# Ways to Use Non-Standard Physics Tests 

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#### Abstract

Why do we need test control of students' knowledge and skills in physics in basic school. The systematic use of thematic tests is necessary for adequate preparation of students for this form of monitoring of learning outcomes. The main argument in favor of using tests in basic school is the need for an objective assessment of the level of training of a student in the amount of the requirements of the educational standard. An objective assessment of the learning outcomes is necessary not only during the final control, but also throughout the training. The elimination of subjectivity in the process of assessing the level of knowledge and skills of students is achieved by excluding human participation in this procedure.


Keywords: non-standard situations, pedagogical test, differentiated approach, individual tasks, non-standard physics tests, theoretical issues, self-control.

## INTRODUCTION

For this, tasks for written answers are used, formalized in such a way that it becomes possible to unambiguously evaluate the results by any examiner or machine and self-control of the results by the students themselves according to the code of correct answers.

When using any pedagogical test, it is assumed that as a result of testing, a certain number will be obtained that objectively characterizes the achievements of the subject. An obligatory requirement for the test is its ability to give the corresponding identical numbers to the same results of the subjects' activity, and different numbers to different results of the activity.

With current control, the main purpose of thematic tests is not so much to determine the level of students' assimilation of each topic and to give marks, but to identify specific gaps in knowledge on this topic and the nature of mistakes made due to inattention or negligence in completing assignments. After identifying specific gaps, it is necessary to return to the study of the relevant theoretical issues of the topic.

However, this task is not the only one. Most students complete tasks within the mandatory requirements without serious difficulty. Why do such students need a thematic test? Thematic tests for successful learners can provide an objective quantitative assessment of the degree of mastery of physics and the ability to compare their progress with the success of other students. This task is performed only if, in addition to tasks focused on the mandatory requirements of the educational standard with the use of knowledge in a familiar situation, the test will also contain tasks focused on testing the ability to independently analyze and solve problems in non-standard situations, use knowledge and skills to practice. With such a test design, not only will the level of students' mastery of compulsory knowledge and skills be objectively determined, but also a quantitative assessment of their ability to independently apply the knowledge gained in non-standard situations will be given.

The use of a large number of tasks in the test and among them some of the tasks for applying knowledge in an unfamiliar situation will allow students to obtain information about their achievements on an objective conditional scale, compare their progress in different subjects and have objective criteria for choosing a profile of further education.

## METHODOLOGY

Criteria for evaluating the success of the test. When using the test, it is fundamentally important to choose the criterion for the success of its implementation. It may seem justified such a criterion as the successful completion of all test items that do not go beyond the requirements of the educational standard. However, in practice, such a criterion is usually not applied as unreasonably strict for several reasons.

First of all, it is necessary to constantly remember that each subject in a general education school is studied not to memorize and reproduce a certain set of facts and rules, but to develop students' abilities, for the subsequent application of the acquired knowledge and skills in practical life and in the process of subsequent learning. As established by the research of psychologists, the acquired knowledge and skills in any academic subject are mainly successfully applied in practice and replenished with subsequent training, if the student masters more than $70 \%$ of the content of the material in this subject. Therefore, about $70 \%$ of successfully completed assignments within the mandatory requirements of the educational standard can be accepted as the lower bound for the "passed" grade when performing the final test.

If the final test also includes tasks aimed at testing the ability to independently analyze and solve problems in nonstandard situations, then only tasks of the first type can be considered mandatory for attestation. With a sufficient level of success in completing mandatory tasks of $70 \%$ and, for example, with a share of $70 \%$ of such tasks in the total test volume, the lower limit of successful completion of the entire test is approximately $50 \%$ conditional points $(0.7 \times 0.7=0.49) \ldots$ If all test items are assessed equally, then at least half of the test items must be completed to pass.

A possible variant of converting the number of correctly solved test items of 14 items into an assessment on a scale of 5 points is presented in the table.

With a differentiated approach to individual tasks of the test, the assessment of the test result can be expressed by a certain conditional number of points. For example, the maximum possible score for a test can be 50 or 100 . When this scale is chosen, the success of students with an interest in studying physics becomes more pronounced. Possible types of tasks in the physics test for the final control and how to solve them. Before using tests as a means of control, the teacher's task is to prepare students for a new way of testing knowledge and skills for them. First of all, they need to be familiarized with the various possible ways of formulating tasks in the test and the correct ways of choosing an answer. For each type of task, it is advisable to give an example of a solution.

## RESULTS

In terms of the form, assignments for tests in physics often coincide with the usual tasks for students, but differ in terms of the requirements for students' activities when completing the assignment. The main difference is that the student is not required to provide a written decision or substantiate his or her opinion. He must solve the problem and compare the result with the answers offered to choose from. From several plausible answers, he must choose only one correct one. For example:

Three bodies A, B and C have the same mass. When lowered into water, body A floats on the surface, body B inside the liquid does not float and does not sink, body C drowns. Which of the three bodies is affected by the smallest force of Arximedes?

1) on body $A$
2) on body $B$
3) on body $B$
4) the same forces act on all three bodies

When solving the presented problem, in order to choose the correct answer, knowledge of the Archimedes law is required: a buoyant force acts on a body immersed in a liquid, equal to the weight of the displaced liquid. Then you need to compare the force of Archimedes with the same force of gravity for all three bodies. The same gravity acts on all three bodies, since their masses are the same. A buoyant force equal to the weight of the body acts on the body A floating on the surface of the water and on the body B inside the liquid, which does not float and does not sink. Body B sinks, which means that the force of Archimedes acting on it is less than the force of gravity. Therefore, the least Archimedes force acts on body B. The correct answer is number 3 .

A multiple choice task can take the form of some unfinished statement and several plausible completions, among which only one is correct. For example:

The physical quantity equal to the product of the force by the path traversed in the direction of the action of the force is called

1) work
2) power
3) kinetic energy
4) potential energy

In this problem, the correct answer is number 1.
A problem with choosing the correct answer can be a common physical problem, for the solution of which you need to perform a calculation and compare the result with the numbers given in the answers to your choice. If the result obtained matches one of the answers, then the solution can be considered complete. If the result does not coincide with any of the suggested answers, then you need to check the solution and try to find the correct one. For example, a calculation task:

In a straight-line uniform movement, the car travels a distance of 100 m in 5 seconds. What distance during such a movement will it cover in 2 seconds?

1) 200 m 3$) 120 \mathrm{~m} \mathrm{5)} 20 \mathrm{~m}$
2) $140 \mathrm{~m} \mathrm{4)} 40 \mathrm{~m}$

## CONCLUSION

Sometimes tests offer tasks in which, to select the correct answer, you need to read several statements and select the correct ones from them. Putting the question in this form means that in this case there can be several correct statements, or one, or none. For example:

Select the correct one from the statements below.
A. The internal energy of the body can be changed by heat transfer.
B. The internal energy of the body can change as a result of the work of forces.
C. The internal energy of the body can not change either as a result of the work of forces, or by means of heat transfer.

1) only A 3) only B
2) only B 4) A and B

The correct answer is number 4.
Testing the ability to determine the nature of the physical process according to the schedule can be performed, for example, using such a task.

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