

refe

reducing the
ecological footprint
through eco-awareness



The student workbook
on
environmental education
for the 6th grade



The Mathematics and Natural Sciences Discipline

Supported by:



on the basis of a decision
by the German Bundestag



The student workbook on Environmental Education

Auxiliary material proposed for the 6th grade,
for the subject Environmental Education,
discipline of Mathematics and Natural Sciences

Approved by the Romanian Ministry of Education by Order no. 5358 of 01.05.2022 - 2022
auxiliary approval

Material created within the European project
"Reducing the ecological footprint through
eco-awareness (REFE)"



refeproject.eu

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reducing the
ecological footprint
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The student workbook on Environmental Education

**Auxiliary material proposed for the 6th grade, for the subject Environmental Education,
discipline of Mathematics and Natural Sciences**

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"The education of the child shall be directed to the development of respect for the natural environment" (Art.29, Convention on the Rights of the Child)

Environmental education aims to promote fundamental knowledge of various aspects of the environment and to develop in students the attitudes and skills necessary for responsible behaviour towards the environment in which they live. Therefore, environmental education in schools must be a constant concern and be introduced in several types of activities.

The student workbook on environmental education encourages students, individually or in teams, to explore and understand issues such as recycling, food waste, sustainable development, energy saving, ecological footprint etc., to be aware of the need to protect nature and use natural resources as rationally and efficiently as possible.

The student workbook on environmental education is made up of 14 units developed around important environmental topics that identify various elements of the environment, their problems and solutions: sustainability, resources, issues related to soil, water, biodiversity, energy, transport, food, clothing, reduction, reuse, recycling, and ecological footprint. Each unit contains curiosities, useful information related to the topic, as well as practical, interactive activities that help students to become familiar with, reinforce, or deepen their knowledge and, above all, to develop environmentally friendly behaviour. Students can go through all the activities or choose the ones that suit their interests. They are engaged in a wide range of enjoyable and interesting activities that take into account their age and interests: quizzes, surveys, experiments, debates, discussions, games, projects, etc., designed to inspire pupils to protect and care for the environment. The proposed activities help students to realise the important role the environment plays in our lives, to appreciate and respect nature, and prepare them to become responsible citizens who act promptly in the community and for the good of the community. Students are encouraged to express their own views through a variety of means, such as writing, drawing, or film, and the products are made popular within the school or community. Each unit ends with a self-assessment test of knowledge accompanied by the answer key.

The resource provides opportunities for students to get informed, investigate, and find answers and solutions for sustainable development.

The workbook can be used not only by subject teachers, but also by other teachers and tutors as needed, providing them with useful materials that can be selected and adapted to any context: environmental topic classes, guidance/counselling classes, environmental education clubs, and excellence clubs. These materials aim to develop active communities of students involved in environmental

protection. The activities, which raise awareness of what a cleaner, better, and more sustainable world looks like, help teachers instil in students a love of nature that is also promoted among their families and friends and develop positive, responsible behaviour towards nature.

The Authors

1

Fun facts & Did you know that...

In 2016 the United Nations adopted the 17 Sustainable Development Goals, which aim to improve quality of life, conserve resources and address climate change.

Humanity has consumed more resources in the last five decades than all our ancestors throughout history.

71% of the earth is covered by water but only 2.5% is freshwater and only 1% of that is drinkable. Water scarcity will displace 700 million people by 2030.

Human beings use almost all kinds of resources in nature. Some resources are unlimited, and some are scarce.

Renewable energy sources (wind, solar, hydropower, ocean energy, geothermal energy, biomass* and biofuels) are alternatives to fossil fuels (coal, oil, natural gas). They help reduce greenhouse gas emissions, diversifying energy supply and reducing dependence on uncertain and limited fossil fuel markets, in particular oil and gas.

Humanity's demand for renewable resources remains at 68% higher than what the planet can provide.

68% of the world's population lives in ecologically deficient countries, where people demand more from the environment than the environment can provide.

Introduction to ecology and sustainability

Ecology, sustainability, resources



* Biomass includes all forms of plant and animal material, the organic component of nature, the biodegradable part of products, wastes and residues from agriculture, including plant and animal substances, forestry and related industries. Biomass is considered one of the main forms of renewable energy (Decision No 1844 of 22 December 2005).

Reflect: Which statement has surprised you the most? Why?



1

Useful information

What is ecology? What is sustainable and what is not? Why is sustainability important? In this chapter we want to start by defining ecology, sustainability and other additional terms.

What is ecology? What is sustainability?

The growth in the human population (from 2 billion in 1920 to 7.497 billion in 2022) and the development of human societies have put pressure on the environment and its resources. There have been changes in the proportion of natural and semi-natural ecosystems (reduction of forest ecosystems, increase in agricultural areas), increased material and energy consumption, increased waste flows, pollution of the atmosphere and the hydrosphere.

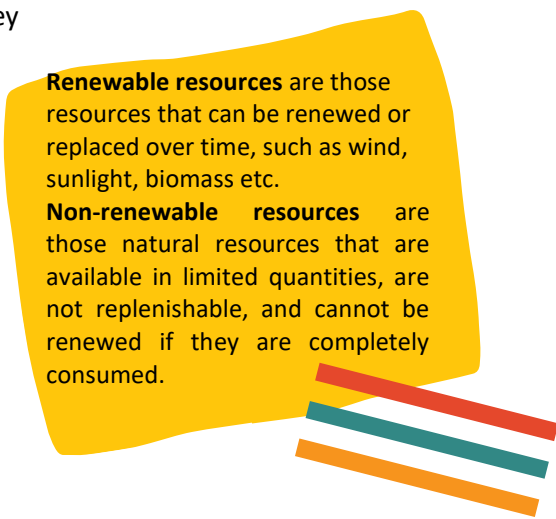
Ecology is emerging as a necessity. It is a branch of biology that studies the interaction between living organisms and their environment. Ecology is a very complex science based on respect for nature, **aiming to reduce** human impact on the environment and protect natural resources. In today's world, sustainable resource management is vital. Sustainability is about meeting all of humanity's present needs without compromising resources for future generations.

Sustainability has three dimensions or pillars: environmental, social and economic, which are interdependent and essential for a functioning society. Nature and natural resources underpin people's social and cultural life.

What are natural resources?

The term sustainability is closely linked to the term resource. A resource is a means to an end. If our goal is to eliminate hunger, then cereals, fruit, vegetables etc. are our resources. But in order to grow them we need the water and soil resources. In addition to these resources, we also need energy, which is obtained from various other resources.

Resources are often only available in small quantities because they are scarce or used on a large and diverse scale. Agricultural land is scarce because it is needed not only for growing vegetables, but also for growing animal feed, for biofuels and for plant fibres, which are essential for making clothes. For a long time, resources such as air and water seemed to be unlimited. But these resources are becoming increasingly scarce because of exhaust gases and environmental pollution. A person's activity uses both renewable and non-renewable natural resources.



Renewable resources are those resources that can be renewed or replaced over time, such as wind, sunlight, biomass etc.

Non-renewable resources are those natural resources that are available in limited quantities, are not replenishable, and cannot be renewed if they are completely consumed.

1. Choose the best option from the words written in italics:

Why is sustainability important? Sustainability is about *meeting/selecting*¹ all of humanity's current needs without depleting *natural/economic*² resources or destroying the environment. The Earth's resources are limited, so they must be used in a *pleasant/responsible*³, sustainable and economical way. These resources will also be essential for future generations. The concept involves establishing strategies to reduce the adverse *effects/conditions*⁴ of our activities that can negatively influence the environment. The concept is based on a *message/balance*⁵ between economic growth, environmental protection and finding alternative resources. We will need newly invented materials, new sustainable resources, or natural resources that we can replace quickly and easily. *Sustainable/selective*⁶ development is everyone's responsibility, the responsibility of all mankind, not just organisations or economic operators. Sustainability is a solution for any person or organisation to make *organisational/environmental*⁷ decisions without negative impact on the community and society.

2. Match the definitions with the concepts



1. Ecology	a. It deals with resource management, trade and transport
2. Sustainability	b. A branch of biology that studies the interaction between organisms, plants and their environment
3. Natural resources	c. Development that meets current needs without depleting the available resources and without destroying the environment, and therefore without compromising meeting the needs of future generations
4. Ecosystem	d. Water that consumed directly or used for the preparation of food does not endanger human health
5. The environmental pillar of sustainability	e. It is about access to education, social mobility and eradicating extreme poverty
6. The social pillar of sustainability	f. It is about the environment and its resources
7. The economic pillar of sustainability	g. Materials that originate in nature and that humans have used to survive and evolve.
8. Potable water	h. The set of living organisms (biocenosis) that are related to each other according to the physical environment in which they develop (biotope)

1

Practical activities

3. Anagrams. Arrange the letters in the following combinations to find words related to the topic of this chapter:

1.aebntulisas	s
2.blopeta	p
3.ouecresr	r
4.swtea	w
5.ictnonmpuso	c
6.rlpila	p
7. mennteivnor	e



4. Specify which type of resource defines the following: renewable (R) or non-renewable (N).

1. Natural gas	R/N
2. Sunlight and wind	R/N
3. Coal	R/N
4. Minerals	R/N
5. Wood	R/N
6. Crude oil	R/N
7. Nuclear energy	R/N
8. Arable land, grassland and pastures	R/N
9. Oxygen	R/N
10. Iron ores	R/N

5. Read the following statement and complete the table with the components and characteristics of each dimension or pillar of sustainability:

Sustainability promotes the idea that natural resources are finite and that our role is to conserve them, use them wisely, and make sure they are sufficient for those who will come after us. This means that a society is sustainable if it is responsible, focused on protecting the environment, and the balance among its various (eco)systems. What are *the three pillars of sustainability*?

The ecological pillar includes both nature, i.e., the environment, and natural resources. It is based on reducing the carbon footprint, using raw materials economically, avoiding water, air, or soil pollution, and managing waste correctly. *The social pillar* focuses on local and individual lifestyles, consumption ethics, social inclusion through healthcare, access to education, social mobility, and the eradication of extreme poverty.

The economic pillar includes resource management, trade, and transport. A green economy "improves well-being and social equity while significantly reducing environmental risks and ecological deficits." This economy does not grow at the expense of environmental degradation.

The environmental pillar of sustainability	The social pillar of sustainability	The economic pillar of sustainability



1

Practical
activities

6. Read the following text and then decide whether the statements below are true or false:

Renewable resources are resources that can be renewed or replaced over time, such as wind, sunlight, biomass, etc. Some renewable resources are continuous resources, such as wind and solar energy, while others have a renewal or replenishment time, such as wood, oxygen, etc. Renewable resources are generally living resources (fish, forests, etc.) that can replenish themselves if used rationally. If renewable resources are consumed at a rate that exceeds their natural rate of replenishment, they will diminish and then run out. The rate that can be sustained by a renewable resource is determined by the rate of replenishment and the size of that resource's availability.

Natural resources are all mineral and ore deposits, arable land, forests, and water. Natural resources occur naturally. Natural resources are classified into renewable and non-renewable resources.

Non-renewable resources are those natural resources that are available in finite quantities, are not replenished, and cannot be renewed if they are fully consumed. Resources that replenish very slowly are also considered non-renewable resources because they will only become available again after a very long period of time. Fossil fuels (coal, oil and natural gas) are such an example. Fossil fuels are produced by the degradation of animal and plant matter. Their rate of production is very slow compared to the rate of extraction and consumption. Our society is highly dependent on non-renewable resources, our main source of energy. Taking centuries to regenerate, there is always the fear of depletion of these resources due to overuse.

True or False:

1. Renewable resources are those that can be used again.
2. Biomass, oxygen, water, sunlight are common examples of renewable resources.
3. Animal resources together with plants are also classified as renewable. One of the most important tasks of our time is to preserve biological diversity.
4. Cultivated land, which provides 88% of mankind's food, is a non-renewable resource.
5. Non-renewable resources are resources that are replenished on a substantial scale.
6. Non-renewable resources have a decay rate lower than the consumption rate.
7. The rate of consumption of non-renewable resources is lower than the rate of production by natural processes.
8. Non-renewable resources are found deep in the ground and take centuries to regenerate.

7. A person uses both renewable and non-renewable natural resources in his or her activity.

What resources do you use? Discuss as a group and present the results to the class.

Do you use these resources responsibly?

Set rules for responsible use of resources.



1

Practical activities

8. How do we reduce consumption pressure on resource reserves? Match the rule (reduce, evaluate, save, substitute, recycle) with its definition. Then illustrate (with an example, drawing, photo, video) how you would apply these golden rules in your life.

1.....: we should not consume more than we need.

2.....: it is necessary to extend the life of the materials and reuse them or reuse only some of the elements of the products for another purpose.

3.....: we should replace the main resources with alternatives that offer greater efficiency and have less environmental impact.

4.....: we should change the way we satisfy some wants or needs with goods and services that require less input of resources.

5.....: we should reflect on the consequences of our activities in order to make the best decisions, respecting and appreciating the resources at our disposal.

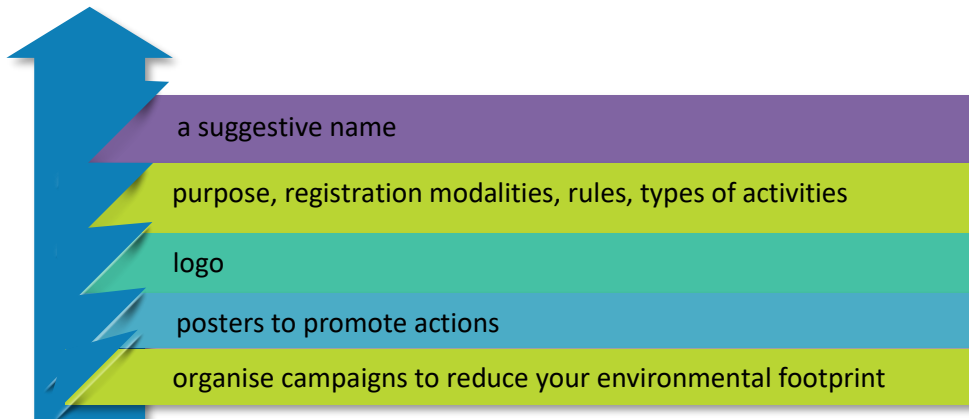
9. Go to the website <https://www.worldometers.info> twice, one month apart. Write down the data for the environment. What changes can you notice after one month? What could you do? In pairs, write a tweet about how you could take action.

10. Write a HAIKU on environmental topics. A haiku has 5 syllables in the first line, 7 in the second and 5 in the third. It must contain a word naming an element of nature. Example:

The ecology
Cleans my beautiful planet
Choked on so much dust

Our nature dies
If between us and the sun
Are only smoke clouds

11. Organise an environmental club in your school. Establish and present your suggestions to the Student Council:





Introduction to ecology and sustainability

Ecology, sustainability, resources

1. What is ecology?

- a. A branch of biology that studies the interaction between organisms, plants and their environment.
- b. A branch of biology that studies the dependence of organisms, plants on their environment.
- c. A branch of biology that studies the interaction between plants and the environment in which they live.

2. What is sustainability?

- a. The development that meets the current needs of human societies
- b. The development that meets present needs without depleting available resources and without destroying the environment
- c. The development that meets present needs while limiting consumption

3. A sustainable society focuses on:

- a. environmental protection
- b. the balance between its various (eco)systems
- c. both

4. What are not non-renewable resources?

- a. coal, oil and natural gas
- b. iron ore
- c. land and water

5. Which of the following are not fossil fuels?

- a. natural gas
- b. forests
- c. coal
- d. oil

6. Natural resources are those riches found on the surface or underground of a given territory that are exploited for the development of human society. Which of the items below are not natural resources?

- a. oil, coal, forests
- b. pastures, meadows and waters
- c. infrastructure

7. What are renewable resources?

- a. renewable resources
- b. resources that can be replaced over time
- c. both

8. What are non-renewable resources?

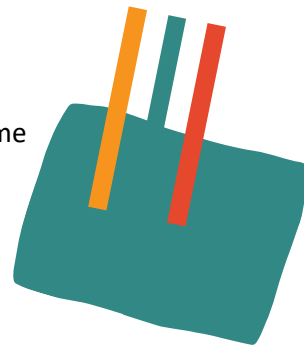
- a. renewable resources
- b. resources that are available in finite quantity, not replenishable
- c. are available in infinite quantity

9. Give three examples of non-renewable resources

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

10. Which of the items below are not renewable energy alternatives to finite fossil fuel resource?

- a. wind energy
- b. solar energy
- c. hydropower
- d. ocean energy
- e. geothermal energy
- f. oil
- g. biomass
- e. biofuels



2

Fun facts & Did you know that...

Environmental issues

Forest



Romania is home to much of Europe's virgin forest? Practically 65% of Europe's remaining virgin forests are in Romania.

Virgin and near-virgin forests currently account for 2-3% of Romania's forests.



A beech or fir tree can be up to 450-500 years old.

The oldest tree in Romania is an oak and it is over 900 years old. The tree, called the "old man of the Carpathians", is located on the outskirts of the village of Mercheaşa in Brasov county.



Europe's largest beech forest is in Semenic National Park.

From 1.8t CO2 input as raw material in the photosynthesis of trees, 1t of woody biomass is obtained.

**March 21 is
International Forest
Day**

Reflect: Which statement has surprised you the most? Why?

Let us take you on a short journey into the structure of wood. At the end of this journey you will see that wood is not just a solid, impenetrable piece but one of the materials with the finest internal structure, a real factory, with cells working to give it life.

Structure of wood - The **structure of wood** refers to the way in which the various anatomical elements that make up the wood are grouped together. Wood has a **microscopic** structure, in which we distinguish cells of different shapes and sizes, and a **macroscopic** structure. Growth rings, also known as tree rings or annual growth rings, can be seen at each cross-section of a tree trunk. Researchers have found that trees and shrubs in temperate and cold areas add a growth ring every year. They indicate the age of the tree.

The forest – a complex natural ecosystem. The forest, the most complex natural ecosystem in the terrestrial environment, is made up of *abiotic* (environmental) and *biotic* (living things) *factors*.

Forest functions (C. Chiriță, 1981) can be classified into three main groups, with specific subgroups:

Production function: plant biomass and animal biomass

Environmental protection function: hydrological, anti-erosion and climatic.

Protective social functions: sanitary - hygienic, recreational, aesthetic - landscape and scientific.

What does a virgin forest mean?

"The virgin forest is a creation that has been perfected over a long period of time, exclusively under the action of the processes of natural laws and in which man has not intervened in any way. The virgin forest reflects the perfection of nature..." (Biriș and Doniță, 2002).

When you visit a virgin forest, you practically have the opportunity to see with your own eyes **the magic and architecture** of nature, which self-regulates and self-perpetuates.

Virgin forests do not need classical forest management because they have **their own internal balance**. Even dead wood makes an important contribution to maintaining and regenerating the ecosystem.

Characteristics of virgin forests. **Naturalness** determined by:

species composition and natural distribution	increased biodiversity	lack of human intervention, including domestic grazing
presence of dead wood on the base or on the ground	uncontaminated soil	absence of roads and constructions
difficult or restricted accessibility		

Area size and boundaries: the area size must be at least 20 hectares, without fragmentation, except for rare ecosystems and especially those of ecological interest, for which the minimum area will be 10 hectares.

Although there are hardly any virgin forests left in Europe, some can still be found in Romania, most of them being virgin beech forests.

Beech - the tree of wisdom

The common beech (*Fagus sylvatica*) is a species that can be over 40 metres tall, over 1.5 metres in diameter, and 300 years old, exceptionally it can live for up to 500 years. The beech has the Greek name "phagein" which means "to eat", because the beech's fruit, "beechnut", is edible.

2

Practical activities

Environmental issues

Forest

1. Bark appearance can be an important criterion for identifying tree species. Do you recognise trees? Maple, birch, poplar, walnut and oak? Write the name of the tree under each of the photos.



1



2



3







4



5

2. The beech (*Fagus sylvatica*) is one of the most common trees in Romania. How do you identify it? Complete the following table with the characteristics of the beech tree.

<p>The Flowers</p>	<p>Unisexual monoecious, flowering occurs in May (inflorescences)</p>		<p>The leaves</p> <p>.....</p> <p>.....</p>	
<p>The trunk</p> <p>....., bark.....</p> <p>....., colour.....</p> <p>.....</p>			<p>The fruit</p> <p>.....</p> <p>.....</p>	



2

Practical activities

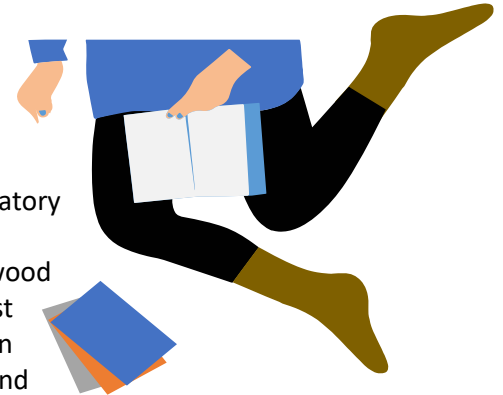
3. Write an essay on the theme of the *Beech Tree - the tree of wisdom*. The essay must be at least 100 words long. You can use some of the information below.

The fruit of the beech tree, the beechnut, was used to produce a butter and to feed pigs.

The bark of the tree is used medicinally as a febrifuge, tonic, and as a quinine equivalent in the treatment of malaria along with willow bark.

Beech tar is used in the treatment of some skin diseases as well as respiratory ailments.

Beech wood has special qualities and is used for various purposes: as firewood because it burns with little smoke and at a fairly high temperature; in the past it was used to make glass and iron. Nowadays its qualities are appreciated in the construction and furniture industry because of its strength, fine fibres and pleasant colour.



4. Do some research and present your ideas creatively!

Based on your knowledge of the functions of the forest, organise a **debate** on the topic "**Man will survive on Earth only in alliance with the Forest**". To prepare for this activity, work in three equal groups and research one of the three functions of the forest.

Each group will have to present, one of the functions of the forest with examples, arguments and pictures.

5. Read the text carefully.

"In the virgin forest, trees die of old age, fall, break or dry out, and the dead wood remains there, nourishing the ecosystem for future generations. Trees of all ages live in the virgin forest, from the barely sprouted saplings to those that have reached their physiological limit, like a community: children, parents and elders supporting each other and leading a harmonious and healthy life. Under the crowns of giants over 500 years old, more than 10,000 species of animals move, from single-celled organisms, fungi, plants, insects to familiar creatures such as wild boar, deer, black goats, wolves, lynxes, owls, brown bears, all in a natural connection." (source <https://wwf.ro>)

Recognise and underline three characteristics of a virgin forest in the given text. State three differences between a virgin forest and an ordinary forest.

Virgin forest

Ordinary forest

2

Practical activities

a. Exhibition on the topic *Virgin forest - a wonder of nature!*

Organise an exhibition of drawings/paintings on the proposed theme. The work can be displayed in the biology lab or presented in the school environment.

b. Competition - *10 reasons to protect the forest*

Suggestions for organising the competition.

