JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS
GERMAN INTERNATIONAL JOURNALS COMPANY
ISSN: 2751-4390
IMPACT FACTOR (RESEARCH BIB) : 9,08. Academic reserach index

METHODS FOR SOLVING MATHEMATICAL PROBLEMS ABOUT MOTION

Makhmudov Azam Kudratovich
Teacher of mathematics at the Terdu Academic Lyceum.
Mamaraimov Bekzod Qodirovich
Teacher of mathematics at the Terdu Academic Lyceum.
Musurmonov Maruf Akrom ugli
Teacher of mathematics at the Terdu Academic Lyceum.

Abstract: In mathematics, motion problems, especially in the areas of kinematics and dynamics, help students understand the changes in physical systems over time and space. This article reviews various pedagogical methods and strategies for effectively teaching students the process of solving motion problems. The aim is to develop students' mathematical thinking and problem-solving skills using an analytical approach to solving problems and practical examples.
Keywords: Motion problems, kinematics, dynamics, teaching students, mathematical thinking, problem solving, pedagogy, analytical approach.

Uzbekistan is a country that has been developing greatly in the field of science and culture since ancient times. In particular, such disciplines as astronomy, mathematics, medicine, chemistry, history, philosophy, linguistics, literary studies, as well as sculpture, weaving, ceramics, glassmaking and other professions are widely developed. Current Uzbek scientists actively study the scientific heritage left by thinkers of the distant past and enrich science with their new discoveries, making a worthy contribution to the development of world science. Mathematics is divided into two complementary parts: theoretical science, which deals with internal mathematical structures, and applied science, which provides its models to other sciences. Physics, chemistry, astronomy, engineering systems, forecasting and logic always use mathematical apparatus. With the help of mathematics, discoveries are made, patterns are found, events are predicted. The importance of mathematics in human life is incomparable. Knowledge of basic mathematical laws helps to learn any profession in the modern world. For example, financiers, astronomers and biologists use mathematics in various fields, for example, in financial operations. They use it to increase, track distances, or understand genetic mutations. Mathematics also helps in engineering and programming.

Mathematics is needed not only for professional study, but also in our everyday lives. In order to understand the structure of our modern world, it is very important to learn to solve simple and complex problems, add, subtract, and multiply. This knowledge develops thinking and thinking and changes our attitude to the world. Starting to study mathematics at school and institute prepares students for independent thinking and problem solving. Teachers and parents play an important role in supporting students in this process, which helps students master knowledge and develop interest in it.

Mathematics plays a very important role not only in obtaining a profession, but also in improving the ability to think and think independently. It teaches a person to identify, correct mistakes, and solve difficulties. Collaboration between parents, support from teachers, and mastery by students all contribute to the development of our mathematical lives. Of course, independence, decision-making, responsibility, and the absence of fear of mistakes are not only developed in algebra and geometry lessons. However, these subjects cultivate qualities that play an important role in life.

Mathematics is also very important in the industrial sector. Machine structures and technical

factors work on the basis of mathematics. Young students need to learn mathematics for their professional development in the industrial sector. Mathematics is important for young students in every aspect of life. This subject helps them develop their abilities and capabilities and provides them with good preparation for professional leadership. It can also help them master mathematical concepts and analyze them every day. Therefore, it is very important to study mathematics and prepare well for it.

The importance of the problem in teaching mathematics is very great, and in this regard, it is advisable to use practical and non-standard problems in the educational process to increase students' interest in mathematics, form basic and scientific competencies. Solving such problems develops logical observation activities such as analysis, synthesis, analogy, generalization, deduction and induction in students, as well as qualities such as intuition, flexibility and adaptability, and teaches students to think critically about the results obtained. In some cases, the solution to practical and non-standard problems may not be found immediately, but only after several attempts, which allows for perseverance in achieving this goal, that is, the development of such very important qualities as willpower.

The general educational goal of teaching mathematics sets the following tasks:

a) to provide students with a system of mathematical knowledge based on a certain program. This system of knowledge should provide students with sufficient information about mathematics and prepare them for studying higher sections of mathematics. In addition, based on the program, students should learn to check the reliability of the knowledge they have acquired in the process of studying, that is, master the basic methods of proof and control;

b) to consolidate students' oral and written mathematical knowledge.

