TASKS RELATED TO CONDUCT OF EXPERIMENT

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ABSTRACT

The article presents examples of tasks related to conducting experiments and the basis of their evaluation.

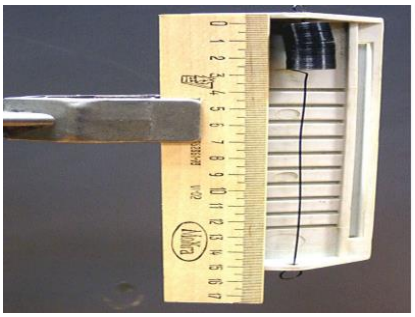
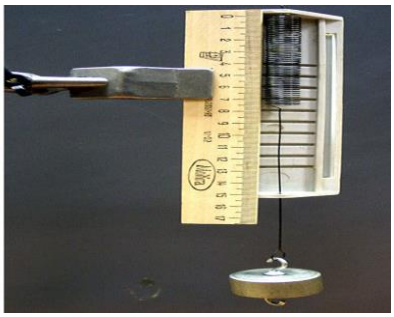
Key words: experiment, problem, calculation, measurement, formula, analysis.

It is known that students' theoretical knowledge of physics is strengthened by solving problems and conducting experiments. Solving problems of an experimental nature can be met in two different ways. In the first case, all the information related to the problem is given, and its correctness should be checked in the experiment, in the second case, the data needed to solve the problem is obtained as a result of the measurement.

Solving an experimental problem related to calculations and writing it down in a notebook consists of the following elements: setting the problem, analyzing its condition, performing measurements, performing calculations, checking the answer in an experiment.

It is possible to check the correctness of the reasoning by putting the units of the quantities included in the formula.

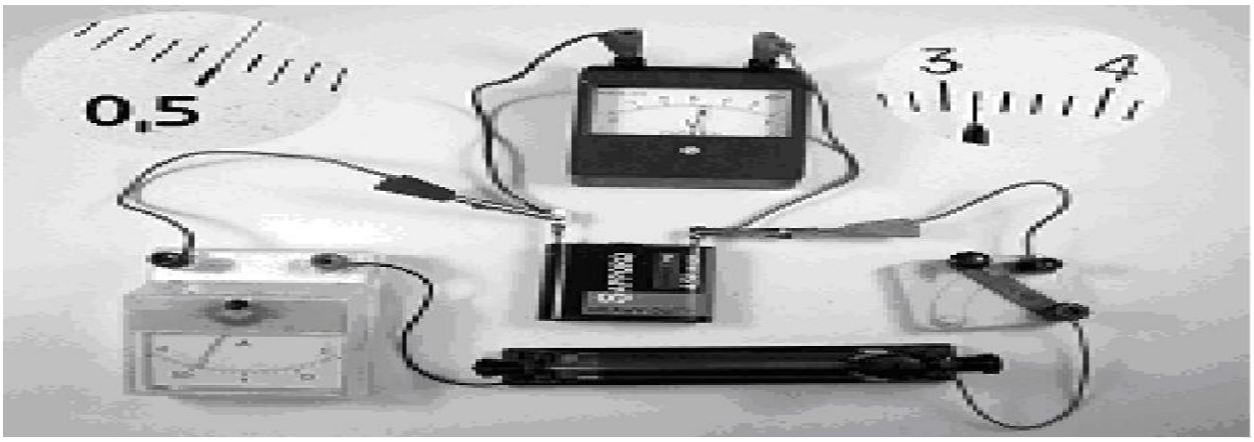
Issue 1. To determine the elasticity of the spring, the student assembled the device shown in the picture and hung a load with a mass of 0.1 kg on the spring. Determine the length of the spring using the information on the device shown in the picture.

