# Cambridge High School

**Department of Natural Sciences**

**Department of Exact Sciences**

**Department of Linguistics and Philology**

**Department of Social Sciences**

**Individual curriculum for the 1st semester for the 2023/2024 academic year**

**10th grade**

Approved:

Director

Velichko P.

Head of the educational department

Azyavchikova M.

# General information

Studying in the 10th grade is an important stage in the life of students, since this is the first year of high school. In addition to specialized knowledge, students are given the opportunity to broaden their horizons and explore various fields of knowledge, which will help them make more informed decisions about their future professional career.

Subjects studied:

1. English

2. The Art of English

3. Algebra

4. Geometry

5. Physics

6. Biology

7. Chemistry

8. Engineering

9. World History

10. Political Science

11. Business and Law

If you have any questions about the content of the program or the organization of study, you can contact your supervisor / administrator.

# English

## Recommended calendar and thematic plan

**3 times a week (42 academic hours)**

The amount of educational material to study in the first semester: introduction unit, unit1, start unit 2.

Grammatical topics:

1. Present Simple,

2. Present Continuous,

3. state verbs, will, going to,

4. Compatibility of adjectives with prepositions,

5. Past Simple,

6. Past Perfect,

7. Past Perfect Continuous,

8. Adjectives to describe appearance, the order of adjectives,

9. Used to, would

**All educational materials are located on the course on the Moodle platform**

# The Art of English

## Recommended calendar and thematic plan

**3 times a week (42 academic hours)**

| № | Topic | Contents |
|---|---|---|
| 1. | The British | Article, discussion, listening |
| 2. | The British and the Weather | DVD, discussion, written tasks |
| 3. | Robinson Crusoe | Article, discussion, listening |
| 4. | The British Landscape | DVD, discussion, written tasks |
| 5. | Screen Exports | Article, discussion, listening |
| 6. | The CSI effect | DVD, discussion, written tasks |
| 7. | The English Language | Article, discussion, listening |
| 8. | The English Language Part 2 | DVD, discussion, written tasks |
| 9. | British Entrepreneurs | Article, discussion, listening |
| 10. | Marks and Spencer | DVD, discussion, written tasks |
| 11. | Alcatraz | Article, discussion, listening |
| 12. | San Francisco | DVD, discussion, written tasks |
| 13. | Wall Street | Article, discussion, listening |
| 14. | The Wall Street Crash | DVD, discussion, written tasks |
| 15. | Sherlock Holmes | Article, discussion, listening |
| 16. | Crime Writers | DVD, discussion, written tasks |
| 17. | Computer Pioneers | Article, discussion, listening |
| 18. | Tim Berners Lee | DVD, discussion, written tasks |

**All educational materials are located on the course on the Moodle platform.**

# Algebra

## Recommended calendar and thematic plan

**3 times a week (max 42 academic hours)**

| № | Lesson topic | Contents |
|---|---|---|
| | Repetition | |
| 1-6 | Repetition of what was studied in the 9th grade | |
| | Derivative and its application | |
| 7-9 | Representation of the limit of a function at a point and of the continuity of a function at a point | Establish the existence of the limit of the function at a point and find it based on the graph of the function. Distinguish graphs of continuous and discontinuous functions. |
| 10-11 | Problems of instantaneous velocity and tangent to the graph of the function | Calculate the average velocity of a material point according to the law of its motion. |
| 12-14 | The concept of a derivative | Formulate the definition of the derivative of a function at a point, the rules for calculating derivatives, signs of constancy, increase and decrease of the function. Find derivatives of functions, tangent equations of the graph of the function, intervals of increasing and decreasing of the function given by the formula, determining the maximum and minimum points, critical points, extremum points of the function, the largest and smallest values of the function on the interval. Investigate the properties of a function using a derivative and draw graphs the functions |
| 15-19 | Rules for calculating the derivative | |
| 20-23 | Tangent equation | |
| 24 | Self-examination of knowledge | |
| 25-28 | Signs of increasing and decreasing function | |
| 29-32 | Extremum points of the function | |
| 33-35 | The largest and smallest values of the function | |
| 36-39 | Drawing graphs of functions | |
| 40 | Extremum points of the function | |

**The educational materials are available at the link:**
**https://drive.google.com/drive/folders/1vIsePPukl3jCjIXAFwH0rKiw6F-clx0n?usp=sharing**

