ERASMUS+ KA220
SOWING CHANGE (SCH)

EDUCATIONAL RESOURCE GUIDE

Activities for ecological education, sustainability and learning through experience

Resources for Teachers

- Outdoor Activities
- Worksheets
- Educational Games
- Interactive Challenges
- Digital Tools

Erasmus+

EDUCATIONAL RESOURCE GUIDE

Activities for ecological education, sustainability and learning through experience

Erasmus+ project: SOWING CHANGE (SCH): *Roots for Inclusion and Self-Knowledge through a Sustainable European Nature*

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CONTENT

Generative artificial intelligence tools (ChatGPT – OpenAI) were used in the development of some of the worksheets included in this guide, as support for structuring, wording and adapting the educational content. The resulting materials were selected, checked, reviewed and adapted by the authors in accordance with the educational objectives, the characteristics of the target group and the context in which they are intended to be used.

The authors of each educational resource assume responsibility for the accuracy and originality of the content, the authenticity of the materials provided, compliance with copyright requirements and the appropriate citation of the sources used.

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Foreword

Children protect what they have learned to love.

This educational resource guide is one of the outcomes of the Erasmus+ KA220-SCH project "Sowing Change: Roots for Inclusion and Self-Knowledge through a Sustainable European Nature", implemented under the Erasmus+ Programme with the support of the European Union. It builds on the experience gained by the project partners in developing innovative educational activities focused on education for sustainable development, inclusion, intercultural learning and the development of the competences needed by citizens of the 21st century.

The Erasmus+ KA220-SCH Sowing Change project was founded on the belief that meaningful change begins with education. In the context of global challenges generated by climate change, ecosystem degradation and the unsustainable use of natural resources, schools have a responsibility to educate young people who are able to understand these phenomena, think critically, identify solutions and actively contribute to building a more sustainable future.

The project focused on five major areas of action: raising awareness of environmental issues and identifying sustainable solutions inspired by both traditional practices and current innovations; promoting inclusion and ensuring the active participation of all students, regardless of their social, cultural or educational background; facilitating self-awareness and personal development through activities carried out in nature; encouraging intercultural dialogue and collaboration among participants from different European countries; and making use of traditional knowledge and practices related to the responsible use of natural resources.

This guide was created out of a desire to transform the experiences gained throughout the project into practical, accessible and easily adaptable resources that teachers can continue to use after the project has ended. The activities are primarily designed for students aged 11 to 15, but they can also be adapted for other age groups depending on students' developmental level, the competences targeted and the educational context.

The proposed activities can be organised as part of special school programmes dedicated to alternative learning and environmental education, as well as within extracurricular activities. They can also be integrated into or adapted to the curriculum, depending on the subject taught, the students' age and the competences being developed.

A significant number of the activities take place outdoors, allowing students to engage directly with nature and their local environment. Parks, forests, rivers, school gardens and even urban spaces thus become genuine learning laboratories. Observation, investigation, experimentation, problem-solving and teamwork help students move beyond the simple acquisition of information towards a deeper understanding of the relationships between people, resources and the environment.

The activities aim to develop green competences, as well as essential transversal skills such as critical and creative thinking, problem-solving, collaboration, communication, learner autonomy, responsibility and initiative. Their interdisciplinary nature creates opportunities for students to connect knowledge acquired across different subjects and apply it in real-life situations.

The guide offers a wide range of methods and tools: outdoor exploration and field investigation, experiments and hands-on activities, observation sheets and worksheets, challenges, quizzes, Escape Room activities, Jeopardy Challenge, educational games and interactive activities supported by digital applications and platforms such as Kahoot!, Wordwall and other tools suited to the learning objectives. Technology is used not as an end in itself, but as a means of stimulating curiosity, active participation, collaboration and immediate feedback.

The activities presented in this guide should not be regarded as rigid models, but rather as starting points. Teachers are encouraged to adapt, combine and further develop them according to the characteristics of their local community, their students' needs and the resources available. Many of the activities lend themselves to interdisciplinary and transdisciplinary approaches, facilitating collaboration among teachers and the creation of authentic learning experiences.

Beyond providing knowledge about the environment, we hope these activities will encourage students to observe, ask questions, investigate, cooperate, make decisions and act responsibly. Education for sustainability thus becomes more than simply content to be learned; it becomes a lived experience, through which students discover that their own choices and actions can bring about meaningful change in their communities.

Through this guide, the experience of the Erasmus+ KA220-SCH Sowing Change project is shared with teachers who believe in an education connected to life, nature and the challenges of the contemporary world. We hope that the proposed activities will serve as a source of inspiration and, in turn, generate new ideas, new learning experiences and new contexts in which students can become active participants in building a greener and more responsible future.

Because before we can protect nature, we must first get to know it, understand it and learn to love it.

CHAPTER I

Exploring the Nature Around Us

We leărn to observe,
to investigate and
to protect the environment
around us.

The river that flows through my town/locality

Duration: 120 minutes (classroom and outdoor activity) or two-weeks project

PURPOSE OF THE ACTIVITY
Developing the skills to observe and investigate the environment, by exploring the elements of nature and awareness of the importance of protecting water resources and aquatic ecosystems, in order to form a responsible behavior towards the environment.

OBJECTIVES
At the end of the activity, students will be able to: • identify the characteristics of a water course in the local horizon; • observe the relationships between natural components and human activities; • analyze the impact of human activities on the aquatic ecosystem; • propose solutions for the protection and responsible use of water resources; • communicate the results of the investigation in a creative and reasoned form.

DESCRIPTION
The activity proposes an interdisciplinary approach, based on learning through investigation and exploring the local environment. Students are challenged to become "River Detectives", tasked with discovering the characteristics of a watercourse near their town and assessing its importance to nature and the community. Starting from a short introductory story, the teacher launches the challenge to investigate the river like researchers. Organized into teams, students are given roles (cartographer, biologist, reporter, photographer, ecologist) and use observation sheets to collect information about the natural features of the river, the biodiversity in the area, uses of water resources and the impact of their activities on the ecosystem. During the investigation, students directly observe the environment, take photos, identify plants and animals, locate possible sources of pollution and talk to community members when possible. The collected data is analyzed and synthesized into educational products such as thematic maps, posters, digital presentations or a "River File". The activity ends with a reflection session, during which students formulate conclusions regarding the state of the ecosystem and propose solutions to protect water resources. The teacher can capitalize on the results by organizing an exhibition, an information campaign or a greening action carried out together with the local community.

This activity helps students to understand that a river is not just a geographical element, but a complex ecosystem, in a permanent relationship with people and other environmental components. Through direct observation and investigation, students develop research, collaboration and critical thinking skills, understanding that their own behaviors influence the quality of water resources and local biodiversity. The activity stimulates civic involvement and responsibility towards the community's natural heritage.

TEACHING METHODS:
heuristic conversation, direct observation, investigation, discovery learning, problem solving, brainstorming, case study, gallery tour (for presentation of final products), reflection.

RESOURCES:
worksheets, maps, phones/tablets (for photos and species identification apps where possible), camera (optional), pencils, markers, bags and gloves (if greening is being done), botanical/zoological atlas digital materials (images, videos, interactive maps)

RESULTS:
At the end of the project the students: • know better the aquatic ecosystem in their community; • identify the main environmental problems; • understand the connection between human behavior and water quality; • formulate solutions to protect the river; • develops civic spirit and responsibility towards the local natural heritage.

INVESTIGATION OF LOCAL FOREST ECOSYSTEMS

Duration: 4-5 hours

THE PURPOSE

The development of geographical and ecological investigation skills through the analysis of forest resources and biodiversity in the local area, as well as the formation of a responsible attitude towards environmental protection and the sustainable use of natural resources.

OBJECTIVES

At the end of the activity, students will be able to:

- identify the main species of trees and animals in the forests near the town;
- explain how forest resources are used;
- analyze the impact of human activities on biodiversity;
- interpret information from maps, graphs and tables;
- formulate proposals for the conservation of forests and the sustainable use of natural resources.

DESCRIPTION

The challenge

The teacher enters the classroom with a photograph of a local forest and tells the students:

"Imagine that in 20 years this forest will no longer exist. What would we lose? Just the trees or much more?"

Then ask the key question:

"How can we find out if the forest near our town is healthy and what can we do to protect it?"

Students are invited to become, for a day, teams of nature researchers, with the mission of carrying out a study on forest resources and biodiversity in the local area.

Carrying out the activity

Stage 1 – Launching the challenge (10 minutes)

Students look at some photos of the local forest and discuss:

- What benefits does the forest offer us?
- What would happen if it disappeared?
-]Who depends on its existence?

The teacher notes the answers on the board and formulates the research topic.

Stage 2 – Organizing the teams (10 minutes)

The class is divided into 4–5 teams.
Each team receives a mission:

Team 1 – Forest resources

- dominant tree species;
- the uses of wood;
- #non-wood products (mushrooms, berries, medicinal plants, honey).

Team 2 – Biodiversity

- specific animals;
- birds;
- protected plants;
- food chains.

Team 3 – Protected areas

- nature reserves;
- Natura 2000 sites;
- protected species.

Team 4 – Threats

- deforestation;
- fires;
- pollution;
- waste;
- poaching;
- climate change.

Team 5 – Solutions

- protective measures;
- afforestation campaigns;
- responsible tourism;
- ecological education

Data and results (analysis part)

Students complete a worksheet using information from atlases, maps, the Internet, or materials provided by the teacher.

Characteristics of the area

- Average altitude: ____ m
- Landform: plain / hill / mountain
- Climate type: _____
- Forested area: ____ ha
- Percentage of the area of the locality/county: __ %

Forestry resources
Students identify:

- the main species of trees;
- their ecological role;
- economic uses;
- non-wood products.

River resources (if any in the area)

- rivers;
- lakes;
- fish species;
- aquatic plants;
- their importance to the ecosystem.

Biodiversity reserves

Students identify nearby protected natural areas and complete a table.

Protected area

Surface
Protected species

Importance

Biodiversity analysis

Students answer the following questions:

- What species are protected?
- What are the most important threats?
- What human activities affect the ecosystem?
- What consequences may occur in the future?

Data processing
Each team performs:

- a graph with the predominant species;

- a simple map of the forests and protected areas;
- a table of identified threats;
- a poster or digital presentation.

Photos taken during a field visit or images from official sources may be used.

Conclusions and proposals

Each team formulates three conclusions and three recommendations.

Examples:

Findings

- The forest is the habitat for numerous species of plants and animals.
- Excessive exploitation of wood can reduce biodiversity.
- Litter and fires affect forest ecosystems.

Recommendations

- tree planting;
- selective waste collecting;
- organizing greening actions;
- promoting responsible tourism;
- informing the community about forest protection.

Evaluation

Each team presents their results and peers complete a feedback sheet.

At the end, the teacher returns to the original question:

"If the forest could talk, what message would it send us?"

Students write a personal commitment to protect nature on a piece of paper and stick it on a board titled "Forest Promise".

METHODS
heuristic conversation; problem solving; inquiry-based learning; project learning; brainstorming; the case study; observation; data analysis and interpretation; teamwork (collaborative learning); making conceptual maps, graphics and posters; presenting and debating the results; reflection and self-evaluation.

RESOURCES
photograph/photographs of the local forest; worksheets; physical and thematic maps, geographic atlas; laptop/tablet and internet connection; informative materials (leaflets, articles, guides, statistical data); images and photographs from the field or from official sources; A3 sheets, markers, post-it notes; video projector/interactive whiteboard (optional); digital applications for making presentations or maps (PowerPoint, Canva, Google Maps, etc.)

Medicinal plants and aromatic herbs from the near horizon and from Romania - knowledge, use and protection

Duration: 90 minute (can be extended into a 2–3 hour project or a trip)

THE PURPOSE

The development of the students' ability to observe, identify and responsibly value medicinal plants and aromatic herbs from the local horizon, through activities of investigation, documentation and exploration of the environment, as well as the formation of attitudes of respect and responsibility towards biodiversity and the sustainable use of natural resources.

OBJECTIVES

At the end of the activity, students will be able to:

- identify at least 8–10 medicinal and aromatic plants;
- describe their characteristics;
- specify traditional and culinary uses;
- explain the importance of conserving wild plants;
- make a herbarium or a descriptive sheet.
- differentiate between cultivated and spontaneous plants;

DESCRIPTION

In every season, the nature around us is home to a diversity of plants that we often notice without really knowing much about them. Some are valued for their fragrance, others have traditionally been used for their properties, while many play an important role in local ecosystems, providing food and shelter for various living organisms. Learning about these plants is the first step towards using and protecting them responsibly.
The activity begins with "The Botanist's Letter", through which students are invited to take on the role of "Plant Explorers."
Based on the message in the letter, the teacher initiates a short discussion:

- What medicinal or aromatic plants do you know?
- What aromatic herbs do you use at home and what do you use them for?
- How can we recognise an aromatic plant?
- Where does our knowledge about the uses of medicinal plants come from?
- What role do these plants play in nature?
- Can we pick any plant we come across?
- What do you think it means to be a "responsible nature explorer"?

The teacher may introduce several easily recognisable aromatic and medicinal plants – mint, basil, lavender, thyme, etc. – which students observe, touch and try to identify by their

appearance and smell. This stage facilitates the transition from students' prior knowledge and experiences to the investigation itself.
Starting from "The Botanist's Letter," students become "Plant Explorers" whose mission is to identify medicinal and aromatic plant species, observe their characteristics and discover their role in nature and in people's lives.
Working in teams, students complete a series of missions and challenges, use observation sheets, photograph plants, record their characteristics and collect information from a variety of sources, such as botanical atlases, digital applications and interviews with members of the local community. The activity emphasises responsible observation, avoiding the unnecessary picking of plants and respecting the rules for protecting species and natural habitats.
Students receive a worksheet entitled "Medicinal Plants of Romania," in which they identify the selected plants, indicate which part of each plant is used and discover its main traditional uses.
Through "The Botanist's Mission," students develop their observation and investigation skills by examining the characteristics of plants and their relationship with the environment in which they grow. When conditions allow, exploration continues in the area around the school – in a park, garden, along a riverbank, in a meadow or in other green spaces within the local community. Students photograph the plants, record their observable characteristics and try to identify them using worksheets, botanical atlases or digital applications.
Throughout the investigation, particular emphasis is placed on responsible observation: plants are not picked unnecessarily, unknown or protected species are not collected, and natural habitats are not disturbed.
The playful dimension of the activity is enhanced by a Botanical Escape Room, in which teams solve tasks and clues using the knowledge they have acquired, as well as by a quiz designed to assess and consolidate learning.
After completing the challenges, students work together to formulate "The Botanist's Code" – a set of principles for the responsible observation, identification, use and protection of plants. The Code summarises not only what they have learned, but also the behaviours they are encouraged to adopt when interacting with nature.
During the stage dedicated to applying and further exploring the information gathered, students compare their field observations, identify traditional and current uses of plants, and analyse their importance for biodiversity, health and nutrition. They also discuss responsible harvesting, protected species and the need to conserve local plant heritage.
The activity concludes with the creation of educational products such as an illustrated atlas of local plants, a responsibly produced herbarium (using cultivated species or plant material that has fallen naturally), a photo exhibition, thematic posters or digital presentations. These are followed by a reflection activity in which students consider how each of them can contribute to protecting biodiversity.
The products created by the teams can be brought together in a shared class atlas, either in printed or digital format.

METHODS

Conversation, observation, discovery, brainstorming, cooperative learning, investigation, didactic game.

RESOURCES

fresh pots or plants, pictures, magnifying glass, worksheets (Annexes 5, 6, 7, 8, 9, 10), botanical atlas, photo phones (optional)

Team project

"Atlas of medicinal plants in my town"

Each team documents 5–10 species found in the area and produces a page for each, including:

- a photo taken by students or drawing;
- the popular name and, if possible, the scientific name;
- the place where it grows;
- flowering period;
- traditional uses (culinary, aromatic or medicinal);
- the role of the plant in the ecosystem (e.g. nectar source for pollinators);
- protective measures and responsible harvesting.

WORK SHEET

Medicinal plants from Romania

The plant	Which part do we use?	What does it help?
Chamomile		
Linden		
Mint		
Bellflower		
Yolks		
Milfoil		

ANNEX 1

THE RIVER
FLOWING THROUGH MY LOCAL AREA

I. IDENTIFICATION AND LOCATION

1. Name of the river: _____
2. Total length: _____ km
3. Source: _____
4. Mouth (river / sea / ocean): _____
5. Important settlements along the river:
   _____
   _____
   _____
6. Main tributaries: _____
   _____
   _____

MAP OF THE RIVER BASIN

N

II. NATURAL FEATURES

1. Describe the landscape of the river area:
   _____
   _____

2. What types of soil and vegetation are predominant in the floodplain or along the riverbanks?
   _____
   _____

3. What animals live in or near the river (fish, birds, mammals)?
   _____
   _____

4. What types of ecosystems are found around the river?
   _____
   _____

III. USE OF RIVER RESOURCES

1. How is the river used by people? (e.g. water supply, irrigation, fishing, transport, tourism)
   _____
   _____

2. What economic activities take place nearby? (industry, agriculture, etc.)
   _____
   _____

3. What are the ecological and economic benefits of the river for the local community?
   _____
   _____

IV. ENVIRONMENTAL ISSUES AND PROTECTION

1. What forms of pollution or environmental pressure affect the river? (wastewater, litter, poaching, illegal logging, etc.)
   _____
   _____
   _____

2. How do these problems affect the aquatic ecosystem?
   _____
   _____
   _____

3. What measures can be taken to protect the river?
   _____
   _____
   _____

4. Are there any local environmental projects or protected areas along the river?
   _____
   _____
   _____

PRACTICAL / CREATIVE ACTIVITY

Choose one of the following:

Create a thematic map of the river.

