Lesson 4. Natural Phenomena II: Earthquakes, volcanoes, tsunamis and flood.

In this lesson pupils are given an insight into a part of the natural phenomena found in the world: earthquakes, volcanoes and their eruptions, tsunamis and flood. Floods, earthquakes and tsunamis can be affected by the current global climate change. Especially strong eruptions of volcanoes, during which ashes also get into the atmosphere, can affect the climate by temporarily lowering the temperature of the atmosphere. Pupils will learn more in details about these natural phenomena, as well as about the Earth's tectonic plates and their movements. The lesson provides also for practical activities, with pupils making seismographs – measuring devices which detect vibrations.

Lesson duration:

depending on the duration of discussions, eco workshop and additional activities, the lesson takes 70-100 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 Eco workshops and experiments:

Activity 13: cardboard box, cardboard or plastic cup, string, marker, scissors, paper, plugs, coins or other things for weight.

Terms:

earthquake – *ground shaking caused by the collision of tectonic plates,*

volcano – *a place from which the magma inside of Earth flows out,*

tsunami – *large waves caused by an underwater earthquake,*

floods – *land being flooded with water,*

tectonic plates – *large blocks that make up the Earth's crust; they are like huge puzzle pieces,*

magma – *a hot, liquid substance inside Earth,*

lava – *magma that has flowed from a volcano onto the ground,*

seismograph – *a device that detects and measures the vibrations of Earth's crust, or earthquakes.*

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. The layers of Earth.

There is a discussion among pupils, led by the teacher, about what each of them knows about the surface of Earth, if it has always been solid and what the interior of Earth looks like. Not all pupils may know the answer to the last question. In this case you can encourage pupils that they will find it out during the following activities.

Additional activity.

You can ask pupils the question: "Is the Earth's surface flat?", as well as let them guess what happens to the questions at the end, why they fall to the ground.

2. The Earth's core.

Pupils make guesses (for example, vote by raising their hand), about what the interior of Earth is made of. When you click on each of the options (diamonds, gas, magma), you hear the information that there are gaseous planets or planets where diamonds fall like precipitation, but the correct answer is magma.

Additional activity.

You can ask pupils, which of the things covered in this lesson – earthquakes, volcanoes, tsunamis or floods – will be most associated with magma. The correct answer is volcanoes, through which magma flows out in the form of lava.

3. The Earth's crust.

Pupils listen to information and watch an animation about the formation of Earth's crust.

Additional activity.

To make it easier to understand the Earth's structure, you can show pupils a plum, peach, nectarine, apricot, etc. cut in half, which, like the Earth, have a "crust" (the skin of a fruit), "hot and liquid inside" (the flesh of a fruit) and a "core" (the bone of a fruit). You can ask pupils what else has a crust. An expected answer would be, for example, bread.

4. Tectonic plates.

Pupils listen to information and watch an animation about the Earth's tectonic plates.

Additional activity.

To promote the pupils' understanding of tectonic plates, they can be compared to puzzle pieces and it can be shown to pupils how they mutually fit together.

5. Tectonic plates II.

Pupils put the tectonic plates in the suitable place like puzzle pieces, creating a world map and strengthening the knowledge heard in the previous activity.

6. Tectonic plate movements.

On the world map pupils click on the names of different geological formations and listen to the information about them. By seeing the animations, pupils obtain an understanding of how various tectonic plate movements and interactions create mountains, trenches and faults.

Additional activity.

Tectonic plate movements can also be shown with sheets of paper or the palms of hands, moving them on top of each other (mountains are formed) or away from each other (trenches are formed).

7. Earthquake.

With the help of questions, as well as the teacher's support if necessary, pupils come to the explanation of what an earthquake is.

8. Can we feel earthquakes?

Pupils express their guesses – in which of the visible countries (Latvia, Lithuania and Croatia) earthquakes can sometimes be felt. After touching Latvia and Lithuania, one can find out that earthquakes there are quite rare and relatively weak or hardly felt, but in Croatia they are more frequent and stronger. Pupils discuss why there is such a difference. If pupils do not know the answer, the teacher tells them that it will be discovered in the next activity.

Additional activity.

You can ask pupils if they have heard about other places in the world where earthquakes occur.

9. Earthquake II.

Pupils listen to information and watch an animation about how earthquakes originate.

10. Magnitude of an earthquake.

Pupils click on points to see the effects of differently sized earthquakes and learn about the Richter scale.

Additional activity.

You can tell pupils that people are still looking for secure ways to build strong buildings that withstand earthquakes.

11. Measuring an earthquake.

Pupils discuss about how it is possible to measure the strength of earthquakes. With the help of questions you can recall to the pupils' memory, for example, what can be used to determine the mass of objects (with scales), length (with a ruler, tape measurer), demonstrating that there are different types of measuring devices. Pupils then listen to information about a seismograph – a device that measures the vibrations of Earth's crust.

12. Safety drill.

First, pupils express their ideas about what to do during an earthquake. You can explain to them that it is important for all people to know, even if they do not live in areas where strong earthquakes are common. Nowadays people travel a lot, and it is good to know how to deal with various unpredictable situations. Pupils then watch an animation and listen to instructions to stay safe during an earthquake.

Additional activity.

If pupils need a dynamic break, it is possible to act out what to do in the classroom in case of an earthquake.

13. Make your own seismograph.

Pupils follow instructions and individually make their own seismograph – a device that measures the vibrations of Earth's crust. The digital learning material offers written instructions and a picture of a ready-made seismograph.