# Geometry
# Recommended calendar and thematic plan

## 3 times a week (42 academic hours)

| № | Lesson topic | Contents |
|---|---|---|
| | Repetition | |
| 1-6 | Repetition of what was studied in the 9th grade | |
| | Circle | |
| 7-8 | The geometric location of the points. Circumference and circle | Depict in the drawings a circle and its elements; tangent to the circle and its properties; a circle inscribed in a triangle and a circle described near it. Know the definitions and properties of the secant, the central angle of the circumference, the inscribed angle of the circumference; the inscribed and circumscribed quadrilateral |
| 9-11 | Some properties of the circumference. Tangent to the circumference | |
| 12-14 | Circumscribed and inscribed circumferences of a triangle | |
| 15-18 | Central and inscribed angles | |
| 19-21 | Arc. Arc length | |
| 22-25 | Inscribed and described quadrilaterals | |
| 26-31 | Secant. Secant and tangent properties | |
| 32 | Self-examination of knowledge | |
| | Polygons. Polygon area | |
| 33-35 | Polygons | Describe a polygon, its elements; convex and non-convex polygons. Know what the area of a polygon is. Know and apply formulas for finding the area of a rectangle, parallelogram and triangle. |
| 36-37 | The concept of the area of a polygon. Rectangle area | |
| 38-40 | Parallelogram area | |
| 41-42 | Triangle area | |

**The educational materials are available at the link:**
**https://open.umn.edu/opentextbooks/textbooks/elementary-college-geometry**

**https://www.ck12.org/fbbrowse/list?grade=all%20grades&language=all%20languages&subject=geometry**

# Physics
# Recommended calendar and thematic plan

### 2 times a week (28 academic hours)

| № | Lesson topic | Contents |
|---|---|---|
| 1-4 | Repetition | |
| 5 | Mechanical movement. The frame of reference. The relativity of motion. Forward movement | Formation of the concepts of "material point", "absolutely solid body" and "frame of reference"<br>Consideration of motion in various reference systems.<br>Comparison of movements |
| 6-7 | Scalar and vector quantities. Actions on vectors | Formation of the concept of "scalar and vector physical quantity"; study of the rules of addition and subtraction of vectors<br>Definition and comparison of the main features of scalar and vector quantities. Image of vectors.<br>Addition and subtraction of vectors. Multiplying a vector by a number<br>Comparison of vectors based on the module, direction. Addition, subtraction of given vectors, multiplication<br>of a vector by a scalar |
| 8-9 | Projection of a vector onto an axis | Formation of the concept of "projection of a vector on an axis", the ability to find projections of a vector on an axis<br>Determination of projections of vectors directed along the coordinate axis, at an angle to the axis, on the coordinate axis. Definition of projections<br>Finding projections of vectors, knowing their modulus and direction, and the modulus of the vector by its projections on coordinate axes. Construction of vectors by their projections, finding vectors of sum and difference |
| 10 | Path and displacement | The concepts of "displacement" and the consolidation of the concept of "path" as kinematic characteristics of the mechanical movement of a material point |
| 11 | Uniform rectilinear motion. Speed | Formation of knowledge about kinematic quantities characterizing uniform motion. Mastering the law of uniform rectilinear motion |

| 12-13 | Graphical representation of uniform rectilinear motion | Familiarity with the graphical dependence of the characteristics of uniform motion on time; the ability to read graphs<br>Translation of information from visual to scientific, practical determination of kinematic characteristics, plotting |
|---|---|---|
| 13 | Generalization | |
| 14 | Uneven movement. Average and instantaneous speed | Formation of the concepts of "average speed" and "instantaneous speed" as kinematic characteristics of mechanical motion |
| 15 | Addition of speeds. Solving problems on the topic "Uneven movement. Average and instantaneous speed" | Formation of knowledge about the classical law of addition of velocities.<br>Conducting diagnostics of the quality of assimilation of the basic concepts characterizing uniform and uneven movement, and the ability to apply them in solving problems |
| 16 | Acceleration | Introduction of the concept of "equidistant motion" and the kinematic characteristics of mechanical motion<br>"acceleration" Distinguishing uniform and equidistant motion, understanding the meaning of acceleration as the main physical quantity of equidistant motion, its vector character and units of measurement |
| 17-18 | Speed with equal- alternating motion | Formation of knowledge about equidistant motion, determination of the formula for calculating the speed, graphical representation of the dependence of speed on time<br>Solving qualitative, computational and graphical problems to determine the speed and acceleration in alternating motion |
| 19 | Displacement, coordinate and path in case of equal-alternating motion | Deepening of knowledge about alternating motion, calculation of displacement, coordinates and paths in alternating motion, graphical representation of the dependence of the projection of displacement and path on time |
| 20 | Curvilinear motion. Linear and angular speed | Acquaintance with a new type of movement (in a circle), its characteristics and formulas, determination of the physical meaning of the characteristics |
| 21 | Acceleration of a point as it moves around a circumference | Formation of the concept of "centripetal acceleration" and definition of formulas for its calculation. Application of these formulas in |

