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FORMATION OF BASIC COMPETENCES FOR STUDENTS BY SOLVING PROBLEMS IN PHYSICS

U.N. Sultonova
Tashkent State Technical University named after Islam Karimov
Associate Professor of Termez branch of the University
Termez, **UZBEKISTAN**

ABSTRACT

As you know, there are a number of theoretical and practical methods in the teaching of physics, and the most important of these is the solution of problems in physics. In the process of solving problems, it is important to educate and develop students' abilities and to develop basic competences - communicative, mathematical literacy, self-development competences. will be developed.

Keywords: Physics, methods, technology, concepts, labs, transformers, physical laws.

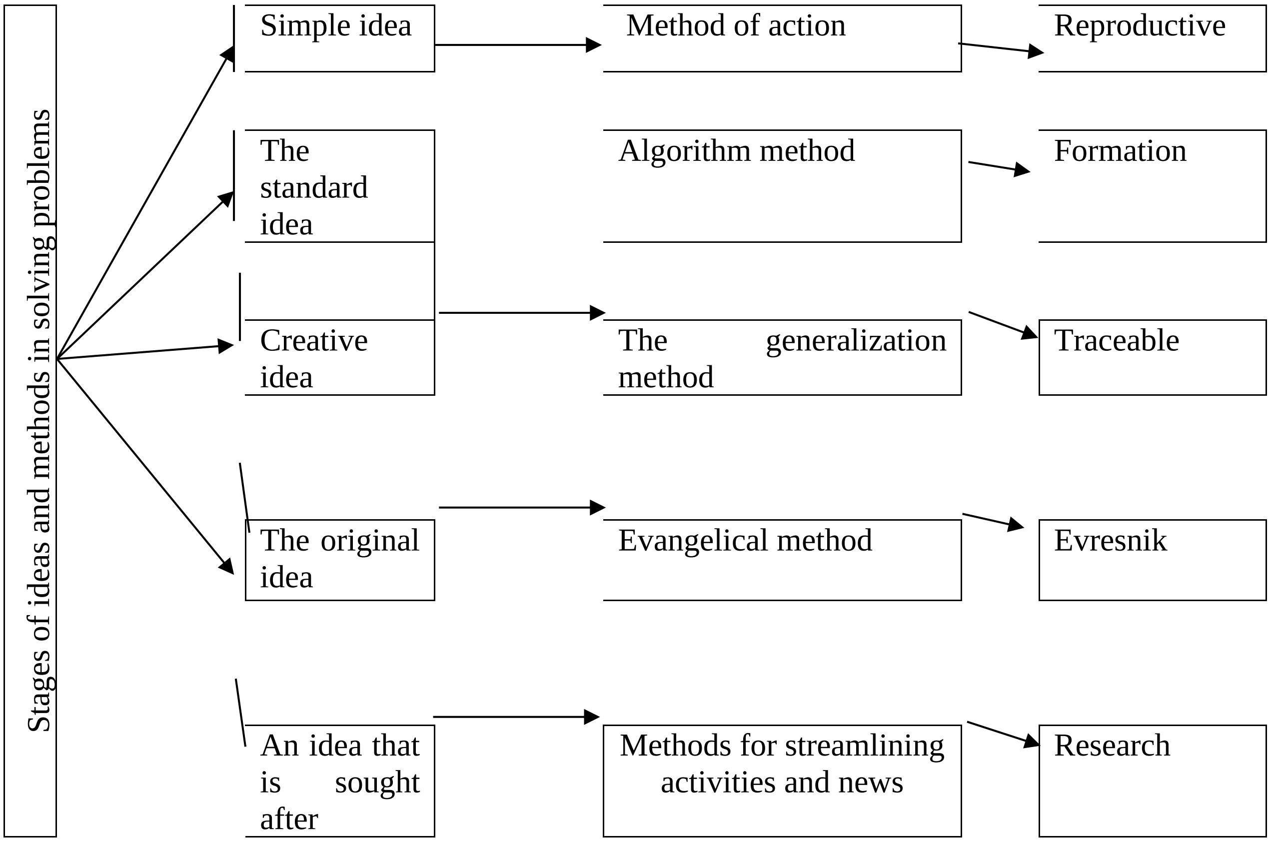
INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

There are both theoretical and practical methods in teaching physics, and the most important of these are the solution of problems in physics. In the process of solving problems, it is important to educate and develop students' abilities and to develop basic competences - communicative, mathematical literacy, self-development competences. There is a greater understanding of the true nature of physical phenomena, the right to apply the laws of physics. better anglaydilar.Masalan: the principle of electromagnetic induction event, transformers, gneratorlarning in-depth studies, practical how importance it is to understand.

