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# Worksheet

*This Worksheet is designed to guide educators on how the comic strips can be integrated into their classroom. Teachers can adjust based on student level and depth of discussion needed.*

## Topic N° 8 – Electricity & Magnetism: The Shocking Truth!

Lesson Duration: [Suggested number of sessions/days]

## Lesson Plan

### 1 Pedagogical objectives [Suggested duration]

By the end of this activity, students will:

- Understand the structure of atoms and the roles of protons, neutrons, and electrons.
- Identify the properties (charge, location, mass) of subatomic particles.
- Explore how opposite charges attract and like charges repel.
- Use storytelling and visuals to reinforce learning through character-driven metaphors.
- Engage in critical and creative thinking around matter and electric charge.

### 2 Introduction: What is Automation in Electronics? [Suggested duration]

Inside every atom, a squad of tiny particles is hard at work. Protons (+) and electrons (−) have opposite charges and love to attract, while neutrons (0) keep things balanced and stable.

In this comic strip, the Charge Squad is a superhero team:

- Protons are bold and positive – leaders of the nucleus!
- Electrons are quick and zippy – always in motion around the team.
- Neutrons are chill and steady – no drama, just vibes.

Together, they explain how electric charge works and how atoms hold together

### 3 Explore the Storyline [Suggested duration]

**Teacher's Role**: Present the comic strip and guide the discussion.

**Student Task**: Read the comic strip and analyse:

- What roles do the characters play in the atom?
- What happens when you have more electrons than protons?
- How does the team stay balanced?

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**Discussion**: The teacher and students analyse the scientific/technological principles in the comic.

Topics for discussion might include:

- Why do opposites attract in electricity?
- What would happen if the Charge Squad broke apart?
- What real-world phenomena are explained by this attraction/repulsion?

## Activities

- **Activity 1: Observation and Reflection [Suggested duration]**

**Objective**: Identify key subatomic concepts in visuals.
**Instructions**: Observe these images and identify which characters or charges are represented.
**Materials**: Use or display images such as:

- A nucleus made of protons and neutrons
- Electrons orbiting the nucleus
- Two magnets repelling each other
- A static electricity shock
- A neutral atom vs. a charged ion

**Discussion Questions**:

- Which images show attraction or repulsion?
- Which images show balance or imbalance of charges?
- How do these reflect the Charge Squad's powers?

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- **Activity 2: Combine the Elements [Suggested duration]**

**Objective:** Link each subatomic particle to its properties.
**Instructions**: Links each concept to its corresponding definition.

| Concept | Definition |
|---|---|
| Proton | A positively charged particle found in the nucleus. |
| Electron | A negatively charged particle that orbits around the nucleus. |
| Neutron | A neutral particle in the nucleus that adds stability. |
| Ion | An atom with more or fewer electrons than protons, resulting in a net charge. |
| Attraction | When opposite charges pull toward each other. |
| Repulsion | When like charges push away from each other. |

- **Activity 3: Reflective questions**
- **Activity 3.1. Mini-challenge: Creation and Imagination [Suggested duration]**

**Objective:** Imagine and design your own superhero atom!
**Instructions**: You are creating your own elemental superhero made up of protons, electrons, and neutrons.

- Choose how many of each particle your atom has.
- Describe its charge, stability, and personality.
- Draw a comic panel showing your Charge Squad in action!

Bonus twist: Add a new villain – maybe a missing electron or an unstable isotope! What happens?

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### Activity 3.2. Group or pair discussions [Suggested duration]

- Why do you think we learn about tiny particles like protons and electrons?
- How does understanding atomic charge help us in real life (e.g., technology, chemistry, medicine)?
- What would happen if charges didn't follow the rules (opposites attract, likes repel)?
- Which Charge Squad member would you want on your superhero team, and why?
- What would happen if atoms didn't have neutrons?
- Why is it important that atoms usually have a neutral overall charge?

## Conclusion and Review

**Quick summary**: Summarize the 3 most important points about the topic.

Example:

- Atoms are made up of protons (+), electrons (−), and neutrons (0).
- Opposite charges attract, like charges repel — that's the foundation of atomic structure.
- When atoms gain or lose electrons, they become ions with net charge.

**Final Quiz**: Answer the following questions in one sentence.

1. What are protons, electrons, and neutrons?
   Example: They are the three main subatomic particles that make up atoms and determine charge and behaviour.
2. Give an example of a concrete application.
   Example: Static electricity from rubbing a balloon on your hair happens because of an imbalance of electrons.
3. What do you think will be the future of atomic science?
   Example: Atomic science will continue powering technologies like quantum computing, nuclear energy, and nanotechnology.

**Remember**: The Charge Squad holds the universe together – every object, every spark, every atom starts with them. Understanding them is understanding everything!