Take a photograph or make a representative drawing.

Create an environmental slogan about protecting water resources.

Write a short poem or environmental message.

_____
_____
_____

ANNEX 2

REPORTER FOR A DAY

Name: _____

Date: _____

Class: _____

Conduct an interview!

Choose a person from your community and carry out an interview.

You can talk to (choose one or more):

☐ a fisherman ☐ a farmer ☐ a local business owner ☐ a local resident ☐ a representative of the local authorities

QUESTIONS:

1. **What does the river mean for the community?**

_____

_____

2. **What was the river like 20–30 years ago?**

_____

_____

3. **What changes have you observed?**

_____

_____

4. **What problems exist?**

_____

_____

5. **How can it be protected?**

_____

_____

Other questions you would like to ask:

_____

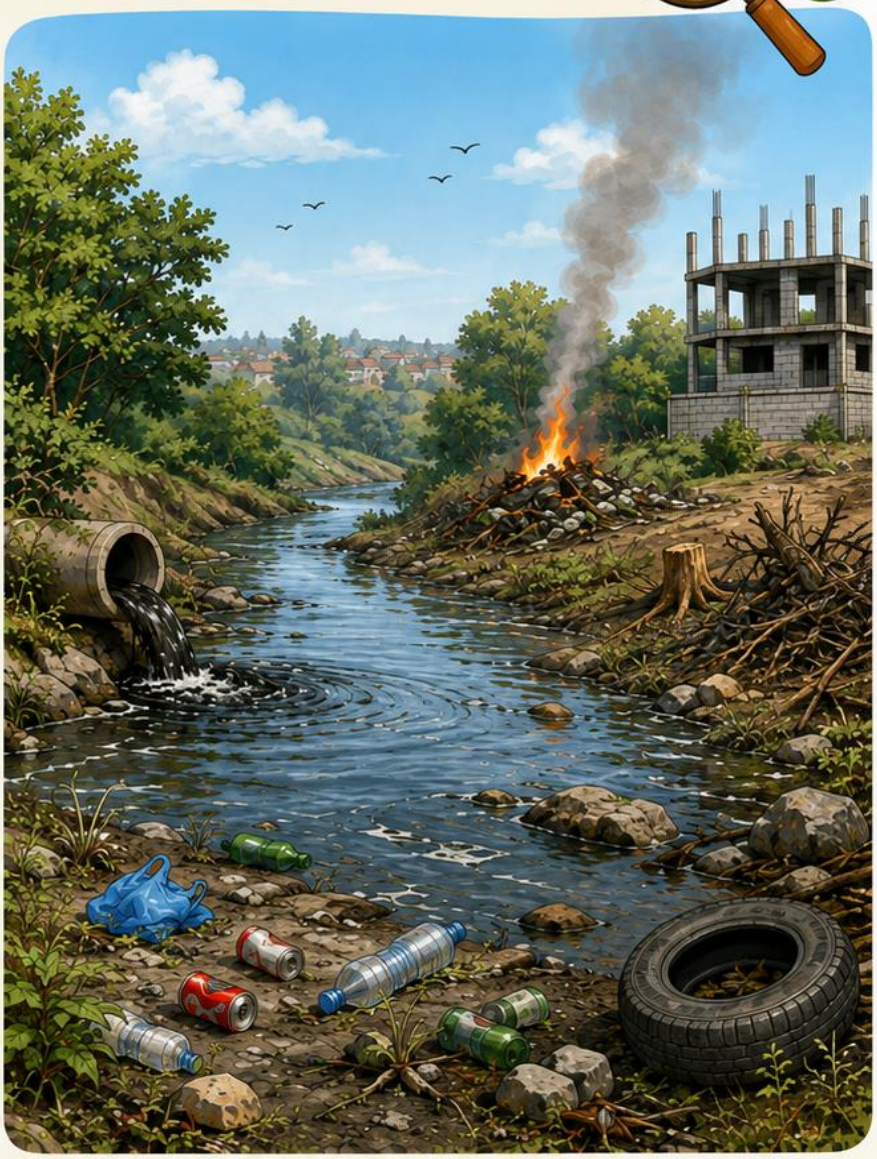
_____

_____

Missions

Observe if it exists:

- ☐ plastic bottles
- ☐ glass bottles
- ☐ cans
- ☐ plastic bags
- ☐ tires
- ☐ wastewater
- ☐ fires
- ☐ illegal construction
- ☐ destroyed vegetation



How healthy do you think the river is?

Give reasons. .....

.....

.....

.....

ANNEX 4

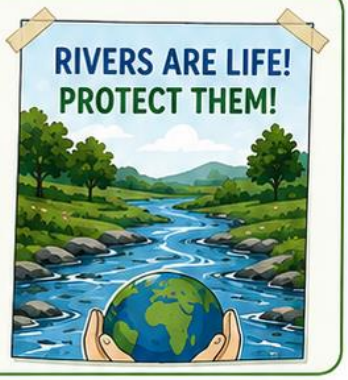
Missions

Become the River's Ambassador

Choose a challenge.

Option A

Create a poster.



Option B

Write a letter addressed to the mayor.

Option C

Create a PowerPoint presentation.

How can the river be protected?

Option D

Create a digital map.

Option E

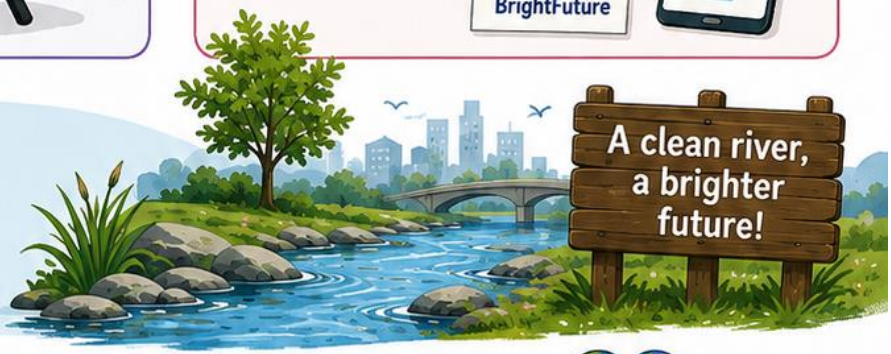
Make a two-minute video.

Option F

Design an awareness campaign.

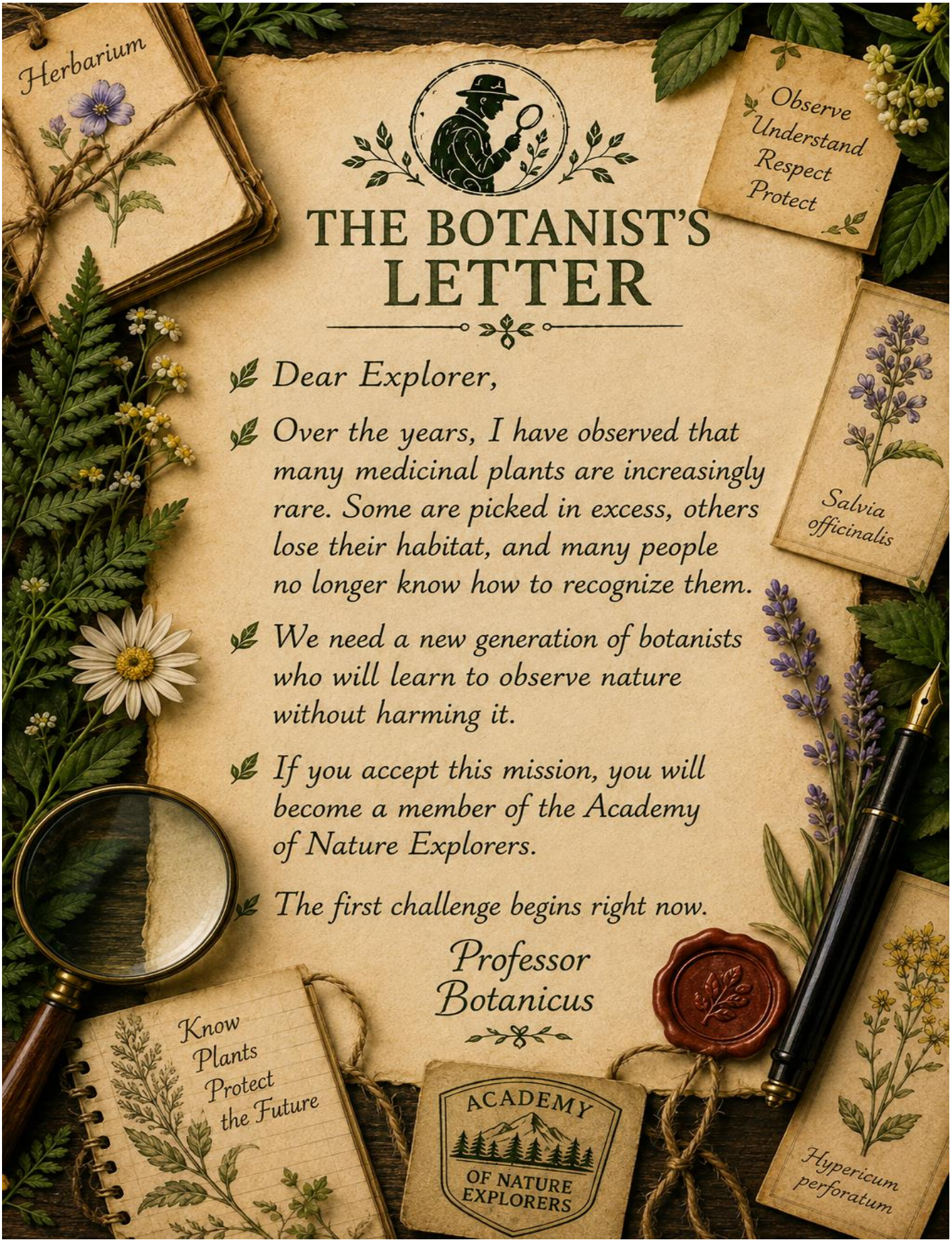
Keys to success:

- Be creative and original!
- Use accurate information.
- Share a positive message.
- Get involved and make a difference!



Every idea counts. Together we can make a difference!

ANNEX 5


Herbarium
Observe
Understand
Respect
Protect
THE BOTANIST'S LETTER
Dear Explorer,
Over the years, I have observed that many medicinal plants are increasingly rare. Some are picked in excess, others lose their habitat, and many people no longer know how to recognize them.
We need a new generation of botanists who will learn to observe nature without harming it.
If you accept this mission, you will become a member of the Academy of Nature Explorers.
The first challenge begins right now.
Professor Botanicus
Salvia officinalis
Know Plants Protect the Future
ACADEMY OF NATURE EXPLORERS
Hypericum perforatum

ACADEMY OF NATURES EXPLORERS

ESCAPE ROOM

THE SECRET OF THE HEALING GARDEN

Story

A storm has closed the botanical garden. To get out, you must solve 6 riddles.

RIDDLE 1

Identify the plant by its clue.

Match each plant with the correct image (details matter).

1. *Chamomile*
2. *Lavender*
3. *Mint*
4. *St. John's wort*
5. *Sunflower*
6. *Sage*

CODE CLUE:
Write the letter of the plant next to each name in the list.

_ _ _ _ _ _

RIDDLE 2

Match the plant with its use.

A. Mint	1. *Helps digestion and soothes*
B. St. John's wort	2. *Calms – for better sleep*
C. Lavender	3. *Treats wounds and irritated skin*
D. Sage	4. *Antiseptic and natural anti-inflammatory*
E. Chamomile	5. *For coughs and sore throat*
F. St. John's wort	6. *For rust, cuts, ulcers, inflammation*

Write the corresponding letter of each use in the correct order.

☐ ☐ ☐ ☐ ☐

RIDDLE 3

Build the chain.

bee → lavender → honey → flower

A B C

Write the corresponding letter of each image in the correct order.

☐ ☐ ☐

RIDDLE 4

Which plant should NOT be picked?

A. It is a protected species.
B. It is very rare and at risk of disappearing.
C. Its overharvesting has been forbidden.
D. It is in a natural reserve.

A B C D

Write the letter of the correct plant.

☐

RIDDLE 5

Complete the code.

M _ _ _ Ă

CLUE: it is "the treasure of nature" and the result of the chain from Riddle 3.

Write the complete word.

☐ ☐ ☐

RIDDLE 6

Decode the message.

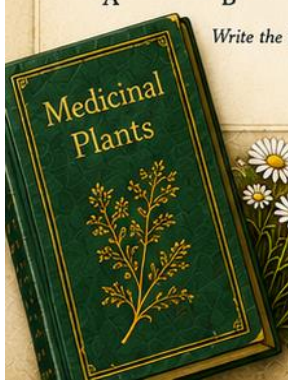
Use the inverse alphabet.

GSYZIFSBĂ! CUPMEA&STUEBUF!

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
Z	Y	X	W	V	U	T	S	R	Q	P	O	N	M	L	K	J	I	H	G	F	E	D	C	B	A	

Write the decoded message.

_ _ _ _ _ _ _ _



WHEN YOU FINISH…

Take the key.

Protect nature, so that you and others may enjoy its gifts!

ANNEX 7

The Botanist's Mission

Students are given a map. There are six points on the map. Each dot hides a plant. They have to identify it using clues.

📍 Station 1

- I have fragrant leaves.
- I am used in tea.
- I love bees.

Who am I?

📍 Station 2

- My flowers are white.
- I calm stomach pains.
- I am one of the most well-known medicinal plants.

Who am I?

Answer: Chamomile

📍 Station 3

- I have purple flowers.
- I have a strong smell.
- I am also cultivated for fragrance.

Who am I?

📍 Station 4

- I have green and aromatic leaves.
- I am often used in food.
- I give good taste to soups and salads.

Who am I?

Answer: parsley

📍 Station 5

- I have yellow flowers.

- I can be used for teas and creams.
- I am known for my skin care.

Who am I?

Answer: marigold

📍 Station 6

- I have small green leaves.
- I am used in spices.
- I am eaten fresh, boiled or tempered and have an unmistakable, spicy taste.
- My smell is intense.

Who am I?

Answer: thyme

ANNEX 8

THE BOTANIST'S MISSION

Discover the 6 plants hidden in nature!
Follow the clues and become a true botanist!

STATION 1

- I have fragrant leaves.
- I am used in teas.
- I give a white infusion.
- What plant am I?

STATION 2

- My flowers are white.
- I soothe stomach aches.
- I am one of the most well-known medicinal plants.
- What plant am I?

STATION 3

- I have purple flowers.
- I have a strong scent.
- I am grown for perfume.
- What plant am I?

STATION 4

- I have green and aromatic leaves.
- I am used in cooking.
- I give a pleasant taste to soups and salads.
- What plant am I?

STATION 5

- I have orange flowers.
- I can be used for teas and creams.
- I am known for helping heal the skin.
- What plant am I?

STATION 6

- I have small green leaves.
- I am used as a seasoning.
- I am consumed dried, fresh, and I have a spicy, intense aroma.
- What plant am I?

Observe, think, search, and write down the plants you discover at each station!

ANNEX 9

Quiz – What Have You Discovered?

1. Which of the following plants is commonly used both as a medicinal plant and as an aromatic herb?

- **a) Mint**
- **b) Fern**
- **c) Oak**
- **d) Spruce**

2. Why are aromatic plants important for pollinating insects?

- **a) They provide nectar and pollen**
- **b) They provide shade**
- **c) They absorb water from the soil**
- **d) They prevent other plants from growing**

3. What is the correct thing to do when we observe a rare plant?

- **a) Pick it for our herbarium**
- **b) Photograph it and leave it in its natural habitat**
- **c) Pick a few of its flowers**
- **d) Move it to a garden**

4. Which of the following is a use of aromatic plants?

- **a) As herbs and spices in food**
- **b) As building materials**
- **c) As fuel**
- **d) As mineral fertiliser**

5. Why is it not recommended to collect plants growing near busy roads?

- **a) They may be contaminated by pollutants**
- **b) They are more difficult to identify**
- **c) They have smaller flowers**
- **d) They have no scent**

ANNEX 10

The Code of the Responsible Botanist

1 Rule 1. Identify the plant before you pick it

- Never pick a plant if you are not sure what it is or if it is toxic.
- Some plants resemble each other very closely and can easily be confused.

Did you know?
Some spontaneous plants can be toxic and may be confused with medicinal plants.

2 Rule 2. Do not pick protected plants

- Some species are protected by law because they are rare or endangered.
- You should only photograph them and admire them.

The best collection is a photograph.

3 Rule 3. Do not pick all the plants from one place

Leave enough plants for:

- birds
- pollinating insects
- birds
- other animals

and so the plant can produce seeds.

It is recommended to collect only a small part from a population in an area, so that the population can regenerate.

4 Rule 4. Do not uproot the plant with roots

If you have to pick:

- ✓ **leaves** – pick only a few.
- ✓ **flowers** – pick only the flowers.
- ✓ **seeds** – pick only a part.

Uprooting the plant prevents it from growing and multiplying, with the exception of cases where the part used is the root; in such cases, harvesting is done in a controlled way, cultivated or from authorized sources.

