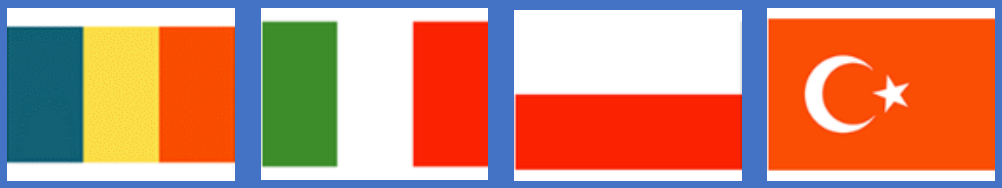
” SCIENCE IS COOL! “
2019-1-RO01-KA229-063363_1

NICOLAESCU ILEANA CĂTĂLINA

CONSTANTINESCU FLORICA

EDUCATION IN THE EUROPEAN SPIRIT METHODOLOGICAL GUIDE



FUNDED BY THE EUROPEAN UNION ERASMUS + PROGRAM

Contributors

Chapter I

Badea Camelia

Chapter II

Prof. Luisa Maria Longo

Chapter III

Prof. Rafal Jakubowski

Chapter IV

Prof. Mehmet Soydan

Content

Introduction

The Technological High School of Auto Transport Targoviste provides a favourable learning environment, a quality, attractive vocational and technical education, equal opportunities for professional development, responsibility, tolerance, dialogue, mobility in the light of European values.

Teachers are challenged to make the most effective use of the Erasmus+ programme to engage pupils with learning difficulties, which is why we have decided under the Erasmus+ programme to establish a strategic partnership with other schools in the European Union.

Therefore, between 01.09.2019 and 31.10.2022 within the Erasmus+ project, key action 2 - cooperation for innovation and exchange of best practices, we are carrying out the strategic partnership in the field of school - inter-school exchange partnership entitled "Science is cool!"

The partners in the project are:

Liceo Scientifico Pasolini Potenza, Italy

Primary School in Gorzyce Wielkie, Poland

Bayrakli Nuri Atik Mesleki Ve Teknik Anadolu Lisesi, Turkey

The aim of the project is to introduce into the educational practice of the partner schools new approaches regarding integrated science learning, the acquisition by pupils of learning skills and competences that facilitate the understanding of scientific concepts and increase pupils' interest in studying science.

The objectives are:

O1. Improve the quality of science lessons, integration of ICT, non-formal methods through cooperation in European context in the field of education by the end of the project.

O2 improving specific skills to increase the graduation rate upon graduation and obtaining a successful job in the market economy within the next 2 years.

O3. development of social skills, communication skills in European languages, mutual knowledge, self-knowledge through participation in European programmes.

We aim to constantly prepare teachers to cope with change and work with pupils from disadvantaged backgrounds, to improve existing partnership relationships and develop new partnerships, to reduce the number of unexcused absences, and to promote the image and increase the prestige of the school.

Project coordinator
Prof. Constantinescu Florica

Chapter I

The education system in Romania

1.1. The education system in Romania

The education system is the main subsystem of the education system. The structure of the education system in Romania comprises: pre-school education, primary education, lower secondary education, compulsory general education, upper secondary education, arts and crafts schools, post-secondary education and higher education.

After 1989, Romanian education made progress despite difficult economic conditions and changes in social life. After 1998, education reform was launched as a result of gradual democratisation and the infusion of European and World Bank funds.

Since the establishment of the Romanian principalities, education has been provided in church schools in the bishoprics, monasteries and churches and in state schools set up in the lords' courts.

After the translation of church books into Romanian in the 17th century under Matei Basarab and Vasile Lupu, education was conducted in Romanian until the reign of the Fanariots in

the 18th century. At that time, Greek was also introduced, especially in the better organised schools attended by clergymen and sons of nobles: the Sfinții Trei Ierarhi (Three Hierarchs) school in Iași and the school at the Monastery of Saint Sava in Bucharest. Some subjects were also taught in these schools in Latin and French. At one point the Romanian language had been almost completely replaced by Greek. During the Phanariot period education declined more and more until the beginning of the 19th century when Gheorghe Lazăr opened the first Romanian school in Sfântu Sava in 1816. He was followed by his disciples I. E. Rădulescu, Paladi and others. Following the 1832 regulation on the organization of schools, schools were established in almost all the county capitals of Muntenia, in addition to the seminaries of Curtea de Argeș, Râmnicu Vâlcea, Buzău. In Moldova, George Asachi founded the first Romanian engineering school in 1814 in Iași and reopened the Trei Ierarhi school, which later became the Vasile Lupu Normal School. Primary schools in the towns and villages began to flourish. The Education Act of 1865 made primary education compulsory.

Pre-school education

The Education Act No. 84/1995 provided for the gradual generalisation of the pre-school preparatory group, so that the enrolment rate of children in kindergarten increased every year. The year 2000 brought a new vision of pre-school education, seen in the framework of the educational programme "Organisation of pre-school education", and in 2002 the programme "Generalisation of the large preparatory group in Romanian pre-school education" was initiated. In 2005-2006, the Strategy of the Ministry of Education and Research in the field of early education was developed with the support of UNICEF.

Pre-school education includes children aged between 3 and 6-7 years. Activities take place in kindergartens with regular, extended or weekly programmes. Pre-school education is structured in two levels: level I, aimed at socialising children aged 3-5, and level II, aimed at preparing children aged 5-7 for school.

Compulsory general education

Compulsory general education is ten grades, with a starting age of 7 years, or 6 years at parents' request. In theory, the age of completion of compulsory general education is 16-17. Since the 2003-2004 school year, the 9th and 10th grades have been completed with a certificate of graduation.

Primary education

Primary education comprises grades I-IV and operates only as daytime education, usually with morning classes. The age of completion of primary education is 10-11 years.

Lower secondary education:

Lower secondary education or gymnasium comprises grades V-VIII and generally operates as daytime education. The school-leaving age is 14-15.

Access to upper secondary education is by national assessment examination and placement in upper secondary schools. Upper secondary education

Upper secondary education comprises upper secondary schools with daytime, 4-year courses (grades IX-XII) and evening or non-attendance courses.

High schools are divided into three streams: theoretical streams - real and humanistic;

- Technological stream - with profiles: exploitation of natural resources, environmental protection, services

- technical vocational stream - with artistic, sports and theological profiles.

High school studies end with a national baccalaureate exam.

Post-secondary education

Post-secondary education is organised on the initiative of the Ministry of Education and Research or at the request of economic agents. Studies last 1-3 years, depending on the complexity of the professions. Admission to post-secondary education is by competitive examination.

Higher education

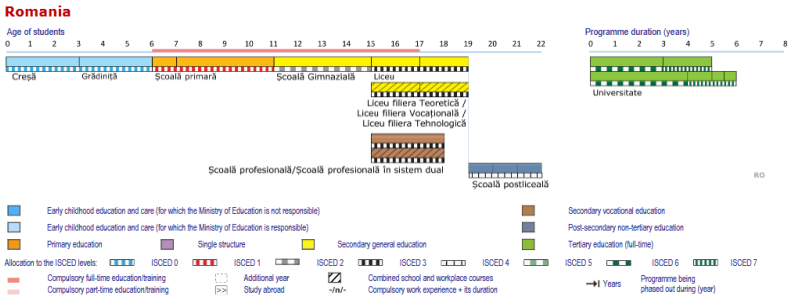
Higher education is organised in three cycles according to Law No 288 of 24 June 2004 on the organisation of university studies:

- batchelor degree studies
- Master's degree studies,
- doctoral studies.

According to Article 4, cycle I comprises undergraduate studies, corresponding to a minimum of 180 credits (undergraduate 3 years) and a maximum of 240 credits (undergraduate 4 years), according to the European Credit Transfer System (ECTS).

According to Article 8, Cycle II comprises Master's degree studies corresponding to a number of transferable study credits, as a rule, between 90 and 120. In daytime education, the normal duration of a Master's degree is 1 to 2 years. Cycle III comprises doctoral studies which normally last 3 years.

Short higher education, which took place in existing university colleges at the time of publication of Law No 288 of 24 June 2004, was reorganised into bachelor's degree studies in existing or similar fields, and graduates of short higher education were given the opportunity to continue their studies to obtain a bachelor's degree in cycle I.



1.2. Liceul Tehnologic de Transporturi Auto Targoviste

Presentation

Since 1991, the School Group of Auto Transport Târgoviște, subordinated to the Ministry of Education, is a school unit recognized in the county by the specific profile in which students are trained in the trades of auto mechanic, auto mechanic and electrician with the possibility of obtaining the driver's license category B.

Since 1 September 2012, the School Group of Auto Transport changes its name to the Technological High School of Auto Transport Targoviste.

Highly trained teachers, with teaching degrees and the desire for continuous improvement, have trained over the years students, who have proven to be very good specialists in this field of activity. Our school is one of the schools in Dâmbovița county with a tradition in training students in transport qualifications/specializations.

In 2014 the school unit was accredited by ARACIP to train students for the qualification of Automotive Electrician Electronic Technician, qualification level 4.

Since 1 September 2017 the school unit has changed its seat to General Ion Emanual Florescu Street, No 20, operating in the building where the Technological High School "N. Mihăescu" has trained students in the field of Construction, Installations and Public Works since 1973.

The new building of the high school was rehabilitated with the support of the Târgoviște City Hall and the local municipal council, and the students benefit from a material base at European standards and a modern sports field.

Technologic de Transporturi Auto Târgoviște is a school unit for mass education, financed by public resources and self-financing.

The experience gained over the years, the seriousness and professionalism of the teaching staff are combined with the ambition to raise the prestige of this school.

High school graduates obtain the qualifications of: Automotive Electrician and Electronics Technician, Electrical Field

Graduates of the 4th level of the technological high school, technical profile, qualification of technician electrician and automotive electrician, are able to carry out operations of diagnosis, adjustment, adjustment, installation, maintenance and repair of electrical and electronic equipment and installations of motor vehicles and to drive and operate motor vehicles.

The automotive electronics electrician is the person who coordinates the testing, maintenance and servicing of the vehicle. All these skills are acquired during the course by completing the specialist modules and practical training courses in workshops and car service centres, which are partners in these courses.

Transport Technician Mechanics

Graduates of level 4, technological high school, technical profile, qualification Transport Technician, are able to carry out tasks of a technical nature of assembly, commissioning, maintenance and repair of means of transport, to draw up transport charts and programmes, to coordinate and monitor transport belonging to different modes of transport. It also optimises transport costs, carries out technical checks on means of transport and ensures compliance with national and international transport legislation.

Graduates of 3-year vocational education obtain the qualifications of:

Vehicle mechanic, field of mechanics, 3-year vocational education - LEVEL 3 qualification

The qualification provides the acquisition of skills and abilities that allow:

o functional, qualitative and quantitative assessment of the condition of mechanical parts of automobiles;

o to carry out adjustment, adjustment, installation, maintenance and repair operations on automobile systems, mechanisms and installations;

o driving and operating motor vehicles for breakdown service at the places requested by customers;

o Driving licence B, skills category C.

Car painter, Mechanics, 3 years vocational training

The qualification ensures the acquisition of skills and abilities that allow:

- to carry out anti-corrosion surface protection operations, frame and bodywork repairs and to apply painting technologies to a given surface;

- assuming responsibilities and establishing the role of the graduate in the team, in the workplace;

- developing the ability to make decisions and solve problems specific to the workplace, thus gaining respect, confidence in one's own strengths and satisfaction in a job well done;

- obtaining a Level 3 Vocational Qualification Certificate upon graduation from Vocational and Technical Education.

1.3. Models of tests to science

Ministry of Education

National Center for Evaluation and Examination

The National Baccalaureate Exam 2019

Test E. c)

Mathematics M_tehnologic

Variant 7

Technology sector: service profile, all professional qualifications; resources profile, all professional qualifications;technical profile, all professional qualifications

- **All subjects are compulsory. 10 points are awarded ex officio.**
- **The actual working time is 3 hours.**

SUBJECT I (30 points)

5p 1. You show that $\left(\frac{3}{2}-\frac{2}{3}\right):\left(\frac{3}{2}+\frac{2}{3}\right)\cdot\frac{13}{5}=1$.

5p 2. The function is considered $f:\mathbb{R}\to\mathbb{R}$, $f(x)=2x-4$. Determine the real number m, knowing that $f(m+1)=m$.

5p 3. Solve the equation in the set of real numbers $\log_7(2x+3)=\log_7 9$.

5p 4. Calculate the probability that by choosing a number from the set A= $\{10,20,30,40,50,60,70,80,90\}$, it should be a multiple of 3.

5p 5. In the cartesian landmark xOy the points are considered *M* (4,1) , *N* (1,5) and *P*(4,5). Calculate the area of MNP triangle.

5p 6. You show that $\frac{1}{\sqrt{3}} \cdot \sin 60° + \sin^2 45° = 1$.

SUBJECT II (30 points)

1. The matrices are considered A= $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and M (a)= $\begin{pmatrix} 1+a & -a \\ a & 1-a \end{pmatrix}$, where a is a real number.

5p a) You show that $\det A = -2$.

5p b) Prove that $M(a) \cdot M(b) = M(a+b)$, for any real numbers *a* and *b*.

5p c) Determine the matrix $X \in M_2(\mathbb{R})$ for which $M(1) \cdot X \cdot M(2) = A$.

2. Consider the polynomial $f = 2X^3 - 4X^2 + 4X - 3$.

5p a) You show that $f(0) = -3$.

5p b) Prove that the number $a = \frac{3}{x_1} + \frac{3}{x_2} + \frac{3}{x_3}$ is natural where x_1, x_2, x_3 are *f* roots.

5p c) Prove that the polynomial *f* ***does not*** have all the real roots.

SUBJECT III (30 points)

1. It is considered the function $f : \mathbb{R} \to \mathbb{R}$, $f(x) = \frac{x}{x^6+5}$.

5p a) Prove that $f'(x) = \frac{5(1-x^3)(1+x^3)}{(x^6+5)^2}$, $x \in \mathbb{R}$. .

