

## LESSON PLAN

# PHARMACEUTICALS IN THE ENVIRONMENT

### SUBJECT

Chemistry or  
Biology

### TOPIC

Pharmaceutical products  
and their release into the  
environment

## MAIN OBJECTIVE OF THE LESSON

Find out how pharmaceutical products and their release effects on your environment.

## ASSUMED PRIOR KNOWLEDGE STUDENTS CAN

- create presentation;
- work together in groups.

## OTHER RESOURCES

- teaching resources and practical hints;
- laptops or tablets;
- interactive board or projector.

## DIFFERENTIATION

Environmental science, Biology, Healthy lifestyle, Chemistry.

## ASSESSMENT

The teacher evaluates how the students work together to create a mind map, and how they have prepared the questions, how they present presentations.

## NOTES

Learning methods/techniques:

- work with text;
- visualization;
- brainstorm.

Forms of work organization:

- individual;
- group work.

## TOPIC OF SCAN-CARD USED

The topic of the corresponding scan-card is "Pharmaceuticals in the environment" and the video focuses on pharmaceuticals and their potentially harmful impact on the environment and the negative effect they can have on animal and human health through the domino effect.

## LEARNING OUTCOMES

To develop the ability to find, evaluate and summarise the most relevant information about pharmaceutical products, their release into the environment, and production companies in your country.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1. Teacher divides students into five work groups, then invites them to take a seat.

2. Teacher prompts students by asking a question: "In everyday life, it is not uncommon to hear the phrase pharmaceutical products. What are "pharmaceutical products"? The teacher prompts the pupils to use the scan-cards and watch the video.

3. The teacher introduces the topic of the lesson.

4. Invite students to write on the jamboard platform using tablets, what they already know using the yellow stickers and what else would they like to know about pharmaceuticals and their impact on the environment using blue stickers. Writing is done using "silent brainstorming", all members of the group write on one online page, whose number matches the group number and writing takes place in silence.

5. Ask the groups to show their pages to the interactive wall and present briefly what they have written.

6. Each summarises what students say using additional information about pharmaceutical products and their impact on the environment. Return to the sheets with the questions on blue stickers at the end of the lesson, discussing whether the students received answers to their inquiries.

### IMPLEMENTATION PHASE:

1. Each group is given a job description, asked to read it, discuss it, and introduce the time distribution of tasks to be performed.

## 1. GROUP WORK TASKS

- Create a mind map with the tasks to be performed and divide the responsibilities among the group! Perform an equal division of responsibilities, each taking responsibility for the overall outcome of the work.
- Analyse the information available on the Internet about the circulation of chemicals in the environment.
- Create a chemical life cycle scheme in your city.
- Display the information obtained in the form of a presentation.
- Prepare 3 questions for classmates on your topic, which you will ask after the presentation of your work!
- Present your work.

## 2. GROUP WORK TASKS

- Create a mind map with the tasks to be performed and divide the responsibilities among the group! Perform an equal division of responsibilities, each taking responsibility for the overall outcome of the work.
- Analyse the information available on the Internet about the diversity of pharmaceutical products, their uses, the main ingredients, and their effects on health.
- Display the information obtained in the form of a presentation.
- Prepare 3 questions for classmates on your topic, which you will ask after the presentation of your work!
- Present your work.

## 3. GROUP WORK TASKS

- Create a mind map with the tasks to be performed and divide the responsibilities among the group! Perform an equal division of responsibilities, each taking responsibility for the overall outcome of the work.
- Analyse the information available on the Internet to find out for what purpose pharmaceuticals are used in food production.
- Display the information obtained in the form of a presentation.
- Prepare 3 questions for classmates on your topic, which you will ask after the presentation of your work!
- Present your work.

## 4. GROUP WORK TASKS

- Create a mind map with the tasks to be performed and divide the responsibilities among the group! Perform an equal division of responsibilities, each taking responsibility for the overall outcome of the work.
- Analyse the information available on the Internet to find out, what is meant by the term resistant to antibiotics, and what are the negative consequences for humans, animals and the environment.
- Display the information obtained in the form of a presentation.
- Prepare 3 questions for classmates on your topic, which you will ask after the presentation of your work!
- Present your work.

## 5. GROUP WORK TASKS

- Create a mind map with the tasks to be performed and divide the responsibilities among the group! Perform an equal division of responsibilities, each taking responsibility for the overall outcome of the work.
- Analyse the information available on the Internet to make recommendations to consumers on the information provided on the labels of pharmaceutical products that need direct attention.
- Prepare information on what to do with old medication.
- Display the information obtained in the form of a presentation.
- Prepare 3 questions for classmates on your topic, which you will ask after the presentation of your work!
- Present your work.

- 2.The teacher follows the students' work and helps.
- 3.The teacher invites the groups to give presentations in turn.
- 4.At the end of the presentations, discuss the questions prepared by the students.

### CONCLUDING PHASE:

Teacher returns to the sheets with the questions on blue stickers and involves students in a discussion to answer any questions that have been asked

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

- 1.Students are divided into 5 working groups.
- 2.Students answer a question.
- 3.Students think about pharmaceutical products and their impact on the environment.
- 4.Writes Without Talking: I Know That..., I want to know ...
- 5.Students briefly comment on what they have written.
- 6.Listening to the teacher

### IMPLEMENTATION PHASE:

- 1.Reads the task get acquainted with the job description, discuss it, and ask questions.
- 2.Searches and selects information, and create a presentation.
- 3.Present presentations.
- 4.Answers the questions asked by the students, and participate in the discussion.

### CONCLUDING PHASE:

Answers the questions



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of the European Union

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## LESSON PLAN

# STUBBLE BURNING

### SUBJECT

Biology

### TOPIC

Consequences and impact of stubble burning

## MAIN OBJECTIVE OF THE LESSON

Find out how stubble burning affects biodiversity, people and ecology.

## ASSUMED PRIOR KNOWLEDGE

### THE LEARNER CAN

- make posters;
- find information on the internet.

## OTHER RESOURCES

### FOR THIS LESSON THE TEACHER SHOULD PROVIDE

- A3 sheets and felt-tip pens;
- tablets.

## INTEGRATION

Geography, Chemistry.

## ASSESSMENT

Evaluation of students' achievements is carried out through observation during the group/individual work and on students' answers to questions.

## NOTES

Educational methods/techniques:

- guided conversation
- brainstorming

Forms of work organization:

- individual
- group

## TOPIC OF SCAN-CARD USED

The scan-card and video will help students understand what is stubble burning, why it is unsustainable, and what impacts it has on air quality and biodiversity.

## LEARNING OUTCOMES

Analyse, extract and display information about the dangers of burning stubble in relation to biodiversity loss and human health, consequences and penalties.

## HOMEWORK

At home, discuss with parents what to do in case of a stubble burning or a forest fire and what is the emergency number.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1. The teacher welcomes the students.
2. The teacher invites the students to look at the pictures and figure out how they are related. What happens to nature and animals?

### PICTURES



3. Define learning outcomes of the lesson using keywords that the teacher writes on the board after watching pictures and students write it in notebooks—stubble, burning, penalties, sustainability, nature protection, ecology.
4. The teacher explains how the students will work during the lesson.

### IMPLEMENTATION PHASE:

1. The teacher divides the students into 6 groups—division into groups can take place in a free form, according to the interests of students and the level of knowledge (If there is a succession in lesson planning).

2. Each group receives an A3 sheet, scan-cards, tablets/phones and markers.

3. The task of the group – find information and make an infographic on canva.com:

CANVA.COM



### ON THE FOLLOWING TOPICS, BUT EACH GROUP GETS ITS OWN TOPIC:

- Legislation (penalties).
- Stereotypes about the usefulness of burning stubble.
- Effects on flora and fauna.
- Damage and harm to people.
- Long-lasting effects in nature.
- Alternative solutions.

The infographic must include at least three images and five facts, and also have a comparison of data by year.

### CONCLUDING PHASE:

1. The teacher invites the students to demonstrate the infographics they have made.
2. At the end of the lesson, the teacher asks questions about forest burning.
3. The teacher gives students homework.

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. Greeting, organizational matters, absence check.
2. Students answer questions
3. Students listen carefully to the teacher.

### IMPLEMENTATION PHASE:

1. Students listen carefully to the teacher.
2. Students split up into groups.
3. Work in groups. Cooperation with each other. Ask questions if there is something that is not clear.

### CONCLUDING PHASE:

1. Demonstrates the prepared infographic.
2. Students answer questions.
3. Students listen to the teacher about homework.



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## LESSON PLAN

# UPCYCLING IN MANUFACTURING

### SUBJECT

Environmental science

### TOPIC

Sustainable manufacturing

## MAIN OBJECTIVE OF THE LESSON

See production by-products that can be reused or gain new purpose

## ASSUMED PRIOR KNOWLEDGE

### THE LEARNER CAN

- can make production schemes;
- find information on the internet

## OTHER RESOURCES

### FOR THIS LESSON THE TEACHER SHOULD PROVIDE

- tablets or laptops

## INTEGRATION

Chemistry

## ASSESSMENT

Evaluation of students' achievements is carried out through observation during the group/individual work and on students' answers to questions.

