Федеральное государственное бюджетное образовательное учреждение высшего образования Первый Московский государственный медицинский университет имени И.М. Сеченова Министерства здравоохранения Российской Федерации

Учебно-методическое пособие по предмету «Биология на английском» для профильных 10-11 классов средних общеобразовательных школ

Чебышев Н.В, Козарь М.В., Гринев А.Б., Романова Л.М., Беречикидзе И.А., Горожанина Е.С., Гринева Г.Г., Лазарева Ю.Б., Ларина С.Н.

Москва – 2016

Федеральное государственное бюджетное образовательное учреждение высшего образования Первый Московский государственный медицинский университет имени И.М. Сеченова Министерства здравоохранения Российской Федерации

Teaching manual
on the subject "Biology in English"
for specialized 10-11 classes of secondary schools

Chebyshev N.V., Kozar M.V., Grinev A.B., Romanova L.M., Berechikidze I.A., Gorozhanina E.S., Grineva G.G., Lazareva Ju.B, Larina S.N.

Moscow – 2016

Введение

Пособие содержит учебно-методический комплекс по биологии и предназначено для учителей и преподавателей, работающих в медико-биологических классах комплекса «школа-вуз»при Первый МГМУ им. И.М.Сеченова.

Пособие содержит программу по биологии, рабочую программу по биологии и календарно-тематическое планирование для 10-11 классов школ партнеров комплекса «школа-вуз» при Первый МГМУ им. И.М.Сеченова на английском языке. Пособие содержит девять демоверсий заданий для промежуточного мониторингапо завершению каждого модуля, демоверсию заданий для набора в 10-е профильные биологические классы, демоверсию заданий переводного экзамена из 10 в 11 класс, демоверсию выпускного экзамена по биологии из 11 класса, примерный график проведения мониторингов, а так же рекомендуемый перечень лекций.

Оглавление:

	7 Демоверсия. Промежуточный мониторинг. Зоология.	
	8 Демоверсия. Промежуточный мониторинг. Анатомия.	
	9 Демоверсия. Промежуточный мониторинг. Экология.	
	Демоверсия. Набор в профильные медицинские классы. Биология.	
	Демоверсия. Переводной экзамен из 10 в 11 класс. Биология.	
	Демоверсия. Выпускной экзамен из 11 класса. Биология.	
	Примерный график проведения мониторингов.	
	Примерный перечень лекций.	

Introduction

This manual contains methodical complex of biology and is created for teachers working in medico-biological classes of ‘school-university’ complex of I.M. Sechenov First Moscow State Medical University.

The manual includes the program in biology, the work program on the biology and calendar-thematic planning for 10-11 classes of schools of the partners of the complex "school-University" at the I.M. Sechenov First Moscow State Medical University in English. The manual contains nine demonstrative tasks for intermediate monitoring after the completion of each module, demo version of tasks for entrance exams in the 10-th specialized biological classes, demo tasks of the transfer exam from 10 to 11 class, and demo version of the final exam in biology for the 11th grade, the approximate schedule for the monitoring and also a recommended list of lectures.

Contents:

Biology program for schools-partners of the complex "school-university" of First MSMU n. a. I. M. Sechenov

Explanatory note

The status of the document

Biology program is based on the federal component of state standard of secondary (full) general education at the profile level.

The program specifies the content of the topics of educational standard, gives the approximate distribution of training hours by sections of the course, the recommended sequence of topic studying and sections of the subject, taking into account inter-subject and intrasubject connections, the logic of the educational process, the age characteristics of students.

The program allows all participants of the educational process to get an idea about the goals, content, general teaching strategies, education and development of pupils by means of a school subject, defines stages of training, structures the educational material, determines its quantitative and qualitative characteristics on each stage, including содержательного fulfillment the of intermediate certification of students.

The program promotes the preservation of a common educational space without restricting creativity of teachers, provides ample opportunities for the implementation of the various approaches to the construction of the course.

Structure of the document

The program comprises three sections: an explanatory note; basic content with the indication of hours devoted to study of each unit, a list of minimal amount of laboratory and practical work, excursions; requirements to the level of training of graduates.

General characteristics of the subject

Biology course at the secondary level (full) of general education at the profile level is aimed at building of an integrated system of knowledge of students about wildlife, its systematic organization and evolution, so the program includes information on general biological laws that are manifested at different levels of organization of living nature. The basis of content selection on the profile level is activity approach, according to which students should get knowledge and acquire skills that make up a sufficient basis for further education at the university, ensure the culture of behavior in nature, conduction and design of biological research relevant for the future specialist. The basis for the content structuring of a course of biology in high school at the profile level includes leading backbone ideas - the distinctive features of wildlife, its level organization and evolution, according to which substantial lines of the course are allocated: Biology as a science. Methods of scientific cognition; Cell; Organism; Species, Ecosystems.

Goals

The study of biology at the profile level of the secondary (full) general education is aimed at achieving the following objectives:

- Development of knowledge about the basic biological theories, ideas and principles, which are an integral part of the modern natural-scientific picture of the world; about the methods of biology (Cytology, genetics, breeding, biotechnology, ecology); structure, diversity and characteristics of biological systems (cell, organism, population, species, ecosystem, biosphere); the outstanding biological discoveries and current research in biological science;
- Mastering the skills of characterization of the modern scientific discoveries in the field of biology; establishment of the connection between the development of biological and socio-ethical, environmental problems of humanity; independent conduction of biological research (observation, measurement, experimentation, modeling) and correctly arrange the obtained results; analyze and use biological information; to use biological terminology and symbols;
- Development of cognitive interests, intellectual and creative abilities in the process of studying problems of modern biological science; conduction oa experimental studies, solution of biological problems, modeling of biological objects and processes.
- Strengthening of belief in the possibility of cognition of wildlife laws, develop careful attitude to it, adherence to ethical standards in the process of conduction of biological research;
- Usage of acquired knowledge and skills in everyday life to assess the impact of human activities on the environment, their own health; development of ecological culture skills; study and observance of prevention of diseases and HIV infection.

The program is developed on the basis of Federal state educational standards. It takes 340 hours to study the biology course, including 10 class - 170 hours (5 hours per week), 11th grade - 170 hours (5 hours per week).

General academic skills and ways of working

Approximate program is aimed at the development of students ' general academic skills, universal ways of working and core competencies. In this direction for a school subject "Biology" for secondary (complete) general education at the profile level there are the following priorities: comparison, analysis, evaluation, problem solving, independent search of information.

Learning outcomes

The results of studying the course "Biology" you may find in the section "Requirements to level of preparation of graduates", which are fully consistent with the standard. Requirements at the profile level are aimed at mastering the content significant for continuing education in the field of biological science, at mastering of biological research methods.

"Know/understand" section contains requirements that are focused mainly on the reproduction of the acquired content.

"To be able" section includes the requirements based on more complex activities, including creative ones: to explain, to establish relationships, to solve problems, to make diagrams, to describe, to identify, to explore, to compare, to analyze and to evaluate, to make an independent search of biological information.

"Use the knowledge and skills acquired in practice and everyday life" section includes the requirements that go beyond the educational process and are aimed at solving various life problems.

TOTAL 340 hours

10 class (170 hours per year)

Fundamentals of cytology (40 hours) 5 hours per week

Introduction. Definition of life. The main features of living organisms. Levels of organization of living matter. Subject, tasks and methods of cytology. The value of cytology for medicine. Methods of studying cells.

The chemical composition of cell. The elemental composition. The ability of living cells and organisms to selectively accumulate certain chemical elements from the environment.

The content of water in the cell. Relation between the chemical structure of water and its role in the cell. The role of water in regulation of intensity of metabolism. The role of inorganic substances (cations and anions) in the cell. Isotonic, hypotonic and hypertonic solutions. Cell turgor. Homeostasis of cells, its importance for the normal body functioning.

Cell organic substances (carbohydrates, proteins, nucleic acids). Biopolymers (periodic and aperiodic). Lipids (fats and lipoids), features of their structures and functions.