5 Rule 5. Use the right tool

It is best to use:

scissors
or
pruning shears.

Do not break the stem.

6 Rule 6. Choose healthy plants

Do not pick plants that are:

- ✗ dry
- ✗ withered
- ✗ moldy
- ✗ damaged by insects

7 Rule 7. Do not pick from polluted areas

Do not collect plants from:

- busy roads
- factories
- landfills
- land treated with pesticides

8 Rule 8. Respect the best time for harvesting

Each plant has its right time.

Examples:

- **flowers** – during flowering.
- **leaves** – before or during flowering (except in species grown for their flowers).
- **seeds** – after ripening.

9 Rule 9. Protect the habitat

- ✓ Do not step on plants.
- ✓ Do not destroy nests.
- ✓ Do not break branches.
- ✓ Leave the area clean.

10 Rule 10. Pick only as much as you need

Do not pick plants just because they are many.

Plants are a resource of nature.

Nature offers us everything. Our respect protects life!

CHAPTER II

Growing the future – from seed to harvest

Discover sustainable agriculture
through experiments, technology,
and hands-on activities.

FUTURE AGRICULTURE – URBAN AGRICULTURE: HYDROPONICS, AEROPONICS AND AQUAPONICS

Duration: 50–60 minutes

OBJECTIVE
By the end of the activity, students will be able to: • define urban agriculture; • differentiate between hydroponics, aeroponics and aquaponics; • identify the advantages and disadvantages of each system; • justify the choice of a system for a given situation.

Lesson stages	Teacher's activity	Students' activity	Time
1. Organisational stage	Creates an appropriate learning environment and checks the necessary materials.	Prepare for the lesson.	2 min
2. Engaging students' attention	Displays an image of a vertical farm and asks: "Do you think agriculture will look the same 30 years from now?" and "If agricultural land disappeared, how would we produce food?" Facilitates the brainstorming session and writes the ideas on the board.	Form hypotheses and participate in brainstorming: • on rooftops? • inside buildings? • underground? • in water? • in space?	5 min
3. Announcing the topic and objectives	Introduces the lesson topic and objectives. Explains the importance of urban agriculture in the context of climate change and population growth.	Listen and express their expectations.	3 min
4. Acquiring new knowledge	Presents hydroponic, aeroponic and aquaponic systems using the PowerPoint presentation. After each system, asks: "What problem does it solve?" and adds to the students' answers. For example: Hydroponics What problem does it solve?	Observe the images, answer the questions, compare the systems and identify the advantages of each.	15 min

Lesson stages	Teacher's activity	Students' activity	Time
	→ lack of soil → water conservation Aeroponics What problem does it solve? → even lower water consumption → limited space Aquaponics What problem does it solve? → resource recycling → simultaneous production of plants and fish In this way, students begin to think in terms of solutions.		
5. Reinforcement – Team activity	Divides the class into four teams and gives each team an envelope containing a problem situation (apartment-block rooftop, water shortage, industrial hall, Mars base). Asks students to choose the most suitable system and justify their decision.	Analyse the situation, choose the appropriate solution, complete the worksheet and present their conclusions.	12 min
6. Consolidation through a game	Organises the game "Choose the Right System". Reads out challenges (saving water, lack of land, fish farming, etc.), and students raise the corresponding card. Optionally, the activity may continue with the "Escape Game".	Participate in the game, justify their answers and collaborate as a team.	8 min
7. Assessment	Uses the "True or False?" game and distributes an Exit Ticket containing three questions.	Answer individually and reflect on the lesson.	8 min
8. Lesson closure	Returns to the initial question: "How will we feed the cities of the future?" Launches the final challenge: "You have 10 million euros. Which system would you invest in, and why?" Presents the optional homework task.	Draw conclusions and justify their choice.	5 min

TEACHING METHODS:
heuristic conversation, brainstorming, explanation, observation, discovery learning, cooperative learning, educational game, case study, problem-solving.

TEACHING AND LEARNING RESOURCES
laptop and projector, PowerPoint presentation, worksheets, coloured cards, images, A3 sheets and markers;

ASSESSMENT
systematic observation, oral responses, educational game, Exit Ticket, assessment of team presentations.

Optional homework

"Imagine you are an agricultural engineer in 2050. Draw or describe an urban farm of the future and explain where it is located, what it grows, what technology it uses and how it contributes to protecting the environment."

Presentation link:
https://drive.google.com/file/d/1jblE8Rwy7XvTbzkz8hDE4QPQ0oa4q7AT/view?usp=sharing

Building a hydroponic system with students:
https://drive.google.com/file/d/1FDcAGScotdYUhZ5A1_5J9Mf7Gk8YboCY/view?usp=sharing

Worksheet – Urban Farmers' Mission

Team: _____

First situation:

☐ The rooftop of a building

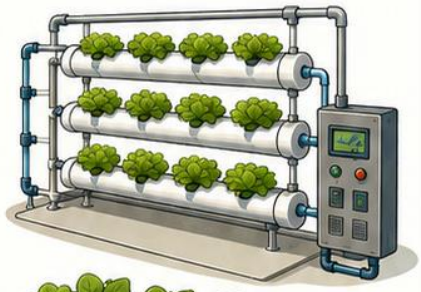
☐ A city with very little water

☐ An abandoned industrial hall

☐ A human base on Mars

1. Which system will you choose?

☐ Hydroponics ☐ Aeroponics ☐ Aquaponics



2. Why did you choose it?

_____

_____

3. What crops will you grow?

_____

_____

4. What are the advantages?

- Water saving
- Sustainable production
- Efficient use of space
- Food source close to home

_____

_____

5. What problems might appear?

_____

_____

6. Present your solution in maximum 2 minutes.

_____

_____

The future grows our ideas today!

ANNEX 12

GAME – "Choose the right system"

The teacher reads the challenge, and the teams raise a card.

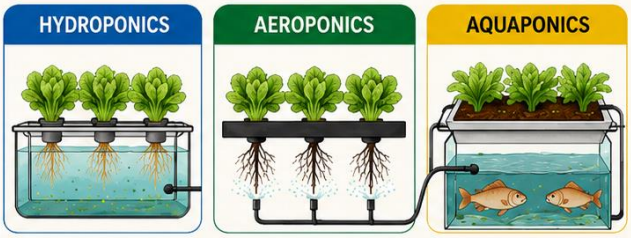
CHALLENGES

- Saving water
- Raising fish
- Lack of agricultural land
- No soil
- Growing lettuce in a mall
- Feeding a very large city
- Very fast production
- Greenhouse in a cold area

SUGGESTION FOR THE TEACHER:
After each challenge, discuss which system is the most suitable and what the advantages are.

ESCAPE GAME – Who are we?

Solve the statement with the correct system.



Statement	System
Raising fish.	_____
Roots are suspended in air.	_____
Plants grow in water.	_____
Uses very little water.	_____
Water circulates between fish and plants.	_____
Does not use soil.	_____

BONUS:
Explain why you think this is the agriculture of the future.

_____
_____
_____

Cards

HYDROPONICS AEROPONICS AQUAPONICS

Self-Assessment Worksheet

Tick the answer that best describes you.

Statement	**Yes**	**Partly**	**No**
I participated actively.			
I expressed my ideas.			
I collaborated with the team.			
I understood the differences between the three systems.			

Today I found out that...

_____

_____

Team evaluation rubric

Criterion	**1 p**	**2 p**	**3 p**
Selection of the appropriate system	☐	☐	☐
Justification of the decision	☐	☐	☐
Team collaboration	☐	☐	☐
Creativity of the solution	☐	☐	☐
Oral presentation	☐	☐	☐

Total: ___ / 15 points

ANNEX 15

Creative Challenge

Design the Farm of the Future

You have an A3 sheet of paper.

Draw an urban farm and specify:

- where it is located;

- which system it uses;
- which crops it produces;
- how it saves water;
- how it produces energy;
- what benefits it brings to the city.

At the end, present your project in no more than 3 minutes.

ANNEX 16

Suggested Assessment Criteria

Team Mission

The following aspects will be assessed:

✓ choosing the appropriate system;

✓ providing clear justification;

✓ using specific terminology;

✓ teamwork;

✓ creativity.

Exit Ticket

1. Hydroponics = plants grown in nutrient-rich water.
   Aeroponics = plant roots suspended in the air and sprayed with a nutrient solution.
2. Fish provide nutrients for the plants, while the plants help purify the water.
3. Any logically justified answer is accepted.

QUIZ – VERTICAL CROPS AND HYDROPONICS

Test what you've learned!

Name and surname: _____ Date: _____ Class: _____

1 CHOOSE THE CORRECT ANSWER.
(1 point each)

1. **What is hydroponics?**
   - ☐ a) Growing plants in soil
   - ☐ b) Growing plants without soil, using water and a nutrient solution
   - ☐ c) Growing plants only in the shade
   - ☐ d) Growing plants in sand
2. **What is the main advantage of vertical farming?**
   - ☐ a) It does not need much land
   - ☐ b) It consumes soil
   - ☐ c) It uses a lot of water
   - ☐ d) It only works on large farms
3. **What is the role of a nutrient solution?**
   - ☐ a) It feeds the plants with water and nutrients
   - ☐ b) It stabilizes the roots
   - ☐ c) It provides light
   - ☐ d) It protects the plants from insects
4. **Which plant is most often grown in hydroponic systems?**
   - ☐ a) Lettuce
   - ☐ b) Oak
   - ☐ c) Wheat
   - ☐ d) Corn

2 LOOK AT THE PICTURES AND ANSWER.
(1 point each)

a) What type of growing system is shown in picture 1? _____

b) What does picture 2 represent? _____

c) Where are the roots in picture 3 located? _____

d) What plant is grown in picture 4? _____

3 TRUE OR FALSE? Write T for true and F for false.

5. Hydroponically grown plants grow directly in soil. ☐
6. Vertical farming saves space. ☐
7. Hydroponics can reduce water consumption. ☐
8. Plants need light to grow. ☐

4 FILL IN THE BLANKS.
(1 point each)

9. In hydroponics, plants grow without _____ .
10. Roots absorb water and _____ from the nutrient solution.
11. Vertical crops are most useful in _____ .
12. A simple hydroponic system can be built using recycled materials such as _____ .

5 MATCH COLUMN A WITH COLUMN B.

A		B
13. Hydroponics	• •	a) Growing plants on multiple levels.
14. Vertical crop	• •	b) Mixture of water and nutrients for plants.
15. Nutrient solution	• •	c) Growing plants without soil.

6 THINK AND ANSWER.
(2 points each)

16. How do you think hydroponics can be a solution for the future of agriculture?

_____

_____

_____

17. **Write:**

One advantage _____

One disadvantage _____

7 YOUR CHALLENGE!
(3 points)

Imagine you have to build this simple hydroponic system.

- What materials would you use?

_____

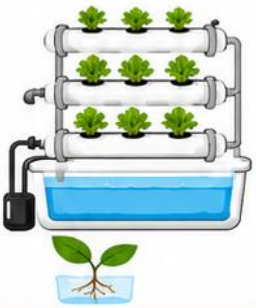
_____

- What plant would you grow?

_____

_____

_____



BONUS

18. **Which of the following statements is correct?**
   - ☐ a) Hydroponics uses only fertile soil.
   - ☐ b) Vertical crops occupy much more space than traditional ones.
   - ☐ c) Hydroponics uses water and a nutrient solution instead of soil.
   - ☐ d) Plants grown hydroponically do not need light.

TOGETHER FOR A GREENER FUTURE!

URBAN GARDENS

Practical activities

URBAN GARDEN DESIGN AND PREPARATION

THE PURPOSE

Developing practical skills and ecological spirit.

DESCRIPTION

Identifying and choosing the space for the urban garden (schoolyard, adjacent green space, terrace);
Analyzing existing conditions (light, access to water, soil type);
Understanding the need for drainage (holes in the bottom) and space for roots
Making boxes/planters from recyclable materials:

Students, under the guidance of the technology education teacher, will make planting boxes using recyclable materials.

THE METHOD

learning by doing, teamwork

RESOURCES

reused wooden crates, pallets, large PETs, plastic boxes, screws, nails, string, brushes, paints, gloves, hammer, stapler, foil

RESULTS

- at least 3 functional boxes/planters for the urban garden,
- the school yard painted by students,
- enriched knowledge about the needs of plants for development

SOWING SEEDS IN MINI-GREENHOUSES

THE PURPOSE

Understanding the process of plant germination.

DESCRIPTION

Sowing Seeds and Monitoring Plant Growth

Sowing seeds in recyclable containers and monitoring their growth.

Recommended plants: tomatoes, lettuce, aromatic herbs

Steps:

1. Consult the *Urban Gardener's Calendar* to identify the optimal sowing period for the selected plant species and to plan the next stages (pricking out, transplanting and plant care). Urban Gardener's Calendar
2. Fill the containers with soil.
3. Sow the seeds.
4. Water and label the containers.
5. Observe the plants' development daily.

Related educational activities:

- Keeping an observation journal;
- Creating a photo album documenting the activities;
- Recording short videos in which students share their impressions of the activity.

THE METHOD

systematic observation; investigation; discovery learning;
demonstration; practical exercise;
project-based learning; cooperative learning (teamwork);
heuristic conversation; reflection.

RESOURCES

seeds, soil, recyclable containers, gloves, miniskirts

RESULTS

Enriched knowledge about the stages of the plant germination process (sowing, watering, emergence of seedlings).

Students acquire basic practical skills in gardening activities.

From seedling to harvest – caring for the school garden

Sowing seeds in mini-greenhouses

THE PURPOSE

Developing practical skills in planting and plant care by transplanting seedlings into the school's green space, thereby promoting urban agriculture principles and environmental responsibility.

DESCRIPTION

After the seedlings develop, they will be transplanted into the previously made boxes, placed in the school yard.
Stages:
1. preparing the soil-filled containers
2. planting the seedlings
3. labeling the plants and watering regularly
4. establishing a care schedule
5. monitoring plant growth
6. keeping a garden journal (photos, observations, worksheets)
7. harvesting the produce
8. organizing an exhibition or presentation
9. promoting the activity on the school website and social media
10. evaluating the activity and gathering feedback from students and teachers

THE METHOD

experiential learning

RESOURCES

boxes, seedlings, gardening tools, gloves

RESULTS

Functional urban garden.

INVESTIGATING THE ROLE OF WATER AND NUTRIENTS IN PLANT GROWTH

Durata: 2–3weeks

OBJECTIVE
To understand the importance of water, nutrients, and pH in plant development, and to compare water use efficiency between traditional (soil-based) cultivation and hydroponics.

ACTIVITY DESCRIPTION

Experiment: The Role of Water and Nutrients
Students will conduct an experiment to observe how the lack of certain nutrients affects plant growth.
Procedure:

- **Select fast-growing plants (lettuce, basil, spinach).**
- **Students will set up 3–4 experimental variants:**
  - **plant with water + complete nutrient solution (control);**
  - **plant with water without nutrients;**
  - **plant with diluted nutrient solution;**
  - **(optional) plant grown in soil.**
- **During the experiment, students record:**
  - **growth rate;**
  - **leaf colour;**
  - **number of leaves;**
  - **overall appearance of the plant.**

Expected results:
Students will observe that plants deprived of nutrients show slower growth, yellowing leaves or poor development.
Measuring Water pH
Students will learn how to measure and interpret the pH of the water used in hydroponic systems.
Procedure:

- **Use pH test strips.**
- **Students test:**
  - **tap water;**
  - **water containing nutrient solution;**
  - **water used in different containers.**
- **The results are compared with the optimal values for the plants being grown (pH 5.5–6.5).**

Expected results:
Students understand that an unsuitable pH can prevent plants from absorbing nutrients, even when those nutrients are present in the water.
Calculating Water Consumption: Soil vs. Hydroponics
This activity aims to highlight the efficiency of hydroponics in water use.