## NOTES

Educational methods/techniques:

- guided conversation

Forms of work organization:

- individual
- group

## TOPIC OF SCAN-CARD USED

The scan-card and video will help students understand what is upcycling and how it would be beneficial for sustainable manufacturing.

## LEARNING OUTCOMES

Can make a production scheme that shows the raw materials, production process and also products and by-products of production.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1. The teacher welcomes the students.
2. The teacher asks questions: what does a zero-waste life mean? What does zero-waste production mean? The teacher prompts the pupils to use the scan-cards and watch the video.

### IMPLEMENTATION PHASE:

1. the teacher announces that during this lesson the students have to watch one of the available „How it's made” videos of their interest and make a production scheme that shows the raw materials, production process and also products and by-products of production. How it's made videos:

## VIDEOS



If not enough information about the production process is available in the video, then additional information should be found on the Internet.

2. the teacher divides students into little groups of two.

3. The teacher allows students to select production videos and notes them down in a common table so that the selected videos are not repeated

4. The teacher announces the start of the group work. The teacher allows them to create production schemes on the most convenient platform for them, but in such a way that at the end of the lesson they can also present the result to the rest of the class.

#### **CONCLUDING PHASE:**

1. The teacher invites the students to demonstrate the production schemes they have made.

2. If the students have not been told about which by-products are reused, then it is asked as a question from the teacher. The teacher can ask the following questions: What is the benefit of zero-waste production? How else could manufacturers improve their production process?

## **STUDENT ACTIVITY**

### **INTRODUCTORY PHASE:**

1. Greeting, organizational matters, absence check.
2. Students answer questions

### **IMPLEMENTATION PHASE:**

1. Students listen carefully to the teacher.
2. Students split up into groups.
3. Select a video.
4. Cooperates with each other. Ask questions if there is something that is not clear.

### **CONCLUDING PHASE:**

1. Demonstrates the prepared schemes.
2. Students answer questions.



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## LESSON PLAN

# SUSTAINABLE FOOD SYSTEM

### SUBJECT

Ecology

### TOPIC

What can I do to protect nature?

## MAIN OBJECTIVE OF THE LESSON

Performing various activities in the lesson, get to know and be aware of their possibilities in nature conservation.

## ASSUMED PRIOR KNOWLEDGE

### THE STUDENT

- Ability to engage in discussion
- Know what pollutes nature

## OTHER RESOURCES

### TEACHING RESOURCES AND PRACTICAL HINTS

- Tablets or laptops
- Interactive board

## INTEGRATION

Environmental science, Biology, Chemistry

## ASSESSMENT

Actively participates in the discussion, fulfills the assigned tasks, and works in pairs.

## NOTES

Educational methods/techniques:

- discussion
- visualization
- digital tasks

Forms of work organization:

- individual
- pair work

## TOPIC OF SCAN-CARD USED

The scan-card will focus on the variety and meaning of what food we consume, and what it does to the planet. How animal products "eat" the globe. What needs to be done for something to change for the better?

## LEARNING OUTCOMES

Creates a mind map about the possibilities of conserving nature from the point of view of using or buying food.

Student finds out what activities can and should not be done to protect nature.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1. After watching the scan-card video, the teacher talks with the students and introduces the topic of the lesson and sets a goal.

### IMPLEMENTATION PHASE:

1. Creating a mind map about the possibilities of conserving nature from the point of view of using/buying food - creating a mind map with students' ideas about each individual's possibilities.

### FOR EXAMPLE:

Mind map  
How can I protect nature?

### STUDENTS EXAMPLES:

- = do not contaminate with waste;
- = save water resources;
- = eat all food.



2. To be aware of the potential for nature conservation, it is necessary to find out how food consumption/production pollutes nature. A question game "Baamboozle" is played, in which questions are asked about the types of pollution and what causes this type of pollution. Link to game:

## GAME



3. A self-assessment by taking an online exercise - Liveworksheets - a student finds out what activities can and should not be done to protect nature. Link to the sheet:

## SHEET



4. Together with the teacher discuss the results.  
5. Test "What is your ecological footprint of food consumption" and the ecological footprint of the class. Students take an individual test to find out their ecological footprint.

## TEST



6. The average ecological footprint of the class is calculated and visually displayed by colouring the foot on the board. For example:

## COLORING



### CONCLUDING PHASE:

1. The teacher discusses with the students what was done and what new knowledge they have gained about the sustainable food system.

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. After watching the video, students listen carefully to the teacher and answer questions. They note down the topic and the aim of the lesson in their notebooks.

### IMPLEMENTATION PHASE:

1. Students write down their ideas in a notebook.
2. Students take part in the questions game "Baamboozle".
3. Students take part in the online exercise.
4. Together discuss the results.
5. With the help of the test, students find out their ecological footprint.
6. Find out the average ecological footprint of the class. Students in pairs share their impressions and attitudes towards an environmentally friendly lifestyle.

### CONCLUDING PHASE:

1. Students engage in a discussion about what they have done in class.



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## LESSON PLAN

# FAST FASHION - T-SHIRT STORY

### SUBJECT

Biology-ecology

### TOPIC

The knowledge on how to reduce the fashion environmental impact.

## MAIN OBJECTIVE OF THE LESSON

- Learn what the fast fashion industry is and how it became popular all over the world;
- Aware of the impact of the fast fashion industry on the environment.

## ASSUMED PRIOR KNOWLEDGE

### STUDENTS

- understands the consequences of the chemicals used in textile production on our health;
- find out the working conditions of the people working in clothes manufacturing.

## OTHER RESOURCES

For this lesson, the teacher should provide 6 "stations" spaces, where T-shirt stories are available, scan-cards, and worksheets for different stations, where different stories of T-shirt resources and production paths are grouped.

## INTEGRATION

Chemistry, Geography, Biology-ecology, Health Education, Design and Technology and Mathematics.

## HOMEWORK

Students write individual letters "Who made my T-shirt?" to the manufacturer who sewed one of their T-shirts.

## TOPIC OF SCAN-CARD USED

The scan-card and video will focus on the negative effects of fast fashion on the environment, workers and society. The effects will be listed and explained in relation to the structure of the supply chain:

- 1.Sourcing materials
- 2.Material production
- 3.Clothing production
- 4.Distribution and retail.

Additionally, the scan-card will provide sustainable fashion tips, for instance, shopping vintage clothes and second-hand items, upcycling clothing ideas, choosing sustainable fashion materials, recycled clothes or fashion brands with transparency, and even changing the way you wash your clothes.

## ASSESSMENT

Assessment of student performance is through observation during group/individual work and on students' additional knowledge of the fast fashion industry and clothing manufacturing and their impact on Climate change and the environment.

Evaluation and feedback provision as I observe their activities in the group, comment and ask prompting questions during group discussions in each station.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

- 1.The teacher welcomes the pupils and introduces the topic of the lesson
- 2.The teacher explains how the pupils will work during the lesson

3. The objectives of the lesson are introduced using a table: what do we know, what do we want to learn, what have we learned (leave the last column to be filled in at the end of the lesson)

#### IMPLEMENTATION PHASE:

1. Presentation of the scan-card video about the fast fashion industry on the interactive whiteboard
2. The teacher explains that in this lesson we will work in 6 stations, each of which will have different stories about T-shirt resources and manufacturing.
3. The teacher allows the students to divide into groups. If they do not divide themselves - put the students in groups.
4. When the groups are ready, the teacher will give each "Station" a T-shirt resource and a production path story. Students rotate stations as they read all the stories and make group notes. When all the stations have been visited, a joint discussion is formed about the different perspectives of T-shirt manufacturing.

#### CONCLUDING PHASE:

At the end of the lesson, students call the steps "where to start", which calls for one of the responsible actions for the use of clothes. Students justify why they have chosen this course of action.

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. Greeting, organisational matters, absence check.
2. Students listen carefully to the teacher.
3. They note down the topic and the aim of the lesson in their notebooks.

## NOTES

### Educational methods/techniques:

- discussion
- 6 stories about T-shirts resources and production – stations:
  - 1) Water pollution due to the fast fashion industry;
  - 2) Chemicals in materials;
  - 3) Fossil fuels;
  - 4) Waste;
  - 5) Climate change;
  - 6) People – the workforce.

### Forms of work organization:

- group



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## LESSON PLAN

# LED LIGHTING

### SUBJECT

Physics - ecology

### TOPIC

Use of LED lighting, its impact on the environment

### MAIN OBJECTIVE OF THE LESSON

- To promote interest in the types of lighting and the purpose of their use;
- To develop an energy-efficient lighting system for a standard-sized apartment.

### TOPIC OF SCAN-CARD USED

Knowledge of what LED light is and how it can help in environmental protection;

### LEARNING OUTCOMES

Students can analyse information about the importance and benefits of led lamps.

Knows what type and how many lamps need to be installed to save resources.

### CONTENT AND TEACHER ACTIVITY

#### GETTING STARTED PHASE:

- 1.The teacher greets the students.
- 2.The teacher raises the topic of the lesson together with the students, showing the packages of different lighting sources
- 3.Teacher, explains the structure of the lesson and the results to be achieved.

