

Lesson 5. Why is the climate changing? Global warming.

In this lesson pupils will have the possibility to find out the causes of climate change and identify ways to slow down global warming. Pupils will get to know about the greenhouse effect and its causes, pupils will discuss daily actions and habits that can either stop or increase climate change caused by global warming. The lesson will also cover the formation of smog, the ozone layer and the importance of its damage, the effects of ultraviolet rays and the principles to be followed when staying in the sun. The lesson provides also for practical activities, with pupils creating smog in a bottle, as well as watching the water level rise as ice melts.

Lesson duration:

depending on the duration of discussions, experiments and additional activities, the lesson takes 60-90 minutes.

Before the lesson:

get to know the methodological recommendations for the lesson and prepare materials to successfully plan and conduct the lesson for your pupils.

Materials necessary for the experiments:

Activity 5: a bottle with a narrow neck, matches;

Activity 15: a large glass container, water, food colouring, ice, paper strip (paper tape), pencil

Terms:

global warming – *general increase in air and water temperature over a long period of time, as a result of which climate change begins, for example, unusual precipitation, severe drought, heat or the other way around – cold,*

greenhouse effect – *rise in temperature in the Earth's atmosphere caused by the gases produced by industry, agriculture, transport (carbon dioxide, methane, etc.),*

ultraviolet radiation – *solar radiation, which in small amounts produces vitamin D in the human body and tans the skin, but in large amounts can cause sunburn and damage the eyes,*

ozone hole – *depletion of the Earth's atmospheric layer (ozone), which protects the planet for the Sun's ultraviolet radiation, as a result of the use of harmful chemicals (Freon),*

smog – *air pollution of large cities and industrial centres: a set of smoke, gases, fog, etc.*

Hand-outs (for printing):

A worksheet for pupils to strengthen the new terms and to learn more about natural phenomena. It can be completed in class or at home;

The lesson

At the beginning of the lesson introduce pupils to the behavioural rules, emphasizing that they should listen carefully because the board does not repeat information several times. In the lesson you will need to cooperate, express your opinion and be able to catch what others say. For younger pupils or pupils who find it challenging to stay focused on work for longer periods of time, dynamic breaks can be included between tasks.



Tablets can also be used for the interactive tasks.

1. Global warming.

With the help of questions on the screen, pupils discuss how global warming affects animals, people and the environment. Pupils can check their guesses and ideas by touching the picture below each question and finding out the correct answer.

3. Eco-friendly alternatives.

Pupils touch the pictures, listen to information and find out which daily activities spare the climate and which have a negative effect on it. Before listening to the information pupils can vote (for example, by raising their hands) which answers they think will have a positive impact and which will have a negative impact on the climate. After listening to the information, the beneficial actions are coloured green (e.g., walking), while the harmful ones are coloured red (e.g., using the air conditioner). Regarding agriculture, it is important to emphasize that it is environmentally unfriendly on a large scale, but a small number of livestock does not do a huge damage.

Additional activity.

You can ask pupils to share the examples from their family and school life, what other environmentally friendly activities are carried out or what could be done

2. Human development and pollution.

Pupils listen to information and observe pictures of how the development of mankind and industry has resulted in constantly more atmospheric pollution, but at the same time the development of science helps to limit and solve it. Perhaps pupils need to be reminded (or it must be drawn for them) what the atmosphere is – the Earth's gaseous envelope, which contains both gases that are necessary for all living organisms and also harmful substances.

4. Smog.

Pupils listen to information about what smog is, what causes it and what the consequences of smog are.

differently to make the lifestyle as environmentally and climate friendly as possible (in connection with energy and material saving, movement, etc.).

5. Experiment “Smog in a bottle”.

Pupils follow the instructions on screen and individually or in groups they simulate the formation of smog in a bottle. When the observation is made, pupils can express their thoughts and ideas about why such haze or smog formed. Afterwards pupils open the “conclusions” section and read an explanation of the experiment’s process. In order to strengthen their knowledge about smog and connect what they saw in the experiment with what they heard in the previous activity, pupils answer the questions in the “questions” section.

Important: Before the activity, safety rules to be observed when working with matches and fire must be discussed with pupils!

**If pupils are too young to work with matches, the teacher can demonstrate the smog in a bottle experiment for the class. It is also possible to watch the video included in the digital learning tool, where this experiment is shown.*

7. The greenhouse effect.

Pupils listen to information about the greenhouse effect and how the average temperature on Earth has increased and continues to increase as a result of it.

Additional activity.

Students complete task 2 in the worksheet by writing three causes of the greenhouse effect..

6. Greenhouse.

In order to prepare for the information about the greenhouse effect, pupils answer questions and discuss about the already known greenhouse, its temperature, and the purposes of its use. This task can be done in small groups or by the whole class together.

8. Causes of the greenhouse effect.

Pupils touch the picture of Earth and step by step see five reasons that cause the greenhouse effect on our planet. Pupils can be drawn to the fact that with the appearance of each cause on the screen, the thermometer rises higher and higher – the temperature increases. After touching the picture for the sixth time, pupils listen to the more detailed information about greenhouse gases and their causes. Before listening to the information, pupils can be invited to share their ideas on how each of the causes could be related to the formation of the greenhouse effect.

