Innovative Experiments In Physics

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ABSTRACT

The article discusses the organization of physical circles in schools, shows how simple fun activities in circles and the disclosure of their meaning can increase students' interest in physics and connect science with practice. The article explains the mechanism and essence of several experiments.

Keywords: School, circle, experiment, tripod, glass, water, salt, capillary, ball, food colors, polyethylene, rail, eggs, magnet, battery, copper wire, pin

Circles are one of the means of effective organization of extracurricular activities of students of secondary schools. A circle is a voluntary association of students who want to engage in a particular field of science. In the circle, students conduct creative work in mutual cooperation, expand and deepen their knowledge in a particular subject, creatively approach this subject. When conducting a circle, an individual approach is required, taking into account the interests, wishes and capabilities of each student.

In physics circles, showing simple interesting experiments and revealing their essence increases students' interest in physics and encourages them to think.

The circles fulfill the following goals and objectives:

- introduce participants to the achievements of science and technology, try to create innovations using these achievements in practice;
- deepening, expanding physical knowledge, bringing it closer to life, applying it in practice, obtaining practical results;
- assimilation of physical concepts in the process of studying the course of physics;
- development of intellectual and mental abilities of students;
- mastering the methods of studying nature;
- understanding the role and function of physics in the development of society;
- mastering and improving the methods of conducting experiments;
- learn how to collect physical samples, using them in practice;
- convergence of science and practice.

Conducting the following innovative simple, interesting physical experiments for students in grades 6-7 will increase students' interest in nature and the phenomena observed in it, motivate them to study physics.

Experiment 1. "Get a coin out of the water without getting your hands wet"

Materials needed: coin, plate, glass, paper, matches.

Task: We put a coin in a plate and pour some water, students are asked to pick up a coin without touching the water.

Explanation: Burning paper is inserted into the glass, then the paper is quickly removed and the glass is lowered by mouth into the water on the plate, as a result, the water is drawn into the glass and you can get a dry coin. The reason is that when the air inside the glass is heated, its pressure exceeds the external atmospheric pressure, and part of the air in the glass leaves, the pressure decreases, as a result, the water in the saucer enters the glass at atmospheric pressure, and the coin gets rid of the water.

Experiment 2. "Magic Water"

Materials needed: A glass of water, white paper (sheet).

Task: Fill a glass with water, put white paper on it and slowly turn the glass upside down so that the water in the glass does not spill.

Explanation: The water in the glass is held by atmospheric pressure, the water does not spill because the outside atmospheric pressure is greater than the pressure of the water in the glass.

Experiment 3. "Fire ball"

Materials needed: two balloons, candles, matches, water.

Task: Inflate one of the balloons and hold it over the candle, the balloon will burst. We fill the second half of the ball with tap water, tie the neck and hold it over a burning candle so that the ball does not burn out and burst.

Explanation: Since the heat capacity of water is high, it begins to absorb the heat given off by the candle and prevents the balloon from burning.

Experiment 4. "Holes impervious to liquid"

Materials needed: plastic bag (white), water, pencils with sharp ends.

Task: Fill a plastic bag halfway with water, then pierce the bag with a pencil from all sides, the water in the bag will not leak out.

Explanation: When a pen pierces a plastic bag, its molecules adhere to the pen by mutual attraction, and water almost does not flow out.

Experiment 5. "The weight of the newspaper breaks the beam"

Materials needed: Newspaper, ruler 60 cm long, 1 cm wide and 0.5 cm thick.

Experiment: We put 60 cm from the end of the rail on the table so that it protrudes from the table by half its length. We cover part of the strip on the table with an open newspaper, if you slightly press on the end of the strip sticking out of the table, then the end pressed by the newspaper will slowly rise. If we hit with a sharp movement on the end of the rail hanging from the table, then the end with the newspaper will not be able to rise, and the hanging end will break.

Explanation: Atmospheric pressure presses on a newspaper. If the air hits the end of the rail quickly enough, the air does not get under the newspaper quickly enough, the air pressure on the newspaper exerts a strong pressure of the air coming from below, as a result, the rail breaks.

Experiment 6. "Cut paper rings"

Materials needed: 2 paper rings 4-5 cm wide (10 cm in diameter); 2 tripods and 2 couplings; wooden lath 80 cm long, 1.0 cm wide, 0.4-0.6 cm thick.

Experience: We hang paper rings parallel to the tripod couplings at the same height, we hang a wooden rod on the lower end of the paper rings. If we quickly strike the center of a wooden reed with an iron rod, the reed will break, but the paper rings will not break.

Explanation: The impact time of an iron rod on a wooden rod is very short, and the rod does not have time to transfer the volume of movement (momentum) to the paper rings and, as a result, breaks.

Experiment 7. "Fireproof handkerchief"

Materials needed: Hand wipes, water, alcohol, tripod with clutch, matches.

