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ERASMUS+ PROJECT: "Development of selected key competences of pupils in lessons and extracurricular activities at school" No. 2024-1-PL01-KA220-SCH-000247484/2

Lesson plan

School: Smolenice Primary School and Nursery School, Komenského 3, Smolenice

Subject: PHYSICS

Year: 9

Class: IX.A

Number of hours per week: 1 (33 hours per year)

Teacher: Mgr. Anna Hagarová

Thematic unit: Electrical properties of substances.

PHYSICS; Class: IX Topic title: Electrical properties of substances.

Electrometer

Content standard: Electrification of bodies, electric charge, electroscope, electrometer

Performance standard: Generalise the electrical properties of substances based on experimental experience. Explain the transfer of electric charge on an electroscope.

Objectives in terms of key competences:

Cognitive: - describe the electrical properties of substances

- know how to use an electrometer
- be able to express the essence in your own words
- apply knowledge in new situations and develop own ideas
- know how to apply knowledge in practice

Psychomotor: - consolidate practical skills in conducting experiments in group work

Affective: - express one's own opinion on the observed phenomena, know how to argue -learning to work in a team and respect different opinions

Key terms: Electrical properties, electric charge, electrometer, grounding

Student's prior knowledge: Knowledge of the composition of substances, atoms and molecules

Interdisciplinary connections:

Biology – composition of atoms and ions

technology – use of static electricity in industry / paint application, electrostatic filters in air purification/

Cross-curricular topics:

-safety compliance

-personal and social development, group work

Teaching aids: student kit for magnetism and electrostatics, glass rod, ebonite rod, balloons, aluminium foil, paper, bubble blower, ruler, straws, electroscope, induction electricity, Van de Graf generator, plastic bags

Forms: frontal work, group work, practical activities and experimentation

Type of lesson: ind combined

Teaching methods: Motivational – demonstration of experiment, discussion

Expository – discussion, problem solving through observation during the experiment

Fixation – interactive consolidation and analysis

Attachments: worksheet

Lesson structure:

I. Introductory part:

Consolidating knowledge, developing communication skills and practical skills.

Revision of previous lessons

a/ ***Magnetic properties of substances*** through experiments - group work
Pupils will work with teaching aids on magnetism. Each group will gradually create one question for another group concerning magnets and their properties and the pupils in the second group will answer and present an experiment to prove their claim

b/ ***Composition of an atom, ion*** – worksheet / Appendix 1

II. Motivational part:

- experiment – electrifying two strips of plastic wrap
- discussion, expressing one's own opinion /combing hair with a comb/

III. Expository part:

a/ Activity – pupils in groups are given various aids and are asked to experiment with them. They will gradually comment on and explain each experiment, not only describing their observations, but also expressing their opinion on why this is happening

- with an electrified ruler and pieces of paper
- with an electrified balloon and poppy seeds
- 2 electrified balloons
- Electrified balloon and wall
- 2 electrified straws and a bottle
- bubble blower on a wet surface and electrified plastic straw
- A thin stream of water and an electrified glass rod
- plastic bag and hand
- plastic bag and paper
- electrified plastic bag and electrified glass rod
- 2 strips of aluminium foil in a plastic bottle and an ebonite rod

b/ Searching for a solution – what is happening, why is it happening, what do you think, what have you discovered – communication, interaction

c/ Demonstration experiment:

- inductive electricity / discharge, lightning/
- Van de Graf generator

The teacher asks frontal questions:

When do bodies become electrified?

What is found in the nucleus of an atom and what is found in the shell?

What is an electric charge? What can it be?

When is an atom electrically neutral?

Where do electrical forces manifest themselves?

How do two positively charged bodies behave towards each other?

How do two bodies behave towards each other when one is positively charged and the other negatively charged?

What do we mean by the term elementary charge?

Demonstration experiment with an electroscope

Replacing the plastic bottle from the previous experiment with an electroscope /+ induced electricity/- repeating the experiment – considerations for use - familiarisation with the electroscope, electrometer

/ not an electrometer!!/

- transfer of charge between bodies
- composition of the electroscope
- grounding

IV. **Fixation part:**

Summary – consolidation of knowledge through presentation

V. **Conclusion:**

Evaluation section – in the form of a discussion – what was most interesting

- whether I understood the lesson
- whether I will be able to use the knowledge in real life

Methodological evaluation

The lesson is designed in accordance with content and performance standards. The objectives are clearly formulated on three levels (cognitive, psychomotor, affective) and are reflected in practical activities, experimentation and discussion. Through experiments, students verify their theoretical knowledge and develop their ability to observe, analyse and argue.

Methodologically interesting is the connection between exact science and methods that develop cooperation, respect for opinions and responsibility for a common result. The teacher creates space for research and discovery in line with the constructivist approach to learning.

The motivation of pupils is based on everyday life, which is not only realistic but also effective in the process of acquiring new knowledge. When conducting experiments, pupils are also required to express themselves verbally, forcing them to argue and communicate, and formulate conclusions in their own words. The use of the Van de Graf generator is an experiential moment for pupils, supporting long-term memory retention.

Conclusion: The lesson effectively combines traditional forms of teaching with an innovative constructivist approach and sensory learning. It is exploratory, respectful and stimulates pupils' curiosity. It is didactically varied, rich in working methods and alternates between activities. It significantly develops scientific competences.

Methodological evaluation prepared by: PhDr. Ivana Štibraná, PhD.

APPROVED

Mgr. Magdaléna Eliášová, school principal

10 October 2025, Smolenice, Slovak Republic