| | | the quantitative description of the motion of a material point along a circle |
|---|---|---|
| 22 | Generalization | |
| 23 | Interaction of bodies. Power. Inertial reference systems. Newton's First Law | Definition of the main task of dynamics. Further formation of the basic concepts: force, resultant force, component force |
| 24 | Mass | Familiarity with the gravitational and dynamic properties of mass, methods of its measurement, with the values of the masses of very large and very small bodies |
| 25-27 | Newton's Second Law | Assimilation of the dependence of acceleration on the mass of the body and the resulting forces applied to it<br>Comparison of accelerations of bodies affected by different resultant forces at the same mass, and bodies of different masses at the same resultant forces<br>The image of forces, the addition of forces. Consideration of body motion in different reference frames. Determination of acceleration of bodies affected by various resultant forces |
| 28 | Newton's third law. Galileo's principle of relativity | Formation of an understanding of the mechanical interaction of bodies; the ability to determine the forces of action and reaction. Demonstration of equality of all inertial systems in mechanics |

**The educational materials are available at the link:**
**https://drive.google.com/file/d/1Rab9u8Yas-6isyRZj403juU5rdNbN-xe/view?usp=sharing**

# Biology

## Recommended calendar and thematic plan

**3 times a week (42 academic hours)**

| № | Lesson topic | Contents |
|---|---|---|
| | Man's place in nature | |
| 1 | Science of man | The relationship of anatomy, physiology, psychology and hygiene |
| 2 | The systematic position of man in the animal kingdom | Man's place in nature |
| | General overview of the human body | |
| 3-4 | The cell, its structure and functions | The concept of "cell", the main organelles and functions. The concept of stem and tumor cells. |
| 5-6 | Tissues (epithelial, muscular) | The tissues that form the integuments of the body, glands and lining the cavities of internal organs, make up the bulk of skeletal muscles and many internal organs. Connection with the motion function. |
| 7-8 | Tissues (nervous, connective) | Nerve tissue forms the bulk of the brain and spinal cord, providing regulation and rapid communication between different parts of the body. Bone, cartilage, blood, lymph. |
| 9-10 | Organs, systems and apparatus of organs, organism | Human organs, integration into organ systems, what is an apparatus, integration into a single whole - an organism. |
| | Regulation of functions in the body | |
| 11-12 | The organism is a single whole. Neurohumoral regulation | Coordination of processes in the human body with the help of the nervous system and humoral factors, homeostasis. |
| 13-14 | Generalization of knowledge | |
| | Endocrine system | |
| 15-16 | Glands of internal secretion | The main glands and functions of the endocrine glands in the human body. The concept of internal secretion |
| 17-18 | Glands of mixed secretion | Glands and functions of mixed secretion glands |
| | Nervous system | |
| 19 | The structure and principle of the nervous system | The main organs of the nervous system. Nerve cells and their functions |
| 20 | The structure and functions of the spinal cord | The concept of "spinal cord", location in the body, structure and functions. |
| 21-22 | Structure and functions of the medulla oblongata, posterior, middle and intermediate brain | The brain, its departments. Where are they located and what are they responsible for |
| 23-24 | Structure and functions of the cerebral cortex | The concept of "cerebral cortex", structure and functions. Central nervous system. |