#### COMPREHENSION PHASE:

- 1.Students watch a scan-card video.
- 2.The teacher forms a discussion about the different types of lighting sources and their advantages and disadvantages, their impact on the environment.
- 3.Together analyse the characteristics of the light sources.

### ASSUMED PRIOR KNOWLEDGE

#### STUDENTS

- Can find information on the internet;
- Knows how to work with information.

### OTHER RESOURCES

The lesson requires 6 worksheets, 6 tables with the required lighting capacities in the room, 6 identical apartment plans.

### INTEGRATION

Health education, design and technology, mathematics

### ASSESSMENT

Evaluation of students' achievements is carried out through observation during the group/individual work and on students' answers to questions.

### NOTES

Teaching method/techniques:

- "brainstorming"
- discussion
- project work

Form of a learning organization:

- frontal work
- group work
- teacher - consultant



## USE AND REFLECTION PHASE:

1. The teacher divides the students into work groups and distributes information about the types of lighting sources,

### TASK



their advantages, disadvantages and characteristics. A table with the required lighting power in different parts of the room.

### DESCRIPTION



2. Each group is given 3 different types of light source packs; students determine which type of bulb will be used to carry out the project. The decision should be reasoned.

3. Distribute an apartment plan.

### PLAN



Students in the group have to develop a plan on how to place the selected light objects, justify the choice with calculations.

4. The teacher as a consultant helps the students to make decisions about the placement of the lamps in the room, to do practical work.

5. After completing the work, the teacher determines the order in which the working groups will present their results, and evaluates what has been done.

## EVALUATION:

1. Summarizes the results obtained and emphasizes what succeeded
2. The teacher writes down with the students the main conclusions on the topic of the lesson

## STUDENT ACTIVITY

### GETTING STARTED PHASE:

1. Students greet the teacher
2. Answers questions asked by the teacher

### COMPREHENSION PHASE:

1. Students watch a video
2. Answer questions

### USE AND REFLECTION PHASE:

1. Performs practical work in 6 groups
2. Presents the result of their work
3. Evaluate their own and other groups' work

### EVALUATION:

1. Students self-assess their lesson work
2. Listens to the teacher's assessment



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## LESSON PLAN

# PALM OIL IN THE COSMETICS INDUSTRY. EFFECTS ON BIODIVERSITY.

## SUBJECT

Biology

## TOPIC

Impact of palm oil production on the environment.

## MAIN OBJECTIVE OF THE LESSON

Find out how palm oil production affects the planet.

## ASSUMED PRIOR KNOWLEDGE

### THE LEARNER CAN

- Make posters;
- Find information on the internet.

## OTHER RESOURCES

### FOR THIS LESSON THE TEACHER SHOULD PROVIDE:

- A3 sheets and felt-tip pens;
- Tablets

## INTEGRATION

Geography

## ASSESSMENT

Evaluation of students' achievements is carried out through observation during the group/individual work and on students' additional knowledge in Kahoot! test on the palm oil production effects on the planet (pollution, biodiversity).

## NOTES

Educational methods/techniques:

- guided conversation
- brainstorming

Forms of work organization:

- individual
- group

## TOPIC OF SCAN-CARD USED

The scan-card and video will help students understand the negative impact of palm oil production on biodiversity and the environment.

## LEARNING OUTCOMES

- analyse, extract and display information about palm oil production effects on the planet (environmental pollution, effects on biodiversity)
- explain the differences between the rainforest and oil palm forest, using examples of biodiversity

## HOMEWORK

Come up with four examples of cultivation or production products that contribute to the reduction of biological diversity in your country. For example: rapeseed oil production. Forests are being cut down and natural meadows are being reduced to get a place for growing oilseed rape.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

- 1.The teacher welcomes the students and introduces the topic of the lesson.
- 2.The objectives of the lesson are introduced using pictures (pictures of tropical rainforest and palm oil forest): the teacher asks what students see in these pictures, what differences of biodiversity

PICTURES



## PICTURES



they see in tropical forest and palm oil ecosystem, tries to ask different questions about biodiversity in these pictures, what do we know about palm oil production, what do we want to learn.

3.The teacher explains how the students will work during the lesson.

### IMPLEMENTATION PHASE:

- 1.The teacher explains to students that they will work in groups (3-5 students per group),
- 2.The teacher allows the students to split up into groups. If they do not organize themselves, then the teacher creates the groups.
- 3.Each group receives its own group topic. Students will need to create an information poster and slogans about the topics. Each student will have a role to play in the group, such as an artist, data analyst and environmental activist. The teacher suggests using the corresponding scan-card and watching the video. Various topics for making posters:

#### WHERE PALM OIL IS USED?

- =The artist - draws the products;
- =Data analyst - looking for information on what percentage and where palm oil is used;
- =Environmental activists - form slogans on the topic.

#### THE IMPACT OF PALM OIL PRODUCTION ON THE ENVIRONMENT!

- =The artist - draws the consequences of using palm oil;
- =Data analyst - searches, analyses information on how many tropical forests are being cut down, and how much CO<sub>2</sub> is being produced;
- =Environmental activists - form slogans on the topic.

#### THE IMPACT ON BIODIVERSITY!

- =The artist - draws attention to the effects on biodiversity;
- =Data analyst - analyses and searches for information on animals and plants that suffer from oil palm cultivation;
- =Environmental activists - form slogans on the topic.

### PALM OIL IN COSMETICS!

- =The artist - draws products and brands where palm oil is used the most;
  - =Data analyst - searches, analyses information seeks, analyses information on how cosmetics companies think about the environment;
  - =Environmental activists - form slogans on the topic
4. When the posters are ready, each group presents what they have done as if they had joined the rally, using slogans and showing the poster.

### CONCLUDING PHASE:

- 1.We make a summary of the lesson and the teacher asks if they have understood the impact of palm oil production on the planet.
- 2.Using Kahoot! platform

## QUIZ



- the teacher checks whether the students have understood the topic of the lesson and achieved the goal of the lesson.
3. The teacher announces the homework.

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

- 1.Greeting, organisational matters, absence check.
- 2.Students answer questions
- 3.Students listen carefully to the teacher.

### IMPLEMENTATION PHASE:

- 1.Students listen carefully to the teacher.
- 2.Students split up into groups.
- 3.Work in groups. Cooperate with each other. Ask questions if there is something that is not clear.
- 4.Demonstrates the prepared poster, data and slogans.

### CONCLUDING PHASE:

- 1.Students answer questions.
- 2.Students test their knowledge on a Kahoot! platform. Compare the results.
3. Write down the homework.

## LESSON PLAN

# ALGORITHM (SELF - DRIVING CARS)

### SUBJECT

IT, Algorithm

### TOPIC

Algorithm (Self- driving cars)



## MAIN OBJECTIVE OF THE LESSON

To find out how a self-driving car knows how to handle different road situations. Develop an algorithm for crossing a certain intersection by developing algorithm thinking skills.

## OTHER RESOURCES

Interactive whiteboard, laptop, multimedia presentation, scan-cards, a memo with algorithm creation flowchart notations.

## DIFFERENTIATION

IT, algorithms, programming, technologies

## ASSESSMENT

Students take a self-assessment at the end of the lesson, naming the things they have learned and mastered in the lesson.

## NOTES

Form of work:

- collective
- groups

Methods of work:

- explanation,
- expositional (film),
- problem-based (brainstorming),
- practical (algorithm development).

## TOPIC OF SCAN-CARD USED

The scan-card and video will focus on the role of driverless cars in road traffic, as such cars are an inevitable part of today and the future. The profession of a programmer plays an important role in the production of such cars.

To become a programmer, you need to learn the ability to create algorithms for different situations, as well as develop strategic thinking skills that help to anticipate all possible events.

## LEARNING OUTCOMES

### THE STUDENT CAN

- clarify several road traffic regulations that a driver must follow to drive safely at a particular intersection.
- explain that the driverless car is controlled by a computer program instead of a human driver; that it uses cameras and electronic sensors to see the world around it, detecting things like the road, traffic signs, other cars, and pedestrians.
- explain that computer scientists write computer programs that tell the car what to do; that these programs consist of a set of steps called an algorithm.
- explain that sometimes the algorithms are represented graphically with a flowchart; know that a flowchart uses blocks of text and arrows to show what should happen next.
- can justify the need to develop programming skills and the importance of developing algorithms now and in the future.
- can practically improve the algorithm development skill.



## CONTENT AND TEACHER ACTIVITY

1.The teacher welcomes the pupils and introduces the topic of the lesson using a scan-card video.

2.The teacher explains how the pupils will work during the lesson

3.The objectives of the lesson are introduced using a table: what do we know, what do we want to learn, what have we learned (leave the last column to be filled in at the end of the lesson)

4.Presentation of the film about Self- driving cars:

### PRESENTATION



Encourages discussion on issues: How do driverless cars know what to do at an intersection? How do they know when they should stop and when it is their turn to go? What about yielding to pedestrians?

5.Demonstrates to students a memo with the notation of creating algorithms, invites them to think about how to use it in the next lesson.

