BASED ON STUDENTS' COMPETENCY-BASED APPROACH TO PHYSICS SOLVE EXPERIMENTAL AND GRAPHICAL PROBLEMS

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ANNOTATION

In this article the ability of students to analyze experimental and graphical problems on the basis of a competency-based approach to physics shows that the competency-based approach is important and relevant in improving the effectiveness of education. Defining and developing lesson requirements based on the competency approach, improving textbooks on the basis of the competency approach, the methodology of using interdisciplinary links are fully reflected in the coverage of the topic. Experimental and graphical issuesi increased the interest of students in the fact that the ability to solve in addition to the formation of skills from students has a practical significance.

Keywords: Independent thinking, skill, graphic, experimental, skill, coordinates axis, ordinate, abscissa, isochors, isotherm, isobar, cycle

INTRODUCTION

Particular attention should be paid to the selection of interesting topics in order to develop students' thinking skills in the development of independent learning activities, to increase their interest in the lesson. The selected issues should form a clear system and be focused on a specific goal. Therefore, it focuses on the formation of independent thinking skills special attention should be paid to the selection of individual topics and chapter-related issues. The content of experimental and graphical issues should be based on the goals and objectives of higher education physics teaching, compliance with the requirements of the SST, the statement of the problem should be clear and realistic, and the student should have clear scientific knowledge and practical skills. In solving experimental problems, experiments should be set in compliance with all the conditions of the school demonstration experiment. In this case, the tools ca special attention should be paid to the fact that the events look good. The process of conducting the experiment should be guided by the teacher himself. Here are some examples of demonstration experimental problems. When a 24 Ohm resistor was connected to a galvanic cell battery, the current in the circuit was 1.5 A, and when a 12 Ohm resistor was connected, the current was 2.7

A. Find the EYUK and internal resistance of the battery. If possible, try this in practice. Two whose resistances are known for this use a resistor and an ammeter.

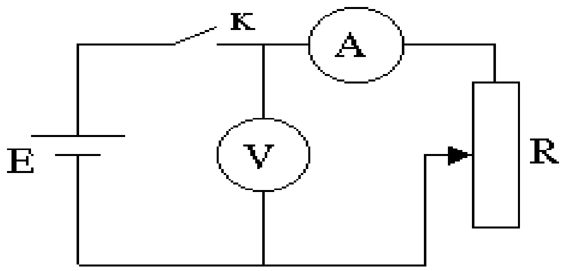


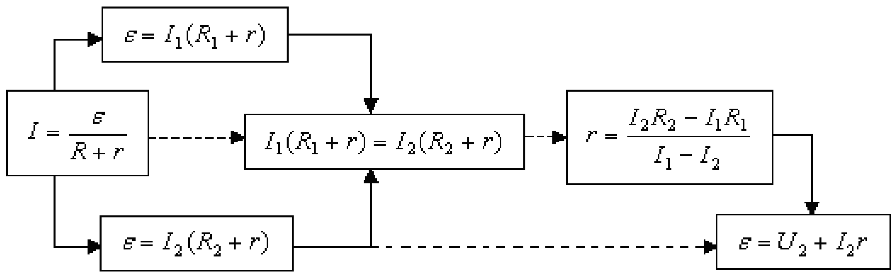
Figure 1. Electricity collected according to the condition of the matter

Schematic diagram of the chain

Given:

R1 = 24 Ohm, I1 = 1.5 A, R2 = 12 Ohm, I2 = 2.7 A, e =?, R =?

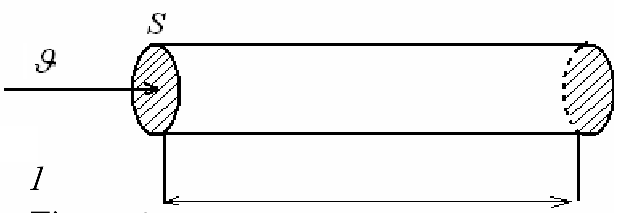
Systematizing the problem-solving sequence in the following order helps the student to clearly visualize the physical process going on in the problem (Figure 1).