Carbohydrates. Mono-, di- and polysaccharides (of the first and second order, homo- and heteropolysaccharides). Carbohydrates function in the cell. Store and structural polysaccharides.

Cell - structural and functional unit of living things. The history of cell discovery. The main provisions of the cell theory.

The main structural components of eukaryotic cell: the cell membrane, cytoplasm and nucleus. Nucleus. Features of the structure of the nuclear membrane. Nucleolus. Nucleoplasm. Chromatin. The plasma membrane, its structure (liquid-mosaic model), features and functions. Glycocalyx. Transport of substances (active and passive). Endocytosis (phagocytosis and pinocytosis) and exocytosis. Intercellular contacts (a simple slot-contact, connection "lock", desmosomes, synapses). The cytoplasm (hyaloplasm, organelles and inclusions). Cyclosis.

Organelles and inclusions. Single-membrane organelles (Golgi complex, endoplasmic reticulum, lysosomes, vacuoles). The concept of compartment . Their interrelation (vacuolar system) in the cell. Structure and functions.

Double-membrane organelles (mitochondria and plastids (chloroplasts, chromoplasts and leucoplasts)). Structure and function.

Non-membrane organelles (ribosomes (70S and 80S), the cell center, centrioles, flagella, cilia, microtubules, microfilaments). The chemical composition, structure and functions. The protein tubulin. Irritability and movement of cells. The cytoskeleton.

Inclusions of trophic, secretory and special types. Structure and functions.The similarities and differences between plant and animal cells.

Prokaryotic and eukaryotic cell. Similarities and differences.

Acellular forms of life. Viruses and phages - intracellular parasites. Their ultramicroscopic organization, importance and role in nature. Viral diseases in humans, animals and plants.

Structure and function of the nucleus. Chromosomes, their chemical composition and structure. The concept of a karyotype.

Nucleic acids - aperiodic biopolymers. DNA and RNA. Functions. Nucleosides. Nucleotides (purine and pyrimidine), their structure and connection during the formation of the polynucleotide chain. Sugar-phosphate backbone and phosphodiester bond. The principle of complementarity of E.Chargoff.

Formation of double-stranded DNA molecule and its helix formation. Characteristics of the DNA helix. DNA replication. Basic replication enzyme. Replicon.

Transcription. The main enzyme transcription. Features of its functionning. Stages of transcription. Promoter. The difference between RNA and DNA molecules. Types of RNA (mRNA, tRNA, rRNA) and their functions in the cell.

Gene and its role in protein biosynthesis. Structural genes. Genes of pro- and eukaryotes. Exons and introns. Splicing. DNA code.

Proteins - aperiodic cell biopolymers. The molecular weight of proteins. Amino acids, their structure and properties. Primary, secondary tertiary and quaternary structure of the protein molecule. Proteins' functions in the cell. Enzymes, their chemical composition and structure. The role of enzymes in the processes of life. Variety of enzymes. Diversity and specificity of proteins. Histocompatibility problem. Denaturation and renaturation of protein.

Metabolism. Plastic and energy exchanges. Plastic exchange. Protein biosynthesis. The role of nucleic acids in the protein biosynthesis. Transcription. Translation. The activation process of tRNA. The role of enzymes in protein biosynthesis implementation.

Autotrophs and heterotrophs. Photosynthesis. The biological significance of photosynthesis. Light and dark phases of photosynthesis. Role of enzymes, pigments and NADP +. The relationship of light and dark phases of photosynthesis. Ways to improve the efficiency of the processes of photosynthesis in crop plants. Chemosynthesis.

Energy metabolism. ATP, GTP, FAD. Macroergic bonds in ATP. Significance of of ATP in the cell activity. The main stages of energy metabolism. The preparatory phase, the role of the lysosomes in the process.

Glycolysis, its energy efficiency. The role of enzymes and NAD + in glycolysis. Fermentation. Types of fermentation (lactic and alcoholic). The energy efficiency of fermentation processes.

Cellular respiration. Oxidative cleavage of pyruvate. Acetyl-CoA. The main reactions and biological meaning of the Krebs cycle. Oxidative phosphorylation. The role of oxygen in respiration. The energy efficiency of the processes of respiration.

Reproduction and development of organisms (20 h)

Reproduction and development of individual organisms.

Cell division - biological process that is the basis of reproduction and individual development of organisms. The generality of the process of mitotic cell division in eukaryotes. Species constancy of the number of chromosomes. The concept of a karyotype (repetition). Haploid and diploid sets of chromosomes. Status of the chromosomes in the nucleus of non-dividing (during interphase). Eu- and heterochromatin. The mitotic cycle (presynthetic, synthetic and postsynthetic periods). Features of periods of the mitotic cycle (prophase, metaphase, anaphase and telophase). Duplication of DNA before mitosis. Formation of polytene chromosomes.

Violations of mitosis - amitosis, formation of polyploids. Amitosis. Biological significance of amitosis. Cytotoxic agents - colchicine and koltsimed. Formation of polyploids.

Forms of reproduction of organisms. Asexual and sexual reproduction. Asexual reproduction of unicellular and multicellular organisms.

Meiosis. The first division of meiosis. Features of prophase of the first meiotic division (leptotena, zygotes, paquita, diplotene, diktiotena, diakinesis). Interkinesis. Features of interkinesis. The second meiotic division. The biological significance of meiosis.

Gametogenesis - spermatogenesis and oogenesis. Features of flow of spermato - and oogenesis.

Reproductive cells: the egg and sperm (especially the structure and functioning).

Types of sexual process in unicellular and sexual reproduction in multicellular organisms. Fertilization - the recovery process of the diploid number of chromosomes. Parthenogenesis. Gynogenesis and Androgenesis. The mechanism of double fertilization in flowering plants (study of the issue is possible in the course of Botany).

Individual development of organisms. Development of a fertilized egg (on Amphioxus example). Splitting up. Blastula. Gastrulation. Gastrula stage. Germ layers. Homology of germ layers as evidence of the unity of origin of animals. Development of organ systems. Post-embryonic development. Direct and indirect development. Examples.

Fundamentals of Genetics (30 hours)

Genetics - science of the laws of heredity and variation. The significance of genetics. Basic laws of transmission of hereditary traits. Hybridological method of studying heredity. Laws of inheritance established by Mendel. Monohybrid cross. The first law of Mendel. The uniformity of the first generation. Complete dominance. Dominant and recessive traits. Homozygote and

heterozygote. The allelic and non-allelic genes. Phenotype and genotype. The second law of Mendel. Splitting in the second generation.

The intermediate type of inheritance (examples). Test cross. The hypothesis of the "purity of gametes." Meiosis as a material basis for the "purity of gametes" hypothesis. Two-hybrid and poligibrid crossing. The third law of Mendel. Independent combination of hereditary traits with di - and poligibrid crossing. The statistical nature of cleavage events. Lattice Penneta. Cytological bases of Mendel laws.

The genotype as a historically constituted holistic system. Interaction of alleles. Inheritance of blood groups and rhesus factor. Rh disease. The interaction of non-allelic genes (complementarity epistasis, polymer). Epistatic gene or suppressor. Hypostatic gene.

The chromosomal theory of heredity of T.Morgan. The phenomenon of linked inheritance. Linkage group. Full grip. Incomplete clutch. Crossing of chromosomes in meiosis - the process of debonding. Genetic maps of chromosomes. Methods for sex determination. Chromosomal sex determination. Sex chromosomes and autosomes. Types of sex determination. Homogametic and heterogametic sex. Gemizigota. Sex-linked inheritance. Inheritance, limited by sex.

Patterns of variation. Role of genotype and environmental conditions in the formation of the phenotype. Variability and its types. The variability of symptoms, not associated with changes in the genotype. The rate of reaction. Statistical patterns of modification variability. Variation series and variation curve, methods for determining the average value of variation series.

Genotypic variability: mutation and combinations. Gene, genomic and chromosomal mutations.

Mutagenic factors. Experimental obtaining of mutations. Mutations as a material for artificial and natural selection. Environmental pollution mutagens and its consequences. Human Genetics. Methods of human heredity studying.