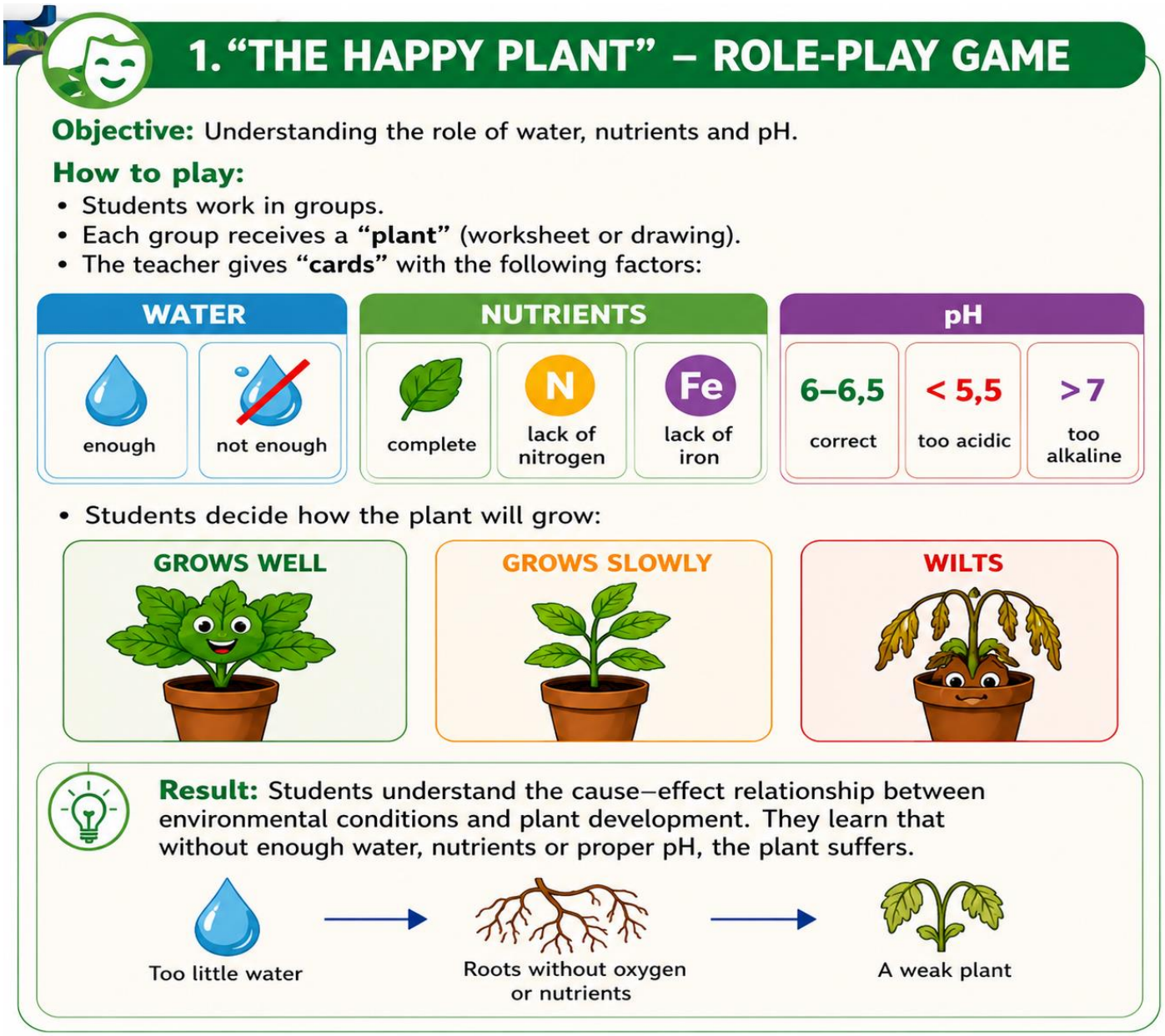
Procedure:

- **Students measure the amount of water used:**
  - **to water a plant grown in soil;**
  - **in a hydroponic system.**
- **Over the course of one week, the amounts are recorded daily.**
- **The data are compiled in a table and presented graphically.**

REZULTATE AŞTEPTATE
Elevii vor constata că sistemele hidroponice folosesc semnificativ mai puţină apă decât cultivarea în sol.

ANNEX 18

EDUCATIONAL GAMES



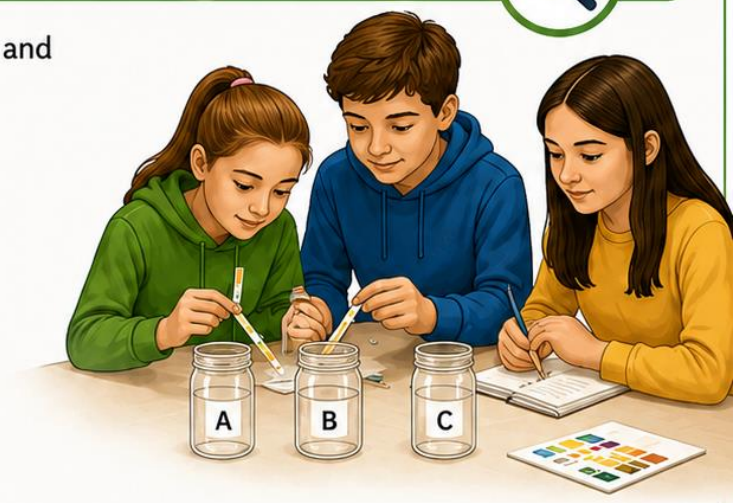
ANNEX 19

2. "pH DETECTIVES"

Objective: To become familiar with measuring and interpreting pH.

Procedure:

- Students take water samples (labeled A, B, C).
- Using indicator strips, they measure the pH.
- Each team must decide:
  - ☑ the pH value,
  - ☑ the effect it has on the plant,
  - ☑ which water is suitable for hydroponics,
  - ☑ what problems may appear in other cases.



SAMPLE	MEASURED pH	EFFECT ON THE PLANT	SUITABLE FOR HYDROPONICS?	POSSIBLE PROBLEMS
A 	 4.5		✗ NO	• pH too acidic • nutrient lockout • damaged roots
B 	 6.2		✓ YES	• optimal pH • good nutrient uptake • healthy growth
C 	 8.5		✗ NO	• pH too alkaline • nutrient lockout • chlorosis (yellow leaves) • slow growth

For hydroponics, the ideal pH of the nutrient solution is 5.5 – 6.5.
We measure regularly and adjust for healthy plants!

3. WHO SAVES MORE WATER?

Soil vs. Hydroponics – The Week-Long Challenge!

Fill in the chart every day!

SCOPE

Compare the amount of water used in soil culture.

STEPS

1. Fill a jug with water:
   - for the soil plant:
   - liter (1000 ml)
   - for the hydroponic system.
2. Every day, add only the by the sol of water needed
   - Soil plant
   - Hydroponic system
3. Similaaat a week. of growth (7 days).
4. Record every day how much water conssumers.

IMPACT

Conscientious use of water helps protect the plarnt aad prepares it for ai better future!

PLANT IN SOIL

VS.

HYDROPONIC SYSTEM

SOIL PLANT – WATER JOURNAL

DAY	ADDED WATER (ml)	REMAINING WATER (ml)	OBSERVATIONS
2			
3			
4			
5			
6			
7			

TOTAL USED: _____ ml REMAINING: ____ ml

HYDROPONIC – WATER JOURNAL

DAY	ADDED WATER (ml)	REMAINING WATER (ml)	OBSERVATIONS
2			
3			
4			
5			
6			
7			

TOTAL USED: _____ ml REMAINING: ____ ml

Tip: An intelligent gardener uses as little water as possible

RULES

Total budget: 1000 ml (per system)
Goal: keep the plant healthy every day for 7 days.
Use as little water as necessary for each system.
Healthy plant + only the necessary water = winning team!

SCORING

WATER CONSUMPTION (out of 10 points)

Excellent	= 10 pts
Good	= 8 pts
Average	= 6 pts
Satisfactory	= 4 pts
Needs improvement	= 2 pts

PLANT HEALTH (out of 10 points)

Excellent	= 10 pts
Good	= 8 pts
Average	= 6 pts
Satisfactory	= 4 pts
Needs improvement	= 2 pts
Very poor	= 0 pts

MAXIMUM SCORE: 20 POINTS

THE TEAM THAT USES LESS WATER AND HAS THE HEALTHIEST PLANT WINS. GOOD LUCK!

WATER IS LIFE! LET'S CHOOSE WISELY, LET'S GROW RESPONSIBLY!

ANNEX 21

THE URBAN GARDENER'S CALENDAR

Monthly guide for small-space gardens

JANUARY

- Plan the garden: draw it, choose plants, calculate the needed space
- Check and repair equipment, tools
- Order seeds (choose varieties suitable for the season)
- Prepare labels (use transparent, waterproof labels)

What can you plant (indoors):

- Lettuce seeds, aromatic herbs or plants that need warmth (herbs, pepper)

FEBRUARY

Start the season of seeds

- Sow indoors: tomatoes, peppers, spinach, lettuce
- Choose small containers or seed trays
- Provide plenty of light (minimum 6–8 hours/day)
- Water moderately and keep in a warm place
- Protect from cold

Animal-friendly activities for students:
"Zoo on the windowsill" – planting in recycled containers that become homes for animals

MARCH

Moving outside and direct sowing

- Early March: continue sowing indoors
- From mid-March (when the weather allows):
  - Sow directly in beds: radishes, spinach, lettuce
  - Plant in raised beds or containers
  - Water regularly and watch for frosts

⚠ Pay attention to "cold days"!

APRIL

Spring explosion

- Sow directly: carrots, beets, onions, garlic
- Plant seedlings of lettuce, tomatoes, peppers, herbs
- Protect early plantings with mulch or fleece on cold nights
- Plant flowers that attract pollinators (tagetes, lavender)

Lunar experiment:
Measure plant growth in sunlight

MAY

The garden is in full swing!

- After May 15 (in general, after St. George's Day), you can plant outdoors:
  - Plants that are sensitive to frost: tomatoes, peppers, cucumbers, melons, beans
  - Direct sowing: pumpkin, zucchini, beans
  - Support climbing plants (trellis, stakes)

Activities:
"Bee and insect hotel" – build shelters for pollinators

JUNE

Care and timely harvesting

- Harvest: salads, arugula, radishes, green onions
- Sow for a second crop: lettuce, spinach, arugula
- Mulch the soil and water regularly
- Control vegetable pests and diseases (organic methods)

School project:
"Garden basket" – exchange harvests between students

JULY

The peak of summer

- Timely harvest: tomatoes, peppers, cucumbers, green beans
- Sow late crops: lettuce, carrots, spinach (for autumn)
- Water in the morning (or evening)
- Mulch (protects the soil and keeps moisture)

Activities:
"Preserving summer" – drying or storing aromatic herbs

AUGUST

Harvest and preparation for autumn

- Continue harvesting
- Sow: salads, radishes, arugula, spinach, parsley
- Prepare beds for autumn crops (loosen the soil)
- Collect seeds from your plants

Useful tip:
How to collect and store seeds

SEPTEMBER

Autumn garden

- Plant lettuce, spinach, arugula for the autumn crop
- Sow garlic for spring
- Harvest root vegetables and some summer fruits
- Prepare the beds for the cold season

Experiment:
Compare the growth of plants with and without nighttime cover

OCTOBER

Autumn harvest and preparation for winter

- Harvest the last vegetables
- Clean and repair tools
- Check the condition of the soil
- Plant (garlic – for spring)
- Add compost or fertilizer to improve the soil

Ecological activity:
Make compost from plant waste

NOVEMBER

Season closing

- Protect plants (cover with fleece, straw)
- Add leaves to the compost
- Clean tools thoroughly
- Plan the garden for next year and write down your experience

Group project:
Analyze successes and challenges of the year

DECEMBER

Rest and preparation

- Check plants indoors (greens or seedlings)
- Prepare seed trays for next season
- Read books and documents about gardening
- Plan the garden: structure, types of plants, families, greenhouse, microgreens

A small garden, a big joy!

CHAPTER III

We protect the planet – resources, consumption and responsibility

STEAM Activities –Pollution and Its Impact on the Environment

Teacher: Jurca Floarea

THE PURPOSE

Developing skills specific to the **STEAM (Science, Technology, Engineering, Arts and Mathematics)** approach by investigating the phenomenon of pollution, using digital technologies, interpreting data, designing sustainable solutions and creating creative products that promote environmental protection and sustainable development.

DESCRIPTION

The activity is designed according to the **STEAM (Science, Technology, Engineering, Arts and Mathematics) approach**, providing students with authentic contexts for investigating, analyzing and solving environmental problems. Starting from the contents **– Pollution and environmental impact**, students identify the relationships between human activities and environmental quality, use digital tools, design sustainable solutions and creatively capitalize on the information acquired through the creation of educational products.

Science

The **Science component** is the foundation of the activity. The teaching approach begins with the presentation of PowerPoint materials dedicated to air, water and soil pollution.

1. ppt presentation – air pollution https://docs.google.com/presentation/d/1pxMvaXsO7zEbSVC-DmyRl3sEqnuc_3T0/edit?usp=sharing&ouid=116300644431826311247&rtpof=true&sd=true ;
1. ppt presentation – water pollution https://docs.google.com/presentation/d/1O7fdkYZBsv1-_-IELebEcOddQJpPW9Sy/edit?usp=drive_link&ouid=116300644431826311247&rtpof=true&sd=true
2. Presentation ppt – soil pollution https://docs.google.com/presentation/d/14URXl4ZIO532WiykvNIe2AJU9IDOMy58/edit?usp=sharing&ouid=116300644431826311247&rtpof=true&sd=true

Starting from the information presented, the students participate in a **brainstorming** session (Annex 1), formulating hypotheses and identifying the main sources of pollution in the environment. The ideas are organized in a concept map, facilitating the activation of previous knowledge and the formulation of investigative questions.

Annex 1

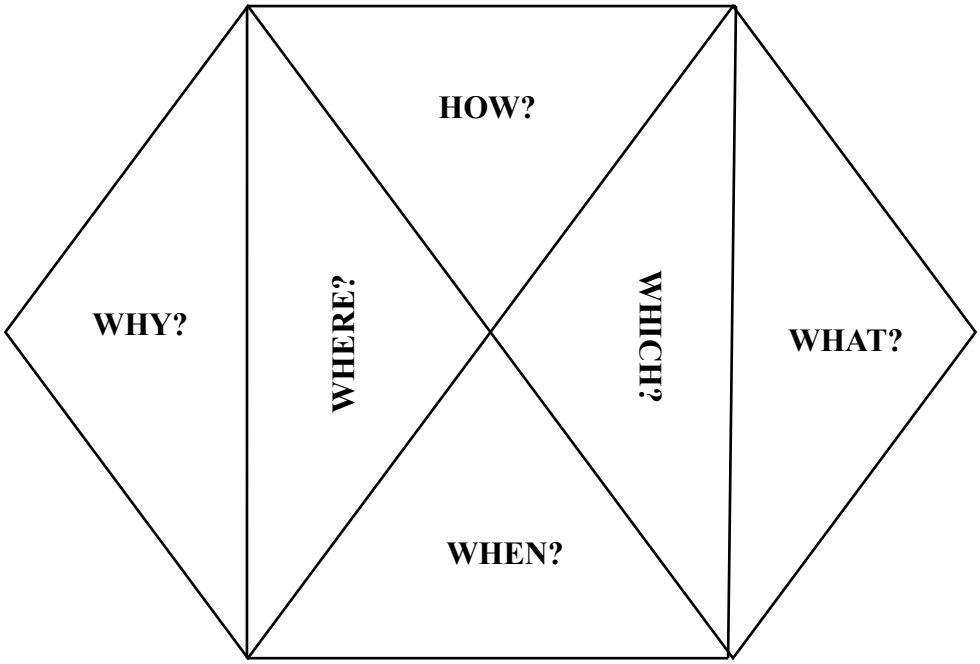
Brainstorming – what we know about pollution

https://drive.google.com/file/d/1vy864AjfgRhFfGkKQXE5xTp0qZshKeKT/view?usp=sharing

In the exploration stage, **the Hexagon Method is applied**, through which students answer the following questions:

1. What is pollution?
2. What are the types of pollution?
3. Where does pollution manifest itself?
4. How does pollution affect water, air, soil and biodiversity?
5. How can pollution be reduced?
6. Why does pollution occur?

The method facilitates the logical organization of information and the development of critical thinking by identifying the relationships between causes, effects and solutions.



In order to deepen the contents related to air, water and soil pollution, **the Star Explosion method** (Annex 2) is used, by means of sheets specific to each type of pollution. Organizing themselves in teams, the students formulate and answer questions regarding the sources of pollution, pollutants, effects on health and the environment, the route of pollutants in nature and prevention measures. The results are capitalized through case studies and investigative activities, in which students formulate conclusions and propose solutions to protect the environment.

Annex 2

Stellar explosion – air pollution

https://docs.google.com/document/d/14BvbtUTWamjSarswrTK2pcBflFfH1uYx/edit?usp=sharing&ouid=116300644431826311247&rtpof=true&sd=true

Stellar explosion – water pollution

https://docs.google.com/document/d/1GqVmgr4Zvb6w6NrPoSrUoTm1YGFIXRrm/edit?usp=sharing&ouid=116300644431826311247&rtpof=true&sd=true

Star explosion – soil pollution

https://docs.google.com/document/d/1H7c6DoMMtdF4fUD4BWsxceBkExB2DWq7/edit?usp=sharing&ouid=116300644431826311247&rtpof=true&sd=true

Technology

The **Technology** component leverages digital technology as a tool for investigation, collaboration, and evaluation. Students use multimedia presentations to explore content, access digital resources, and participate in interactive activities through the **Kahoot** app, which is used to consolidate and assess knowledge. Digital platforms facilitate immediate feedback and stimulate active participation in the learning process.

https://create.kahoot.it/details/poluarea-aerului/c6b49e04-0d10-4a8f-aefb-ad9144c87786?drawer=

https://create.kahoot.it/my-library/kahoots/4286f0ca-111c-424a-a211-62146a0d95d1

https://create.kahoot.it/my-library/kahoots/4286f0ca-111c-424a-a211-62146a0d95d1

Engineering

The **Engineering** component involves students in identifying and designing solutions to reduce pollution.

Starting from the identified problems, the students fill in the sheet **"The sun of solutions for reducing pollution"** (Annex 3), writing concrete measures to protect the environment on each radius. The activity takes place in the form of a competition between teams, winning the team that identifies and argues the largest number of correct, applicable and innovative solutions.

Annex 3 "The Sun of Solutions for Reducing Pollution"

https://drive.google.com/file/d/1uFEaPygv2nhqUwyottaZ55EP376AfdyH/view?usp=sharing

The Engineering component involves students in the process of designing and implementing sustainable solutions to reduce pollution. Starting from the problems identified as a result of the investigations, the students work in teams to analyze different alternatives, choose the solution considered the most effective and design a model that responds to the proposed challenge.