6.Demonstrates examples of algorithms.

7.Invites students to split into groups of 2-3.

8.Distributes a task sheet to each group, invite students to read the description of the task, asks them to ask a question about the task.

9.Observes the progress of group work, provides support groups, provides recommendations.

10.Invites students to think about what happened? (You probably found that designing an algorithm for a driverless car is very complicated! It might be simple to write rules for a very basic scenario, like driving straight through an intersection. However, your algorithm quickly becomes more complicated after accounting for unexpected behaviour by other drivers or things like turning instead of going straight. Your algorithm might fail and result in a crash if you do not account for certain possibilities, like another driver running a red light. Real driverless cars need to know how to drive in many different scenarios, ranging from winding country roads to speedy highways and busy city streets.)

11.Asks students to fill in the self-assessment section in the table provided at the beginning of the lesson.

12.Offers to complete an exit ticket - to indicate one idea on how to further improve the knowledge acquired today.

## STUDENT ACTIVITY

1.Greetings, organisational matters, absence check.

2.Pupils listen to the teacher attentively.

3.They fill in the table together with the teacher.

4.Watch the video and think about the answers to the questions: How do driverless cars know what to do at an intersection? How do they know when they should stop and when it is their turn to go? What about yielding to pedestrians? Participate in the discussion.

5.Familiarize themselves with the memo and how to use it.

6.Get acquainted with examples of algorithms by using the scan-cards.

7.Pupils are divided into groups.

8.Get acquainted with the description of the task, ask unclear questions.

9.Carry out group work, creating a flowchart and answering questions.

10.Students participate in a discussion using the brainstorming method.

11.The students complete the last column - what was learned - with the teacher.

12.By using a scan-card form a mindmap as they record their ideas.

## LESSON PLAN

# 3D PRINTING - 3D MODEL DEVELOPMENT

### SUBJECT

Computer skills  
(3D model development and designing)

### TOPIC

The basic principles of 3D model development, as well as how to start modelling your dream figure.

## MAIN OBJECTIVE OF THE LESSON

- Learn basic principles of 3D model development and about the required software
- Gain the ability to model your dream figure.

## OTHER RESOURCES

For this lesson, the teacher should provide: various types of 3D prototypes as examples, videos of 3D modelling, scan-cards.

## INTEGRATION

Engineering, chemistry, environment, computer skills

## ASSESSMENT

Assessment of student performance is through observation during group/individual work and on students' additional knowledge of the application and development of 3D printing technologies.

## HOMEWORK

Modelling and development of the 3D product till the end (own prototype)

## TOPIC OF SCAN-CARD USED

The scan-card and video will focus on 3D printing as an innovative technology, widely used for different purposes, also in manufacturing. Is the construction of a three-dimensional solid object from a digital 3D model image with a 3D printer.

For printing different materials could be used, depending on the wanted characteristics of the printed product. 3D printing enables the production of complex shapes using less material than traditional manufacturing methods.

It will show, what kinds of things can be done with a 3D printer and how it can be useful (for some older machines, if the replacement parts do not exist anymore, they could be 3D printed).

## ASSUMED PRIOR KNOWLEDGE

### STUDENTS:

- Understands the types of 3D modelling;
- Repeats the application and development of 3D printing technologies;
- Develop a 3D figure.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

- 1.Organizational activities.
- 2.Informs students that the aim of the lesson is to get to know the types of 3D modelling. To repeat the application and development of 3D printing technologies and start developing a 3D model.

## NOTES

Educational methods/techniques:

- discussion
- exercise

Forms of work organization:

- individual
- group



## IMPLEMENTATION PHASE:

1. At the beginning of the lesson the teacher explains what 3D printing is and what it is used for. During the introduction, he/she uses a video:

**VIDEO**



illustrating that 3D printing is now using technologies to print everything from fully functional cars to Michelin-starred dinners.

2. The teacher asks the children to describe:

- what types of 3D modelling they already know,
- what 3D development methods exist.

3. The practical part. Students are in groups or one by one. Goes to the computer and opens the program 123D DESIGN and starts modelling their 3D figures according to the acquired knowledge of 3D modelling methods: geometric and organic modelling.

## CONCLUDING PHASE:

We provide a summary of the lesson. We remind students about the types and methods of 3D modelling, 3D materials that are environmentally friendly and the use of technology.

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. Greeting, organisational matters, absence check.
2. Students listen carefully to the teacher.
3. They note down the topic and the aim of the lesson in their notebooks.

### CONCLUDING PHASE:

Students participate in summarising the knowledge acquired during the lesson.

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of the European Union

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## LESSON PLAN

# SUSTAINABILITY IN FOOD PACKAGING

### SUBJECT

Ecology

### TOPIC

Packaging and its impact on the planet

## ASSUMED PRIOR KNOWLEDGE

### STUDENT

- Knows what environmental protection and eco-friendly behaviour are;
- Understands the importance of nature for all living beings and how important it is to protect nature;
- Realises what threats humans pose to the natural environment;
- Knows what measures can be taken to protect nature.

## ASSESSMENT

Assessment of pupils' performance is done by observation while working in groups. The group that cites the most examples receives the highest grade, each subsequent group that cites fewer examples receives a one-point lower grade.

## INTEGRATION

Environmental science, Biology, Healthy lifestyle, Chemistry.

## NOTES

Educational methods/techniques:

- discussion
- exercise
- game

Forms of work organization:

- individual
- group

## MAIN OBJECTIVE OF THE LESSON

- Learn basic information about the function of packaging and the raw materials from which it is made,
- Gain the ability to evaluate packaging in terms of segregation and recycling possibilities.

## TOPIC OF SCAN-CARD USED

The scan-card will focus on the variety and meaning of food packaging and where are points for improvement in sustainability. It will describe different materials, potential uses and the importance of environmentally friendly packaging.

## LEARNING OUTCOMES

### THE STUDENT:

- Will learn about how humans can contribute to caring for the environment
- Learn to evaluate packaging in terms of segregation and recyclability.

## OTHER RESOURCES

### TEACHING RESOURCES AND PRACTICAL HINTS:

For this lesson, the teacher should provide: various types of product packaging, photographs of the packaging, puzzles with drawings of A4 packaging in envelopes, scan-cards. Students bring different types of packaging from home i.e. Rigid Plastic Packaging, Paper, Paperboard, Cardboard/Fiberboard, Aluminium, Glass, Flexible Plastic Packaging

## HOMEWORK

Students have to make reusable bags from eco-friendly materials. The provided link will help them.

VIDEO



## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1. Organizational activities.
2. The teacher introduces the topic of the lesson.
3. Informs pupils that the aim of the lesson is to get to know the basic information about the function of packaging and raw materials from which it is made as well as to gain the ability to evaluate packaging in terms of segregation and the possibility of using it in the recycling process.

### IMPLEMENTATION PHASE:

1. At the beginning of the lesson the teacher explains what packaging is, what it is used for and what it can be made of. During the discussion, he/she uses photographs illustrating the materials from which the packaging is made.

2. The teacher asks the children to put in front of them the packaging they brought from home.

Together they describe them according to the criteria:

- what was in this package,
- what material the packaging is made of.

3. The teacher places 6 boards with the names of the raw materials i.e. (Rigid Plastic Packaging, Paper, Paperboard, Cardboard/Fiberboard, Aluminium, Glass, Flexible Plastic Packaging) on the floor and the children place their packaging on the corresponding boxes.

Then they discuss which material of packaging is the dominant one and what are the advantages and disadvantages of each packaging material. For example a jar - it breaks (bad quality), it can be reused (good quality).

The teacher writes this information on the blackboard according to the classification: type of packaging good quality -plus, bad quality- minus. Pupils jointly draw conclusions about which packaging is the most environmentally friendly and which is the least.

4. Pupils work in groups. We suggest using scan-cards, which give information about the consequences of the overuse of plastics in food packaging, their impact on the environment and health, and suggestions for using other non-harmful materials for food packaging. Each group takes 5 cards with information about waste and composes ecological slogans encouraging rational waste management.

### EXAMPLES OF CARDS WITH INFORMATION:

- One plastic bag is produced in 1 second, is used for 25 minutes on average, and takes 300 years to decompose in a landfill.
  - One small battery, thrown into a normal household waste bin, can contaminate 1 m<sup>3</sup> of soil and as much as 400 liters of water!
  - Recovering 1 ton of waste paper saves 17 trees from being cut down.
  - A warm fleece can be made from 35 PET bottles.
  - The jerseys of the Polish national football team were made from recycled PET bottles.
  - PET bottles can also be used to make T-shirts, curtains, warming inserts for clothes, filling inserts for furniture and toys.
  - 670 cans of fizzy drinks will be used to produce 1 bicycle.
  - Replacing 5 ordinary light bulbs with energy-saving ones will reduce electricity costs.
  - By recycling the glass from just 1 bottle, you can save as much energy as a 100W light bulb would consume if lit continuously for 4 hours.
  - By composting green waste you save 30-50% of the total waste sent to landfill.
- A representative from each group presents their examples to the rest of the students. We summarise our reflections on how to reduce the amount of waste produced.

