

Task:

In groups of 5, students will plan and carry out an experiment using simple materials (such as modeling clay, plastic wrap, coins, bottle caps) to test how shape, mass, and volume affect floating.

Level 1 – Use guided inquiry (recipe type)

Required Elements:

Identify variables (shape, mass, volume)
Record observations
Summarize findings

Level 2 – Semi-guided inquiry
Give the objectives and materials.

Required Elements:

Identify variables (shape, mass, volume)
Design the steps
Record observations
Summarize findings

Level 3 – Give a testable problem.

Required Elements:

Formulate a hypothesis
Identify variables (shape, mass, volume)
Choose materials
Design the steps
Record observations
Summarize findings

In option 3B, the teacher may identify the level of learners and use the appropriate activity level for them.

You can plan with the students how they would want their output to be graded. Some of the criteria suggested are variable identification, procedure or planning, execution, observation, conclusion, hypothesis(depending on the level, and creativity)

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The teacher may identify the level of the students, or let the students identify their own level. All the levels are geared towards the achievement of the objective for the topic.

Option 3C

Phet Simulation on density
Link: https://phet.colorado.edu/en/simulations/density

Checkpoint Question:
What makes an object float?

DESIGN CHALLENGE

Option 4A
A. “Buoyancy Solutions”
Design a Floating Device That Helps Communities. Have students use Archimedes' Principle to create a model that could support clean water delivery, flood response, or sustainable transport in line with one or more SDGs.
Suggested : Flood Warning Device – Buoyant Alert System
Design a flood warning device applying the Archimedes principle.

Option 4B
B. “Build it, Load it!”
In pairs or in groups of 3, students will craft a simple aluminum foil boat and see how many marbles it can hold before it sinks.

Materials:
Aluminum foil sheets
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Option 3C uses PHET simulation. However for this activity, the teacher can only investigate the effects of mass and volume to the objects ability to float in fluid.

The teacher may ask the checkpoint question to check if the students understand the concept behind what makes an object float. This is also a good avenue to check for misconceptions.

If there is still time, the teacher can do a design challenge in order for students to apply their learning. If there is not enough time, it is recommended to give the activity as a take home.
The teacher can choose between 4A and 4B as a performance task.
Activity 4A is a good activity that would help address issues related to climate resilience and disaster preparedness.

Option 4B is also a good semi-guided activity application of Archimedes principle. This activity will also lead to understanding boat design and safety — real-world transportation tie-in.
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	Straws, plastic wrap, tape Small weights (like coins or marbles) A basin or tub of water Ruler (optional) **Follow-Up Discussion:** Which designs were the most effective, and why? How did the shape and volume of the boat affect its floating ability? How did Archimedes' Principle explain the results?	*For these activities, the teacher can ask the students how they want their outputs to be evaluated.*
C. Demonstrating Knowledge and Skills	**1. Finding Practical Application** **ACTIVITY D** **Option D.1** **Task: Mini Research** **Title: "Hydraulics in the Community"** ● Divide the class in 5-6 groups. Assign different fields (such as construction, health care, transport) to research how Pascal's Principle is applied. ● Each group presents examples (such as hydraulic cranes, dentist chairs, hydraulic presses) with simple diagrams or models. **Option D.2** **Task: Create an Infographic** **Title: "Pascal in Action"** **Activity**: ● Individually or in pairs, students design an infographic showing at least **3 real-world applications** of Pascal's Principle — including how it works and why it's important.	The teacher may choose D.1 or D.2 for applications of Pascal's principle.

ACTIVITY E

<u>Option E.1</u>

Escape the Sinking Ship Challenge

Scenario:

- Your ship has hit an obstacle and is starting to take on water! To stay afloat and reach safety, your crew must use your knowledge of **Archimedes' Principle** to solve these challenges. Complete each task to unlock clues that will keep your ship balanced and above water.

Escape Instructions:

Complete **all tasks** and show your answers to the captain (the teacher).

Each **correct answer unlocks a clue** to patch the ship and stay afloat!