- the activity can take place during the counselling hour
- the class is divided into several equal teams
- each team is given the task of writing on flipchart sheets 10 reasons to protect the forest (a time limit is given - e.g. 10 minutes)
- each team assigns a student to present the 10 reasons orally
- the jury can be made up of students, teachers, guest, parents etc.
- the jury sets the criteria for evaluating the teams
- the winning team is awarded



6. Questionnaire - As a group, do a small survey on the uncontrolled felling of trees in our country.

Set the questions of the questionnaire (suggestions) - What do you think about the cutting down of trees in our country? / Specify what effects can occur in nature as a result of uncontrolled cutting down of trees (at least three effects)/ Suggest some methods that would reduce this phenomenon. Apply the questionnaire to your colleagues. Analyse and disseminate the survey responses in the school.

7. Go to the link and perform a similar experiment.

<https://www.youtube.com/watch?v=piiA46Elhbc>

With this experiment, you can demonstrate that the forest prevents **soil erosion** and **filters water from rainfall** by draining it through layers of moss and dead leaves, ensuring clear, clean water.



2 Test

1. In a virgin forest:

- a. man intervenes in the removal of aged trees.
- b. classical forest management is needed.
- c. it has its own internal balance.
- d. the number of species is low.

2. The beech tree:

- a. is a shrub.
- b. is a tree with a branched trunk at the base.
- c. its fruit is called an acorn.
- d. its flowers are unisexual monoecious.

3. One option is wrong about the naturalness of a virgin forest:

- a. species composition and natural distribution.
- b. high biodiversity.
- c. domestic grazing is allowed.
- d. presence of standing dead wood or ground

4. Regarding the area of a virgin forest:

- a. it must not exceed 5 hectares.
- b. it must not exceed 20 hectares.
- c. it must be at least 20 hectares.
- d. is not a characteristic of virgin forests.

5. False (F) or True (T)?

- a. The leaf of *Fagus sylvatica* is oval with a smooth edge.
- b. The fruit of the beech (beechnut) is used in animal feed.
- c. The bark of the beech tree can be used for medicinal purposes.
- d. Burning beech wood produces a lot of smoke.

6. Correct any potential mistakes:

- a. Beech wood is used in construction but not in the furniture industry.
- b. The largest beech forest in Europe is in the Semenic National Park.
- c. The best quality wood comes from species that have regularly grown, narrow and even annual rings.

7. Do you recognise the tree by the appearance of the trunk bark?



a.



b.

8. Fill in the dotted lines with the corresponding concepts.

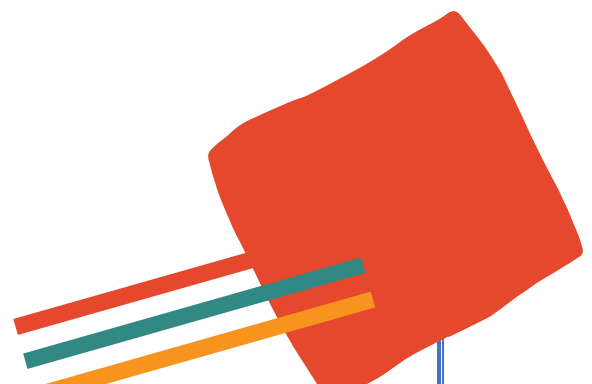
The beech tree name in Romanian originates from the Greek name "phagein" which means "to eat" because the fruit of the beech tree, ".....", is

9. What can annual growth rings be used for?

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

10. What are the characteristics of a virgin forest?

.....



3

Fun facts &
Did you know
that...



Soil is made up of rocks, plants and decaying animals.

Soil and plants growing in soil capture around 20% of global CO2 emissions.

Soil helps clean the water we drink and the air we breathe.

Healthy soil reduces the risk of groundwater supplies*.

* groundwater or groundwater tables in the first impermeable layer at the earth's surface that feed springs, wells, and influence soil formation and properties.

There are several microorganism in a spoonful of soil than humans living on earth.



About 350 earthworms live in a single square metre of agricultural land.

95% of all food is produced directly or indirectly from the soil.
33% of our global soils are now classified as degraded.
68% of European soils are used for arable agriculture - compared to 83% in North and Central America and 85% in Asia.

Currently, Romania loses more than 100 million tons of fertile soil annually due to the phenomenon called soil erosion.

Reflect! Which statement has surprised you the most? Why?

3

Useful information

Land is one of the most important resources we have. We build our buildings on land and much of our food and raw materials come from the land. That's why we should manage it better. However, the opposite situation occurs and every year more and more land is destroyed. In doing so, we are also destroying the vegetation that grows on the land and the agricultural land that serves as our livelihood.

*Buy land, they're not making it anymore.
Mark Twain*

Soil erosion

Through soil erosion, the topsoil is removed. This phenomenon can occur, for example, due to rainfall (due to its torrential nature), wind, or the action of gravity. The topsoil, known as humus, is the most important layer of soil for agricultural use because many additional substances needed for plant growth are stored in the humus layer.

Soil erosion is a natural process that can also be aggravated by *agricultural practices*. For example, if a field is abandoned for several months/years, i.e. the area is not cultivated, the soil may erode more easily under the action of the same external factors.

Another problem can occur in hot, dry regions: soil *salinization*. Humus becomes unusable if the salt concentration is too high. Salinization makes the deeper layers of the soil impermeable and impossible to cultivate. This phenomenon occurs when the soil is heavily irrigated during the dry season and more water evaporates than normal. The salt it contains remains and accumulates in the soil. As a result, the salinity in the soil rises sharply.

Soil sealing

Soil sealing is the destruction or covering of soil with an impermeable material and is one of the main causes of soil degradation. If soil is sealed, it can no longer perform its normal function and, for example, no longer store water and CO₂.

Limited resources

Our modern society needs large amounts of resources, and many of these come from the ground. Coal and oil are widely extracted. Coal mining means whole villages have to give way to mining and natural landscapes are destroyed. In addition, there is high environmental pollution as raw materials are extracted from the ore by using chemicals.

Effect of farming

The way we use soil to grow crops has a huge impact on the performance of soil and nature. When several agricultural areas bear the same fruit year after year, this is called *monoculture*. Such agricultural areas contribute particularly to soil depletion. Extensive monocultures are a feast for pests. To combat the spread of pests, large quantities of pesticides are used against fungi, insects and weeds. Unfortunately, pesticides not only affect pests, but also all the other animals in and around the field, destroying their habitat.

3

Practical activities

1. Complete the following statements with the correct answer:

- a. The removal of the top, fertile layer from the earth's surface by rain or wind is called
- b. Soil salinisation is specific to the regionsand
- c. Soil fertility is provided by the layer of
- d. Soil erosion is caused byand by.....
- e. Humus has a high content of necessary for plant growth.
- f. Soil depletion occurs when
- g. The habitat of many animals can be destroyed by using

2. The following list of words is given: conservation, parks, animals, nature reserves, species, plants, soils, biosphere, human, activity. Write in the blanks a logical text, using the words, concepts and names from the list above.

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

3. Organise World Earth Day in schools, which is celebrated every year on 22 April, to raise awareness of the importance of maintaining healthy soil and supporting sustainable management of soil resources. In your group make a programme for the day.



3

Practical activities

4. Discuss!

a. Discuss with your classmates how each of the following paedogenetic factors influences soil formation. The time it takes for a soil to form can take from a few thousand years to hundreds of thousands of years. Soil formation depends on several factors, called paedogenetic (soil-forming) factors. These are: rocks, topography, temperature, precipitation, wind, groundwater, plants, animals, weather and humans.

b. Discuss in class the characteristics of the soil in your community and its importance. Write down three arguments that support this statement in the boxes.

5. Project

Do your research (with the help of encyclopaedias, the internet, and field observations) or go with your colleagues on a visit to the town hall and find out if the soil is degraded in your community and, if so, what action the authorities are taking.

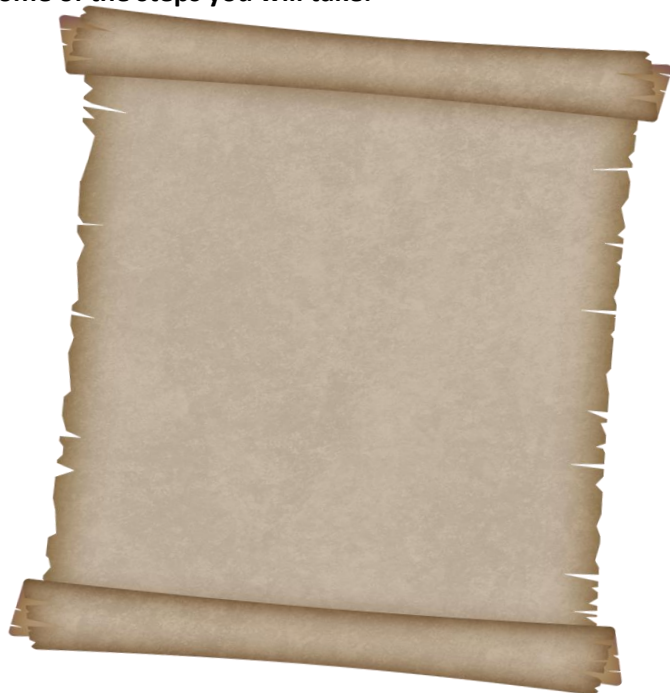
Make a list of ways to improve (if needed) the quality of the soil in your area based on what you learned from your investigation. Present them in class, write an article and post it on the internet, or publish them in the school magazine.

6. You have received the following message in which Earth asks for your help. Write a message to Earth assuring it of your help and outlining some of the steps you will take.

My dears,

I don't feel well. I'm sick and I think only you can help me. I hope you can see that everything around me is dirty, full of plastic bottles and papers. I can hardly breathe the air I share with the cars. Plants, animals, and trees are dying... is anyone noticing? MAYDAY! I'm sure you'll help me! Now, when it's not too late!

Earth



3

Practical activities

Environmental issues

Soil

7.Experiments:

Activity no 1. Make compost at home!

Composting is a simple way to give back to the earth what we get from it. Take a box and line it inside and out with garbage bags. Punch some holes in the sides to make it easier to aerate. Put the box in a sunny spot and add organic kitchen scraps, vegetable matter, and a little soil. After a few days you will have a great fertiliser for your plants.

Activity no 2 - Soil erosion

Soil is not only important for human beings; it is also where thousands of living things grow food. Soil is the result of thousands of years of formation, and its destruction can have devastating consequences. That's why it's important to protect it from erosion. Vegetation helps to stabilize the soil, preventing erosion and the loss of nutrients. Vegetation also plays a key role in climate change, not only by producing oxygen and absorbing CO2, but also because without vegetation there is no rain and no life.

Required materials:

- 3 plastic cans or 3 PETs cut in half
- soil to fill the containers
- water
- grass seeds
- organic material (compost)
- bucket of water/hose



Performing the activity

Prepare the three dishes. The vegetation in the first pot has already grown (you can have it cut or grown by you some time ago or buy a strip of ready-made turf). In the second pot, put their organic matter. Only soil is placed in the third container.

Pour water into the containers. Write down your observations in the table and compare them with those of your colleagues. Discuss the role of vegetation in maintaining and cultivating the soil.

Container with grown vegetation	Container with organic matter	Container with soil

Write down your observations in your notebook. Collect a glass of soil from the regions you visit on trips or holidays. Together with your classmates, make a collection of soils.



3

Test

1. Complete the text below with the correct information:

The process of destruction of1 by the action of water, wind or the action of living organisms is called2. Soil erosion causes great damage, such as: it reduces3 of the soil, makes it difficult to use agricultural land, destroys communication routes etc. Deforestation causes rainfall on sloping clay areas to produce4.

2. Chemical pollution of the soil means:

- a. use of organic fertilisers
- b. rainfall
- c. soil compaction
- d. wastewater irrigation

3. What is the most important layer of soil for agricultural use?

- a. Topsoil, also known as humus layer, is the most important layer of soil for agricultural use.
- b. Areas near rivers
- c. Topsoil and water surfaces

4. What is industrialised agriculture?

- a. high use of energy, machinery and large areas
- b. use of monoculture (same crop year after year)
- c. use of mineral fertilisers to ensure that the soil is permanently fertile
- d. the use of pesticides against fungi, insects and weeds
- e. all of the above

5. One third of the land used for agriculture is almost completely exhausted. Which method is not used for soil regeneration?

- a. promoting biodiversity, growing a variety of plants, always keeping the soil covered
- b. biological protection against pests and pathogens
- c. use of pesticides
- d. crop rotation and the use of biofertilisers
- f. use of compost

6. A measure to protect the soil would be:

- a. increasing humus content in the soil
- b. reducing the risk of wind erosion
- c. avoid soil compaction
- d. use of natural fertilisers
- e. all of the above

7. What is soil erosion?

- a. Soil erosion is considered to be the most dangerous form of soil degradation
- b. destruction of fertile soil by water or wind action
- c. both

8. How can we prevent soil erosion? Answer true or false next to each sentence:

- a. A solution to prevent this phenomenon is to terrace the slope.
- b. To stop erosion of sloping land, the simplest solution is strategic planting.
- c. Crop rotation is another solution.
- d. Chemical fertiliser use reduces the impact of erosion.
- e. Green manures (lupin, vetch, rye), which are incorporated into the soil at the same time as tillage.
- f. Providing uninterrupted ground cover, such as by planting cover crops, grassing the soil.

4

Fun Facts & Did you know that...

Environmental issues

Water



71% of the earth's surface is covered by water.

Humans are about 70% water. Every single life form in the world needs water to survive.

Most of the water is in the seas and oceans, only 3% is freshwater and two-thirds is contained in ice caps and glaciers.



In the Middle East, the Jordan was once a great river that flowed into the Dead Sea. Due to unsustainable use over the decades, it remains only a small stream and the Dead Sea is in danger of drying up. The use of fossil water sources can also have other consequences.

In some arid regions, for example in the eastern US or Mexico, large amounts of groundwater have been used on a large scale through wells, with unexpected consequences. Mexico City, for example, sank 32 feet in 60 years as it consumed about 70% of its groundwater.



The planet's ocean level has risen at an average rate of 1.8 mm per year during the 20th century. According to data published by NASA in 2019, the Planetary Ocean level rose an average of 7.4 cm between 1992 and 2019.

For a long time it was thought that sea levels would rise by less than one metre by 2100. Now a new study - by researchers at the University of Bristol - shows that the level could rise by about twice as much due to accelerated melting in Greenland and Antarctica. The phenomenon is significantly due to global warming.

Rising sea levels would mean the loss of more than 1.7 million square kilometres of land.

640 million people live in regions up to ten metres above sea level.

Reflect: Which statement has surprised you the most? Why?

4

Useful information

Water is essential to life. Water is the cradle of life, the first life forms emerged in the aquatic environment. About 70% of the Earth is covered with water in the form of oceans, groundwater (groundwater, lakes, rivers, glaciers, atmosphere and biosphere (plants, animals, humans). Water makes up 50-70% of the weight of plants and animals. It is vital to our existence and a living environment for many plants and animals. The water intake required for normal vital functions is 2 to 2.5 litres per day. For hygiene, humans consume about 100 l/day.

*Water, water
everywhere, but not a
drop to drink.*

The Rime of the
Ancient Mariner
-Samuel Taylor
Coleridge-

A man can go without water for around 4-5 days. When 15% of tissue water is lost, death occurs. Water is a source of rich minerals, raw materials, energy provider.

The amount of freshwater available would be sufficient if the global distribution was correlated with the distribution of water consumers. Unfortunately, most freshwater is concentrated in areas where it is not in short supply. While some regions have more than enough water, others are experiencing drought. In recent years this situation has worsened. Due to climate change and poor water management, more people are now affected by water scarcity than ever before. Due to global warming, some regions are affected by drought and others by excess water. Too much water suddenly is almost as damaging as too little rain, as everything is flooded for a short time and then the water disappears.

The situation is also worsened by poor water management. In the Middle East, the Jordan was once a great river that flowed into the Dead Sea. Due to unsustainable use over the decades, it remains just a small stream and the Dead Sea is in danger of drying up.

Due to rising temperatures and melting ice caps, sea levels are rising. High sea and ocean water levels are dangerous not only because they cause an increase in flooding leading to the relocation of thousands of people, but also because higher water masses in coastal regions lead to more intense land erosion. Seawater is increasingly penetrating groundwater, leading to a shortage of drinking water.

On the other hand, existing water is inadequately exploited and heavily polluted. Not only industry, but also agriculture and even the population contribute to water pollution. All water sources can be polluted by a multitude of substances such as rotting organic waste, toxic chemicals, oil, oil, pathogenic micro-organisms, plant nutrients, sediments and radioactive substances. Polluted water has become a real problem in recent years, affecting the proper functioning of vegetation, aquatic and animal life and the human body. It is very important for every person to be aware that polluted water can make any healthy organism sick and, moreover, can lead to death. Pathogens in water in the form of disease-causing bacteria and viruses from human and animal waste are a major cause of disease from drinking water. Even swimming can pose a risk. There can be many chemical pollutants in water, from heavy metals such as arsenic and mercury to pesticides and nitrate fertilisers.

1. Discuss the quotation from Useful information. What you know about droughts? Is the area where you live exposed to these phenomena? What measures should be taken in such cases? Imagine you have a friend who lives in such an area. Write a letter with your suggestions for water conservation.

2. Match the definitions with the concepts:



1. Water conservation

2. Protection of water resources

3. Direct use of water

4. Hydrosphere

5. Indirect water use (virtual water)

6. Ecological footprint for water

7. Freshwater

8. Water scarcity

a. water used directly in our daily activities: for drinking, bathing, washing, watering plants

b. a measure of a person's resource consumption.

c. production of food, energy or consumer goods

d. sustainable management of freshwater resources, protecting the hydrosphere and meeting current and future human demand (thus avoiding water scarcity)

e. keeping water clean, its quality and purity

f. the part of the biosphere containing the Earth's surface water in all its states, gaseous, liquid and solid

g. the lack of a quantity of drinking water that meets the needs of humans, animals and plants in an area

h. water without salt. In most cases it is potable.

3. Are you interested in working in the field of water conservation and protection?

As a group, create a poster with careers in one of the following fields dealing with water conservation and protection: repairs, pipe replacements; drinking water and wastewater treatment; water sanitation maintenance; irrigation systems; aquaculture; hazardous waste site clean-up; swimming lessons, and lifeguard services; media and marketing; journalism (environmental journalist); research in non-governmental institutions interested in environmental projects; legislation (environmental lawyer); environmental consulting. The poster will include the following for each profession: **qualifications/studies required, skills required, and a description.** Make a gallery to display these posters. Discuss which professions you would like and why.

4. Visit the town hall or other relevant institutions to find out what is being done in the community to protect water quality and cut water use. Share this with colleagues and make a joint poster to display on the school website.

4

Practical activities

Environmental issues

Water

5. Read the text below:

It's raining so hard that streams of dirty water full of papers, glasses, and even plastic bottles are running downhill towards the river where the children swam the day before. Rainwater washes away everything: pet waste, car oil, and detergent from a bike washed in the street. Drains are flooded, and in places they spill out onto the streets.

Which of the following tips would you give to those responsible for water pollution?

Dispose of rubbish in the designated areas.

Never throw chemicals, detergents, pesticides on the ground.

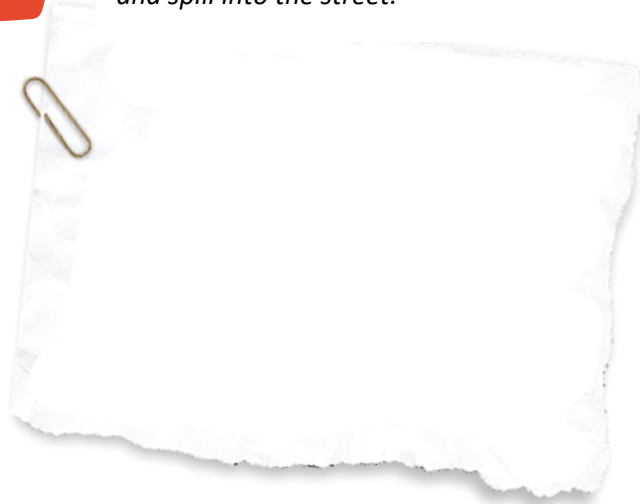
Pick up after animals.

Pick up litter and educate people to dispose of it in bins.

Don't throw rubbish into drains, it can clog and spill into the street.

Draw or write a short text to:

- explain how rainwater can affect rivers in the area
- give solutions that can improve water quality
- explain why these solutions are relevant to your area and protect children's health.



6. Calculate your school water footprint

Work in groups of 3-4 students and make a list of habits you have related to water consumption (at school). Discuss these habits with the whole class.

Assess your personal footprint using the Water Footprint Calculator from www.watercalculator.org

Discuss your results. Compare your results and identify activities that could lead to a reduction in footprint.

Work as a group and research this.

Then create a poster promoting the best ideas.

Draw up an action plan for the class and follow it up. Promote your actions at school level and train other colleagues.

7. Do you agree with the following statement? Calculating the ecological footprint of water helps us be aware of our water consumption and make the necessary changes. Analyse and discuss your results as a group using the water footprint calculator. Does it accurately reflect your water consumption and habits? Does it surprise you? Which section has the highest consumption? What steps can you take to reduce water consumption?

8. Discuss strategies to preserve water quality and substantially reduce water pollution. Then imagine you are a marketer, and you have to create a poster/video to educate your school community. Work as a group and then present your product to the class. The most compelling product will be posted on the school website.

9. How to reduce water consumption at home in the family? Here's a list of possible actions to take. What would you add?

Fixing dripping pipes or taps, turning off the water when brushing teeth or shampooing, using the shower and not the bath, only using the washing machine or dishwasher when full, using a double flush toilet tank, buying water saving appliances.

Discuss as a family what strategies you as a family can use and make a joint action plan that you all stick to for a month. After a month, see if there is a difference in consumption and payments. Communicate to colleagues and discuss the results. Which measure was the most popular but most effective?

10. Name the rivers you find near your locality. Rate the water quality of the rivers in your area.

11. Organise World Water Day in your school on 22 March.

a. Exhibition on the topic Let's protect water resources!

Pupils make an exhibition with drawings/pictures on the proposed theme.

b. Competition - 10 Reasons to protect water

Suggestions for organising the competition.

- each team is given the task of writing on flipchart sheets 10 reasons to protect water (a time limit is given - e.g. 10 minutes)
- each team assigns a student to present the 10 reasons orally
- the jury can be made up of students, teachers, guest, parents etc.
- the jury sets the evaluation criteria for the teams
- the winning team is awarded



4

Test

1. What percentage of the Earth's surface consists of potable water?

- a. 30%
- b. 1%
- c. 70%

2. How long can a man live without water?

- a. 2 days
- b. one week
- c. 4-5 days

3. What is hydrosphere?

- a. the part of the biosphere that contains water on the Earth's surface in gaseous and liquid form
- b. that part of the biosphere containing water on the Earth's surface in all its states, gaseous, liquid and solid
- c. that part of the biosphere containing the Earth's surface water in all its states, liquid and solid

4. What is *water conservation*?

- a. managing freshwater resources sustainably, protecting the hydrosphere and meeting current and future human demand (thus avoiding water scarcity)
- b. keeping water clean, its quality and purity

5. What are water pollutants?

- a. fish and aquatic animals
- b. industry, agriculture and population

Environmental issues

Water

6. True or False?

There is very little drinking water in the world, and it is very unevenly distributed.