### CONCLUDING PHASE:

The teacher makes a summary of the lesson, reminds the pupils of the important functions of packaging, but also points out that the packaging of products generates an enormous amount of waste.

Each of us has a say in how much and what kind of packaging we use and whether it becomes useless waste or is reused and thus kept out of the landfill. By reducing the amount of packaging we use, segregating and recycling it, we protect the environment and ourselves from its harmful effects.

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. Greeting, organisational matters, absence check.
2. Students listen carefully to the teacher.
3. They note down the topic and the aim of the lesson in their notebooks.

### IMPLEMENTATION PHASE:

1. Students listen carefully to the teacher, ask questions if they do not understand something.
2. Students in their notebooks, according to the criteria, describe the packaging brought from home
3. Students follow the instructions, draw a conclusion about which packaging is the most environmentally friendly and which is the least.
4. Students take part in the game "Playing with packaging".
5. They look at the information given in the scan-cards and share their impressions.
6. Students work in groups to create slogans promoting the ecological use of raw materials

### CONCLUDING PHASE:

Students participate in summarising the knowledge acquired during the lesson.



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## LESSON PLAN

# SEED BANKS

### SUBJECT

Biology

### TOPIC

Saving our plant genetic heritage: seed banks

## ASSUMED PRIOR KNOWLEDGE

### THE STUDENT KNOWS

- About pollination, types of seeds, photosynthesis;
- Plants have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow;
- Plants have both internal and external structures that serve various functions in growth, survival, behaviour, and reproduction;
- Plants respond to some external inputs.

## OTHER RESOURCES

Seeds of different vegetables or flowers, printed seed packet outlines, glue or clear packing tape, markers or coloured pencils, smartphones, internet.

## INTEGRATION

Environmental science

## NOTES

Educational methods/techniques:

- discussion
- didactic game
- problem-solving method
- tasting

Forms of work organization

- individual
- group

## MAIN OBJECTIVE OF THE LESSON

To explain to the students the importance of genetic diversity for plants, especially food crops, the science behind seed saving, the important work of seed banks. To teach students how to store seeds.

## LEARNING OUTCOMES

Students will learn about the mission of seed banks and the importance of carefully and intentionally preserving genetic information from a diversity of plant species. Students will know how and when to harvest and save a variety of seeds from their school garden or local producers. Explain why seed saving is important for genetic diversity. Describe how seeds are formed. Identify a variety of seeds.

## TOPIC OF SCAN-CARD USED

The importance of storing seeds from all over the world. The global seed vault in Norway.

## ASSESSMENT

Students complete a test "From seed to plant" and are evaluated according to its results. There are 20 questions in the test.

TEST



## HOMEWORK

Students watch the video about the global seed vault in Norway and write a report presenting basic information.

VIDEO



## CONTENT AND TEACHER ACTIVITY

### INTRODUCING THE LESSON

1. Introduce your students to the idea of seed banks. Talk about why they might be important. Explain that you are going to create your own kind of seed bank at your school by having people in your community keep seeds going, by planting them, seed saving, and returning the seeds, much as seed banks grow rare varieties to keep them alive. You can have your own seed bank without scientific equipment.

2. Activate prior knowledge: Ask students if they know why saving historic seeds might be important. Write their ideas on the board.

3. Speak about the importance of the seed banks. Perhaps the most famous seed bank is the Svalbard Global Seed Vault run by Norway. This seed bank is inside a sandstone mountain on an island almost as far north as the North Pole. This island naturally has permafrost, and so presents ideal storage conditions for the seeds, as well as protection from human activity with its isolated location.

Genetic diversity is vitally important for the health of any ecosystem, our food production system is no exception. The Rural Advancement Foundation International has conducted a survey which showed that the diversity of our plants is in decline, some species are even lost forever. One answer to this problem is “seed banks”. Seed banks are types of gene banks that store seeds in controlled conditions. They are often housed in underground vaults so that surface events such as extreme weather or wars would not affect the seeds stored there. Temperatures also stay more stable underground. In these underground storage sites, seeds are kept in controlled conditions. They are often also dried down, so that the seeds contain a very low moisture content, at below-freezing temperatures.

4. Engage students’ interest: Tell them that we can join the worldwide effort to save vegetable biodiversity by starting a seed library in our school. Consider having a guest speaker or showing a video on seed libraries.

**VIDEO**



5. Write down the seed saving procedure as a class. Use the video information to help students write the instructions.

**VIDEO**



Break it down into steps. Talk about clear explanations and sequential information. Work on this as a group, and write it up on the board or use the platform:

**PADLET**



so that students using their smartphones could present their ideas on one common board. Students need to have QR code readers installed on their smartphones.

6. Go over the seeds you are going to pack up. Tell the students which seeds you are going to start your library with, and why. Write up the seeds types and varieties, where they came from, and a short description of how to save these seeds.

7. Have students decorate seed packets, students could do that in groups. Hand out the seed packet outlines and have students fill them with their seed information, and draw a picture of their vegetables.

8. Ask students to fill the seed packets, they should immediately glue down the top flap of the packet to prevent spilling.

9. Collect the seed packets and figure out how you are going to “lend” your seeds out. It could be as simple as “lending” them to future classes in your school, and as elaborate as setting up a shelf in your school library to lend out to any family in your school.

Figure out a library lending system for your seeds. Work with your school librarian.



## WHAT IS A SEED LIBRARY?

Like traditional library services, a seed library provides access to a resource. Access to diverse varieties of plants is important to our community. By selecting and saving seeds from plants that thrive, over generations, there are opportunities to cultivate a collection of seeds that excel in our growing region.

Packets, containing enough seeds for 10-15 viable plants are checked out to members. Members grow the seeds and enjoy their harvest while letting a few plants go to seed. A portion of these new seeds is then returned to the library for the next growing season's collection.

## WHEN IS THE COLLECTION AVAILABLE?

Members may borrow seeds during the spring season. We will accept returned seeds in the autumn. The collection will be available, in season, during the operating hours of the library.

## STUDENT ACTIVITY

1. Students generate ideas – their opinion on why preserving seeds for the future is important. Students think about the places where those seeds could be kept and about the conditions.
2. Working in groups, students generate ideas about the seed saving procedure, then using [www.padlet.com](http://www.padlet.com) they share their ideas with the rest of the class.
3. Using the ideas presented students write down the instructions for and steps to be taken to preserve seeds, identify the type/variety, where they come from, name of the plant.
4. Students decorate the seed packets, fill them with seeds, and glue it. Now the seeds are ready to be displayed in the school library and the community members can use them in spring, grow plants and return new seeds to use next year.



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## LESSON PLAN

# GREEN TECHNOLOGIES - SOLAR THERMAL TECHNOLOGY

### SUBJECT

Natural sciences

### TOPIC

Green technologies in everyday life



## ASSUMED PRIOR KNOWLEDGE

### THE LEARNER CAN

- Make mind maps;
- Find information on the internet;

## OTHER RESOURCES

For this lesson the teacher should provide:

- A4 sheets and felt-tip pens;
- tablets

## INTEGRATION

Physics, Chemistry, Economy

## LEARNING OUTCOMES

Can make mind maps, which show the benefits of solar thermal technologies.

## ASSESSMENT

Evaluation of students' achievements is carried out through observation during the group/individual work and what they have written in the notebooks.

## NOTES

Educational methods/techniques:

- guided conversation
- brainstorming

Forms of work organization:

- individual
- group

## MAIN OBJECTIVE OF THE LESSON

To understand the need for Green Technologies - Solar Thermal Technology in everyday life.

## TOPIC OF SCAN-CARD USED

The scan-card and video will help students understand how easy it is to use solar thermal energy in everyday life.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1.The teacher invites the students to the classroom and invites them to draw cards and take their seats accordingly. Cards:

CARDS



2.On the screen a picture of month wise line diagram of the average electricity uses (in kWh) of a middle-class family:

GRAPHS



3.“What is depicted in these pictures? What connections can be found in these images?”

4. Moves to the result to be achieved in the lesson. "What is the common thread between all the images (both electric bills and solar panels)?"

## IMAGES



Together with students watch scan-card video and ask after "What are we going to learn about in class today?"

The teacher tells the topic of the lesson: "Green technologies in everyday life"

"What could be the outcome of this lesson?"

The teacher attaches an A4 page on the blackboard, on which the achievable result is written - Actualize the necessity of Green technologies - Solar thermal technology in everyday life.

Invites the pupils to write the subject of the lesson and the result to be achieved in the notebook.

### IMPLEMENTATION PHASE:

1. "Watch the video carefully because the information will be useful for creating a mind map!" Show video:

## VIDEO



2. Distribute texts (No. 1, No. 2, No. 3, No. 4) to each group

## VIDEO



3. The teacher divides the tables according to the numbering - No. 1, No. 2, No. 3, No. 4

Each group must create a unified narrative about their group topic (6 minutes).

4. The teacher advises if necessary. Using IT tools, create a mind map analysing 2 types of water heating - electric water heating system and solar panel system - pros and cons.