5p b) Determine the equation of the tangent to the graph of the function *f* at the abscissa point $x = 0$ located on the graph *o*f function *f* .

5p c) Determine the set of function values *f*.

2. It is considered the function $f : \mathbb{R} \to \mathbb{R}, f(x) = (x-1)e^x$.

5p a) You show that $\int_0^1 \frac{f(x)}{e^x} dx = -\frac{1}{2}$.

5p b) Prove that $F : \mathbb{R} \to \mathbb{R}, F(x) = (x-2)e^x + 2019$ is a primitive of the function *f* .

5p c) Calculate $\int_0^1 f^2(x) f'(x) dx$.

Test written in mathematics M_tehnologic *Variant 7*

Technology sector: service profile, all professional qualifications; resources profile, all professional qualifications; technical profile, all professional qualifications

Ministry of Education

National Center for Evaluation and Examination

The National Baccalaureate Exam 2019 Test E. d)

Technology sector - technical profile and profile of natural resources and environmental protection

- All subjects from two thematic areas of the four provided by the program are required, namely: A. MECHANICS, B. ELEMENTS OF THERMODYNAMICS, C. PRODUCTION AND USE OF THE CONTINUOUS CURRENT, D. OPTICS
- 10 points are awarded ex officio.
- The actual working time is 3 hours.

A. MECHANICS Variant 4

The gravitational acceleration is considered $g = 10 m/s^2$.

I. For items 1-5 write on the answer sheet the letter corresponding to the correct answer. (15 points)

1. The symbols of the physical sizes being those used in textbooks, the unit of measure in S.I. of the size expressed through the report $F/D\ell$ is :

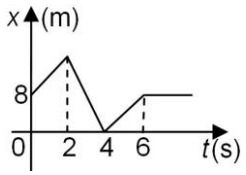
a. $kg \cdot m \cdot s^{-1}$ **b.** $kg \cdot m \cdot s^{-3}$ **c. N/m** **d.** W **(3p)**

2. A material mass point m drops vertically with constant velocity v, on the distance h. Mechanical work carried out by its weight is:

a. $L = mv^2/2$ **b.** $L = m \cdot g \cdot h$ **c.** $L = 2 \cdot g \cdot h$ **d.** $L = m \cdot g$

3. The time graph of the coordinate of a moving body is represented in the accompanying graph rectilinear. The moment of time at which the body is at maximum distance from its origin has the value:

a. 2s **b.** 4 s **c.** 6s **d.** 8s **(3p)**



4. Action and reaction are two forces that have:

a. the same module

b. the same meaning

c. different directions

d. perpendicular directions. (3p)

5.A car traveling straight ahead increases its speed from 15 m / s to 25 m / s for 2 s.The average acceleration of the car in the considered time interval is equal to:

a. $-5 m/s^2$ **b.** $-2,5 m/s^2$ **c.** $1,5 m/s^2$ **d.** $5 m/s^2$ **(3p)**

II. Solve the following problem: (15 points)

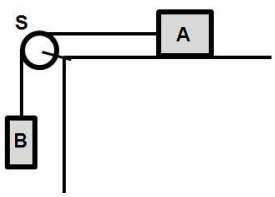
Two bodies A and B, of masses 2 kg A m = and 1 kg B m = respectively, are connected by a inextensible and mass wire negligible, as in the figure below. The S pulley is inertial and frictionless. Movement of body A on the horizontal surface occurs with friction, the coefficient of friction at slip being m = 0.2. The system of the two bodies, initially at rest, is left free.

a. Represent on the answer sheet all the forces acting on body A.

b. Calculate the value of the frictional force when sliding between body A and the surface horizontal.

c. Determine the value of the system acceleration.

d. Determine the value of the reaction force in the shaft of the pulley.



III. Solve the following problem: (15 points)

A train with the total mass $m = 2 \times 10^{-5}$ kg moves at a constant speed v = 10m / s on a railway horizontal. Forward resistance force represents a fraction f = 0.05 of the train weight and is maintained constant during

travel. determine:
a. kinetic energy of the train;
b. the time interval in which the train travels the distance D = 1km;
c. the value of the power developed by the locomotive for moving the train at constant speed v;
d. the mechanical work performed by the forward resistance force while moving the train over the distance d = 100m.

B. ELEMENTS OF THERMODYNAMICS Variant 4

It is considered: Avogadro's number $N_A = 6{,}02 \cdot 10^{23} mol^{-1}$, ideal gas constant $R = 8{,}31\ J \cdot mol^{-1} \cdot K^{-1}$.
Between the state parameters of the ideal gas in a given state there is the relation: $p \cdot V = RT$.

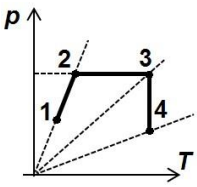
I. For items 1-5 write on the answer sheet the letter corresponding to the correct answer.

1. In a constant volume heating of a constant mass of ideal gas:
a. the gas pressure decreases
b. the gas pressure increases
c. gas density increases
d. gas density decreases. (3p)

2. The unit of measure in the S.I. of the caloric capacity of a body is:
a. $J \cdot mol^{-1} \cdot K^{-1}$ **b.** $J \cdot K^{-1}$ **c.** $J\ kg^{-1}$ **d.** $J\ kg^{-1} \cdot K^{-1}$

3. The notations of the physical quantities being those of the physics textbooks, the general expression of the first principle of thermodynamics is:
a. $\Delta U = Q - L$ **b.** $Q = L$ **c.** $Q = \Delta U$ **d.** $Q = -L$ **(3p)**

4. In the next figure, a sequence of transformations is represented, in p -T coordinates of a constant mass of ideal gas. Of the numbered states, those in which the volume gas is the same are:



a. 1 şi 4
b. 2 şi 3^0
c. 1 şi 2
d. 3 şi 4 **(3p)**

5. The specific heat of the water has its value C_{apa} =4200 J/ kg · K
Heat required to heat a table m = 2 kg water temperature $t_1 = 60^0C$ at the temperature t_2 90^0C has the value:
a. 252 J **b.** 252 kJ **c.** 2,54 MJ **d.** 25,4 MJ **(3p)**

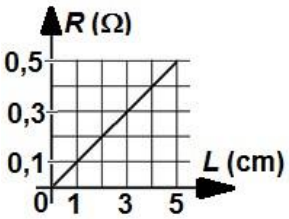
II. Solve the following problem: (15 points)
A metal tank is filled with a table $m_1 = 0{,}145$ kg of air (μ_{aer} =29g· mol^{-1}). The air in the tank se is under pressure $p_{1=}$ 2,9 10^5 $N.^{m-2}$ and at the temperature $T1$ = 290K he tank is fitted with a faucet evacuation, initially closed.
a. Determine the amount of air in the tank in its initial state.
b. Calculate the density of air in the tank.
c. The valve remains closed and the air in the tank is heated to temperature $t_2 = 27^0C$. Calculate air pressure from the tank after heating.
d. Determine the mass of air to be discharged from the tank, by opening the valve, so that.
the air pressure returns to the initial value p_1 if the gas temperature remains at the value $t_2 = 27^0C$.

III. Solve the following problem: (15 points)
O quantity n = 1 mol of ideal monoatomic gas (C_v = 1,5R), initially at temperature T_1 = 400 K, performs a cyclical transformation composed of the following thermodynamic processes:
1 →2 heating under constant pressure until the volume doubles,

$2 \rightarrow 3$ constant volume cooling to the initial temperature and
$3 \rightarrow 1$ compression at constant temperature to the initial state.
Is known ln2 = 0,7.
a. Represent the cyclic process in coordinates $p - V$**.**
b. Calculate the exchanged heat of the gas with the outside in the transformation 1-2.
c. Calculate the variation of internal energy in the process 2-3;
d. Determine the mechanical work of the gas with the outside in the compression at constant temperature.

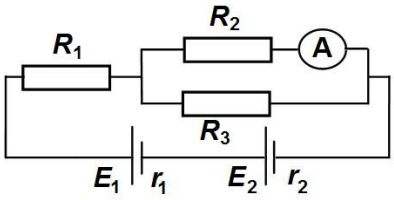
C. CONTINUOUS CURRENT PRODUCTION

I. For items 1-5 write on the answer sheet the letter corresponding to the correct answer. (15 points)
1. At the terminals of a battery having electromotive voltage E an ideal voltmeter is connected ($R_V \rightarrow \infty$).
The voltage indicated by the voltmeter is:
a. U=2E b. U=E c. U=E/2 d. U=0V **(3p)**
2. The symbols of physical quantities being those used in physics textbooks, the mathematical expression of Ohm's law for a portion of the circuit is:
a. I=U/R b. I=U*R c. I=U/R d. I= E(R+r) **(3p)**
3. The graph of the figure below shows the length dependence of the resistance of a homogeneous metal wire. Electrical resistance of the wire when the length it is L = 4 cm has the value:



a. 0,2 Ω
b. 0,3 Ω
c. 0,4 Ω
d. 0,5 Ω **(3p)**
4. The symbols of the physical quantities being those used in the physics manuals, the unit of measure in S.I of the size physical expressed through the product $U \cdot I$ *is*:
a. C **b.** W **c.** J **d.** Ω **(3p)**
5. The energy of 1 kWh expressed in units of S. I. has the vallue:
a. 3,6MJ **b.** 0,36MJ **c.** 3,6kJ **d.** 0,36kJ **(3p)**

II. Solve the following problem: (15 points)
The diagram below shows the diagram of an electrical circuit. Known: electromotive voltages electric generators $E_1 = E_2 = 4{,}5$ V, the internal resistance of the two generators. $r_1 = r_2 = 1\ \Omega$.
The equivalent resistance of the external circuit is $R_e = 3\ \Omega$, and the electrical resistors of resistors 2 and 3 are equal to $R_2 = 3\ \Omega$, respectively $R_3 = 1{,}5\ \Omega$. The circuit-mounted ammeter is considered ideal ($R_A = 0\ \Omega$).
Determine:
a. The electromotive voltage and the internal resistance of the equivalent source with the grouping of the two generators;
b. current intensity through generators;
c. electrical resistor R_1 of resistor 1;
d. current intensity indicated by the ammeter.

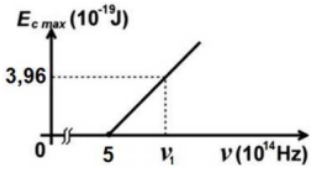


III. Solve the following problem: (15 points)
Two bulbs with nominal powers P_1 = 100W şi P_2 = 60 W are connected in series to the terminals of a source with electromotive voltage E = 100 V and unknown internal resistance r. It is found that the bulbs works at

nominal parameters. The total electrical power produced by the source during normal operation of the bulbs is P_{total} = 200W. Neglecting the variation of the electrical resistance of the bulbs with temperature over time for normal operation, determine:
a. the electricity consumed together by the two bulbs in one hour;
b. the intensity of the electric current through the circuit during the normal operation of the bulbs;
c. the electrical resistance of the bulb having the nominal power 1 P;
d. the internal resistance of the source.

D. OPTICS

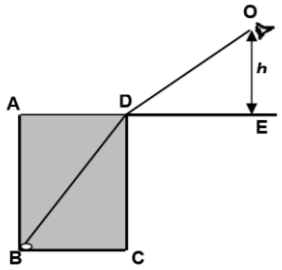
It is considered: the speed of light in vacuum c = 3×10^8 m / s, Planck constant h = $6{,}6 \times 10^{-34}$ J × s.
I. For items 1-5 write on the answer sheet the letter corresponding to the correct answer. **(15 points)**
1. The external photoelectric effect consists of:
a. the emission of electrons by a metal plate as a result of its heating;
b. the emission of electrons by a metal plate under the action of electromagnetic radiation;
c. the emission of electrons by a filament through electric current;
d. bombardment of a metal plate by an electron flow; **(3p)**
2. Two slim lenses, with focal lengths 1f and 2f respectively, form a focused optical system.
The system is equivalent to a lens with focal length:
a. $f=f_1f_2/(f_1+f_2)$**;** **b**. $f=(f_1+f_2)/f_1f_2$; **c**. $f=f_1+f_2$; **d**. $f=f_1f_2$; **(3p)**
3. The unit of measure in S.I. the convergence of a lens is::
a. m **b.** m^{-1} **c.** s^{-1} **d.** s **(3p)**
4. A ray of light coming from the air ($n_{aer} \cong 1$) falls from an angle of incidence $i = 45^0$ on the surface of a optical medium having the refractive index $n = 1{,}41 \cong \sqrt{2}$. The value of the refraction angle is:
a. 0^0 **b.** 15^0 **c.** 30^0 **d.** 45^0 **(3p)**
5. Maximum kinetic energy of electrons extracted by photoelectric effect externally depends on the frequency of incident radiation according to the graph in next figure. Under these conditions, the threshold frequency has the value:
a. $3{,}96 \cdot 10^{14}$ Hz
b. $5 \cdot 10^{14}$ Hz
c. $7{,}92 \cdot 10^{-5}$ Hz
d. 5Hz **(3p)**



II. Solve the following problem: (15 points)
A luminous linear object, with height $y_1 = 2$ cm, is placed perpendicular to the main optical axis of a focal length lenses f = 20cm. On a screen 30 cm from the lens, the clear image of a of the object considered.
a. Calculate lens convergence.
b. Determine the distance between the object and the screen.
c. Make a drawing in which to highlight the construction of the image through the lens in the situation described above.
d. Calculate the height of the observed image on the screen.