They will also learn more about the function, structure of physical measuring devices, acquire skills in dealing with the principles of working with them, as well as the skills of diligence, courage and will.

Future technical students cannot be taught without the use of practical and technical issues in the learning process to enhance their interest in physics and form basic competences. By addressing these issues, students develop logical thinking, critical thinking, and critical thinking and analysis of the results. Multiple attempts and difficulties are solved without the immediate solution of unconventional problems of physics I-V in difficulty, and the student begins to achieve such important qualities as the persistence and the will to overcome these difficulties.

The most important thing for a student is that he / she enjoys the feeling that the result is hard work but that the solution is not traditional. Dealing with logical, intriguing issues that are more complex in physics will allow prospective technical specialists to replicate the previously learned concepts to deeper science. So, the introduction of this kind of issues will lead to the core competencies and the realization of their unique talents. Depending on the content of the issues, they are divided into mechanical, molecular physics, electromagnetic, optical, atomic sections, each of which is different in content and complexity. These issues have a specific purpose and can be addressed in a variety of ways.



Issues can be divided into two types by their nature:
1) creative issues;
2) non-creative issues.

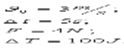
The creative problem motivates students to think independently, logically, and fully understand the meaning of the issue, which is different from other types of issues.

V.G. Razumowski argues that the issue, which is unknown to the student, is the creative problem. When deciding on a creative problem, the student should be able to think independently of the conditions, requirements, and methods of the problem. To address the problem independently, the student addresses previously resolved issues, and if the specific answers are not satisfied, he or she is looking for a new solution, changing the context of the issue and clarifying the goal. IJ Lerner argues that the creative problem differs from the non-creative one in that the student achieves something new in his or her own independent work, resulting in a freshness of thinking. Creative - it is necessary to acquire new knowledge in solving problems.

It should be noted that the educational and educational significance of this issue is significant if the selected system of questions, as well as each issue, meets the following requirements:

1. What knowledge should students have in order to solve the problem independently?
2. The issue should be interesting to the student.
3. What educational and scientific value is in the issue.
4. Know how issues differ from one another.
5. Each issue must have a clear purpose.
6. The teacher should be aware of the extent to which he / she helps the student.
7. Know how the student has achieved success in solving creative problems.

8. Knowledge of issues related to each other.
Examples of problem solving.

1-масала. to the cylindrical drum above the water level of the boat  With a constant rope, the rope pulls towards the shore of the lake (Figure 1.1). ϑ_q boat speed L Find the link to the length of the rope. In particular, the boat $L = 10\,m$ the speed at which you are moving and the distance you can move from this position to time.

Issued by: $h = 6m$; $\vartheta = 1m/s$; $L = 10m$; $t = 1s$.

To find: $\vartheta_q = ?$; $\Delta s = ?$

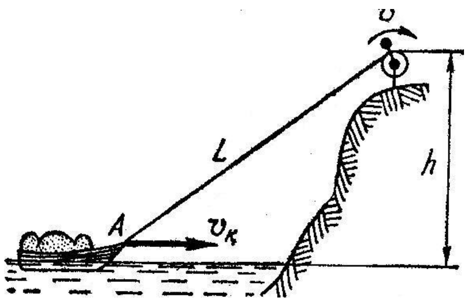


Figure 1.1

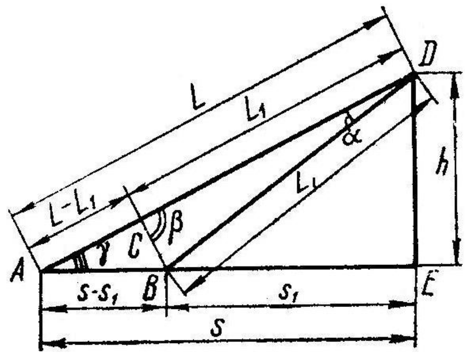


Figure 1.2

Solving: During very small intervals, the boat moves from point A to point B $s - s_1 = \vartheta_q t$ distance (Figure 1.2). At the same time, the AD rope gets the BD position, with its length $L - L_1 = \vartheta t$ decreases in size. t in a very small amount of time α The angle is also small. Therefore the BCD is in a triangle with equal sides β angle 90^0 very little. Consequently, calculate ABC triangle as right angles and $\dfrac{L - L_1}{s - s_1} = \dfrac{\vartheta t}{\vartheta_q t} = \dfrac{\vartheta}{\vartheta_q} = \cos\gamma$