### CONCLUDING PHASE:

1. Ask students to present their mind maps.
2. Students are invited to write in their notebooks which of the heating methods is the best and justify the choice

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. As the students enter the class, everyone pulls out a piece of paper with a picture and sits down after the given pictures. In groups of 4.
2. Brainstorming.
3. Answers the questions.
4. Brainstorming (how to save electricity, calculate average electricity consumption, application of solar panels, construction....)  
Brainstorming (Students name their options)  
Make notes in a notebook.

### IMPLEMENTATION PHASE:

1. Watch the video
2. Each student in his group takes the corresponding text with his number. Everyone reads their text silently and underlines the keywords. (3 minutes)
3. Students change seats according to their numbers. At one table No. 1, at the second table No. 2, at the third table No. 3. At the fourth table No. 4.  
Each group must create a unified narrative about their group topic (6 minutes).  
Everyone writes on their own page.  
The students return to their original groups and tell the other group members their topic in order, starting with No. 1. While the student is telling the story, the other members of the group write down keywords for each topic in the notebook. (10 minutes)
4. Creates a mind map.

### CONCLUDING PHASE:

1. Presents a group mind map emphasizing which of the ways is more beneficial and why.
2. After listening to the stories of all the groups, each individual writes in his notebook which of the water heating methods is more profitable and justifies his choice.

## LESSON PLAN

# SOLID SHAMPOO

### SUBJECT

Environmental science

### TOPIC

Packaging and its impact on the planet

## MAIN OBJECTIVE OF THE LESSON

- To find out how a human being can contribute to taking care of the environment.
- To find out what are the dangers of excessive plastic production.

## ASSUMED PRIOR KNOWLEDGE

### STUDENT KNOWS

- what is environmental protection, eco-friendly behaviour
- understands that nature is useful to man and should be respected
- what threats man poses to the natural environment
- what measures can be taken to protect nature

## TOPIC OF SCAN-CARD USED

Solid shampoo.

## ASSESSMENT

Students complete a test „Plastic pollution” and are evaluated according to its results. There are 20 questions in the test.

TEST



## HOMEWORK

Carry out a survey: count and record in a table how much and what kind of plastic waste you and your family members throw away each day of the week. According to the results, draw a bar chart.

VIDEO



## LEARNING OUTCOMES

### STUDENT KNOWS

- what waste is and what its sources are
- how to segregate waste
- what recycling is
- the positive effects of reusing waste
- what to do with problematic waste

## OTHER RESOURCES

### TEACHING RESOURCES AND PRACTICAL HINTS:

For this lesson, the teacher should provide the following: chewing gum, tissues, plastic bags, an apple, a smartboard, sticky notes, scan-cards.

## INTEGRATION

Sciences, Biology, Healthy lifestyle, Chemistry.

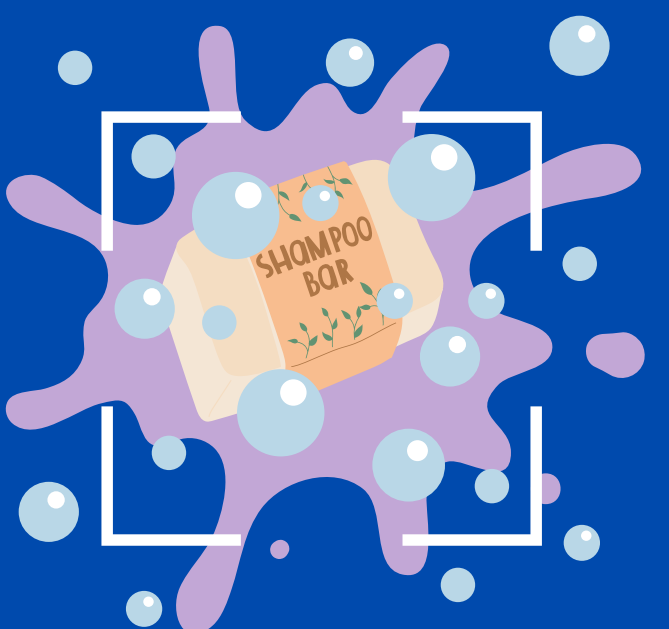
## NOTES

Educational methods/techniques:

- guided conversation
- brainstorming
- problem-solving method

Forms of work organization:

- individual
- group



## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1. Organizational activities.
2. The teacher introduces the topic of the lesson
3. The teacher informs the pupils that the aim of the lesson is to find out how a human being can contribute to taking care of the environment and what are the dangers of excessive plastic production.

### IMPLEMENTATION PHASE:

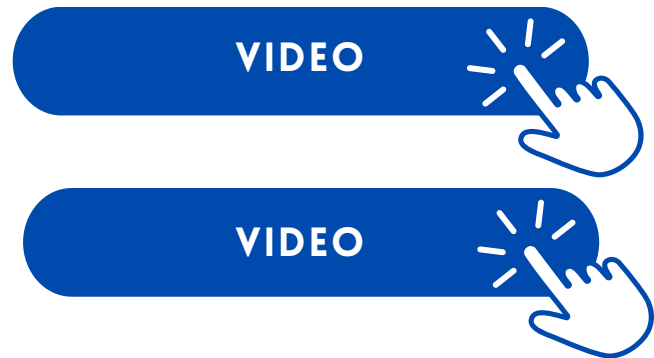
1. Start the lesson with a short talk on the benefits of having meals at school. We ask students to tell us what they use to pack their lunch for school (e.g. breakfast paper, aluminium foil, plastic boxes, plastic bags, etc.). Not all students may have a second breakfast, so we only ask volunteers to show the packaging. We write all the answers on the board.

2. Ask which packaging (from those whom students have brought their food is reusable and which is not. The teacher lists all the packages that students have brought their food in on the board and underlines those packages which cannot decompose and can become waste.

3. Distribute the following objects on each desk: chewing gum, an apple, tissues, and plastic bags. The children's task is to put the objects in pairs in order from those that decompose most quickly to those that take the most time to decompose. We check the answers and work out how long each item takes to decompose (tissue 3 months, apple half a year, chewing gum 5 years, plastic bag 300 years). We think about which of these wastes is the most dangerous and why.

4. Brainstorm ideas to find an answer to the question of whether plastic can "migrate". i.e. What happens to plastic once people have disposed of it? Students present the journey of plastic into the oceans, rivers, soil, etc. The teacher writes students' ideas on the board. Summarises their thoughts on plastic migration, e.g. if plastic migrates from our bin to the recycling container, then the waste will be recycled. Unfortunately, plastic can migrate from our households to the wrong places. The causes of environmental pollution include dumping waste in forests, in rivers and leaving it in other places not intended for it, which causes pollution of the area, groundwater, and a danger to animals.

5. Present a film for children to prove the migration of plastic: (use one of the links provided)



We discuss what impressions the film has left.

6. The teacher asks students to work in groups to explain how we can reduce the amount of waste produced. As an example, we suggest using scan-cards that give information about solid hair shampoos, the production of which helps to protect the environment.

A representative from each group presents their examples in front of the class. We summarise our reflections on reducing waste e.g.:

- Go shopping with your own reusable bags; ideally, you should be able to buy directly from the farmers at the stalls (this avoids the extra packaging that the fruit and vegetables come in).
- Buy loose products (e.g. groats, rice, beans) by weight and put them in your own bags.
- Do not buy products in several packs (e.g. chocolate sweets wrapped in paper and still packed in the bag; rice or groats in extra plastic bags inserted in a cardboard box).
- Do not use disposable utensils - cups, plates, cutlery, straws.

### SUMMING UP PHASE:

Distribute sticky notes to the students. Ask each of them to write one example of how he/she will replace some of the plastic items in everyday life to reduce the waste they produce. The students stick the sticky notes on the board. The teacher reads out all the suggestions and announces the homework.

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. Greetings, organisational issues, checking of absences.
2. Students listen carefully to the teacher.
3. They note down the topic and the aim of the lesson in their notebooks.

### IMPLEMENTATION PHASE:

1. Pupils take part in the chat, write answers on the board, and volunteers show the packaging they use for food they bring with them to school.
2. On the board the pupils underline those packages which have become waste.
3. The pupils follow the instructions, conclude which of these wastes is the most hazardous and why.
4. Pupils think about whether the plastic can 'migrate'. Write their ideas on the board.
5. Pupils share their impressions after watching the film.
6. Students work in groups, writing down information in their notebooks about ways to reduce the amount of waste produced.

### CONCLUDING PHASE:

Pupils write on sticky notes one example of how they will replace some of the plastic everyday items. Pupils stick the sticky notes to the board.



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## LESSON PLAN

# THE FREEZE-DRIED METHOD AS THE FUTURE OF FOOD PRESERVATION

### SUBJECT

Environmental  
Science

### TOPIC

What can be done to  
prevent food from spoiling?

## MAIN OBJECTIVE OF THE LESSON

Learn the principles of handling food products and their importance in maintaining health.

## ASSUMED PRIOR KNOWLEDGE THE STUDENT KNOWS

- what nutrients are;
- that food can get spoiled;
- that eating spoiled food is dangerous;

## OTHER RESOURCES

Teaching resources and practical tips:

For this lesson the teacher should supply: a large bristol sheet; markers; word cards with food preservation methods for puns, scan-cards, freeze-dried fruit and vegetables for degustation.