In this eco-workshop pupils use the seismograph they have created to "measure" vibrations made by pupils, not caused by the Earth's tectonic plates. You can suggest pupils to try shaking the seismograph box very lightly, gradually increasing the strength, to see how the seismograph's "measurements" differ.

Additional activity.

If pupils do not have the opportunity to make a seismograph themselves due to lack of time, the teacher can prepare it and offer pupils only the demonstration part, where, when moving and shaking the box, "measurements" of the strength of vibration appear on the paper.

14. Earthquakes and climate change.

Pupils listen to information and watch an animation explaining how earthquakes can be related to climate change. In the animation tsunami is mentioned – huge waves that are caused by underwater earthquakes –, as well as strong winds: hurricanes and typhoons. When it comes to hurricanes and typhoons, it is possible to refer to Lesson 3, where hurricanes and tornadoes were discussed.

15. Tsunami.

Pupils discuss what the highest waves they have seen are, how high pupils think waves can be in the world, and whether they have heard of a tsunami. Pupils can mention the height of the waves in meters or compare them to objects they know, for example, as high as a person's height, a car, a school building, a tree, a skyscraper.

16. Causes of tsunami.

Pupils choose those pictures from the given ones that can create a tsunami. Pupils can discuss with each other, make guesses and explain their choice. If they click on the correct picture (there are 4 of them), its name turns green.

17. Tsunami II.

Pupils match pictures with the correct explanations. After each correct match, they listen to new facts about tsunamis.

18. Flood.

Pupils, listening to the information and looking at the picture, unravel that the talk will be about floods. Under the teacher's guidance, pupils discuss and express their ideas about what can cause floods.

19. Causes of floods.

Pupils choose the pictures from the given ones that can cause floods. Pupils can discuss with each other, make guesses and explain their choice. If they click on the correct picture (there are 4 of them), its name turns green. Pupils then listen to additional information about why floods occur and what role climate change has in it.

20. Tectonic plate movements and their consequences.

Pupils choose one of the given pictures related to the movements of tectonic plates, thus leading to the next topic – volcanoes.

21. Volcanoes.

Pupils listen to information and watch an animation about volcanoes, learning how they are related to climate change – global cooling.

Additional activity #1.

You can remind to pupils or let them remember another event on Earth millions of years ago that caused global cooling. In this way, a connection with the 1st lesson about dinosaurs is formed, where the climate was probably influenced to a greater extent by a meteorite that fell on Earth.

Additional activity #2.

You can make a demonstration by adding vinegar that is coloured with food

22. Final test "Mix and match!".

With the help on an interactive test pupils can test the knowledge obtained in the lesson about natural phenomena. The test can be taken by everyone together or individually – using tablets. Pupils match pictures with the concepts explaining them.

Additional activity.

You can encourage pupils to recall an interesting fact or some information about each of the concepts that has stuck in their mind by the end of the lesson.

colouring to a laboratory flask (which by appearance resembles a mountain, a volcano). Pupils can then pour soda into it and watch a reaction similar to a volcanic eruption.

23. Final test "What does not fit here?".

With the help on an interactive test pupils can test the knowledge obtained in the lesson about tectonic plates. The test can be taken by everyone together or individually – using tablets. Pupils choose which one of the given phenomena does not cause movements of tectonic plates.

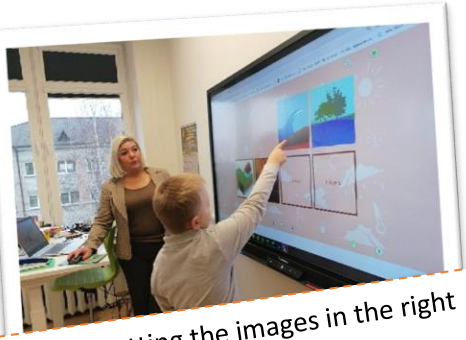
24. Global warming.

To build a "bridge" with the next lesson "Why is the climate changing? Global warming", pupils discuss and express their ideas about who heats up the Earth's atmosphere more and has a greater influence on global warming – people or volcanoes. The correct answer can be found out by clicking on the corresponding image (its name turns green). Pupils then listen to information about the human impact on 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?

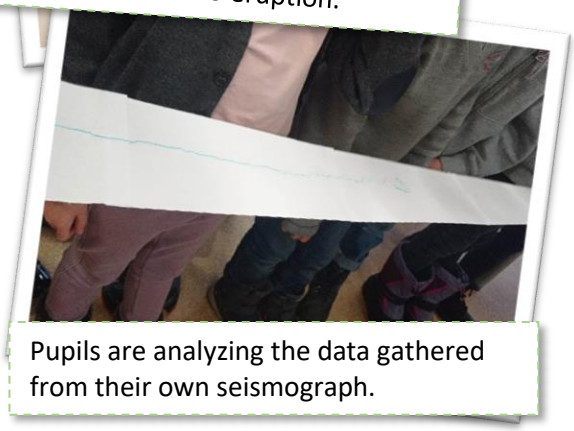
Images from the lesson process



Pupil is putting the images in the right sequence on a smartboard.

Pupils are conducting an experiment imitating a volcano eruption.

Pupils are building their own seismograph.



Pupils are analyzing the data gathered from their own seismograph.

Natural phenomena: earthquakes, volcanoes, tsunamis and floods were the lesson I liked the most. I have learned how to make a tornado in water and that I have to hide under a table if there is an earthquake.