The law of homologous series in hereditary variation of Vavilov. Fundamentals of breeding. Genetic basis of breeding. Selection of plants, animals and microorganisms. Fundamentals of biotechnology.

Bacteria, fungi, lichens, plants (45 hours)

Botany - the study of plants. The plant - the entire organism. General familiarity with plants and their taxonomy. Elementary concepts of systematic (taxonomic) categories.

The cellular structure of plants. The structure of the plant cell. Fabrics plant organs in connection with the functions performed in the whole organism. Relationship bodies. Vegetative organs of flowering plants: root, stem, leaf. Generative organs: Flower (inflorescences), fruit, seed. Life forms of plants. Basic vital functions of the plant organism: nutrition, breathing, growth and development, reproduction. Tension. Movement of plants.

Green algae. General characteristics. Systematics. Single-celled algae (chlamydomonas, chlorella, pleurococcus). The filamentous algae. The structure and characteristics of life. Asexual and sexual reproduction of algae. Distribution of algae. Brown and red algae. Examples of seaweed. The value of algae in nature and economy.

The structure, reproduction and life conditions of the bacteria. Meaning of bacteria in human life.

Kingdom Fungi. These fungi Division. General characteristics. Systematics. The reasons for the ambiguity of the systematics of fungi and their comparison with the plants and animals. The lower and higher fungi. Zygomycetes, Ascomycetes and Basidiomycetes.

Kingdom Fungi. Moulds (Mucor and Penicillium). Yeast. The structure, reproduction, especially life. Mushroom-parasite (smut, ergot, tinder). The structure, nutrition, reproduction. Pileate mushrooms, their structure, nutrition and reproduction. Terms of the fungus lives in the forest. Contact mushrooms plants roots (mycorrhiza). Edible and poisonous mushrooms. The role of fungi in nature and in human life.

Lichens. Lichens are a symbiotic organisms. General characteristics. Lichens crustose, foliose, bushy. The structure of the lichen thallus. Food. Reproduction. The role of lichens in nature and human life.

Department spread Moss plants. General characteristics. Systematics. Green moss. The structure, reproduction and development cycle of flax Kukushkin. Concepts sporophyte and gametophyte.Sphagnum moss. Waterlogging. Peat formation, its meaning.

Department lycopsids plants. General characteristics. Lycopodium clavatum. The structure, reproduction, development cycle. Meaning lycopsids plants.

Department Horsetail plant. General characteristics. Horsetail. The structure, reproduction, development cycle. Meaning Horsetail plant.

Department of Ferny plants. General characteristics. Bracken fern. The structure, reproduction and development cycle. Fossil fern and coal formation. Meaning fern plants in nature and human life.

Department of gymnosperms. General characteristics. The structure, reproduction and development cycle on the example of pine and spruce. Male and female cones. Pollen. Ovules. Female and male gametophyte. Germination of pollen, the pollen tube growth and fertilization. Distribution and biology of conifers. The value of nature and the economy.

Department of angiosperms (flowering plants). The dominance of angiosperms. The systematics of angiosperms. Main aromorphoses angiosperms.

Flower. Flower Features. The structure of the flower. The concept of the formula and the diagram of a flower. Flowers regular and irregular; gay and bisexual. Monoecious and dioecious plants.Female and male gametophyte.

The inflorescences and their biological significance. Self-pollination. Cross-pollination by insects and wind. Artificial pollination. Germination of pollen. Double fertilization in flowering plants and its mechanism.

The formation of the seed and fruit. Seed. Functions seeds. The structure of the seed (for example monocotyledonous and dicotyledonous plants). Composition of seed. Terms of seed germination.Seed germination. Sowing time and depth of seeding. Breathing seeds. Nutrition and growth of seedlings. Germination elevated and underground.

Fetus. The functions of the fetus. Variety of fruits: monokarpnye, apocarpous, syncarpous and psevdomonokarpnye.

Meaning of flowers, fruits and seeds in nature and human life. Methods for propagation of seeds and fruits in nature.

Root. Root functions. Types root (main, side, pridatochny). Types of root systems (rod, branched and fibrous). Root zones. Root cap. The structure of root hairs. Root growth in length and thickness.External and internal structure of the root zone in monocots and dicots suction in the zone of. Root tissue. Root uptake of water and mineral salts. The mineral salts useful plant.

Modifications roots, their structure, biological and economic importance. The phenomenon of parasitism among plants. Meaning of tillage, fertilization, irrigation, cultivation of crops for life.

Escape and its parts. Variety shoot: erect, creeping, climbing, creeping, clinging. Life forms of flowering plants: tree, shrub, shrubs, herbaceous plants - annuals and perennial. Runaway growth in length and width. The gusset growth.

Bud. Kidney vegetative, floral, mixed. Their structure and location on the stem. The development of kidney escape. Branching escape.

Stem. Stem functions. Stem tissues. The anatomical structure of a woody stem dicot. The increase in thickness of the stem. The formation of growth rings. Seasonal variations in the timber. Age trees. The movement of mineral and organic substances on the stalk.

Modified shoots: underground (rhizome, stolon, tuber, bulb) and aboveground (stolons tuber, tendril, thorn), their structure, biological and economic importance.

Sheet. Options sheet. The external structure of the leaf. Simple and compound leaves. Venation leaves. Phyllotaxy. Leaf movement. Leaf mosaic.

Fabrics sheet. Features of the internal structure of the sheet in connection with its functions. Peel and stomata, the pulp sheet. Chloroplasts. The structure of the leaf veins (vascular bundles). The leaves of light and shadow. The formation of organic substances in the leaves of the light. Absorption leaves carbon dioxide and release of oxygen. The breath leaves. Evaporation of water leaves.Plants wet and dry habitats. Modifications of leaves. Lifespan leaves. Listopad. Value sheet plants. The role of green plants in nature and human life and protection.

Class dicots. General characteristics. Families: Cruciferous, Rosaceae, legumes, Solanaceae, Compositae.

Class Monocots. General characteristics. Family: Liliaceae, Cereals.

Evolution (35 hours)

General characteristics of the pre-Darwinian biology period. The dominance of metaphysical concepts of nature and immutability of "primordial expediency " in science.

Works of Carl Linnaeus on the taxonomy of plants and animals and their importance.

The theory Lamarck on the evolution of nature and its value.

The first Russian evolutionists.

Historical preconditions of Charles Darwin's theory. Socio-economic background. Biology advances in the first half of the XIX century. Advances in agricultural breeding of domestic animals and varieties of cultivated plants. Journey on the "Beagle".

Works of Charles Darwin. The main provisions of the theory of evolution of Charles Darwin. Its value for development of natural sciences.

The driving forces of evolution. Heredity. Variability, variability of species. Natural selection. The leading role of natural selection in evolution. The struggle for existence, its forms.

Artificial selection and genetic variation - the basis of breeding of domestic animals and varieties of cultivated plants. Comparison of artificial and natural selection.

STE. The adaptive nature of evolution. Relative expediency. The divergent nature of evolution. Convergence.

Microevolution. The population as a basic unit of evolution. The concept of the ecological and genetic characteristics of the populations.

Elementary factors of evolution. Genetics and evolution. Population genetics. Provision of genetic variation in natural populations. The forms of natural selection, their connection and relation to environmental conditions.

Natural selection - the guiding factor in evolution. The forms of natural selection. The creative role of natural selection.

Natural selection - the result of microevolution. Ways of speciation. View. Criteria species. The structure of the species.

Macroevolution. The emergence of supra-species taxa. Forms of phylogeny. The concept of the speed of evolution.

The relationship between micro - and macroevolution. The main directions of evolution.

Biological progress or biological regression. Ways to achieve biological progress. The extinction of species.

The concept of levels of evolutionary change. The results of evolution: organic feasibility, adaptability of organisms, the diversity of species.

System of plants and animals– display of evolution. The principles of modern classification of organisms.

Basic evidences of organic evolution: comparative anatomical, embryological, biogeographical, and paleontological.