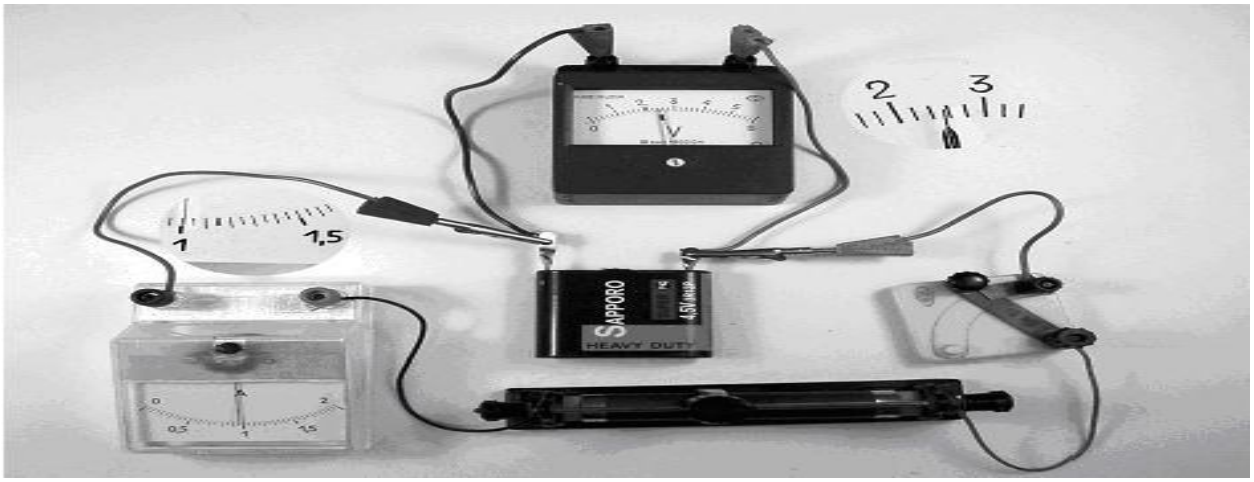
Rating: 5 points

№	Performance evaluation criteria	Ball
1	From the picture, determine the initial position of the end of the spring correctly from the ruler	1
2	From the picture, the position of the end of the spring after hanging the load can be correctly determined from the ruler	1
3	If it correctly determines the absolute elongation of the spring	1
4	If he correctly writes the formula for calculating the length of the spring	1
5	If he performs calculations correctly	1

Issue 2. The student assembled an electrical circuit consisting of a battery(1), a rheostat(2), a switch(3), an ammeter(4) and a voltmeter(5) as shown in the figure. It then measures the voltage at the source pole and the currents in various parts of the external circuit (see figure).



By changing the resistance of the rheostat, it again measures the voltage at the source pole and the currents in various parts of the external circuit (see the next figure). Find the EIuK and internal resistance of the battery. 3 points.



An example of a solution	
According to the instruments, U_1 = 3,2 V I_1 = 0,5 A U_2 = 2,6 V I_2 = 1 A. According to Ohm's law for the whole chain: $I = \frac{\varepsilon}{R+r}$. From this: $\varepsilon = IR + Ir$, $\varepsilon = U + Ir$, $\varepsilon = U_1 + I_1 r = U_2 + I_2 r$. *So*, $r = \frac{U_1 - U_2}{I_2 - I_1}$ = 1,2 Ом, ε = 3,8 В. Note: Different students may not write exactly the same number due to the degree of division of the scale on these instruments. If these differences are within the measurement error, they are not considered errors.	
Criteria for assessing the completion of the task	**Ball**
For a fully implemented solution, consider the following elements: - if the formula representing the physical law necessary to solve the problem is correctly written (in this case, Ohm's law for the entire chain); - if all the necessary mathematical calculations and conversions are performed correctly and the correct answer is obtained. In this case,	3
If the solution is given with one exception: - if there is an error in mathematical form substitutions or calculations; - if the solution is given in general and the calculations are not completed - the necessary formulas and the answer are written correctly, but the	2

The solution is provided only for the following cases: - there is an error in the mathematical form substitutions in the solution and no numerical calculations are provided; - an error was made when extracting data from the image (more than half of the division level of the instrument scale), but the rest of the solutions were performed correctly without errors; - A shortcoming was made in writing the law of Om, but the rest of the	1
If it does not correspond to the cases where points 1, 2, 3 are given above.	0

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