The students fill in before making the model:

1. Problem identified: .....
2. Proposed solution: .....
3. Materials used: .....
4. Why did I choose this solution? .....
5. How does it reduce pollution? .....
6. How can it be applied in our community? .....

Using recyclable and reusable materials, they make models representing selective collection systems, green spaces, recycling areas, urban gardens or other arrangements that contribute to reducing the impact of pollution on the environment. Each team presents its project, argues the choice of the solution and explains how it can be applied in real life to protect the environment and promote sustainable development. The activity develops engineering thinking, creativity, collaboration and problem-solving skills through the practical application of acquired knowledge.

Arts

The **Arts** component stimulates students' creative expression, communication and awareness of environmental issues through the use of verbal and visual language.

Starting from the information acquired in the investigation phase, the students write an argumentative text on the theme "**Protecting the environment – a responsibility we all share**" (Annex 4), formulating a point of view supported by arguments based on relevant evidence and examples, using a vocabulary specific to the ecological field.

Annex 4

Argumentative essay on **"Protecting the environment – a responsibility we all share"**

https://drive.google.com/file/d/12CO6cKunPmOxCNmTiVQNcJL9AqOsbVKO/view?usp=sharing

In the continuation of the activity, the students design and create slogans, persuasive messages, posters, drawings, leaflets and other visual materials intended for an information and awareness

campaign on protecting the environment. In their elaboration, they are encouraged to use design elements, color, symbols and graphic techniques that convey a clear and convincing message to the target audience.
The products are brought together in a thematic exhibition entitled "Together for a clean environment!", organized with the Gallery Walk method. Students present and argue the proposed solutions, analyze their colleagues' products, provide constructive feedback and reflect on the impact that visual communication and persuasive messages can have in changing behaviors towards the environment. The activity develops creativity, aesthetic spirit, communication and collaboration skills, as well as the ability to use art as a means of promoting the values of sustainable development.

Mathematics

The **Mathematics** component develops students' skills in data analysis, interpretation and representation, using quantitative information and graphical representations to understand the phenomenon of pollution and substantiate evidence-based solutions.
The activity starts with the analysis **of Annex 5** – Regions affected by different forms of pollution, where the students identify on the map geographical areas affected by air, water and soil pollution, locate the corresponding regions and establish relationships between geographical characteristics, anthropogenic activities and the predominant types of pollution.

Annex 5

Regions of the world affected by different forms of pollution

https://drive.google.com/file/d/1VLfoJ1GC7zkysq7gh9GCgcZdgYLgFK7C/view?usp=sharing

Next, using **Annex 6** – Analysis of data on air quality in Arad County, the students investigate a dataset inspired by the structure of the indicators monitored by the automatic air quality monitoring stations. Analyzing the table, the comparative graph and the map of the location of the monitoring stations, they compare the values of the main pollutants (PM10, PM2.5 and NO_2), identify differences and trends and establish relationships between traffic intensity, human activities and pollution levels.
Based on the analyzed information, students perform mathematical calculations (differences, arithmetic averages and comparisons between values), interpret graphs and cartographic representations, formulate reasoned conclusions and propose measures to reduce pollution at local and regional level. The results are presented and discussed in teams, being used as support for arguing the proposed solutions within the STEAM activities.

Annex 6

Analysis of air quality data in Arad County

https://drive.google.com/file/d/1V-ZKoV2xWRH_A5q_WF5l-9-6rsKcOPgH/view?usp=sharing

Through this activity, students develop their data analysis and interpretation skills, logical and critical thinking, the ability to use statistical information and cartographic representations in solving real environmental problems, strengthening the applicative and interdisciplinary character of the STEAM approach.
By integrating the components of Science, Technology, Engineering, Arts and Mathematics, the project transforms students from mere receivers of information into investigators, creators and promoters of change, giving them the opportunity to apply the knowledge acquired in authentic contexts and to develop essential skills for the 21st century: critical thinking, creativity, collaboration, communication and problem solving. The STEAM approach thus contributes to the formation of a responsible behavior towards the environment and to the awareness of the role that each person has in building a sustainable community.

THE METHOD

1. Brainstorming;
2. Concept map;
3. The Hexagon Method;
4. Star explosion;
5. Case study;
6. Investigation;
7. Analysis and interpretation of thematic maps;
8. Analysis and interpretation of tables, graphs and statistical data;
9. **Project-Based Learning (PBL);**
10. Design Thinking (identifying the problem, generating ideas, designing and presenting solutions);
11. Collaborative teamwork;
12. Gallery tour;
13. Reflection and self-evaluation;

- Interactive evaluation through **Kahoot**.

RESOURCES

Curricular and didactic materials:

1. the school curriculum and the Biology textbook;
2. PowerPoint presentations on types of pollution;
3. activity sheets (Annexes 1–6);
4. thematic maps and drawings;
5. tables, graphs and statistical data;
6. thematic images and videos.

Digital resources

1. calculator/laptop;
2. video projector;
3. interactive whiteboard;
4. Kahoot (interactive assessment);
5. applications for making digital presentations.

Materials for practical activities

1. carton color;
2. A3/A4 paper;
3. markers;
4. colored pencils;
5. scissors;
6. glue;
7. recyclable materials (PET, cardboard, paper, stoppers, caps, packaging, etc.);
8. materials for making models, posters and leaflets.

Information resources

1. reports and materials on environmental protection;
2. data on air quality and pollution monitoring in Arad County (used for educational purposes);
3. geographical maps and cartographic representations;
4. bibliographic sources and online resources dedicated to environmental education and sustainable development.

Human Resources

1. the coordinating teacher;
2. students organized in work teams;
3. collaborators and representatives of environmental institutions (optional, depending on the context).

RESULTS

Following the implementation of STEAM activities, students:

1. identify and explain the main types of pollution, analysing their causes and effects on air, water, soil and biodiversity;
2. investigates real environmental problems, formulates hypotheses and uses scientific methods to interpret the phenomena studied;
3. uses digital tools for documentation, collaboration, evaluation and presentation of results, developing skills specific to the **Technology component**;
4. interprets thematic maps, graphs, tables and statistical data on environmental quality, performing calculations, comparisons and formulating reasoned conclusions based on evidence (**Mathematics**);
5. designs and implements sustainable solutions for reducing pollution, using recyclable materials and applying the stages of the engineering design process;
6. writes argumentative texts and creates slogans, posters, leaflets and other information materials, creatively capitalizing on verbal and visual language (**Arts**);
7. communicates effectively, collaborates in a team, argues their own opinions and provides constructive feedback during the reflection activities and the **Gallery Walk**;
8. develops critical thinking, creativity, problem-solving skills and decision-making skills in authentic contexts;
9. They are aware of the importance of protecting the environment and adopt responsible behaviors, becoming promoters of sustainable development in school and in the community.

Final Products

1. **Annex 1** – Brainstorming sheet and concept map;
2. **Annex 2** – "Starburst" sheets for air, water and soil pollution;
3. **Annex 3** – Argumentative text and slogans for the awareness campaign;
4. **Annex 4** – "The Sun of Solutions for Reducing Pollution";
5. **Annex 5** – Analysis sheet of the regions of the world affected by different forms of pollution;
6. **Annex 6** – STEAM data analysis sheet on air quality in Arad County;
7. models made of recyclable materials;
8. posters, leaflets and thematic drawings;
9. the team's portfolio and the exhibition **"Together for a clean environment!"**.

THE LIFE OF TREES DEPENDS ON ME

Duration: 120 min.

COMPETENCES

General competences:

1. Adopting positive attitudes towards oneself and a healthy, balanced lifestyle

Specific competences:

- Self-assessing a healthy lifestyle in relation to the living environment;
- Making safe and healthy decisions to prevent situations with potential risk or crisis.

2. Building harmonious relationships with others in school and extracurricular contexts

Specific competences:

- Recognising a variety of emotions experienced in relation to oneself and others;
- Demonstrating simple forms of self-control and self-regulation.

OBJECTIVES

By the end of the activity, students will be expected:

- to identify concepts and criteria related to sustainability;
- to understand how personal choices affect society as a whole;
- to understand the impact of personal choices on the environment and on the lives of others, now and in the future.

METHODS

heuristic approach, role play, Six Thinking Hats method, brainstorming, practical activity

RESOURCES

- seedlings for planting; gardening tools (shovels, gloves, watering cans);
- coloured cardboard and materials for teamwork; coloured hats for the Six Thinking Hats method; watercolours, brushes, markers;
- worksheets and feedback sheets; tablet/video projector for presenting the video material; an excerpt from Hans Christian Andersen's story "The Fir Tree"; outdoor space (greenhouse, garden or schoolyard).

DESCRIPTION

Stages of the activity (180 minutes):

- Icebreaker - students are asked to quickly complete the following sentence: If I were a tree, I would be….., because…..... (10 min.)
- The teacher reads an excerpt from Hans Christian Andersen's story "The Fir Tree". The behaviour of people towards the fir tree is highlighted. A short excerpt is used: https://www.youtube.com/watch?v=hPvQXUC12CM (10 min.)
- Questions: How long do you think it took for the fir tree to burn? How long does it take for a fir tree/tree to grow? (10 min.)
- Role play: students are asked to imagine a dialogue between the fir tree and the children and to express their thoughts and feelings in different situations. (20 min.)
- Practical activity: observing trees at different stages of development. (10 min.)
- Conclusion: although wood is a renewable resource, it takes a long time for a tree to reach maturity.
- Practical activity: planting young trees/seedlings (60 min.)
- Brainstorming: students are asked to find as many solutions as possible for saving trees. (15 min.) The answers considered applicable are selected by vote. (5 min.)
- In the second part of the activity, students take part in a brainstorming session to identify solutions for reducing wood consumption and use the Six Thinking Hats method to analyse the issue from different perspectives. The activity ends with a reflection and feedback session, during which students identify ways in which, through their own behaviour, they can contribute to protecting forests and promoting a sustainable lifestyle: the white hat (data related to reducing wood consumption and deforestation), the yellow hat (positive thinking, awareness of benefits), the black hat (negative aspects and weaknesses), and the green hat (encouraging free thinking). (20 min.)
- Feedback: worksheets (20 min.)

OUTCOMES

- Increased awareness of the importance of trees and forests for environmental protection;
- Development of students' environmental and civic competences;
- Development of responsible attitudes towards the consumption of paper and wood products;
- Development of teamwork, empathy and communication skills;
- Development of critical thinking and the ability to identify solutions for environmental protection;
- Planting and caring for seedlings, contributing to the improvement of the school's green space;
- Identification of everyday products that can be recycled to reduce wood consumption.
- Estimating personal consumption of paper products and identifying practical solutions to reduce it.

HOW CAN WE USE WATER EFFICIENTLY AT HOME?

WATER IN EVERYDAY LIFE

AIM

Raising awareness of the importance of water at home and identifying the main situations in which it is used on a daily basis.

The activity aims to develop a responsible attitude towards water consumption and students' ability to distinguish between necessary water use and water waste.

DESCRIPTION

The activity begins with a guided discussion based on the question: **"Where do we use water at home?"**. Students are encouraged to give examples from everyday life by identifying activities in which water is used at home: personal hygiene, cooking, cleaning, washing clothes, watering plants, and drinking.

The teacher writes the students' answers on the board and groups them into categories so that students can better understand how essential water is in everyday life. The difference between necessary water use and water waste is then discussed through concrete examples: leaving the tap running, taking very long showers, washing dishes under continuously running water, using the washing machine when it is not full, or watering plants at inappropriate times of the day.

As the activity continues, students become "Water Detectives". They are asked to observe how water is used in their own homes and to identify situations in which it is used responsibly or wasted. At this stage, students use the questionnaire on water use at home, which helps them investigate their family's water consumption habits.

Students complete the questionnaire by considering aspects such as: turning off the tap while brushing their teeth, shower duration, dishwashing, using the washing machine, repairing dripping taps, collecting rainwater, or reusing water for plants.

As Water Detectives, students do more than answer questions: they observe, analyse, and draw conclusions. They identify good habits already present in their families, as well as behaviours that

could be improved. The activity concludes with students suggesting simple solutions for using water efficiently at home.

METHODS

guided discussion, brainstorming, explanation, learning through concrete examples, guided observation, problem-based learning

RESOURCES

board, markers, images illustrating water consumption at home, worksheet, A4 sheets, coloured pencils, and, if available, a video projector for presenting relevant images

OUTCOMES

Students identify the main household activities in which water is used, understand the role of water in everyday life, and become aware that water is an essential but limited resource that must be protected. Students suggest simple solutions for using water responsibly at home.

HOW MUCH WATER DO YOU USE?

AIM

Developing the ability to observe, estimate, and calculate approximate water consumption during common household activities. The activity aims to develop responsibility towards water use and an understanding of how daily actions influence the total water consumption of a household.

DESCRIPTION

The activity builds on the results of the questionnaire on water use at home and on the observations made by students in their role as "Water Detectives". Students discuss household activities that frequently use water and try to identify where the greatest losses may occur. The teacher explains that, in order to save water, it is important first to observe how we use it and estimate the amount consumed. Students choose several common household activities: washing hands, brushing teeth, taking a shower, washing dishes, watering plants, and doing laundry. For each activity, they record how many times it is carried out in a day or a week and estimate the approximate amount of water used. The data are entered in an observation table. After completing the table, students compare the activities and discuss where the most water is used, where waste can be reduced, and what solutions can be applied at home.

METHODS

exercise, observation, estimation, guided discussion, data analysis, personal reflection

RESOURCES

calculation worksheet, questionnaire, pencils, observation table, basic calculator, board, markers

OUTCOMES

Students understand that small habits can influence the total amount of water used in a household. They learn to observe, estimate, compare, and draw conclusions about responsible water consumption.

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ANNEX

OBSERVATION SHEET – WATER USE

Look at the pictures, observe and answer the questions!

Name: _____ Date: _____

1 What would life be like without water?

Look at the pictures and write a few ideas about what would happen if there was no water.

Without water, we wouldn't have anything to drink.

Plants would dry up and die.

We couldn't cook or have water for hygiene.

Rivers, lakes and seas would dry up.

Animals would suffer and die.

Life on Earth would be in danger.

.....
.....
.....

2 Where do we use the most water at home?

Look at the pictures and name the activities in which we use water.
Then, put them in order from the biggest water consumer (1) to the smallest (9).

1. Shower / Bath

2. Washing clothes

3. Washing dishes

4. Drinking

5. Cooking

6. Toilet (WC)

7. Handwashing

8. Cleaning the house

9. Watering plants

Where do you think the most water is used at home? _____

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ANNEX

SCH – Sowing Change

Questionnaire – How do we use water at home?

General information:

- Name and surname: _____
- Class: _____ • Age: _____

1 Where do you drink the most water from?
- ☐ tap water
- ☐ bottled water
- ☐ other sources: _____

2 How many times a day do you brush your teeth?
- ☐ Once
- ☐ Twice
- ☐ More than twice
- ☐ Not daily

3 When you wash your hands, do you leave the tap running?
- ☐ Yes, all the time
- ☐ Sometimes
- ☐ No, I turn the water off while soaping

4 How long do you shower?
- ☐ Less than 5 minutes
- ☐ 5–10 minutes
- ☐ More than 10 minutes

5 You prefer:
- ☐ Shower
- ☐ Bathtub

6 Do you wash the dishes while the water is running?
- ☐ Yes, all the time
- ☐ Sometimes
- ☐ No, I use a basin or turn off the water

7 Do you know how many liters of water are used in a 10-minute shower?
- ☐ Less than 20 liters
- ☐ About 50 liters
- ☐ More than 100 liters
- ☐ I don't know

8 Have you noticed any leaking taps or pipes in your home that waste water?
- ☐ Yes
- ☐ No
- ☐ I don't know / I haven't paid attention

9 Gardening/watering is done:
- ☐ with a hose
- ☐ with a watering can
- ☐ with a special collected rainwater
- ☐ we don't have a garden/garden

10 Do you think that the water consumption in your household is:
- ☐ moderate
- ☐ excessive
- ☐ not sure

11 Have you learned at home or at school how to save water?
- ☐ Yes
- ☐ No
- ☐ Partly

12 Do you think it is important to save water?
- ☐ Yes
- ☐ No
- ☐ I haven't thought about it

13 What can you do personally to avoid wasting water?
(Tick everything that applies)
- ☐ Turn off the tap while brushing your teeth
- ☐ Take shorter showers
- ☐ Fix leaking taps or pipes
- ☐ Wash dishes efficiently
- ☐ Talk to your family about saving water
- ☐ Other: _____

14 What do you think is most important so we don't waste water?

_____
_____
_____

15 What have you learned by completing this questionnaire?

_____
_____
_____

Thank you for your answers!
Every drop counts!

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ANNEX

WORKSHEET – TEAM CHALLENGE

HOUSEHOLD WATER CONSUMPTION

Observe. Calculate. Save. Protect water!

General information:
Team name: _____ Class: _____ Age: _____

MISSION: Investigate how water is used in the household!
Answer the questions, observe, calculate and propose solutions to protect each drop!

1 WHERE DO WE USE WATER?

Mark the activities in which you use water at home.

	YES	NO
Washing hands	☐	☐
Brushing teeth	☐	☐
Shower / Bath	☐	☐
Washing dishes	☐	☐
Washing clothes	☐	☐
Watering plants	☐	☐
Drinking water	☐	☐
Cleaning the house	☐	☐

2 WATER DETECTIVES!

Answer the questions.