## INTEGRATION

Biology, Healthy lifestyle, Chemistry

## NOTES

Educational methods/techniques:

- discussion
- didactic game
- problem-solving method
- degustation

Forms of work organization

- individual
- group

## LEARNING OUTCOMES

### STUDENT

- identifies the conditions under which food can be spoiled;
- describes methods of food preservation, their advantages and disadvantages;
- names methods of food preservation that people can carry out themselves at home in their kitchens;
- correctly places foods in the refrigerator;
- distinguishes between products that should be kept out of the fridge and those that should be kept in the fridge
  - describes the importance of food handling principles in maintaining health.

## TOPIC OF SCAN-CARD USED

The scan-card and video will focus on a healthy and nutritious replacement for regular sweets suitable for daily consumption with freeze-dried fruit, berries, and vegetables, the process of production, how to make an advent calendar for children using freeze-dried treats instead of chocolate.

## ASSESSMENT

Students' achievement is assessed through observation during group work and by taking a test to summarise students' knowledge.

TEST



## HOMEWORK

Find freeze-dried fruit recipes in the culinary search engine. Provide the recipes in a nice graphic design.

## CONTENT AND TEACHER ACTIVITY

### INTRODUCTORY PHASE:

1. Organizational activities.
2. The teacher introduces the topic of the lesson
3. Informs the pupils that the aim of the lesson is to learn about what to do to prevent food from spoiling. What are the ways to avoid its spoilage and what are the advantages and disadvantages of food preservation methods?

### IMPLEMENTATION PHASE:

1. The teacher asks the students to give examples of spoiled food. The teacher asks what characterises such food (smell, texture, colour) and what the reasons for spoilage might be.
2. Pupils then watch the first part of the video for the part on how to store food properly in the fridge, learning about the different methods of preserving food.  
Food preservation methods - how to prevent food spoilage.

VIDEO



3. After watching the film, the teacher proposes a pantomime game.

The methods of food preservation that should be guessed can be drawn or printed on cards. There are three pictures and three students. Each student chooses one picture and using just gestures tries to present the method of preservation. The rest of the class tries to guess.

Examples of food preservation methods to be presented in pantomime: are freezing, drying, pickling, smoking, vacuum packing, pasteurisation, canning, dehydrating, salting, and curing.

4. After the game the teacher discusses with pupils that the advantage of preserving food is to prevent it from spoiling, but do preservation methods only have advantages?

The teacher starts a discussion by asking the questions: What are the advantages of preserved food? What are the advantages and disadvantages of preserving food using natural methods? Do any of the methods discussed compare unfavorably with others?

5. The teacher invites the students to get acquainted with another very prospective way of product preservation - freeze-drying and invites them to work in groups using scan cards. One group writes down the advantages and the other the disadvantages of freeze-drying.

A representative from each group presents the advantages and disadvantages of freeze-drying to the rest of the students.

After the instruction is done the teacher invites you to taste dried and freeze-dried fruits of one kind.

6. Next, the teacher explains that apart from using different food preservation methods, it is important to store food properly in the fridge. She also says that it is important to remember and respect the use-by dates of the products and always pay attention to the dates on the labels.

7. The teacher suggests another game. They divide the pupils into two groups. Each group has to guess where to put the product mentioned by the teacher; whether we keep it outside the fridge or in the fridge, and if in the fridge, in which place. Examples of products: potatoes, mandarins, bananas, yesterday's dinner, breadsticks, fruit juice not yet opened, compote, sparkling water, ice cream, eggs, chocolate and sultanas.

The group with the most correct answers wins.

### SUMMING UP PHASE:

The teacher asks the students the following questions as a conclusion:

- 1) Why is it necessary to preserve food?
- 2) Why shouldn't we eat spoiled food?
- 3) How are smoked sausages made?
- 4) What is pickling?
- 5) What are the disadvantages of, for example, pasteurisation, drying and smoking, and what are the advantages of these methods?

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. Greeting, organisational matters, absence check.
2. Students listen carefully to the teacher.
3. They note down the topic and the aim of the lesson in their notebooks.

### IMPLEMENTATION PHASE:

1. Students participate in the survey.
2. Students watch the film carefully, note down information about conservation methods in their notebooks.
3. Students play a pantomime game
4. Students take part in a discussion.
5. Work in groups, with a representative from each group presenting their findings to the class and taking part in a tasting.
6. Listen carefully to the teacher.
7. They take part in a game.

### CONCLUDING PHASE:

They consolidate the knowledge acquired during the lesson, take a test and finally note down the homework information.



## LESSON PLAN

# THE IMPORTANCE OF BEES FOR THE ENVIRONMENT

### SUBJECT

Biology, Ecology

### TOPIC

The environmental importance of bees

## ASSUMED PRIOR KNOWLEDGE

### THE STUDENT KNOWS

- the diversity of insects;
- recognises that different plants and animals live in the local environment and name some of them;
- knows that flowering plants produce seeds that grow into new plants;

## OTHER RESOURCES

Interactive whiteboard, laptop, overhead projector film, teaching charts, multimedia presentation scan-cards, honey.

## DIFFERENTIATION

Biology, Ecology, Conservation, Bioengineering.

## NOTES

### Form of work:

- collective
- individual

### Methods of work:

- explanation,
- expository (film),
- problem-based (brainstorming).
- practical (scan-cards)

## MAIN OBJECTIVE OF THE LESSON

Introduction to the thematic unit 'Insects'. To make pupils familiar with the life of bees.

To develop a responsible and emphatic attitude towards nature and the environment in which we live.

## LEARNING OUTCOMES

### THE STUDENT

- identifies the basic reasons for bee decline,
- provides solutions to prevent the problem of bee decline,
- explains the relationship between pollinating organisms and the environment and humans;
- analyses the relationship between one's actions and the preservation of biodiversity in the environment;
- justifies the need to take care of other organisms in their environment;
- demonstrates an attitude of respect and empathy towards themselves and other organisms;
- presents the importance of plants in nature and for humans;
- presents the habitat, characteristics and lifestyle of insects, using the example of the honeybee;
- becomes aware of how his/her everyday decisions and actions can affect the environment,

## TOPIC OF SCAN-CARD USED

The scan-card and video will focus on the importance of bees for the environment, how the bees support the growth of trees, flowers, and other plants.

What will happen if the bees disappear, what can be done to prevent the disappearance of the bees?

## ASSESSMENT

The students are assessed according to their performance in Activities 1 and 2. And they complete the test on qonzizz.com

### TEST



## HOMEWORK

Students choose one of the options:

-Make a Bee Hotel

### VIDEO



-Poster Design. Design and create a poster informing people what they can do to help save the bees.

-Research Task. Research the types of wildflowers that we can plant to make sure bees have enough food.

## CONTENT AND TEACHER ACTIVITY

1. The teacher welcomes the pupils and introduces the topic of the lesson
2. The teacher explains how the pupils will work during the lesson
3. The objectives of the lesson are introduced using a table: what do we know, what do we want to learn, what have we learned (leave the last column to be filled in at the end of the lesson)
4. Suggested starter activity: why are bee populations declining?

### VIDEO



Can the children presume how many species of bee have already disappeared from the UK and how many are at present under threat of becoming extinct? Can they suggest reasons for this decline?

TEACHER INPUT. The teacher shows slides and comments.

### PRESENTATION



Since 1900 the UK has lost 20 species of bee and a further 35 are now under threat of extinction. Bees are in danger of disappearing from our environment and the effects could be catastrophic.

### SLIDE 2

Loss of Wildflowers Farming practices disturb natural habitats. In the early 20th century Britain had thousands of acres of wildflower meadows that supported a great diversity of flowers of different colours and shapes - perfect for bees.

But increased demand for food and changes in the way we manage land to grow food have led to the destruction of most of our meadows, leaving bees with little to feed on. As a result, most UK species of bumblebee have begun to decline rapidly, with 2 becoming extinct in the UK since 1940. Several other bumblebee species are in trouble e.g. the Great Yellow bumblebee and could become extinct in the UK within a short time.

To enrich students' academic vocabulary and to improve students' knowledge about the processes and notions related to bees, the teacher gives a task. Students may use the provided article to help them find useful words.

### ARTICLE



### ACTIVITY 1

A-Bee-C Relay. Preparation. Write a list from A to Z down the left side of a large piece of paper. Repeat this for the number of groups you will have in your class. Spread these out along the classroom walls or tables where the students can reach them. Activity. Divide the class into groups of about 5- 6 students per group, each stationed on a piece of paper. One at a time, each student in the group writes down a word beginning with each letter of the alphabet about bees.

The groups work together until they have completed the entire list from A-Z. To add a competitive element to it, time the teams. Afterward, invite each team to present their answers. Answers can range from different species of bees, types of plants they pollinate, descriptive words that have to do with bees, etc. Students spend about 15 min. on this activity. The teacher continues the presentation.

### SLIDE 3

**Nesting Sites and Unfriendly Gardens.** There are no longer as many natural places as there used to be e.g. long grass, hedges, and underground holes made by other creatures. Many gardens are covered with paving slabs or decking so plants cannot grow. Some garden flowers are very pretty but don't have much pollen or nectar inside them, so are not good for bees.