A comparative study of the structure of modern plants and animals in order to prove their historical development. Homology and analogy.

Rudiments and atavism in the structure of modern organisms as a proof of evolution.

The similarity of embryonic development of organisms as proof of the unity of origin. Müller- Haeckel biogenetic law.

The main directions of evolution – the ways of development of the organic world. The division of the earth's history into eras and periods.

The development of the organic world in the Archean, Proterozoic and Paleozoic era. The appearance of plants and animals - the divergence in the organic world according to the process of nutrition. Space the role of green plants. Single-celled. Multicellular.

Emergence of plants on land in the Paleozoic era. Psilophytes. Mosses. The reasons for fern prosperity. The appearance of gymnosperms.

Emergence of animals on land. The emergence of vertebrates after improvement of organization, emergence of devices of wide importance and expansion of the habitat. Crossopterygii as the ancestors of amphibians. The emergence and flourishing of ancient amphibians. Stegocephalia - "prefabricated" form.

The development of the organic world in the Mesozoic era. The dominance of gymnosperms. The emergence and spread of angiosperms. The spread of reptiles. The emergence of birds and mammals. The emergence of bony fishes. The reasons of the gymnosperms and reptiles extinction in the Mesozoic era.

The development of the organic world in the Cenozoic era. The dominance of angiosperms, insects, birds and mammals. The emergence in the evolution of multiple devices for adaptation to a variety of habitats.

The hypothesis of human origins. The role of biological and social factors in human evolution. Human evolution. The leading role of the laws of social life in the social progress of mankind.The unity of the origin of the human races. Unscientific, reactionary nature of "social Darwinism" and racism.

11 grade (170 hours per year)

Animals (40 hours)

The classification of animals. The concept of a kind, family, order, class and type. The value and success of modern zoology. Similarities and differences between plants and animals.

Subclass Protozoa. General characteristics of the class. Systematics. Type Sarkozhgutikovye. Class rhizopod. General characteristics of the class. Amoeba Proteus. Habitat. External and internal structure. Cytoplasm. Core. Motion. Food. Respiration. Isolation. Osmoregulation. Reproduction. Encystation. Marine sarkodovyh (foraminifera and radiolarians).

Dysentery amoeba. Structure. Habitat. Protection from infection (complete development cycle of a dysenteric amoeba is not studied).

Class flagellates. General characteristics of the class. Euglena green as a single-celled organism that combines the features of animals and plants. Volvox - colonial organism. Evolutionary significance of euglenophytes and volvoxes.

Parasitic flagellates (Giardia, trypanosomes, Leishmania, Trichomonas).

Type of ciliates. General characteristics of the type. Paramecium, bursariya, trumpeter, jib, stilonihiya, vorticella as more complex single-celled animals. Habitat. Structure. Features of life processes. Reproduction. Irritability.

Parasitic infusorium (balantidiums, Ichthyophthirius).

Sporozoa type. General characteristics of the type. Plasmodium falciparum as the causative agent of malaria. The way a human is infected by malaria. The general concept of the infection ways, changy of owners, life forms, the infective stage, the development cycles of parasitic protozoa. Ways of liquidation of malaria as a mass disease.

Subclass multicellular. Type Sponges. General characteristics of the type.

Type Coelenterates animals. General characteristics of the type. Systematics. Habitat Class Hydroids. General characteristics of the class. The freshwater hydra. External and internal structure. Radial symmetry. Nutrition of hydra. Respiration. Reflex. Regeneration. Reproduction asexual and sexual. Celled stage in the development of hydra.

Sea hydroid on the example of whitewash. Change of the phases in the life cycle.

Scyphozoa Class. General characteristics of the class. Representatives. The features of the marine hydroid.

Class coral polyps. General characteristics of the class. Representatives. Signs of complications in the organization. Meaning of coelenterates animals.

Type of flatworms. General characteristics of the type. Systematics. Class turbellarians. General characteristics of the class. White Planaria, as a representative of free-living worms. Habitat. External and internal structure. Bilateral symmetry. Nutrition. Respiration. The nervous system and sensory organs. Reproduction. Regeneration.

Flukes Class. General characteristics of the class. Liver fluke. External and internal structure. Adaptations to parasitism. Protection from infection. Change of the hosts in the development cycle (the full development cycle of the parasite is not studied).

Class Tapeworms. General characteristics of the class. Swine and bovine tapeworm, tapeworm echinococcus and broad fish tapeworm - human parasites. Features of external and internal structure. Cycles of development and change of owners. Protection from infection.

Type Roundworms. General characteristics of the type. Ascaris. Habitat. External and internal structure. Reproduction and development of the roundworm. Prevention measures against infection.

Roundworms - human parasites (threadworm, Trichinella, guinea-worm disease). Protection from infection.

Type Annelida. General characteristics of the type. Systematics.

Class Polychaetes. Nereid. Evolutionary significance of polychaete worms, their role in the nutrition of commercial fish.

Class Oligochaeta. General characteristics of the class. Earthworm. Habitat. External and internal structure. Digestive system, blood circulation, excretion. Features of the structure. Nervous system. Reproduction. Regeneration. The value of earthworms in soil formation.

The class of leeches. Features of the structure. The medical importance of leeches.

Type of Shellfish. General characteristics of the type. Systematics. Class Gastropods. General characteristics of the class. Habitat (freshwater and marine forms). External and internal structure. Movement. Features of life processes. Reproduction (particularly the development of marine and freshwater forms). The main representatives.

The class of Bivalves. General characteristics of the class. Habitat. External and internal structure. Movement. Reproduction. Marine and freshwater bivalve (the main representatives). Meaning of gastropods and bivalves.

The class Cephalopods. Features of the structure. Meaning for humans.

Type of Arthropods. General characteristics of the type. Systematics.

Class Crustaceans animals. General characteristics of the class. Crayfish. Habitat. External structure: chitin cover, dismemberment of the body, of extremities. Internal structure. Features of life processes. Reproduction. Other crustaceans. The medical importance. The value of fish in the diet. Commercial shellfish.

Class Arachnids animals. General characteristics of the class. Habitat. External and internal structure of the spider Araneus. Respiration,nutrition, reproduction. Web and its structure. Ticks. The role of ticks in nature and their medical value. Human protection measures against ticks.

The class of insects. General characteristics of the class. Habitat. External and internal structure of the insect on the example of the May beetle. Features of life. Reproduction. Types of insect development. A variety of insects and their importance.

The principal groups of insects. Insects with incomplete metamorphosis. Troop Orthoptera. Representatives. Locusts as a dangerous pest of agriculture. Troop Hemiptera (bugs). Representatives.Value. Protective coloration.

Insects with complete metamorphosis. The Order Lepidoptera. Representatives. Cabbage pierid. Silkworm. Sericulture. Coleoptera. Harmful and beneficial bugs. Warns coloring. The order Diptera.Representatives. Housefly, gadflies. Troop Hymenoptera. Representatives. Honeybees, ants. Features of life of social insects. Instinct. Riders as representatives of parasitic

Hymenoptera. Biological method of combating harmful insects. Protection of beneficial insects. The similarities and differences between arthropods and annelids. Aromorphoses arthropods.

Animals (35 hours)

Type Chordates. General characteristics of the type. Systematics. Class Amphioxus. Lancelet as a form close to the ancestor of vertebrates. Habitat. External and internal structure.Reproduction. Lifestyle. The similarity of lancelet with invertebrates and vertebrates.

Subtype Cranial or vertebrates. Superclass Pisces. General characteristics. External and internal structure of the fish on the example of river perch. Reproduction and development. The initial concept of the unconditioned and conditioned reflexes.

A systematic review of the superclass of fish.

Class Cartilaginous fish: sharks and rays. Characteristic. External and internal structure.

The class of Bone Fish.

Osteo-cartilaginous fishes (sturgeon). Representatives, structural features, value.

Bony fish: units - Clupeiformes, Salmoniformes, carps, Somoobraznye, gadiformes, Kamboloobraznye. Spawning conditions.

Lungfish.