9. Sunbathing.

Pupils look at the pictures and share their experience of sunbathing and sunburn.

Additional activity.

Pupils can vote (e.g., by raising hands) on whether they like to sunbathe or prefer to stay in the shade; whether or not they have ever been sunburned. Pupils can be invited to share ideas about why they got sunburned, expecting answers that, for example, they did not use sunscreen, did not use a sunshade, they were staying in direct sunlight instead of the shade for a long time. If there is enough time, you can discuss with pupils how to take care for sunburned skin.

11. The ozone layer.

Pupils listen to information about the ozone layer, its importance, and the possible prevention of damage done to it.

13. Final test “What have you learnt so far?”.

With the help of the interactive test pupils have the opportunity to test their knowledge of pollutants of the atmosphere and global warming. The test can be taken by everyone together or individually – using tablets. In each question pupils choose one correct answer from the three given options.

Additional activity.

10. A safe stay in the sun.

Pupils insert the missing pictures to create the correct sequence (if a person only wears sunglasses, he will not be protected from getting burned; if he uses both sunglasses and sunscreen, he will be well protected from the harmful rays of the sun). It is important to explain to pupils that, although sunscreen protects against sunburn, it is also necessary to wear sunglasses, because the sun’s ultraviolet (UV) radiation damages not only the skin, but also the eyes. It is recommended to mention that the strongest UV radiation in summer is from 11.00 to 15.00 o’clock, and during this time it is better to stay indoors. In order not to get the impression that the sun and its UV radiation are only harmful to people and should be avoided, pupils can be told that under the influence of UV radiation vitamin D forms in the human body, which is necessary for bone development and growth, and it protects against cold.

Additional activity.

Students complete task 3 in the worksheet by colouring the things that can protect them from the Sun.

12. Ozone hole.

Pupils strengthen the acquired knowledge and arrange the pictures in the correct order, showing the course of events, how the use of harmful substances in industry leads to the formation of a hole in the ozone layer, whereas which lets in a dangerous amount of sun’s UV rays, causing sunburns.

14. Rising water level.

As a transition to the next lesson, pupils listen to information and watch a video about what will happen to glaciers and the World Ocean if global warming continues at its current rate.

Pupils test their knowledge of the concepts used in the lesson and complete task 1 in the worksheet by connecting each explanation with their corresponding term!

15. Experiment “Sea level rising”.

To build a “bridge” to the next lesson and connect global warming with rising water levels in the world, pupils follow the instructions on the screen and individually or in groups watch the ice melt and the water level rise in the container. It is possible to speed up the experiment process by placing the container with ice under a warm lamp. To strengthen knowledge about the rise of water level and connect what pupils saw in the experiment with what they in the previous activity, pupils answer the questions in the “questions” section.

** The activity can also be demonstrated by the teacher, for example, at the beginning of the lesson. At the end of the lesson, pupils have the opportunity to “read” the result together – how much the water level has risen after the melting of ice. It is also possible to watch the video included in the digital learning tool, where this experiment is shown.*

Additional activity.

Pupils complete task 4 in the worksheet by writing and drawing how each of them could protect the Earth from global warming.

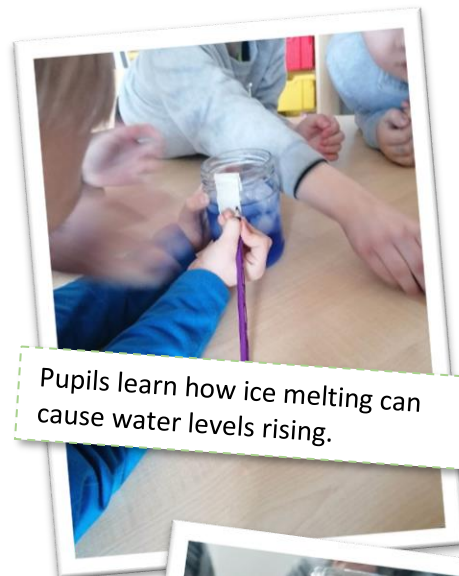
At the end of the lesson ask pupils:

What did you like the most? What new did you learn? What will you tell your parents? What else would you like to know?

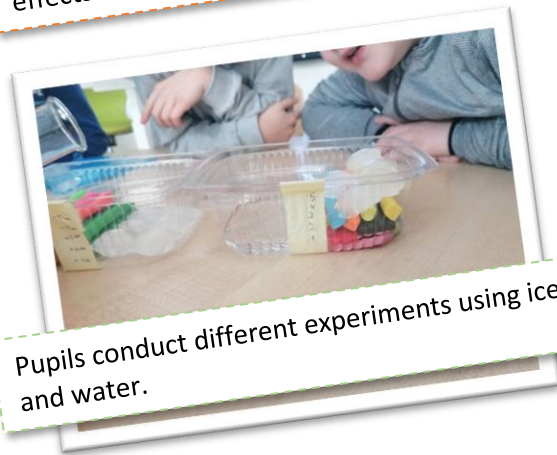
Images from the lesson process



Pupils learn about the causes and effects of the global warming.



Pupils learn how ice melting can cause water levels rising.



Pupils conduct different experiments using ice and water.



Pupils observe formation of a smog in a bottle.

I have learned that we must not pollute nature and that some animals live in warm places, and some in cold places.

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