1. At home, what is the biggest water user?
_____

2. In what situation can water be wasted?
_____

3. What is a solution for saving water?
_____
_____

3 LET'S CALCULATE WATER CONSUMPTION!

Complete the table based on your observations, estimating the approximate consumption.

Activity	How many times a day / week?	Estimated consumption (liters)	Total daily consumption (liters)	Where can leakages occur?	Solution for saving water
Washing hands					
Brushing teeth					
Shower					
Washing dishes					
Washing clothes					
Watering plants					

EVERY DROP COUNTS!

4 I DO / I DON'T DO

Write in the correct column.

I DO (responsible)	I DON'T DO (waste water)

- I turn off the tap when I brush my teeth.
- I leave the tap running when I don't need it.
- I take short showers.
- I fix the leaky tap that drips.
- I fill the washing machine only when it's full.
- I wash the car with a hose.
- I use rainwater to water plants.
- I water plants in the morning or evening.

5 FIND THE RIGHT SOLUTION

Match each situation with the correct solution.

The tap drips all the time.	A. I fill the machine only when it's full.
The washing machine isn't full.	B. I fix the tap.
Plants need water during hot weather.	C. I water more often.
The hose is left out all day.	D. I turn off the hose or use a spray.
The leaking tap.	

6 CHOOSE THE CORRECT ANSWER!

Underline the correct answer.

1. To save water when brushing your teeth, you should:
   a) leave the tap open b) close the tap c) use a lot of water
2. A full washing machine is:
   a) a waste of water b) empty c) just as good
3. Plants need water:
   a) in the morning b) at night c) anytime, with a lot of water
4. A leaking tap can be:
   a) ignored b) fixed c) left that way

7 THREE RULES FOR SAVING WATER

1. _____
2. _____
3. _____

8 MY PROMISE

Today, I promise to save water by _____

9 CONCLUSION

Water is important because _____
To protect water, we can _____

EVERY DROP COUNTS!

CIRCULAR ECONOMY – FROM WASTE TO RESOURCE

ACTIVITY: 5 LIVES FOR A JAR

Duration: 45–50 minutes

PURPOSE

Raising awareness of the importance of reusing objects aiming at waste reduction and understanding the principles of circular economy by identifying creative ways of reusing a jar.

Objectives

At the end of the activity, students will be able to:

- explain the difference between reuse and recycling;
- describe the basic principles of the circular economy;
- identify at least five ways to reuse a jar;
- come up with creative solutions to reduce the amount of household waste;
- collaborate as a team to create a practical reuse solution.

DESCRIPTION

1. Lead-in (5 minutes)
The teacher presents an empty jar and asks the question:
"How many lives can this jar have before it reaches the recycling bin?"
Students give answers and write down ideas on the board.
2. Exploring the concept (10 minutes)
The teacher briefly presents the principles of the circular economy and explains the difference between:
reuse;
repair;
recycling.
The discuss why reuse is preferable to recycling when the object can still be used.
Why a jar?
In the circular economy an object does not become waste immediately after its first use. It can have multiple "lives" by being reused creatively and responsibly. A simple glass jar is a great example: before being recycled, it can be used countless times for storage, gardening, organization, creative projects or school experiments.
By reuse :

- we save energy and raw materials;
- REDUCE the amount of waste ;
- we avoid buying new products;
- we contribute to protecting environment .

Only recycle when it can no longer be reused!

3. Practical activity (20 minutes)

Students work in teams.
Each team receives a jar and is tasked with finding as many uses as possible.
Examples:
food container;
flowerpot;
vase;
pencil holder;
screw container;
lantern;
mini-greenhouse;
salad in a jar;
candle holder ;
STEAM experiment.
Each team chooses an idea and implements it.

4. Product presentation (5 minutes)

Each group presents their creation and explains:
why he chose that use;
what materials did he save;
what a positive impact it has on the environment.

5. Reflection and evaluation (5 minutes)

Guided discussion:
What did you learn today?
Which of the ideas can be applied at home?
What other objects can have multiple lives?

METHODS
heuristic conversation; brainstorming; discovery learning; project-based learning;

RESOURCES
clean jars of different sizes; markers; colored paper; glue; scissors; recyclable materials; aromatic plants or flowers (optional); worksheet; internet access (optional).

Think circularly!

Look for the objects around you.

Complete the table.

Object	How do you USE it now?	What other use can I give it?	How long can I extend its life?
Jar			
T-shirt			
Carton			
PET bottle			
Yogurt jar			

Class challenge

"10 objects – 50 new lives"

Work in teams.

Choose 10 objects that frequently end up in the trash and find 5 ways each can be reused.

Finally, create a poster or infographic and vote for the most ingenious ideas.

5 WAYS FOR A JAR

1 ORGANIZE

- Pencils and pens
- Caps and lids
- Spices and dried ingredients

ENVIRONMENTAL BENEFIT
We reduce waste and reuse resources we already have.

2 PLANT

- Herbs
- Succulents and cacti
- Seeds for the garden

ENVIRONMENTAL BENEFIT
We extend the life of materials and bring more green into our lives.

3 ZERO WASTE LUNCH BOX

- Salads to go
- Yogurt with fruits and grains
- Soup or leftover pasta

ENVIRONMENTAL BENEFIT
We avoid single-use packaging and reduce daily waste.

4 DECORATE

- Candle holder
- Vase for flowers
- Decorative storage

ENVIRONMENTAL BENEFIT
We get creative and reduce the need for new products.

5 STEAM EXPERIMENT

- Volcano in a jar
- Cloud in a jar
- Observing plants
- Water cycle in a jar

ENVIRONMENTAL BENEFIT
We encourage curiosity and learning through pollution-free experiments.

The mystery of the city buried in garbage

Subject

Selective waste collection – every choice counts!

Duration: 120 min

PURPOSE

Developing environmental responsibility by understanding the importance of selective collection and forming ecological behaviors applicable in everyday life.

OBJECTIVE

At the end of the activity, students will be able to:

- explain the importance of selective waste collection ;
- recognize the main types of waste and the appropriate containers;
- consider the impact of waste on the environment ;
- collaborate to solve challenges;
- come up with solutions to reduce the amount of waste.

DESCRIPTION

The opening story (5-7 minutes)
The Mystery of the City Buried in Trash
The teacher enters the classroom with a large box full of objects (PET, juice box, paper, banana, can, battery, jar, etc.).
He/She tells them:
"Last night I received a mysterious letter..." (See Appendix 1)
The teacher asks:
What would happen if all waste ended up in one place?
Who would suffer?
Do you believe that one person can change something?
Teams are formed.

CHALLENGE
Each student receives a **"Recycling Detective" badge***(Appendix 2)* and is invited to accept the mission to save the city. For each stage, students solve the challenges proposed in **the Recycling Detective Missions***(Appendix 3)* . They must solve the missions to save the city.

Mission 1 – Who am I? (10 minutes)
Students must sort the objects
The answers are discussed.

Brief explanation
The teacher presents the colors of the containers: (Annex 4)
Blue – paper and cardboard
Yellow – plastic and metal
Green – glass
Brown – biodegradable
Black/Grey – residual
Special containers – batteries, light bulbs, WEEE.

Mission 2 – Truth Detectives
Students decide whether the statements are true or false.

Mission 3 – Environmental Detective
Students must identify five objects in the home that can be recycled and explain in which container they should be collected.

Bonus Mission – How do we save the city?
After identifying the main types of waste and learning the rules of selective collection, the teams receive one last challenge from **Verdino** :
"You've managed to restore order to the recycling bins, but the city isn't saved yet. To stop people from producing so much waste, I need your ideas. Can you come up with a rescue plan?"
Each team receives an A3 sheet and makes a poster with the title:
"5 things we can do starting tomorrow to save the city"
Students choose and illustrate five concrete solutions, for example:

- we use a reusable bottle;
- collect waste selectively;
- we reuse objects before throwing them away;
- buy only what we need;
- we avoid single-use plastic products;
- we use textile bags;
- we compost waste vegetable ;
- we participate in greening actions;
- we also explain to others how to recycle correctly.

At the end, each team presents their poster, arguing why they believe the their solutions are important for protecting the environment. The posters can be displayed in the classroom or in the school hallway becoming an awareness campaign carried out by the students.
.

WOW moment
The teacher asks a question:
"If each student recycled just one bottle a day for a year, how many bottles would the class save?"
Students estimate.
Then do the maths.
Example:
25 students × 365 days = 9,125 PETs
Then:
"What if all classes in school did the same?"
Students become aware of the impact.

Reflection

Everyone completes the sentences:
Today I found out that...
What surprised me the most...
From tomorrow I will...

ASSESSMENT
It can be achieved by:
✓ participation
✓ solving worksheets
✓ team involvement
✓OVERVIEW poster
✓responses to challenges

METHODS

Storytelling, conversation, brainstorming, learning through games, investigation, teamwork, role play, reflection.

RESOURCES

images of waste, colored containers (or labeled boxes), cards with different objects worksheet, markers, A3 sheets, glue, timer, short video (optional)

RESULT

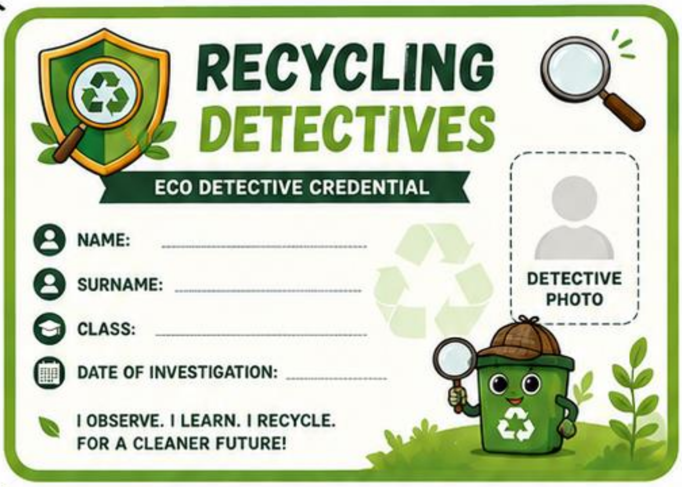
Students :

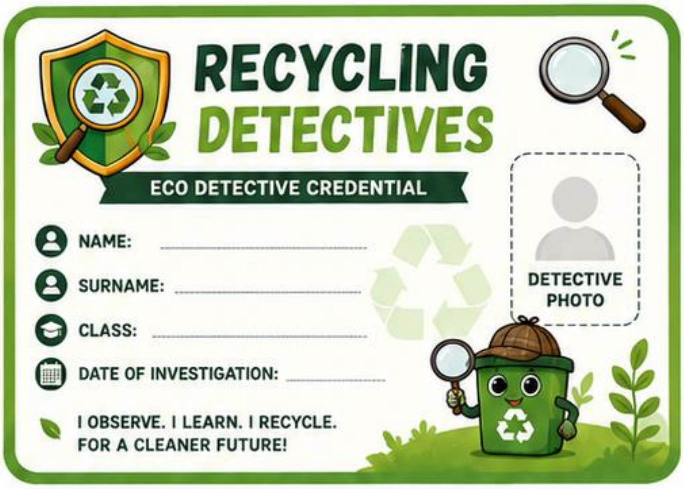
- become familiar with the rules of selective waste collection;
- correctly identify the types of waste;
- become aware of the impact of waste on the environment;
- adopt a responsible behavior;
- pass on the information to other people.

ANNEX 25


Hello!
I am Verdino,
the spirit who is green with nature.
I have an important message for you.
In recent times I have been very sad and I have discovered that all the recycling bins in the city have disappeared.
People throw everything on the ground.
Rivers are starting to look sad.
Animals no longer find food.
Trees are suffocating from plastic.
If things don't change soon and we don't restore order, the city will become a huge mountain of garbage.
But a team of Recycling Detectives can save the city!
Do you think you will be part of that team?
Verdino

ANNEX 26


RECYCLING DETECTIVES
ECO DETECTIVE CREDENTIAL
NAME:
SURNAME:
CLASS:
DATE OF INVESTIGATION:
DETECTIVE PHOTO
I OBSERVE. I LEARN. I RECYCLE.
FOR A CLEANER FUTURE!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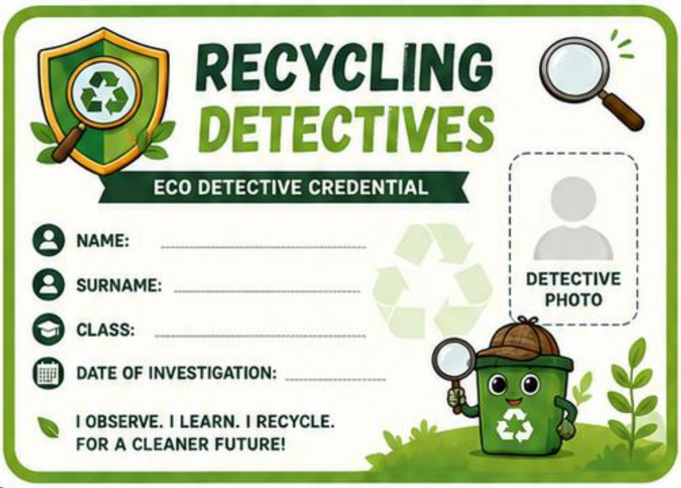
FOR A CLEANER FUTURE!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DETECTIVE PHOTO
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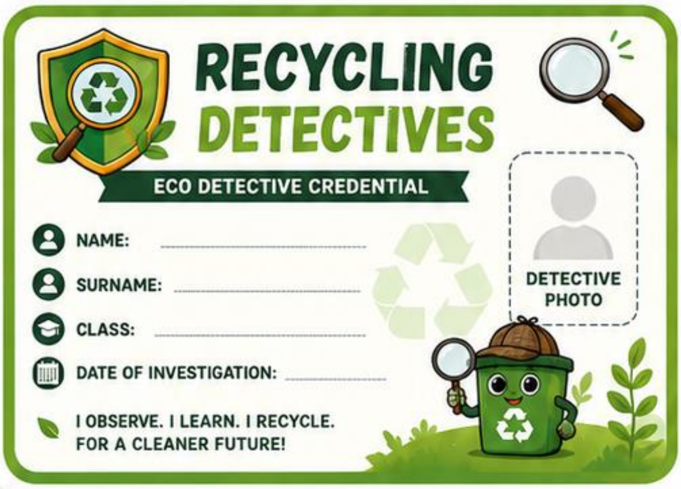
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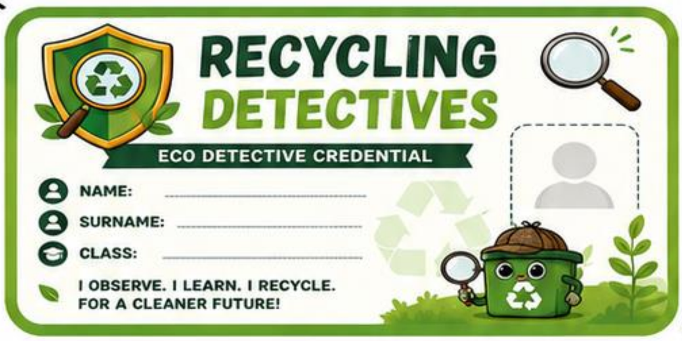
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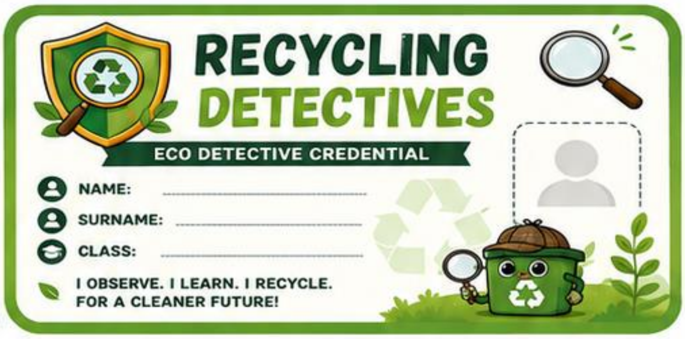
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ECO DETECTIVE CREDENTIAL
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SURNAME:
CLASS:
I OBSERVE. I LEARN. I RECYCLE.
FOR A CLEANER FUTURE!

ANNEX 27

MISSION 1

Where does it go?

Complete: choose the suitable bin for each type of waste.

Waste	Bin
PET	_____
Newspaper	_____
Glass jar	_____
Aluminum can	_____
Banana peel	_____
Light bulb	_____
Batteries	_____
Cardboard box	_____
Yogurt cup	_____
Dirty tissues	_____

MISSION 2

True or False

Mark T (true) or F (false).

1	Plastic takes hundreds of years to decompose.	T	F
2	Glass can be recycled.	T	F
3	Batteries go in the regular trash.	T	F
4	Dirty paper cannot be recycled.	T	F
5	Recycling saves natural resources.	T	F

MISSION 3

Environment Detective

Look around you.
Write down 5 items that you could recycle at home.

1. _____
2. _____
3. _____
4. _____
5. _____

ANNEX 28

The colours were not chosen randomly, but to make them easy to recognise and associate with specific materials. Not all countries use exactly the same colour-coding system. In Romania, the system is largely harmonised with the European one, although there may be minor differences between waste collection operators.

You can explain them as follows:

🟦 Blue – Paper and cardboard

Why blue?

- Blue reminds us of the sky, the air and the white pages we write on.
- It is a colour associated with information, education and communication, areas in which paper is most commonly used.

