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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° 9 – Waves & Energy: The Invisible Forces!

Lesson Duration: 2 sessions (90 minutes total)]

Lesson Plan

1 Pedagogical objectives [15 minutes]

By the end of this activity, students will:

- Understand how sound and light waves behave and travel.
- Recognize concepts like frequency, pitch, wave speed, and the Doppler Effect.
- Explore real-life phenomena shaped by wave behaviors.

2 Introduction: What is Robotics? [10 minutes]

Sound and light are all around us—but they're more than just noise and brightness. They are waves: invisible carriers of energy that can explain music, vision, and even how we understand motion in space. From sirens that change pitch to light-speed communication, waves are everywhere!

3 Explore the Storyline [15 minutes]

Teacher's Role: Present the comic strip "Waves & Energy: The Invisible Forces!"
Student Task: Read the comic strip and analyse:

- What scientific concepts are presented?
- How are wave properties shown through characters and scenes?
- What real-world examples are featured?

Discussion:

- How do frequency and pitch relate to each other?
- Why does light travel faster than sound?
- What is the Doppler Effect, and how do we experience it?

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Activities

Activity 1: Observation and Reflection [10 minutes]

Objective: Identify wave-related concepts visually.

Instructions: Look at the following visual scenes and pick the ones that illustrate sound or light waves. Justify your answer.

Materials: (Include images such as a violinist, thunderstorm, ambulance siren, laser beam, vibrating tuning fork)

Discussion Questions:

- What kind of wave is each example showing?
- How can you tell the difference between high and low frequency?

Activity 2: Combine the Elements [10 minutes]

Objective: Understand wave behavior by linking terms and definitions.
Instructions: Match each concept to its correct definition.

Concept	Definition
Frequency	The number of wave cycles per second; determines pitch in sound.
Wavelength	The distance between two peaks of a wave.
Amplitude	The height of the wave; linked to volume or brightness.
Doppler Effect	The change in wave frequency due to movement of the source or observer.
Wave Speed	How fast a wave travels through a medium.

Activity 3: Reflective questions (25 minutes)

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Activity 3.1. Mini-challenge: Creation and Imagination [15 minutes]

Objective: Apply understanding through creativity.

Instructions: Imagine you're a science musician. Design a short performance or comic strip to teach a wave concept through music or visuals.

- Choose a wave type (sound or light).
- Illustrate how the wave behaves in different environments (e.g., air, space, water).
- Use symbols or drawings to show pitch, frequency, or Doppler shift.

Activity 3.2. Group or Pair Discussions (10 minutes)

Prompt:

- Why do thunder and lightning seem out of sync?
- Can we “see” sound or “hear” light?
- How do emergency sirens use the Doppler Effect to alert us?

Conclusion and Review (5 minutes)

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

1. Waves carry energy through vibrations—sound and light are two key types.
2. Frequency and amplitude affect how we perceive pitch, volume, and brightness.
3. The Doppler Effect explains the changes in sound we hear as objects move.

Final Quiz : Answer the following questions in one sentence.

1. What is a wave in one sentence?
   A wave is a repeating disturbance that carries energy through space or a medium.
2. Give a real-world example of the Doppler Effect.
   An ambulance siren sounds higher as it approaches and lower as it passes.
3. Which travels faster—light or sound? Why?
   Light travels faster because it does not need a medium; it can move through a vacuum.

Remember: Waves are the hidden language of sound and light—listen and look closely, and you’ll find them everywhere!