LESSON PLAN TEMPLATE

Lesson Title	Fluid Mechanics in Philippine Context: Pascal and Archimedes Principles
Learning Area/s	General Science
Name of Teacher/s	DEPED TAMBAYAN PH
Grade Level and Section	Grade 11
No. of Sessions	4 Sessions
References	Lesson Exemplar (LE) | Uploaded Files: SHS_GS_Q1_LE1.pdf, SHS_GS_Q1_LE2.pdf, SHS_GS_Q1_LE3.pdf, SHS_GS_Q1_LE4.pdf, SHS_GS_Q1_LE5.pdf, SHS_GS_Q1_LE6.pdf, SHS_GS_Q1_LE7.pdf, SHS_GS_Q1_LE8.pdf, SHS_GS_Q1_LE9.pdf, SHS_GS_Q1_LE10.pdf
Declaration of AI use	This lesson plan was co-created using Gemini AI to assist with unpacking competencies into a 4-session learning design, structuring activities, and assessment formulation.

Intentions. **Meaningful learning experiences are anchored in how we frame them. Start by deciding what you want learners to master by the end of the lesson – keep it clear and simple.**	
Learning Competency and Curriculum Standards:	**Learning Competency:** • Identify applications of Archimedes' principle and Pascal's principle in various contexts, such as home, community, businesses, and transportation. • 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. **Content Standards:** Physics principles apply to numerous aspects of everyday living. Understanding linear and angular quantities to describe motion helps in the design of efficient machines. The efficiency of simple and compound machines can be improved by applying basic physics principles. Hydraulic systems exploit the relationship between pressure, force, and area to multiply forces and perform tasks. Analysis of electricity generation, consumption patterns, and energy-efficiency practices can lead to better energy supply and management. An understanding of the properties of light and sound leads to their safe and productive application. Past research in the field of chemistry provides the foundations for the development of helpful products and processes. Household and personal care products contain chemical substances that determine their properties and guide their proper use and disposal.

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<tr><td></td><td colspan="4">Performance Standards:
By the end of the term, 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 and local businesses and explore the advantages and drawbacks of light and sound in medical imaging, security, communication, and entertainment.</td></tr>
<tr><td></td><td>Session 1</td><td>Session 2</td><td>Session 3</td><td>Session 4</td></tr>
<tr><td>Learning Objectives:</td><td>By the end of the session, the learners should be able to:
Explain Pascal’s Principle and the relationship between pressure, force, and area (P=F/A).
Identify applications of Pascal's principle in local contexts such as car repair shops (vulcanizing) and transportation (braking systems).</td><td>By the end of the session, the learners should be able to:
Describe Archimedes’ Principle and the concept of buoyant force.
Relate the weight of displaced fluid to the ability of an object to float in a Philippine nautical context.</td><td>By the end of the session, the learners should be able to:
Identify the relationship between an object’s mass, volume, and shape and its ability to float.
Conduct a simple experiment varying these physical properties to determine their effect on buoyancy.</td><td>By the end of the session, the learners should be able to:
Design and build a simple practical model (banca or cargo vessel) that maximizes load capacity using principles of buoyancy.
Present and critique the efficiency of their models based on the variations in shape and volume.</td></tr>
<tr><td>Learner Context:</td><td>Learners in this Grade 11 section are generally highly observant of their local environment, showing strong interest in</td><td>Many learners reside in coastal or riverside areas, making them familiar with local 'bancas' and fishing vessels. They demonstrate</td><td>The class shows a preference for collaborative, kinesthetic learning. They are proficient in following step-by-step</td><td>Learners are currently very motivated by competitive, project-based tasks. They enjoy presenting their work but may be</td></tr>
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	mechanical systems like motorcycles and public transport (jeepneys). While most are proficient in conversational English, some struggle with abstract mathematical derivations. A significant portion of the class exhibits strong visual-spatial intelligence but faces barriers such as limited access to personal laboratory equipment at home. Recently, they have responded positively to hands-on demonstrations involving everyday household items.	high engagement during storytelling but sometimes find it difficult to link qualitative observations (floating) to quantitative principles (weight of displaced water). Barriers include occasional absenteeism due to community responsibilities, requiring clear, modular lessons that allow for quick catch-up.	instructions but need guidance in isolating variables (scientific method). Some learners with learning disabilities require simplified data recording sheets and visual aids to track the changes in variables during the activity.	shy when critiquing peers. Strengths include creativity and the ability to use recycled materials. A barrier is the uneven distribution of tasks within groups, necessitating clear roles for every member to ensure inclusion.
Learning Experience. **A learning experience is like a thoughtfully designed journey. Each activity and interaction builds towards meaningful understanding and growth. Identify activities and interactions to help learners gain knowledge, skills, or understanding in a purposeful way.**				
Pre-Lesson:	**Squeeze and Observe:** ● Provide each group with a sealed plastic bag filled with water or a tube of toothpaste. ● Ask	**The Eureka Story:** ● Retell the 'Eureka' moment of Archimedes in the bathtub (LE6 reference). ● Ask: "Why did the water level	**Shape Challenge:** ● Give each student a piece of aluminum foil. Ask them to crumple it into a ball and drop it in water. Then ask:	**Recap Quiz:** Use a quick 'True or False' regarding Day 1-3 concepts (Active Retrieval) to ensure readiness for the design phase.

