

PISA ASSIGNMENTS AS A MEANS OF TESTING AND EVALUATING STUDENTS' KNOWLEDGE

<https://doi.org/10.53885/edinres.2022.7.7.043>

*Melikuziev Dadakuzi Jurakuzievich,
Teacher of Kokand SPI Faculty of Physics and Mathematics
Department of Physics and Astronomy*

ЗАДАНИЯ PISA КАК СРЕДСТВО ПРОВЕРКИ И ОЦЕНКИ ЗНАНИЙ СТУДЕНТОВ

*Меликузиев Дадакузи Джуракузиевич,
Преподаватель Кокандского ГПИ физико-математического
факультета, Кафедра физики и астрономии*

PISA TOPSHIRIQLARI – O'QUVCHILARNING BILIMLARINI TEKSHIRISH VA BAHOLASH VOSITASI SIFATIDA

*Meliqo'ziev Dadakuzi Jurakuzievich,
Qo'qon DPI fizika-matematika fakulteti o'qituvchisi
Fizika va astronomiya kafedrasida*

Annotation: This article discusses about PISA assignments as a means of checking and evaluating students' knowledge. Quality teaching and the proper use of knowledge in practice are key requirements of education today, and this article provides examples of the PISA task as a means of testing students' knowledge of physics.

Keywords: PISA, natural sciences, creative thinking, amount of heat, mass, fuel, specific heat of combustion of fuel, assignment, physics, evaluation

Аннотация: В данной статье рассматриваются задания PISA как средство проверки и оценки знаний учащихся. Качественное преподавание и правильное использование знаний на практике являются ключевыми требованиями образования на сегодняшний день, и в данной статье приведены примеры выполнения задания PISA как средства проверки знаний учащихся по физике.

Ключевые слова: PISA, естественные науки, творческое мышление, количество теплоты, масса, топливо, удельная теплота сгорания топлива, задание, физика, оценка

Annotation: Ushbu maqolada PISA topshiriqlari – o'quvchilarning bilimlarini tekshirish va baholash vositasi sifatida muhokama qilinadi. Sifatli ta'lim berish va bilimlardan amaliyotda to'g'ri foydalanish bugungi kun ta'limning asosiy talabi bo'lib, ushbu maqolada talabalarning fizika fanidan bilim darajasini tekshirish vositasi sifatida PISA topshirig'iga misollar keltiriladi.

Kalit so'zlar: PISA, tabiatshunoslik, ijodiy fikrlash, issiqlik miqdori, massa, yoqilg'i, yoqilg'ining solishtirma yonish issiqligi, topshiriq, fizika, baholash

Introduction. An agreement has been signed between the State Inspectorate for Education Quality Control and the Organization for Economic Cooperation and Development (OECD). For the first time, Uzbekistan has participated in international research conducted by this organization (PISA, PIRLS, TIMMS, TALIS). These international assessment programs include an international assessment program for students aged 15-16 - PISA (The Programme for International Student Assessment) and the program has a special place. In PISA,

the quality of students' knowledge is determined in 5 areas: Reading literacy, Mathematical literacy, Science literacy, Financial literacy, and Computer literacy. PISA focuses on the acquisition of knowledge, skills, and competencies that students need in life, as well as the assessment of students' awareness of the interdependence of disciplines.

In Uzbekistan, PISA research also assesses students in the field of natural science literacy, which assesses students' ability to think logically, knowledge, skills and abilities in the natural sciences (physics, astronomy, chemistry, biology, geography).

A student who is literate in the natural sciences has the following competencies[1]:

- Scientific understanding of events;
- Design and evaluation of scientific research;
- Scientific interpretation of data and evidence.

The study not only teaches students literacy, but also changes and enhances their thinking. The main task of education is to develop in students the skills they need today and in the future to succeed in society. Creative thinking is an important skill that today's youth need to have[2]. This means that today's students need thorough knowledge and creative thinking. Developing students' creative thinking skills will enable them to address local and global challenges that may arise today and in the future. Students with a high level of natural-scientific literacy, in particular, are able to think independently about the events and processes between man, nature and technology, and are more advanced in overcoming and preventing problems and finding the right solutions to real-life situations. Every activity, starting from school, aimed at improving the scientific literacy of students, will bear fruit in the future. Literacy competencies in the natural sciences depend primarily on knowledge of the content of the science - knowledge of physical systems (physics and chemistry), living systems (biology), terrestrial and space systems (geography, geology, astronomy)[3]. It is well-known that the natural sciences include physics, astronomy, chemistry, biology, and geography. When these subjects are taught in school, students are given a fairly fundamental knowledge of the processes and events that take place in the natural environment. The main requirement of today's education is to provide thorough knowledge and develop the skills to apply the acquired knowledge in real life activities.

For example, physics is the study of the whole of nature, natural phenomena, from the simplest mechanisms to the latest technologies.

For this reason, students need to be taught why each piece of physical knowledge they need to learn, where it can be used, and how to apply it in real-life situations. The use of PISA assignments is a key guide in achieving these goals.

The PISA assignment below can be used to identify and evaluate the knowledge and skills that 9th graders have acquired in the second quarter.

