Teacher: Huică Mihaela
Subject: Biology, Physics, Geopraphy

Title	**Living in Balance**	**Time**	2-3 days
Subject:		**Biology, Physics, Geopraphy**	
Aims		**General competence[1]:** 4. Developing a healthy lifestyle in a natural living environment **General competence[2]**: 3. Analysing data and information collected experimentally or from other sources on simple physical phenomena and their technical applications. **General Competence[3]**: 4. Developing an investigative approach from a lifelong learning perspective and for everyday life. S**pecific competence[4]:** 4.2. Evaluating the consequences of one's own behaviour on own health and the state of the environment **Specific competence[5]:** 3.4. Identifying risks to the environment and to oneself due to inappropriate use of technological appliances and devices. **Specific competence[6]**: 4.4. Identifying solutions to protect the geographical environment **Aim of the activity:** Develop a personal plan for sustainable energy consumption.	
Key CS elements:		Decomposition; Pattern recognition; Algorithm design; Debugging	
Age group :		**14-16 year old**	
Learning situations:	investigation	**Activity type :**	**extracurricular**
Resources:		Notebooks and pencils	
Duration:		2-3 days	
Learning development:			

[1] According to the school curriculum for Byology, grade VIII, approved by order of the Minister of Education no 3393 / 28.02.2017.
[2] According to the school curriculum for Physics, grade VII, approved by order of the Minister of Education no 3393 / 28.02.2017.
[3]According to the school curriculum for Geography, grade VII, approved by order of the Minister of Education no 3393 / 28.02.2017.
[4] Idem [1]
[5] Idem [2]
[6] Idem [3]

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Objective:

- To develop students' understanding of energy consumption.
- To teach students how to measure energy usage and identify ways to reduce it.

Lesson Outline

1. Introduction (5 minutes)
    - Briefly discuss the importance of energy conservation.
    - Explain the goal of the lesson: to measure energy consumption and find ways to reduce it.
2. Decomposition (10 minutes)
    - Break down the problem of high energy consumption into smaller, manageable parts.
        - Discuss different sources of energy consumption in a typical household (e.g., lighting, appliances, heating, and cooling).
        - Identify which appliances consume the most energy.
3. Pattern Recognition (10 minutes)
    - Guide students to identify patterns in energy usage.
        - Compare energy consumption of different appliances.
        - Recognize peak usage times and factors that contribute to higher energy use (e.g., leaving lights on, standby power consumption).
        - Identify common behaviors that lead to increased energy consumption.
4. Abstraction (10 minutes)
    - Abstract key concepts from the data collected.
        - Focus on understanding the main causes of high energy consumption.
        - Highlight effective solutions to reduce energy usage, such as using energy-efficient appliances and changing habits (e.g., turning off lights when not in use, unplugging devices).
5. Algorithm to measure energy consumption and reduce it

    Step 1: Measure current energy consumption

    1. Identify major energy consumers:
        - List all electrical appliances and devices in your home.
        - Note the power rating (in watts) of each device (usually found on a label or in the user manual).
    2. Calculate daily energy consumption for each device:
        - Use the formula:

        Energy (kWh)=Power (W)×Usage Time (hours)1000Energy (kWh)=1000Power (W)×Usage Time (hours).

        Record the daily usage time of each device.

3. Sum up total daily energy consumption:
   - Add the energy consumption of all devices to get the total daily consumption.
4. Use an energy monitor (Optional):
   - Install a smart energy meter to track real-time energy usage.
   - Collect data over a period (e.g., one month) to understand consumption patterns.

Step 2: Analyze and identify areas for reduction

1. Identify high energy consumers:
   - Highlight devices that consume the most energy.
   - Look for patterns (e.g., certain times of the day when consumption spikes).
2. Assess energy efficiency:
   - Check if appliances are energy-efficient (look for Energy Star ratings or equivalent).

Step 3: Implement measures to reduce energy consumption

1. Optimize usage:
   - Turn off devices when not in use.
   - Use power strips to easily switch off multiple devices.
   - Unplug chargers and devices that are not in use.
2. Upgrade to energy-efficient appliances:
   - Replace old appliances with newer, energy-efficient models.
   - Look for appliances with high energy efficiency ratings.
3. Implement smart home solutions:
   - Use smart thermostats to optimize heating and cooling.
   - Install smart lighting systems to automatically turn off lights when not needed.
4. Behavioral changes:
   - Encourage household members to be mindful of energy usage.
   - Schedule high-energy activities (like washing and drying clothes) during off-peak hours if your utility offers time-of-use rates.
5. Improve home insulation:
   - Insulate walls, roofs, and floors to reduce heating and cooling needs.
   - Seal windows and doors to prevent drafts.

Step 4: Monitor and review

1. Track progress:
   - Continue using the energy monitor to track changes in energy consumption.
   - Compare monthly energy bills to see if consumption has decreased.

2. Adjust measures as needed:
   - Review the effectiveness of the measures implemented.
   - Make adjustments based on real-time data and ongoing analysis.
3. Repeat the process:
   - Regularly reassess energy consumption and look for new ways to save energy.

6. General Approach (10 minutes)
   - Summarize the steps students can take to measure and reduce energy consumption.
   - Discuss how to apply these steps to real-life scenarios.

Assessment

- Evaluate students based on their participation and understanding of energy consumption measurement and reduction techniques.
- Have students create a short plan on how they will implement energy-saving strategies at home.

Expected Outcomes

- Students will be able to measure energy consumption.
- Students will identify patterns in energy usage.
- Students will abstract key energy-saving concepts.
- Students will develop a plan to reduce energy consumption in their daily lives.

Assessment/Extension:	Students can create their own plan.
Notes:	By following these steps, you can effectively measure and reduce energy consumption at home. Start by identifying and measuring the energy usage of your devices, analyze the data to find high-energy consumers, implement practical measures to reduce usage, and continually monitor progress to ensure ongoing efficiency.