

Exploitation of Research results In School practice



Guide



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Weather – a game between pressure and temperature

Guide

“Weather – a game between pressure and temperature ” is an educational package which is addressed to the students between 14 and 18 years, students in upper secondary school. The subject of the package has a multidisciplinary approach and therefore the included materials could be used at different subject from physics to geography, from mathematics to computer science.

Due to the richness of the subject treated, the package can be used during the lessons from the core curriculum but also during extracurricular lesson or educational projects. Especially for the second type of activities the students has the freedom to explore more favorable the information available in the data base to understand and to establish the way the nature work.

Title	Weather – a game between pressure and temperature – basic package
Author	Vasile Bercu University of Bucharest, Romania
Age of students	14-18
Stage of education	Upper secondary school
Subject	Physics, Geography, Computer science
Overview of package content	
<p>Our planet is a very fragile system in which the atmospheric condition has made possible the appearance of life as we know today. Our daily life is very much influenced by the way in which the atmosphere behave. Therefore, we must know and also to understand the atmosphere of our planet in order to decide what we can do in order to not change it. In the atmospheric studies we need to involve different subjects and many different phenomena, but in the same time the atmosphere could be a wonderful laboratory in which the students, from all ages, can observe, test and understand natural phenomena.</p> <p>By the content of this package we try to offer for the students the access to the real experimental data which could be used and integrated by the teachers at different subjects in order to demonstrate the real live applications of the phenomena's that they are</p>	

studying.

The package is a self consistent material which contains theoretical facts, tasks to be completed by the students, quizzes and projects to be carry out. From the position of the Earth in our solar system until to the greenhouse gases effects, from atmospheric pressure and temperature until to the structure and composition of the atmosphere, all are discussed and presented.

The theoretical part of the package is included in a PDF presentation in which are presented the most relevant facts needed for the students to understand the complexity and scientific facts which must be taken into account when we want to understand the weather. This part contains also different recorded video with a more detailed explanation of same phenomena that can be used or not depending on the interests of particular groups and their current level of knowledge.

The main goal of the package is related with the practical part. After the presentation of different theoretically facts, the students will have different tasks to accomplish by using meteorologically data available free on web. They will have the possibility to verify how different aspects related with the atmosphere influence the weather. In this way they will understand the applicability to the real live of different phenomena they have learned in different classroom subjects. In addition to this tasks , the package contain also a couple of project proposal which is also a very useful method for increase the interest of the students for science and to be used also as project-based learning method.

Assumed educational aims

The student knows:

- About the planet Earth: solar system, seasons on Earth, atmosphere
- weather, clime
- global warming and climate change effects

The student understands:

- What is the cause for seasons
- How to determine the daily/night temperature alteration
- How to determine the seasons temperature alteration
- How to discover influence of sea/ocean on the temperature variation

The student can:

- Search and analyze the methodological data
- Observe differences in weather condition in different geographical zone and time

Package content

1. [Weather_HS_ENG.pdf](#) - presentation slides
2. [Instruction for using database.pdf](#)
3. [Worksheet no 1.pdf](#)
4. [Worksheet no 2.pdf](#)
5. [Worksheet no 3.pdf](#)
6. [Worksheet no 4.pdf](#)
7. [Worksheet no 5.pdf](#)
8. [Weather methodological guide highschool.pdf](#) - methodological guide
9. [Quiz no 1_upper secondary](#)
10. [Quiz no 2_upper secondary](#)

Supplementary materials

- **Weblinks with metheorological resources**

- <https://rp5.ru/Weather in the world>

- **Weblinks with resources**

- Video 1: www.youtube.com/watch?v=Ux33-5k8cig (6 min)
- Video 2: www.youtube.com/watch?v=7xZc7lo23C4 (2.07 min)
- Video 3: www.youtube.com/watch?v=WgHmqv-UbQ (3.16 min)
- Video 4: www.youtube.com/watch?v=tX3Y5bzNDiU (5.38 min)
- Video 5: www.youtube.com/watch?v=WLRA87TKXLM (5.59 min)
- Video 6: www.youtube.com/watch?v=CibvtVMtA2E (3.17 min)
- Video 7: www.youtube.com/watch?v=LPHF323XIWw (2.36 min)
- Video 8: www.youtube.com/watch?v=6LkmD6B2ncs (12.52 min)
- Video 9: www.youtube.com/watch?v=aiYyCurh_SU&t=48s (2.35 min)
- Video 10: www.youtube.com/watch?v=4ozwCtUuU_s (1.39 min)
- Video 11: www.youtube.com/watch?v=E-5rieCUPuc (12.10 min)
- Video 12: www.youtube.com/watch?v=t3NAN6ZfIjc (2.56 min)
- Video 13: www.youtube.com/watch?v=o4lg8UfY5DM (2.21 min)