Option E.2

Task: Scavenger Hunt (Individual Activity)

Title: "Picture Perfect!"

Objective:

- Identify real-life uses of Archimedes' principle in different settings.

Activity:

- Students will find and photograph (or list) examples of Archimedes' principle in action in each setting.
  Home: Floating bath toys, kitchen measuring jugs, water dispensers.
  Community: Swimming pools, water tanks, fishermen's boats.
  Businesses: Shipping docks, hydrometers in beverage industries.
  Transportation: submarines, hot-air balloons

The teacher may choose E.1 or E.2 for applications of Archimedes principle. Escape the sinking ship challenge must be done by group and be done in a form of a game.

These may also be done as an assignment.

Suggested rubric for scavenger hunt:

Criteria	4- Excellent	3- Good	2- Developing	1- Needs Improvement
Accuracy of Examples	All examples clearly demonstrate Archimedes' Principle in each setting.	Most examples are accurate and relevant.	Some examples are loosely related or unclear.	Few examples are correct or show misunderstanding.
Variety of Settings	Includes examples from all required settings	Missing one setting, but remaining	Only two settings included; limited diversity.	Fewer than two settings addressed or

Outcome: Students bring their research to life by presenting or displaying their work through engaging presentations or eye-catching posters.

2. Making Generalization

- **Exit Pass**:
  - Name one real-life object that uses Archimedes' Principle and explain how it works.
  - Name one application of Pascal's principle and explain its importance to the society.

- **Reflection**:

  Activity: "Pass a Question"

  Step 1 – Reflect and Write (Individual Work):
  On a ¼ sheet of paper, instruct students to write one thoughtful question related to today's lesson.

  - It could be about something they learned,
  - something they are still curious about, or
  - something they found difficult to understand.

  Step 2 – Pass and Respond (Peer Exchange):
  Pass your paper to the person in front of them.

  - Read the question carefully.
  - On the back of the paper, write responses based on what they understand.

	(home, community, business, transport).	examples are relevant.		examples do not match categories.
Creativity and Presentation	Presentation/poster is engaging, well-organized, and visually appealing.	Clear and organized with some creative elements.	Some effort shown, but presentation lacks polish or creativity.	Disorganized or lacks visual clarity.

The teacher may choose the from the following generalization: These are designed to;

- Encourage metacognition (thinking about one's own learning).
- Support peer teaching and collaboration.
- Promote critical thinking and question formulation.
- Help teachers identify learning gaps and follow up.

- If they're not completely sure, instruct them to write down their thoughts and include any questions or topics they like to explore more.

Optional Step 3 – Share Out (Whole Class):

- A few volunteers can read the questions and answers out loud to kick off a class discussion or clear up any common misunderstandings.

3. Evaluating Learning

Multiple Choice:

1. What does Pascal's Principle states about the pressure applied to a confined fluid?
A. Decreased at the bottom
B. Lost in the fluid
C. Transmitted equally in all directions
D. Absorbed by air

2. When an object is submerged in water, what force acts upward against it?
A. Gravity
B. Buoyant force
C. Friction
D. Centripetal force

3. Which of the following best explains why a large, hollow object can float in water, while a small, solid object may sink?

Answer Key:

Multiple Choice:
1. C
2. B
3. C
4. B
5. B

For the Explanation, the answers may vary. Below is the suggested rubrics in assessing the students answers:

For numbers 1 and 2, the total points per number is 9 points.

Criteria	3 points (Excellent)	2 points (Satisfactory)	1 point (Needs Improve ment)

A. The larger object has more mass, so it floats better.
B. The smaller object is lighter, so it sinks faster.
C. The shape and volume of the larger object cause it to displace more water, increasing the buoyant force.
D. The solid object traps air inside, making it heavier than the hollow one.