7. What is the Ecological Water Footprint?

- a. The Ecological Water Footprint is a way of measuring the impact of human activities on the environment.
- b. The Ecological Water Footprint is our water consumption.
- c. Both

8. List three strategies to reduce water consumption

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

9. List three strategies by which you contribute to maintaining water quality.

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

10) What is the daily drinking water requirement of an adult human to maintain vital functions?

- a. 5 litres
- b. 2 litres
- c. 1 litres



5

Fun Facts &
Did you know that...



The air acts as a protective cushion for the Earth, preventing the planet from cooling too much or overheating.

Ozone in the air protects us from intense sunlight.

The air is the one protecting us from meteors. When they enter the atmosphere, a mechanical friction phenomenon occurs between the meteorites and the air and they start to burn up so that small, harmless pieces reach Earth.



If the air didn't contain nitrogen, then oxygen would burn, so we should be glad that there is nitrogen alongside oxygen.

The power of air is really great, so it is used to generate electricity.



Our lungs can hold 4-6 litres of air on average, although we use only a small part of this space with each breath. Every minute, an adult breathes 7 litres of air.

The oxygen we so desperately need and look for in forests is not produced in large quantities by trees but by ocean algae that are capable of providing us with tons of oxygen.



Reflect: Which statement has surprised you the most? Why?

5

Useful
information

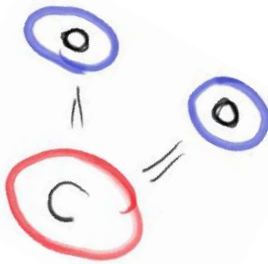
The Earth's atmosphere is unique in the solar system and maintains a friendly environment for life. The Earth has a very thin atmosphere composed of a series of distinct atmospheric layers that each play a role in regulating the Earth's internal environment. The main layers in the atmosphere are the troposphere, stratosphere, mesosphere and thermosphere. The outer layer of the Earth's atmosphere, located at very high altitudes, where the air is extremely thin, is called the exosphere. Through this layer there is a gradual transition to outer space. The thickness of the atmosphere, depending on how you define it, is between 100 and 10,000 kilometres.

The troposphere, the first layer of the atmosphere, is no more than 15 kilometres thick. The upper section of the troposphere is where planes fly, and the main weather phenomena take place. It is here that humans breathe with great difficulty. Mount Everest, the highest mountain in the world at 8,848 metres, is so high that climbers find it hard to breathe here. And 8,000 metres, which is 5 miles, isn't much, is it? Surely, you've walked 8 km.

Can you imagine how vulnerable this thin protective layer surrounding the planet is? In comparison, it is proportionally thinner than a peach skin.

In this context, we can of course imagine that the atmosphere can change very easily and that humans have a major influence on this process, known as '*climate change*'.

Have you noticed the Earth's temperature rising? But surely you are not familiar with the extent of this process. Researchers around the world have been measuring the exact temperatures of our planet for more than a hundred years and can prove that it is getting warmer. Why?



The reason for this is *the greenhouse effect*. The atmosphere can be imagined as a greenhouse: cool on the outside but very warm on the inside. Without the atmosphere, the average temperature on the planet would be minus 18 degrees Celsius. Fortunately, we have this thermal blanket, which means that our planet enjoys an average temperature of plus 15 degrees Celsius. But because we burn a lot of coal, petrol and gas, CO₂ is released. This proportion is very small compared to the rest of the air, but it is enough to change the composition of the air. Carbon dioxide stores heat. Six thousand years ago it was as warm as it is today, but this happened for a variety of reasons.

The current international community has agreed to limit the temperature rise to 1.5 degrees. But this challenge would require a very rapid phase-out of fossil fuels. At the moment, we don't seem to be able to meet that target. It would be a success if we could limit global warming to 2 degrees.

In addition to global warming, there are other phenomena. Extreme weather events and storms are increasing in intensity, and the global ice cap is shrinking dramatically. The poles as well as glaciers around the world are losing much of their ice volume.

Man is the biggest polluter even though he is biodegradable.
Valeriu Butulescu

1. Match the elements in the first column with those in the second column to discover the role of gases in the Earth's atmosphere for life.

a. Water vapour

b. Carbon dioxide

c. Nitrogen

d. Oxygen



1. Essential in the breathing of living beings

2. Enables burning

3. Participates in the photosynthesis process

4. Stimulates plant growth, favors soil fertility

5. Essential for protein formation

6. Source of environmental moisture

2. Determine whether the sentences below are true or false. Tick "X" next to the correct answer.

	A	F
The atmosphere is trapped near the Earth's crust by gravity.	<input type="checkbox"/>	<input type="checkbox"/>
The greenhouse effect is the result of the release of carbon dioxide into the atmosphere as a result of human activities.	<input type="checkbox"/>	<input type="checkbox"/>
78% of the Earth's atmosphere is composed of oxygen.	<input type="checkbox"/>	<input type="checkbox"/>
Extreme weather events and melting glaciers are consequences of global warming.	<input type="checkbox"/>	<input type="checkbox"/>
Plants photosynthesize thanks to oxygen.	<input type="checkbox"/>	<input type="checkbox"/>

3. What climate actions could you initiate in your school or community to combat climate change? - poster or video clip:

Form working groups. Discuss individual actions/ misbehaviours that cause climate change (plastic consumption, food waste, etc). Capture these actions in photos/videos (role play).

Then make a list of actions you can do in your school/community to combat climate change (e.g. toy/bike/hay repair workshops, planting trees in the school garden, using bins to recycle plastic/paper waste, organising 'second hand' days/fairs, alternative ways of reusing materials, transporting pupils to school, etc.). Propose to carry out these activities in your class/school within a given timeframe and monitor how they are achieved. Make posters or videos (2 minutes) of the two types of actions to present and promote in the community.



4. Select from the list of terms below those that correspond to the causes of global warming and note in the left column those that correspond to the effects of global warming: drought, climate change, greenhouse effect, melting glaciers, methane emissions from animals, fuel burning, deforestation, hurricanes and storms, species extinction, fertilizer abuse.

Causes of global warming	Effects of global warming

5. Global climate change is a concern of today's world.

Form working groups. First, discuss as a group: What is the climate in the region? How much rainfall is recorded on average each month? What about throughout the year? Have there been any unusual weather conditions recently: heat waves, extremely cold winters, for example?

Note the reported climate changes that have occurred. Each group presents the results. By using <https://climateknowledgeportal.worldbank.org/download-data>, find out whether or not climate change has occurred since 1990.

Discuss the effects of global climate change. Is climate change dangerous? How does it affect us? Does the climate affect our lifestyles in schools and local communities? What can we do?

6. Experiments

In this activity you will carry out an experiment to understand how the greenhouse effect works and what its effects are on temperatures on Earth.

Necessary materials:

- 2 transparent jars
- soil
- Water
- One teaspoon
- 2 thermometers
- Transparent foil
- Elastic strips
- Tape

Results

Write down the initial temperatures. Then measure the temperatures in both jars every five minutes, completing the table below.

Carrying out the activity:

1. Put a quantity of soil in each jar so that the bottom is covered. Add 2-3 drops of water.
2. Place the thermometers in the jars so that they do not touch the soil. Use tape to stick the thermometers into the jars.
3. Cover the top of one of the jars with cling film. Use rubber band to hold the foil tight.
4. Leave the other jar uncovered.
5. Note the initial temperature of each thermometer.
6. Place both jars in the sun (or under a strong hot lamp).

	Open jar	Covered jar
Temperature from the beginning		
Measurement 1 after 5 minutes		
Measurement 2 after 10 minutes		
Measurement 3 after 15 minutes		

Discussion

1. Did one of the two thermometers in your experiment show a higher temperature or not? If yes, explain why.

.....

2. One jar (1) represents the Earth with an atmosphere; the other jar (2), the Earth without an atmosphere. Identify which jar represents each situation and circle the correct answer.

Open jar: (1) (2) Covered jar: (1) (2)

3. Explain why we need the greenhouse effect on Earth.

.....

7. Complete the following sentence: If the Earth did not have an atmosphere, then ... Then check your assumptions by doing exercise 8.

.....

8. What would happen if there were no atmosphere? Join the two columns to reconstruct the sentences.

a. If there were no atmosphere, the earth would be

b. Birds and airplanes would fall out of the sky because

c. The sky would turn black:

d. All the unprotected plant and animal life on the earth's surface would die because

e. The lack of atmosphere would cool the Earth's surface

i. air has a mass that supports flying objects.

ii. we can't survive long in a vacuum, which we would if the atmosphere suddenly disappeared.

iii. and the temperature would drop below freezing.

iv. t is blue because of the atmosphere.

v. silent because sound requires a medium to transmit waves.

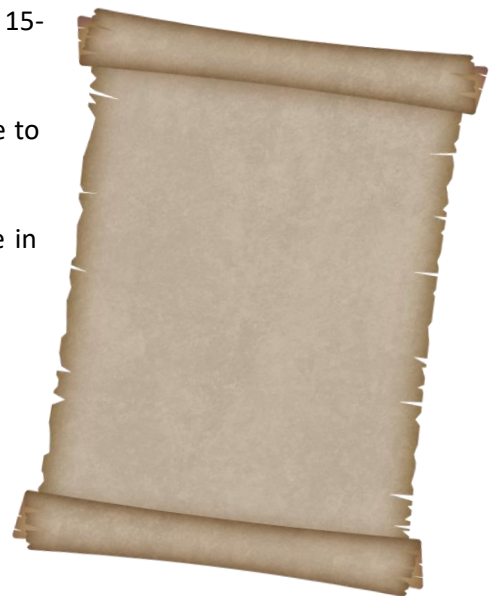


9. The found poem

In groups of 4, read the text from Useful Information and select 15-20 words/phrases that you think are important to the topic.

Then arrange these words to create a poem. You do not have to use all the words you have selected. Give the poem a title.

Read the poems aloud and discuss them. What do they have in common? How do they differ?



1. The atmospheric layer we live in is called:

- a. stratosphere
- b. troposphere
- c. mesosphere
- d. ionosphere

2. The Earth is protected from ultraviolet radiation by:

- a. oxygen
- b. hydrogen
- c. ozone
- d. neon

3. Air temperature decreases with increasing altitude, every 1,000 m with:

- a. 6° C
- b. 3° C
- c. 10° C
- d. 1° C

4. The main source of energy that causes the Earth's air temperature to change is:

- a. Moon
- b. Sun
- c. Tide
- d. Wind

5. What are the sources of air pollution?

- a. human activities: agriculture, waste treatment, industrial activity and processes involving the use of solvents, use of fossil fuels for transport
- b. recycling and reuse of materials
- c. cycling

6. What are the effects of air pollution?

- a. Affecting human and animal health
- b. Climate change
- c. The occurrence of acid rain
- d. Ozone depletion
- e. All options

7. Which of the examples given are not climate change?

- a. Extreme temperatures
- b. Melting glaciers
- c. Precipitation, average temperatures plus 15 °C

8. True or False?

CO₂ from human activities contributes most to global warming.

9. Correct the mistake!

Ozone is responsible for protecting the Earth from acid rain, and the thinning of this layer is creating worrying imbalances caused by too much acid rain. This affects human health, including in the long term.

10. How you can help combat climate change?

.....



Fun facts & Did you know that...



Over a distance of 1000km a car consumes as much oxygen as a human breathes for a year.

To destroy aquatic life, 2-3 mg of sulphuric acid per litre of water is enough.

1.6 million tonnes of oil are spilled into the planet's oceans every year.

In Europe, 36 species of mammals, 72 species of birds, 47 species of reptiles, 37 species of amphibians, 104 species of freshwater fish and 896 species of butterflies are threatened with extinction.

In Romania there are three biosphere reserves, the Danube Delta, Retezat and Pietrosul Rodnei, 17 national parks, nature reserves, landscape reserves, scientific reserves.

The Danube Delta is considered a "bird paradise" with over 300 migratory and sedentary species such as pelicans, cormorants, swans, egrets, ducks, wild geese, etc. 26 species of animals are threatened with extinction.

Across Europe, more than 80% of the population is exposed to particulate matter and ozone at levels higher than those recommended by the World Health Organisation.

Around 30 billion tonnes of carbon dioxide are emitted into the atmosphere every year on earth.

Pollution in the urban environment costs about €2.6 trillion and kills 3.5 billion people annually in industrialised countries.

15 km² of forest disappear every minute.

Reflect: If you were Minister for the Environment, would you be okay with compromising on nature? Yes or no? Give reasons for your answer.
Are you a believer in a world of balance and harmony?

Biodiversity is traditionally defined as the variety of life on Earth in all its forms. It contains the number of species, their genetic variety and the interaction of life forms in complex ecosystems. Today, however, we are witnessing a steady decline in biodiversity, with profound consequences for the natural world and human well-being.

The biggest threat to many species is habitat destruction by human activities. This happens when, for example, a meadow is turned into a cereal field or virgin forest becomes arable land. 75% of the world's surface has been heavily shaped and changed by humans. Another threat to biodiversity is environmental pollution. Various toxic chemicals dumped into the water have wiped out many endemic fish species.

In some cases, there is even deliberate pollution, for example when using pesticides. Pesticides are used to control pests in agriculture. In doing so, not only pests are affected, but also many other species of animals and plants in the area. Climate change is also threatening. In the Arctic, polar bears and all other animals in the region are severely affected by climate change. Global warming and increasing extreme weather events are also causing problems for many species in other parts of the world.

Direct exploitation of nature through poaching and overfishing are the most direct threats to some species. Fish are caught in large numbers, threatening many species. Rhinos are still hunted for their horns which are believed to have magical healing properties. Another example is the reduction in the number of pollinators, bees, through human activities: land use change for agriculture or urbanisation, intensive farming, pesticides, herbicides, etc. Bees are essential for ecosystems and biodiversity, for pollinating crops. 35% of world food production depends on pollination.

From a purely economic point of view, it might not affect us to begin with how many species there are in the world, as long as we have our large fields and enough grazing land for our animals. Conservation of nature and biodiversity often gives way to economic interests. But living organisms interact within dynamic ecosystems and the disappearance of some species can have a major impact on the food chain. The quality of air, water, soil.

While the rural landscape is getting quieter and biodiversity is declining, in cities the situation is the opposite. Many cities have become biodiversity hotspots. There are two different reasons for this: on the one hand, cities don't use pesticides, which means insects and other species can spread more easily, and on the other, cities offer a great diversity of landscapes, small wooded parks, ponds, gardens, flowers on balconies, old houses and rooftops. Many species need more than just a landscape to live well and now they can find this diversity in cities.

The environment is not anyone's property to destroy, it is everyone's responsibility to protect.
Mohith Agadi

1. Research and observe:

Did you know that different types of biological indicators are used to identify different pollutants? For general pollution - lichens (lower organisms that are not a systematic group but a symbiosis between an alga and a fungus) and mosses? Since lichens are very sensitive to air pollution and die to high levels of carbon monoxide, sulphur, nitrogen and fluorine compounds, they can be used as living indicators of environmental cleanliness.

As a group, investigate the lichens near your home.

Set two dates for the survey: one in September and one in October.

September: identify areas populated by lichens; identify lichen species (leafy, crustose or bushy); photograph identified areas to determine the degree of air pollution. Record the number of leafy lichen species in the investigated area. Leafy lichens are generally more sensitive to pollution.

October: go back to the studied areas and photograph them to determine the degree of air pollution. Compare the photos with those from September and see if and which lichens have changed or disappeared.

**Interpretation of research findings:**

1. If no lichen survives, it's an area of maximum pollution
 2. If there are leafy lichens, it is an area of medium pollution
 3. If the tree trunks are abundantly covered with leafy lichens, it is an area of low or very low pollution.
- Disseminate the results to your school and community. What should be done if pollution is high?

2. Discover and analyse:

Put a clean sheet of paper on one of your windows. After a few days, observe the thickness of the layer of dust you inhale daily through your breath. Find a solution to remove this environmental problem.

3. Biological challenge. Get involved in the community!

In and around the city where you live, you'll find fewer and fewer living creatures. Depending on your skills, take a role in one of the following teams:

- a. Analyst team - who will identify the causes of the disappearance of the living creatures in and around the city.
 - b. expert team - to identify solutions to the problem.
 - c. the team of promoters - who will promote the environmental problem reported to the community.
- Cooperate within the teams and present the findings identified by each team to the class.

4. Fill in the following worksheet.

Recognise in the pictures below types of human actions on nature:

a.



b.



1. Explain the effects of these actions on natural ecosystems in the two cases:
 a.....
 b.....
2. Find solutions to mitigate the negative effects of human action in each case:
 a.....
 b.....

5. Match the word with the corresponding definition.

a. nature		i. Water, air and soil fouling
b. contamination		ii. Scrap materials that can no longer be used
c. pollution		iii. Poisonous substance or gas
d. toxic		iv. Everything around us: water, air, plants, animals, landforms
e. waste		v. Infection of water, air and soil

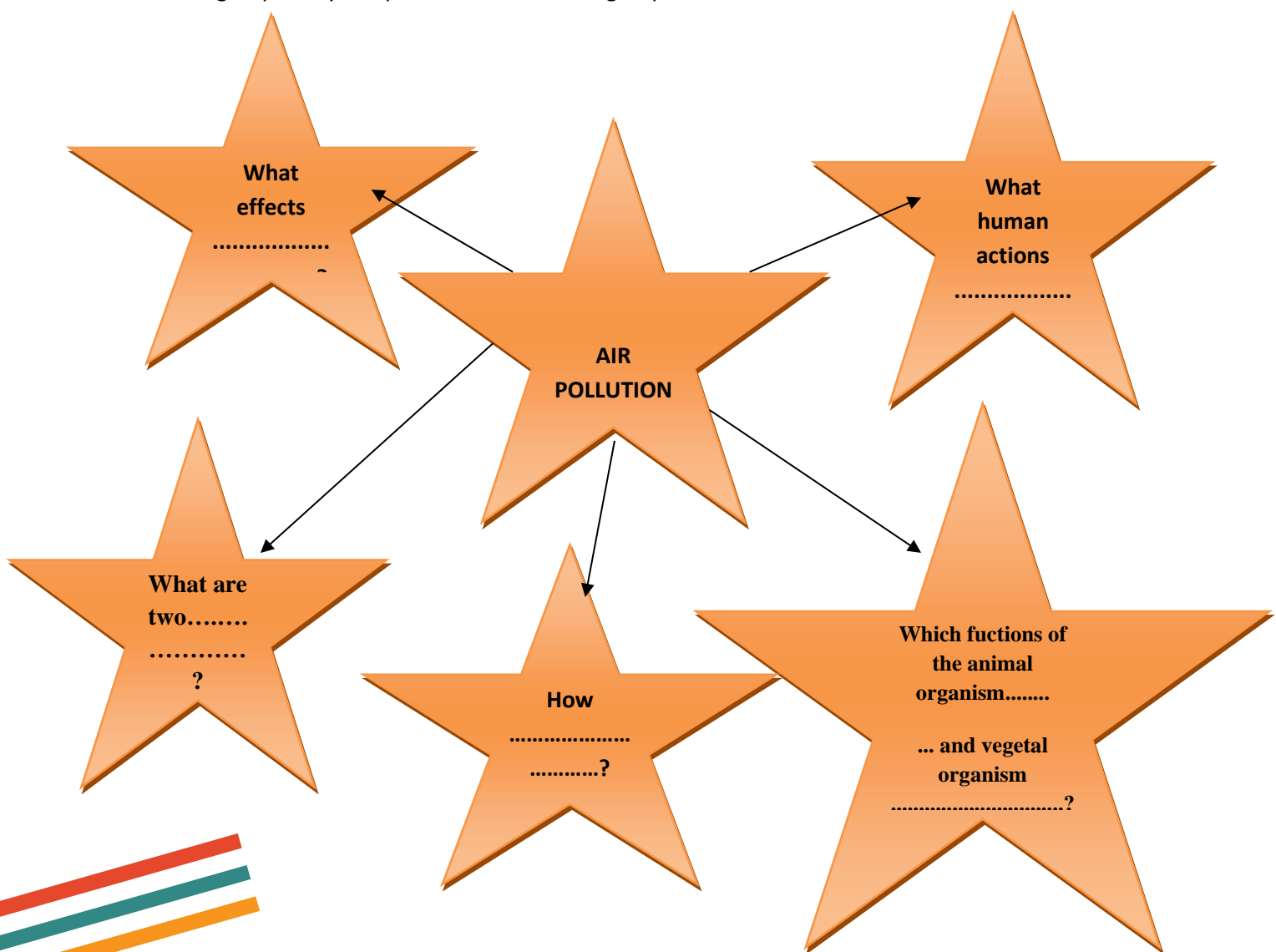
6. Did you know that 4 October is animal day? A good opportunity to remember and celebrate biodiversity. Draw up an action plan with your colleagues to organise this day in your school. Make a poster or video of the highlights of the day. Promote it in your school and community.

7. Read the following information about the causes of air pollution and what you can do about it.

CAUSES: Emission of fine solid gases and dusts into the atmosphere (from the combustion of various household fuels, industrial fuels, transport engine fuels).

MEASURES: reducing emissions of gases and particulates into the air by using filters and modern technologies applied in industry, building the least polluting vehicles possible, planting protective green areas. Pollutants - carbon dioxide (greenhouse effect), sulphur dioxide, sulphuric acid, nitric acid (acid rain), sulphuric anhydride (smog).

Work in groups using the 'starburst' method, which is based on formulating problem-solving questions. The main idea is in the star in the centre: air pollution. Formulate questions on the theme starting with the question word at the top of each star (use the information given). Then find the answers and discuss them as a group. Ask your questions to the other groups.



1. What is biodiversity?

- a. The entirety of plant species and the variety that exists in each species.
- b. The entirety of plant and animal species, their genetic variety, and the interaction of life forms in complex ecosystems.
- c. The entirety of animal species and the variety that exists in each species.

2. Why does biodiversity matter?

- a. ecologically, the sustainable development of plant and animal species and their habitats.
- b. in socio-economic, medical, nutritional and/or usefulness to other living beings.
- c. in all the aspects listed above.

3. What are the factors that affect biodiversity?

- a. technological and industrial progress.
- b. habitat loss, climate change, overexploitation, invasive alien species, pollution.
- c. climate change.

4. Biodiversity is vital, it helps us in countless ways: it provides us with food, medicine, and clothing. Which of the activities below are sustainable, preserving the health and integrity of the natural system?

- a. learning about biodiversity and sharing this information with family, friends
- b. reducing consumption of material goods
- c. consuming energy efficiently
- d. using public transport, cycling or walking
- e. using environmentally friendly and recycled products
- f. recycling
- g. all of the above

5. What are the main sources of pollution?

- a. industry, transport and agriculture
- b. commercial activities
- c. residential areas
- d. all options

6. Which of the examples below are not deliberate pollution?

- a. burning of waste
- b. use of pesticides
- c. industrial processes and use of solvents

7. Complete the statement below.

Air is a mixture of a).....of which only b).....enables life.