- **Link to online quiz:**

Quiz no.1: <https://play.kahoot.it/#/?quizId=4736bf04-7e41-4377-b816-f0e129639f74>

Quiz no.2: <https://play.kahoot.it/#/?quizId=442e0112-a21d-4e1d-b737-27a26b972d3f>

Lesson 1

Subject: Weather – a game between pressure and temperature

Lesson plan for “Weather – a game between pressure and temperature”

Necessary materials and equipment:

- multimedia projector, computer, loudspeakers;
- printed materials for each student:
 - Worksheet 1-5
- mobile phone or individual computers with internet connection for playing kahoot game;

Lesson aims:

General and specific aims as specified in “Weather – a game between pressure and temperature” package

Methodological suggestions:

- expository methods: lecture, talk;
- demonstration methods: presentation, video;
- activation methods: brainstorming;
- practical methods: worksheets;
- evaluation: quiz test (paper or kahoot)

Lesson procedure:

1. Start of the lesson, administrative activities, checking the register.
2. Introduction of the topic. The teacher asks the group questions and moderates the brainstorm.
3. The first issue discussed is related with the energy source that we have in our galaxy and under what form we receive that energy. Here the pupils should identify the Sun, as the source of energy and most probable the "light" as the form of energy that we receive from it. (Depending on the class level, the teacher could bring in discussion also how the energy is produced in the Sun - for help you can use the [video 1](#)).
4. After this brief introduction the teacher can perform the Kahoot [quiz no.1](#) to determine the class level.
5. The next aspect that should be discussed is the picture of the Earth from the fist slide of the presentation. The pupils should identify the main three color and shapes: the clouds, the oceans and the land and argue about difference between them by answer to the questions: which one heats up faster: land or water? (the answer is land) which one cools down faster : land or water? (the answer is land). The pupils should

explain the answer (the water has a much higher specific heat than land: 1 calorie/gram °C for water vs 0.19 calorie/gram °C for dry soil).

CLASSROOM ACTIVITY - [worksheet 1](#)

[- instructions for using the site with weather data.](#)

6. The next idea that students can debate is related to the types of kinetic energy: mechanical energy — motion of macroscopic systems , thermal energy- motion of particles of matter, radiant energy or electromagnetic radiation. For the last type of energy, which play an important role for the weather, the students should answer to the question: why do you feel warm when you stand in sunlight? , and starting from this question the students should conclude that everything in the class room (the people, the walls, the air from classroom) emit radiant energy even if is an invisible (infrared) form of radiant energy.
7. The next issue should be related to the Earth trajectory around the Sun; the seasons and daily temperature variation and under what form we receive the energy from the Sun.

The teacher can also ask : How many kilometers does the earth travel in one year? and using the slide no 3 the students should discuss if the distance variation influence the seasons or not.

Another issue discussed here is to explain the alternation of the seasons. The teacher can also use one of the following movies: [video 2](#), [video 3](#), [video 4](#), [video 5](#) .

CLASSROOM ACTIVITY - [worksheet 2](#)

[- instructions for using the site with weather data.](#)

8. Another issue that can be discussed here is the one about the influence of latitude on temperature. To have a starting point, teachers can use workshop 3.

CLASSROOM ACTIVITY - [worksheet 3](#)

[- instructions for using the site with weather data.](#)

9. The presentation continue with the structure and composition of the atmosphere and after that are introduced the main parameters which characterize the atmospheric air: pressure and temperature.

The teacher can use also one of the following movies: [video 6](#), [video 7](#), [video 8](#).

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- these records will be tracked for as long as possible
- provide a commentary for each day regarding the coincidence of actual and predicted weather
- after, let's say 30 days, the data will be analyzed, and the students will have to identify a way to decide which source is the most correct. .

Project no. 2 - the atmosphere of the Earth

One of the important questions is related to the origin of the atmosphere. The goal of this project is to study and to present how and when the atmosphere appeared on Earth and how it evolved.

Project no 3. the Barometer and the Thermometer

Using the following video: www.youtube.com/watch?v=ah8F-xmvB2k to build a barometer and www.youtube.com/watch?v=qwHvXSJlp-s for a homemade thermometer. In order to check the relationship between pressure and temperature recorded each day the results obtained with the instruments you have build. What conclusions do you get?