III. Solve the following problem: (15 points)
A water-filled basin has a rectangular section ABCD, with sides AB = CD = 4m and BC = AD = 3m. On the ass in the B corner, there is a coin. An observer is at a distance DE = 4m from the side of the CD and has eyes at the point O, at the height h = 3m from the surface of the water in the basin. The drawing shows a BDO beam of light that originates from the coin and reaches the point O.The refractive index of air is known, n_0 = 1.

a. Redo the drawing on the exam sheet, represent the meaning of light propagation along the radius, mark and note the angle of incidence and angle of refraction.
b. Calculate the total length of the BDO geometric path along the light.
c. Calculate the refractive index of water, based on the problem data.
d. Determine the speed of light propagation in water.



The initial assessment test for 10th grade in the Chemistry discipline

The specifications matrix is presented below:

Competences / Contents (Common trunk)	1.1	2.1	3.1	3.2	4.2
pH of aqueous solutions		**x**			**x**
Determination of the acid-basic character of the solutions with indicators	**x**	**x**			**x**
Redox reactions. Applications of redox reactions: the lead battery	**x**	**x**			**x**
Calculations stoichiometry			**x**	**x**	

The competencies evaluated are:
1.1. Description of the behavior of the chemical species studied in a given context.
2.1. Conducting investigations to highlight characteristics, properties, relationships
3.1 Analyzing the problems to establish the context, the relevant relationships, the stages of solving.
3.2 Integration of mathematical relationships in problem solving.
4.2 Correct use of chemistry specific terminology.
The initial evaluation test has two parts:
Part I includes objective and semi-objective items and has 40 points.
Part II contains the subjective type items and has 50 points distributed.
The total score awarded is 90 points, to which 10 points are added ex officio.
The test duration is 45 minutes.

INITIAL ASSESSMENT TEST
2019-2020 school year
Chemistry discipline
Class X

Student's first and last name _____

Date the test was taken _____

● For the correct resolution of all the requirements in Part I and Part II, 90 points are awarded. 10 points are awarded ex officio.
● The actual working time is 45 minutes.

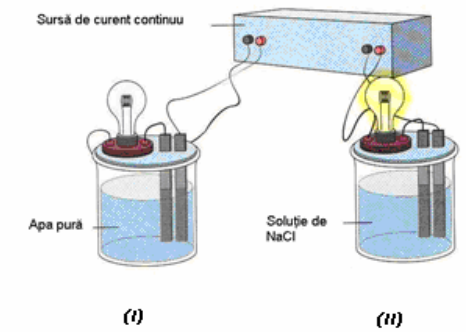
PART I (40 points)
1. Write, on the test sheet, the term in parentheses that correctly completes each of the following statements:
1. In the solution obtained after ionization of hydrochloric acid in water, the concentration of hydroxide ions is
more ... ... than the concentration of hydronium ions. (big / small)
2. The pH of the gastric juice has the value more ... ... than 7. (high / low)
3. Reduction is the phenomenon in which a particle ... ... electrons. (accept / give up)
4. A solution of sodium carbonate, treated with a solution containing Ca^{2+} ions, forms a precipitated ... ... in acid solution. (soluble / insoluble)
5. After adding sunflower, the color of the solution obtained from the reaction between sodium and water, guess ... ... (red-carmine / blue-purple)

20 points

2. Read the following statements carefully. In the dotted space next to each statement, write the letter A, if you consider that the statement is true or the letter F, if you consider that the statement is false.
a. Sodium chloride is an ionic compound. ...
b. In methane (CH4) the polar covalent bond is found ...
c. Ionic compounds are not water soluble. ...
d. In the oxygen molecule we find the simple covalent bond ...
e. The covalent bond is formed by electron transfer ...

20 points

Partea II (50 points)
1. Analyze the image and text below:
DC power source.
Pure water
Solution of NaCl



a. Explain, in the box below, why in experiment (I),the bulb does not work.

5 points

b. Following the electrolysis of experiment (II), a substance is also found which is dissolved in the lesion used by Ion Creangă to cure the diarrhea. Note, in the box below, the chemical formula and the substance name.

5 points

2. Copper is a trace element that is found in the human body in small quantities and is essential for physical and mental health. The body of an adult contains about 128 mg of copper, distributed between different organs, especially in the liver, lungs, heart, ocular tissues and hair.

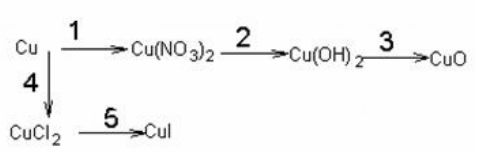
Answer the following requirements:

a. By reaction of Cu^{2+} ions with $[Fe(CN)_6]^{4-}$ $Cu_2[Fe(CN)_6]$ is formed, a brown precipitate reddish. Calculate the amount of $[Fe(CN)_6]^{4-}$, expressed in moles, necessary for the Cu^{2+} precipitation existing in the body of an adult.

7 points

b. Write the equations of the chemical reactions corresponding to the transformations included in the diagram, in the box on the test sheet:

15 points



1.
2.
3.
4.
5.

3. A large amount of lead is used in the manufacture of battery plates.
The lead accumulator is a liquid electrolyte battery made for the first time, in 1859, by the French engineer Gaston Planté. The negative electrode is formed by a lead grate with the mesh filled with spongy lead, and the positive electrode is also constructed from a lead grate with the mesh filled with lead dioxide. The electrolyte is a solution of sulfuric acid of 38% concentration, and the density of the solution corresponding to the charged battery has the value 1.29 g / cm3.
Note, in the box below, the equations of the reactions that occur at the electrodes during operation battery.

10 points

1. 2.

4. Calculate the mass of sodium hydroxide needed to form 585 Kg NaCl, following the neutralization reaction of hydrochloric acid with sodium hydroxide.

8 points

INITIAL ASSESSMENT TEST
2019-2020 school year
Chemistry discipline
Class X

SCALE OF EVALUATION AND NOTATION

Any other formulations / modalities for correct resolution of the requirements are scored.
• No intermediate scores, other than those explicitly stated in the scale, are given. It is not granted point fractions.
• 10 points are awarded ex officio. The final grade is calculated by dividing the total score awarded for test at 10.

PART I (40 points)
Subject 1 **20 points**
1. small; 2. small; 3. accept; 4. soluble; 5. blue-purple (5x4p)
Subject 2 **20 points**
a. A; **b**. F; **c**. F; **d**. F, e F (5x4p)

Partea II (50 points)
Subject 1 **32 points**
1. a. Correct explanation: pure water does not conduct electricity **5 points**
b. Notation of the chemical formula: NaOH (3p); Name marking: Sodium hydroxide (2p) **5 points**
2. a. Write the chemical reaction equation (3p):
$2\ Cu^{2+} + [Fe(CN)6]^{4-} \rightarrow Cu2[Fe(CN)6]$
Correct reasoning (3p), calculations (1p), number of moles:
$[Fe\ (CN)_6]^{4-}$ 0,001 *n · moli* **7 points**
b. Scrierea ecuatiilor reactiilor chimice corespunzătoare transformărilor cuprinse in schemă (5x3p)
15 points

Subject 3 **10 points**
Write the equations of chemical reactions corresponding to the transformations included in the scheme (2x5p)

Subject 4 **8 points**
1. Writing the neutralization reaction equation **4 points**
2. Closing the mass of sodium hydroxide = 400 Kg **4 points**

Chapter II

The education system in Italy

2.1. The education system in Italy

In Italy, education is compulsory for all children aged between 6 and 16, lasts 10 years and covers the eight years of the first cycle of school and the first two years of the second cycle. After completing the first school cycle, the last two compulsory years (14-16 age group) can be attended in secondary schools of state competence or in vocational training units of regional competence. Young people aged 15 may complete the last year of compulsory schooling in a work context, on the basis of an apprenticeship contract, subject to prior agreement between the Region, the Ministry of Labour, the Ministry of Education and the social partners.

Compulsory education involves both enrolment in courses and attending them in public, private or homeschooling institutions; in vocational education and training units of regional competence, the last two compulsory years are carried out with the support of training agencies. Parents of pupils or legal guardians are responsible for their children's education, while municipalities and principals of schools where pupils are enrolled check that the legal conditions are met.

If, at the end of the compulsory education period, pupils do not intend to continue their schooling, they will be issued with a declaration attesting to the completion of the classes up to that date and the skills acquired.

Once they have passed the baccalaureate examination, students can be admitted to higher education institutions. The conditions for admission are set by the Ministry of Education and each academic institution.

The three-year vocational qualification and the four-year vocational diploma obtained in vocational training institutions of regional competence allow access to "second level" vocational education courses. These can also be accessed by those with a baccalaureate diploma.

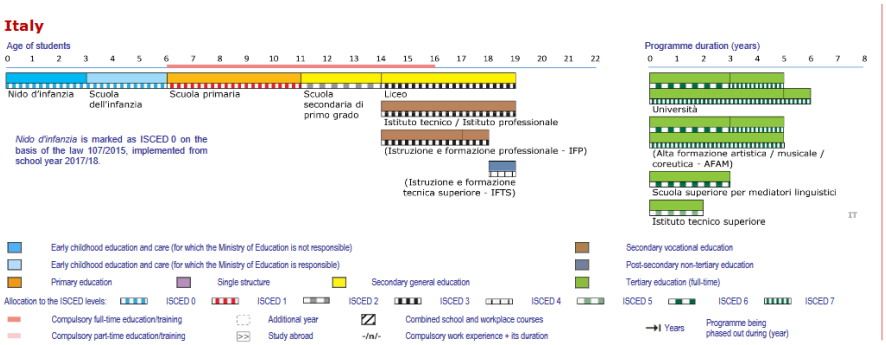
Structure of the Italian pre-university education system:

- Pre-school level, for children aged 3 to 6;
- First school cycle, lasting eight years, structured as follows:
  - o Primary school (5 years), for children aged 6 to 11;
  - o Secondary school (3 years), for pupils aged 11 to 14;
- The second school cycle, comprising two types of institutions:
  - o Secondary schools of national competence (5 years), for pupils aged 14 to 19. This category includes secondary schools, technical and vocational institutes;
  - o Vocational training units (3 / 4 years), of regional competence, for young people who have completed the first cycle of school.

High school (scuola superiore) in Italy lasts 5 years. Students start high school at the end of 8th grade after completing 5 classes of primary school (scuola elementare) and 3 more classes of secondary school (scuola media). At the end of high school, students take a national exam (equivalent to the Romanian baccalaureate), called "Matura".

Classes are usually held between 8.00 and 14.00, including Saturdays. It is a tradition for each class in an Italian high school to organise an annual trip of several days to areas of interest to the students.

The school year starts in mid-September and ends in mid-June. There is a Christmas Holiday of about 2 weeks and an Easter Holiday of one week.



2.2. Liceo Scientifico Pasolini

Potenza

Presentation

Liceo Pasolini is a science high school, which means that our programs focus mainly on scientific/mathematical subjects. In particular, the school offers two educational programs: a traditional one in which Latin is studied together with Mathematics, Science, Physics, Philosophy, Art, English and the other in applied sciences based on the knowledge of Science, Mathematics, ITC, Physics, English, Art.

The school has 835 students aged 14-19, 90 teachers and 32 staff members. We would really like to participate in this project as we feel the need to make our school dimension more European. So far we have participated in a KA1 project and now we feel ready to participate in a strategic partnership.

Moreover, we are really interested in the subject of the project, e.g. STEM, as our school is strongly specialized in it.

This could be an excellent opportunity for students and teachers to develop their professional and personal skills and become part of a European network. The school has appointed an Erasmus staff to run the project. It is composed of the director, who monitors and coordinates all the different project activities; an English teacher as a contact reference; two teachers from the schools' science and mathematics departments.

More teachers may be involved depending on the need for the project, but this is the minimum number of staff that will be involved. Should some of these staff have to leave the school, they will be replaced by colleagues responsible for the same subjects/roles. As I said earlier, the school has a strong vocation for STEM, being in Italy and very close to the current European Capital of Culture Matera, in fact for STEAM.

We could bring to the project the experiences and knowledge we have gained by participating in previous projects.

For example, last year we started the Mathematical High School in collaboration with the University of Basilicata, e.g. a class of about 28 first grade students taking workshop lessons in LOGIC, HISTORY OF MATHEMATICS, COMPUTER SCIENCE and MATHEMATICS IN ART.

Other noteworthy projects include:

- School work project with the National Institute of Nuclear Physics, in collaboration with CERN, on "ART AND SCIENCE": the project includes visits to different national and regional museums and scientific research sites. At the end of the project, students, divided into small groups, worked on how art tells science. They also visited the CERN laboratory in Geneva.

- Workshop on the use of graphing calculators in collaboration with MIUR, CASIO and the Leonardo da Vinci Science Museum in Milan - Mathematical Olympiad: Pristem-Bocconi

- Physics Olympiads;

- Individual and team IT Olympiads;

- Chess course

- Autocad course

- ECDL course

- scientific diploma preparation course

We have six classes developing the STEAM project using the CLIL methodology.

2.3 Models of tests to science from Italy

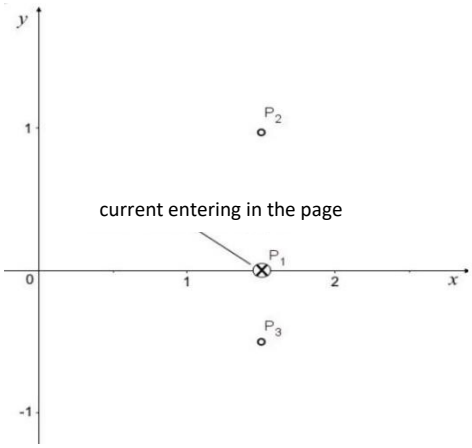
SOLVE ONE OF THESE PROBLEMS AND ANSWER TO 4 QUESTIONS (6 HOURS)

PROBLEM 1

Consider the following functions: $f(x) = a\,x^2 - x + b$ $\qquad$ $g(x) = (a\,x + b)e^{2x - x^2}$.

1. Prove that however values of a and b are chosen in R ($a \neq 0$), the function g has an absolute maximum and minimum. Determine the values of a and b such that the graphs of the two functions intersect at point
   A (2 ; 1).