8. Why have some cities become biodiversity hotspots? Can you give an example from your community?

- a. Pesticides are not used in cities, which means insects and other species can spread more easily.
- b. Cities offer a great diversity of landscapes, small, wooded parks, ponds, gardens, flowers on balconies, old houses and rooftops.
- c. Both answers.



7

Fun facts & Did you know that...



Oil was formed about 300,000,000 years ago.

Wind power provides about 10% of Europe's electricity.

Romania has only one nuclear power plant at Cernavodă.

Energy is responsible for 77.01% of EU greenhouse gas emissions in 2019, of which transport accounts for about a third. Greenhouse gas emissions from agriculture contribute 10.55%, industrial processes and product use 9.10% and waste management 3.32%.

The EU is the third largest emitter of greenhouse gases after China and the United States, followed by India and Russia.

Ecological footprint reduction solutions

Energy and global warming

The energy can never be lost, it can only be transformed.

There is no such thing as good energy, only bad (unsustainable) and very bad energy.

Natural gas is the 'cleanest' fossil fuel because it emits 'the least' waste when burned.

Coal is the dirtiest (polluting) source of energy

Have you never thought about the animals that suffer every day from pollution? Well...

Smog - the name for urban air pollution - is a mixture of carbon monoxide, organic compounds from incomplete combustion of fossil fuels such as coal, and sulphur dioxide from fuel impurities. It reacts with oxygen, while organic and sulphuric acids stiffen the haze by condensing into droplets. Snow or fog usually removes most pollutants. Others gather in the atmosphere - sulphur and nitrogen oxides are converted to acids which combine with the rain to form acid rain. This falls on rivers and lakes killing fish, algae and all the life in these waters. Rain also falls on forests, this time affecting animals such as bears, foxes, wolves, etc. and tall old trees. Being a result of burning coal means it comes from fossil fuel power plants. A fossil fuel power plant is a thermal power plant that burns fossil fuel (coal) to produce electricity. Fossil fuel power plants have machinery to convert the heat energy of combustion into mechanical energy which then drives an electric generator. The main engine can be a steam turbine, a gas turbine or in small plants a reciprocating gas engine. All plants use the energy extracted from the expansion gas either steam or combustion gas. One of the good solutions to save the environment is to build more wind turbines, which convert wind energy into electricity (no pollutants or greenhouse gases are produced because no fuel is burned, and no waste is produced).

Let's be kind to animals and help them!

Written by Ioana Harhas, 6th grade, EuroEd Secondary School.

Reflect: Which statement has surprised you the most? Why?



7

Useful information

Basically, there are **four types of energy**:

1. **Fossil energy** (energy from oil, natural gas or coal).
2. **Nuclear energy** is converted into electricity in nuclear power plants.
3. **Electricity from renewable sources** (hydroelectric, wind and solar power plants).
4. **Geothermal energy**; for example, in Iceland it is used for heating.

The first form of energy is responsible for global warming because burning the necessary fuels produces greenhouse gases. The fuels used are oil, natural gas and coal. It would be good to reduce and, in the future, to give up the use of fossil fuels, a sure way to stop climate change

Nuclear power uses nuclear fission. It produces a lot of energy but can cause problems in operation, with serious consequences that are difficult to control, which is why more and more countries are closing their nuclear power plants. The disposal of nuclear waste is another problem that currently has no solution.

Renewable energy is generated by the forces of nature (through wind turbines, solar power plants and hydroelectric plants). Power plants do not emit CO₂ during operation.

Geothermal energy is the use of heat from within the earth (volcanoes, hot springs and geysers). Geothermal energy is very good for heating.

How electricity is produced

To generate electricity, there are fossil fuel power plants, nuclear power plants and others that run on natural forces (photovoltaic plants, wind power plants and hydroelectric plants).

Hot water and heating

As with electricity generation, fossil fuels and renewable fuels are used. To use geothermal energy, certain geological requirements must be met. Geothermal power plants use hot rocks in the ground to generate electricity. This process of drilling to reach the rocks is very expensive and often accompanied by the release of toxic gases from underground or even earthquakes.

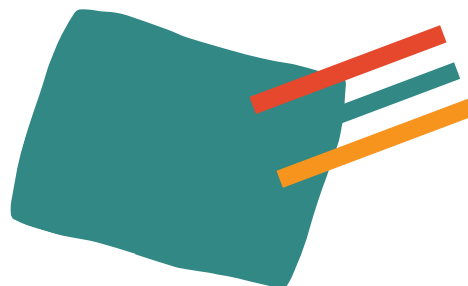
In the past, most people used wood for heating. But when forests began to disappear, coal and later natural gas were used. Even today, much heating is still done with natural gas. Most of the energy consumed in the household is heat. This means that heating and hot water require the most energy. It is therefore important to save money through better insulation and alternative, 'greener' heating systems.

Ecological footprint reduction solutions

Energy and global warming

I think we will give up a lot if we truly understand how much we lose by not giving up and how much we gain in return. So, we might find that while we are drastically reducing our energy consumption, we are actually raising our standard of living.

David R. Brower








7

Practical activities

Ecological footprint reduction solutions

Energy and global warming

1. Match the picture in column A with the name in column B and the property in column C.

<i>A</i>	<i>B</i>	<i>C</i>
<p>1</p> 	<p>Nuclear power plant</p>	<p>Converts solar energy (light and heat) into electricity.</p>
<p>2</p> 	<p>Photovoltaic systems</p>	<p>Use nuclear fission reactions to obtain mechanical energy.</p>
<p>3</p> 	<p>Hydroelectric power plant</p>	<p>Converts thermal energy (heat) into electrical energy.</p>
<p>4</p> 	<p>Wind power systems</p>	<p>Converts mechanical energy from falling water into electrical energy.</p>
<p>5</p> 	<p>Coal-fired power plant</p>	<p>Converts mechanical energy from wind speed into electrical energy.</p>

7

Practical activities

2. Draw a picture showing that fossil fuel power plants harm animals and plants on Earth.

3. Write a paper entitled "Electricity from mechanical energy". The report must contain:

Examples of power plants converting mechanical energy into electricity.

Suggestions for saving animals affected by renewable energy power plants.

combustion. We also depend on importing them from outside Europe.

Coal is the dirtiest source of energy. It is needed to produce electricity and for district heating. It emits a lot of CO₂ when burned and even sulphur. Coal-fired power plants are only profitable in times of crisis. As part of its climate targets, the EU has agreed to reduce CO₂ emissions so that coal-fired power plants are phased out in Europe.

4. True or False?

Read the following text about fossil fuels and then decide whether the statements accompanying the text are true or false:

Oil is an advantageous fuel and difficult to replace because: it is easy to store, it can be refined into diesel and petrol, it has a high energy density. It is the raw material from which plastics are made.

Natural gas is the 'cleanest' fossil fuel because it emits 'the least' residues during combustion. These gases are used for cooking, heating, electricity generation and as fuel for cars. Romania is even the largest producer of natural gas in central Europe. We should give up this energy source because a lot of CO₂ is released during

a. It is not easy to replace oil because it is a fuel that offers us many advantages.

b. Natural gas is the greenest natural fuel.

c. Natural gas is the raw material for the production of plastics.

d. Cars can only be fuelled by natural gas.

e. Since burning coal releases a large amount of CO₂ and sulphur, coal-fired power plants are no longer built.



7

Practical activities

5. Work in three groups: each group is assigned a form of renewable energy; you have to make a poster about the advantages and disadvantages of that form of energy and present it to your colleagues. See the text below and the information available at the links in the bibliography. Discuss with other colleagues. What examples do you know of renewable energy plants in Romania? Which of these plants are more appropriate to the Romanian context? Why?

Wind power provides about 10% of Europe's electricity. Wind turbines generate renewable energy, but are made from non-renewable and non-recyclable materials. For example, their foundations need to be replaced every 20 years and are made of concrete, which creates environmental problems arising from the production and use of concrete. In addition, wind turbines kill large numbers of birds and bats each year when these animals fall into the turbines. Because of the noise they produce, wind turbines should not be built near residential areas. However, wind turbines are ideal in combination with solar power plants because they produce electricity all year round.

Hydropower is the most powerful renewable energy on the market today. It uses falling or flowing water. It has no impact on the air but it does have an impact on the water because hydroelectric dams affect the course of rivers, altering river ecosystems and thus having a negative impact on animal life. Sometimes these dams can also cause flooding, destruction of land and wildlife, or population displacement. The advantage of hydropower is that once a dam is built, it lasts a very long time; hydropower is cheap.

Photovoltaic energy is booming. Panels are getting cheaper and cheaper, making more and more projects profitable. But the sun is not a permanent source, shining only during the day and only when there are no clouds. One solution would be if there was a way to store electricity cheaply; this is being researched. However, the use of photovoltaic energy reduces CO₂ emissions considerably. Despite the fact that many toxic metals (lead and cadmium) are used in the production of solar panels, photovoltaics is probably the fastest-growing green energy sector because the sun is an enormous source of energy.

6. As a group, discuss how you can reduce energy consumption in the classroom. How can you reduce energy consumption at home? Make a poster or video about ways to reduce consumption.

7. Questionnaire. As a group, take a questionnaire on energy consumption (e.g. Turn off the computer after using it/ turn off the light when you leave the classroom/ what kind of light bulbs you use). Present the questionnaire to your classmates and draw up a joint questionnaire to use in class. Then discuss the results and draw up an action plan to reduce consumption. Train the whole school and observe the results on the tally and pay after one month.

8. Adapt the questionnaire to your home context. Discuss the results as a family and make a joint action plan to reduce consumption. Observe the results after one month. Have there been any differences?

9. In pairs, discuss in class the quote: *I think we will give up a lot if we really understand how much we lose if we don't give up and how much we gain in return. So we might find that while we are drastically reducing our energy consumption, we are actually raising our standard of living.*



1. Which are renewable energy sources?

- a. nuclear, wind, solar and oil
- b. wind, solar, hydroelectric and geothermal
- c. wind, solar, hydro and natural gas

2. Which of the following is not a fossil fuel?

- a. oil
- b. gas
- c. wind energy

3. Coal is:

- a. a renewable energy source
- b. a non-renewable energy source

4 Wind energy systems

- a. convert solar energy (light and heat) into electricity.
- b. convert mechanical energy from wind speed into electricity.

5. Which of the following energy sources emits the most CO2 (carbon dioxide):

- a. hydroelectric
- b. solar
- c. oil

6. True or False?

Natural gas is the greenest natural fuel.

7. How you can save a little energy when using the fridge?

.....
.....

8. True or False? After using your computer, TV, games console or similar, you should turn off the device to save power.

9. Complete: When you leave a room you must light.

Light bulbs in an average home account for 15% of energy consumption

10. What is wrong with the following statement? Sometimes the TV, the computer work even though I don't use them.



8

Fun facts & Did you know that...

Over 820 million people are undernourished and many more people have unhealthy diets that contribute to premature death and morbidity.

More than 20% of the food produced is thrown away.

Obesity rates are rising. More than half of EU adults are overweight.

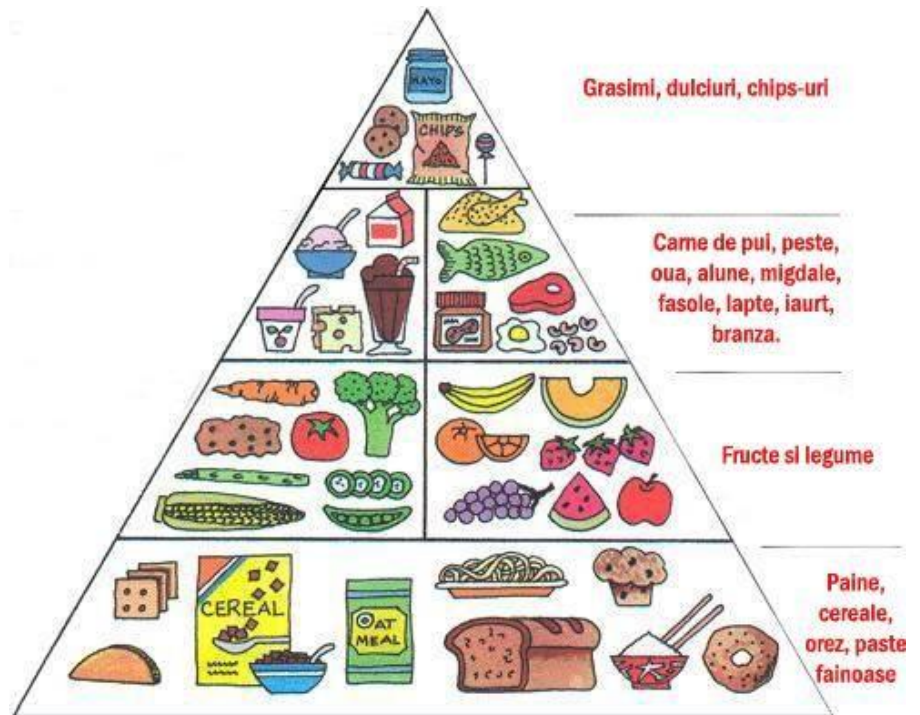
55% of adults in Romania are overweight.

Romania ranks second in the European Union for childhood obesity.

About ¼ of our environmental footprint is due to food.

Ecological footprint reduction solutions

Healthy and sustainable food



Do you know what you need to do for healthy and sustainable eating?

- Eat a variety of foods in moderation.
- Prefer water to other liquids!
- Eat more fruit and vegetables (5 portions).
- Find out where the food comes from and how it is produced before you buy it.
- Eat dairy products and meat in moderation.
- Include nuts, peanuts, seeds in your diet.
- Consume as few fatty foods, sweets, chocolate, juices as possible.
- Learn to prepare certain products yourself. This exercise is great if you want a sustainable, environmentally friendly diet.
- Buy locally produced food, reducing your national or international transport costs.

Reflect: Which statement has surprised you the most? Why?

8

Useful information

Ecological footprint reduction solutions

Healthy and sustainable food

Sustainable food is healthy and safe food, produced through production systems that respect the natural environment, take into account the livelihoods of animals, and at the same time create fair working conditions and wages, thus helping local economies to prosper.

Food is a necessity, but eating wisely is an art.
La Rochefoucauld

Sustainable food principles

The basic products are organic (eco/bio). No chemical pesticides or fertilisers are used. Products are local and seasonal. It is important to pay attention to the origin of the food. Long distances for transporting fruit and vegetables sometimes lead to considerable gas emissions. Local fruit from the market is very healthy, has not been transported long distances and is not packed in plastic. This reduces the amount of energy used during transport and contributes to a better local economy.

Sustainable food takes ethical considerations into account. Food must be produced in a way that provides working conditions and income for the people who work to produce it.

Processed products have labels. They give us information about the food and also help us make decisions.

Over the years, agricultural policy has claimed many victims: animals suffering and dying on a yearly basis; deforestation giving way to farmland and seriously affecting biodiversity; nature and the environment severely harmed by the widespread use of pesticides and chemical fertilizers. Livestock farming systems affect water, air and soil quality. The livestock sector is responsible for 78% of terrestrial biodiversity loss, 80% of soil acidification and air pollution (with ammonium and nitrate emissions), 73% of water pollution. Our ultimate goal is to have an organic, animal-friendly farm that grows healthy food and doesn't have to rely on food from other countries. We can have healthy, long-term farming if we fix natural cycles and pay farmers a fair price for their goods.

We need a sustainable, healthy diet. Food must be clean and healthy, rich in nutrients and not causing long-term damage to nature's resources. In addition, such a diet must produce waste that can be easily composted and decompose in a short period of time. There also needs to be a complete picture of where our food comes from, how it is produced and whether the price covers costs. Reducing meat consumption and increasing fruit and vegetable consumption is recommended.

For the 10 billion people who will populate the Earth in 2050 to have a sustainable diet, experts say we should have a small ecological footprint (no extra land use), protect existing biodiversity, reduce and responsibly manage water consumption, substantially reduce nitrogen and phosphorus pollution, produce 0 carbon dioxide and methane emissions. If you too want to eat more sustainably, replace animal products with plant-based ones from time to time.



8

Practical activities

Ecological footprint reduction solutions Healthy and sustainable food

1. Complete the following text:

Sustainable diet is the diet that has a little.....1on the environment , 2 and respects biodiversity, ecosystems, is accessible, accepted, safe, appropriate in terms of3, doesn't make us sick. In a sustainable diet it is recommended not to eat too much meat. There is no need to give up4, but to consume it in moderation. Livestock farming increases carbon emissions, but also5. Studies have shown that dairy and meat production have the greatest impact on6. It's best to buy meat from local traders.

2. Anagram:

Arrange the letters in the following combinations to find words related to the topic of this chapter:

ibtsualean	S
liaceclgoo	E
atyhleh	H
edti	D

3. Underline only the sustainable foods in the following list:

salami, fruit, ham, vegetables, nuts, whole grains, chocolate, hamburger, ice cream.

4. Decide whether the statements below are true or false:

a. We should eat no more than 300 grams of meat per week.

b. By consuming products with a low degree of industrial processing, we put our health at risk.

c. Fish can be eaten more often, preferably phytophagous fish.

d. Cereals should be the foundation of our diet.

e. It is not important to pay attention to the origin of the food as long as its appearance is very attractive.



5. What solutions do you find to reduce meat consumption? One solution would be to eat fish, but here again it depends on the type of fish consumed. Read the following text. Which fish is recommended? Why fish?

Predatory fish grow slowly and need lots of food until they reach maturity. Given that the seas are overfished, this is very worrying. Trout in local fishponds feed on by-catch. They are very susceptible to disease and are given antibiotics. These enter our bodies when we eat them. It is advisable to eat fish with the MSC (Marine Stewardship Council) eco-label, which shows whether the fish has been caught sustainably. Phytophagous fish, such as carp, feed on underwater plants and algae that are abundant in their environment. Carp have a much smaller footprint and are also very healthy.

8

Practical activities

Ecological footprint reduction solutions

Healthy and sustainable food

6. Why eat meat rationally? What are your suggestions? Compare them with the following text.

Animal products account for about 80% of land consumption in agriculture. There are four main reasons why we should consume animal products sensibly and avoid waste:

- ✓ A large area of land is needed; animal feed plants occupy a large area. More efficient crops could be grown in the same area.
- ✓ There is a high-water consumption because animals need a lot of water, about 15,000 litres are needed for a kilogram of beef, compared to 250 litres of water for a kilogram of potatoes.
- ✓ There are high methane emissions from ruminants (cows, goats, etc.). Nitrous oxide is produced by manure and fertiliser.

Discuss as a group the following reason for reducing meat consumption, related to animal welfare on farms. Are animals happy on farms? How could animals be given a good living environment?

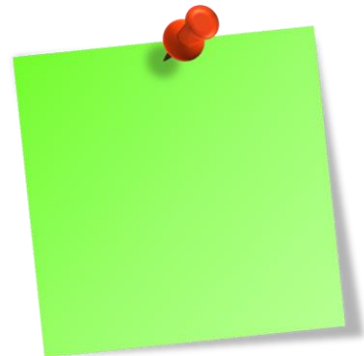
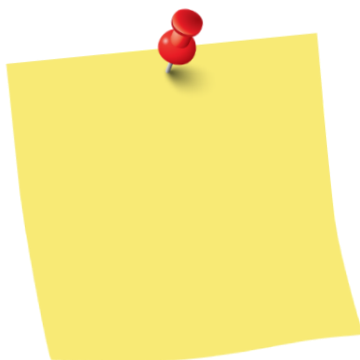
7. Complete the table with the local seasonal fruit and vegetables that you should eat

Vegetables and fruit are an excellent source of vitamins, protein, fibre and many other beneficial nutrients for a healthy life. Locally grown fruit and vegetables have a positive impact on the environment in the long term, but also on your community.

June	
July	
August	
September	

8. What is a sustainable breakfast?

If you had a budget of only 10 lei, what could you buy to prepare a nutritious and healthy breakfast/lunch? Write your shopping list.



9. Don't throw food in the bin. Learn to use everything in your fridge and don't let food spoil. Make yourself a sustainable lunch using only leftover ingredients you find in your fridge. What will you prepare?

8

Activități practice

Ecological footprint reduction solutions

Healthy and sustainable food

10. Experiment: what is a sustainable drink? Is carbonated soft drink with citrus juice sustainable and healthy?

Băutură răcoritoare carbogazoasă cu suc de citrice. Ingrediente: apă, zahăr, suc de citrice din suc concentrat de citrice (în proporții variabile, min 5,2 %): portocale, lămâi și mandarine, pulpă de portocale (0,8 %) - ingrediente primare din UE și din afara UE, dioxid de carbon, acidifiant: acid citric, stabilizatori: gumă de acacia și acetat izobutirat de zaharoză, conservanți: benzoat de sodiu și sorbat de potasiu, antioxidant: acid ascorbic, aromă, colorant: luteină.

Informații nutriționale per 100 ml	
Valoare energetică	218 kJ / 51 kcal
Grăsimi	0 g
din care acizi grași saturați	0 g
Glucide	13 g
din care zaharuri	13 g
Fibre	0 g
Proteine	0 g
Sare	0,002 g

A se consuma, de preferință, înainte de: vezi pe ambalaj. A se depozita în loc ferit de îngheț și soare. Depozitarea în condiții neadecvate sau lângă produse cu mirosuri puternice poate afecta calitatea produsului.

- ✓ Buy a bottle of juice and check the carbohydrate (sugar)/100 ml content. This 330ml bottle of juice contains 13g sugar/ 100ml.
- ✓ How many grams of sugar does the bottle contain?
- ✓ 42.9 g sugar
- ✓ One cube of sugar has on average 3-4 grams.
- ✓ How many sugar cubes were put in this bottle?
- ✓ $42.9 : 3 = 11$ cubes

Would you put 11 sugar cubes in a more generous cup of tea?



11. What is a sustainable desert? Give examples.

12. What tips would you give a friend for a healthy and sustainable diet? Write a message.

13. Make a menu, inspired by the healthy eating pyramid, for a teenager, respecting the number of calories recommended by experts for this age group (2000-2500 calories).

You can use the information from: www.calorii.oneden.com



8

Test

Ecological footprint reduction solutions

Healthy and sustainable food

1. True or False?

A sustainable lifestyle requires giving up meat.

2. At the bottom of the food pyramid we find:

- a. sweets
- b. dairy products
- c. cereals

3. True or False:

Don't over-eat meat, eat it in moderation.

4. Livestock farming leads to:

- a. increased carbon emissions
- b. pollution
- c. both

5. True or False?

Studies have shown that dairy and meat production has a low environmental impact.

6. Complete the following statements:

- a. Consume dairy products and meat with.....
- b. Include nuts, peanuts, seeds in.....
- c. Consume fatty foods, sweets, chocolate, juices.