Crossopterygii fish. Spawning conditions. Fertility. The development of fish migration.

Amphibians class. General characteristics of the class. Systematics. External and internal structure of a frog. Features of habitat. The role of the skin in the respiration. Reproduction and development of frogs (tadpoles, their resemblance to fish). Nutrition. Wintering. The diversity of amphibians and their meaning. The origin of amphibians.

Class of Reptiles. General characteristics of the class. Systematics. External and internal structure of the sand lizard. Adaptations to life in the terrestrial environment. Reproduction. Regeneration.

Snakes: snakes, vipers. Appearance. Differences between the Viper and Grass Snake. Poisonous glands, fangs and venom of a Viper. The action of venom poison. First aid after snakebite. Other modern reptiles: turtles, crocodiles. Variety of ancient reptiles. Origin of reptiles.

The Class Of Birds.. General characteristics of the class. External and internal structure of a dove.

The adaptation to flying. Features of life processes. Reproduction and development. The origin of birds.

Archeoptheryxes. Real birds. Ostrich (ratites) birds. Features of the structure and life. Penguins. Features of the structure and life. Flying (Keel) birds. Lifestyle, adaptability to different conditions of existence. Nutrition, reproduction and development.

Seasonal events in the life of birds: migration, nesting.

Ecological groups of birds. Security and attraction of birds (winter feeding, production and placement of artificial nests). The role of birds in nature and their significance for human life. Bird flu.

Class Mammals. General characteristics of the class. Systematics. Features of external and internal structure of mammals on the dog's example. Reproduction and development. The origin of mammals. Variety of mammals and their significance. Oviparous. Platypus and echidna. Similarities of egg-laying animals and reptiles. Present animals.

Placental mammals - the most progressive group of modern vertebrates. Their diversity.

Units: Insectivores, Bats, Rodents, Lagomorphs, Carnivora (canids, felids), Pinnipeds, Cetaceans, Artiodactyls, Later, Primates. Features of structure and life.

The value of mammals in nature and human life. Higher primates. Families Old World monkey and Apes. Apes and humans.

Human (60 hours)

Place and role of human in the organic system of the world, its similarity and contrast to animals.

The value of knowledge of the structure of the human body and of life for self-knowledge and preservation of health. Human sciences: anatomy, physiology, hygiene, medicine, psychology and others. Tissues, tissue types and their properties..

The structure and processes of the human organism. Neuro-humoral regulation of the processes of vital activity.

Nervous system. Structure and functions of the nervous system. Nervous tissue. Neuron. Features of its structure. Classification of neurons. Glia cells. The nerve impulse. Synapse.

Parts of the nervous system: central and peripheral. Spinal cord, its structure and functions.

Reflex nature of the activity of the nervous system. The reflex arc.

Brain structure and functions.

Somatic and vegetative (autonomic) nervous system. The autonomic nervous system, particularly its structure and functioning.

Sympathetic, parasympathetic, and metasympathetic parts, especially their structure and functioning. The influence of the sympathetic and parasympathetic part of the body on separate systems and organs. Stress and its development phases: alarm, adaptation exhaustion. Preventing the negative effects of stress.

Disorders of the nervous system activity and their prevention.

Endocrine system. Glands of external, internal and mixed secretion. The glands of internal secretion, their structure and function. The interconnection of the endocrine organs. Secrets and hormones. Hormones and their chemical nature, properties and functions. The hormones of the pituitary and pineal gland, thyroid, parathyroid and thymus glands, pancreas, adrenal glands

and gonads. Agencies - target. The concept of hypo- and hyperfunction of endocrine glands. Regulation of the activities of the glands. The interaction of the nervous and hormonal regulation.

Digestion. Nutrients, food. Significanse of food.

Digestive system, its structure (alimentary canal and digestive glands) and functions.

An overview of the digestive system: oral cavity organs (teeth, tongue, salivary glands), pharynx, esophagus, stomach, intestines, pancreas, liver.

Digestive enzymes. Changes of food in different parts of the alimentary canal.

Experiments of I.P. Pavlov on the activity of the salivary glands. The action of enzymes in the saliva of carbohydrates. Swallowing.

Allocation of gastric juice. The Pavlov's experiments on dogs with the same ventricle isolated from gastric fistula. Sham feeding. The influence of food composition on the activity of the digestive glands.Digestion in the stomach and small intestine. Enzymes.

Role of liver and pancreas in digestion.

Absorption of nutrients. The functions of the large intestine. Defecation. Examples of unconditioned and conditioned food reflexes.

Nervous and humoral regulation of digestion. Hygienic conditions of normal digestion. Diseases of the digestive system. Food poisoning. First aid measures. Infectious, non-infectious, acute, chronic diseases of the digestive system. Worm infestation. The concept of prevention of food-borne infections.

Respiration. The structure and function of respiratory organs (airway and lungs). Respiratory tract (nasal passages, larynx, trachea, bronchi). Vocal apparatus. Sound Education. Mutation of voice. Voice hygiene.

Lungs. Pleura. Pleural cavity. Respiration stages. External respiration, its mechanism. Respiratory movements. Vital capacity of the lungs.

Transport of blood gases. Tissue respiration. Nervous and humoral regulation of breathing. Protective breathing reflexes.

The value of breathing exercises. Artificial respiration. The concept of the clinical and biological death. Pre-hospital recovery methods of respiration and cardiac activity (mouth-to-mouth, chest compressions). First-aid measures after carbon monoxide poisoning and suffocation. Respiratory hygiene. The value of proper breathing. The fight for clean air at home, school and on the workplace. Transmission of infectious diseases (influenza, tuberculosis, diphtheria) through the air and their prevention. The harm of smoking.

Metabolism. Types of metabolism. Exchange of water. Exchange of mineral salts. Exchange fats. Exchange of proteins. Exchange of carbohydrates. Glycogen. Urea. The transformation of energy in the body. Body temperature. The importance of maintaining a constant body temperature.

Assimilation and dissimilation as two sides of a single process of metabolism. Self-renewal in the body in the process metabolism. The role of enzymes.

The role of the liver in the metabolism. The body's need for protein, fat, carbohydrate, water and salts. The content of proteins, fats and carbohydrates in the major food groups.

Regulation of metabolism. Food standards. Calories in food. Features of power in a period of growth. The value of proper nutrition for the body. The concept of diet therapy.

Vitamins (water-soluble, fat-soluble). Significance of vitamins. Diseases associated with lack of vitamins in the diet (vitamin deficiency, hypovitaminosis, hypervitaminosis).

The internal environment of an organism: blood, tissue fluid and lymph. The relative constancy of the internal environment of the body. Homeostasis. Tissue fluid, its composition, location in the body, a source of and the place of formation, functions. Saline. Blood substitutes.

Blood. Functions of blood. Composition of blood: plasma, formed elements. Role of erythrocytes in the transfer of gases. Anemia.

Platelets. Blood coagulation as a protective reaction of the organism. Coagulation disorders: thrombosis, hemophilia. The natural anticoagulant system of the body. Structure and functions of leukocyte.

Lymph formation. The difference between the lymph and plasma.

Immunity. The immune system. Types of immunity (cellular and humoral). Mechnikov's theory of the protective properties of the blood. Infectious agents: bacteria and viruses. The fight against epidemics. Stages of infectious disease: the incubation, acute, recovery.

Immunity and its types. Graft. Serum. Terms of care for infectious patients.

Blood groups. The transfusion of blood and its significance. RH factor. Rh disease.

Vascular system. The circulatory system, its functions. Blood vessels: arteries, capillaries and veins. Large and small circles of blood circulation. Heart, its structure and functioning. Heart valves.

The properties of the heart muscle. Automata heart. Cardiac conduction system. Cardiac cycle. Pulse, its about bution.

The mechanism of blood flow in the vessels. Blood pressure and blood flow rate in different parts of the bloodstream.

Circulation of lymph (lymph capillaries, lymphatics, lymph nodes, lymphatic trunks, lymph ducts).