🟨 Yellow – Plastic and metal

Why yellow?

- Yellow is a highly visible colour and immediately attracts attention.
- Plastic items and cans are among the waste materials most frequently disposed of incorrectly, so the yellow container needs to be easy to spot.

🟩 Green – Glass

Why green?

- Many glass bottles are green (for example, wine or beer bottles).
- Green is associated with nature and the idea of reuse, while glass can be recycled almost indefinitely without losing its quality.

🟫 Brown – Biodegradable waste

Why brown?

- Brown is the colour of soil, dry leaves and compost.
- It suggests the return of organic waste to nature.

⬛ Grey or black – Residual waste

Why grey or black?

- These colours symbolise waste that can no longer be recycled and ends up in landfill.
- They convey the idea that this type of waste should be the last option and kept to a minimum.

🔴 Special containers – Batteries, light bulbs, WEEE

Why are they different?

- These types of waste contain hazardous substances and must not be mixed with other waste.
- Special containers draw attention to the fact that these items require separate collection.

“If you could choose the colours for the recycling bins, would you keep the same colours? Why?”

Students will notice that:

- green matches glass and nature;
- brown reminds us of soil and compost;
- yellow is highly visible;
- blue suggests order and cleanliness.

In this way, students understand that the choice of colours is not random; it is intended to make recycling more intuitive and easier to remember.

Did you know?

“Our brain recognises colours much faster than it reads text. That is why, when you see a green or yellow container from a distance, you know almost instantly what should go into it. Colours help us make the right decisions in just a few seconds.”

LIVING SOIL – COMPOST

ACTIVITY 1: WHAT IS THE SOIL'S STORY?

THE PURPOSE

Students discover the role of soil in nature and human life, understanding that the health of plants, food, and ecosystems depends on the quality of the soil layer.

The lesson aims to foster an attitude of soil conservation and cultivate a more attentive perspective regarding the green spaces around the school and the home.

DESCRIPTION

The teacher brings two or three soil samples to the class: garden soil, sandy soil, potting soil or soil collected from the schoolyard. Without immediately offering explanations, he invites students to look, smell and gently touch the samples, using gloves or chopsticks.

The discussion starts from the question: "If the soil could talk, what would it tell us about how we treat it?". The students formulate short answers, and the teacher organizes them around key ideas: food, water, roots, living things, waste, garden, responsibility.

The class is then given the role of "Researchers of the Living Earth". In teams, students investigate the samples and write down what they observe: color, humidity, smell, texture, plant debris, pebbles, roots or traces of creatures.

At the end, each team formulates a conclusion: "The soil is alive because...". The conclusions are displayed on the board and become the starting point for the compost activity.

METHODS

sensory observation, guided conversation, brainstorming, discovery learning, teamwork, reflection

RESOURCES

soil samples, gloves, magnifying glasses, chopsticks, clear cups, labels, observation sheets, markers, A4 sheets

RESULTS

The students see the soil as an active environment, not as a simple support. They understand that healthy soil means more vigorous plants, richer green spaces, and a more nature-minded community.

ACTIVITY 2: REMNANTS WITH SUPERPOWERS

THE PURPOSE

Students learn to recognize debris that can return to nature through composting and distinguish it from waste that needs to be collected separately.

The activity develops the habit of looking at plant residues as resources, not as useless garbage.

DESCRIPTION

The teacher prepares cards with images or names of leftovers: apple peels, dried leaves, cut grass, coffee grounds, plain paper, eggshells, glossy packaging, plastic, glass, metal, oil or meat scraps.

Students work in teams and are challenged to organize the cards into three areas: "Feeds the soil," "Recycle separately," and "Not suitable for composting." Every choice must be justified by a simple argument.

After sorting, the class discusses the scraps that appear daily at home or at school. The students identify the places where they are lost unnecessarily: the classroom trash can, the kitchen, the yard, the garden or the park.

The activity ends with a rule created by the students: "In the compost we only put what nature can decompose safely."

Nourishes the soil	**Does not go into the compost**
fruit and vegetable peels	plastic, cans, glass
dry leaves and grass clippings	Batteries & Chemicals
crushed eggshells	oil and fats
coffee grounds, plastic-free tea	meat, dairy, very fatty scraps
plain paper, unplasticized cardboard	glossy or brightly coloured packaging

METHODS

classification game, argumentation, analysis, conversation, cooperation, reflection on one's own habits

RESOURCES

worksheet for the classification of waste into the three categories: 'Feeds the soil', 'Recycles separately', “Not suitable for composting”;

RESULTS

At the end, each team creates a mini-rule for compost and sticks it on a common poster titled "Correct Compost Code".

ACTIVITY 3: THE WORKING JAR

THE PURPOSE

Students notice how organic matter begins to transform and understand that decomposition needs air, moisture, the right debris, and time.

The mini-composter becomes a small classroom laboratory, tracked through a diary of observations

DESCRIPTION

Activity Procedure

After investigating the characteristics of living soil and identifying—in the previous activity—organic waste suitable for composting, students move from observation and classification to experimentation.

Working in teams, they build a mini-composter inside a transparent container to track changes in the organic waste over several days. This activity allows them to directly observe a natural decomposition process and understand how organic matter can return to nature's cycle and become a resource for the soil.

Each team receives a jar or transparent container and, using the "Working Jar" worksheet, records the materials used, the order of the layers, and the function they believe each layer serves.

Preparing the Experiment

A thin layer of soil is placed at the bottom of the container.

A layer of dry leaves or plain, non-plasticized paper—torn into small pieces—is added.

Small amounts of chopped plant waste are added: fruit or vegetable peels, grass clippings, or other organic materials previously identified as suitable for composting.

The mixture is lightly moistened, without becoming waterlogged.

Another thin layer of soil is added on top.

The container is labeled with the team's name and the experiment's start date.

The mini-composter is kept in a safe place and observed periodically.

Investigation questions
What changes do we observe after a few days?
Which of the scraps changes its appearance the fastest?
Does moisture appear on the sides of the container? Why?
How do the appearance and smell of the materials change?
What would have happened if we had put plastic in the jar?

How might the material obtained through composting benefit the soil and plants?

Periodic observations are compared with the initial hypotheses. The teacher encourages students to identify changes, seek explanations, and draw connections to what they discovered in previous activities.

At the end of the observation period, each team presents its findings and formulates a conclusion regarding the transformation of organic waste, the cycling of matter in nature, and the role of compost in maintaining healthy soil.

Caution!

The experiment is conducted using small quantities of materials. Avoid using meat, fish, dairy products, oils, and other scraps that spoil easily and can produce unpleasant odors.

Students must wear gloves, avoid tasting or smelling the materials at close range, and wash their hands after the activity. The container should be kept in a safe place.

The jar must not be sealed airtight, as aerobic decomposition processes require air. The container may be covered in a way that allows for ventilation.

METHODS

Observation, experiment

RESOURCES

Transparent containers, organic waste, gloves

RESULTS

Students notice that nature recycles matter through slow processes. They learn to track a change, write down data, compare, and draw conclusions.

Erasmus+
Enriching lives, opening minds.

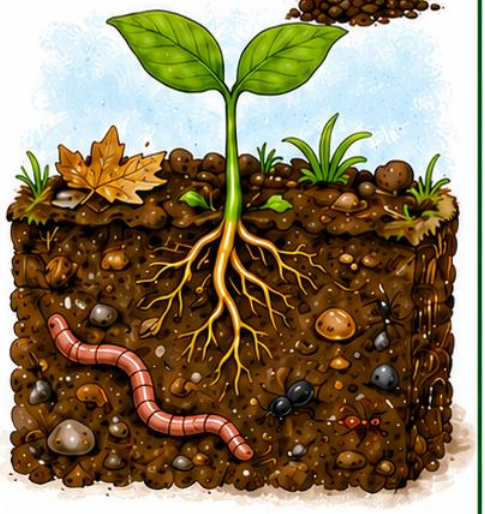
ANNEX

SCH – Sowing Change

LIVING SOIL

Observe carefully, touch gently, compare and record.

Name: _____ Class: _____ Date: _____



1. What story does your soil sample tell?

What do I observe?	My notes
Soil color	
Texture: fine, crumbly, sticky, sandy	
Moisture: dry, damp, very wet	
Smell	
What can I see: roots, stones, pebbles, small insects	
What can grow well in this soil?	

2. Complete the sentences:

- Soil is important for plants because _____.
- Healthy soil is full of _____.
- If we throw waste on the soil, _____.
- To protect the soil, I can _____.

3. Tick what you can find in healthy living soil:

☐ worms	☐ roots	☐ dry leaves	☐ pebbles	☐ small insects
☐ water	☐ seeds	☐ broken glass	☐ plastic	☐ batteries

4. Match each element with its role:

worms	help plants grow and get their food
water	store water and turn into humus
roots	help soil and plants breathe
dry leaves	feed the soil

5. My conclusion: _____

Healthy living soil is full of life and helps plants grow strong!

ANNEX 30

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SCH – Sowing Change

COMPOSTING WITH SUPERHEROES

Turning organic waste into compost

Name: _____ Date: _____

1. YOUR MISSION

Help good waste reach the compost.
This will give soil superpowers and help plants grow stronger.

2. CLASSIFY THE WASTE

Tick only what can become compost.

plastic ☐	banana peels ☐	dry leaves ☐	glass ☐
lettuce scraps ☐	crisp packet ☐	apple cores ☐	coffee grounds ☐
tea bag ☐	batteries ☐	carrot scraps ☐	potato peels ☐
grass clippings ☐	eggshells ☐	green leaves ☐	dried flowers ☐

3. SORT CORRECTLY

GOES IN COMPOST

_____
_____
_____

DOES NOT GO IN COMPOST

_____
_____
_____

4. THE SUPERPOWER OF COMPOST

Compost nourishes the soil.
Organic waste is turned into _____.
Healthy soil helps plants _____.
We do not put plastic in compost because _____.

5. MY GREEN PROMISE

From today, I will use the superpower of waste by...

_____

GOOD WASTE NOURISHES THE EARTH!

Erasmus+
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ANNEX

SCH – Sowing Change

THE COMPOST BIN THAT WORKS

Investigate. Take notes. Build. Draw conclusions.

Team name: _____ Class: _____ Date: _____

1. Mission

Build a mini-composter and observe how nature does its job.

2. Materials used by our team:

_____

_____

_____

_____

_____

3. Organize the layers in the jar:

Layer	What did we put?	Why do we think it is useful?
1		
2		
3		
4		
5		

4. Our team's hypothesis:

After a few days, we think that _____

The fastest to break down will be _____

The compost will be useful because _____

5. Our safety rules:

- we work with gloves;

- we do not taste or smell the materials;

- we wash our hands after the activity;

- we keep the compost bin in a safe place.

Nature works hard, but it turns waste into something useful!

RESOURCE DETECTIVES

PURPOSE

Developing critical and analytical thinking: Students learn to no longer view resources (water, current, money) as something unlimited or abstract, but to quantify and analyze their impact.

Developimg ecological and responsible behavior: Awareness that small daily gestures (a tight tap, a light bulb, packaging) can have impact on the planet.

Developing financial skills: Students understand basic notions about family budget, saving, investment amortization and how to make smart choices when shopping.

DESCRIPTION

Link to the activity: https://share.gemini.google/6AchzkNDHdT7

An interdisciplinary activity that takes the form of a **practical investigative workshop**(design thinking or project-based learning). The activity is designed to be carried out during **1-2 hours of course**(or under the *"School other"/ "Green week" program*), being ideal for teamwork.

Synthesis of activity

- **Target group:** 7th grade (12-14 years)
- Group activity (teams of 4-5 students)
- **Team roles:**
  - *The technician* (analyzes materials and appliances),
  - *The mathematician* (performs calculations and equations),
  - *The designer* (creates sketches and visual solutions),
  - *The spokesman* (presents the conclusions).
- **Necessary materials:** The text of the story ("Resource detectors"), worksheets with mathematical challenges, real energy labels (from home appliances) brought by students or cut out of advertising leaflets, pocket calculators/phones, flipchart sheets and markers.

Stages of the work

1. Capture attention

- The story of Resurselorts is presented through - a quick reading or a short role play. A physical object is brought into the class (for example, an old incandescent bulb and an LED bulb, or a full water bottle and a graduated container).

- Students intuitively identify the problem: *Why does the bulb flicker? How much water do I think is lost if I let the tap drip while I brush my teeth?*

2. Investigation and technological analysis

- Students are divided into teams and receive energy label sheets (A-G) and packaging examples (bulk vs. individual portions). The technological concepts are explained: Consumption in Watts (W), energy efficiency, environmental impact of plastic and material recycling capacity.
- Students analyze the files and objects received. Identifies the materials from which the packaging is made and the efficiency classes of the appliances. Discuss why a class machine *A* is more technologically efficient than a class machine *E*.

3. Solving mathematical challenges

The teacher guides students in the application of mathematical formulas. It monitors teams and provides clues for calculating discount percentages, converting units of measurement (from W to kW, from to mlliters) and calculating costs.

Students work in teams to solve the challenges on the cards:

1. *Calculation of the volume of water lost by* the tap (working with time and volume units).
2. *Led Financial Analysis vs. Incandescent* (calculation of energy consumption in kWhand calculation of the payback time of the investment).
3. *The price-quantity ratio of purchases* (calculating the price per kilogram and applying the percentages to find out the actual discount).

4. Co-creating solutions and drawing up a plan to streamline the school/house

The teacher challenges students to apply what they have learned at the level of their own school or home.

Each team draws a poster with **3 concrete measures**they propose to reduce their carbon footprint and school expenses. They must justify each measure both technologically (what materials/equipment are used) and mathematically (an estimate of the savings achieved).

5. Presentation and evaluation

The teacher coordinates the mini-support of the projects. Provide constructive feedback.

- Spokespeople present the posters in front of the class. Students from other teams can ask questions or come up with arguments against or pro

At the end of the activity, students will play in teams the game X-O created with the help of Claude AI:

https://claude.ai/public/artifacts/3b3d8396-cee2-4bc2-9cb6-83ab2b24b9c0

METHODS

- **Cooperative learning (modified mosaic method or working in small teams):**
  - Students work in teams where each member has a well-defined role. This method develops interpersonal intelligence, negotiation and taking responsibility for the success of the group.
- **Project-based learning (microproject):**
  - The activity ends with the creation of a poster (sketch/infographic) with solutions for optimizing consumption. Students apply elements of technological design and mathematical calculation to propose a "real plan" of savings.

Methods of stimulating critical thinking and evaluation

- **Role play:**
  - Students assume the role of resource detectives, which gives them a professional perspective on everyday problems and increases their self-esteem.
- **Tour of the Gallery (for the final phase):**
  - The posters made by the teams are displayed on the walls of the class. Students rotate to examine the work of their peers, leaving comments, questions or appreciations on stickers (post-it). This method provides a formative, interactive and constructive assessment.

RESOURCES

Material resources:

- **Resource Detective package (for each team):**
  - Printed worksheet (with story text and mathematical challenges).
  - A sheet of flipchart or cardboard A3 (for drawing the poster/efficiency measures).
  - Writing and coloring tools (markers, markers, ruler).
- **Demonstration kit (brought by teacher or students):**
  - An old incandescent bulb and an LED bulb (to observe the constructive differences in design and temperature during operation).

- Real packaging brought by students (a box with individual plastic portions vs. a large bulk bag).
- A syringe 5 ml or pipette and a measuring cup (to physically demonstrate what a drop of means 0,05 ml).

- **Calculation tools:**
  - Computers or mobile phones (used exclusively for mathematical operations in the sheet).
- **Colorful post-it:**
  - For the feedback session at the end (the "Gallery Tour" method).

Digital and multimedia resources (optional for lesson extension)

- **Online applications and simulators:**
  - *Calculator de amprentă ecologică:* https://www.footprintcalculator.org/en/quiz/0/food/category where students can calculate their own household resource consumption.
  - *Simulatoare de circuite:* **PhET Interactive Simulations** https://phet.colorado.edu/en/simulations/filter?subjects=work-energy-and-power,light-and-radiation&type=html https://phet.colorado.edu/en/activities/4656

- **Short videos:**
  - ClipYouTube: Everything you need to know about a LED https://youtu.be/6uMi5nqd6-c?si=zP2qodEL61IRtKl2 bulb
  - Saving resources: https://youtu.be/6uMi5nqd6-c?si=zP2qodEL61IRtKl2

RESULTS

1. Cognitive and curricular results (what students know at the end of the activity)

- **Applied Mathematical skills:** Students know how to quickly convert units of time and volume, calculate energy consumption using the formula $E = P \cdot t$, and apply percentages to calculate reductions or financial losses.
- **Technological understanding:** Students can read and interpret an energy efficiency label (A-G classes) and understand the constructive and consumption difference between various technologies (incandescent bulb vs. LED).
- **Systemic thinking:** Students link the causal relationship between individual behavior (a tap allowed to drip) and the global ecological impact (millions of gallons of drinking water wasted in a community).

2. Functional and practical results (what students can do)

- **Performing a quick audit:** Students become able to analyze energy and water consumption in their home or school and propose corrective measures.
- **Smart purchasing decisions:** Know how to compare two similar products with different packaging and calculate the price per unit of measure (kg/liter) to avoid marketing pitfalls.

- **Effective teamwork:** Develops skills for negotiation, task delegation and public presentation of a project with scientific and mathematical arguments.