### SLIDE 4

**Pesticides** Sometimes pesticides kill useful insects as well as harmful ones. One type, called neonicotinoids, has been linked to a drop in bee numbers. They are found in crops and products around the home such as pet flea treatments and lawn care products. They are believed to damage the immune system of the bee, making them susceptible to disease.

### SLIDE 5

**Mobile Phone Masts** These can confuse bees, upsetting their sense of direction and the way they navigate, so they can't find their way back to their hives.

### SLIDE: 6

**Weather** Some UK summers have been particularly wet which is no good for bees who cannot forage (look for food) unless it is dry.

### SLIDE 7

**Varroa Mite** The varroa mite is a major factor in the decline of honey bee populations across the world. Most wild honey bee colonies have died out as a result of this disease. It doesn't kill the bees straight away but passes disease and viruses which shorten bees' lifespans and can cause colonies to collapse.

The teacher gives students another assignment.

### ACTIVITY 2

**Bee Aware of Danger.** This activity aims to encourage students to explore the decline of bees. Divide the class into five groups. Provide each group with an image (see Appendix 1) and a blurb. Explain that each group was given one reason why many different kinds of bees are in danger. The groups should look at their image and read the information that goes along with it (provided below). Once they have discussed what they have, they must prepare a newscast sharing this information with the class. Provide the group with a few minutes to prepare the news report. Students are invited to take roles as reporters, farmers, meteorologists, beekeepers, or scientists. Each group prepares a 1-minute report telling the cause of danger and at least one suggestion for the viewer to try at home.

## DANGERS FOR BEES

### HOMELESSNESS

Bees' nests are disappearing because there are fewer "natural" areas of farms where wild bees can live such as hedge bottoms and wild areas with long grass. Many areas are being disturbed by livestock such as cows. Try leaving some undisturbed areas (e.g. piles of grass clippings, areas of longer grass that are not mown) for bees to nest in.

### HUNGER

There aren't enough flowers on some farms or in cities and bees need the food to last from early spring to late autumn and sometimes run out of nectar. Try planting more wildflowers to help the bees get more food!

### SICKNESS

A very dangerous bug called the Varroa mite is causing the honeybees to become very sick because of the diseases the parasite carries. They attach to the bee and are difficult to see. Try capturing them with a 'drone comb' or with powdered sugar!

### POISONING

More and more farmers are using chemicals on plants to fight unwanted bugs, but this is harming the bees. Try supporting organic farms in your area!

### CHANGING ENVIRONMENT

Extreme weather is causing plants to grow early and leaving the bees with less nectar when they are ready to collect it. Try planting flowers, herbs, and crops that will grow well in Irish weather! Each group should share these presentations with the rest of the class. Encourage students to ask questions as audience members after each group presents.

The end of the lesson. Students answer the teacher's question "what have we learned in this lesson?". The teacher evaluates the students and announces their homework.

If there is time left students have a sweet ending to the lesson - tasting honey.

## STUDENT ACTIVITY

Students watch the short video and find out the answers to the questions: How many species of bee have already disappeared from the UK and how many are at present under threat of becoming extinct? Can they suggest reasons for this decline?

After reading the article



One at a time, each student in the group writes down a word beginning with each letter of the alphabet about bees. ( Appendix 1) The groups work together until they have completed the entire list from A-Z. Afterward, each team to present their answers. Answers can range from different species of bees, types of plants they pollinate, descriptive words that have to do with bees, etc. depending on the level of the class.

Groups of students look at their image and read the information that goes along with it (provided below). Once they have discussed what they have, they must prepare a newscast sharing this information with the class. Provide the group with a few minutes to prepare the news report. Students are invited to take roles as reporters, farmers, meteorologists, beekeepers or scientists. Each group prepares a 1-minute report telling the cause of danger and at least one suggestion on how to prevent the problem for the students to try at home.

## LESSON PLAN

# HOMEMADE DISINFECTANT

### SUBJECT

Environmental science

### TOPIC

Packaging and its impact on the planet



## MAIN OBJECTIVE OF THE LESSON

To reinforce pupils' habits of personal hygiene, to form a pro-health attitude.

## ASSUMED PRIOR KNOWLEDGE

### STUDENT

- knows the principles of taking care of hygiene in everyday life;
- knows how to wash his hands, following the different steps;
- knows what health is;

## LEARNING OUTCOMES

### STUDENT

- further develops personal hygiene habits,
- improves the technique of preparing solutions using available measuring vessels;
- develops laboratory skills;

## DIFFERENTIATION

Environmental science, Biology, Healthy life-style, Chemistry

## NOTES

Learning methods/techniques:

- crossword
- demonstration
- practical work

Forms of work organization:

- individual
- group

## TOPIC OF SCAN-CARD USED

The scan card and video will focus on the importance of disinfectant in destroying the pathogens including the coronavirus, what is the easiest way to produce disinfectant at home, the basic ingredients, and basic rules of hygiene

## OTHER RESOURCES

### TEACHING RESOURCES AND PRACTICAL HINTS:

For this lesson, the teacher should provide: an educational board with a crossword puzzle, a poster "School of clean hands", a leaflet "Coronavirus. Follow basic safety and hygiene rules", bar soap (maybe different types), liquid soap, antibacterial gel, moistened hand wipes, ethyl alcohol solution, glycerine, hydrogen peroxide, syringe, funnel, a container with dispenser, boiled water, scan-card.

## ASSESSMENT

Assessment of pupils' performance is done through observation while working in pairs: how they use the equipment and the laboratory vessel, measure the volume, and make the solution.

## HOMEWORK

On a chosen day after school, try to observe your family members, colleagues and people e.g. on the tram, in the shop. Try to count how many of them sneezed? Observe - what did they do next? What objects did they touch next? Think about which objects in your house are touched by unwashed hands. On which of these could there be the most viruses?

You can clean surfaces contaminated with viruses yourself, using a cloth and water with washing-up liquid or soap. Remember also that washing your hands for a long time will remove viruses from them. Write down your observations in a notebook.

# CONTENT AND TEACHER ACTIVITY

## INTRODUCTORY PHASE:

1. Organizational activities.
2. The teacher introduces the subject of the lesson. The teacher informs pupils that the aim of the lesson is to consolidate pupils' habits in the field of personal hygiene, to shape a pro-health attitude.

## IMPLEMENTATION PHASE:

1. We start the lesson with the students solving the crossword and reading the password „Higiena”. In order to create the crossword the teacher might use the link <https://crosswordlabs.com/>

Then we have a short talk on the principles of taking care of hygiene in everyday life. For example: What is hygiene? How should we take care of it? What makes us sick? How can we protect ourselves against bacteria and viruses? Why should we be vaccinated? How do we wash our hands properly and after what activities? How and why should one wear a mask?

2. The teacher demonstrates different items for hand washing: bar soap (there may be different types), liquid soap, antibacterial gel, moistened hand wipes, etc. Pupils look at them and can smell them. Together they arrange the items in order of the most effective (liquid soap, bar soap, antibacterial gel, moistened hand wipes).

3. Students are invited to the practical work "Antibacterial liquid for hand disinfection". Pupils work in pairs, using a scan-card. (On each desk the following ingredients will be provided: ethyl alcohol solution, glycerine, hydrogen peroxide, syringe, funnel, container with dispenser, boiled water). The teacher helps and consults the students during the practical activity.

4. The teacher shows pupils how to wash their hands properly, attaches on the board a poster on how to wash hands properly to wash away possible bacteria, viruses and parasites that are harmful to health.

## HE/SHE INFORMS THAT 20-30 SECONDS IS THE MINIMUM TIME FOR HAND WASHING. SIX SIMPLE POINTS - WHAT DO WE WASH?

1. the inside of your hands,
2. the palm recesses,
3. outer parts of the hand,
4. spaces between fingers,
5. thumbs,
6. pads under fingernails.

Pupils individually practise hand washing, using their prepared antibacterial hand disinfectant liquids.

## CONCLUDING PHASE:

Teacher distributes feedback cards to students, "I liked the activity/ I didn't like the activity" (evaluation) encourages them to share their impressions and observations about the activity and the information gained with their parents and friends, distributes information leaflets "Coronavirus. Observe basic safety and hygiene rules".

## STUDENT ACTIVITY

### INTRODUCTORY PHASE:

1. greeting, organisational matters, absence check.
2. students listen carefully to the teacher.
3. they note down the topic and the aim of the lesson in their notebooks.

### IMPLEMENTATION PHASE:

1. They solve the crossword, read out the password, participate in the chat.
2. They take part in the demonstration, together arrange the items in the order of the most effective.
3. In pairs they do practical work "Antibacterial liquid for disinfection" using scan-card, they consult the teacher if there are any questions.
4. They listen carefully to the teacher's instructions, and wash their hands according to the basic six rules, using their prepared antibacterial liquid for hand disinfection.

### CONCLUDING PHASE:

Students mark on cards, "I liked the activity / I didn't like the activity". They share their impressions and observations on the activities and the information they have learnt, make notes on their homework.