Lesson 6. In the world of water.

This lesson provides pupils with an insight of the World Ocean, its inhabitants, explorers and threats. As a result of human activity and climate change, water acidification occurs, waste, microplastics, and other pollutants enter the water, which harms the animals and plants living there. Pupils will also learn about fresh water and salt water, and the need to save water so that there is enough for everyone. Pupils will have the opportunity to look critically at different water usage habits in order to understand the responsible use of water on a daily basis. The lesson provides also for practical activities, with pupils performing two experiments: observing the effect of an acidic environment (vinegar) on an egg shell (similar to the shells of corals and shellfish living in water) and building their own water treatment plant.

Lesson duration:

depending on the duration of discussions, eco workshop and additional activities, the lesson takes 60-75 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 and eco workshops:

Activity 5: 2 plastic cups, 2 shells or 2 eggs, vinegar, water;

Activity 6: a plastic bottle, scissors or a knife, a container with water, pebbles, sand, cotton or a coffee filter, or activated carbon.

Terms:

oceanographer – *a scientist that researches oceans and their inhabitants,*

bathyscaphe – *a submarine, used to help research what is happening deep in the ocean,*

coral reef – *an island made of animal corals,*

World ocean – *the body of all the World's oceans,*

carbon dioxide – a gas in the air that occurs during breathing and combustion (including in car exhausts and factories); too much carbon dioxide or carbonic acid gas causes global warming and water acidification,

microplastics – *small plastic particles invisible to the eye that pollute the environment, especially water bodies,*

Handouts (for printing)**:**

1) A worksheet for pupils to strengthen the new terms and to find out more about water. It can be completed in class or at home. Encyclopedias or internet resources about water can be used to complete the tasks on the worksheet.

The lesson

At the beginning of the lesson introduce pupils to the behavioral 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 World Ocean.

Pupils insert oceans in the suitable places like puzzle pieces, creating a world map; afterwards they listen to information and find out that the set of all five World oceans is called the World Ocean. Pupils also learn that without water there would be no life on Earth.

Additional activity.

Pupils do task 1 on the worksheet, writing the names of oceans visible on the map next to the letters under the picture.

2. Ocean.

Firstly, pupils discuss and express their ideas about what the pictures have in common: an oceanic trench, an oceanographer, a humpback anglerfish, a coral reef and a blue whale. Then, by touching the pictures, pupils listen and learn new information about the World Ocean, its inhabitants and explorers. In order for pupils to understand the mentioned depths better (4 km and 11 km), it is possible to compare them with something from life, for example, the distance to a known object from school.

3. Ocean life.

In the ocean landscape pupils look for five animals hidden there. When pupils touch each animal they find, information about it is played back. The already found animals are marked with a green circle.

Additional activity #1.

Pupils can be invited to vote on who they think is the most interesting of the ocean inhabitants discussed. Pupils can also tell the class what other interesting ocean animals or plants they know.

Additional activity #2.

Pupils do task 3 on the worksheet, circling the names of those animals that could be hiding at the bottom of the ocean.

4. Kas apdraud okeānus un jūras.

Pupils move the ship from point to point and listen to information about what pollutes the World Ocean and endangers its inhabitants. Before sailing to each of the following stops, pupils can make their guesses, what could be the particular ocean threat.

Additional activity.

Pupils do task 2 on the worksheet by colouring the things in the picture, which should not be present in water bodies.

5. Experiment.

Pupils follow the instructions and individually or in groups perform a simple experiment to see, how an acidic environment affects animal shells. Before doing the experiment, pupils can express their thoughts on what could happen to the shell of an egg in an acidic environment. The results will be available no earlier than the next day (although it is better to wait three days), therefore it can be also carried out before, and discuss the observations and conclusions during the lesson. The digital learning tool offers written instructions and necessary materials in the form of pictures. It is important to follow the safety rules when working with vinegar, so that it does not accidentally spill, and splashes do not hit the eyes.

Additional activity.

You can tell pupils that carbon dioxide, which is found in the exhaust gases of cars, airplanes and other vehicles, as well as which is produced by combustion processes in factories and elsewhere, not only causes the greenhouse effect and global warming, but also dissolves in the water of the World Ocean and, similar to the vinegar in the experiment, makes the water more acidic. It is not so acidic for us to taste it (but water from oceans, seas, etc. is not for drinking!), but aquatic animals that have shells (corals, clams) are sensitive to acidity, and their shells (like an egg's shell), break down, thus harming these animals, they may even die. Seeing that because of the vinegar (acidic environment), the egg's shell has "disappeared", you can invite pupils to draw their own conclusions. Knowledge transfer can also take place by showing or telling pupils that sugary carbonated drinks such as "Coca-Cola" also create an acidic environment, which can damage teeth if you drink it a lot and often.

6. Experiment.

Pupils follow the instructions and in pairs or small groups build a water treatment plant and check how it can clean water that is "polluted" in different ways. The digital learning tool offers written instructions, questions for post-experiment discussion, and the necessary materials in the form of pictures. It is important to follow the safety rules when working with scissors or a knife! To prevent dangerous situations, preparatory work can also be done by the teacher.

After the water treatment plant has been built and its ability to clean different types of water "pollution" has been tested, pupils discuss which types of pollution are easier and which are more difficult to clean.

**If for some reason pupils do not have the opportunity to do the experiment themselves, the teacher can prepare it and offer it to pupils as a demonstration. Pupils can also do this experiment at home under parental supervision.*

7. Freshwater and saltwater.

Pupils sort the pictures of bodies of water according to whether they contain fresh water or salt water. Pupils can be asked to try to explain the difference between freshwater and saltwater, and whether different plants and animals live there.

Additional activity.

Pupils can be invited to name some other water bodies of freshwater and saltwater.

8. Water quantity.

Pupils touch the water droplets and listen to information about the amount of water on our planet.

9. Proper water usage.

After listening to the information in the previous task about the relatively small freshwater quantity on Earth, pupils should be aware of how important it is to save water. Pupils read examples of different actions and sort them into columns “right” and “wrong”, based on whether the particular action saves water (is right) or wastes it (is wrong). Pupil involvement can be increased by dividing pupils into smaller groups and asking them to reach agreements – which statements are about the right and which are about a wrong usage of water.

Additional activity #1.

Pupils can be invited to share more examples from their own family, school life, how they can use water responsibly, or where pupils have noticed excessive water consumption and how it could be reduced.

Additional activity #2.

Pupils do task 4 in the worksheet, writing below the pictures how it is possible to save water.

10. Final test.

With the help of this activity pupils have the opportunity to test the knowledge they have obtained in the lesson about the world of water. The task can be done by everyone together or individually, using tablets. Pupils match the pictures with the corresponding descriptions.

11. Who does not fit here?

To create a “bridge” with the next lesson “Hot and cold deserts”, pupils touch the plants and animals in the desert landscape. The plants and animals that do not fit in the desert (cannot survive long without water) disappear after being touched, while those organisms that can survive without water for a long time are marked with a green circle after being touched. After completing the task pupils discuss and express their ideas about why the specific organisms do not fit in the desert environment.

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 are conducting an experiment by filtering dirty water.

Pupils are conducting an experiment using water, eggs and vinegar.

Pupils observe a chemical reaction happening.