Nervous and humoral regulation of the heart and blood vessels. Health of the cardiovascular system. Factors contributing to the normal functioning of the heart. Factors that negatively affect the cardiovascular system.

Circulatory disorders. Haemorrhage (capillary, venous, arterial, internal). First aid in the case of bleeding.

bodies urinary system. The structure and operation of the kidneys and urinary tract. The structure and function of the nephron.

The mechanism of formation of primary and secondary urine. The value of excretory organs in maintaining the constancy of the internal environment of the body. Hygiene of the organs of excretion. The spread of infections in the urinary system (the descending and ascending infection).

The development of the human body. Reproductive system (male and female). Sex organs (internal and external). Gonads. The sex cells, their structure and development. Ovulation. Ejaculation. Embryonic period. Fertilization. The role of chromosomes in the transmission of hereditary characteristics. Splitting. Gastrulation. Implantation. Embryonic shell. The similarity of the early stage of development and human vertebrate embryo. The law of embryonic similarity of K.Bera. Nutrition of embryo. The placenta (afterbirth). Post-embryonic development of human. Features of the development of children and youth organisms. The importance of physical culture and sport for the normal development and strengthen of the body.

Musculoskeletal system (passive and active parts). The functions of the locomotor system. Bone. The structural unit of bone - osteon. Structure and classification of bones. Organic and inorganic bone substance. Bone growth in length and width. Connection of bones. The structure of the joint. The structure of the human skeleton. The characteristics of its structure in connection with bipedal locomotion and labor activities.

The muscular system of human. Muscle tissue, its types. Muscle tissue properties. Skeletal muscle, their structure and function. Contraction of skeletal muscles. Reflex nature of the muscle activity. Coordination of movements. Work of muscles (static and dynamic). Fatigue according to I.M. Sechenov. Features of the musculoskeletal system of children and adolescents. The importance of physical education and sport for the proper formation of the skeleton and muscles. The negative effects of physical inactivity on health. First aid in case of fractures, dislocations and sprains The prevention of spinal curvature and the development of flatfoot. Proper seating, posture and working position.

Skin. Functions of the skin. The structure of the skin. Derivatives of skin. The role of skin in regulation of heat exchange. Sweating.

First aid for hypothermia (freezing, frostbite, burns, heat and sun strokes). The value of hardening of the body. Natural factors of hardening and rules of their usage. Hygiene of skin and clothing. Prevention of allergic, pustular, fungal diseases, scabies.

Analyzers. The Pavlov’s theory of analyzers. Meaning of analyzers for the perception of the surrounding world.

The structure of the eye (the eyeball, the auxiliary unit).

Image Perception. Accommodation. Binocular (stereoscopic vision). The optical system of the eye.

Visual analyzer. The photosensitive apparatus of the eye. The construction of the image on the retina.

Myopia, hyperopia, astigmatism, cataract, glaucoma and their correction. Hygiene of sight.

The structure and hygiene of the organ of hearing.

Auditory analyzer. The mechanism of perception of sounds. The organ of Corti.

Otolithic apparatus and the semicircular canals.

Vestibular analyzer.

The analyzer of the muscular sense. Analyzers of smell and taste.

Higher nervous activity (HNA). I. M. Sechenov's role in the development of the doctrine of HNA.

The I. P. Pavlov's theory of conditioned reflexes. Conditional and unconditional reflexes. Instinct. Skill. Habit.

Ecology (35 hours)

Ecology - the science of the laws governing the relationships of organisms with the environment. The problems of ecology. Habitat (terrestrial and air, water, living organisms) and ecological factors (abiotic, biotic and anthropogenic).

The adaptability of the organism (species) to abiotic and biotic factors of the environment. Optimum Law. Law of the minimum. Tolerance. Eurybionts and stenobiont. Complex impact of factors on the organism. Main climatic factors (light, temperature, humidity) and their influence on the organism. Limiting factors.

Biological rhythms Condition of winter dormancy (anabiosis). Cold-resistance. Factors that control the seasonal development. Photoperiodism.

The ecological characteristics of species and populations (size, density, fertility, mortality, population growth, the growth rate).

Population structure: sex, age, spatial and behavioral. The growth of the population. Survival curves. Regulation of population size. The ecological niche.

Community or biocenosis (phytocoenosis, zoocenoses, microbiocenosis). Biotope (ecotope).
Concepts biogeocoenosis and ecosystem. Species, spatial and trophic structure of the ecosystem.

The components of the ecosystem (producers, consuments, destructors). Chains and food networks. Types of food chains.

Lawa of the ecological pyramid. Self-regulation in biogeocoenose. Change of ecosystems (succession). Climax community. Agro-ecosystems.

Biosphere - a global ecosystem. Works of V.I. Vernadsky on the biosphere. The boundaries of the biosphere. The components of the biosphere (living, biogenic, bone, bio-bone, radioactive and cosmogenic substances, scattered atoms).

The functions of living matter (gas, concentration, redox, biochemical and biogeochemical). Biomass. The biological cycle. Biogenic migration of atoms (on the example of carbon and nitrogen cycle).

The evolution of the biosphere.

Global human-induced changes in the biosphere (the population explosion, the expenditure of natural resources, habitat alteration, pollution).

The Nature Conservancy (international organizations and programs, environmental monitoring, Red Books, protected natural areas and objects, natural monuments, zoos, MPC norms). Noosphere.

Expected outcomes of the educational activities of students

As a result of study of the section “Biology, Biological systems and processes" the students will be able to:

Call:

• the major milestones in the history of biology; the names of outstanding scientists who have made contributions to the development of biology;

• scientific facts, laws, theories, and concepts of modern biology; biological systems of various organization levels;

• the reasons which led to the differentiation of biological knowledge on separate sectors; other sciences related to biology.

Characterize:

• scientific, socio-historical background of the most important discoveries in the biological sciences;

• biological systems and processes taking place in them;

• methods for studying biological systems and phenomena of nature;

• Human system of views on wildlife and human place in it.

Justify:

• the value of scientific discoveries in biology, medicine and ecology for human culture;

• inevitable synthesis of science and socio-humanitarian knowledge in the era of information civilization;

• measures of safe behavior in the environment, in emergency situations of natural and technogenic character.

Compare:

• different biological concepts and theories;

• views on the relationship between man and nature at different historical stages of development of society;

• socio-humanitarian and natural-scientific approaches to the consideration of man and nature, the material and spiritual principles in his thinking.

Evaluate:

• the significance of the most important discoveries in biology, medicine and ecology;

• information on current research in biology, medicine and ecology, their practical and ethical value;

• the possible consequences of activities for the existence of certain biological objects, whole natural communities and ecosystems.

Gives an example of:

• the use of the achievements of modern biology to address the environmental, demographic and socio-economic problems;

• the positive and negative human impact on wildlife;

• the use of biological and ecological knowledge for the conservation of biodiversity as a condition for the sustainable existence of the biosphere.

Make conclusions:

on the social, cultural, philosophical and economic reasons for the development of biology and ecology;

the need to review the basic concepts of biology and ecology in terms of their historical implications, the economic significance;

about the results of biological, ecological observations and experiments.

Participate:

in organizing and conducting biological and ecological observations and experiments, observing the seasonal changes and the progressive development of ecosystems;

in discussions of the problems related to biology, ecology and medicine, formulate arguments and to defend position on these issues;

in the collective group activities in search and systematization of the additional information in preparation for seminars, for writing reports, essays, project implementation and research.

Follow:

rules of respect of the natural sites of importance for sustainable coexistence of humanity and nature;

measures of prevention of infectious and parasitic diseases in humans, the rules of a healthy lifestyle.

