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INFOGRAPHICS IN TEACHING THE TOPIC "NEWTON'S LAWS" AT SCHOOL

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Abstract

This paper discusses the experience of using infographics when teaching the topic "Newton's Laws" in the school curriculum. Several options for infographics on this topic are proposed. It is emphasized that creating infographics is a creative process that requires considerable effort and time, and that exchanging experiences is very important. It is noted that students enjoy lessons that use infographics. Visual images facilitate understanding of the topic, which is confirmed by improved student performance in physics.

Keywords

Infographics, physics, students, Newton's laws, teaching, visualization, academic performance.

The intensive use of modern pedagogical and information technologies makes it possible to increase the effectiveness of teaching physics at school. The first serious step into the world of physics for students usually occurs in the seventh grade. It is here that they first encounter the fundamental laws of mechanics, including Newton's laws. The abstract nature of the formulations and the difficulty in visualizing physical processes make understanding difficult. Moreover, in the current age of abundant information, the perception and thinking of modern students have changed. Nowadays, students' minds require visualization. Therefore, teachers strive to diversify the formats of their lessons.

To facilitate better knowledge acquisition in physics classes, we used infographics. Infographics are a graphic way of presenting information, data, and knowledge. They include visual elements and accompanying text that explain these images. Infographics are particularly effective when there is a need to quickly and clearly illustrate and remember large amounts of information. They can be used in any lesson. Creating high-quality infographics is a creative task that requires significant effort and time. Therefore, sharing experiences in developing infographic resources for physics is of great importance.

As part of this experience-sharing effort, we present several infographic designs we developed on the topic "Newton's Laws" for the seventh-grade physics curriculum (Figures 1, 2, 3). One can choose a suitable option depending on the particular group of students. Alternatively, students can be given the opportunity to select the version they prefer.

The foundation of the dynamics of a material point consists of Newton's three laws, formulated in the 1680s. The first law identifies reference frames in which the equations of dynamics have a simple form. These are called inertial reference frames. The law can be stated as follows: every object remains in a state of rest or uniform motion unless acted upon by external forces. From this follows the definition of inertia as the property of objects to remain in a state of rest or uniform linear motion. Therefore, this law is also called the law of inertia.

The second law of Newton establishes the relationship between the acceleration of a material point in an inertial reference frame and the forces acting on it. It can be stated as follows: the acceleration acquired by a body under the action of a force is in the direction of the force and is proportional to the force and inversely proportional to the mass of the body. This law is the fundamental law of translational motion. Here, the force refers to the sum (i.e., the resultant) of all the forces acting on the body.

The third law (action and reaction) relates the forces with which bodies act on each other. It is stated as follows: two interacting bodies exert forces on each other that are equal in magnitude and opposite in direction.

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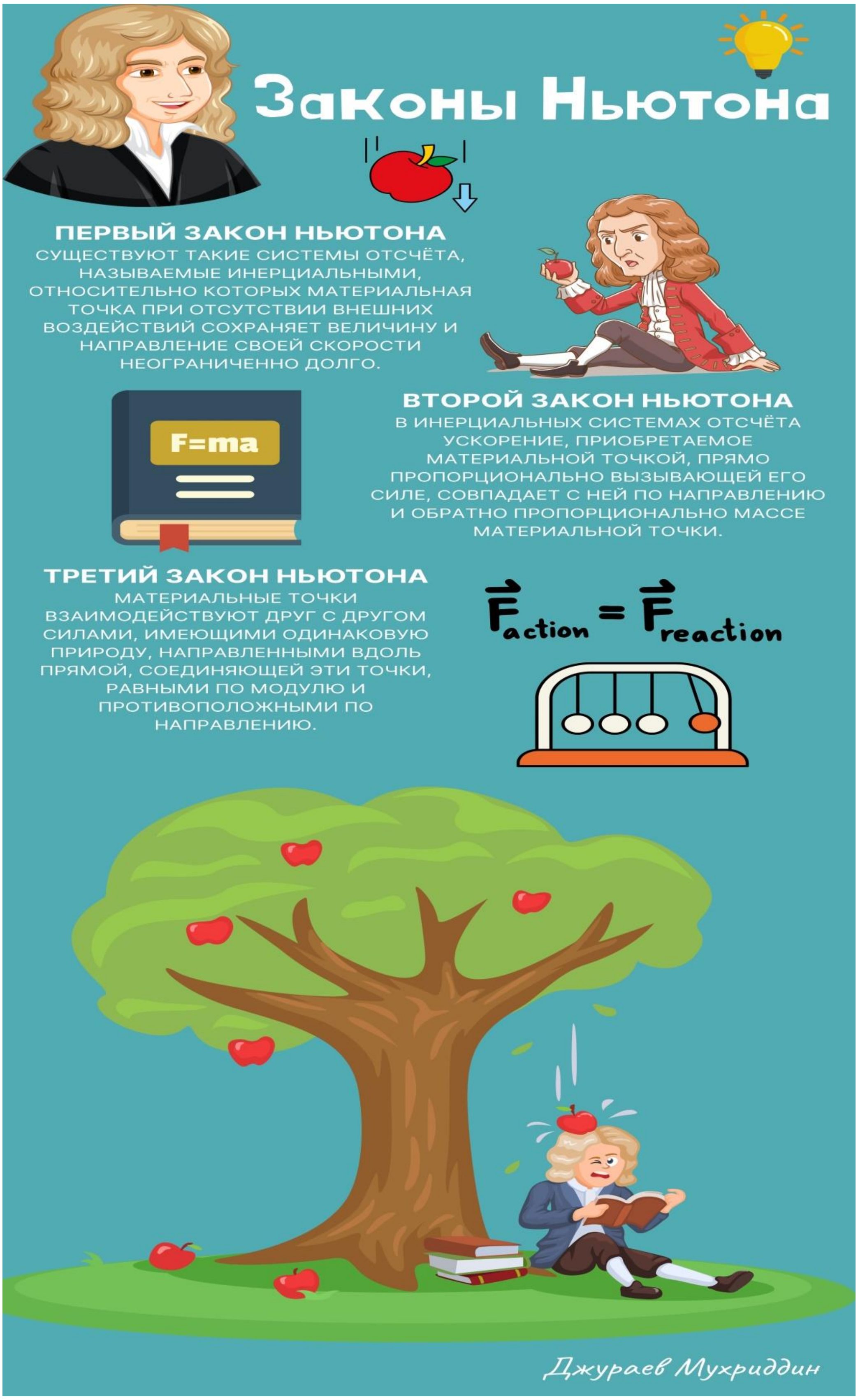

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The expressions for the forces included in Newton's laws can be taken from other areas of physics, such as friction force, elastic force, and gravitational force from mechanics; electrostatic force from electrostatics; Ampere's force and Lorentz force from electromagnetism, etc.

Surveys of students show that they enjoy lessons that incorporate infographics. They find them interesting, visually accessible, and pleasant to engage with. Visual images make the topic easier to understand, and assessment tests show a noticeable improvement in students' performance in physics.

Conclusion

Visualizing the topic "Newton's Laws" in school physics classes helps students understand physics better, while also enabling teachers to make the learning process modern and effective. The proposed infographic options can become elements of an infographic resource bank to support school teachers and physics educators, as well as students in pedagogical universities.

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