It is possible; from this $\vartheta_q = \dfrac{\vartheta}{\cos\gamma}$. As the boat approached the shore γ the angle increases and ϑ_q increases. As you can see from Figure 1.4, $\cos\gamma = \dfrac{s}{L} = \dfrac{\sqrt{L^2 - h^2}}{L}$. Therefore $L = 10m$ also

$$\vartheta_q = \frac{\vartheta L}{\sqrt{L^2 - h^2}} = 1{,}25 m/s .$$

A straight-line path formula for finding the distance of the boat $s - s_1 = \vartheta_q t$ Only t The time span is small enough to be used when the speed of the boat does not change significantly during this time: $\Delta s = s - s_1 = \sqrt{L^2 - h^2} - \sqrt{L_1^2 - h^2} = \sqrt{L^2 - h^2} - \sqrt{(L - \vartheta t)^2 - h^2} = 1{,}25m$

Answer : $\vartheta_q = 1{,}25 m/s$; $\Delta s = 1{,}25m$

Issue 2 The point of the material point is the kinematic equation of progressive motion $S = At^4 + Bt^2 + C$ looks. Speed, acceleration, and baseline in the second second 2 s Find the average speed for. $A = 4m/s^4$, $B = 2m/s^2$

Given:	**Eliminate:**
$S = At^4 + Bt^2 + C$;	Average velocity of the material point $<\vartheta> = \dfrac{\Delta S}{\Delta t}$ (1)
$A = 4m/s^4$;	Identified by expression.

$B = 2m/s^2$;
$t = 2s$;
$\Delta t = t - t_0 = 2s$;

$< \vartheta >= ?$
$\upsilon = ?$
$a = ?$

Here it is.

$\Delta S = S(2s) - S(0)$,
$\Delta t = t - t_0 = 2s - 0 = 2s$.

Then (1) gets the following view

$$< \vartheta >= \frac{\Delta S}{\Delta t} = \frac{S(2S) - S(o)}{\Delta t} \quad (2)$$

The instantaneous velocity of a material point

$$\vartheta = \frac{ds}{dt} = 4At^3 + 2Bt . \quad (3)$$

Instantaneous acceleration

$$a = \frac{d\vartheta}{dt} = 12At^2 + 2B , \quad (4)$$

(2) ёки (3) ва (4)– we will check the units of the required sizes using the formulas.

$$[\vartheta] = \frac{[S]}{[t]} = \frac{1m}{1s} = 1\frac{m}{s} ,$$

$$[a] = \frac{[\vartheta]}{[t]} = \frac{1\frac{m}{s}}{1s} = 1\frac{m}{s^2}$$

And we make sure that they are true.

$$< \vartheta >= \frac{(4\cdot 2^4 + 2\cdot 2^2 + C)m - (4\cdot 0 + 2\cdot 0 + C)m}{2s} = \frac{72m}{2s} = 36\frac{m}{s} ;$$

$$\vartheta = (4\cdot 4\cdot 2^3 + 2\cdot 2\cdot 2)\frac{m}{s} = 136\frac{m}{s} ;$$

$$a = (12\cdot 4\cdot 2^2 + 2\cdot 2)\frac{m}{s^2} = 196\frac{m}{s^2}$$

Answer: $< \vartheta >= 36\frac{m}{s} ; \vartheta = 136\frac{m}{s} ;\ a = 196\frac{m}{s^2}$

Issues of quantitative computing

Students play an important role in developing scientific knowledge. Students will learn to remember the formulas, to calculate the given units, and to calculate the units. For example, when selecting quantitative computing problems, you need to move from simple to complex problems. Otherwise, if students do not solve their problems, their interest in science will diminish and their activity will decline. Encourage each student to give his or her point of view in solving the problem, to explain the disadvantages and to keep the student's psychology in focus until the student can adapt the psychology so that the result can be effective. Here are some questions:

Issue 1 The distance between the center of the earth and the moon is 60 radius. The moon's mass is 81 times smaller than the Earth's mass. At what point is the straight line connecting the earth and the moon?