2. From now on, assume that a=1 and b= -1. Study the graphs of the functions so obtained and verify that the graphs of g has a centre of symmetry and that the graphs of f and g are tangent at the point B (0; -1). Also determine the area of the plane region bounded by the graphs of f and g.



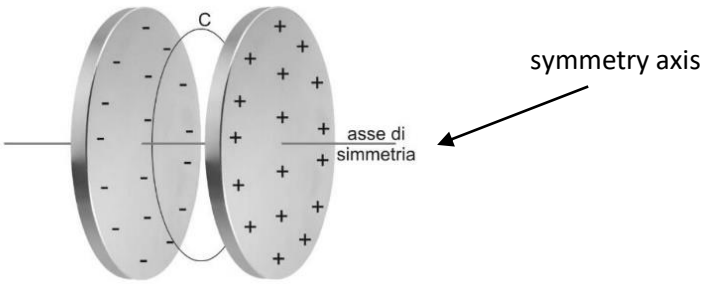
3. Suppose that in the system of reference Oxy lengths are expressed in meters (m). Consider three straight conductive wires arranged perpendicular to the plane Oxy and passing respectively through the points $P_1\left(\frac{3}{2}\,;0\right)$, $P_2\left(\frac{3}{2}\,;1\right)$ and $P_3\left(\frac{3}{2}\,;-\frac{1}{2}\right)$.

   The three wires are crossed by continuous current of intensity: $i_1 = 2{,}0\ A$, i_2 , i_3 . The verse of i_1 is shown in the figure, while the other two verses are not indicated.
   Establish how the magnetic field (generated by the currents i_1 , i_2 and i_3) circuitry, along the boundary of S, varies according to the intensity and verse of i_2 and i_3 .

4. Suppose, in absence of the three wires, that the boundary of the region S represents the profile of a conductive coil whose resistance is $R = 0{,}20\ \Omega$. the coil is placed inside a uniform magnetic field of intensity $B = 1{,}5\ \cdot 10^{-2}\ \mathrm{T}$ perpendicular to the region S. By rotating the coil around the x-axis at a constant angular speed ω, inside it induced current is generated whose maximum intensity is $5{,}0\ mA$. Determine the value of ω .

PROBLEM 2

A parallel plate capacitor consists of two circular plates two circular plates of radius R, placed at a distance d, where R and d are expressed in meters (m). The potential difference between the plates is variable in time and initially it equals zero.



Inside the capacitor is detected the presence of a magnetic field $\vec{B}$. Disregarding the effects on board, the intensity (magnitude) of $\vec{B}$ expressed in Tesla (T) varies according to the law: $\left|\vec{B}\right| = \frac{k\,t}{\sqrt{(t^2+a^2)^3}}\,r$

where r is the distance from the symmetry axis of the capacitor ($r \leq R$); a and k are positive constants and t is the time elapsed from the initial instant expressed in seconds (s).

1. After determining the units of measure of a and k, explain why there is a magnetic field in the capacitor, even in the absence of magnets and induction currents. What is the relationship between the directions of $\vec{B}$ and the electric field $\vec{E}$ in the points inside the capacitor?
2. Consider, between the plates, a plane perpendicular to the axis of symmetry. On this plane, name C the circumference having centre on the axis and radius r. Determine the circuitry of $\vec{B}$ along C and from it derive that the flux of $\vec{E}$ through the circular surface bounded by C is given by:

$$\Phi(\vec{E}) = \frac{2k\pi r^2}{\mu_o\,\varepsilon_o}\left(\frac{-1}{\sqrt{t^2+\,a^2}} + \frac{1}{a}\right)$$

Calculate the potential difference across the plates of the capacitor. What value does $\left|\vec{B}\right|$ approach with the passage of time? Explains the response from a physical point of view.

3. For a > 0, consider the function $f : \mathbb{R} \to \mathbb{R}$ so defined: $f\,(t) = -\frac{t}{\sqrt{(t^2+a^2)^3}}$. Verify that the function $F\,(t) = \frac{1}{\sqrt{t^2+a^2}} - \frac{1}{a}$ is the antiderivative of f whose graph passes through the origin. Study the function F identifying any symmetries, asymptotes, extremes. Prove that F has two inflection points when $t = \pm\frac{\sqrt{2}}{2}\,a$ and determine the slope of the straight lines tangent to the graph of F in such points.
4. With the appropriate motivations, deduce the graph of f from that of F , specifying what the abscissas of F inflection points represent for the function f . Calculate the area of the plane region between the graph of f , the x-axis and the lines parallel to the y-axis passing through the endpoints of the function. fixed b, calculate the value of a. Fixed b > 0 , calculate the value of $\int_{-b}^{b} f(t)dt$.

QUESTIONS

1. A given function can be expressed in the form $f(x) = \frac{p(x)}{x^2+d}$, where $d \in \mathbb{R}$ and p(x) is a polynomial. The graph of f intersects the x-axis at the points whose abscissas are 0 and 12/5 and has as asymptotes the lines whose equations are: x = 3, x = - 3, and y = 5, determine the relative maximum and minimum points of the function f .

2. Given the function $g(x) = \sum_{n=1}^{1010} x^{2n-1} = x + x^3 + x^5 + x^7 + \cdots . + x^{2017} + x^{2019}$

   prove that there is one and only one $x_o \in \mathbb{R}$ such that $g(x_o) = 0$.
   Also determine the value of $\lim_{x \to +\infty} \frac{g(x)}{1{,}1^x}$

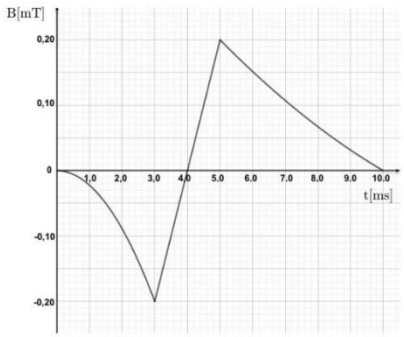
3. Between all rectangular parallelepipeds with square base, with total surface S, determine for which the sum of edge lengths is minimum.

4. Given the points A (2,0, -1) and B (-2, 2, 1). Prove that the locus of points in space, such that $\overline{PA} = \sqrt{2}\ \overline{PB}$ consists of a spherical surface and write its Cartesian equation. Verify that point T(-10, 8, 7) belongs to S and determine the equation of the tangent plane at point T to S.

5. Rolle 4 dice with 1 to 6 numbered faces.
   - What is the probability that the sum of the four numbers does not exceed 5?
   - What is the probability that the product of the 4 numbers is multiple of 3?
   - What is the probability that the maximum number is 4?

6. A coil of copper, of resistance $R = 4{,}0\ m\Omega$, encloses an area of 30 cm^2 and it is immersed in a uniform magnetic field, whose field lines are perpendicular to the surface of the coil. The magnetic field component perpendicular to the surface varies over time as shown in the figure. Explain the relationship between the variation of the field that induces the current and the direction of the induced current. Calculate the average current passing through the coil during the following time intervals:

   a) From 0,0 ms to 3,0 ms;
   b) From 3,0 ms to 5,0 ms;
   c) From 5,0 ms to 10 ms.



7. In the laboratory you are observing the motion of a particle moving in the positive direction of the x-axis of a reference frame jointed to it. At the initial instant the particle is in the origin and in a time interval of 2,0 ns it covers a distance of 25 cm. A spaceship passes with speed $v = 0{,}80\ c$ along the x direction of the laboratory, towards the positive x-axis, and observes the motion of the particle. Determine the average speeds of the particle in the two reference frames. What interval of time and distance would an observer on the spaceship measure
8. A proton penetrates a region of space where a uniform magnetic field is present ($\left|\vec{B}\right| = 1{,}00\ mT$). It begins to move describing a cylindrical helix trajectory with constant pitch $\Delta x = 38{,}1\ cm$,

obtained from the composition of a uniform circular motion of radius $r = 10{,}5\ cm$ and a uniform straight motion. Determine the speed vector magnitude and the angle it forms with $\vec{B}$. physical constants

PHYSICAL CONSTANTS		
carica elementare	e	$1{,}602 \cdot 10^{-19}$ C
massa del protone	m_p	$1{,}673 \cdot 10^{-27}$ kg
velocità della luce	c	$2{,}998 \cdot 10^{8}$ m/s

SOLVE ONE OF THESE PROBLEMS AND ANSWER TO 4 QUESTIONS (6 HOURS)

PROBLEM 1

To vary of $a \in \mathbb{R}$ consider the following family of functions: $f_a(x) = \begin{cases} \frac{9}{2}(1 + xe^{a-x}) & ; \ x \geq 0 \\ \frac{9a}{a(x-1)^4} & ; \ x < 0 \end{cases}$

5. Discuss function $f_a(x)$ sign and continuity as the parameter a changes. Prove that, whatever $a \in \mathbb{R}$, the function has a maximum point with abscissa 1.
6. Indicated by f the function obtained from f_a for a =2, Determine if f is differentiable at x=0. Study the course of the function f, specifying the asymptotes, the inflection points and the width of the angles (in degrees) formed by the tangents left and right at the point of non-derivability. Considering the function

$$g(x) = h\,[1 + (3 - kx)e^{kx-1}]$$

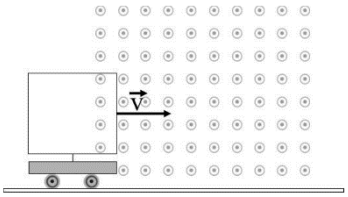
determine the values of the positive constants h and k such that $g(3 - x) = f(x)\ for\ \ x \geq 0$
7. A particle accelerator prepares a beam of protons having a kinetic energy of 42 MeV. To direct this beam to a desired target, a uniform magnetic field, orthogonal to the trajectory of protons, of intensity 0,24 T shall be used. Disregarding relativistic effects, describe the motion of each proton within the field and calculate the radius of curvature of the trajectory.
8. At the exit of the zone where $\vec{B}$ is present, the proton beam enters the water. Indicate with $\varepsilon(x)$ the proton energy, expressed in MeV, after x cm walk in the water and let $d\varepsilon$ be the energy released by the water to the proton in the tract dx. Assuming that the function $y = -\frac{d\varepsilon}{dx}$ can be approximated with the function $y = g(x)$ g, setting $h = \frac{9}{2}$ and $k = 1$, calculate the energy ε absorbed by water in the first 3 centimetres of proton path.

PROBLEM 2

Two point charges $Q_1 = q > 0$ and $Q_2 = -q$ are placed respectively at points A and B, placed at a distance 2k. The charges are expressed in Coulomb (C) and the distances in meters (m). Indicate with r the line passing through points A and B

9. Determine, at a point C of the line r, the magnitude of the electric field generated by the charges Q_1 and Q_2 , as C varies over r. Are there, on this line, points where the electric field is zero? Justify the answer.

10. Demonstrate that the magnitude of the electric field generated by Q_1 and Q_2 , at a point P on the axis of segment AB decreases when P moves away from the midpoint of AB. Indicated by x the distance of P from the midpoint of AB, express the magnitude of the electric field in as a function of x.



P

11. Set the real and positive parameters h and k, study the course of the function $f(x) = \frac{h}{(x^2+k^2)^{\frac{3}{2}}}$

identifying, in particular, symmetries, asymptotes and inflection points.

- Among the functions: $g(x) = \frac{b\,h}{(x^2+k^2)^a}$ with $a, b \in \mathbb{R}$, determine the antiderivatives of f. Demonstrate that, if h =k^2 , the function represents the probability density of a random variable over the range $[0; +\infty[$. What are the mean and median values of this random variable?

QUESTIONS

1. Fixed the real and positive numbers a and b, with $a \geq b$, prove that:
$$\lim_{x\to+\infty} \log_x\left(x^a + x^b\right) = a$$

2. The function $f: \mathbb{R} \to \mathbb{R}$ is defined as follows: $f(x) = \int_1^x e^{t^2}\,dt$
Study the sign of the function f and prove that it is increasing. Determine the value of $\int_0^1 \frac{f''(x)}{f'(x)}\,dx$

3. Prove that the quadrilateral having for vertices the midpoints of the sides of a rhombus is a rectangle.

4. Consider the points A (2; 3; 6), B (6; 2; -3), C (3; -6; 2) in three-dimensional space, verify that the segments OA, OB, OC (O is the origin of the axes) form three edges of a cube. Determines the centre and radius of the sphere circumscribed to that cube.

5. A person simultaneously throws two dice, with faces numbered from 1 to 6, then transcribes on a sheet the maximum of the two numbers released. Repeating the procedure many times, what average of the transcribed values can we expect?

6. Consider a moving spaceship that travels relative to the Earth to the speed *v = 0,90 c*. On board the ship there is a box of dimensions a = 40 cm, b = 50 cm and h = 20 cm. Side b is placed parallel to the direction of motion of the spaceship. What volume will the box have for an observer placed on earth? If the astronaut throws the box with a speed $v_s = 0{,}50\ c$ in the direction of the ship's motion, what speed does the observer on earth measure?

7. A coil consists of N square spires of side l, it has an electrical resistance R and is mounted on a trolley that can move without friction on a horizontal plane. The trolley is pulled with constant velocity $\vec{v}$ and enters an area where there is a magnetic field coming out of the page as in the

figure. Explain why the coil heats up and determine the expression of dissipated power. What happens if the trolley is launched with velocity $\vec{v}$ towards the same region?

8. A compact coil consists of 130 spires of radius R=15 cm. A magnetic needle is placed, the size of which is negligible compared to R, at the centre of the coil, as shown in the figure. The plane of the coil is oriented so as to contain the needle which is oriented in the direction of the horizontal component of the Earth's magnetic field. When the coil is crossed by current, the needle deviates by an angle α. Explain the cause of this deviation. In the table are reported some values, experimentally measured, of α and of the corresponding current in the coil. Using these data, measure the intensity of the horizontal component of the Earth's magnetic field, with the relative uncertainty.