Assignment: In winter, we use fuels such as coal, oil, gasoline, and natural gas to heat the room, prepare food, and generate other heat in our daily activities, and we always feel the need. The amount of heat released when 1 kg of fuel burns is called the specific heat of combustion of the fuel. The specific heat of combustion of fuel is denoted by the letter q . $Q = q * m$. Q - is the amount of heat released during the combustion of fuel, m - is the mass of fuel burned.



The following are the specific combustion temperatures of several fuels:

T	Fuel	Specific combustion heat (MJ/kg)	T/r	Fuel	Specific combustion heat (MJ/kg)
1	Gasoline	46	1	Dry wood	10
2	Kerosene	42	2	Natural gas	44
3	Coal	29	3	Alcohol	29

Question 1: How can heat dissipation be understood chemically?

Answer: When fuel burns, energy is released when the flammable atoms combine with the air atoms. For example, coal, oil, and gasoline contain carbon (C) atoms. Carbon atoms combine with oxygen atoms to form carbon dioxide (CO₂) gas. Heat is released during the formation of carbon dioxide.

Question 2: Using the expression $Q = q \cdot m$ and the knowledge you have acquired in physics lessons, find the formula and unit for finding the specific heat of combustion (q).

Answer: From $Q = q \cdot m$ (1) we find that $q = Q / m$ (2) and since the unit of heat (Q) and mass (m) is known:

$$\text{We can find that } [q] = \left[\frac{Q}{m} \right] = \frac{1 \text{ J}}{1 \text{ kg}} = 1 \frac{\text{J}}{\text{kg}}; [q] = \left[1 \frac{\text{J}}{\text{kg}} \right].$$

Question 3: Knowing the specific heat of combustion of coal and dry wood, compare and summarize the amount of heat released during the combustion of coal and dry wood with a mass of 10 kg.

Answer: 1) $q_{\text{coal}}=29 \text{ MJ/kg}$; 2) $q_{\text{dry wood}}=10 \text{ MJ/kg}$; $m_1=m_2=10 \text{ kg}$

$$Q_1 = m_1 \cdot q_{\text{coal}} = 10 \text{ kg} \cdot 29 \cdot 10^6 \text{ J/kg} = 290 \text{ MJ.}$$

$$Q_2 = m_2 \cdot q_{\text{dry wood}} = 10 \text{ kg} \cdot 10 \cdot 10^6 \text{ J/kg} = 100 \text{ MJ.}$$

$$Q_1 > Q_2;$$

This means that coal of the same mass and coal burn more heat when they burn.

Question 4: 750 m³ of natural gas is burned for 1 month to heat an apartment in winter days. If this house is heated with coal, 450 kg of coal will be burned in 1 month. Or if the apartment is heated using electricity, ie air conditioning, it will consume 220,000 soums of electricity (just to heat the room). If the price of 1 m³ of gas is 380 soums and the average price of 1 kg of coal is 1000 soums, which fuel will be used to heat the house?

Answer: We will mathematically calculate the cost of natural gas, coal, electricity for a month:

Natural gas 750 m³*380 soums = 285 thousand soums.

Coal 450kg*1000 soums = 450 thousand soums.

Electricity costs 220 thousand soums.

This means that the use of electricity and natural gas for heating will be slightly cheaper than coal. However, the rate of heat transfer of these fuels also varies.



An electricity inspector who visited Karim's home found that the electricity meter reading was 312.12 kW • h at the beginning of the month and 354.6 kW • h at the end of the month. He then said the amount of payment for the electricity that Karim had been using for a month.

The following electrical appliances are used in Karim's apartment

№	Consumers	P,W	№	Consumers	P,W
1	Mobile phone	0,3-1	5	TV	50-300
2	Mobile radio	2-10	6	Washing machine	350-600
3	Refrigerator	110-160	7	Led lamp	12
4	Computer	40-200	8	Iron	500-2000

1. What do you know about the power of electricity in consumers?
2. How do you calculate the electricity consumption in your apartment?
3. If a 12 W electric lamp burns for 6 hours every day, find the work done by the current flowing through this lamp in a month? Express the answer in kW • h.
4. If the set price for each 1 kW • h of electricity used is 295 soums, how much will Karim pay?
5. How much electricity did Karim use to watch 2.5 hours of TV a day?

Conclusion and recommendations. When this task is used to test students' knowledge during the lesson (consolidation and repetition) or at the end of the term, students first become interested in science, learn how to apply it in real life situations, develop financial economy skills, and most importantly, it is possible to develop self-study and independent thinking.

The use of such assignments in regular teaching contributes to the development of students' natural science literacy and is important in preparing students for international research in the present and future years.

References:

U.N. Tashkenbaev. «Information for preparing students for international research, 1» Tashkent, 2020, 4, pp. 64-65.

Thinking developing learners who generate ideas and can think critically_9781785832369 (accessed on 26 March 2018).

P.Habibullayev, A.Boydadayev, A.Bahromov, K.Suyarov, J.Usarov, M.Yuldasheva. Physics. 9th grade of secondary schools. Tashkent-2019.