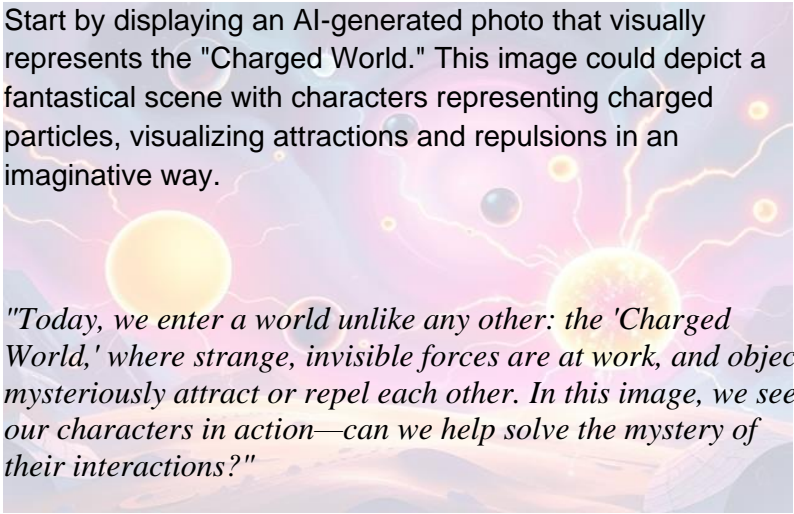


## Learning Scenario Template

<b>Title</b>	<i>The Mystery of the Charged World: Exploring Electric Charges using AI</i>
<b>Subject</b>	Physics
<b>Grade Level</b>	Middle School grade 8
<b>Duration</b>	2 lessons (100 minutes)
<b>Objective(s)</b>	<p>By the end of this lesson, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic properties of electric charge.</li> <li>2. Describe technologies associated with static electricity.</li> <li>3. Explain the transfer of electrons between two objects.</li> <li>4. Compare different objects based on their electric charge.</li> </ol>
<b>Pedagogical Methods</b>	<ul style="list-style-type: none"> <li>✓ Scenario-based learning with role-play</li> <li>✓ Integration of AI tools for creative storytelling</li> <li>✓ Inquiry-based experiments</li> <li>✓ Group discussions and comparisons</li> </ul>
<b>Structure</b>	<ol style="list-style-type: none"> <li>1. <b>Introduction &amp; Scenario Setup: The Charged World Role-Play (15 min)</b> - Interactive introduction with role-play.</li> <li>2. <b>Guided Experiment: Charging Objects by Friction (30 min)</b> - Hands-on experiments to observe charge behaviors.</li> <li>3. <b>Group Activity: Observation &amp; Comparison (20 min)</b> - Classifying objects based on their observed charges.</li> <li>4. <b>Discussion &amp; Reflection (15 min)</b> - Analyzing the behaviors of charged objects and linking them to real-world examples.</li> <li>5. <b>Application of Concepts: AI-Powered Electric Charge Story (20 min)</b> - Collaborative storytelling activity using an AI tool.</li> <li>6. <b>Conclusion &amp; Recap (10 min)</b> - Summarizing key takeaways and checking for understanding.</li> </ol>
<b>Materials/Resources</b>	<ul style="list-style-type: none"> <li>• Balloons, plastic rods, wool cloth, small bits of paper, aluminum foil, combs, and a whiteboard or chalkboard for notes</li> </ul>



	<ul style="list-style-type: none"><li>• Access to an AI tool like ChatGPT (computers or tablets for each group)</li><li>• Role Cards: Cards labeled “Electron,” “Proton,” and “Neutral Object” to assign roles in the scenario</li><li>• Optional: A short video clip on static electricity in technology (e.g., photocopiers, air purifiers)</li></ul>
<b>Pre-requisites</b>	Basic understanding of atoms and the concept of electrons.
<b>Activities &amp; Procedures</b>	<p><b>1. Introduction to Electric Charges with Role-Playing</b></p> <p>Start by displaying an AI-generated photo that visually represents the "Charged World." This image could depict a fantastical scene with characters representing charged particles, visualizing attractions and repulsions in an imaginative way.</p>  <p><i>"Today, we enter a world unlike any other: the 'Charged World,' where strange, invisible forces are at work, and objects mysteriously attract or repel each other. In this image, we see our characters in action—can we help solve the mystery of their interactions?"</i></p> <ul style="list-style-type: none"><li>• <b>Assign Roles:</b> Divide the class into groups and assign each group one of the following roles:<ul style="list-style-type: none"><li>○ <b>Electrons:</b> Negative charge, “free-moving” around the room.</li><li>○ <b>Protons:</b> Positive charge, stationary in their spots.</li><li>○ <b>Neutral Objects:</b> Have no charge until they interact with other objects.</li></ul></li><li>• <b>Objective for the Role-Play:</b> Electrons and protons move or remain stationary, mimicking attraction and repulsion as students observe the effects. Some "neutral objects" can interact with other characters, simulating the charging by friction process, resulting in a new charge that students can then use in their interactions.</li><li>• <b>Reflection Questions:</b><ul style="list-style-type: none"><li>○ "Why do some objects attract and others repel?"</li><li>○ "What might cause these invisible forces between objects?"</li></ul></li></ul>