The study of mathematics should help students master the skills of speaking in their native language without errors, expressing their thoughts clearly, clearly and concisely. This means achieving students' ability to correctly pronounce each mathematical rule in their native language and comprehensively developing their ability to correctly write the mathematical expression of this rule using formulas;

d) teaching students to know real truths based on mathematical laws. Here, it is intended to provide students with knowledge in a volume that allows them to understand the spatial forms of everything that occurs in the real world, from the simplest to the most complex phenomena, and the quantitative relationships between them. By providing such knowledge, students' spatial imagination is formed and logical thinking is further developed.

Solving motion problems can be difficult for students, because they require many physical laws, formulas, and mathematical manipulations. At the same time, motion problems provide students with great opportunities to develop mathematical thinking, apply an analytical approach, and solve problems. Using various methods in teaching motion problems to students helps increase their understanding and success in solving problems.

Motion is a process of change that occurs as a result of the interaction of physical systems. Types, forms, and laws of motion are widely used in various fields. In physical problems, the study of motion, the development of its physical laws, and models are important. Kinematics and dynamics are the main branches of physics that study the types of motion and the factors that affect it.

The word ``motion`` is found in various types of sentences, such as the rule of simple triads, finding the unknown by two differences, and other problems. However, these problems do not belong to the category of problems about motion.

In the methodology of teaching mathematics, the sentence about motion includes problems about finding the relationships between the three quantities that represent motion: speed, time, and distance. In these problems, the quantities mentioned are involved as directed quantities.

That is: all simple and complex problems about the motion of one body. In such problems, each of the quantities is involved depending on the other two; problems about collisional motion; problems about the motion of two bodies in opposite directions; problems about the motion of

two bodies in the same direction. Problems of this type are not studied in elementary mathematics.
When solving simple problems about motion, it is useful for a teacher to first clarify how to construct sentences that imply speed, such as: "The cyclist rode at a speed of 14 km per hour", "Anvar rode at a speed of 4 km per hour". Only then should he conduct methodological work on the connections between speed, time and distance.
Choosing the types of problems: When teaching problems about motion, problems of different levels should be selected according to the students. In this case, the problems are divided into the following categories:
Straight-line motion: In these problems, students learn the connections between speed, time and distance.
Circular motion: Students learn the geometric shapes of circular motion and angular velocity.
Parabolic motion: In these types of problems, the vertical and horizontal movements of an object are analyzed separately.
The level of the problems should be changed depending on the students' learning stage. At the beginning stage, simple calculations are proposed, and later more complex analysis and formulas are proposed.
It is very useful to provide explanations using visual aids, such as graphs, diagrams, and shapes, when teaching students about motion. Using graphs to represent motion in geometric form, such as a graph of distance versus time or a graph of velocity, makes it easier for students to understand. These aids teach students to use mathematical formula-based analysis to describe motion.
It is also necessary to give real-life examples when teaching students how to solve problems related to motion. For example, problems about the speed of a car, the movement of stars in the sky, or physical movements in sports teach students how to solve problems related to real life. When choosing these examples, it is very important to take into account the interests of students, to make them easy to understand and interesting for them. It is also very important to explain the connection between mathematics and physics when solving motion problems. Kinematics problems are used to describe physical motion using mathematical formulas, so it is necessary to show students how mathematical methods help describe physical processes. For example, using mathematical formulas to calculate speed, acceleration, and distance helps students better understand physical laws. That is, Kinematics is the branch of physics that describes motion and studies the motion of physical objects and systems, its properties and laws. Kinematics deals with the calculation and description of motion, but does not study the forces and energies that act on bodies and systems in this process. Kinematics mainly studies variables such as time, distance, velocity, and acceleration to provide a complete description of motion.
The main concepts in kinematics are as follows:
1. Distance (S) is the path an object travels.
2. Velocity (v) is the average speed of an object, determined by the ratio of distance to time. Velocity can be a scalar quantity (distance) or a vector quantity (direction and velocity).
3. Acceleration (a) is how the velocity of an object changes over time.