3. Attitudinal and behavioral results (how their mentality changes)

- **Moving from passivity to action:** Students no longer see ecology as an abstract topic in the news, but as a series of concrete mathematical actions that they can control.
- **Early financial responsibility:** Develop an increased respect for the family's financial resources, realizing that saving natural resources also means saving money.
- **Environmental empathy:** Increases awareness of the value of drinking water and clean energy.

Added Value within the Erasmus+ Project

The activity is in direct correlation with the European priorities: It transposes directly into the classroom the EU objectives of climate neutrality and circular economy. Students not only hear about European policies, but apply them on a micro level.

The activity promotes eco-responsible behavior among students, making them good practice multipliers in their local and European communities.

Worksheet: RESOURCE DETECTIVES

Team name: _____

Class: 7th ____

Date: _____

Chapter 1: The Alarm in the Kitchen

Read the story below carefully, then solve the math challenge with your team!

Mina and Matei, two seventh grade classmates, were sitting at the kitchen table trying to sketch a project for the school. On the table, an old, incandescent bulb flickered tired, and the sink tap dripping rhythmically: *Pic... pic... pic...*

Did you know that waste is not only ugly, it also has a mathematical formula? Matthew asked, spinning a pencil on his fingers.

Mina, passionate about technological design and environment, looked up from her sketches:

“What do you mean?” The waste is just... negligence. From a technological point of view, it means that our systems are not optimized.

It is pure mathematics! Matthew insisted. Look at that tap. It drips about a drop per second. One drop is about **0.05 ml**. Let’s calculate how much water we lose in a single month (30 days) if we don’t fix it!

Mathematical Challenge No. 1: The Loop Tap

Help Mina and Matthew calculate the amount of water lost! Use the space below for calculations.

Problem data:

- Droplet frequency: 1 drop per second.
- Volume of a drop: 0.05 ml.
- Estimated duration: One month.
- It is considered a 30-day month.
- Note: **1 liter = 1000 ml**

Calculates:

1. How many seconds does a day have?

Resolve:

(Write the formula and result)

.....

.....

2. How many milliliters (ml) of water are lost in a whole day?

Resolve:

(Use the above result and the volume of a drop)

.....

.....

3. How many liters of water are lost in one day?

Resolve:

(Turns milliliters into liters)

.....

.....

4. How many liters of water are lost in a month (30 days) due to this tap?

Resolve:

.....

.....

Final answer: In a month they lose _____ liters of water.

Think about it: A regular bottle of water has 2 liters. How many of these bottles have been leaked into the sewer in a month because of that unrepaired faucet?

_____ bottles.

Mathematical Challenge 2: The task of compacting PET

After solving the problem of the tap, Mina opened the cabinet under the sink and sighed:

Look at the plastic recycling bin. It is full of eyes with plastic cans (PET) thrown whole. The air takes up almost all the space. Technologically, uncompacted waste transport means trucks carrying mainly air, increasing the carbon footprint by more than 70%.

We can prove it mathematically. He proposed Matthew. Let's calculate the volume saved by compaction (pressing).

Problem data:

- Matthew's family consumes and throws out **an average of 30 plastic bottles (PET)**a month.
- Each uncompressed PET bottle occupies an estimated **1.5 liters of space (volume) in the trash.**
- If the glass is correctly compacted (pressed with the foot or with a special device before throwing), its volume decreases by **80%.**

Calculates:

1. What is the total volume (in liters) occupied by the 30 uncompressed bottles in the trash?

Resolve:

……. …….

……. …….

2. How many liters is the 80% volume reduction for a single bottle by compaction?

Resolve:

……

……

3. What is the new volume (in liters) of a single bottle after it has been compacted?

Resolve:

……

……

4. What will be the total volume occupied by the 30 compacted bottles in the trash?

Resolve:

……

……

5. Think about the saved space:

If the recycling bin has a capacity of **45 liters**, how many times should the bin be emptied in a month if the bottles were uncompacted vs. if they were compacted?

- Number of empties (uncompressed): _____
- Number of empties (compacted): _____

Math challenge #3: The math behind the trash

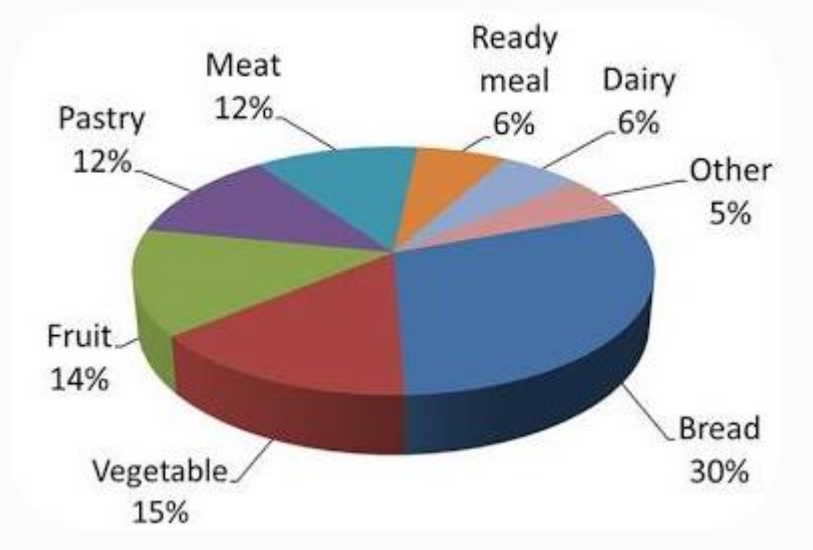
At lunch, Mina looked sad at the leftover food in the plates.

Every year, tons of food go to the trash directly from our homes. In addition to wasting food, we also waste all the technological resources used to produce it: fuel for tractors, water for irrigation, energy from factories and packaging.

Matthew quickly searched the tablet for a study about food waste in households and found a circular diagram showing what types of food people throw away most often.

Distribution of food waste:

- **Cooked food:** 6%
- **Bread and bakery products:** 30%
- **Fresh fruits and vegetables:** 29%
- **Dairy products:** 6%
- **Meat and sausage:** 12%
- **Other:** 5%



Calculations:

An average household throws away about **16 kg of food every month**. Using the percentages above, it responds to the following requirements:

1. How many kilograms of cooked food and bread are lost each month in this household?

Solution (cooked food + bread = _____ % of total):

.....

.....

2. Calculate the exact amount (in kg) of fresh vegetables and fruits wasted in a year (12 months) of a single family.

Resolve:

.....

.....

3. If a family reduced the waste of dairy products by half (50%saving on discarded dairy), how many pounds of dairy would they save in a month?

Resolve:

……

……

4. Technological education challenge:

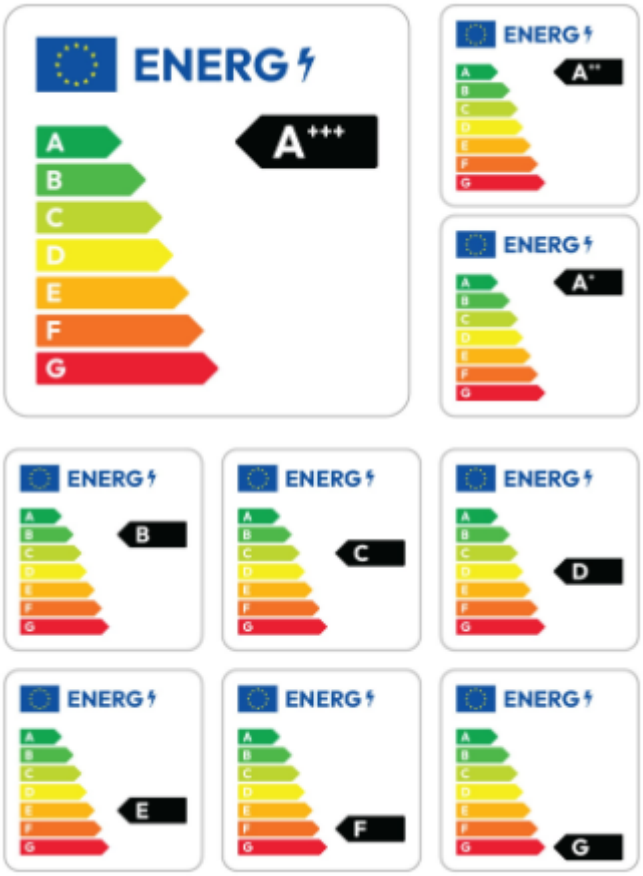
What do you think is the main technological or organizational cause for which vegetables, fruits and cooked food have the highest percentage of waste? How would the correct use of the refrigerator (organizing by temperature zones) or planning shopping help?

……

……

Worksheet No. 2

Energy labels are essential to understand how effective a home appliance is. In the European Union, the labeling system has been simplified in recent years, moving from the old classes with pluses to **A clear scale from A**(most efficient, dark green) to **G**(least efficient, red).



Examples of **technical and consumer data sheets for 4 of the most common household products**, structured exactly by current labeling standards.

1. Refrigerator/ freezer

Refrigerators operate non-stop, so the energy class has the biggest long-term impact on your current bill.

Parameter on the label	**Value/ Details**	**Importantance**
Energy class	**C** (on the new A-G scale)	Very effective for a machine that works permanently.
Annual consumption	**140 kWh / an**	Estimated average consumption based on standard tests.

Parameter on the label	Value/ Details	Importantance
Freezer compartment capacity	**100 liters**	Useful storage volume for frozen food.
Capacity fresh produce compartment	**220 liters**	Useful volume for the refrigerator itself.
Noise level	**35 dB (Class B)**	Extremely quiet (ideal for open kitchens).

2. Washing machine

Unlike refrigerators, the consumption of the washing machine is calculated for **100 washing cycles**(Eco program 40-60), not per year.

Parameter on the label	Value/ Details	Importance
Energy class	**A**	Maximum performance in terms of electric consumption.
Power consumption	**49 kWh / 100 cicluri**	Calculated on the basis of the eco program.
Maximum capacity	**9.0 kg**	Maximum dry weight for one cycle.
Water consumption	**48 liters/ cycle**	Water consumption per wash in the eco program.
Efficiency at squeezing	**Class B**	The percentage of moisture left in clothes after squeezing.
Centrifugal noise	**71 dB (Class A)**	Noise level during the loudest phase.

3. TV/ Monitor (devices with screen)

The screen label includes 1000-hour power consumption and differentiates simple (SDR) consumption from advanced color and brightness (HDR) consumption.

Parameter on the label	Value/ Details	Importance
Energy class (SDR)	**E**	Large and bright screens have quite a high consumption.
Power consumption (SDR)	**55 kWh / 1000h**	Standard consumption at normal viewing.
Energy class (HDR)	**G**	HDR (High Dynamic range) mode consumes much more power.
Energy consumption (HDR)	**85 kWh / 1000h**	HDR content consumption (games or compatible films).
Screen size	**139 cm / 55 inches**	Screen diagonal
Resolution	**3840 x 2160 pixels**	Screen resolution (4K UHD).

4. Dishwasher

Standard measurements for the eco setup/100 cycles

Prameters on the label	Value/ Details	Importance
Energy class	**C**	Excellent cost – consumption balance
Energy consumption	**75 kWh / 100 cycles**	Power consumption for the Eco setup
Capacity (Sets of dishes)	**14 sets**	How much room has the dishwasher got

Prameters on the label	Value/ Details	Importance
Water consumption	**9.5 liters / cycle**	Much more efficient than hand washing (which need more than 40 liters)
Duration for Eco	**3 h 55 min**	Eco setups last longer but use less warm water
Noise levels	**42 dB (Class B)**	Extremely silent

JEOPARDY CHALLENGE

THE PURPOSE

The purpose of the Erasmus+ JeopardyLabs Mini Quiz is to reinforce students' knowledge of the partner schools, cities, and countries involved in the Erasmus+ project through an engaging and interactive game-based learning experience.

DESCRIPTION

Link to the activity: JeopardyLabs – Mini Quiz 43

The **Jeopardy Challenge** is an interactive educational activity designed to consolidate students' knowledge about the partner schools and the countries involved in the Erasmus+ project. Inspired by the popular television quiz format, the activity transforms factual learning into an engaging competition where participants collaborate, discuss, and make strategic decisions.

Before the game begins, students are divided into mixed-nationality or mixed-class teams of four to six members. Each team chooses a name and appoints a spokesperson responsible for giving the final answers. The facilitator briefly explains the Jeopardy rules, including the point system, the time allowed for discussion, and the scoring procedure.

The game board contains several categories representing the Erasmus+ partner cities and countries:

- Istanbul (Turkey)
- Novi Sad (Serbia)
- Lalín (Spain)
- Varaždin (Croatia)

- Panevėžys (Lithuania)

Since the game is proposed to be played in Arad, Romania as a category is not included.

Each category includes five questions with increasing difficulty, worth 100, 200, 300, 400, and 500 points respectively. Easier questions focus on basic geographical knowledge, while higher-value questions require a deeper understanding of cultural traditions, historical landmarks, architecture, festivals, languages, and regional characteristics.

Teams take turns selecting a category and a point value. After the facilitator reads the question aloud, teams are given approximately 30 seconds to discuss possible answers. The spokesperson provides the team's response. Correct answers earn the selected points, while incorrect answers receive no points, allowing other teams the opportunity to answer if desired.

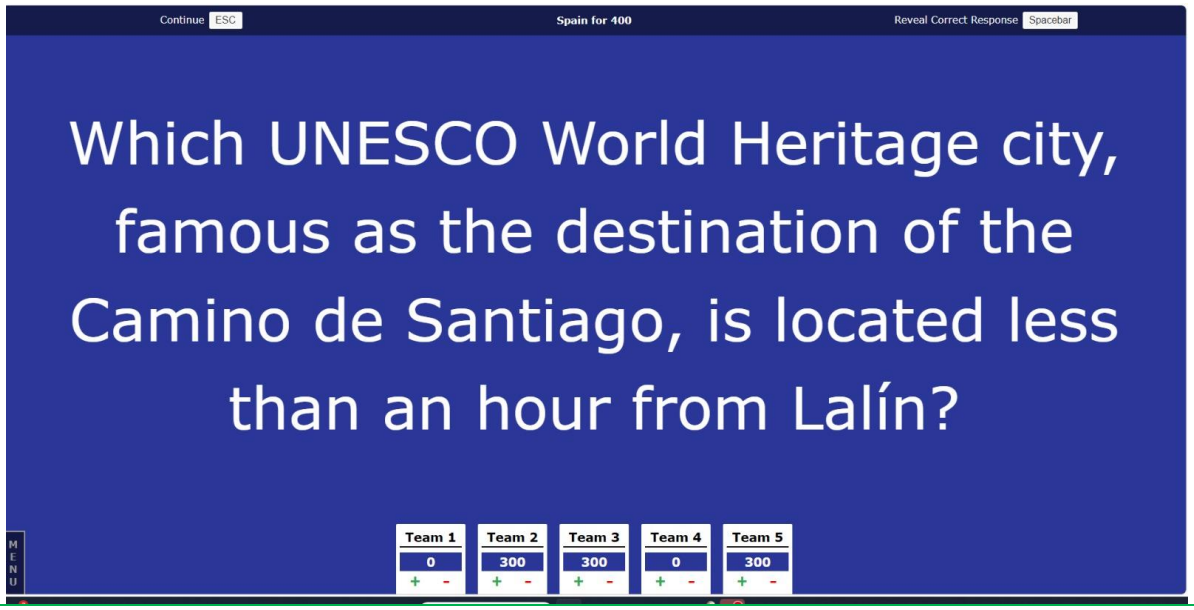
Throughout the activity, the facilitator enriches the experience by providing additional cultural information after each question. Instead of simply confirming the correct answer, short explanations are offered about monuments, traditions, historical events, festivals, local cuisine, natural landscapes, or educational institutions connected to each location. This transforms the game from a simple quiz into an authentic intercultural learning experience.

As the game progresses, students naturally compare similarities and differences among European regions, discovering common values while appreciating cultural diversity. The competitive aspect maintains a high level of engagement, whereas teamwork encourages communication, negotiation, and shared decision-making.

The activity concludes with the announcement of the winning team and a short reflection session. Students are invited to discuss:

- Which country surprised them the most.
- What new facts they learned.
- Which places they would like to visit.

- How cultural knowledge helps build stronger international friendships and successful Erasmus+ partnerships.



THE METHOD

- Gamification
- Cooperative learning
- Quiz-based learning
- Peer collaboration

RESOURCES

- Digital tools: JeopardyLabs
- Projector
- Interactive whiteboard
- Large screen with internet access.

RESULTS

At the end of the activity, participants will be able to:

- identify the Erasmus+ partner countries and cities;
- recognize important cultural and historical landmarks;
- describe distinctive traditions and geographical features of each partner region;
- demonstrate increased intercultural awareness;
- communicate effectively within an international team;
- make informed decisions collaboratively under time constraints;
- appreciate European cultural diversity and shared values.

Added Value within the Erasmus+ Project

This activity goes beyond testing factual knowledge. It creates a dynamic learning environment where students revisit experiences from Erasmus+ mobilities, strengthen their sense of belonging to the project, and celebrate the cultural richness of Europe. By combining digital tools, collaborative learning, and friendly competition, the Jeopardy Challenge promotes active participation, motivation, and meaningful intercultural dialogue, while reinforcing the key objectives of the Erasmus+ programme: cooperation, inclusion, cultural exchange, and lifelong learning.

NATIONAL HIGH SCHOOL OF INFORMATICS

LN ARAD

Sowing Change

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