| 25 | Autonomic nervous system | Types of the autonomic nervous system. Sympathetic, metasympathetic and parasympathetic. Their autonomy and subordination to the central nervous system. |
|---|---|---|
| 26 | Hygiene of the nervous system | Ways to prevent nervous disorders |
| 27 | Generalization of knowledge on the topic "Nervous system" | |
| Sensor systems | | |
| 28 | General characteristics of sensor systems. Visual sensory system | Concept of sensory systems. Eye. Structure, functions |
| 29-30 | Auditory sensory system | Ear. Structure, functions. Inner and outer ear. The principle of sound transmission |
| 31-32 | Sensory systems of balance, taste and smell | Cerebellum, taste buds, olfactory receptors |
| 33 | The importance and hygiene of sensory systems | |
| Musculoskeletal system | | |
| 34-35 | The structure and functions of bones. The connection of the bones of the human skeleton. | Human skeleton. Bones, joints, cartilage. Bone structure |
| 36-37 | The structure of the human skeleton. First aid for dislocations and fractures | The structure of the skeleton, skull bones, spine and its parts. Belts of the upper and lower human limbs |
| 38-39 | Skeletal muscles, their functions and structure | Skeletal muscles. Tendons. Structure and functions |
| 41 | The importance of physical activity for the preservation of health | |
| 41 | Generalization of knowledge on the topic "Musculoskeletal system" | |

**The educational materials are available at the link:**
**https://open.umn.edu/opentextbooks/textbooks/fundamentals-of-anatomy-and-physiology**

# Chemistry
# Recommended calendar and thematic plan

**2 times a week (28 academic hours)**

| № | Lesson topic | Contents |
|---|---|---|
| 1 | Repetition. Basic concepts in chemistry | |
| 2 | Repetition. Classes of inorganic compounds | Classification, nomenclature, physical and chemical properties and methods of obtaining oxides, acids, bases and salts |
| 3-4 | Repetition. Problem solving | Repetition of calculation formulas with values: chemical quantity, mass, volume, number of particles |
| 5 | Repetition. Atomic structure and chemical bonds | Atomic structure: nucleus and electron shells<br>Periodic law and change of properties of atoms and their compounds in the PT<br>The nature of the chemical bond<br>Covalent, ionic, metallic chemical bonds<br>Crystal structures of substances |
| 6 | Degree of oxidation. Redox reactions | Oxidation state and ion charge<br>Determination of redox reactions<br>Preparation of oxidation and reduction schemes |
| 7 | Solutions. Problem solving | Quantitative and qualitative characteristics of solutions<br>Solving problems for finding the mass fraction and molar concentration<br>Processes of dilution, concentration, evaporation, mixing of solutions |
| 8-9 | Electrolytic dissociation | Electrolytic dissociation of substances with an ionic type of chemical bond<br>Electrolytic dissociation of substances with a covalent polar type of chemical bond (acid)<br>Step dissociation<br>Irreversibility and reversibility of electrolytic dissociation |
| 10 | Generalization | |
| 11 | General characteristics of nonmetals | The position of nonmetal elements in the periodic table<br>Electronic structure of nonmetal atoms<br>Degree of oxidation<br>Finding nonmetal elements in nature |
| 12 | Simple substances are nonmetals | Structure of simple substances<br>Allotropy |

| 13 | Halogens are elements of the VIIA group | General characteristics of halogens<br>Chlorine in nature<br>The position of chlorine in the periodic table<br>Electronic structure of the chlorine atom<br>Physical and chemical properties of chlorine |
|---|---|---|
| 14 | Hydrogen chloride. Hydrochloric acid and chlorides | The difference between hydrogen chloride and hydrochloric acid<br>Action on the indicator<br>Chemical Properties of Hydrochloric acid<br>Qualitative reactions to chlorides<br>Distribution of hydrochloric acid and chlorides in nature |
| 15 | Halogens in nature. Biological significance and application of halogens and their compounds | The content of halogens and their role in the life of various groups of organisms |
| 16 | Oxygen and sulfur are elements of the VIA group | Oxygen and sulfur in nature<br>The position of oxygen and sulfur in the periodic table<br>Electronic structure of the oxygen and sulfur atom<br>Allotropic modifications of oxygen<br>Allotropic modifications of sulfur<br>Physical properties of oxygen and ozone |
| 17 | Chemical properties of oxygen and sulfur. Application of simple substances | Chemical properties of oxygen, ozone and sulfur<br>The use of simple substances – sulfur, oxygen and ozone |
| 18 | Sulfur oxides. Sulfuric acid | Physical and chemical properties of sulfur oxides<br>Physical properties of Sulfuric acid<br>Action on indicators<br>Study of properties of sulfuric acid salts |
| 19 | Chemical properties and application of sulfuric acid | Chemical properties of dilute and concentrated sulfuric acid |
| 20 | Generalization | |
| 21 | Nitrogen and phosphorus are elements of the VA group | The situation in the PT<br>Electronic structure of the nitrogen and phosphorus atom<br>Simple substances nitrogen and phosphorus, its physical and chemical properties<br>Allotropic modifications of phosphorus |
| 22 | Ammonia | Physical properties of ammonia<br>Chemical properties of ammonia<br>Application of ammonia<br>Reaction product yield |