Work programme and lesson plan 10th grade (170 hours)

Week number	Lesson number	Content	Subject of the lecture	Monitoring	
		Fundamentals of cytology (40 hours) 5 hours per week			
1	1	The rules of conduct and safety in biology class when performing laboratory and practical work. Definition of life. The main features of living organisms. Levels of organization of living matter. Subject, tasks and methods of cytology. *Cytology significance for medicine.* Methods for studying cells.		1	
	2	The chemical composition of cells. The elemental composition. Water. Isotonic, hypotonic and hypertonic solutions. Tension cells. *Homeostasis cells, its importance for the normal functioning of the body.*		2	
	3	Organic substance cells. Biopolymers. Lipids (fats and lipids), particularly their structures and functions.		3	
	4	Carbohydrates. Carbohydrates function in the cell. Backup and structural polysaccharides.		4	
	5	**Lab.** Working with a microscope. Deplazmolysis and plasmolysis in plant cells. **Lab.** Color change of the cut plants put in water containing a colorant. **Lab.** The splitting of hydrogen peroxide by enzymes contained in the leaf cells elodea.		5	
2	6	Cell - structural and functional unit of living matter. The history of the cell opening. The main provisions of the cell theory.	Cell - structural and functional unit of living matter. The main structural components of eukaryotic cells: the cell membrane, cytoplasm and	1	
	7	The main structural components of eukaryotic cells: the cell membrane, cytoplasm and nucleus.		2	
	8	Single-membrane organelles, their structure and function. The concept of compartment .Vacuolar system in a cell organelle structure **Practical work:** 1. The acquisition of the skill of reproduction of schemes of single-membrane **organelles** structure**;..** 2. The acquisition of the skill of finding a variety of organelles in the cell electron diffraction.		3	
	9	Double-membrane organelles, their structure and function of organelles structure **Practical work:** 1. The		4	

		acquisition of the skill of reproduction schemes of double-membrane **organelles** structure**;.** 2. The acquisition of the skill of finding a variety of organelles in the cell electron diffraction.	nucleus. Organelles and inclusions. Single-membrane organelles. Vacuolar system.		
	10	Non-membrane organelles, their structure and function. . Inclusions of cell organelle structure **Practical work:**1. The acquisition of the skill acquisition of the skill of reproduction of schemes of non-membrane **organelles** structure**;.** 2. The acquisition of the skill of finding a variety of organelles in the cell electron diffraction.		5	
3	11	The concept of organelles and inclusion. **Lab.** The main structural components of eukaryotic cells. **Lab.** Inclusions and their functions.	Double-membrane organelles . Non-membrane organelles. Inclusions. Prokaryotic and eukaryotic cells.	1	
	12	The structural features of plant, animal and fungal cells. **Lab.** The structure of plant, animal and fungal cells under a microscope. **Lab.** Movement of chloroplasts in plant cells.		2	
	13	Prokaryotic and eukaryotic cells.		3	
	14	Features of the structure and prokaryotic cell activity.		4	
	15	Acellular forms of life. Viruses and phages - intracellular parasites. Viral disease in humans, animals and plants.		5	
4	16	Structure and function of the nucleus. Chromosomes, their chemical composition and structure. The concept of a karyotype.	Structure and function of the nucleus.Chromosomes , their chemical composition and structure. Nucleic acids - non-recurrent biopolymers. DNA and RNA.	1	
	17	Nucleic acids, their structure and function. Differences between DNA and RNA molecules.		2	
	18	Characteristics of the DNA helix. DNA replication.		3	
	19	Transcription. RNA types, their role in the cell.		4	
	20	Gene. Structural genes. Genes pro- and eukaryotes. Splicing. DNA code. **Practice work.** The solution of situational problems in the construction of DNA, RNA and protein.		5	
5	21	Proteins. Primary and secondary structure of the protein.	Metabolism. Plastic and energy	1	
	22	Tertiary and quaternary structure of the protein.		2	

	23	Proteins function in the cell. Enzymes, their chemical composition and structure. Denaturation and renaturation of protein.	exchanges. Plastic exchange. Protein biosynthesis.	3	
	24	Metabolism. Plastic and energy exchanges.		4	
	25	Protein biosynthesis. The role of nucleic acids in the protein biosynthesis. Transcription.		5	
6	26	The activation process of tRNA. The role of enzymes in protein biosynthesis implementation.	Autotrophs and heterotrophs.Photosynthesis. The biological significance of photosynthesis.	1	
	27	Translation. The role of ribosomal protein biosynthesis.		2	
	28	**Practice work.** The solution of situational problems to build protein molecules on the basis of the DNA molecule.		3	
	29	Autotrophs and heterotrophs.		4	
	thirty	Photosynthesis. The biological significance of photosynthesis. The structure of the chloroplasts. Light and dark phases of photosynthesis.		5	
7	31	The light phase of photosynthesis. Role of enzymes, pigments and NADP +.	Energy metabolism.Glycolysis. Fermentation.Cellular respiration.	1	
	32	The dark phase of photosynthesis. The relationship of light and dark phases of photosynthesis. The role of enzymes.		2	
	33	Ways to improve the efficiency of the processes of photosynthesis in crop plants.		3	
	34	Chemosynthesis.		4	
	35	Energy metabolism. ATP, GTP, FAD. Energy bonds in ATP. The role of ATP in the cell activity.		5	
8	36	The main stages of energy metabolism. The preparatory phase, the role of the lysosomes in the process.		1	
	37	Glycolysis, its energy efficiency. The role of enzymes and NAD + in glycolysis.		2	
	38	Fermentation. Types of fermentation (lactic and alcoholic). The energy efficiency of fermentation processes.		3	
	39	Cellular respiration. Oxidative cleavage of pyruvate. The main reactions and biological meaning of the Krebs cycle.		4	
	40	Cellular respiration. Oxidative phosphorylation. The role of oxygen in the respiration. The energy efficiency of the processes of respiration.		5	

		Reproduction and development of organisms (20 hours) 5 hours per week			
9	41	Cell division - biological process that underlies reproduction and individual development of organisms.The concept of a karyotype. Haploid and diploid sets of chromosomes.		**Intermediate monitoring. Cytology.**	
	42	Eu- and heterochromatin. The constancy of the amount of DNA in the nucleus. The mitotic cell cycle.Polytene chromosomes.			
	43	Mitosis. The phases of mitosis.			
	44	The biological significance of mitosis. Practical work. Solution of the problems involving division of mitosis.			
	45	Amitosis. The biological significance of amitosis. Cytotoxic agents. Formation of polyploids. **Practical work**. Solution of the problems involving division of mitosis.			
10	46	Types of breeding organisms. Asexual and sexual reproduction. Types of asexual reproduction.	Meiosis. The biological significance of meiosis. Gametogenesis - spermatogenesis and oogenesis.	1	
	47	Meiosis. The first division of meiosis. Interkinesis. The second meiotic division.		2	
	48	The biological significance of meiosis. **Practical work.** Solving problems in the phase of meiosis.		3	
	49	**Practical work.** Solving problems on the phases of mitosis and meiosis.		4	
	50	Gametogenesis. Features of spermato - and oogenesis.		5	
11	51	Germ cells. **Practical work.** The solution of tasks on gametogenesis.	Fertilization is the process of restoring the diploid set of chromosomes. Individual development of organisms (crushing, gastrulation, histo-and organogenesis).	1	
	52	Types of sexual reproduction.		2	
	53	Fertilization - the recovery process of the diploid number of chromosomes. Parthenogenesis.		3	
	54	Double fertilization in flowering plants.		4	
	55	Individual development of organisms. The periods of ontogeny.		5	
12	56	The development of a fertilized egg (in Amphioxus example). Splitting. Blastula.		1	
	57	Gastrulation. Gastrula stage.		2	

