Co-funded by the European Union

Erasmus+

This project has received funding from the European Union's Erasmus+ programme, under Grant Agreement No°000150994

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 Nº 7 – Forces & Motion: The Laws of Physics in Action!

Lesson Duration: [Suggested number of sessions/days]

Lesson Plan

1 Pedagogical objectives [Suggested duration]

By the end of this activity, students will:

- Understand Newton's First, Second, and Third Laws of Motion.
- Explore real-world and superhero-inspired examples of these laws in action.
- Think critically about how forces influence motion in everyday life.
- Reflect creatively and imaginatively on the physics behind movement and reactions.
- Collaborate in group analysis and challenges.

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

In physics, Newton's Laws of Motion describe how objects move and interact under the influence of forces.

In this comic strip, our young superhero is in training – but nothing seems to work until they begin to understand the science behind their powers:

- They float helplessly until an external force gets them moving.
- They discover that speeding up takes more force if they're carrying something heavy.
- And they quickly learn that punching a wall means feeling that punch right back

Example: Ever tried pushing a car? If it doesn't move, you've felt Newton's First Law. Once it starts moving and you have to keep pushing hard – that's the Second Law. And when the car "pushes back" on your arms – that's the Third!

Co-funded by the European Union

Erasmus+

This project has received funding from the European Union's Erasmus+ programme, under Grant Agreement No°000150994

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 challenges does the superhero face during training?
- How are each of Newton's three laws represented in the story?
- How do their powers improve as they begin to understand physics?

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

Topics for discussion might include:

- What happens when there is no external force?
- Why does heavier mass make movement harder?
- What are real-world examples of "equal and opposite" reactions?

Activities

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

Objective: Identify real-life or illustrated examples of Newton's Laws.
Instructions: Observe the following scenes or images and link each to one of Newton's three laws.
Materials: Use or display images such as:

- A skateboarder coming to a stop
- A rocket launching
- A superhero lifting a huge boulder
- A person jumping off a boat and the boat drifting backward
- A shopping cart speeding up when pushed
- A soccer ball staying still until kicked

Discussion Questions:

- Which Newton's law is illustrated in each image?
- How would you explain what's happening using the language of physics?

Co-funded by the European Union

Erasmus+

This project has received funding from the European Union's Erasmus+ programme, under Grant Agreement No°000150994

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

Objective: Match each of Newton's Laws to its correct description and example.
Instructions: Links each concept to its corresponding definition.

Law	Definition	Example
1st Law (Inertia)	An object remains at rest or in motion unless acted upon by an external force.	A superhero floating in space stays still until pushed.
2nd Law (F = ma)	Force equals mass times acceleration – heavier objects need more force to move.	Lifting a car requires more effort than lifting a chair.
3rd Law (Action-Reaction)	For every action, there is an equal and opposite reaction.	Jumping off the ground pushes you up, the ground pushes back.

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

Objective: Apply Newton's Laws creatively.
Instructions: You are designing a superpower training tool that helps new heroes learn Newton's Laws.

- Describe your invention in a few sentences.
- Make a sketch or comic panel showing how it trains heroes using physics.
- Label the parts of the design connected to each law.

Example: A zero-gravity chamber with adjustable mass objects that demonstrate inertia and reaction forces!

Co-funded by the European Union

Erasmus+

This project has received funding from the European Union's Erasmus+ programme, under Grant Agreement No°000150994

Activity 3.2. Group or pair discussions [Suggested duration]

- Why do you think Newton's Laws are important for real-life engineers, athletes… and superheroes?
- How could understanding these laws improve things like safety equipment, sports performance, or robotics?
- Which of Newton's laws do you see most often in everyday life?
- Which one feels most "magical" when you see it in superhero stories?
- Can you think of a moment when you felt inertia or an action-reaction force?

Conclusion and Review

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

Example:

- Newton's First Law explains how things resist changes in motion (inertia).
- Newton's Second Law shows how force, mass, and acceleration are connected.
- Newton's Third Law reveals that all forces come in action-reaction pairs.

Final Quiz: Answer the following questions in one sentence.

1. What are Newton's Laws of Motion?
   Example: They are three fundamental principles that describe how forces affect the motion of objects.
2. Give an example of a concrete application.
   Example: Seatbelts in cars protect us because of Newton's First Law – they stop us when the car suddenly stops.
3. What do you think will be the future of physics and motion in tech or science?
   Example: Physics will continue to drive innovations in transport, space exploration, and even virtual reality by helping us understand and simulate real-world motion.

Remember: Newton's Laws help us understand how everything moves — from rolling marbles to rocket launches to superhero take-offs. Mastering them is like unlocking the code of the universe!