

# STEAM Education & Leadership Workshops:

## *Lesson Plan - Exploring the Properties of Water Through Hands-On Experiments*

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### Age range

10–11 years old

### Learning objectives

By the end of this 90-minute session, **students will be able to :**

- Identify and demonstrate the properties of matter related to water: floating, sinking, dissolving, and phase change (evaporation).
- Accurately record experimental results using structured charts and clearly labeled diagrams.
- Articulate in simple terms the scientific concepts of density (for floating/sinking), solubility (for dissolving), and vaporization (for evaporation).
- Evaluate and articulate their scientific learning and observations through a written reflection.
- Apply their written observations and reflections to independently design a related follow-up experiment for the next session

### Structure of the lesson

- Engage with a spark video and a "noticing" routine to activate prior knowledge.
- Conduct hands-on experiments exploring physical properties: floating, sinking, dissolving, and evaporation.
- Students document detailed observations in science notebooks, utilizing tables, labeled diagrams, and narrative notes.
- Students complete written reflections covering key takeaways, surprising discoveries, and next-step inquiry questions.
- Facilitate a class discussion linking the observed properties of water to real-life phenomena (e.g., drying clothes, boiling water, salt production)
- Students will utilize their documented observations and reflections to independently design and plan a follow-up experiment in the next session, promoting ongoing STEAM inquiry.

### Duration

90 minutes

### Note to Educators

- This lesson plan adapts a successful, hands-on activity (previously implemented with 25–50 students) into a comprehensive STEAM inquiry template.
- The structure is designed to foster experiential learning, observational reasoning, and student-led inquiry.
- Educators are encouraged to adjust the pacing and materials to align with student readiness levels and available classroom equipment.

## Resources

- **Slides:** [\*Exploring Properties of Water through Hands-On Experiment\*](#)
- **Materials Required:**
  - Containers: Clear glass or plastic beakers (250ml) or recycled transparent jars.
  - Tools: Small stainless steel evaporating dishes (formerly "katoris") or heat-resistant glass bowls.
  - Substances: Common salt (Sodium Chloride), granulated sugar, vegetable oil, and small stones/pebbles.
  - Heat Source: Electric hot plate or laboratory Bunsen burner (Teacher-Led Zone only).
  - Documentation: Science journals, Observation Matrix, and "Post-it" notes for the Noticing Routine.

Timing	Facilitator's actions	Students outcomes	Technical notes
0–10 mins	<p><b><i>Spark and Attention Grabber</i></b></p> <p>Video/Introduction: Show a video on Properties of Water and ask noticing questions.</p>	<p><b>Awareness and Connectedness</b></p> <p>Focus: Sense of Identity, foundational skills, Social Awareness and Global Mindedness</p> <p>Students activate their curiosity and begin identifying the behaviors of water through guided observation</p>	Check the video and sound setup
10–30 mins	<p><b><i>Activity 1: Density (Float &amp; Sink)</i></b></p> <p>The facilitator demonstrates the test objects, guides student predictions, allows time for testing/experimentation, and prompts scientific reasoning/explanation.</p> <p><i>Teaching Tip:</i></p> <ul style="list-style-type: none"> <li>● <i>Use a diagram to show why objects with a lower density than water float.</i></li> <li>● <i>Drop an orange into the bowl. It floats. Now, peel the orange and drop it back in. It sinks!</i></li> </ul>	<p><b>Mastery and Agency</b></p> <p>Focus: Cognitive, Creativity, Critical thinking and collaboration.</p> <p>Students engage in scientific thinking by predicting outcomes, testing objects, and systematically recording their findings in a float–sink data table.</p> <p>They create clearly labeled diagrams to visually represent their observations.</p>	<p><b>Spill Management:</b></p> <p>Ensure containers are placed on a level surface to prevent spills.</p> <p>Keep paper towels at each station.</p> <p>Water on the floor is a slip hazard and must be dried immediately.</p>