4. Which of the following objects is most likely to float in water?
A. A small, dense metal ball
B. A large, flat sheet of metal shaped like a bowl
C. A wooden cube smaller than a marble
D. A rock with air bubbles inside

5. Which combination of properties makes an object most likely to float in water?
A. High mass, low volume, round shape
B. Low mass, high volume, wide shape
C. High mass, small volume, sharp shape
D. Low mass, low volume, compact shape

Explanation:

1. Give two examples of hydraulic systems found in your home or community.
2. Give two real-life examples of Archimedes' Principle at work—one in the home and one in transportation. Explain how it applies in each case.
3. How does Pascal's Principle make a car's brake system work?
4. Using your own words, explain how the weight of the fluid pushed aside determines if something floats or sinks.

4. Additional Activities:

Relevance of Examples	Provides two accurate and distinct real-life examples (one home, one transport).	Provides only one relevant example or both are from the same context.	Examples are vague, incorrect, or missing.
Explanation of Principle	Correctly explains how Archimedes' Principle applies in both examples (mentions displacement, buoyant force, etc.).	Basic explanation with limited use of scientific terms or partial understanding.	Inaccurate or missing explanation of how the principle applies.
Clarity of Writing	Well-structured, clear, and written in the student's own words.	Mostly clear, with some minor issues.	Confusing, copied, or lacks sufficient detail.

For numbers 3 and 4, the total points per number will be 6 points.

Criteria	3 pts (Excellent)	2 pts (Satisfactory)	1 pt (Needs Improvement)
Accuracy of Concept	Correctly explains the concept	Partial understanding; some correct concepts, but with minor errors or vague phrasing.	Misunderstanding or incorrect explanation

1. Interpret data from an experiment involving hydraulic systems.

- Supports scientific inquiry and data literacy.
- *Example*: "Analyze how changing the size of a syringe affects force transmission."

2. Field Observation or Interview (optional/homework)
Activity: Have students talk to a mechanic, nurse, or heavy machinery operator about tools they use that involve fluid pressure. They will summarize how those tools relate to Pascal's Principle.

Clarity of Explanation	Clearly written in the student's own words; easy to understand.	Understandable but with minor grammar or clarity issues.	Unclear, poorly worded, or copied verbatim.

V. ASSESSMENT
(Assessing Learnings)

I. Multiple Choice

1. Which of the following is an example of a hydraulic system?
A. Bicycle chain
B. Car brake system
C. Windmill
D. Ceiling fan

2 . What happens to the small force applied to a small piston in a hydraulic lift?
A. No change in pressure
C. A smaller force on the other piston
C. A larger force on the larger piston
D. The system failing to operate

3. What does Archimedes' Principle say about the buoyant force of an object equal to?
A. The weight of the object
B. The volume of the fluid
C. The mass of the object
D. The weight of the displaced fluid

4. When will an object float in water?

	A. When it is heavier than the water it displaces. B. When it is made of metal. C. When it displaces a volume of water equal to or greater than its weight. D. When it is shaped like a ball. 5. When the volume of an object increases but its mass stays the same, what is likely to happen to its ability to float? A. It will definitely sink. B. It will become more dense and float better. C. It will become less dense and float better. D. Its density won't change, so its buoyancy is unaffected. **II. Explanation** 1. Explain how Pascal's Principle helps a barber's hydraulic chair work efficiently. 2. Evaluate how Archimedes' Principle is used in designing floating structures like rafts and pontoon bridges. What materials and shapes are most effective, and why? **III. Performance Task:** Design a simple experiment using clay or foil to test how changing shape, mass, or volume affects floating. In your design, include: A. The materials you will use. B. The steps you will follow. C. The variables you will change. D. How you will measure floating ability? E. What you expect to find? <u>Answer Key:</u> **I. Multiple Choice:** 1. B 3. C 5. D 7. C 9. C

II. Explanation

Student's answers may vary. The teacher may use the suggested rubric to assess student's answer.
Suggested Rubric: Total points (6 points per number)

Criteria	3 pts (Excellent)	2 pts (Satisfactory)	1 pt (Needs Improvement)
Accuracy of Concept	Correctly explains the concept	Partial understanding; some correct concepts, but with minor errors or vague phrasing.	Misunderstanding or incorrect explanation
Clarity of Explanation	Clearly written in the student's own words; easy to understand.	Understandable but with minor grammar or clarity issues.	Unclear, poorly worded, or copied verbatim.