Deviazione α	10°	20°	30°	40°	50°
Intensità di corrente	11,4 mA	23,3 mA	36,8 mA	52,4 mA	73,9 mA

PHYSICAL CONSTANTS		
carica elementare	e	$1{,}602 \cdot 10^{-19}$ C
massa del protone	m_p	$1{,}673 \cdot 10^{-27}$ kg
permeabilità magnetica del vuoto	μ_0	$4\pi \cdot 10^{-7}$ N/A^2
velocità della luce nel vuoto	c	$2{,}998 \cdot 10^{8}$ m/s
elettronvolt	eV	$1{,}602 \cdot 10^{-19}$ J

Chapter III

Education system in Poland

3.1. Education system in Poland

Since the 1999 reform, compulsory education in Poland starts at the age of five or six in kindergarten grade 0 (in Polish przedszkole, literally pre-school) and six or seven in secondary school.

It is compulsory for children to do one year of formal education before entering the first grade, but no later than age 7. At the end of 6th grade, when pupils are 13, they take a compulsory exam, which will determine which gymnasium (gymnazjum) they go on to. They will attend this school for three years for grades 7, 8, and 9. They then take another compulsory exam to determine which high school they will attend.

There are several educational alternatives, the most common being three years at high school or four years at technical school. Both end with a matura exam (matura, quite similar to the baccalaureate), after which the student can follow several forms of higher education, leading to the bachelor's degree: licencjat or inżynier (the first qualification cycle, of the Polish Bologna Process),

then the master's degree: (the second qualification cycle, of the Polish Bologna Process) and eventually the PhD, i.e. the doctoral degree, which is the third cycle of the Polish Bologna Process.

The Polish education system allows 22 years of uninterrupted schooling.

In universities, grades are given from 2 to 5, with the possibility of an increase of 0.5 points. A grade of 2.0 is a failing grade, a grade of 3.0 is the minimum passing grade, followed by grades of 3.5; 4.0; 4.5 and finally the maximum grade of 5.

There is no 2.5 grade, and 5.5 or 6.0 grades are given for exceptional results that "exceed expectations", but it depends on the university.

Stages of the education process

1. Institutions for children from 0 to 3 years old

These include: nurseries, children's clubs. Attendance at a crèche is not compulsory, this period is not included in compulsory education, and crèches are supervised by the Ministry of Family, Labour and Social Policy.

2. Institutions for children aged 3 to 6:

Kindergartens (pre-school)

Pre-school classes in primary schools

Pre-school units

Pre-school centres

This stage of education is also optional for 3-5 year olds, but once they reach the age of 6, enrolment in pre-school education becomes compulsory. Every child between 3 and 5 has the right to be enrolled in pre-school education.

From the 2016/2017 school year, compulsory education for primary grade 1 starts at the age of 7. Parents of 6-year-olds have the choice of enrolling them in the first year of primary education - grade 1 - or leaving them in a pre-school for another year.

3. Primary education

New structure (single cycle education ISCED 1 + ISCED 2)

Primary school of 8 years (one cycle/module) is compulsory for all pupils between 6/7 and 15 years old. And it includes two stages:

Grades 1-3 (early/primary school education)

Grades 4-6 subject-based teaching.

At the end of Year 8 all pupils take a compulsory external examination and the results/scores from this examination influence their admission to the next cycle of Education.

4. Middle and upper secondary education

Since 2017 the three years of secondary education have been abolished. Pupils who passed year 6 of primary school became pupils in year 7 of 8-year primary school.

Upper secondary education

Although this cycle of education is non-compulsory (or compulsory part-time until the age of 18), the vast majority of pupils continue their studies in upper secondary education.

In the old system there were three types of schools for higher education:

3 years general/theoretical higher education (high school)

4-year technical higher education

3 years basic vocational education (already replaced by phase I of vocational education by fields/sectors)

Students attend higher education between 16 and 19 years (20 years for 4-year technical education).

New structure

The new structure is phased in from 2019/2020 to 2023/2024.

At secondary level (ISCED 2) a new structure of 8 years of primary education will be introduced.

The new reformed structure for upper secondary education (ISCED 3) mentions the following types of schools:

4 years general/theoretical higher education (high school)

5 years higher technical education

Phase I 3 years vocational education by sector/group/specialisation

Phase II 2 years vocational education by sector/group/specialisation

Evaluation of students

Students in vocational schools - both higher technical and vocational education by specialisation - can take tests and examinations that test their readiness for a particular occupation/trade both during and at the end of their course, leading to a qualification in their chosen trade.

Students in general/vocational high schools and students in 5-year technical high schools can take the externalised secondary school leaving examination at the end of their studies - the Matura exam, which gives them the baccalaureate (Matura) diploma and access to higher education.

5. Post-secondary/post-secondary education

Post-secondary education is considered as an integral part of secondary education. Post-secondary/post-secondary schools are designed in particular for secondary school pupils who wish to obtain a diploma certifying their vocational skills.

These schools offer courses between 1 and 2.5 years. Students in post-secondary schools take the same type of vocational examination at the end as students in higher technical schools and vocational schools.

Post-secondary schools will continue to operate under the new education structure.

6. Higher education

There are two types of higher education institutions

Universities

Non-university type educational institutions

Both types of institutions offer two cycles of study as well as an extended cycle with the possibility of obtaining a master's degree, but only university-type institutions offer the possibility of continuing with the third cycle of study and are authorised to issue doctoral degrees.

In all higher education institutions studies can be both continuous and part-time/non-continuous.

After the first cycle of study in higher education, students can obtain 2 types of degrees:

Bachelor's degree -3-4 years of study

Engineering diploma -3.5 -4 years of study

Holders of the above diplomas can choose to continue with the second cycle and obtain Master's degrees in 1.5 -2 years, depending on the field of study.

There are a few fields where the Master's study programme can take longer, up to 4-6 years. All first and second cycle graduates take final examinations to obtain degrees in line with their studies.

Master's degrees give holders the opportunity to practice the profession for which they hold the degree, as well as to follow courses leading to a doctoral degree. Doctoral courses are organised in university-type institutions as well as in research and development institutes for a period of 3-4 years.

Colleges for social services

These colleges operate in the area of the education system (not higher education) and offer tertiary level studies (equivalent to the first cycle of higher education).

Adult education

Adult education is aimed at all adults wishing to continue their education at primary and secondary level as well as those wishing to obtain new professional qualifications for professional or personal reasons.

This form of education is organised in school and non-school structures such as:

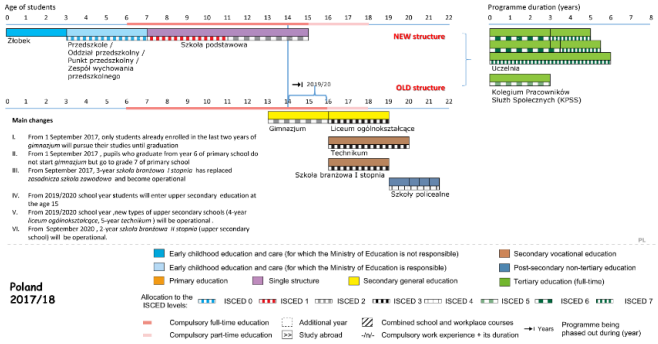
Institutions for further learning

Institutions for practical training

Institutions for continuing training

Higher education institutions in non-degree postgraduate study programmes

Courses are also offered for unemployed or other job seekers.



3.2. Primary School in Gorzyce Wielkie

Presentation

Gorzyce Wielkie Primary School includes the territorial division of the following cities: Gorzyce Wielkie, Radziwiłłów, Topola Mała. From September 1, 2017, the school, together with the gymnasium, became an 8th grade elementary school, with high school branches. The school has about 250 students between the ages of 7 and 16.

The teaching process is supported by a broad educational process, including sports, arts and science courses, moving in the direction of expanding interests, mental and scientific horizons, and physical culture, tourist, cultural and recreational excursions - tourism, entertainment theater and meetings with musicians, actors, environmental events, including cyclical water competitions. There are 30 teachers in the school - this is a highly qualified staff, very involved in the work for students and the school and who is constantly improving their skills and therefore the quality of teaching at the school.

Teaching staff and management have experience in implementing EU projects. The school has twice participated in EU projects, first in 2012, the Comenius Project "Learning Science with the Senses" for high school students with schools in Turkey, Romania, the Netherlands, Germany with the coordinator Rafał Jakubowski and Mrs. Małgorzata Byzia in 2013.

The local community and parents rated both projects positively. An experiment was also carried out on school pedagogy approved by the Minister of Education and implemented in mathematics and science. Gorzyce School was also the organizer of 5 science festivals

3.3 Models of tests to science from Poland

PHYSICS MATURA EXAM
EXTENDED LEVEL
DATE: May 2019
START TIME: 9:00
DURATION: 180 MINUTES
POINTS: 60
Instruction

1. Check whether the exam sheet contains 20 pages (tasks 1-12). If your exam sheet is incomplete, report it to the chairman of the examination committee.

2. The answers should be written down in the provided space.

3. Provide your reasoning in solving accounting tasks leading to the final result and remember about the units.

4. Write legibly. Use a pen / a fountain pen with black ink.

5. Do not use correction fluid. Cross out the incorrect answers.

6. Remember that notes in the draft will not be graded.

7. You can use „Selected formulas and physicochemical constants on Matura exam in biology, chemistry and physics”, a ruler and a calculator.

8. Write down your PESEL number (personal ID number) and stick the code sticker on this page and on the answer sheet.

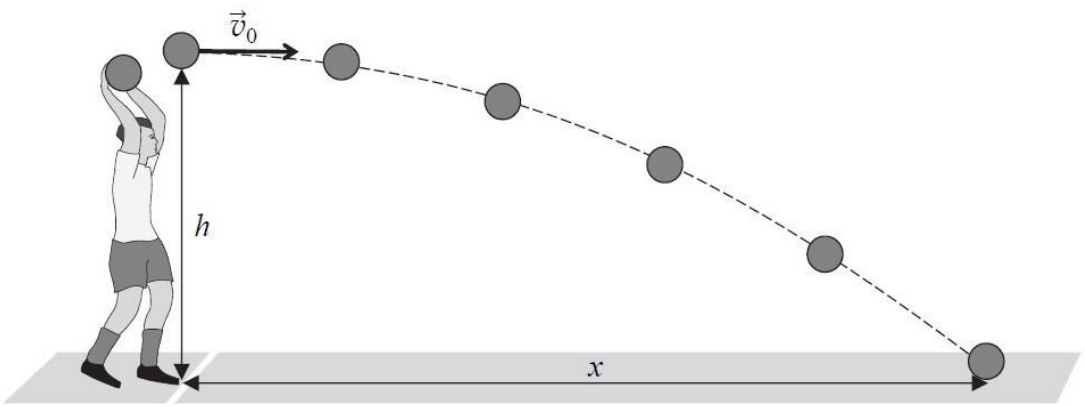
9. Do not enter any characters in the section intended for the examiner

TASK 1.

A throw-in is a part of football and involves putting the ball into play from the side pitch line. During the performance of the throw-in, a player throws the ball with both hands from behind the head.

In tasks 1.1.-1.4. omit the resistance to motion and assume that the initial velocity of the thrown ball from the throw-in has a horizontal direction, and the acceleration due to gravity is g = 9.81 m / s2.

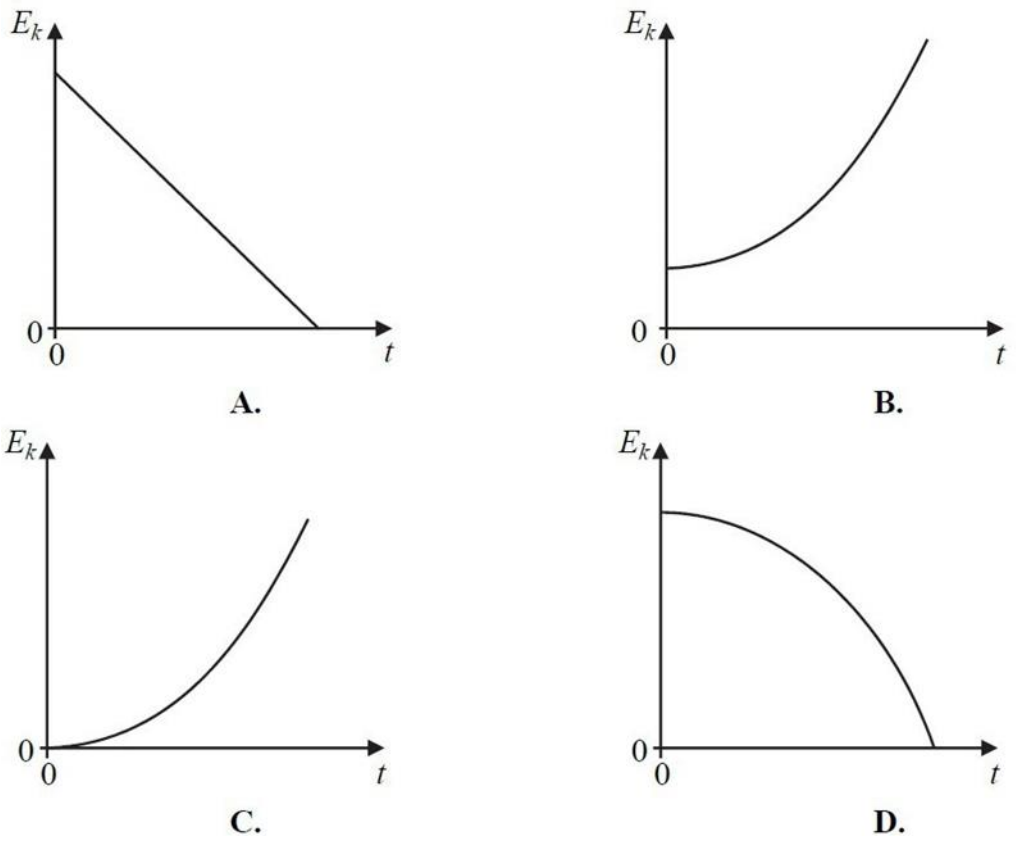
The figure below shows the position of the ball during its movement at equal intervals.