30–50 mins	<p><b>Activity 2: Solubility (Dissolving)</b></p> <ul style="list-style-type: none"> <li>• Model the correct procedure for stirring and mixing solutes (salt, sugar, soil),</li> <li>• Distribute necessary materials.</li> <li>• Facilitate guided observation and comparison.</li> </ul>	<p><b>Mastery and Agency</b></p> <p>Focus: Cognitive, curiosity and problem solving.</p> <p>Students analyze the results by comparing and classifying which substances exhibit solubility and which do not.</p> <p>They then articulate an explanation for why dissolved solutes remain uniformly dispersed within the water.</p>	<p><b>Measurement:</b> Utilize graduated cups or beakers; ensure that equal quantities of liquid and test materials are measured and used for fair testing.</p> <p><b>Glassware:</b> If using glass beakers, inspect for chips or cracks before use. If a break occurs, do not touch; notify the facilitator immediately.</p> <p><b>Chemical Hygiene:</b> While materials (salt, sugar, soil) are non-toxic, students must not taste any substances. Wash your hands thoroughly after handling soil and oil.</p>
50–70 min	<p><b>Activity 3: Phase Changes (Evaporation)</b></p> <ul style="list-style-type: none"> <li>• To be conducted as a whole-group demonstration to save time and ensure safety.</li> <li>• Demonstrate the process using heated water and a natural drying tray.</li> <li>• Connect the demonstration to real-life examples and the historical context of the Dandi March salt-making.</li> </ul>	<p><b>Mastery, Wellbeing and Connectedness</b></p> <p>Focus: Global Mindedness, Collaboration, Critical Thinking and Perspective Taking.</p> <p>Students synthesize their learning by connecting evaporation to relevant real-world applications and everyday scenarios.</p> <p>They record their hypotheses regarding the demonstration's outcome and justify their reasoning using scientific evidence.</p> <p>Students collaborate effectively and prioritize safety in their activities</p>	<p><b>Thermal Safety:</b> The evaporation experiment involves a hot plate. This station is a "<b>Teacher-Led Zone.</b>" Students must maintain a 3-foot distance.</p>
70–80 min	<p><b>Graphic Organiser + Vocabulary</b></p> <p>Reinforce student understanding of</p>	<p><b>Wellbeing, Mastery and Connectedness</b></p>	<p>Offer sentence starters or frames to provide</p>

	<p>the following <b>Observation Matrix</b>:</p> <ul style="list-style-type: none"> <li>• Float sink, dissolve evaporate transparent.</li> <li>• Property   Substance   Prediction (Will it...?)   Observation (What happened?)   Scientific Term </li> <li>• Density  Plastic Toy / Stone  </li> <li>• Solubility   Salt / Oil / Soil   Solute/Solvent  </li> <li>• Phase Change  Boiling Water   Vaporization  </li> </ul>	<p>Focus: Inclusivity, collaboration and sense of belonging</p> <p>Students solidify their understanding by completing their graphic organizers (GO) with definitions, real-world examples, and relevant illustrations.</p> <p>They apply the target vocabulary in context to accurately describe their experimental observations.</p>	<p>necessary scaffolding for learners needing additional support.</p>
<p><b>80–90 min</b></p>	<p><b>Reflection + Next-Step</b></p> <p>Students complete a structured reflection using the prompts:</p> <ul style="list-style-type: none"> <li>• Share one <i>Key Learning</i>, <i>Surprising Observation</i>, and <i>Next Inquiry Step</i>.</li> <li>• We saw the stone sink because it is dense. If we break that stone into tiny dust particles and stir it in water, will it 'disappear'(dissolve) like salt? Why or why not?"</li> <li>• We saw salt dissolve into the water. If we heat that water until it turns to steam, what do you think happens to the salt left behind?</li> </ul> <p>This is followed by a brief exit ticket assessment:</p> <p><b>Guided questions for assessment:</b></p> <p>If you leave a glass of water outside on a very hot, sunny day, you notice that the water level slowly goes down. Which state change is happening here, and what is providing the energy for the change?</p> <p>Look around your home or classroom. Can you find one place where water is currently in its liquid state, one place where it is in its solid</p>	<p><b>Metacognition Mastery &amp; Agency</b></p> <p>Focus: Cognitive, Creativity, Critical thinking and collaboration.</p> <p>Students synthesize their learning and formulate initial experiment ideas by completing a reflection addressing: <i>Key Learnings</i>, <i>Surprising Observations</i>, and <i>Next Inquiry Steps</i>.</p> <p>Students move from passive observation to active scientific reasoning and recognize where their prior mental models were challenged.</p> <p>Students identify the necessary preliminary steps for designing their own independent experiment in the follow-up session.</p>	<p>Collect all student science notebooks and exit ticket assessments for review and evaluation.</p>

	state, and one place where it is in its gas state (even if you can't see it)? Describe your three examples.		
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