III. Performance Task

You may use the rubric below to assess the students output.
Suggested Rubric: Total points (20)

Criteria	4 pts (Excellent)	3 pts (Satisfactory)	2 points (Developing)	1 pt (Needs Improvement)
Materials identified	All necessary materials are listed clearly and are appropriate	Most materials. are listed and appropriate	Some materials listed; may be missing one or two key elements	Materials are unclear, inappropriate, or mostly missing
Clear steps/procedure	Steps are logical, clearly described, and easy to follow	Steps are mostly clear, with minor gaps	Steps are unclear or missing key actions	Steps are incomplete or very unclear
Identification of variables	Independent, dependent, and controlled variables are correctly identified	One or two types of variables identified correctly	There are some confusions about variables	Variables not identified or completely incorrect
Method of measuring floating activity	Clear, practical, and measurable method described (e.g. depth, time, float/sink)	A generally workable method with minor vagueness	Vague or incomplete method of measurement	No clear way of measuring floating ability provided
Prediction and reasoning	Prediction is logical and clearly based on scientific reasoning	Prediction is reasonable with some explanation	Prediction is given but lacks clear reasoning	No prediction or explanation given.

VI. REFLECTION *(Feedback and Continuous Improvement)*	Teachers can take note tasks that will be continued the next day or additional activities needed. They are also encouraged to record relevant observations or any critical teaching events that influence on the attainment of the lesson objectives.

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APPENDIX

Suggested Rubric for Option 1A: Under Pressure

Criteria	*4-Excellent*	*3- Good*	*2- Developing*	*1- Needs Improvement*
Observation skills	*Makes detailed and accurate observations, identified pressure effects correctly.*	*Describe main effects with some supporting observations.*	*Observations are basic or lack details.*	*Few or unclear observations, missed main effects.*
Participation and engagement	*Actively engaged in the hands-on activity and group discussion.*	*Participated in activity and group discussion*	*Participated somewhat, needed reminder to stay focused.*	*Minimal participation, disengaged or off-task.*
Scientific Understanding	*Clearly explains Pascal's principle using accurate terms and reasoning.*	*Explains the concept with minor errors or some reliance on example.*	*Shows partial understanding; explanation lacks clarity and accuracy.*	*Limited or incorrect explanation of the science concept.*
Critical Thinking	*Thoughtfully answers follow-up question with insight and reasoning.*	*Answers question with some reasoning an understanding.*	*Basic or incomplete answers; reasoning needs development.*	*Struggles to answer question or shows limited understanding.*

Suggested Rubric for Oprion 1B: **Hydraulic System Model (Syringe Experiment)**

Criteria	*4-Excellent*	*3- Good*	*2- Developing*	*1- Needs Improvement*
Setup & Procedure	Set up the system accurately with no air bubbles; followed all steps correctly.	Set up mostly correct; minor errors or needed small corrections.	Set up with help; some important steps missed.	Setup incomplete or incorrect; did not follow procedure properly.
Scientific Understanding	Clearly explains Pascal's Principle; accurately connects to the experiment.	Explains concept with minor errors or partial understanding.	Some understanding shown; explanation is vague or missing key ideas.	Little or no understanding shown; explanation is incorrect.
Observation & Data Recording	Detailed and accurate observations; differences in syringe sizes and force noted.	Basic observations noted with some detail; attempted comparison.	Limited observations; lacked specific details or accuracy.	Observations missing or not meaningful.
Application & Reasoning	Thoughtful responses to reflection and extension questions; strong reasoning.	Responded to questions with some reasoning and real-life connections.	Incomplete or surface-level answers; reasoning needs development.	Incorrect or unclear responses; lacks scientific reasoning.
Teamwork & Engagement	Worked very well with partner/group; participated actively in all parts.	Good participation; worked cooperatively with some prompting.	Participated with reminders; minimal contribution to group.	Rarely participated; distracted or off-task.