TASK 1.1.
During the match, a player throws-in the ball horizontally. Calculate the flight time of the ball from the moment of being thrown to hitting the ground.

TASK 1.2.
The ball is thrown-in horizontally, height h = 1.96 m, fell onto the field at a distance x = 5.10 m - if measured horizontally from the throwing place.
Calculate the v 0 value of the initial velocity of the ball.

TASK 1.3.
From drawings A – D, select the one showing the dependence of E k kinetic energy on t time of the ball thrown horizontally.
The axes in the following charts are scaled linearly, and the charts in figures B, C, D are parabola fragments.



TASK 1.4.

P1 ball was thrown horizontally (as in the description in task 1), and P2 ball (the same as P1) was dropped from the same height. The flight time of P1 ball, until it hits the ground, will be marked as t1 and the velocity value of this ball just before hitting the ground will be marked as v1. Similarly - P2 ball flight time until it hits the ground will be marked as t2, and the velocity value of this ball just before hitting the ground will be marked as v2.

Complete the sentence. Select the correct answer from A-C and 1-3.

Answer according to the phenomenon model in which we skip the air resistance.

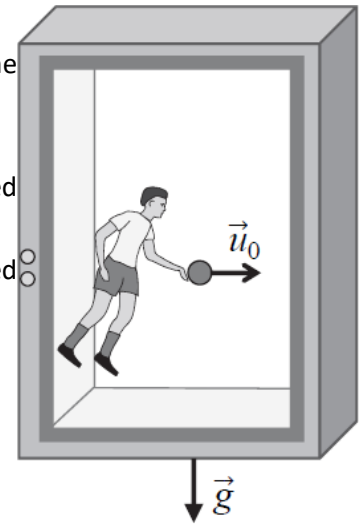
The relationship between flying time of both balls depends on relationship A B C and the relationship between the velocity values of the balls just before hitting the

A.	$t_1 = t_2$	**1.**	$v_1 = v_2$
B.	$t_1 > t_2$	**2.**	$v_1 > v_2$
C.	$t_1 < t_2$	**3.**	$v_1 < v_2$

TASK 2.

Consider the hypothetical situation in which, for some time, a player with the ball was in a free-falling cabin with acceleration due to gravity The cabin does not rotate when falling. At some point, the footballer - in a position of weightlessness – slightly threw the ball. The initial velocity of the thrown ball, determined regarding the cabin, has a parallel direction to the cabin's floor (see the figure beside). Skip the air resistance.

Choose the correct sentence.



The ball movement in a frame of reference connected with the cabin, from the moment of throwing it till hitting the cabin's wall will take place...

A. along a straight line parallel to the cabin's floor, at a constant velocity.

B. along the parabola line directed upwards with acceleration directed upwards.

C. along the parabola line directed downwards with acceleration directed downwards.

D. along a straight line parallel to the cabin's floor with nonzero acceleration

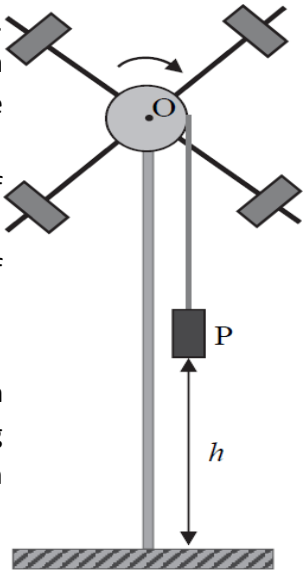
TASK 3.

Students analysed the dependence of rigid body motion from its moment of inertia. To this end, they used a device called the Oberbeck's pendulum. The rotating part of the device is made of a homogeneous cylinder and four rods attached to the cylinder. The bars lie in one plane, they are perpendicular to each other, and the roller can rotate freely around its symmetry axis O. The O axis is motionless and horizontal.

Besides, there are identical weights attached to the bars that can be fitted to the cylinder at different distances (see the figure beside). The described block is set in rotary motion through a weight P hung on a light and inextendible thread wound on the cylinder. When the weight moves down, the TASK 3.

Students analysed the dependence of rigid body motion from its moment of inertia. To this end, they used a device called the Oberbeck's pendulum. The rotating part of the device is made of a homogeneous cylinder and four rods attached to the cylinder. The bars lie in one plane, they are perpendicular to each other, and the roller can rotate freely around its symmetry axis O. The O axis is motionless and horizontal.

Besides, there are identical weights attached to the bars that can be fitted to the cylinder at different distances (see the figure beside). The described block is set in rotary motion through a weight P hung on a light and inextendible thread wound on the cylinder. When the weight moves down, the thread does not slide on the roll. Students measured time t of lowering the weight P from height h.



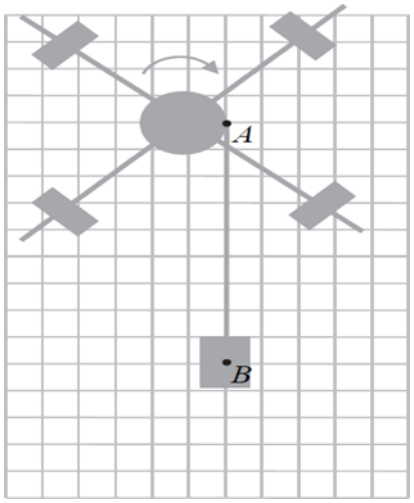
The experiment was repeated but each time the conditions were modified - in subsequent tests, the weights were attached to different places of the rods or the height of the weight was changed. The placement of weights remained symmetrical, i.e. weights were placed at the same distance from the axis of Rotation. At the beginning of the experiments, the whole system was motionless. Ignore the impact of air resistance and friction between the cylinder and the axis of rotation. Ignore weight of the thread.

TASK 3.1.

When the weight is lowered by accelerated motion, two forces act on it: - tension strength of the thread and - gravitational force (assume that both forces are hung at point B). However, the roller at point A is affected by the force - tension strength of the thread.

Draw the vectors of the listed forces together with their indications.

Keep relations (larger, equal, smaller) between the values and write them down – put one of the characters in the spaces below: >, =, <



1) F_B ..... F_g **2)** F_B ..... F_A

TASK 3.2.

The a value of the falling weight acceleration was determined by the students using a stopwatch, linear measure and after assuming that a is constant. Fall time of theweight t=1.6s. 0 was measured by height (h=0.960m).

a) Write down the formula to calculate the a value of the weight acceleration based on measured t and h. Calculate a.

When physical quantities y and x are related y=f(x), then y can be determined from the measurement of x. Then, if the measurement uncertainty Δx of x is known, then its contribution to the measurement uncertainty Δy of y can be determined as follows: $\Delta y = \frac{1}{2}\left| f(x+\Delta x) - f(x-\Delta x) \right|$

In the described experiment the a value of the weight acceleration depends on two measured factors: t and h.

b) Calculate the uncertainty of a determination assuming that t measurement is accurate and h measurement was made with uncertainty Δh = 5 mm.

c) Calculate the uncertainty of a determination assuming that h measurement is accurate and t measurement was made with uncertainty Δt = 0.1 s.

d) Determine and write down which of the uncertainties: Δt = 0.1 s or Δh = 5 mm, to a greater extent affects the uncertainty of determining the acceleration. Justify the answer.

TASK 3.3.

After determining the a value of the weight acceleration, students decided to determine the I inertia moment (relative to the O axis) of the rotating part of the Oberbeck pendulum. The following formula was used:

$$I = mr^2\left(\frac{g}{a} - 1\right)$$

Derive the above formula. Use one of the methods: use the dynamics equations for weight motion and roller motion or, as a rule, mechanical energy conservation.

TASK 3.4.

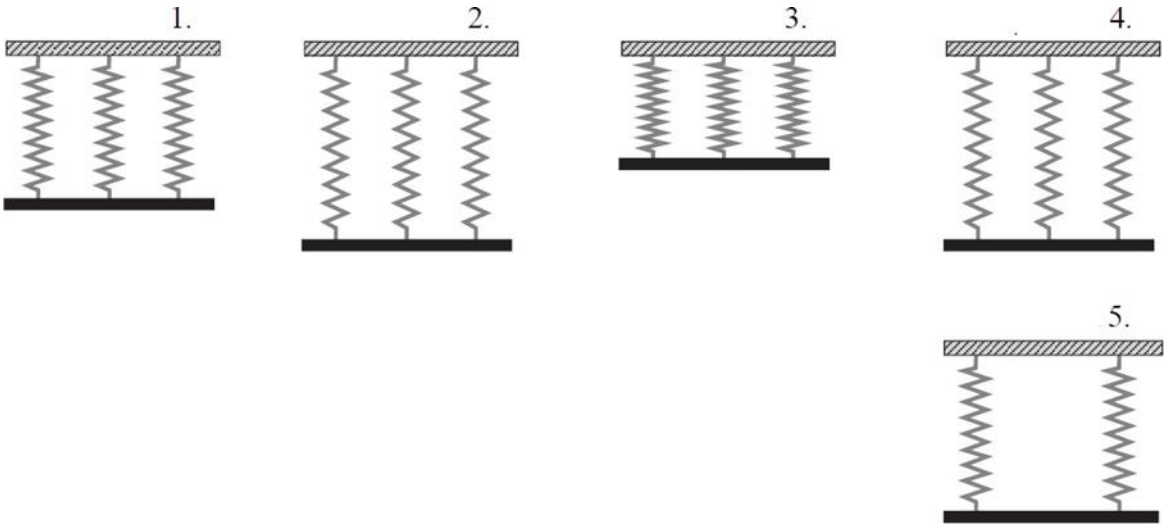
Underline the proper terms so that the first and second sentences were true.

When in the next experiment, the weights were mounted closer to the axis of the roller's rotation then

1. the moment of inertia of the four weight system (increased / decreased / has not changed).
2. the tension strength of the thread (increased / decreased / has not changed).

TASK 4.

The rod is attached horizontally to three identical, very light springs. The ends of the upper springs are attached to the ceiling (see fig. 1.). Then the rod was placed in the vertical direction from the position of balance of power, then released. As a result, the rod together with the springs system were set in vertical vibration so that the instantaneous position of the rod was always horizontal (see Figures 2-4). The vibration frequency of the described system equalled f1.



Then the central spring was removed from the system (see Fig. 5.), and it was set in vibrating motion similar to the one described above. The frequency of the vibrations system after removing the middle spring equalled f2.

Calculate the frequency ratio

Write the obtained numerical result to four significant digits. Skip the resistance movement.

TASK 5.

Three planets move in the central gravitational field of the G star in O1, O2 and O3 orbits. All the planets orbit the star in one direction and their orbits lie in one plane.

The O1 orbit is elliptical (Fig. 1.), while the O2 and O3 orbits are circular (Fig. 2 and 3.). Point A is the tangent point of the O1 and O2 orbits, and point B is the tangent point of the O1 and O3. The assumption is tha the planets do not collide at these points. The interaction between planets is also skipped.

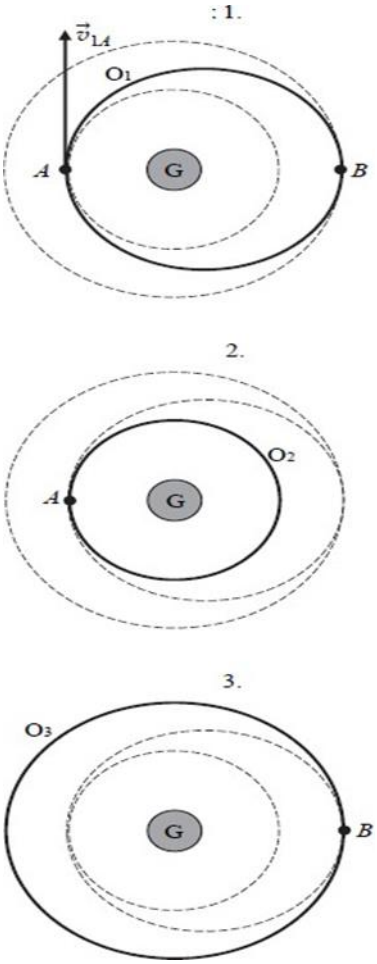
Figure 1 shows the planet's speed vector in O1 orbit at point A. The speed vector of the same planet in O1 at point B is denoted by $\vec{v}_{1B}$, while the speed vector of the planet in O2 at point A is denoted by $\vec{v}_{2A}$ and the speed vector of the planet in O3 at point B is denoted by $\vec{v}_{3B}$.