7. Avoid eating foods that have undergone lengthy, energy-intensive processing. These ultra-processed products are responsible for:

- a. the development of complex diseases (e.g. diabetes)
- b. environmental problems
- c. both

8. A sustainable dessert can be:

- a. an ice cream
- b. a fruit salad
- c. a chocolate cake

9. A sustainable diet means first and foremost

- a. eliminate fats from our food
- b. eat as much fruit and vegetables as possible
- c. do as much sport as possible

10. Avoiding excessive food consumption can be achieved by:

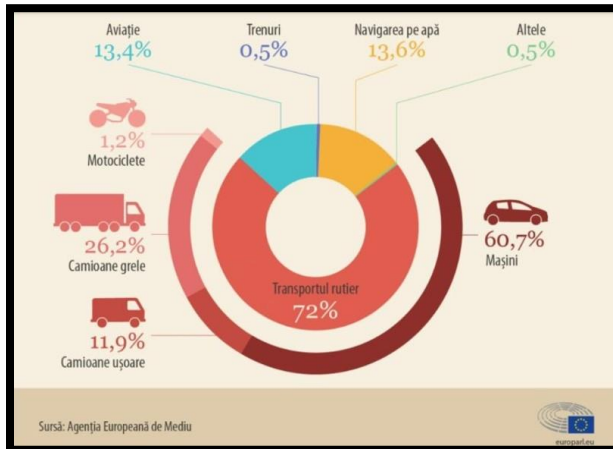
- a. rarer purchases
- b. adapting food portions to our needs
- c. avoiding shopping that we don't immediately need

9

Fun facts & Did you know that...

Ecological footprint reduction solutions

Mobility & transport



Transport is the source of almost 30% of total EU CO2 emissions, 72% of which come from road transport.

The amount of CO2 emitted by passenger transportation varies greatly depending on the mode of transport. Private cars pollute the most, emitting 60.7% of total CO2 emissions from European road transport.

In Romania, the transport sector has grown rapidly by 36% since 1990, despite accounting for only 12% of total GHG emissions.

Transport accounts for a large share of emissions. In particular car, truck, and plane traffic. There are 7,000,000 cars in Romania, many of which are old. By 2030, the EU wants to reduce the number of combustion-engine cars by 55%.

If all Europeans cycled like in Denmark, where an average person rides 965 km per year, then GHG emissions in the EU would fall by 25%.

It has been shown that for distances of up to seven kilometres in the city, it is faster to cycle than by any other transport.



Reflect: Which statement has surprised you the most? Why?

9

Useful information

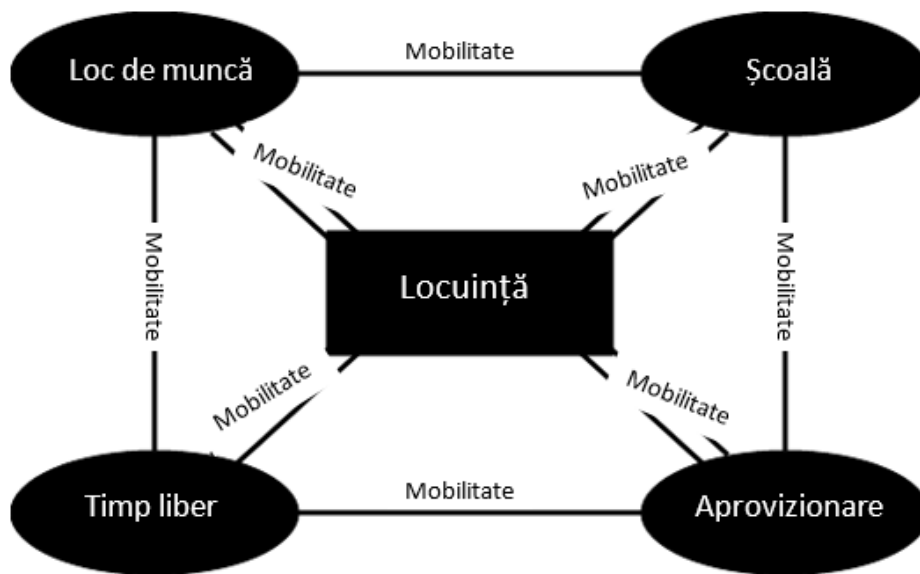
Ecological footprint reduction solutions

Mobility & transport

Transport is one of the main causes of greenhouse gas emissions. Greenhouse gas emissions from transport generally come from the burning of fossil fuels for cars, trucks, ships, trains and planes, accounting for more than half of all transport emissions. More than 90% of the fuel used for transport is oil-based, mainly petrol and diesel. The rest of the transport sector's greenhouse gas emissions come from other modes of transport, including freight trucks, commercial aircraft, ships, boats and trains, as well as pipelines and lubricants.

Did we realise that if we walk or cycle more, we will have a healthier, more sustainable, more attractive, safer, more dynamic, and livelier environment? So what are we waiting for?
Jan Gehl

Our society is characterised by unprecedented mobility. In our daily lives we move to many different places: school, work, the supermarket, with friends on the sports field and, of course, at home. The figure below schematically shows these places. What connects them are the roads we travel.



Transport is the biggest source of CO2 emissions in the EU, making up 30% of all emissions. There are several options for getting around, which can have a major impact on the environment and climate. In terms of environmental impact, there is a big difference between walking, cycling, taking public transport, or driving. The number of people in a vehicle also matters: compare 30 people each in their own car with 30 people in a bus.

9

Practical activities

Ecological footprint reduction solutions

Mobility & transport

1. Which of the following means of transport produces the most CO₂? Bicycle, plane, SUV, train or electric car? Compare your ideas with the information in the text below.

If we cycle 1000 kilometres, we use 45kg of CO₂ emissions (the manufacture of the bike and tyres also requires energy).

A train emits almost 100kg CO₂ for the same distance, an electric car 225kg CO₂ and a plane 552kg CO₂. So when we fly by plane, we produce five times more emissions than when we travel by train. That's a lot, isn't it?

Rank these activities in ascending order of pollution (from least to most polluting).

2. We have seen that different means of transport emit different amounts of CO₂. Have you ever wondered which means of transport are the most environmentally friendly? Match the two columns and find out the answers.

1. Ferries are

2. In terms of pollution, ferries are

3. Airplanes produce five times more emissions

4. Trains are

5. Cycling is

6. Walking is



a. a clean form of transport but can be used over relatively short distances.

b. the biggest polluters.

c. a more environmentally friendly form of transport.

d. than the train

e. the cleanest form of transport but can only be used over short distances.

f. followed by planes and cars.



9

Practical
activities

3. Read the following text and complete the table with the advantages and disadvantages of electric cars:

The biggest advantage of electric cars is that they produce no polluting emissions. They use a renewable resource, which can be obtained by eco-friendly means that do not endanger the environment. This can help us reduce air pollution and its effects on our health. Electric cars are quiet and therefore do not contribute to noise pollution in cities. Even though this can be a problem because it makes them harder for pedestrians to see, electric cars have technology that automatically stops them when they sense an obstacle. The electric car is cheaper to maintain because it has fewer parts, which means cheaper servicing. Electric cars require maintenance, but this is paid for by fuel savings. **Electricity costs are low**, with prices for any electricity consumed ranging from 30 to 60 lei. The cost of a 'full tank' of electric cars is much lower, compared to 5-10 litres for a fuel car. Electric cars are exempt from annual tax.


On the other hand, the purchase price of an electric car tends to be high because it uses new state-of-the-art technologies. For example, a classic car can sell for around €10,000 while its electric equivalent can go for €25,000-30,000. A smaller, cheaper electric car at €17,000-23,000 is not comfortable. The range of an electric car is much less because electric cars need to be charged much more often. Every trip has to be planned and all charging stations (which are few) have to be identified. In our country there are 400 charging stations, but they are not evenly distributed, and their charging capacity is 2-3 cars. A charge takes 30 minutes. Electric car breakdowns are quite rare, but they are very expensive, close to the price of the car.

Advantages	Disadvantages

4. As a group, conduct a survey on how your classmates travel to school, what means of transport they use, how many people are on that means of transport. Involve the whole school. Then analyse the results. Together identify sustainable solutions. Draw up an action plan with proposed solutions for sustainable, cheaper mobility, including all pupils in the school. Promote the ideas and involve colleagues in their implementation. Apply the same questionnaire after some time and compare the results (fuel savings, costs). Promote the activity locally (Inspectorate, town hall, press) and involve other schools.



5. Matches definitions with concepts:

1. Mobility		a. a colourless gas, also present in the atmosphere (about 0.04%). It is one of the most important greenhouse gases.
2. Transport		b. a component of environmental pollution, produced by noise.
3. Renewable resource		c. the ability to move, to move.
4. Noise pollution		d. fuels formed from the fossilised remains of dead plants and animals (coal, oil, natural gas).
5. Fossil fuels		e. the increase in temperature on Earth due to the action of gases, some of them man-made, which absorb infrared radiation, causing the Earth's surface and the surrounding atmospheric layer to heat up.
6. Greenhouse effect		f. resources that are normally replenished and cannot be depleted by consumption.
7. CO2		g. branch of the national economy comprising road, air and sea means of transporting goods and people.

6. Debate: Electric or conventional cars? Set the rules of the discussion adopted by the majority. No discussion of opinions that are not argued.

Organising the debate: There are two groups: electric car supporters/conventional car supporters.

Preparing arguments: Each group prepares two arguments that are justified (example, explanation or description).

Presentation: Arguments are presented in turn by each group. During the presentations, each group identifies two weaknesses in the opposing team's presentation. The justifications are prepared.

Rejecting the arguments: Each group takes turns presenting two weaknesses of the opposing team and dismantling them in public. Voting (a jury may also be chosen to observe the debate).

Briefing: The conclusions are discussed, what you have learned, what car you will choose as an adult.

6. Read the following problem situations and in pairs choose the most suitable solutions for you for sustainable transport:

a. Air transport produces the largest amount of CO2. What can we do?

Avoid domestic/short-haul flights
Those who fly a lot by plane should seriously save elsewhere.
Always fly direct and as infrequently as possible.
So you should always calculate when you need to fly.
Sustainable travel means seeing the beautiful places along the way that others just fly over.

b. I live far from school, so my parents use the car. What can I do?
Use the car less often, especially in town.
Use public transportation.
Share the car with other colleagues who live in the same area.

7. Go to site www.worldometers.info Write down the data for Government & Economy on car and bicycle production.

What have you noticed? How many cars and how many bikes are produced? What do these figures suggest to you? As a group, discuss what you could do. How you could encourage your colleagues to cycle (think about the benefits of cycling)

Create a poster on the benefits of cycling. Vote for the most convincing posters and display them in the school on the notice board or on the school website. *Remember:* to be able to ride a bike on public roads you must be at least 14 years old, know the rules of the road and be properly equipped, but you can learn to ride a bike at any age.

8. Organise a competition with video creations demonstrating your actions to protect the environment.

Every one of our daily decisions about how we move from place to place can have an impact on the environment and make it cleaner and healthier. Ask your colleagues: How did you go to school today? By car, bike or public transport? Film best practices and promote them.

9. 100% Cycling School

Think about turning your school into a school for bike-friendly students. Share this idea with your school leadership and teachers. Organise a competition for solutions to create a place where pupils can learn to cycle. Write a tweet about how you could take action and encourage suggestions from colleagues. Draw up an action plan with proposed solutions. Ask for support and collaborate with schoolteachers. Promote the activity locally (Inspectorate, town hall, press) and involve other schools.





9

Test

1. Which means of transport pollutes most in cities?

- a. private cars
- b. buses
- c. trams

2. What is the source of greenhouse gas emissions from transport?

- a. heat
- b. burning fossil fuels for cars, trucks, ships, trains and planes
- c. electricity

3. Which of the following are not fossil fuels?

- a. coal, oil
- b. natural gas
- c. ultraviolet radiation

4. What is the cleanest form of transport?

- a. walking
- b. cycling
- c. travelling by car

5. True or False?

- a. the biggest advantage of electric cars is that they produce no polluting emissions.
- b. electric cars require affordable maintenance.
- c. electric cars are exempt from annual tax.

6. How can we control vehicle exhaust emissions?

7. Which of the following actions should be avoided for sustainable transport?

- a. public transport
- b. short-distance (1-2 passengers) car travel in the city
- c. long-distance car travel in town (1-2 passengers)
- d. cycling
- e. walking

8. Name two ways you use for sustainable transport.

.....
.....

9. What would be two strong arguments to convince your colleagues to cycle?

.....
.....

10. Correct any possible mistakes:

- a. electric cars are expensive. Their price varies according to size. A small electric car is cheaper but not comfortable.
- b. Electric cars have a short range and need to be charged more often.
- c. there are many efficient charging stations for electric cars.
- d. the amount of CO2 emissions from passenger transport is the same for all means of transport.



10

Fun facts & Did you know that...

Ecological footprint reduction solutions

Reduce, reuse, recycle



More than 300 million tonnes of plastic are produced every year. At least 14 million tonnes of plastic waste ends up in the oceans. Plastic is found in 80% of the waste identified.

Each year, approximately 1.15 to 2.41 million metric tons of plastic enter the ocean, eventually forming the Pacific Garbage Island, which is three times the size of France.

Plastic waste never fully decomposes and so will end up in the soil, oceans, animals, plants and even our own bodies.

The average person consumes 5g of plastic a week, about the size of a credit card.

For every 10,000 tonnes of rubbish from landfills, one job is created. The same amount creates 10 jobs if the materials are recycled, and 75 jobs if the materials are reused.

Paper decomposes in 5 months, cardboard in 5 years and plastic bags partially decompose in 10-12 years.

75% of waste can be reused and recycled!

Reflect: Which statement has surprised you the most? Why?

What is *rubbish*? Rubbish is everything we no longer need and want to dispose of. Here are some ways to reduce, reuse and recycle rubbish. Rubbish wasn't always rubbish. It was something we used (a newspaper, a PET bottle, etc.). Discarded materials are renewable or recycled, but there are also materials that cannot be reused or recycled. These are burned or landfilled. Organic waste can be turned into fertiliser for plants. New glass can be made from old glass. The same goes for paper, textiles and plastics. This can only happen if the rubbish has been properly separated. Incorrectly separated rubbish can be incinerated and often ends up directly in nature.

There is no such thing as garbage, just useful stuff in the wrong place.

Alex Steffen

Rubbish in nature

We don't want rubbish, nature wants it even less. If rubbish is dumped in nature, it has consequences for plants, animals, and us humans. Chemicals can leak from electrical appliances, for example, poisoning and killing animals and plants. Old plastic bags are often eaten by animals, who then have no space for real food because of their stomachs full of rubbish and so starve to death. Under the influence of solar radiation, wind, etc., plastic breaks down into small particles (microplastics), which are then spread in nature and ingested through breathing or feeding by animals. Some plastic substances are carcinogenic. More and more people are volunteering to clean up the environment from randomly discarded plastic waste. But the best way to remove plastic waste from nature is to make sure it doesn't end up there.

Reduce, reuse, recycle

How waste should be treated to protect the environment is shown in the waste hierarchy pyramid. Waste reduction is in the first and highest field of this pyramid. For example, using a bag more than once generates less rubbish. The second field in this hierarchy is resource reuse. Plastic bottles that are refilled and reused are another good example. Another form of reuse is upcycling. An old jar can be transformed into a flowerpot by repurposing it. You can often turn old objects into real art objects, such as furniture or even clothing.



Recycling comes in third place in the waste hierarchy, for example, plastic recovered from PET bottles used to make new plastic bottles. Ideally, the recycling stage would be at the top of the pyramid. Unfortunately, a lot of waste remains, which has to be burned or landfilled. Either way, climate-damaging greenhouse gases are released, and valuable raw materials are destroyed. For this reason, these strategies should be avoided wherever possible.

10

Practical activities


Ecological footprint reduction solutions

Reduce, reuse, recycle

1. Group the following objects that we throw into the given categories: a banana peel, plastic cup, an iron, newspaper, plastic rings, magazine, paper napkin, a can of fish, notebook, a can of coke, old bread, an old doormat, a bottle, plastic stopper, a plastic bottle, a paper bag, a plastic bag, a cotton sock, a plastic cup, a wool sock, disposable cutlery, food scraps, batteries, plastic toys:

1.Paper	2.Plastic	3.Textiles	4.Metal	4. Household waste	5.Glass	6. Special places for recycling-hypermarkets (batteries)

2. Match the definitions with the concepts

<p>1. waste _____</p> <p>2.renewable _____</p> <p>3.compost _____</p> <p>4. biodegradable _____</p> <p>5. recyclable _____</p> <p>6. the three r's _____</p> <p>7.polystyrene _____</p> <p>8.carcinogenic _____</p>		<p>a. which can be degraded/decomposed by biological factors _____</p> <p>b. which can cause cancer _____</p> <p>c. remainder, part that remains _____</p> <p>d. natural agricultural fertiliser, resulting from the fermentation of some residues _____</p> <p>e. solid, colourless, transparent, highly chemically and electrically resistant plastic material _____</p> <p>f. which is put to another use _____</p> <p>g. reduction, reuse, recycling _____</p> <p>h. which can be regenerated, remade _____</p>
---	--	---

3. Complete the following table and discuss it with your desk mate and then with other classmates:

	Reduce/use less/share with others	Reuse/ Use more than once	Recycle	Repair	Refuse
What it means	Buy/use less	Use again	Give another use	Fix it when it breaks	Say no if...
Example	Buy fewer books! Organize a small classroom library with your books!	Write on both sides of a sheet of paper/notebook.	Use a plastic cup as a pen holder!	Sew the shirt that ripped! Don't throw it away!	Don't use a straw to drink a soda!
Your example					
The example of your colleague					
Other examples in class					



10

Practical activities

Ecological footprint reduction solutions

Reduce, reuse, recycle

4. True or False?

Read the text below and then decide whether the sentences accompanying the text are true or false.

Each material can be recycled, but we don't recycle all materials for various reasons. It is cheaper to use new materials, recycling material is too expensive (each recycling process requires large amounts of energy), material is available in too small quantities, it is difficult to separate from other materials, etc.

The recycling of the material also depends on how many components it is made of. If the product is made from a single material, recycling is simple: newspapers that are made only of paper, bottles, PET bottles that can be recycled into new PET bottles. But most products are made of several materials and cannot be separated into their individual parts: some paper packaging is often covered with plastic. If you have a choice, choose plain packaging.

The new trend in design, "Design to recycle", looks from the start of product development at how the product can be recycled after use. This means, for example, that it can be easily separated into its component parts or is made up of few materials.

Recycling generally takes place in industrial plants. But the most important step is taken in our households where the waste must first be separated and sorted properly. Incorrect sorting of rubbish in a recycling plant requires a lot of technical effort, or sometimes manual sorting which is often not done anymore. So the better we separate the waste, the better it can be recycled afterwards.

Until recently, rubbish was dumped in a landfill. This is not advisable because toxins from the waste can leach into the soil and organic materials (organic waste or paper) start to rot and methane is produced. Methane is a greenhouse gas that is 20 times more harmful than CO₂ and very dangerous for the climate, animals, plants and humans. That's why landfilling household waste is now banned in the European Union. A less problematic alternative is burning waste with its consequences: the release of CO₂, which as a greenhouse gas contributes considerably to climate change.

a. It's relatively easy to recycle garbage because it can be recycled.

b. Recycling depends on the materials of the discarded items.

c. All paper packaging is easily recyclable.

d. Recycling PET bottles does not produce new PET.

e. According to the principle, "Design to reuse," products are designed to be recycled.

f. The simpler a material is, made up of fewer elements, the easier it is to recycle.

g. Each of us is responsible for recycling because it starts at school.

h. Recycling starts with proper sorting of garbage.

i. Incorrect sorting of rubbish makes it impossible to recycle.

j. Disposal of household waste is not hazardous to humans.



10 Practical activities

5. Make a list of things you can donate instead of throwing away. Together with colleagues identify a place where you can donate them and donate them. Share your experience with colleagues through a video.

6. What materials can be recycled? Read the list and group (recyclable/non-recyclable materials): used napkins, toilet paper, newspapers, magazines, flyers (promotional flyers), notebooks, books, beer and juice cans, tinned food, completely emptied deodorants (sprays), jar lids, dirty or dirty cans (these should be rinsed first), metal cans or tins contaminated with various substances (with paints or other dangerous products), dirty aluminium foil, PET plastic bottles, cans of products containing plant fertilisers or pesticides, jars (without lids), glass cosmetics, bottles of wine and other glass packaging, mirrors, window panes.

For solutions, please visit:

<https://medium.com/earthfluence/ghid-de-reciclare-2020-9f342399c801>

Discussion. What surprised you? What should we do with old books, old plastic toys or plastic bags? What happens to them once they end up in the bin? Can they be reused? How?

7. Read the following article about a high school student who makes clothes from recycled materials. Make a short presentation of this idea (poster, video, message). What about you? What uses do you have for these materials? You could apply this idea to your school?

Articol: https://adevarul.ro/locale/targu-jiu/video-liceanul-haine-numai-materiale-reciclabile-lucraza-exclusiv-manual-doar-acul-ata-1_5ed64b225163ec42716bb065/index.html

8. Questionnaire As a group do a small survey on paper consumption and apply it at home and then to another class in the school. *How much paper do you use? Do you recycle it? How? Does this concern you? Do you recycle paper at school? How?* Publish your results on your school's online page. Popularise paper collection and reuse/recycling methods.

9. What problems does plastic cause in water? What do you know about the Great Plastic Island in the Pacific Ocean? As a group, go to one of the websites and make a poster on this topic including your solutions. <https://www.mediafax.ro/life-inedit/video-descoperirea-unui-inotator-care-s-a-scurfundat-in-marea-insula-de-gunoaie-din-pacific-18664031/>

Great Pacific Garbage Patch, <https://www.nationalgeographic.org/encyclopedia/great-pacific-garbage-patch/>

10. Video. The things we buy have a limited life and end up in the landfill quickly. As a group make a short video about ways to reuse, repair or recycle such things.





10 Test

Ecological footprint reduction solutions

Reduce, reuse, recycle

1. Which waste never goes away?

- a. glass
- b. plastic
- c. metal

2. What is the basis for proper recycling?

- a. correct sorting in the household
- b. reducing litter
- c. the introduction of waste containers

3. True or false?

- a. Reuse involves treating a waste to be used for the same purpose as it was originally intended.
- b. Recycling involves using the waste for a different purpose than the original purpose.

4. Why is rubbish dangerous?

- a. pollutes soil, water, air
- b. is fatal to life, plants, animals, humans
- c. both

5. In the waste hierarchy pyramid

- a. recycling of waste comes first
- b. first is waste reduction
- c. waste reuse comes first

6. Burning waste is dangerous because

- a. valuable raw materials are destroyed in the process
- b. it creates climate-damaging greenhouse gases
- c. both

7. How do you deal with flyers or advertising gifts?

- a. do not accept flyers or advertising gifts
- b. write down the information that interests you from these flyers
- c. both

8. What is the best thing you can do about rubbish?

- a. reduce it as much as possible
- b. incinerate it
- c. store it in designated areas

9. How can you reduce litter?

- a. avoid disposable products
- b. buy products that are easy to recycle
- c. both

10. Which materials are non-recyclable, and you should avoid?

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



11

Fun facts & Did you know that...



Ecological footprint reduction solutions

Let's dress sustainably

Do you buy your clothes responsibly? Here are a few reasons to make your choice towards responsible consumption!

80 billion clothes are bought worldwide every year, 400% more than 20 years ago.

The fashion industry is now the world's second largest source of pollution after the oil industry, contributing 10% of global carbon emissions.

Women make up 85% of people working in textile factories and can earn the lowest wage of \$3/day.

Before 1850, 70% of women made their own clothes.