4. Time (t) is the duration of the motion.

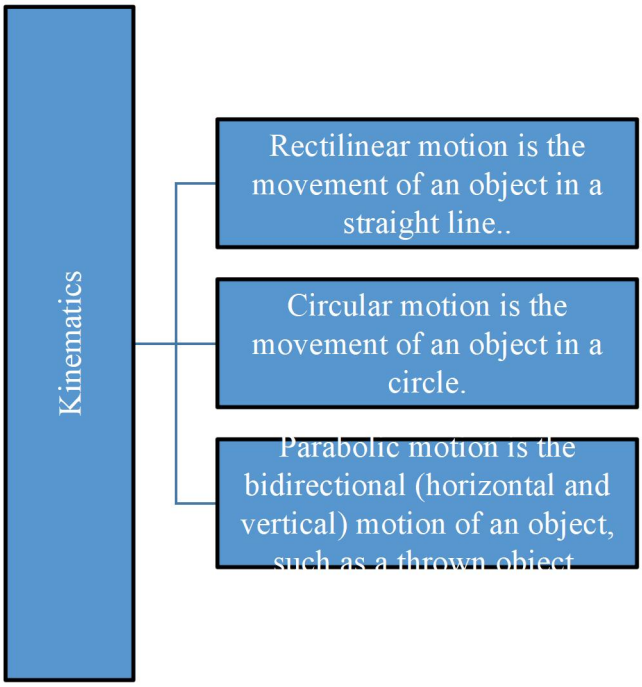

Table 1.

There are many formulas and laws in kinematics, such as formulas for calculating speed, and the relationship between distance and time. This field serves as the basis for other branches of mechanics (such as dynamics).

It is also worth noting that the use of an analytical approach to solving problems related to motion is very effective. Students should be taught how to create formulas for the problem, how to perform calculations and algebraic manipulations. It is important to learn simple mathematical formulas to solve kinematics and dynamics problems. The analytical approach also helps students apply the formulas correctly and understand their practical significance.

A step-by-step approach should be used when teaching students motion problems. First, students are helped to solve simple problems, and then they move on to more complex problems. At each stage, time should be allocated so that students understand the new concepts they are learning. Each problem solution explains to students what methods to use in solving the problem, developing their mathematical thinking.

In motion problems, various problems that arise in real-world situations are considered. For example, the braking process of a car, the movement of space objects, or problems in the field of aerodynamics demonstrate the laws by which motion occurs.[1]

Conclusion: Solving motion problems helps students develop not only mathematical skills, but also logical and analytical thinking. Through pedagogical methods, practical examples, and interactive approaches, students can be taught to solve these problems effectively. In this process, it is necessary to teach students to solve problems step by step, explain them using graphs and real-life examples, and choose effective methods for applying mathematical and physical formulas. At the same time, encouraging students to actively participate in group work and interactive lessons makes the learning process more effective.

References

1. Feynman, R.P. (1963). Feynman Lectures on Physics. Addison-Wesley.
2. Serway, R.A., Jewett, J.W. (2013). Physics for Scientists and Engineers. Cengage Learning.

[1] Mamadjanova M.K. Mantiqiy, kombinatorik va nostandart masalalar. O‘quv qo‘llanma. – Toshkent. “ Innavatsiya- ziyo”, 2020. - 99b.

3. Halliday, D., Resnick, R., Walker, J. (2014). Fundamentals of Physics. Wiley.
4. Giancoli, D.C. (2008). Physics: Principles with Applications. Pearson Prentice Hall.
5. Young, H.D., Freedman, R.A. (2007). University Physics with Modern Physics. Pearson.
6. Stewart, J. (2016). Calculus: Early Transcendentals. Cengage Learning.
7. Young, H.D., & Freedman, R.A. (2014). University Physics with Modern Physics. Pearson.
8. Tipler, P.A., & Mosca, G. (2007). Physics for Scientists and Engineers. W.H. Freeman and Company.
9. Mamadjanova M.K. Mantiqiy, kombinatorik va nostandart masalalar. O‘quv qo‘llanma. – Toshkent. “ Innavatsiya- ziyo”, 2020. - 99b.