	students to apply pressure at one point and observe how the fluid reacts throughout the container. ● Prompt: "Does the pressure stay only under your finger?" (Active Retrieval of basic pressure concepts).	rise?" and "Why do you feel lighter when you go for a swim in the sea?"	"How can we change this same piece of foil to make it float?"	
Flow:	**1. Contextual Introduction:** Show a picture of a local 'vulcanizing shop' using a hydraulic jack to lift a tricycle. Ask: "How can a small person lift a heavy machine?" **2. Concept Scaffolding:** Introduce the formula P=F/A. Use the 'Clay Press' activity where students press a nail vs. a coin into clay to visualize area-pressure inverse relationships. **3. Interactive Simulation (Social Learning):** Using two connected syringes of different sizes (LE5/LE6	**1. The Buoyant Force Demo:** Submerge a heavy stone attached to a spring scale into a clear container of water. Observe the change in weight. CFU: "Where did the 'lost' weight go?" **2. Active Discovery:** In groups, students submerge various local objects (stones, wood, plastic bottles) into an overflow can and catch the displaced water. **3. Scaffolding Concepts:** Direct instruction on the weight of displaced water = Buoyant Force. Relate this to why massive steel ships float while small	**1. Variable Identification:** Brainstorm factors: Mass, Volume, and Shape. CFU: "If we have two items with the same mass but different shapes, will they float the same way?" **2. Modeling Activity (Scaffolding):** Groups use equal masses of clay. They must mold it into 3 different shapes (ball, flat disk, boat shape) and record which one floats or supports the most 'cargo' (marbles/coins). **3. Data Recording:** Students fill out a worksheet comparing the	**1. Design Challenge Brief:** "The Great Banca Challenge." Using recycled materials (plastic bottles, foil, sticks), design a vessel that can carry the most 'cargo' (pebbles/coins) without sinking. **2. Collaborative Construction:** Groups design their models, explicitly explaining their choice of shape and volume to maximize displacement. (Scaffolding: Teacher provides a rubric focused on 'Physics Application'). **3. Testing Phase:** Models are placed in a common water tank. Students add

	reference), students observe how force is multiplied. Check for Understanding (CFU): "If we want to lift a heavier load, should the output piston be larger or smaller?" **4. Real-World Analysis:** Groups analyze a diagram of a jeepney's hydraulic brake system, identifying where the driver applies force and where the fluid transmits pressure.	pebbles sink. **4. Cultural Contextualization:** Discuss the design of a traditional Filipino 'banca' with outriggers (katig). Ask how the displacement of water changes when more people board the boat.	volume of water displaced by each shape (LE6 reference). **4. Group Discussion (Social Learning):** Groups compare why the 'hollow' boat shape displaced more water than the solid ball, despite having the same mass.	cargo one by one until the vessel sinks, recording the maximum load. **4. Gallery Walk & Critique:** Students observe other designs and leave 'Feedback Post-its' identifying which physics principle (Pascal or Archimedes) was best applied or if a shape could be improved.
Learning Resources:	• Plastic bags/toothpaste tubes • Connected syringes and plastic tubing • Modeling clay • Diagram of a jeepney braking system	• Spring scales and overflow cans (or DIY versions using plastic cups) • Stones, wood blocks, plastic bottles • Pictures of local bancas and cargo ships	• Aluminum foil and modeling clay • Marbles or small coins for 'cargo' • Clear water basins • Visual data recording sheets	• Recycled materials (PET bottles, snack wrappers, foil) • Pebbles or coins for weights • Large water basin or trough • Rubrics for assessment
Opportunities for integration:	**Vocational Technology:** Integration with automotive servicing concepts used in local workshops.	**History/Culture:** Discussing the maritime heritage of Filipinos and the engineering behind pre-colonial vessels like the Balangay.	**Mathematics:** Calculating volume of regular and irregular shapes. **Art:** Sculpting and molding techniques.	**Environmental Science:** Discussion on the proper disposal and recycling of plastics used in the project.

Assessment.

Assessments reveal what learners have gained and what they still need help with. These are helpful in providing you with information to guide your future instruction

throughout the entire session.				
Formative Assessment:	**The 'Hydraulic Hunt' Exit Ticket:** Students must list three items in their community that use hydraulic systems and explain in one sentence how fluid pressure helps that device work.	**Prediction Table:** Students are given a list of 5 objects and their masses. They must predict whether each will sink or float based on estimated volume, then test one to verify. Success is measured by their ability to explain the result using 'Buoyant Force'.	**Variable Check:** A 'Quick-Fire' round where the teacher changes a variable (e.g., "I add more mass to the boat") and students must use hand signals to indicate if the boat will 'Sink lower' or 'Rise higher'.	**The 'Engineer's Log':** A tangible evidence piece where each group must write 3 sentences justifying their design based on the weight of the displaced fluid and the shape of the hull.
Ways Forward. **Meaningful learning can also happen beyond the classroom – for both the learners and the teacher. Pause and reflect on what happened today.**				
Extended learning opportunities:	Ask students to interview a local mechanic or driver about how they maintain their hydraulic brakes and what happens if air bubbles enter the lines (connecting back to fluid incompressibility).	Observation task: Observe a local 'palengke' (market) and find examples of objects floating in water (e.g., fish in buckets, floating produce). List factors that keep them afloat.	Students research why life vests are made of foam (low density, high volume) and how they help a person float regardless of their mass.	**Community Action:** Students create a small poster for a local boat landing or ferry terminal explaining the safety of not overloading vessels based on the science they learned.
Reflections:	Reflect on: How well did the syringe model help learners with low mathematical proficiency understand force multiplication? Were there any misconceptions about air vs. liquid in the tubes?	Reflect on: Did the 'lost weight' analogy resonate with students, or did they still confuse density with weight? How can I better support learners who struggle with the concept of displacement?	Reflect on: Did the use of 'cargo' successfully illustrate the limit of buoyant force? Were the simplified recording sheets effective for students needing accommodations?	Reflect on: Did the competitive element overshadow the scientific inquiry? How can I ensure that the critique phase remains constructive and inclusive for all learners?