92% of women have at least one item of clothing they have never worn.

Louis Vuitton is said to burn his old bags to preserve the brand's absolute exclusivity.

A middle-income person buys 60% more clothes than 15 years ago.

What's more, 15 years ago clothes were worn for twice as long as they are now.

It takes 10 times less energy to produce a tonne of steel or glass than a tonne of clothes.

Reflect: Which statement has surprised you the most? Why?

11 Useful information

Ecological footprint reduction solutions

Let's dress sustainably

What are you wearing now? What are your criteria for choosing your clothes? Have you thought about the impact your clothing has on the environment and the people who produce it? In this chapter, we want to take a closer look at this topic. We also want to give you some tips on how to make your outfit as sustainable as possible.

Sustainable fashion is not a fad, it's the future.

Antonia Böhlke,
founder and editor of
MOCHNI magazine

The fabrics of your clothes

I bet if you look at the materials your clothes are made of, you'll see cotton at least once. Cotton is the most common textile in the world, but it is also the most problematic material in terms of production: the amount of water needed, the insecticides used, the production process, etc. Other natural fabrics such as linen, hemp, vegetable silk or wool are not perfect either; there are many issues to consider: the pesticides and insecticides used, the conditions in which animals are kept, their feed, the space needed for wool production, etc.

Synthetic fibres (polyacrylic, polyester or elastane) are also used but, from a sustainable consumer and environmental perspective, synthetic fibres should be avoided in clothing. In the following we would like to list different ways you can make your clothing more sustainable.

Fast Fashion (Consumer Fashion)

Did you know that the fashion industry is making an important contribution to the global climate crisis? The new trend, Fast Fashion, which promotes cheap, modern clothes, encourages us to buy as much as we can, as often as we can, and to ignore the environmental consequences of this behaviour.

Donating clothes seems like the smartest alternative, but appearances can be deceiving too. Bringing donated clothes to a developing country often prevents the country's own fashion industry from growing because its own products cannot be sold because people have already received donated clothing for free. Only what is needed should be donated.

Slow Fashion

Slow Fashion developed as a counter-concept to Fast Fashion. Slow Fashion opposes the short and fast life cycle of a garment with all its consequences. The aim is to use a garment as long as possible and avoid buying new clothes. Under this concept, clothes are repaired and passed on, which was considered normal until recently.

Slow Fashion and sustainable living is not about sacrifice or giving up, but about realising that things can be done differently than we are used to and that our actions should not do any harm to this planet.

Slow Fashion means:

- natural (organic) materials are used.
- produced with care for the environment and people.
- the production process is safe for skin and the environment.
- the materials come from safe sources.
- products can be used for a long time, they do not go out of fashion.
- production is not mass-produced (with an extremely limited number of collections launched)

11 Practical activities

Ecological footprint reduction solutions

Let's dress sustainably

1. Complete the following statement:

Ways you can dress more sustainably. What are the Slow Fashion rules?

Shopping is done according to needs¹. Identify your real needs, what you really need. Look in your closet and see which clothes you wear most. What matters and deserves to be²? Choose quality: a coat made of³ will cost more, but will last over time. Buy⁴ and less: buy only what is necessary. Give up the desire to buy⁵. Preserve,.....⁶: if your clothing is well kept, it will have a long life!

Reflect and discuss with colleagues: What rules do you already follow? Which rule is harder to follow? Why? What can you do to integrate it into your lifestyle?

2. Textile materials and environmental issues. Read the statements and choose the correct answer:

A. Wool is a biodegradable and durable material. But animals don't always enjoy the right conditions. Especially in industrialised livestock farming, it is not the welfare of the sheep that matters, but only the production. In some countries, an operation to remove the skin around the sheep's tail to avoid future infection with fly larvae is widespread. This painful and barbaric procedure is performed without anaesthesia!
Wool production requires a lot of space. Forage crop production requires large areas for cultivation. Forests are sometimes cleared, or other natural ecosystems are destroyed to make way for pasture.

1. Why is the operation to remove the skin around sheep tails considered painful and barbaric?

- a. only local anaesthesia is used
- b. no anaesthesia is used at all
- c. not mentioned

2. How are the necessary pasture spaces obtained?

- a. clearing forests
- b. destruction of natural ecosystems
- c. both

B. Cotton is the most widely used, but also the most problematic material used in clothing. First of all, cotton needs the sun and very large quantities of water: between 7000 and 29000 litres of water/kg of cotton, making it by far the most water-intensive crop. Secondly, cotton is mainly grown in areas where there is not much rainfall, as it is difficult to harvest in wet weather because the fibres stick together. Cotton production, like many branches of the textile industry, takes place in developing countries where environmental regulations are weak. Many fertilisers and pesticides are used and workers work in poor conditions and receive low wages. The Aral Sea is a terrifying example. Once the fourth largest lake in the world, it has shrunk by 90% in two decades because of cotton, which is grown around it on a large scale. The local population initially benefited from the cultivation, but now has to live with the consequences.

1. What is not necessary for growing cotton?

- a. a large amount of water
- b. shade
- c. rain

2. Why is cotton generally grown in areas with little rain?

- a. not mentioned
- b. cotton does not need much water
- c. it is easier to harvest

11

Practical activities

Ecological footprint reduction solutions

Let's dress sustainably

3. Auction

Work in groups. Each group gets a sheet of sentences, only some of which are correct, and "100 lei" with which you can "buy" the sentences. Analyse the correctness of the sentences in each group and "buy" sentences by "bidding". The sentence goes to the group that gives the most. At the end analyse and discuss each sentence. The group that bought the most correct sentences and lost the least money wins.

True or False?

1. Cotton is the world's most common textile. 43% of all clothes in the EU are made of cotton.
2. Wool is a good material but not durable.
3. Donating clothes is the most sensible and appropriate alternative for clothes we no longer need.
4. Fast Fashion encourages consumers to use natural and artificial materials that are durable and pleasant to wear.
5. Slow Fashion assumes that the number of collections launched is limited and that garments are of quality and can be used for a long time if kept.
6. Consumer fashion has promoted new styles of fashionable clothes at very low prices and has led to a substantial increase in the amount of clothes being produced and thrown away.
7. From a sustainable perspective, synthetic fibres do not pose problems in terms of consumer and environmental protection.
8. Natural fibres enter the environment in the form of microplastics and then into animals and are ingested by humans.
9. The unprecedented global climate crisis is also fuelled by the fashion industry.

4. Match the definitions with the concepts



Concept

1. Slow fashion
2. Fast fashion
3. Synthetic fibres
4. Natural fibres
5. Sustainability
6. Microplastics
7. Natural ecosystems
8. Biodegradable

Definition

- a. Fibres made from synthetic organic raw materials, the most important being polyamide, polyester and polyacrylonitrile fibres.
- b. The ability to exist and develop without depleting natural resources.
- c. Plastic particles smaller than 5 millimetres found anywhere in the environment, food, water.
- d. The collection of living organisms that are related to each other in the physical environment in which they grow.
- e. Fashion that encourages consumers to buy cheap, modern clothes but quickly goes out of fashion.
- f. Textile fibres made from natural materials obtained by mechanical processing: weaving, knitting.
- g. Fashion based on respect for people, the environment, and animals.
- h. Material that can decompose naturally.

11

Practical activities

Ecological footprint reduction solutions

Let's dress sustainably

4. Anagrams

Arrange the letters in the following combinations to find words related to the theme of this chapter:

1. FlosH Sawion (2 words)	S F
2. ctehtsyni	S
3. urebdal	DU
4. nsaleuatsbi	S
5. ahosnfi	F
6. leshcto	C
7. ganoric	O
8. macpiat	I

6. Debate: Fast vs. Slow fashion? Set the rules of the discussion adopted by the majority. Do not discuss opinions that are not argued.

Organisation of the debate: Two groups are established: **Fast fashion/Slow fashion supporters.**

reparation of arguments: Each group prepares two arguments that are justified (example, explanation or description).

Presentation: The arguments are presented in turn by each group. During the presentations, each group identifies two weaknesses in the opposing team's presentation. The justifications are prepared.

Rejecting arguments: Each group takes turns to present two weaknesses of the opposing team and to dismantle them in public. Voting (a jury may be chosen to observe the debate).

Briefing: The conclusions are discussed, what has been learned.

7. Project/Poster: Work in groups. Choose one of the topics below, discuss and produce a PPT presentation or poster to present to your colleagues. Post your best work on the school notice board and/or school website.

How can I dress sustainably?

What materials should we buy our clothes from?

Materials used in clothing - advantages and disadvantages

The Aral Sea - environmental disaster



11 Test

Ecological footprint reduction solutions

Let's dress sustainably

1. What are the most used fibres in clothing?

- a. synthetic fibres
- b. cotton
- c. wool

2. Why should synthetic fibres be avoided in clothing?

- a. can cause health problems (toxic, can cause allergies, dermatitis)
- b. they are not biodegradable
- c. both

3. Why Fast Fashion should not be followed?

- a. it promotes chaotic, impulsive consumption that does not correspond to needs
- b. it promotes consumption that ignores the environmental consequences of this behaviour
- c. both

4. Which of the following does not characterise Fast fashion?

- a. the products being promoted are the latest fashions
- b. cheap production of mass-produced clothes
- c. its products are very durable.

5. How is the cheap clothing production promoted by Fast Fashion achieved?

- a. no pesticides and fertilisers are used
- b. low worker wages, very low safety standards, savings
- c. its products are very durable

6. Which of the following does not characterize Slow fashion?

- a. products made of organic materials can be used for a long time, they do not go out of fashion
- b. products made from organic materials are not mass produced
- c. organic products are cheap

7. Why is donating clothes not always a sustainable solution for recycling clothes?

- a. not mentioned
- b. can hinder the development of the local textile industry
- c. does not encourage consumer fashion

8. Why is the Aral Sea considered an environmental disaster?

- a. Massive irrigation for cotton cultivation has turned the lake into a sandy desert (90%)
- b. natural ecosystems have been destroyed
- c. both.

9. What are the criteria for clothes shopping?

- a. according to needs and not impulses of the moment
- b. according to the desires of each buyer
- c. there are no criteria

10. What are the qualities of sustainable clothing?

- a. Quality, sustainable clothing made from organic materials whose production takes into account care for the environment and the consumer
- b. modern clothes in shops
- c. cheap clothes made of natural and synthetic materials that are pleasant to wear

12

Fun facts & Did you know that...



Ecological footprint reduction solutions

Waste electrical and electronic equipment (WEEE)

Global internet traffic is set to grow by over 40% in 2020, driven by the growth of video streaming, video conferencing, online gaming and social networking.

Since 2010, the number of internet users worldwide has doubled, and global internet traffic has grown 15-fold.

More than 160 million laptops (rising to 250 million during the COVID pandemic) were produced each year.

The IT industry produces as much greenhouse gas as the entire airline industry.

The IT industry contributes 1.4% to 5.9% of global CO₂ emissions, rising to 14% in 2040.

You can reduce your environmental footprint by buying a sustainable IT device.

CO₂ emissions during the production of a laptop are around 331 kg.

The majority of CO₂ emissions come from the production and materials used for the motherboard, SSD and monitor to produce a laptop. At the same time 190,000 litres of water are consumed and mercury, lead, chromium and other heavy metals are used.

A Google search generates about 7g CO₂. Viewing a simple text-only web page emits 0.02g CO₂ per second.

Running a desktop generates between 40g and 80g CO₂ per hour.

AssassinsCreedOdyssey is considered the most energy-intensive game of all time, with an average completion time of 40 hours and 24 minutes.

Reflect: Which statement has surprised you the most? Why?

The use of electrical and electronic equipment

The use of electrical and electronic equipment consumes energy. Therefore, devices should always be switched off to save energy for sustainable consumption.

Listening to a video uses 33 times more energy than listening to it on a music streaming service. According to a survey by Bitkom, 59% of YouTube is used to listen to music, which consumes a lot of energy and generates CO2 emissions.

Cloud storage seems useful and modern. But these services consume more energy than we think. External hard drives may be a better alternative, especially when you consider data security. You can also build your own cloud at home (but this is very complex).

Surfing the internet consumes a lot of energy. We should be aware that every search uses electricity.


Smartphones require a lot of resources and electricity to operate. A new smartphone might be cool, but is it really necessary? Can't you turn to smart settings instead of making an unnecessary new purchase? Can't you save money?

Recycling of old devices

Any old equipment (that has broken down, is no longer in use) that plugs into an outlet, has a cable, battery or circuit board can be called WEEE (waste electrical and electronic equipment). If it fits this description, you know it should go to recycling.

Globally, less than 20% of e-waste is formally recycled, 80% either ends up in landfill or is recycled informally.

In addition to health impacts and pollution, improper management of e-waste results in a significant loss of raw materials such as iron, silver, copper, aluminium, as well as rare and valuable materials such as gold, platinum, cobalt and rare earth elements. Through recycling, we recover over 98% of materials, saving natural resources.



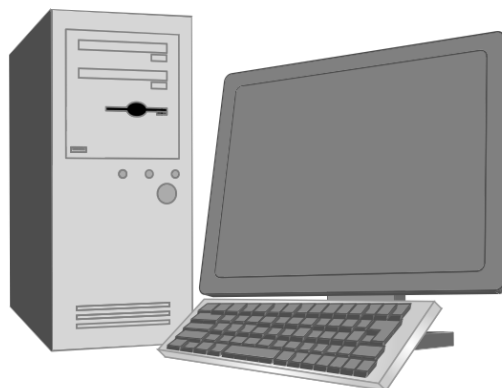
Responsible, sustainable consumption: the consumer is aware of the environmental impact of the goods/services used and protects the planet's resources by reducing consumption of natural resources, generation of materials and the emission of waste and pollutants.

WBCSD (World Business Council for Sustainable Development)



1. Which device consumes less energy: a laptop or a computer? Why? Read on to find out:

A laptop consumes between 19 and 60 watts/day during moderate activity, about 70% less than a desktop computer because the monitor is included, the microprocessor is efficient, and it extends battery life. A desktop computer consumes between 60 and 250 watts per day. Switching off the computer's power reduces CO2 emissions by 83%, around 63 kg per year.



2. How can you reduce the power consumption of a laptop? Monitor your daily electricity consumption and record the running time of your personal laptop over 10 consecutive days. Reflect and discuss with colleagues. **What are the costs of the electricity consumed? What steps can you take to reduce consumption? Survey your colleagues and write down their answers then make a poster to display on the school website.**

3. Is the mobile phone responsible for CO2 emissions? Which device has higher emissions, the mobile or the laptop? Read the statement to find out and then decide whether the sentences accompanying the text are true or false.

According to researchers at McMaster University in Canada, carbon emissions from smartphones exceed emissions from laptops or computers; emissions increased from 17 Mt CO₂e per year to 125 Mt CO₂e per year, an increase of 730%.

Mike Berners-Lee* writes that in 2020 there were 7.7 billion phones in use, producing 1% of all CO₂ emissions, but the figure is growing. Taking into account the manufacturing process, the networks and data centres that smartphones connect to, and the electricity used, it can be said that:

- - mobile phone used one hour a day produces 63 kg CO₂e per year.
- - mobile phone used 195 minutes on average per day produces 69 kg CO₂e per year.
- - mobile phone used 10 hours a day produces 86 kg CO₂e per year.

* British researcher and expert concerned with greenhouse gas emissions from people, institutions.

True or False?

a. Emissions from laptops or computers are lower than CO ₂ emissions from smartphones.	A/F
b. CO ₂ emissions from smartphones have seen negligible growth in recent years.	A/F
c. The assessment of CO ₂ emissions from smartphones takes into account the manufacturing process, the networks and data centres to which smartphones connect and the electricity used.	A/F

12 Practical activities

Ecological footprint reduction solutions

Waste electrical and electronic equipment (WEEE)

4. Discuss the following statement as a group and express your opinion.

A study by University of East London engineer Rabih Bashroush shows that the streams of Justin Bieber's Despacito video with Louis Fonsi produce 250,000 tonnes of CO₂ and consume more electricity than Chad, Guinea-Bissau, Somalia, Sierra Leone and the Central African Republic combined in a year!

5. How can we reduce the CO₂ emissions of a mobile phone? Read the following suggestions. What would you add? Consult your colleagues.

- reduce energy consumption
- use auto adjustment settings from HD to a lower resolution if a higher quality image is not required
- disable automatic downloads for applications
- disable cloud backups if not needed

6. What happens to the electrical and electronic appliances in our home that have broken down or are no longer useful? Match the two columns to find out:

1. What do we do with the appliances in our home that we plug in and at some point, have broken down or are no longer useful to us?

2. Why it's not a good idea to throw away waste electrical and electronic equipment at random?

3. It is possible to recycle these appliances?

4. What are the requirements for WEEE to be recycled?

a. These appliances are generally recycled.

b. These old appliances become waste electrical and electronic equipment (WEEE). We have to return them either to specialised centres or to shops when we buy a new product.

c. A WEEE waste is recyclable if it meets at least one of the following requirements:

- it is inserted into the socket.

- it uses batteries.

- requires charging.

- it has an image of a wheeled bin with an "X" cut into it 

d. WEEE is not thrown away. They are handed in for recycling because they contain either substances hazardous to human health or precious metals (gold, silver, platinum and palladium), as well as copper, aluminium and plastic. If properly recycled, these valuable materials are reused as secondary raw materials.

7. Because of the substances they contain, WEEE is hazardous to the environment. They must therefore be handed over to specialised collection points for recycling. **Do you know where these centres are in your locality? As a group, do some research on the internet to find out where the nearest point is. Investigate which WEEE can be handed in at school or at home and organise an action. Make a video to share on the school website.**



8. Refurbished smart phone - World School Debate - a new phone versus a recycled phone

A refurbished phone can be a second-hand phone, or a phone returned within 30 days by the buyer or sent in for repair. A refurbished phone is new, cheaper and helps reduce pollution. Refurbishment can be done by the manufacturer, where the phone is remanufactured with a new battery and casing, or by the retailer, who tests and repairs it.

Two teams of three members are organized with different views on the phone purchased. There is a judge who decides which team has offered more convincing arguments.

Conduct of the activity

Intervention of the teams	Time	Speaker's responsibility	Rules for participants
Team 1 Statement 1	5 min	Introduces the topic under discussion, defines energy consumption, environmental pollution, sets tasks, gives arguments;	The other team may request intervention after the first minute but not before the last minute of the intervention. The speaker may accept or reject the intervention.
Team 2 Statement 1	5 min	Expresses agreement with the framework proposed by the first speaker, puts forward counterarguments to the previous speaker's speech, states own arguments;	
Team 1 Assertion 2	5 min	Offers significant new arguments, supports the peer's point of view;	
Team 2 Assertion 2	5 min	Offers new relevant arguments, supports teammate's point of view;	
Team 1 Assertion 3	5 min	Offers counterarguments to team 2's assertions and summarises the fundamental issues expressed by the team;	
Team 2 Assertion 3	5 min	Provides counterarguments to team 1's assertions and summarises the underlying issues expressed by the team;	
Team 1's response	5 min	Points out the key elements of argument;	Expressed by the first or second speaker. No interventions from the other team allowed
Team 2's response	5 min	Points out the key elements of argument;	

The decision is made by the judge after analysis, summary and brief presentation of both perspectives put forward by the teams.

10. What do we do with electrical, electronic and household appliances that we no longer use but are still functional (mobile phones, laptops, etc.)? Donating them to other schools is one solution. Organise an action to this end. Make a video and promote it on the school website.

12 Test

Ecological footprint reduction solutions

Waste electrical and electronic equipment (WEEE)

1. Which device consumes the most during moderate level activity:

- a. a desktop computer
- b. a laptop
- c. a smartphone

2. To reduce a laptop's CO2 emissions:

- a. use an animated screensaver
- b. keep the laptop always open
- c. donate the laptop when we buy a new one

3. Can a mobile phone be refurbished?

- a. a refurbished phone is like new, cheaper and helps reduce pollution
- b. no

4. What is WEEE?

- a. waste electrical and electronic equipment
- b. electrical and electronic devices and equipment

5. Why it is important to return and recycle WEEE

- a. contain non-biodegradable materials that are extremely harmful to health and the environment
- b. contain large and valuable quantities of secondary raw materials that can be recovered
- c. both

6. What metals can WEEE contain?

- a. gold, silver
- b. platinum and palladium
- c. copper
- d. aluminium
- e. all

7. A WEEE waste is recyclable if it meets

- a. at least one of the following requirements
- b. all the requirements
 - it is inserted into the socket
 - it uses batteries
 - requires charging
 - - has a picture of a wheeled bin with an "X" cut through it

8. WEEE are:

- a. appliances in our home that we plug in and at some point, break down
- b. appliances in our home that we plug in and are no longer of use to us
- c. both

9. What do you do with electrical, electronic and household appliances that you no longer use:

- a. they are returned to specialised centres
- b. return them to shops when you buy a new product
- c. donate it
- d. all

10. Fluorescent lamps should:

- a. be disposed of in glass containers
- b. be disposed of in containers for household waste
- c. be handed over to a shop that sells them or to a special WEEE collection centre



13 Fun facts & Did you know that...

Ecological footprint reduction solutions

Building materials and sustainable construction



Construction has an impact on the health of the earth and us.

In many first-world countries, more buildings have been constructed in the last 70 years than in all of human history. So, what is the impact of this? About 47% of the world's emissions, 49% of the energy we use, and 50% of the resources we take out come from buildings. Buildings are a \$10 trillion global industry. This equates to about \$1,400 per person per year. Approximately 25% of the world's economic output and about 25% of the world's workforce exist because of the way we live.

So what is the impact of this?

Some 47% of global emissions, 49% of the global energy we use, and 50% of resource extraction can be attributed to buildings.

Buildings are a \$10 trillion global industry. This equates to about \$1,400 per person per year.

Approximately 25% of the world's economic output and about 25% of the world's workforce exist because of the gargantuan construction industry.

Asbestos* is a material that has been used in construction. In the 1970s, it was discovered that asbestos causes significant dust emissions, which lead to air pollution. By inhaling asbestos fibers, formerly called "miracle fibres" (because of their high heat resistance), thousands of people have fallen ill with asbestosis and lung cancer. Worldwide, more than 100,000 people die each year from asbestos-related diseases.

Asbestos is a naturally occurring mineral that can be separated into thin, durable strands that are heat, fire and chemical resistant and do not conduct electricity. It is widely used in many industries and, in the past, in construction (now banned). It is a particularly dangerous substance (category 1A carcinogen, [Regulation \(CE\) nr. 1272/2008](https://ec.europa.eu/taxation_customs/dds2/SAMANCTA/RO/Safety/Asbestos_RO.htm) on classification, packaging and labelling of chemicals). Small fibres can be inhaled, leading over time to diseases such as asbestosis and other forms of cancer. https://ec.europa.eu/taxation_customs/dds2/SAMANCTA/RO/Safety/Asbestos_RO.htm

Reflect: Which statement has surprised you the most? Why?