Experience: Dip a handkerchief in water and wring it out well, then dip it in alcohol, secure it to a tripod clip, and light it with a match. The

handkerchief will not burn, even if it remains in the flame.
Explanation: The reason the handkerchief does not burn is because the heat generated by burning alcohol is used to evaporate the water in the handkerchief.

Experiment 8. "Multicolored Cabbage Leaves"

Materials needed: 4 cups of water; food coloring (4 types); white cabbage leaves.
Experiment: 4 different colors in 4 cups and put one cabbage leaf in each of them and put end up (or put sheets of white paper in each of them and put end up).
Experiment: Dissolve 4 different colors in 4 glasses and place a cabbage leaf in each of them and set end up (or put in each sheet of white paper and set end up). In the morning, you can see that the cabbage leaves (or white paper) are colored in the color of the solution in which they were dipped.
Explanation: Based on the phenomenon of capillarity, colored water rises from thin tubes inside cabbage leaves to the leaf tip and forms colored leaves. In nature, nutrients rise from the water from the roots of trees to their tips.

Experiment 9. "The Egg That Doesn't Sink"

Materials needed: 2 glasses, water, 2 eggs.
Experience: Pour ordinary clean water into the first glass, pour hot water into the second glass, dissolve 4 tablespoons of salt, wait until the water in the second glass cools down. Start the experiment in front of the students. Put 2 eggs in 2 glasses. The first sinks, the second does not. The reason is explained to the students.
Explanation: Since the average density of the egg is greater than the density of water, the first egg sinks. Since the salt is dissolved in the water in the second glass, its density is equal to or greater than the density of the egg, so the second egg does not sink in the water.

Experiment 10. "Steam engine"

Materials needed: water, egg, needle, thin wire, spool of thread, candle or spirit lamp.
Experiment: Make a small hole in the egg from opposite sides with a needle and take out the liquid inside the egg, rinse the eggshell well and fill it halfway with water. Gently pass a thin wire through the holes of the egg and connect the ends and hang on a thin thread. Heat it with a candle or spirit lamp. When the water boils and steam starts to come out of the holes, the egg will start to rotate.
Explanation: There is a jet movement here, i.e. steam comes out and pushes the egg in the opposite direction, as a result, the egg begins to rotate.

Experiment 11. "Charging hair"

Materials needed: Children's balloon.
Experiment: a student is given a balloon and asked to inflate it, then raise it over his head with his mouth closed and rub the balloon against his hair. As a result, the student's hair is raised to a vertical position. This experiment turns out to be interesting and proves that objects are charged by friction.

Experiment 12. "Wireless Electrical Circuit"

Materials needed: 9V Corona battery, LED, 6m soft pencil.
Experiment: Draw a simple electrical circuit on white paper with a 6m soft pencil. The head of the circuit must be open and drawn so that the poles touch when the battery is turned over, and the end of the circuit must be open and intended to connect the ends of the LED. Circuit diagrams must not cross each other, otherwise the paper may burn due to a short circuit.
Explanation: Here, students are interested in the fact that the light bulb is on, and the pencil (graphite) conducts electricity.

Experiment 13. "A simple electromagnet"

Materials needed: 15cm large nail, 40cm copper wire, 9V corona battery, wrench, magnetic buttons or violins.
Experiment: Leave 12 cm from the ends of the copper wire and wind the wire evenly around the nail, then connect the ends of the wire to the battery through the switch. When the switch is turned on, an electromagnet is created, which begins to attract ferrous metals. Iron is a ferromagnetic substance and has a high magnetic absorption, which creates a magnetic field from an electric current.

Experiment 14. "Magnetic Motor"

Materials needed: small magnet, watch battery, copper wire (2 meters), 2 small plugs, tape.

Experiment: On both sides of the battery, glue two studs with the round side up. Roll the copper wire into a ring with a diameter of 1-1.5 cm, glue a magnet on top of the battery, strip the ends of the wire from insulation and pass it through the outlet. Turn the wire winding by hand so that the winding (rotor) continues to rotate.

Explanation: The battery is a source of current, when current passes through a coil of wire, a magnetic field is created that interacts with the magnetic field of a permanent magnet (ampere force). The magnetic field is oriented perpendicular to the current and ensures the rotation of the rotor.

Thus, by showing interesting experiments from physics in the classroom, it is possible to improve students' worldview, thinking and horizons of interest in science.

References:

1. Ковалева С.Г., Иванова О.М., Баталева Н.Ю., Стрелецкая Е.В., Крылов В.В. Внеклассная работа-как средство компетентности учащихся. Санкт-Петербург. 2011. 156 с.
2. Пальперштейн Л.Я. Занимательная физика. М:.РОСМЭН.2000. 115с.
3. Горев Л.А. Занимательные опыты по физике М.: Просвещение. 1977. 152с.
4. Ванклив Дж. Занимательные опыты по физике. М:. Астрель. 2008, 254с,
5. Бердиев У. Б., Кузимуродова М.Ш. Кружковая работа в школе. //Республика илмий-техник анжумани. Нукус. 2019. С. 149-152.