| 23 | Nitrogen oxides and nitric acid | Physical and chemical properties of nitrogen oxides |
|----|-------------------------------|---------------------------------------------------|
|    |                               | Physical and chemical properties of nitric acid |
|    |                               | Features of the interaction of concentrated nitric acid |
| 24 | Phosphorus oxides and phosphoric acid | Acidic properties of phosphoric acid |
|    |                               | Phosphoric acid salts |
|    |                               | Application of phosphoric acid and phosphates |
| 25 | Mineral fertilizers | Trivial names of substances |
|    |                     | Solving computational problems |
| 26 | Carbon and silicon are elements of the IVA group | The situation in the PT |
|    |                               | Electronic structure of carbon and silicon atoms |
|    |                               | Carbon and silicon in nature |
|    |                               | Allotropic modifications of carbon and their physical properties |
|    |                               | Chemical properties of carbon and silicon |
| 27 | Carbon and silicon oxides | Physical and chemical properties of oxides |
|    |                           | Prevalence in nature |
| 28 | Carbonic acid and its salts | Physical and chemical properties |
|    |                             | The concept of acidic acids |
|    |                             | Qualitative reactions to the carbonate ion |

**The educational materials are available at the link:**
**https://open.umn.edu/opentextbooks/textbooks/chemistry-atoms-first**

**https://open.umn.edu/opentextbooks/textbooks/chemistry**

**https://flexbooks.ck12.org/cbook/cbse-chemistry-class-10/?_gl=1*1tdgelp*_ga*MTk3ODgwNTc4NS4xNjg1NzE0ODM1*_ga_7PBE4L0PZZ*MTY5NTY0ODE5Ni4zMC4xLjE2OTU2NDg5NTQuMC4wLjA**.

# Engineering

## Recommended calendar and thematic plan

**1 time a week (14 academic hours)**

| № | Lesson topic | Contents |
|---|---|---|
| 1 | Introduction | Acquaintance<br>A story about this subject<br>Setting goals and objectives<br>Familiarization with the rules and requirements |
| 2 | Modern engineer | The role of engineers in modern society and their impact on technological progress |
| 3 | Basic principles of engineering activity and approach | A systematic approach<br>Analysis and projecting<br>Innovation and creativity<br>Optimization<br>Standardization<br>Engineering Ethics<br>Research and development<br>Consideration of user needs<br>Continuous learning |
| Construction Engineering | | |
| 4 | Introduction to Construction Engineering | Types of construction engineering<br>Role and significance in social and economic development |
| 5 | Fundamentals of design and construction | Selection of materials<br>Structural solutions |
| 6 | Programs for solving engineering problems in construction | Familiarity with programs for the design of engineering projects |
| 7 | Landscape design | Interaction of construction engineering with biology and ecology |
| 8 | Generalization | |
| 9-10 | Software in construction engineering | Working with programs for project engineering |
| Aerospace Engineering | | |
| 11 | Aerospace Engineering | Contribution to space research and aviation technology development<br>Spacecraft<br>Exploration of new territories and search for life |
| 12 | Principles of functioning of aircraft | Models<br>Aerodynamics and structure |
| 13 | The impact of aerospace engineering on physics and mathematics | Determine the relationship of engineering with other subjects |

| 14 | Engineering and construction within the framework of aerospace engineering | Creating your own prototype aircraft and testing |