The first dwellings are thought to have been leaf huts or dwellings woven from branches. Interestingly, these two archetypes were present well into the modern era. The earliest houses were pits dug into the ground and fortified with clay, appearing towards the end of the Stone Age. These houses, called huts made of mud, mostly covered with straw, lasted until the end of the 19th century and can be seen in open-air museums in Romania. Experts admit that they appear to be healthy and earthquake-resistant houses. Slate is an environmentally friendly material (unburnt brick made from clay, straw and horse dung), a good thermal insulator, taking in heat, slowly giving it away and providing a healthy indoor environment. In Ireland, there were hedge schools until the 1930s. Classes were held in small rooms with little light, surrounded by hedges - no roof or heating!

About 47% of global emissions, 49% of global energy use and 50% of resource extraction can be attributed to buildings.

These pit houses became increasingly important with the development of new tools and led to the first large buildings (palaces, temples, etc.) in Mesopotamia and the pyramids in Egypt. However, the cradle of architecture and building is probably ancient Greece. The ancient Greeks laid the foundations for modern architecture in terms of materials (brick), design and technology (e.g. plumbing systems). Vitruvius (c. 80-70 BC - c. 15 BC) was a Roman architect who established the three golden rules of architecture: utility and harmony, durability and beauty. Greek architecture together with Roman architecture led to the architecture of the Middle Ages and the Renaissance when building methods became increasingly sophisticated: this is the period of castles and cathedrals. The building materials commonly used from antiquity to the early 20th century were wood, stone, brick (made by burning clay/clay), iron, glass, straw.

The real revolution began more than 100 years ago with the industrialisation of construction: new materials and a new way of thinking fundamentally changed architecture. Cement is widely used although it is not a new material; the Romans used it to build domes. New materials such as concrete, reinforced concrete, asphalt and insulating materials are emerging. Concrete is a mixture in which cement serves as a binder, used for foundations, walls, floors, stairs and roads. Reinforced concrete consists of concrete (cement, sand and water) applied to a frame ('skeleton') of metal or steel bars.

Aluminium was first mined in 1854 and industrial production began in the 1950s. Since then aluminium has helped architects create modern designs that were unimaginable before, because it can be shaped and coloured in a variety of ways. Plastics are probably the most widely used building materials today. New materials and additives have been added over time.

Recently new initiatives have been developed:

- In the EU in particular, official buildings are being built again with a lot more wood.
- another important step is building sustainable houses.
- new green in the city: green roofs, green walls.
- conscious building which means protecting water bodies and wetlands, protecting forests, wildlife and ecological corridors, using natural materials.



1. Read the text under Useful information and complete the table with the building materials used over time. Discuss the information with your colleague.

Period of time	Prevailing building materials
0-1900	
1900-1950	The following materials were added:
1950-2020	More materials and additives were added:

2. Sort the letters in the following combinations to find the building materials.



3. Find the appropriate continuation of the sentences from column 1,2,3... to column a,b,c:

1. The glass making process is simpler	a. CO2 emissions. Wood, as long as it exists, retains CO2. Only when it burns or decomposes does it release CO2.
2. The classical method of making bricks consists of	b. in terms of CO2.
3. Reinforced concrete is a building system consisting of	c. in burning clay soil.
4. The stones are neutral	d. melting the necessary raw materials (sand, limestone, soda, and shards), shaping the glass into the desired form, and finally cooling it.
5. Concrete is a cement mixture	e. made of concrete (cement, sand, and water) applied to a frame (a "skeleton") of metal or steel bars.
6. Wood is neutral in terms of	f. water and aggregate (gravel and sand). Cement, in powder form, is the main element.

4. Buildings have an impact on the health of the earth as well as ours.

Before humans, the entire planet was an intact ecosystem. This has changed under human action: large-scale destruction and alteration of natural landscapes, waterways, and eco-systems, extinction of species, CO₂ and toxic emissions on a gigantic scale, etc. The construction industry is one of the main contributors to climate change. Let's take a closer look! What is the environmental impact of building materials?

Form 7 groups to present a construction material from the texts below to your colleagues and fill in the table with the data for the material assigned to the group. As a group, first present the material and its impact on the environment using theatre techniques (mime). The other classmates have to guess the material and its impact. Then present the information about the material.

Main building materials	Impact on the environment
Aluminium	
Cement	
Concrete and asphalt	
Reinforced concrete	
Glass	
Plastics	
Dispersion paints	

1. Aluminium: Aluminium production is energy-intensive, releases various gases (carbon dioxide, sulphur dioxide) that are hazardous to human and animal health and contribute to climate change. The energy required for aluminium production is so high that in North America, for example, about 25% of hydroelectric power generation is used for aluminium production.

2. Concrete and asphalt: Concrete consists of cement, water and aggregate (sand, water and rock). The biggest problem with concrete is the sealing of the soil which destroys all natural cycles by sealing. Asphalt is a mixture of bitumen and mineral materials used in road construction. Asphalt and concrete create artificial heat islands in cities, in addition to general climate change. In cities where concrete blocks predominate, temperatures hardly drop at all on summer nights. If, for example, the air temperature in Bucharest is 26°C, a room with a concrete ceiling heats up by about 10.5°C, and one with an asphalt ceiling by about 18°C more than the air outside.

13 Practical activities

Ecological footprint reduction solutions

Building materials and sustainable construction

3. Reinforced concrete: formed by pouring concrete over a reinforcement made of steel bars and wires. Reinforced concrete presents a number of problems. Firstly, cement production causes environmental problems (toxic emissions). In addition, reinforced concrete tends to corrode at the joints of buildings, reducing the life expectancy of many buildings to a maximum of 100 years. Many modern buildings are rebuilt after 25-50 years, and interiors are redesigned at short intervals (usually 5-10 years).

4. Glass: In glass production, the material is melted at 1600°C for two days, which has a significant environmental impact. The furnace (used for the melting process) operates 24 hours a day and cannot be switched off or cooled during its 15-year life, constantly releasing large amounts of CO₂, sulphur dioxide (SO₂), nitrogen oxides, etc.

5. Dispersion paints: For a good indoor climate, it is important that the walls can "breathe": condensation from the air must be absorbed by the walls and released again. But emulsion paints have the property of sealing the walls (as in a nylon bag). Dispersion paints are toxic because they contain various chemical compounds, the vapours of which we breathe in, especially when the paints are fresh.

6. Cement: Cement is a fine, grey powder. Cement production begins with the excavation of limestone and clay, which are transported to the factory and finely ground together with other raw materials that provide iron and/or silicon. The raw meal is heated to a temperature of up to 1,450°C and then, by quenching, is transformed into a new, granular-looking material called clinker. This is ground very finely together with set dosages of gypsum and manufacturing additives (slag, limestone, etc.) to produce the final product - cement. Waste is increasingly being (re)used in cement factories, thus conserving raw materials. But these so-called substitute raw materials are contaminated with environmental toxins. This practice also leads to the release of mercury and lead into the atmosphere through heating.

7. Plastics: During the production process, large quantities of toxic chemicals are released into the air, including acetone and methylene, as well as sulphur and nitrogen oxides. The production of a single plastic bottle produces more than 100 times more emissions than a glass bottle. Plastics can also have negative health effects - for workers in factories, but also for those who use plastics, as they sometimes even end up in food. The biggest problem, however, is plastic waste that ends up in the most unexpected places (e.g. in the ocean, causing major problems for wildlife). In addition, plastics take a long time to decompose.

5. Some statements are true, others false. Mark true statements with T and false statements with F.

1. Aluminium production requires a lot of energy and releases various hazardous gases.	T/F
2. Cement production causes the release of mercury and lead into the atmosphere through heating.	T/F
3. Concrete seals the soil.	T/F
4. Asphalt and concrete create artificial heat islands in big cities.	T/F
5. In cities, in concrete blocks, on summer nights the temperatures are pleasant.	T/F
6. Glass melts at a high temperature for a day and has a significant environmental impact.	T/F
7. Cement production causes environmental problems.	T/F
8. Plastic waste decomposes in a short time.	T/F

6. Debate

Set the rules for the discussion. No unsubstantiated opinions will be considered.

Establish two groups: supporters of sustainable houses/supporters of block flats.

Each group prepares two justified arguments presented in turn by each group. During the presentations, each group identifies two weaknesses in the opposing team's presentation, which they debunk with arguments in public. The winning team is voted on by the jury, then conclusions are drawn.



7. What do we do with building rubble?

Building rubble is very often thrown away. Concrete, for example, seals the ground and thus destroys topsoil, biodiversity, etc. Many chemical components in buildings cannot naturally disintegrate and many end up in water systems. What solutions do you propose?

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Practical activities

Ecological footprint reduction solutions Building materials and sustainable construction

8. What do you know about sustainable housing? Read the text below and match the questions with the answers.

Many initiatives have been launched over the years to integrate residential buildings into their surroundings. Friedensreich Hundertwasser (Vienna, 1928–2000) focused on the visual pollution of cities and designed houses in full harmony with nature, incorporating environmental features (lines, spirals, bright colours, grassy roofs, trees growing inside houses). Juri Troy (contemporary architect born in 1972) proposes sustainable construction without carbon emissions.

The sustainable house must meet rigorous requirements in terms of energy consumption for heating/cooling, primary energy requirements, and airtightness. The term "sustainable" comes from sustainable sources that provide the heat and energy needs (released by occupants, technical equipment, and solar radiation). To find out more about the sustainable house match the questions with the answers:

1. What are sustainable homes?

2. What heating system do they use?

3. What are the benefits?



a. Low heating and cooling costs. Save up to 90% on heating and cooling costs. High thermal comfort and fresh air, filtered of dust, allergens, etc

b. The houses provide a comfortable indoor climate in both summer and winter without using a conventional heating source.

c. High-efficiency insulation, heat recovery systems, solar (solar panels).

Are there sustainable houses in Romania? Consult the given bibliography and discuss what you have learned with your colleagues. Draw your ideal sustainable house and explain to others what the main features are.

9. As a group, search the internet for fully green schools/institutions in Romania



<https://www.rothnews.ro/stiri/esential-29-786189-premiera-nationala-scoala-renovata-standard-consum-energie-aproape-zero-prin-romania-eficienta.html>

Analyse the information identified (characteristics of the green school, how it became a green school, contact details of the school). Discuss whether you can follow their example and what you should do about it.

13 Test

1. The first houses were built in...

- a. Iron Age
- b. Bronze Age
- c. Stone Age

2. The cradle of modern architecture is found in...

- a. Mesopotamia
- b. Phencia
- c. Greece

3. The father of architecture is ...

- a. Herodotus
- b. Plinius
- c. Vitruvius

4. Before humans, the planet was an ecosystem...

- a. integral
- b. intact
- c. fragmented

5. Asbestos causes a significant release of ...

- a. sand
- b. gravel
- c. dust



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6. Asbestos is a substance...

- a. hazardous to human health
- b. that does not endanger human health

7. The use of aluminium releases

- a. toxic acids
- b. dangerous gases
- c. rain clouds

**8. The major problem with concrete is
produced by foundations.**

- a. soil sealing
- b. soil cracking
- c. seepage of wastewater

9. One of the measures taken to avoid pollution is ...

- a. the presence of green roofs and walls
- b. Drawing plants on walls
- c. placing cow farms on the outskirts of the town

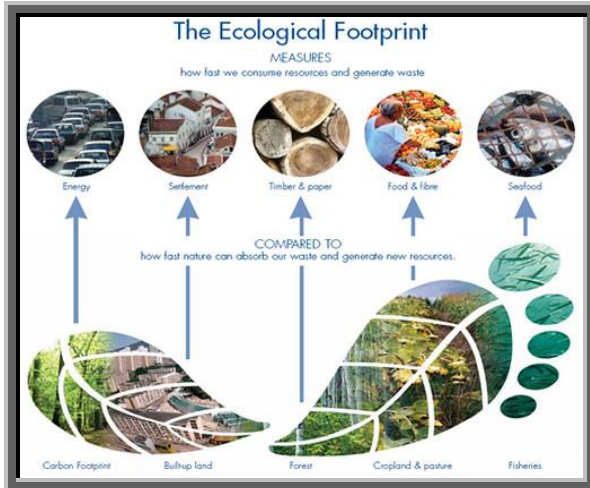
10. A sustainable home

- a. has low heating and cooling costs
- b. uses electric heating



14

Fun facts & Did you know that...



Environmental Footprint Calculator

Environmental footprint

Humanity's demand for renewable resources remains 68% higher than what the planet can provide.

68% of the world's population lives in an ecologically deficient country, where people demand more from nature than it can provide.

A person's environmental footprint is 12 hectares.

In 2019, developed countries had the highest environmental footprint per material per capita i.e. 13 times higher than in poor countries.

The resource footprint per capita increased from 8.1 tonnes in 1990 to 12.2 tonnes, an increase of 50%.

If everyone on the planet lived like Europeans, we would need 2.8 planet Earths. (WWF Report, 2019).

Romania is ranked 46th in the world and 13th in the European Union in terms of its biocapacity. This is the ability of the country's ecosystems to produce useful biological materials and absorb the waste (especially CO₂) made by its people. Romania's ecological footprint is 1.4 hectares per person (hgc), most of which comes from carbon emissions.

Reflect: Which statement has surprised you the most? Why?

What does Environmental/Ecological Footprint mean?

The ecological footprint is a measure of a person's consumption of resources and the impact of that consumption on the environment. The higher a person's standard of living, the greater the area required to maintain that standard. As a result, since the planet's population is growing, we should manage resources better and learn how to use resources more sustainably.

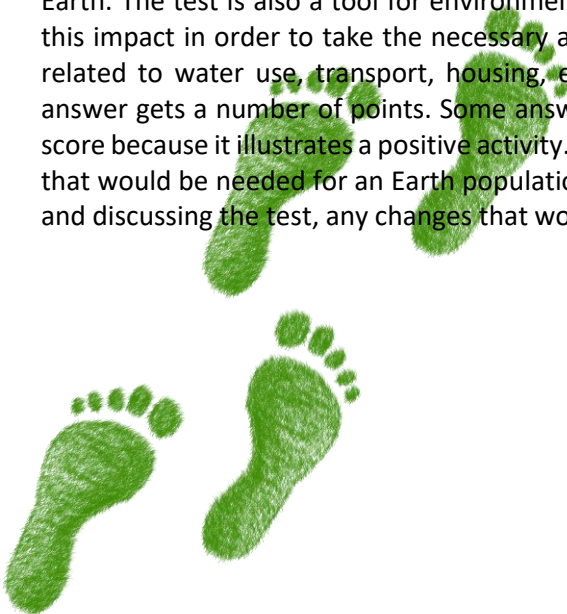
***The earth provides
enough to meet
man's needs, but
not his greed.
Mahatma Gandhi***

The ecological footprint expresses the amount of land and water needed to produce what we consume and to absorb the waste we produce. Many human activities put pressures on the planet, such as providing and processing food, building and maintaining homes, transporting and consuming goods and services. The ecological footprint measures nature's supply and demand. Demand refers to how much humans take from nature and supply is the amount of natural resources nature can renew and the amount of waste it can absorb. The Ecological Footprint can be applied to the actions of an individual, a family, an event, an organisation or an entire nation. Thus the ecological footprint of the European Union, including the United Kingdom, is twice the natural capacity of the whole area.

The main components of the environmental footprint are: food, what we eat, whether our food is processed, packaged or imported; consumer goods: how many goods we buy and how much waste we produce; housing: the type of house we live in; mobility: how and how far we travel.

Our environmental footprint can be calculated through physical or digital tests, which can alert us to our consumption and the waste we produce.

The Ecological Footprint Test is a tool to assess the impact our consumption and activities have on the Earth. The test is also a tool for environmental awareness and education because it helps us to analyse this impact in order to take the necessary action. The Ecological Footprint Test has eight main sections related to water use, transport, housing, electricity, and consumption of goods: food, clothing. Each answer gets a number of points. Some answers have a negative score, which is deducted from the final score because it illustrates a positive activity. The point total is converted into the number of Earth planets that would be needed for an Earth population that would behave similarly to the applicant. By analysing and discussing the test, any changes that would improve the ecological footprint can be identified.



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Practical activities

1. Complete the following text:

The ecological footprint measures.....1 of the human activities on the environment. The ecological footprint is illustrated by our.....2 and how this consumption is absorbed into nature. The ecological footprint illustrates the amount of.....3 and water (nature) needed to produce what we consume and to absorb the waste we produce. The ecological footprint can refer to actions.....4 of a family, an event, an institution, a country, etc. The main components of the ecological footprint are: consumption of.....5, energy, food, consumer goods, housing, transport. Our ecological footprint can be calculated through physical tests and.....6, that can warn us about our consumption and the waste we produce.

2. Match the definitions with the concepts

- 1. impact
- 2. zero waste
- 3. ecological deficit
- 4. ecological footprint
- 5. climate change
- 6. consumption



- a. impact of human activities on the environment
- b. the difference between the biocapacity and the ecological footprint of a region or country. An ecological deficit occurs when the footprint of a population exceeds the biocapacity of the area available to that population.
- c. refers to the use of goods or services
- d. permanent and significant changes in the Earth's climate, locally or globally (changes in temperature, amount and distribution of precipitation, wind or number of hours of sunshine)
- e. influence
- f. set of principles based on near 100% reuse of residues

3. Anagrams. Arrange the letters in the following combinations to find words related to the topic of this chapter:

1. tware	w
2. geryen	e
3. ofdo	f
4. trospnart	t
5. seouh	h
6. hstcloe	c
7. bgeagra	g

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Practical activities

Environmental Footprint Calculator Environmental footprint

4. Decide whether the statements below are true (T) or false (F):

1. Ecological footprint illustrates the effects of our actions on nature.	T/F
2. Ecological footprint measures the total amount of carbon emissions an individual produces.	T/F
3. Your environmental footprint will be smaller if you buy quality products that you don't throw away after a few wears.	T/F
4. Your environmental footprint will be smaller if you buy cheaper imported products.	T/F
5. How you travel largely determines your environmental footprint.	T/F
6. For a small environmental footprint avoid air travel when going on holiday.	T/F
7. Daily use of packaging does not influence the environmental footprint.	T/F
8. We can all calculate our environmental footprint using an affordable digital app.	T/F
9. The ecological footprint of the European Union, including the UK, is twice the natural capacity of the whole area.	T/F

5. Do you agree with the following statement? Calculating our ecological footprint helps us to be aware of our consumption and make the necessary changes. Calculate your ecological footprint using the ecological footprint calculator, in physical or digital form. Analyse and discuss your results as a group. Does it accurately reflect your consumption and habits? Does it surprise you? Which section has the highest consumption? What steps can you take to reduce consumption?

6. What are the benefits of calculating the environmental footprint? Conduct a dialogue in which you try to convince a person who thinks it is a waste of time of the benefits of calculating an ecological footprint. Interpret your colleagues' dialogue.

8. How can we reduce our environmental footprint? Work in groups; each group gets a section (water consumption/use, household, waste, etc). Do some research in this direction. Then create a poster promoting the best ideas, which you present to the class for improvement. Draw up an action plan for the class and follow it up. Promote your actions at school level and train other colleagues.

9.

8. Make a list of habits you have related to water, paper, and energy consumption at school. Work in groups of 3-4 students. For each habit identify activities that could lead to a reduction in footprint. Illustrate these actions with drawings and then organise a mini exhibition and display them in the school.

9. How to reduce consumption at home, in the family? Analyse and discuss your results as a family using the ecological footprint calculator. Does it accurately reflect your consumption and habits? Draw up lists of possible actions to take, make a joint action plan that you all stick to for a month. After a month observe if there is a difference in consumption and payments. Communicate to colleagues and discuss the results. Which measure was the most popular? But the most effective?

10. In pairs or groups, make posters reminding students of the unpleasant effects of littering and what to do about it. Illustrate these ideas in an attractive way. The best posters will be displayed in an exhibition at school.

11. As a group, find out about environmental problems in your area: lakes, forests, rivers at risk. Identify a problem. Children and young people can have a powerful influence on the authorities. Get in touch with organisations, clubs, schools involved in environmental conservation actions, get informed, discuss and, if possible and if you have common goals, join their activities. If not, alert the organisations to the identified problem and establish and get involved in the joint plan.

12. Pay particular attention to plastic waste, which is one of the biggest environmental problems. Calculate your plastic footprint using the following link: <https://www.earthday.org/plastic-pollution-calculator-2/>

Train your colleagues and family to calculate this footprint. How can you reduce your footprint? What would you use from the following tips? What would you add to reduce the footprint for plastic?

Can you become **Class Zero Plastic Waste**?

Take a bag, basket, or backpack made from renewable raw materials when you go shopping. But if you still use a plastic bag, use it more than once.

Do you like drinking juice through a straw? Don't use plastic straws! Look for bamboo or steel straws.

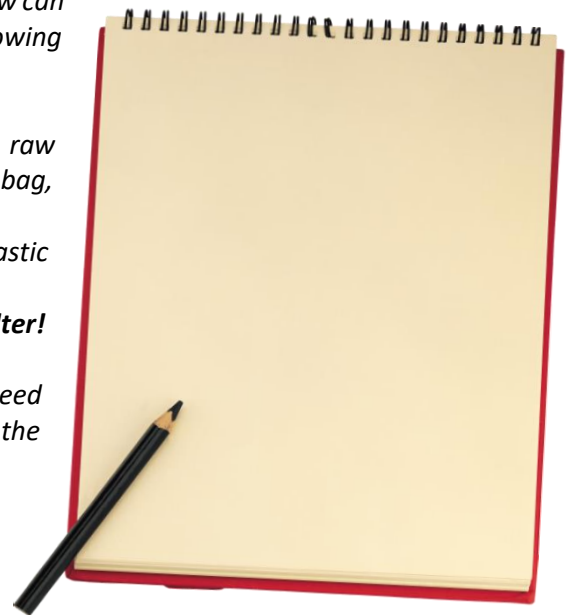
Instead of buying water in plastic bottles invest in a water filter!

In time it will be much cheaper.

Don't accept flyers or advertising gifts unless you really need them. They end up in the bin or on the street. Make a note of the dates that interest you.

Don't use plastic cutlery.

Only buy what you really need! It is best to make a list before each purchase and think about what you will use and what you really need.





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Test

1. Which of the following statements is true?

- a. The Ecological Footprint Test is a tool for assessing the impact our consumption and activities have on the Earth.
- b. The test is also a tool for environmental awareness and education because it helps us to analyse this impact in order to take the necessary action.

2. What are the main components of the ecological footprint?

- a. food, shelter
- b. transport, goods and services
- c. both

3. True or false:

Our environmental footprint can only be calculated through digital tests, which can alert us to our consumption and the waste we produce.

4. What is not an environmental footprint?

- a. The Environmental Footprint is a digital application that illustrates our consumption.
- b. It shows how much land and water are needed to produce what we eat and to get rid of the trash we make.

5. True or False:

Romania has a global environmental footprint of 1.4 hectares per capita (hgc), mostly from carbon emissions. *Efforts must be increased to introduce modern sustainable techniques and practices into industry and all economic sectors.*

Environmental Footprint Calculator

Environmental footprint

6. Which of the following habits scores well in the environmental footprint calculation?

- a. I often forget to turn off the light when I leave a room.
- b. I use a plastic bag more than once.
- c. I don't buy water in plastic bottles; I have a water filter at home.
- d. I don't use plastic cutlery.
- e. I buy clothes rarely. I am not tempted by fashion.
- f. I write on one side of a sheet of paper.
- g. I don't buy notebooks made of recycled paper. I don't like the way they look.