Write down the appropriate relationships in the dotted spaces below: larger, equal, smaller (>, =, <), between the values of the planets' speed at the given points on the particular orbits.

a) v_{1A} ..... v_{1B}(Fig.1)

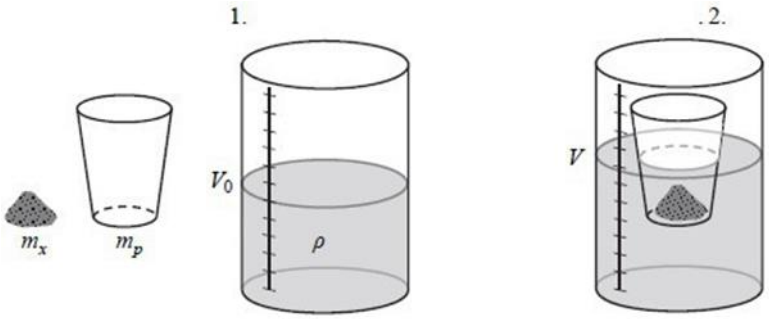
b) v_{2A} ..... v_{3B}

c) v_{1B} ..... v_{3B}

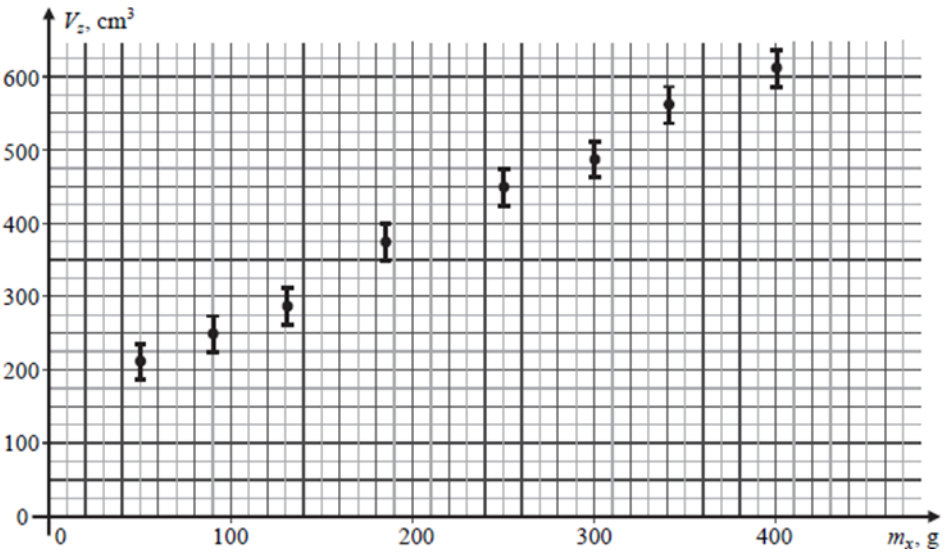


TASK 6.

Students intended to determine the ρ density of a certain liquid. They could use sand, a glass vessel with a volume scale, a smaller container (see fig. 1) and a weight. The mass of a smaller empty box is marked as Students poured liquid into the glass vessel with the volume and a portion of sand into the container. Then the container was put into the vessel so that it floats (see Fig. 2.). During the experience, students poured sand into the container, and the container was still floating. Since the added sand was weighted, the total sand mass in the container was known. After adding sand, students read the volume V on the scale together with the submerged part of the sand container. The volume of the submerged part of the smaller container was determined by subtracting the volume of liquid from the volume V.



The results of the measurements are shown in the following figure. Measuring points(V) and uncertainty ΔVz are marked. Sand mass measurements were assumed to be accurate.



Students considered that the relationship between the Vz volume of the submerged part of the container and the mass of sand in this container is linear, and it is
described by the expression:

$$V_z = A \cdot m_x + B$$

TASK 6.1.

a) In the figure (task 6), draw a straight line best suited to the experimental data shown in this chart.

b) Basing on the straight line in the figure (task 6), determine the volume of the immersed part of the container assuming that it floats and there is no sand inside.

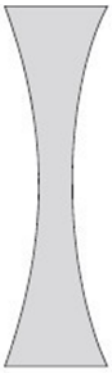
c) Calculate the A factor based on the data read from the straight line in the figure (task 6).

TASK 6.2.

a) Write down the condition of the balance of power acting on the floating container with sand and express it using the quantities listed in task 6.

b) Derive two formulas: the formula showing the dependence of the A coefficient on the liquid density ρ and the formula showing the dependence of the factor B on the liquid density ρ and weight of the empty container

c) Calculate the liquid density ρ. Assume that the coefficient A is 1.2 cm3 / g.



TASK 7.

Consider a concavo-concave lens (see the figure below) made of glass with an absolute refractive index n = 1.6.

TASK 7.1.

The described lens was placed in different media. The values of the absolute refractive indexes are given in the table below.

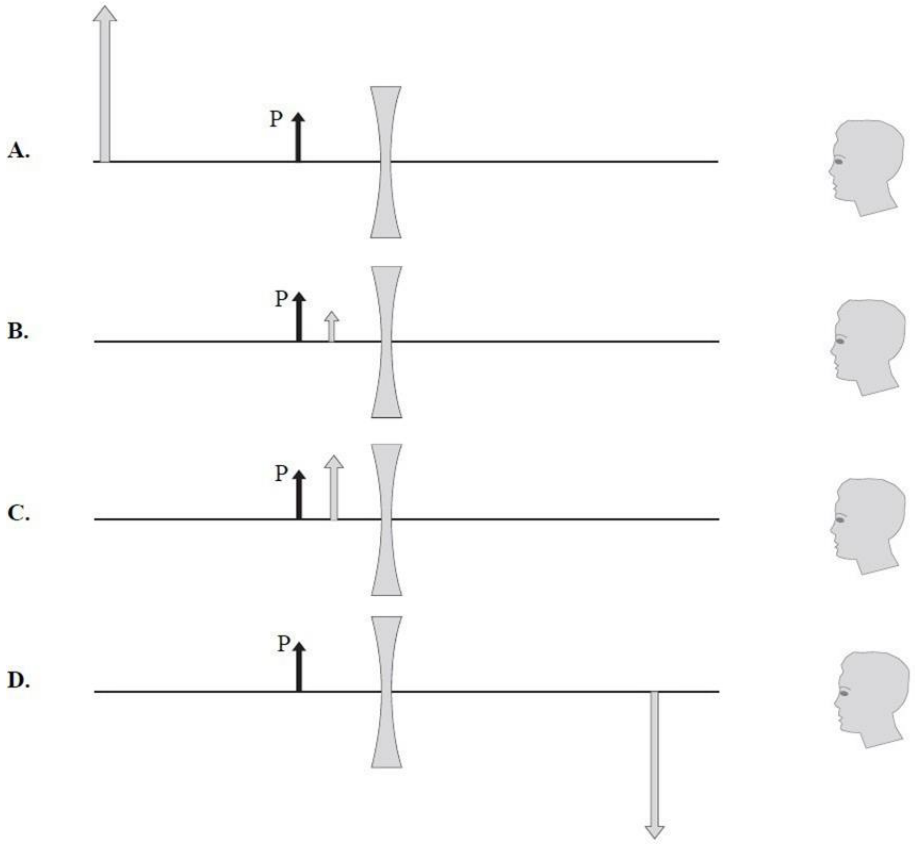
From media 1-5, select only the media where the described lens is focusing. Include all the possibilities.

Medium 1	Medium 2	Medium 3	Medium 4	Medium 5
n1 = 1,1	*n2* = 1,7	*n3* = 2,2	*n4* = 1,6	*n5* = 1,5

TASK 7.2.

Only one of the following four figures A – D shows the correct position of the P object image - the image seen by the observer and obtained with the help of the described lens placed in the air (the image of the P object is shown by a gray arrow).

From drawings A-D, select the drawing that correctly represents the P object image seen by the observer looking from the right side of the lens.



TASK 7.3.

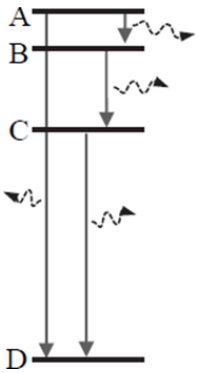
The concavo-concave lens described in task 7 is in the air. An object was positioned 0.4m away from the lens, on its optical axis. The observer sees the image of this object, which is 0.25 m away from the lens.

Calculate the focal length of this lens.

TASK 8.

Consider electron transitions between the selected energetic levels A, B, C, D in some atom. The electron can transfer from level A to level B, from level B to level C, and from level C to level D. In addition, it is possible to directly transfer the electron from the level A to level D (see the figure). Wavelengths of the emitted photons during these transitions will be marked as follows: λAB, λBC, λCD, λAD.

Derive the formula to determine - only on the basis of the provided values: λAB, λBC, λCD - the wavelength λAD of the photon emitted at electron transition directly from level A to level D.

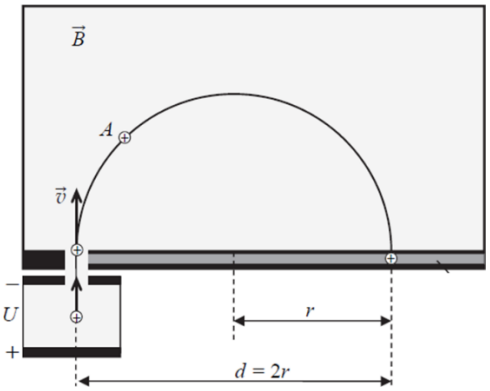


TASK 9.

Cations fall into the area of the homogeneous magnetic field so that their velocities are perpendicular to the magnetic induction vector. In the area of the magnetic field the ion path is a circle (or a part of the circle). The radii of these circles depend on the ions velocity value, their mass, electric charge and the value of the magnetic field induction.

The above phenomenon is used to determine the mass of ions. For this purpose, the initially resting ions are first accelerated in the electric field with the U voltage. The speeding ions obtain a certain speed at which they leave the electric field and fall into the area of the homogeneous magnetic field with an induction vector perpendicular to the ion velocity vector The ions circle the semicircles in the magnetic field, then they fall into detector at a distance d (depending, among others, on the mass of ions) from the ion source (see the figure below).

Assume that ions move in a vacuum, and ignore the influence of other fields on the ion movement.



TASK 9.1.

a) Draw a vector of Lorentz magnetic force in point A acting on a positive ion. Mark the exact direction and sense of this force.

b) In the drawing next to the symbol of the magnetic induction vector, draw the sense of this vector.

For this purpose, use one of the symbols:

⊙- denoting the sense in front of the drawing plane (towards the viewer), OR ⊗- denoting the sense behind the plane of the drawing, OR → – denoting the right sense, OR ← - denoting the left sense.

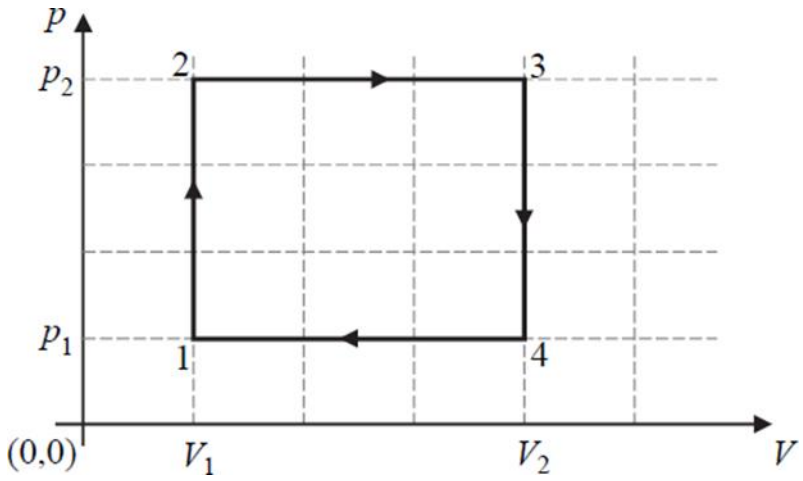
TASK 9.2.

Basing on the experiment described in task 9, we know the B value of the magnetic induction vector, U voltage accelerating ions and d distance.

Derive the formula for determining the mass of once ionized ion depending on the U, B, d value and the value e of the elemental charge.

TASK 10.

The figure below (in the plane of parameters (V, p) - volume and pressure) presents the thermodynamic cycle graph of the determined ideal gas mass that occurs during the operation of a certain heat engine. The axes on the graph are scaled linearly.



TASK 10.1.

Select the correct ending of the sentence.

The ratio of total work (so-called useful work) performed by the engine in one cycle, to the absolute value of the work performed by the gas pressure force during expansion equals:

A. $\frac{1}{4}$ **B.** $\frac{2}{5}$ **C.** $\frac{4}{3}$ **D.** $\frac{3}{4}$

TASK 10.2.

Rate the veracity of the sentences. Circle T if the sentence is true or F if it is false.

1	The gas in the engine took heat in the transformation of 1-2 and 3-4.	T	F
2	The work of external forces carried out in the transformation of 4–1 against the thrust force was greater in the absolute value than the gas thrust force in transformation 2-3.	T	F
3	The internal gas energy in state 1 at the beginning of the cycle was the same as after completing cycle 1-2-3 and returning to state 1.	T	F

TASK 10.3.

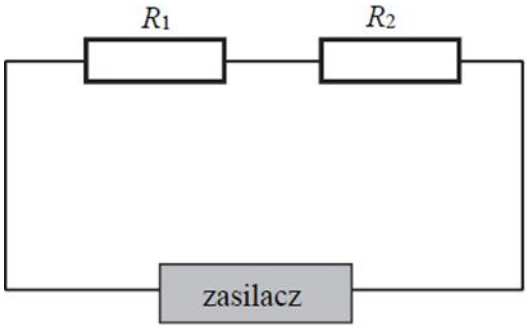
Assume that the heat engine efficiency η described in task 10 is given and the p1, p2, V1 and V2 parameters marked in the figure are also known.

Derive the formula to calculate - only on the basis of the above data – heat transferred by gas to the radiator in one cycle of this heat engine.

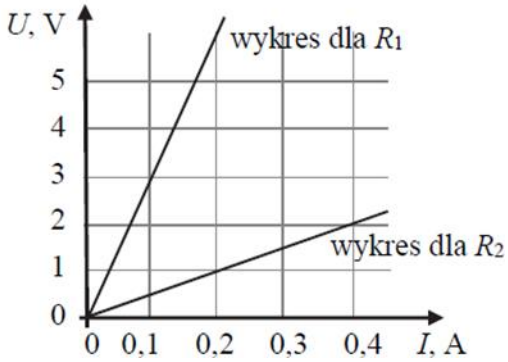
TASK 11.

Two resistors R1 and R2 were connected in series and attached to a regulated voltage power supply unit (Fig. 1.). Then, at various voltage settings of the power supply unit, the amperage flowing through both resistors and the voltage on each resistor were measured. As a result, each resistor obtained a graph representing dependence between the U voltage on a given resistor and the I amperage flowing through this resistor (Fig. 2.).

1.



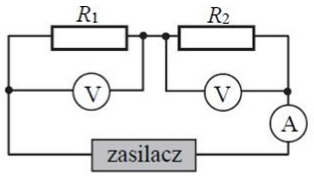
2.