Problem solving algorithm

According to the calculations, it can be determined that e = 27 V, r = 3 Ohms.

2. What is the average power of the air flow, air velocity and normal conditions with a cross section?

Given:	**Solve:**
$S = 0{,}55 m^2$; $\vartheta = 20 \, m/s$; $\rho = 1{,}29 \, kg/m^3$.	 Figure 2 The formula for determining the average power $< N > = \frac{\Delta A}{\Delta t}$, (1)

Here is the work done to give the air mass y velocity in time. This work is equal to the kinetic energy of the gas mass.

$$\Delta A = T = \frac{m\vartheta^2}{2} .(2)$$

Gas mass

$$m = \rho \cdot V = \rho \cdot S \cdot l \qquad (3)$$

Here we define as the product of the volume, cross section and flow length of a gas mass.

$$\Delta A = T = \frac{1}{2}\rho \cdot S \cdot l \cdot \vartheta^2 \qquad (4)$$

Substituting (3) into (2)

We create. We put this expression in the power determination formula.

$$< N >= \frac{1}{2}\rho \cdot S \cdot \frac{l}{\Delta t} \cdot \vartheta^2 = \frac{1}{2}\rho \cdot S \cdot \vartheta^3 \quad . \qquad (5)$$

In This place $\frac{l}{\Delta t} = \vartheta$ taken into account that.

We check the power unit using the generated expression.

$$[N] = [\rho][S][\vartheta]^3 = 1\frac{kg}{m^3} \cdot 1m^2 \cdot 1\frac{m^3}{s^3} = 1\frac{Nm}{s} = 1W .$$

We put the given in (5).

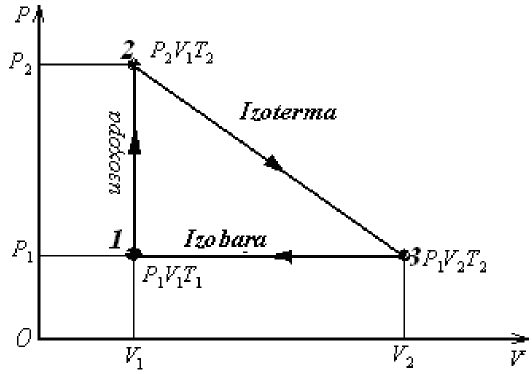
$$< N >= \frac{1}{2} \cdot 1{,}29 \cdot 0{,}55 \cdot (20)^3 W = 2{,}84 \cdot 10^3 W = 2{,}84\, kW .$$

Answer: *<N>=2,84kW.*

As a result of students' ability to independently conduct experiments and observations in solving experimental problems, students develop and develop skills and abilities to work independently. Problems in which the object of study consists of connection graphs of physical quantities are called graphical problems. In some cases these graphs are given in terms of issues, and in some cases they need to be aggregated. When solving graphic problems: The students "read" the graphs and simple should have the skills and competencies to create graphs. Making it increasingly difficult to work with graphs, it is important to encourage students to find quantitative relationships between sizes so that they can go as far as constructing equations. The steps for solving graphical problems are as follows: 1) if a graph of the connections between the quantities is given, then it is necessary to explain it, to study the nature of the connection in each section; 2) the magnitudes sought from the graph using the scale must find (values on the abscissa and ordinate axes); 3) If a link graph is not provided, then a graph is created based on the values obtained from special tables or the condition of the problem. To do this, the coordinate axes are drawn, a certain scale is selected, tables are drawn, and then the corresponding points are placed on the ordinates and abscissa corresponding to the plane with the coordinate axes.

By combining these points, a graph of the relationship between the physical quantities is made, and then above studied in the order mentioned. As an example, we see the following issue. Using the graph given in the figure, the two-atom gas-fired heat engine must perform a cycle consisting of an isochors, an isotherm, and an isobar, as well as study and write formulas for each cycle.