7. What is the Environmental Footprint?

- a. Ecological footprint measures the impact of human activities on the environment
- b. the ecological footprint is illustrated by our consumption and how this consumption is absorbed into nature
- c. both

8. Which of the following actions should be avoided in order to have a small environmental footprint?

- a. walking, cycling, or using public transport
- b. shop often and cheaply
- c. avoid packaging

9. Which option do you choose to complete the following statement:

TheFootprint illustrate theof our actions on the

- a. Sustainable, effects, environment
- b. Environmental, improvement, nature
- c. Environmental, effects, nature

10. Name two ways you can reduce your environmental footprint.

.....
.....



14

Environmental Footprint Calculator

Environmental Footprint Calculator

Environmental Footprint

The Personal Ecological Footprint Calculator invites you to answer a variety of questions covering your eating habits, consumption and resource use, details about your household and the means of transport you use. The calculator assesses your personal footprint, revealing how many planets you would need for such a living. Ecological footprint is the index that measures the pressure you, as an individual, put on ecosystems.

Test

How to fill in: Tick the box of the answer that best fits or fill in the values that are correct for a typical day. Use only one answer choice unless otherwise specified.

WATER

1. During one day, showering/bathing in the bathtub takes:

No shower/bath in bathtub	Shower 2-5 minutes / a quarter of a bath	Shower 5-10 minutes / half bath	Shower for 10 minutes/full bathtub
<input type="radio"/> 0	<input type="radio"/> +50	<input type="radio"/> +70	<input type="radio"/> +90

2. I use a toilet: (select one of the first options, and if applicable the last).

Regular	I use an economical toilet	I use an ecological toilet	
<input type="radio"/> +40	<input type="radio"/> -20	<input type="radio"/> -40	

3. When I brush my teeth, I let the water run

Yes	No
<input type="radio"/> +40	<input type="radio"/> 0

4. I wash my car

Frequently (weekly)	Rarely (once a month)	Never
<input type="radio"/> +40	<input type="radio"/> +20	<input type="radio"/> 0

5. I water the lawn

Frequently (weekly)	Rarely (once a month)	Never
<input type="radio"/> +40	<input type="radio"/> +20	<input type="radio"/> 0

6. I use an economical shower

Yes	No	I don't know whether it is economical	I use an economical shower
<input type="radio"/> -20	<input type="radio"/> 0	<input type="radio"/> 0	<input type="radio"/> -40

7. I use the dishwasher daily.

Yes	No
<input type="radio"/> +50	<input type="radio"/> 0

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Environmental Footprint Calculator

Environmental Footprint Calculator Environmental footprint

FOOD

1. In a typical week, I consume: (fill in the number of servings, or "I don't know" - 0 points) (after the final calculation, the total is divided by 7 for reporting daily servings))

Type	Number of servings	Type	Number of servings	Type	Number of servings
Beef	+150/serving	Wild fish	+40/ serving	Fruit	+20/ serving
Chicken	+100/serving	Eggs	+40/ serving	Vegetable	+20/ serving
Fish from fish farms	+80/ serving	Milk/dairy	+40/ serving	Starchy products: bread, cereals, rice, etc.	+20/ serving

2. _____ of the food I consume comes from local sources

All	Some of	None of	I don't know
<input type="radio"/> 0	<input type="radio"/> +30	<input type="radio"/> +60	<input type="radio"/> 0

3. _____ of the food I consume is organic

All	Some of	None of	I don't know
<input type="radio"/> 0	<input type="radio"/> +30	<input type="radio"/> +60	<input type="radio"/> 0

4. I compost household waste from fruit and/or vegetables

Yes	No	I don't know
<input type="radio"/> -20	<input type="radio"/> +60	<input type="radio"/> 0

5. _____ of the food I consume is semi-prepared

All	Some of	None of	I don't know
<input type="radio"/> +100	<input type="radio"/> +30	<input type="radio"/> 0	<input type="radio"/> 0

6. _____ of the food I consume is packaged

All	Some of	None of	I don't know
<input type="radio"/> +100	<input type="radio"/> +30	<input type="radio"/> 0	<input type="radio"/> 0

7. On an average day, _____ food

I don't throw away	I throw a quarter of the	I throw one third of the	I throw half of the
<input type="radio"/> 0	<input type="radio"/> +100	<input type="radio"/> +150	<input type="radio"/> +200

TRANSPORT

1. On a typical day, I

walk	cycle	use public transport	drive my car
<input type="radio"/> 0	<input type="radio"/> +5	<input type="radio"/> +30	<input type="radio"/> +200

2. The fuel efficiency of the personal car is _____ litres/100 km

Not applicable	<6	6-9	10-13	>13	I don't know
<input type="radio"/> 0	<input type="radio"/> -50	<input type="radio"/> +50	<input type="radio"/> +100	<input type="radio"/> +200	<input type="radio"/> 0

3. The average time spent in a personal car during a day is:

Not applicable	<30 minutes	30-60 minutes	>60 minutes
<input type="radio"/> 0	<input type="radio"/> +40	<input type="radio"/> +60	<input type="radio"/> +100

4. How big is your personal car?

Not applicable	Small	Medium	SUV
<input type="radio"/> -20	<input type="radio"/> +50	<input type="radio"/> +100	<input type="radio"/> +200

5. How many family members there are per personal car?

0	1	2	3 or more
<input type="radio"/> -20	<input type="radio"/> +200	<input type="radio"/> +100	<input type="radio"/> +50

6. On an average day, I walk or run:

5 hours or more	3-5 hours	1-3 hours	30-60 minutes	<30 minutes
<input type="radio"/> -75	<input type="radio"/> -25	<input type="radio"/> 0	<input type="radio"/> +10	<input type="radio"/> +100

HOUSE
1. The number of rooms per family member is:

<2 rooms/member	2 - 3 rooms/member	4 - 6 rooms/member	>7 rooms/member
<input type="radio"/> +10	<input type="radio"/> +80	<input type="radio"/> +140	<input type="radio"/> +200

2. There are non-family members living in our house

Da	Nu
<input type="radio"/> -50	<input type="radio"/> 0

3. We also own a second or holiday home which is often not lived in

No	We own/share it with others	Yes
<input type="radio"/> 0	<input type="radio"/> +200	<input type="radio"/> +400

ENERGY USE
1. In the cold months, the temperature in the house is:

<15°C	15 - 18°C	19 - 22°C	>22°C
<input type="radio"/> -20	<input type="radio"/> +50	<input type="radio"/> +100	<input type="radio"/> +150

2. We dry the laundry outside/using a rack dryer (not using dedicated appliances)

Always	Sometimes	Never
<input type="radio"/> -50	<input type="radio"/> +20	<input type="radio"/> +400

3. Our fridge is energy efficient

Yes	No	I don't know
<input type="radio"/> -50	<input type="radio"/> +50	<input type="radio"/> 0

4. We use energy-saving light bulbs

Yes	No	I don't know
<input type="radio"/> -50	<input type="radio"/> +50	<input type="radio"/> 0

5. We turn off the lights, computer and TV when not in use

Yes	No
<input type="radio"/> 0	<input type="radio"/> +50

6. For cooling use (select one or more options as appropriate)

Air conditioning - in the car	Air conditioning - in the house	A fan	Nothing
<input type="radio"/> +30	<input type="radio"/> +30	<input type="radio"/> -10	<input type="radio"/> -50

CLOTHES

1. I change my set of clothes every day and launder them

Yes	No
<input type="radio"/> +80	<input type="radio"/> 0

2. I wear clothes that have been mended

Yes	No
<input type="radio"/> -20	<input type="radio"/> 0

3. A quarter of the wardrobe is hand tailored/ second hand clothes

Yes	No
<input type="radio"/> -20	<input type="radio"/> 0

4. Most clothes are bought every year

Yes	No
<input type="radio"/> +120	<input type="radio"/> 0

5. I donate clothes I no longer wear to collection centres/other people

Yes	No
<input type="radio"/> 0	<input type="radio"/> +100

6. I buy clothing made from materials labelled 'sustainable' where possible

Yes	No	I don't know
<input type="radio"/> -10	<input type="radio"/> 0	<input type="radio"/>

7. I never wear _____ from my wardrobe

Less than 25%	50%	75%	More than de 75%
<input type="radio"/> +25	<input type="radio"/> +50	<input type="radio"/> +75	<input type="radio"/> +100

8. I have _____ pairs of shoes

2 - 3	4 - 6	7 or more
<input type="radio"/> +20	<input type="radio"/> +60	<input type="radio"/> +90

9. Of all the pairs of shoes I own,

0 have been bought in the last 3 months	1-2 have been bought in the last 3 months	3 or more have been bought in the last 3 months
<input type="radio"/> -10	<input type="radio"/> +20	<input type="radio"/> +40

THINGS

1. All the garbage I've produced today can fit:

A shoe box	Half a garbage bag	A garbage bag	I have not produced any garbage today!
<input type="radio"/> +20	<input type="radio"/> +60	<input type="radio"/> +200	<input type="radio"/> -50

2. I reuse things instead of throwing them away

Yes	No
<input type="radio"/> -20	<input type="radio"/> 0

3. I fix things instead of throwing them away

Yes	No
<input type="radio"/> -20	<input type="radio"/> 0

4. I recycle: (select more options as appropriate)

paper	metal	glass	plastic	I don't recycle
<input type="radio"/> -5	<input type="radio"/> -5	<input type="radio"/> -5	<input type="radio"/> -5	<input type="radio"/> 0

5. I avoid disposables as much as possible

Yes	No
<input type="radio"/> -10	<input type="radio"/> +60

6. I use rechargeable batteries as often as possible

Yes	No
<input type="radio"/> -30	<input type="radio"/> 0

7. In a month, I spend _____ on beauty/care products

0-50 lei	50-250 lei	+250 lei	I don't know
<input type="radio"/> +10	<input type="radio"/> +50	<input type="radio"/> +100	<input type="radio"/>

8. Add one point for every 5 lei spent on a regular day _____

9. Today is a day when I don't spend anything.

Yes	No
<input type="radio"/> -10	<input type="radio"/> +10

ENTERTAINMENT

1. At home we have ___ electronic devices (computer, TV, smartphone, tablet, DVD player, Xbox, Game boy etc.):

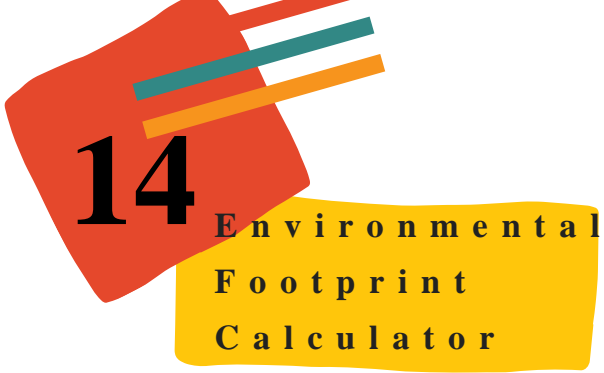
0-5	5-10	10-15	>15
<input type="radio"/> +25	<input type="radio"/> +75	<input type="radio"/> +100	<input type="radio"/> +200

2. On a typical day, I use the TV:

Not at all	< 1 hour	> 1 hour
<input type="radio"/> 0	<input type="radio"/> +50	<input type="radio"/> +80

3. How much time they spend on the internet: Google, social media platforms, streaming services?

0-1 hours	1-2 hours	2-3 hours	3-4 hours	4-5 hours	>5 hours
<input type="radio"/> +5	<input type="radio"/> +10	<input type="radio"/> +20	<input type="radio"/> +30	<input type="radio"/> +40	<input type="radio"/> +50



14 Environmental Footprint Calculator

Environmental Footprint Calculator Environmental footprint

Table for instructors/teachers with total score for each assessed category.

CATEGORY	SCORE
WATER	
FOOD	
TRANSPORT	
HOME	
ENERGY USE	
CLOTHES	
THINGS	
ENTERTAINMENT	
TOTAL	

The total is divided by 450: _____ number of planets (Earth)

1 - Ecology, sustainability, resources

Ex1 1. meeting; 2.natural;3.responsible;4.effects; 5.balance; 6.sustainable; 7.environmental;

Ex2 1b;2c;3g;4h;5f;6e;7a;8d;

Ex3 1. sustainable; 2. potable; 3.resources; 4.waste; 5.consumption; 6.pillar 7.environment;

Ex4 Renewable:2,5,8,9,10,11; Non-renewable:1,3,4,6,7,12;

Ex5 The environmental pillar of sustainability: nature, natural resources; The social pillar of sustainability: a company's responsibility towards employees, partners and the community, local and individual lifestyles, consumption ethics, social inclusion through health services, access to education, social mobility and the eradication of extreme poverty; The economic pillar of sustainability: resource management, trade and transport;

Ex6 1-T;2-T;3-T;4-F;5-F;6-T7-F;8-T;

Ex8: 4 reduce, 5 value, 1 save, 3 substitute,2 recycle;

Test 1.a2, b3, c4, c5, b6, c7, c8, b9-see ex.6;10-f

2 –Forest

Ex.1 1.Walnut 2.Poplar 3.Birch 4.Oak 5.Maple

Ex.4 Trunk: Tall, cylindrical, smooth bark, greyish; Leaves: Oval, with serrated margins and pointed tip; Fruit: Beechnut-achene, covered with spiny bark, appears in autumn

Test 1.c; 2.d; 3.c; 4.c; 5.a.F, b.T, c.T, d.F 6.T. – a. – It is used in the furniture industry; b and c are correct; 7. a.birch, b.beech 8. beechnut/edible; 9. to determine the age of the tree 10. naturalness/surface size and boundaries.

3 – Soil

Ex1 a. soil erosion; b.hot and dry; c. humus; d. rainfall, wind; e. nitrogen f. monoculture; g. chemical fertilizers

Test 1. 1-soil; 2.soil erosion; 3.fertility; 4. Landslides. 2. 4-e; 5c; 6-e; 7.c; 8-d

4 – Water

Ex1 Drought is an extreme climatic condition characterised by a lack of water requirements, frequently accompanied by very high temperatures. Consequences: crop failure, famine, depopulation of regions;

Ex2 1d, 2e, 3a,4f, 5c, 6b, 7g, 8h

Test 1a, 2c, 3b, 4a, 5b, 6A, 7c, 10b

5 – Air

Ex1 a6, b3, c4,5, d1,2;

Ex2 1A, 2A, 3F, 4A, 5F;

Ex3 Examples: planting trees in the school garden, using bins to recycle plastic waste, alternative ways of reusing materials, pupils using public transport

Ex5 causes: gas emissions, fuel combustion, greenhouse effect, deforestation, fertiliser abuse; effects: drought, climate change, melting glaciers, hurricanes and storms, species extinction;

Ex.6 3. The greenhouse effect is necessary because, in this way, the Earth maintains a certain thermal balance that establishes an average temperature of 15°C, ensuring a variable range in which life can thrive.

Ex.7 Birds, planes wouldn't fly (the air has a mass that supports flying objects), the sky wouldn't be blue, the planet would be frozen and there would be no life, etc.

Ex.8 a-v, b-i, c-iv, d-ii, e-iii;

Test 1.a, 2.c, 3.a, 4.b, 5.a, 6.e, 7.c, 8.A, 9. Ozone is responsible for protecting the Earth from harmful UV rays and the thinning of this layer creates worrying imbalances caused by the penetration of too much UV radiation; 10. Suggestions: reducing plastic consumption, reusing, recycling materials, not wasting food, buying only what is necessary (clothing), using electricity sparingly, using public transport, cycling/walking, sharing these ideas with others, etc.

6 – Biodiversity

Ex.7 Excessive hunting - extinction of animal species/ Deforestation - landslides/ Fires - plant and animal life at risk/ Pollution - human health at risk;

Ex.5 Questions:What effects does air pollution have on humans?/What chemicals can pollute the air?/What human actions can be sources of air pollution?/What functions of animal and plant organisms are affected by pollution?/How do we prevent air pollution?

Test 1b, 2c, 3b, 4g, 5d, 6 c, 7 gases/ oxygen, 8 C

7 – Energy and global warming

Ex.1 1 hydroelectric power plants-d; 2 coal-fired power plants-c; 3 wind energy systems-e; 4 nuclear power plant-b; 5 photovoltaic systems-a;

Ex.3 gas, oil, wind, water, nuclear, emissions, energy, turbine, power plant, wind, electricity, coal.

Ex.4 a-A; b-A; c-F; d-F; e-F;

Ex.5 Wind energy: advantages: renewable energy - the earth "produces" wind constantly, free of charge and without harming the environment; the source is available virtually everywhere on the earth's surface; does not emit harmful substances; disadvantages: expensive installations; the area covered by wind installations is quite large; made of non-renewable and non-recyclable materials/concrete foundations (environmental problems)/kill a large number of birds and bats every year. Hydropower: advantages: the most powerful renewable energy/efficient/water source/no impact on air; disadvantages: affects the course of rivers, altering their ecosystem thus negatively impacting animal life; flooding, destroying land and wildlife, or displacing people. Photovoltaics: advantages: cheap renewable energy/sun is a huge source of energy; disadvantages: limited sunshine period/solar panels contain toxic metals (lead and cadmium).

Test 1b; 2c; 3b; 4b; 5c; 6F; 7 don't set the refrigerator too low; 8a; 9 turn off; 10 They have to be switched off because money and energy are wasted.

8 – Healthy and sustainable food

Ex.1 1-impact, 2-protect, 3-health, 4-meat, 5-pollution, 6-environment;

Ex.2 sustainable, ecological, healthy, diet;

Ex.4 a-T, b-F, c-T, d-T, e-F;

Ex.5 phytophagous carp because it has a small footprint and is healthy;

Test 1-F, 2-c, 3-T, 4-c, 5-T, 6 a-moderation/b-diet/c-few, 7-c, 8-b, 9-c, 10-c

9 - Mobility & transport

Ex.1 A large SUV produces the most emissions per 1000 km

Ex.2 1-b;2-f;3-d; 4-c; 5-a;6-e;

Ex.3: *Advantages:* no polluting emissions. Reduce air pollution and health effects. Detects obstacles. Low maintenance. Save fuel. Low electricity costs. Annual tax. *Disadvantages:* high purchase price. Low range. Few charging stations. Expensive repairs;

Ex5:1.c; 2-g; 3-f; 4-b; 5-d; 6-e; 7-a;

Test 1-a;2-b;3-c;4-a&b;5-b; 6- possible answer: use of public transport-cycling or walking; modern cars with low-pollution technologies; creation of pedestrian zones în centrele oraşelor și, în general, restricționarea circulației vehiculelor private în unele zone ale oraşelor; 7-b&c; 8- possible answer: Cycling/ Public transport; 9- possible answers: improved sleep, weight reduction, boosting mental skills, creative thinking, boosting immunity, no parking problems, new friends; 10-c. There are few efficient charging stations for electric cars. d. The amount of CO2 emissions from passenger transport varies by means of transport.

10 - Reduce, reusw, recycle

Ex1 1. newspaper, magazine, notebook, paper napkin, paper bag; 2. plastic cup, plastic stopper, plastic rings, a plastic bottle, a plastic bag, a plastic cup, disposable cutlery, plastic toys; 3. an old doormat, a cotton sock, a woollen sock; 4. an iron, tinned fish, a can of coke; 5. a banana peel, leftovers, old bread; 6. a bottle;

Ex.2 1.c, 2.h, 3.d, 4.a, 5.f, 6.g, 7.e, 8.b;

Ex.4 a. It's not easythough...;b. Correct; c. if they don't have other elements (e.g. plastic); d. can be obtained...;e. Design to recycle; f. Correct; g. in everyone's home; h. Correct; i. Correct- most of the time; j. Correct;

Ex6 Recyclable materials: newspapers, magazines, flyers (promotional flyers), notebooks, books, beer and juice cans, cans, deodorants (sprays) completely emptied of contents, jar lids, PET plastic bottles, jars (without lids), glass cosmetics, wine bottles and other glass packaging; Non-recyclable materials: Used napkins, toilet paper, neglected or dirty cans (these must be rinsed beforehand), cans or metal cans contaminated with various substances (with paints or other hazardous products), dirty aluminium foil, cans of products containing plant fertilisers or pesticides, mirrors, glass panes.

Test 1a; 2a; 3a; 4a; 5c; 6b; 7c; ;9a; 10-see Ex6.

11 – Let's dress sustainably

Ex1 1.real, 2.kept, 3.quality, 4.wise, 5.impulsive, 6.keeps;

Ex2 A.1b,2c, B.1b,2c, C.1c, 2c;

Ex3 1A,2F,3A,4F,5A,6A,7F,8F,9A;

Ex4 1-g, 2-e, 3-a, 4-f, 5-b, 6-c, 7-d, 8-h;

Ex5 1. Slow fashion, 2. synthetic,3. durable, 4. sustainable, 5. fashion, 6. clothes, 7.organic, 8.impact;

Test 1.b, 2c, 3c, 4c, 5b, 6c, 7b, 8c, 9a, 10a

12 – Waste electrical and electronic equipment (WEEE)

Ex.1 The laptop because the monitor is included, the microprocessor is efficient and extends battery life;

Ex.2 Tips: a. Turn off your laptop when not in use, at night and on weekends. b. Manage your laptop power plan. Built-in options for powering your laptop allow you to reduce consumption if it is not used for a period of time. It is recommended to reduce the screen brightness and to stop using screensaver.

Ex.3 a-T;b-F;c-T

Ex.5 efectuați apelurile prin rețeaua mobilă în loc să utilizați internetul;

Ex.6 1-b; 2-d; 3-a; 4-c;

Test 1a;2c;3a;4a;5c;6e;7a;8c;9d;10c

13 – Building materials and sustainable construction

Ex.1 0-1900: natural stones, bricks, iron, wood, glass, straw, clay; 1900-1950: The following materials were added: concrete, reinforced concrete, asphalt and insulating materials; 1950-2020: More materials and additives were added: aluminium, chipboard, laminated wood, asbestos, heavy metals, polyvinyl chloride (PVC), polychlorinated biphenyls (PCB), nano and electronic materials, etc.

Ex.2 1 cement, 2 aluminium, 3 glass, 4 wood, 5 stone, 6 brick;

Ex.3 1-a, 2-c, 3-e, 4-b, 5-f, 6-a;

Ex.5 1-A; 2-A; 3-A; 4-A; 5-F; 6-F; 7-A; 8-F;

Ex.6 1-b, 2-c, 3-a;

Test 1-a, 2-c, 3-c, 4-b, 5-c, 6-a, 7-a, 8-a, 9-a, 10-a

14 – Environmental Footprint

Ex.1 1-impact, 2-consumption, 3-Earth, 4-individual, 5-water, 6-digital;

Ex.2 1e, 2f, 3b, 4a, 5d, 6c;

Ex.3 water, energy, food, transport, home, clothes, garbage;

Ex.4 1A, 2F, 3A, 4F, 5A, 6A, 7F, 8A, 9A;

Test 1a,b; 2c; 3F; 4a; 5A; 6b, c,d, e; 7c; 8b; 9c; 10 e.g., walking, cycling, turning off lights when not in use, reducing water consumption when brushing teeth.

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