**All educational materials are located on the course on the Moodle platform.**

# World History

## Recommended calendar and thematic plan

**1 time a week (14 academic hours)**

| № | Lesson topic | Contents |
|---|---|---|
| 1 | Recent history, what is it? | Definition of the term recent history<br>General trends in recent history |
| 2 | The First World War and its results | Paris Peace Conference;<br>Formation of the League of Nations<br>Treaty of Versailles (Germany),<br>(mandates)<br>Treaty of Saint-Germain (Austria)<br>Treaty of Trianon (Hungary)<br>Neyiskiy Treaty (Bulgaria)<br>Treaty of Sevres (Turkey)<br>The Treaty of Lausanne |
| 3 | Versailles-Washington Conference | Reasons<br>Basic provisions<br>Contradictions of the new system |
| 4 | The results of the First World War for the USA | The Roaring Twenties;<br>Prosperity of the 1920s. (society) |
| 5 | Formation of the philosophy of modernity and its brief description | What is modern?<br>General characteristics and theses<br>Representatives of the epoch |
| 6 | Lesson generalization | Essay |
| 7 | Germany after the First World War | November Revolution<br>Political forces of Germany<br>Formation of the Weimar Republic |
| 8 | Revolutionary movements in Western Europe | Socio-economic development of Western European countries<br>International relations<br>The Communist Movement in Europe<br>The emergence of fascism |
| 9 | Global Economic Crisis | Reasons<br>The Great Depression<br>Getting out of the crisis<br>Roosevelt's New Deal<br>The European way out of the crisis (totalitarianism) |
| 10 | Italy in the interwar period | The situation of Italy after the First World War<br>The doctrine of fascism<br>March to Rome |

| | | Establishment of the fascist regime in Italy |
|---|---|---|
| 11 | Germany in the interwar period | The mood in society<br>The rise of the Nazis to power<br>The Fall of the Weimar Republic<br>The political regime of the Third Reich |
| 12 | France in the interwar period | Public sentiment<br>Political processes<br>People's Front |
| 13 | Spain in the interwar period | Spain after the First World War<br>Spain 1918-1931<br>People's Front<br>The Spanish Civil War |
| 14 | Russia in the interwar period | Bolsheviki, who are they?<br>The Uprising in Petrograd<br>Soviet power in Russia<br>Brest Peace Treaty |

**The educational materials are available at the link:**
**https://www.ck12.org/fbbrowse/list/?Subject=History&Grade=All%20Grades&Language=All%20Languages**

**https://open.umn.edu/opentextbooks/textbooks?term=world+history&commit=%D0%98%D0%B4%D1%82%D0%B8**

# Political Science

## Recommended calendar and thematic plan

**1 time a week (14 academic hours)**

| № | Lesson topic | Contents |
|---|---|---|
| 1-2 | Introduction | Why do we need knowledge about political institutions? |
| 3-4 | Political institutions. The State as the main institution of the political system of society | Approaches to the study of the essence and origin of the state. Forms of government and state structure in the modern world |
| 5-6 | Individual work | Comparative analysis. Civil and legal foundations of the modern state. |
| 7-10 | Legislative power in the political system. Comparative analysis of the structure and powers of legislative institutions in the modern world | Explanation of the system of checks and balances, why it is necessary |
| 11-13 | Executive power in the political system | Comparative analysis of the structure and powers of executive power institutions in the modern world. Government and State apparatus |

**The educational materials are available at the link:**
**https://open.umn.edu/opentextbooks/textbooks/introduction-to-political-science**

# Business and Law

## Recommended calendar and thematic plan

**1 time a week (14 academic hours)**

| № | Lesson topic | Contents |
|---|---|---|
| 1 | Introduction to Entrepreneurship and basic concepts | Basic concepts in entrepreneurship. |
| 2-4 | The idea and concept of the business. Market and needs analysis | How can I analyze the market and assess the potential demand in the market? |
| 5-8 | Defining business goals and strategies. Development of a business plan | Goal setting. What does a business plan consist of? |
| 9-11 | Financial planning and evaluation of start-up costs | |
| 12-15 | Legal aspects and business registration | Work with regulatory legal acts regulating the sphere of business |

**The educational materials are available at the link:**
**https://drive.google.com/file/d/1PBRU7_mSU5cG0VW2a_bKL5VHXuTrArbC/view?usp=drive_link**