## 2. Guided Experiment: Charging Objects by Friction

**Objective:** To observe the effects of friction on electric charges.

- **Experiment Steps:**
  - **Experiment 1:** Rubbing a balloon on hair and observing its attraction to small paper pieces.
  - **Experiment 2:** Using a plastic rod and wool to charge the rod, then testing its effect on bits of paper and aluminum foil.
- **Observation and Notes:** Students record their observations in pairs or small groups and describe which objects attracted or repelled each other.

## 3. Group Activity: Observation & Comparison

**Objective:** To classify and discuss findings.

- **Grouping:** Students discuss observations with their peers and classify objects based on observed behaviors, such as attraction, repulsion, or no interaction.
- **Comparison Discussion:** Groups share their findings with the class, discussing any patterns or surprises.

## 4. Discussion & Reflection

**Objective:** To deepen understanding of charge behavior using simulations.

- **Discussion Questions:**
  - "What similarities did you notice in how objects behaved?"
  - "Where else might we see these effects outside the classroom?"

## 5. Application of Concepts

	<p><b>Objective:</b> Relate electric charge concepts to creative storytelling using AI.</p> <ul style="list-style-type: none"> <li>• <b>Group Formation:</b> Divide the class into small groups of 3-4 students.</li> <li>• <b>Brainstorming:</b> Each group brainstorms ideas for their story, including characters (charged objects or particles) and a plot that involves charging by friction, attraction and repulsion, or a real-world application of electric charges.</li> <li>• <b>Using the AI Tool:</b> Groups interact with the AI tool (like ChatGPT) to help develop their story by prompting it for ideas on character interactions, plot development, and dialogue related to electric charge concepts.</li> <li>• <b>Story Creation:</b> Students use AI-generated content alongside their ideas to create a cohesive story, adding their personal touch.</li> <li>• <b>Presentation:</b> Each group presents their story to the class, either reading it aloud or performing a short skit.</li> </ul> <p><b>6. Conclusion &amp; Recap</b></p> <p><b>Objective:</b> Reinforce key concepts and check for understanding.</p> <ul style="list-style-type: none"> <li>• Summarize the main points of the lesson, revisiting the behaviors of positive and negative charges, electron transfer, and real-life applications.</li> <li>• Answer any lingering questions and confirm that students can differentiate between positive and negative charges.</li> </ul>
<p><b>Assessment/Evaluation</b></p>	<ul style="list-style-type: none"> <li>• Group observation checklist during experiments</li> <li>• Quick verbal quiz on key concepts</li> <li>• Written reflection: Students write a brief reflection on their role in the Charged World and how charges interact in real life.</li> </ul>
<p><b>Extensions/Modifications</b></p>	<p><b>Extension:</b> Compile the stories into a <b>digital book</b> or share them on a class blog or website.</p>
<p><b>Additional Notes</b></p>	<p><b>Safety Reminder for AI Tools:</b> Ensure students are aware of the importance of using AI tools safely and responsibly. Remind them to keep personal information private, think critically about the content generated, and collaborate with peers for a well-rounded understanding. Encourage respectful and ethical behavior while engaging with technology.</p> <p><b>Lab Safety Reminder:</b> Reinforce proper handling of all materials</p>

**Attachments/Links**[Group Observation Checklist.docx](#)<https://phet.colorado.edu/el/simulations/john-travoltage><https://phet.colorado.edu/el/simulations/balloons-and-static-electricity><https://www.youtube.com/watch?v=yc2-363MIQs>

Here's a prompt you can use to generate an AI photo that visually represents the "Charged World":

**Prompt for AI Image Generation:**

"Create a vibrant and imaginative scene depicting the 'Charged World.' In this world, visualize characters representing electric charges: positive charges (protons) are glowing orbs of light, while negative charges (electrons) are smaller, darker orbs that move energetically around them. Include neutral objects, represented as translucent shapes, interacting with the charged particles. The background should be a fantastical landscape with swirling colors and electric sparks, symbolizing attraction and repulsion. Capture a sense of energy and movement, showcasing the dynamic interactions between these characters in an engaging and educational manner."