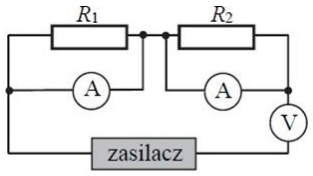


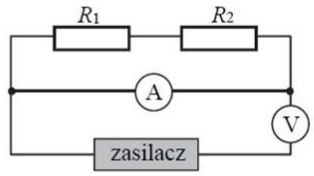
TASK 11.1.

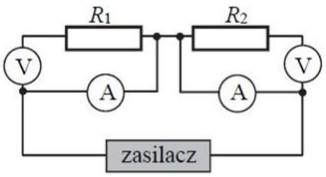
From the circuit diagrams shown in figures A – F, select all the possible circuits that correctly present the meter connections which allow of taking measurements as in the experiment described above.

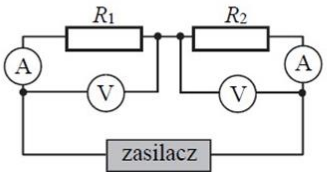
Assume that the resistance of the ammeter is negligible and the resistance of the voltmeter is very high (compared to R1 and R2 resistances).

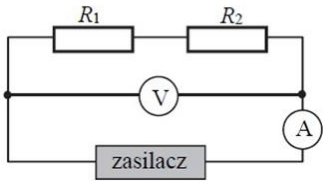
A.


B.


C.


D.


E.


F.


TASK 11.2.

Rate the veracity of the sentences. Circle T if the sentence is true or F if it is false.

1	The *R1* resistor has a greater resistance than the *R2* resistor.	**T**	**F**
2	Less current strength flows through the *R1* resistor than through the *R2* resistor, at each (different from zero) power supply voltage.	**T**	**F**
3	Less power is released on the *R1* resistor than on the *R2* resistor, at any (different from zero) power supply voltage.	**T**	**F**
4	When 0.1 *A* current strength flows through the circuit, the power supply voltage is about *3.5 V*.	**T**	**F**

Chapter IV.

The education system in Turkey

4.1. Education system in Turkey

Structure of the education system:
Preschool
Elementary
Secondary
University

Pre-school education is not compulsory and is organised in 3 levels:
Gr. Mica:3-4 years
Gr. Middle: 4-5 years
Gr. Large: 5-6 years
Elementary (primary) school comprises 8 years of compulsory study from age 6 to 14 for all boys and girls in Turkey and is free in public schools.
First grade: 6-7 years
2nd grade: 7-8 years
Class III: 8-9 years
Class IV: 9-10 years old begin foreign language lessons

5th grade: 10-11 years

Class VI: 11-12 years

7th grade: 12-13 years

Eighth grade: 13-14 years

Secondary education comprises 4-year vocational and technical schools:

General High Schools prepare students for higher education institutions.

Vocational and Technical Schools prepare students to become skilled people: electricians, electricians, chemists, mechanics, builders, etc.

Industrial high schools train students in economics, health, agriculture, meteorology, animal husbandry, cadastre, etc.

Higher education includes faculties, institutes, police and military academies where Turkish is taught, but there are some universities where English, French, German, etc. are used as the language of instruction.

Admission to university education takes place through an examination for all high school graduates who wish to go on to higher education.

Those with very good grades can attend 4-year universities and those with borderline grades can attend 2-year universities.

Dentistry and veterinary medicine have a 5-year course and medicine a 6-year course.

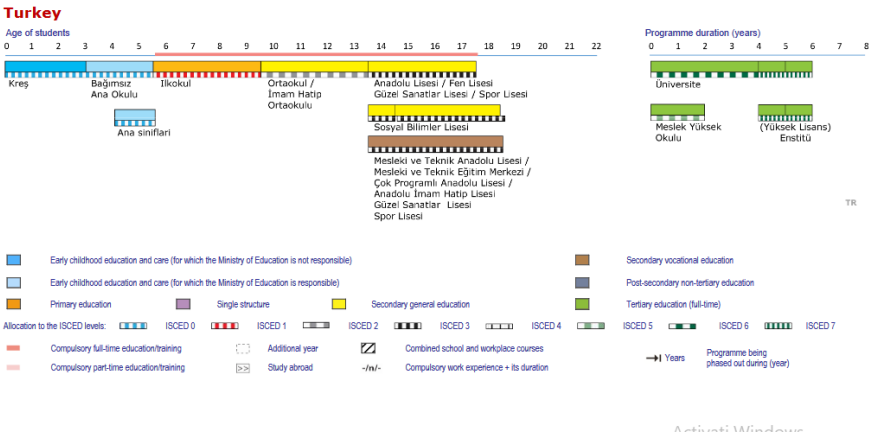
After university the 2-year Master's follows, followed by the doctorate after 4 years.

Primary and secondary school teachers are trained in 4-year universities.

NON-FORMAL EDUCATION occupies an important place in Turkey and is supervised by the Ministry of National Education. It aims to teach literacy to illiterate people and to help those who have not completed their education; to teach them to lead a balanced and healthy life and to be able to have a job.

The academic year begins in mid-September and ends in early June.

The winter break is two weeks in February and one week in November and April.



4.2. Bayrakli Nuri Atik Mesleki Ve Teknik Anadolu Lisesi

Bayraklı Nuri Atik Vocational and Technical High School

Our school constitutes the last phase of 12 years of compulsory education. We have 9, 10, 11 and 12th graders. The 9th grade is for general high school education with Math, Literature, Physics, Biology, English etc. Towards the end of the 9th grade, students choose a vocational department for the next year from our school or other schools in the region, according to their abilities, interests and needs. So, the vocational training begins in the 10th year. During the 10th and 11th years, pupils learn the basics of the chosen vocation with lots of practice. But at the same time, they keep on taking general classes but fewer hours. The 12th year is for internship. Pupils are assigned to workshops, factories or businesses. They work there three days of the week and come to school just for two days for extra classes.

Our school, Bayraklı Nuri Atik Vocational and Technical High School, consists of seven vocational departments:

*** two slides of departments***

Information and Communication Technologies has four programs. Our students study network ystems, programming languages, web designing, software and hardware in this department.

- Computer Technical Service
- Network Management
- Database Programming
- Web programming

Machine Technologies has two programs in it. The skills of drawing 2-D and 3-D drafts of machines and operating CNC device are given to the students in this department.

- Computer Aided Machine Drafting
- Computerized Machine Manufacturing

Electrical And Electronics Technologies consists of three programs. Basically, electrical installations, household appliances, dashboard monitoring, and maintenance of systems are the topics that are taught in the department.

- Electrical Installations and Dashboard Monitoring
- Electrical Household Appliances Technical Service
- Industrial Maintenance and Repair

Furniture and Interior Design teaches our students how to draw 3-D drafts of works, dimensioning them and interior design in its two programs.

- Furniture and Interior Drafting
- Interior and Furniture Technology
- Construction Technologies focuses on drawing structural projects and making models of them,

static structure artistry. Also, drawing interior projects and relieves are included in its three programs.

- Architectural Technical Drafting
- Static Structure Technical Drafting
- Interior Technical Drafting

Renewable Energy Technologies deals with solar and wind energy systems, their foundation, running, maintaining and repair are the fields that it studies on
solar Energy Systems

- Wind Energy Systems

Plumbing Technology and Air Conditioning department aims to teach indoor gas systems, heating, plumbing and sewage systems in its three programs of education.

- Installation of Heating and Natural Gas
- Heating and Plumbing
- Building Plumbing Systems

Our school also incorporates a The Student Dormitory which has the capacity of 88 students with 22 dorm rooms, a mess-hall and facilities. It provides the students with sheltering, food and health service.

Before finishing the presentation, I would like to mention our other Erasmus+ project briefly.

Its name is “Roots and Offshoots” and we have been conducting the projects since last year. Our partners are Bulgaria, Lithuania and Italy.

The main objective of the project is knowing other nations, being aware and tolerant of different cultures, and learning to communicate effectively with them.

The first meeting was in Bulgaria and the second was in Turkey. The third meeting is going to be held in Lithuania in November.

4.3.Models of tests from Turkey

2019-2020 EDUCATION YEAR 1st TERM 2nd BIOLOGY EXAM QUESTIONS OF 9th GRADE

Name Surname:
Class Number:
CHOOSE THE CORRECT ANSWER (each question is 4 p.)

1. Which molecule is on inorganic compounded.
   a) water b)corbohydrate c)vitamin d)lipid e) protein
2. Which one is disaccharide?
   a) fructose b) glucose c) ribose d) lactose e) galactose
3. Which organic component below is preferentially used when the cell needs energy?
   a) lipid b) enzyme c) protein d) vitamin e) carbohydrate
4. Which of the polysaccharides participates to the Shell of insects?
   a. Starch b. Cellulose c. Chitin d. Glycogen e. None
5. Which of the minerals given is important for or teeth health?
   a) magnesium b) flor c) iodıne d) iron e) clor

FILL IN THE BLANKS WITH THE WORDS GIVEN (Each question is 3p.)
---Fructose – Protein – hydrolysis – water- nitrogen – unsaturated-aids- - basic – five

1. Separating into structural units of big molecules by adding water is called _____.
2. Amino acids, which aren't synthesized in the body and got outside to the body are called _____
3. Olive oil is _____ oil.
4. there is a _____ between the amino acids creating proteins.
5. sac arose-known as tea sugar – is a mixture of glucose and _____.
6. Ribose and deoxyribose are carbonized simple sugar.
7. in living things contains the most inorganıc matter in living things
8. Proteins contain the atoms of carbon(C.), hydrogen(H),oxygen(O) and _____.
9. when the carbohydrate is excessively taken to the body, it's turned into lipid and _____.

10. glucoses connect each other with _____.

WRITE "T" İF THE SENTENCE IS TRUE , WRITE "F" IF THE SENTENCE IS FALSE (each question is 3p)

1 - ( ) calcium and phosphorus are added to bones .

2 - ( ) the acidic features increase from ph7 to ph14.

3 - ( ) proteins are firstly used for producing energy.

4 - ( ) plants need water for photosynthesis.

5 - ( ) deoxyribose is added to DNA.

6 - ( ) sac arose is a kind of polysaccharide.

7 - ( ) lack of iodine causes goiter.

8 - ( ) lipid is not structural organıc matters.

9 - ( ) glycogen is stored in the cells of muscle and liver of human

10 - ( ) ATP has the ribose.

ANSWER THE QUESTIONS (EACH questıon is 5p.)

1- Write three of the organıc compounds situated of living things.

2- What are the causes of being different of proteins? Write them.

3-write the polysaccharides in the chart?

	Herbal	Animal
Added to the Structure		
stored		

4 - Show the _____ bond between the Trigliserid?

THE 10th GRADE CHEMISTRY EXAM QUESTIONS OF 2nd TERM

Name – Surname:

Class - Number:

Each question is 10 point the exam is 40 minutes

Wish You Luck!!!

1. Write ''T'' if the sentence is True and write ''F'' if the sentence is False.

a) Gas-gas mixtures are always homogeneous mixtures ( )

b) Steel is a kind of alloy and heterogeneous. ( )

c) Nothing can be created from nothing, _ _ _ _ _ _

d) Dialysis machines work as kidneys ( )

2. Fill in the blanks with the given words simple distillation -Aerosol – Isotope-Chemical-Ionic

a) If a soluble matter separates into ions a solution, it is called _ _ _ _ _ _ _ _ _ _ _

b) It is called _ _ _ _ _ _ _ _ which has the same

Atom numbers but different mass numbers.

c) Heterogeneously separating of a solid or liquid in a gas is called _ _ _ _ _ _ _ _ _ _ _ _ _

d) A matter separating into different matters or interacting with different matters and creates a new matter means _ _ _ _ _ _ _ _ _ _ _ _ reaction.

e) If you apply _ _ _ _ _ _ _ _ _ _ _ _ _to salty water you can separate it into components.

3. Which one is called ‘’kezzap ’’ın Daily life

a) HBr b) HCl c) H2SO4 d)HNO3 e) CH3COOH

4. If 15gr-salt is dissolved in 300gr. Salty water, what is the percentage(%) of the solution?

5. Which methods can we use to separate the compounds of a mixture of iron oust, sand, and salt.

6. Match the chemical reaction formulas with the names of reactions.

a) $C_{(K)}+O_2$ (g) $CO_2(g)$

b) $H_2O_{(5)}$ H2(g)+1/20$_{(2)}$(g)

c) NaOH (in water) +HCl(in water) NaCl(in water)+H_2O(s)

d) $H_2(g)+ Cl_2(g)$ 2 HCl(g)

e) $NaCl_{(in\ water)}$+$AgNO3_{(in\ water)}$ AgCl(k)+$NaNo3_{(in\ water)}$

1-A reaction of combustion

2- A reaction of acid-base (neutralization)

3- A reaction of synthesis (formation)

4- A reaction of dissolving-precipitation

5- A reaction of analysis (ole composition)

→

→

→

→

→

7. Find poH of a solution of Ph 4 İs this solution acid or base?

8. Write (A) if the reaction is acid or write (B) if the reaction is Base.

$NaOH_{(K)}$	$Na^{+}_{(aq)}{}^{+}OH$	$CO_2(g)+H_2O(s)$	$2h^{+}_{(aq)}{}^{+}$
aq →	_ _ _ _ _ _ _	Co_3^{-2}(aq) →	_ _ _ _ _ _ _ _

9. Write two of the features of bases.

10. $C_2H_8+O_2$ CO_2+H_2O

→

Offset the reaction with the smallest coefficient

Bibliografy

1. https://eacea.ec.europa.eu/national-policies/eurydice/content/organisation-education-system-and-its-structure-56_en

2. http://subiecte.edu.ro/2021/bacalaureat/modeledesubiecte/probescrise/

This project has been funded with support from the European Commission. The contents of these publications reflect the views only of the author, and the National Agency and the European Commission are not responsible for any use which may be made of the information contained therein.