$A)\,54R_0 \qquad B)\,6{,}4R_0 \qquad C)\,0{,}64R_0 \qquad D)\,\dfrac{1}{64R_0} \qquad E)\,\dfrac{1}{6{,}4R_0}$

Берилган:

$R = 60R_0$

$\mu_2 = 81\mu_1$

$R_2 = ?$

Ечилиши: Масала шартига кура

$$R = r_1 + r_2 \qquad (2\text{-}25)$$

Бутун олам тортилиш конунидан

$$F_1 = \sigma\frac{\mu_1 m}{R_1}; \qquad (2\text{-}26)$$

$$F_2 = \sigma\frac{\mu_1 m}{r_1^2}; \quad F_1 = -F_2 \qquad (2\text{-}27)$$

$$\sigma\frac{\mu_1 m}{r_1^2} = \sigma\frac{\mu_2 m}{(R-r_1)^2}; \qquad (2\text{-}28)$$

Берилганлардан фойдаланиб

$$-\sigma\frac{\mu_1 m}{r_1^2} = \sigma\frac{81\mu_1 m}{(R-r_1)^2}; \quad \frac{\sigma}{r_1^2} = \frac{81}{(R-r)^2} \qquad (2\text{-}29)$$

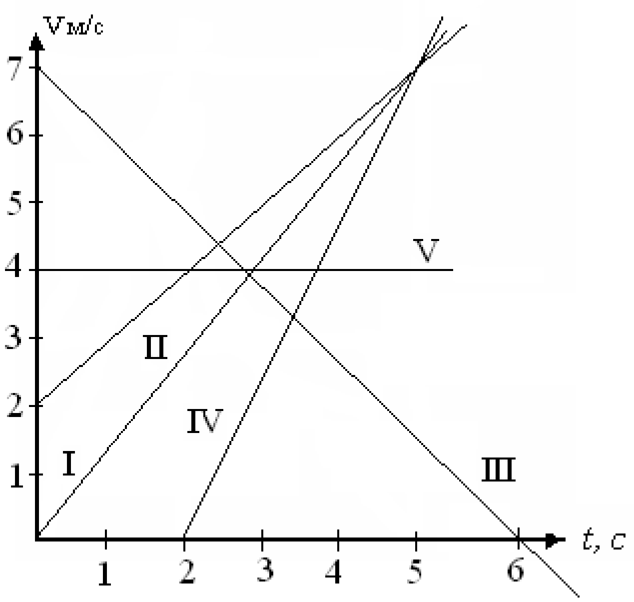
$$\left(\frac{R-r_1}{r_1}\right)^2 = 81; \quad \frac{R}{r_1} = 1 = 9 \quad \frac{R}{r_1} = 10 \ \textit{бундан}$$

$$r_1 = \frac{R}{10} = \frac{60R_0}{10} = 6R_0. \qquad (2\text{-}25)$$

$$\textit{дан}\ r_2 = R - r_1 = 60R_0 - 6R_0 = 54R_0 \qquad Ж:\ 54R_0$$

Graphic issues. Graphical problems are the questions that the object of study consists of graphs of physical size correlation.
In some cases, these graphs are presented on a case by case basis, and in some cases, they need to be summarized.
When solving graphic problems:
• Students should be given the skills to “read” graphs and to make simple graphs.
• It is increasingly difficult to work with graphs and recommend students to find quantitative links between sizes, before going to equations.
The steps for solving graphic issues are:
1) If there is a graph of the links between the sizes, then it is necessary to explain it, to study the nature of the links in each section; 2) use the scale to find the values (values of the abscess and ordinate axis) on the graph; 3) If no link graph is provided, a graph is drawn based on the values obtained from specific tables or case conditions. To do this, draw the coordinate arrows, select a specific scale, draw tables, and then make points corresponding to the plane ordinances and abscisses with the coordinate arrows. By combining these points, a graph of the relationship between physical quantities is drawn, and then studied in the order described above.
As an example, we will see the following issue.
Using the graph shown in the picture, describe how the objects moved and write a velocity formula for each movement.
Students independently analyze the movement by looking at the graph.

Analyze each look of the chart separately.
The actions on the graph are analyzed by students as follows:
1. (a) If the velocity increases over time, then the movement is accelerated.
b) If speed decreases with the passage of time, it is slower.
c) If the velocity remains constant, there is a smooth motion.
2. For a shifting movement $a = \frac{\Delta \vartheta}{\Delta t}$ acceleration is determined.
3. The velocity formula is written from the acceleration formula for a smooth variable variable. $\vartheta = \vartheta_0 + a \cdot t$ will be.
4. From the graph, constant values are defined: From the velocity axis and the calculation $a = \frac{\Delta \vartheta}{\Delta t} = \frac{\vartheta_2 - \vartheta_1}{t_2 - t_1}$ (2-39) can be found. ϑ_0 and a The value of



How a teacher analyzes charts based on the theoretical knowledge that students receive to arrive at their own conclusions based on student responses, analyzes of graphs based on their independent thinking
In graph I, the flat acceleration is zero with the initial velocity zero.
II is a straight-line motion with an initial velocity of 2 m / s.
III is a straight-sliding motion with a starting velocity of 7m / s.
IV is a special case of flat acceleration with zero starting velocity.
V – speed υ = 4 A straight motion equal to m / s
According to the above conclusions, the equations are written by placing the values of acceleration in the formula of velocity:

I $\vartheta_0 = 0$; $a = \frac{7м/c}{5c} = 1{,}4м/c^2$; $\vartheta = 1{,}4t$

II $\vartheta_0 = 2м/c$; $a = \frac{7м/c - 2м/c}{5c} = 1м/c^2$; $\vartheta = 2 + t$

III $\vartheta_0 = 7м/c$; $a = \frac{0м/c - 7м/c}{6c} = 1{,}2м/c^2$; $\vartheta = -7 + 1{,}2\,t$

IV $\vartheta_0 = 0$; $a = \frac{7м/c}{5c - 2c} = 2{,}33м/c^2$ $\upsilon = 2{,}33(t_2 - 2)$

V $\vartheta_0 = 3м/c$; $a = 0$ straight action. It can be regarded as a private case of a flat-displacement of 0 with acceleration.

$\vartheta = \vartheta_0 + 0 \cdot t = \vartheta_0$ will be analyzed. Through these considerations, the graphic matter is considered to be fully processed.
Pupils independently solve problems:
- strengthens theoretical knowledge;
- Creates and develops the ability to think independently;
- Examines the links between physical dimensions;
- achieves conscious development of the laws of physics;

- the ability to make graphs, depending on the situation;
- learns to record physical data according to the charts.

5. Experimental issues. Experiments in solving experimental problems should be put in place with all the conditions of the school demonstration experiment. Special attention should be paid to the good look of the instruments and events. It is imperative that the teacher guide the experiment. Here are some examples of demonstration experimental issues.

1. There is a rotating pivot around a fixed base. On the two ends of the Richag we hang objects with equal mass but of different size. Richag is in balance. If you immerse your body in water, it will be determined that the force that pushes them is affected.

The magnitude of this force is proportional to the body's volume and fluid density. Therefore, a smaller body mass draws the tip of the rod in water.

This answer will be tested in practice with student participation.

The problem can be solved without experimentation, but more is lost.

Issue 9. When connecting 24 ohms to a galvanic element battery, the current at the circuit was 1.5 A, and when connecting 12 ohms the current was 2.7 A. Find the EUT and the internal resistance of the battery. If possible, try it. Use two resistors and an ammeter to do this.

Principle diagram of the electrical circuit, which is assembled according to the condition of the matter

Issued by: R_1= 24 Om, I_1= 1,5 A, R_2 = 12 Om,, I_2= 2,7 A, ε = ?, r = ?

The sequencing of the problem-solving sequence in the following order helps the reader to visualize the physical process in question.

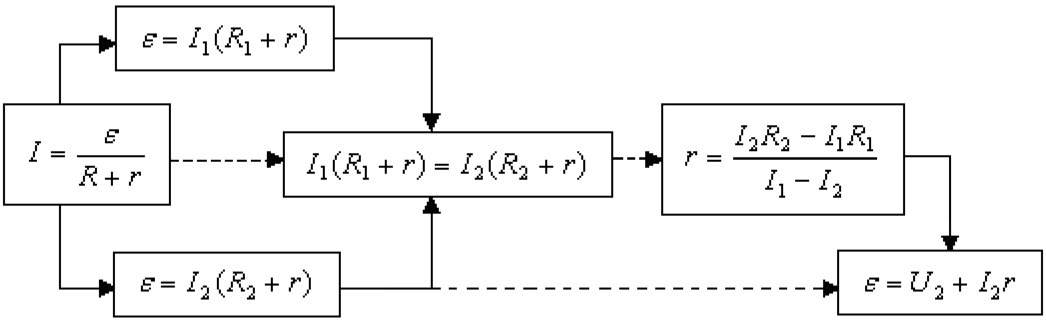
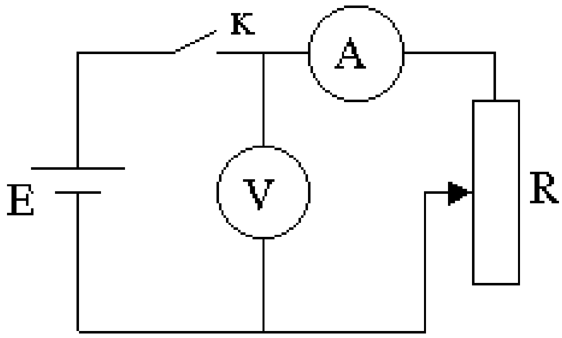


Figure 2.9. Problem solving algorithm

According to calculations ε = 27 B, r = 3 One can determine if om.



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