Students independently look at the graph and analyze the cycle and the process that takes place in that cycle. Each view of the graph is separate Analyze a. Problem: A two-atom gas-fired heat engine performs a cycle consisting of an isochors, an isotherm, and an isobar. The maximum volume occupied by the gas is three times the minimum volume. The isothermal process takes place at a temperature of 450K. Execute over a cycle and find F.I.K.

Given	Solve: Let's make a diagram of a cycle:
$v = 2\ mol;$ $i = 5;$ $\frac{V_{max}}{V_{min}} = 3;$ $1) V = const;$ $2) T = 450\ K = const;$ $3) P = const.$	

$V_2 = V_{max},$
$V_1 = V_{min},$
$T_2 = T = const.$

In the isobaric process $V_2 = V_{max}, \; V_1 = V_{min}, \; T_2 = T = const.$ $\quad \frac{V_1}{V_2} = \frac{T_1}{T_2}$

Given that $T_1 = T_2 \cdot \frac{V_1}{V_2} = T_2\left(\frac{V_{min}}{V_{max}}\right) = \frac{T_2}{3}$ made this formula.

The Frisky of the cycle is defined as follows

$$\eta = \frac{Q_1 - Q_2}{Q_1} = \frac{A}{Q_1}$$

Where -the amount of heat received from the heater, - the amount of heat transferred to the refrigerator, the work done during one cycle.

The amount of heat received during the cycle is equal to the sum of the amounts of heat received in isochoric and isothermal processes,

$$Q_1 = Q_{12} + Q_{23} \quad (1)$$

The amount of heat received in the isochors (1->2)

$$Q_{12} = \frac{i}{2} Rv(T_2 - T_1) \quad (2)$$

And the amount of heat received in the isotherm (2->3)

$$Q_{23} = \nu RT_2 \ln\frac{V_2}{V_1} = \nu RT_2 \ln\frac{V_{max}}{V_{min}} \quad (3)$$

Is defined as.

The amount of heat given off is determined by the amount of heat given off in isobar (3->4)

$$Q_2 = Q_{31} = \frac{i+2}{2} R\nu(T_2 - T_1) \quad (4)$$

Now considering (1), we find the expression for A and

$$A = \frac{i}{2} RT_2\nu\left(1-\frac{1}{3}\right) + \nu RT_2 \ln\frac{V_{max}}{V_{min}} - \frac{i+2}{2} R\nu T_2\left(1-\frac{1}{3}\right) = \nu RT_2 \ln\frac{V_{max}}{V_{min}} - \nu RT_2\cdot\frac{2}{3} = \nu RT_2\left(\ln\frac{V_{max}}{V_{min}} - \frac{2}{3}\right), \quad (5)$$

$$\eta = \frac{\nu RT_2\left(\ln\frac{V_{max}}{V_{min}} - \frac{2}{3}\right)}{\nu RT_2\left(\frac{i}{3} + \ln\frac{V_{max}}{V_{min}}\right)} = \frac{\ln\frac{V_{max}}{V_{min}} - \frac{2}{3}}{\frac{i}{3} + \ln\frac{V_{max}}{V_{min}}} \quad (6)$$

We put the given ones in (5) and (6). (R = 8, 31 -universal gas constant)

$$A = 2\cdot 8{,}31\cdot 450(\ln^3 - \frac{2}{3})J = 7479(1{,}1 - 0{,}67)J = 3215{,}97J \approx 3{,}2\ kJ,$$

$$\eta = \frac{\ln^3 - \frac{2}{3}}{\frac{5}{3} + \ln 3} = \frac{1{,}1 - 0{,}67}{1{,}67 + 1{,}1} = \frac{0{,}43}{2{,}77} = 0{,}16.$$

Answer: A=3.2кЖ η=0.6

The practical importance of solving experimental and graphical problems

By solving problems independently, students achieve the following results strengthen theoretical knowledge, form and develop the ability to think independently, learn the relationships between physical quantities, consciously master the laws of physics, develop the ability to create graphs according to the conditions of the problem, write down physical quantities learns to take.

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