	58	Germ layers. Homology germ layers as evidence of the unity of origin of the animals.		3	
	59	Formation of organ systems. Embryonic induction.		4	
	60	Post-embryonic development. Direct and indirect development.		5	
		Fundamentals of Genetics (30 hours)			
13	61	Genetics - the science of the laws of heredity and variation. Hybridological method of studying heredity.Basic concepts of genetics.	Basic concepts of genetics. Mendel's laws.	**Interim monitoring.Reproduction and development.**	
	62	Mendel’s Laws. Monohybrid cross. The first law of Mendel. Practical lesson. Task solution.			
	63	The second law of Mendel. Splitting in the second generation. Practical lesson. Task solution.			
	64	The intermediate type of inheritance. Analyzing cross. The hypothesis of the "purity of gametes." Meiosis as a material basis for the "purity of gametes" hypothesis. Practical lesson. Task solution.			
	65	Two-hybrid and polhybrid crossing. The third law of Mendel. The statistical nature of cleavage events.Lattice Penneta.			
14	66	Practical lesson. Task solution.	The interaction of allelic and non-allelic genes.	1	
	67	Genotype as a holistic system of historically established. Interaction of alleles.		2	
	68	Inheritance of blood groups and rhesus factor. Rhesus factor. Practical lesson. Task solution..		3	
	69	Interaction of non-allelic genes.		4	
	70	Practical lesson. Task solution.		5	
15	71	The chromosomal theory of heredity of T.Morgana. The phenomenon of linked inheritance. Linkage group.	The chromosomal theory of heredity of T.Morgana.Types of sex determination. Sex-linked inheritance.	1	
	72	Full linkage.		2	
	73	Practical lesson. Task solution.		3	
	74	Incomplete clutch. Crossover. Genetic maps of chromosomes.		4	
	75	Practical lesson. Task solution.		5	
16	76	Methods of sex determination. Chromosomal sex determination.	Variability and its	1	

	77	Sex chromosomes and autosomes. Types of sex determination. Sex-linked inheritance. Inheritance, limited by sex.	types.	2	
	78	Practical lesson. Task solution.		3	
	79	Variability and its types.		4	
	80	Modification variability. The rate of reaction. Statistical patterns of modification variability. Variation number and variation curve.		5	
17	81	Practical lesson. Task solution by the drawing a number of variations, variational curve.	Human Genetics.Methods of studying human heredity.	1	
	82	Genotypic variability: mutation and combinative. Recombinant chromosome. Mutagenic factors.		2	
	83	Genomic mutation.		3	
	84	The gene and chromosomal mutations.		4	
	85	Human Genetics.		5	
18	86	Methods of studying human heredity.		1	
	87	Plant selection.		2	
	88	Selection of animals and microorganisms.		3	
	89	Fundamentals of biotechnology. Cell engineering.		4	
	90	Fundamentals of biotechnology. Genetic Engineering.		5	
		Bacteria, fungi, lichens, plants (45 hours)			
19	91	Botany - the study of plants. General knowledge about plants and their taxonomy. Elementary concepts of systematic (taxonomic) categories. The plant - the entire organism. The general concept of vegetative and generative organs.	Plant Systematics. The plant cell. Tissues of plant organs in connection with the functions performed in the whole organism	**Interim monitoring. Genetics**	
	92	Life forms of plants. Basic vital functions of the plant organism. Turgor. Movement of plants. Features of the structure of the plant cell. **Lab.** The main components of the plant cell. **Lab.** The movement of chloroplasts in plant cells. **Lab.**Plasmolysis of the plant cell. **Lab.** Inclusion in a plant cell.			
	93	Tissues of plant organs in connection with the functions performed in the whole organism (the covering,			

		basic and formational).			
	94	Tissues of plant organs in connection with the functions performed in the whole organism (conductive and mechanical).			
	95	Green algae. General characteristics. Systematics. Single-celled algae (chlamydomonas, chlorella, pleurococcus).			
20	96	The filamentous algae. The structure and characteristics of life. Asexual and sexual reproduction of algae.Distribution of algae. **Lab.** Algae.	Algae . General characteristics. Systematics. Significance for humans.	1	
	97	Brown and red algae. Examples of seaweed. The value of algae in nature and economy. **Lab.** Laminaria.		2	
	98	The structure, reproduction and life conditions of the bacteria. Significance of bacteria for human life.		3	
	99	Kingdom Fungi. Real fungi. General characteristics. Systematics. The reasons for the ambiguity of the systematics of fungi and their comparison with the plants and animals. The lower and higher fungi.		4	
	100	Moulds. Yeast. The structure, reproduction, especially life.		5	
21	101	Mushrooms parasites. The structure, nutrition, reproduction.	Mushrooms and lichens.Features of the structure and functioning. The role for nature and human life.	1	
	102	Pileate mushrooms.		2	
	103	Lichens.		3	
	104	Department spread Moss plants. Green moss. The structure, reproduction and development cycle of flax Kukushkin. Concepts sporophyte and gametophyte.		4	
	105	Sphagnum moss. Waterlogging. Peat formation, its significance.		5	
22	106	Order lycopsids. General characteristics. Lycopodium clavatum. The structure, reproduction, development cycle. Significance of lycopsids plants.	Spread of moss and ferns.Features of the structure.The alternation of generations. Significa nce for humans.	1	
	107	Order Horsetail plant. General characteristics. Horsetail. The structure, reproduction, development cycle. Significance of Horsetail.		2	
	108	Order of Ferny plants. General characteristics. Bracken fern. The structure, reproduction and development cycle. Fossil fern and coal formation. Significance of fern plants in nature and human life.		3	
	109	Order of gymnosperms.		4	

	110	Distribution and biology of conifers. Significance for nature and the economy.		5	
23	111	Angiosperms (flowering plants). Main aromorphoses angiosperms.	Gymnosperms. The structure, reproduction and development cycle on the example of pine.	1	
	112	Flower.		2	
	113	The inflorescences and their biological significance. Pollination. Double fertilization.		3	
	114	The formation of the seed and fruit. Seed. Functions of seeds. The structure of the seed.		4	
	115	Composition of seed. Terms of seed germination. Seed germination. Sowing time and depth of seeding. Respiration of seeds. Nutrition and growth of seedlings. Elevated and underground germination. **Lab.** Detection of reserve substances in wheat seed. **Lab.** Germination of wheat seeds and beans.		5	
24	116	Fetus. Methods for propagation of seeds and fruits in nature.	Angiosperms. Flower. Double fertilization in flowering plants and its mechanism. The formation of the seed and fruit.	1	
	117	Root. Root functions. Types of roots. Types of root systems. Root zones. Root cap. The structure of root fibril.Root growth in length and width.		2	
	118	The anatomical structure of the root of monocots in the suction zone. Root uptake of water and mineral salts. The mineral salts needed for a plant.		3	
	119	The anatomical structure of roots of dicotyledonous plants in the zone o carriage.		4	
	120	Modifications of roots, their structure, biological and economic importance. The phenomenon of parasitism among plants. Significance of tillage, fertilization, irrigation, cultivation of crops for life.		5	
25	121	The shoot. Variety shoots. Runaway growth in length and width. The gusset growth.	Vegetative plant organs.	1	
	122	Bud , its structure and location on the stem. The development of shoot from bud. Branching shoot.		2	
	123	Stem. Stem functions. The anatomical structure of a woody stem dicot. The increase in thickness of the stem.The formation of growth rings. Seasonal variations in the timber. Age of trees. The movement of mineral and organic substances on the stalk.		3	
	124	Modified shoots: underground (rhizome, stolon, tuber, bulb) and aboveground (stolons tuber, tendril, thorn), their structure, biological and economic importance.		4	
	125	Vegetative reproduction of plants.		5	

26	126	Leaf. Functions of leaf. The external structure of the composite leaf. Leaf fall.	Dicotyledonous class and the Monocots class. Features of classes and the main features of the families.	1	
	127	Leaf. Functions of leaf. The external structure of the composite leaf. Leaf fall.		2	
	128	Features of the internal structure of the leaf in connection with its functions.		3	
	129	Class Dicots. General characteristics. Cruciferous.		4	
	130	The Rosaceae family.		5	
27	131	The Legume family.		1	
	132	The Solanaceae family		2	
	133	The Asteraceae family.		3	
	134	Class Monocots. General characteristics. The family of Liliaceae.		4	
	135	Class Monocots. General characteristics. The family of Cereals.		5	
		Evolution (35 hours)			
28	136	General characteristics of the pre-Darwinian biology period. Dominance in the science of metaphysical notions of the immutability of nature and "primal feasibility".	General characteristics of the period of pre-Darwinian biology in **works of Carl Linnaeus. The teaching of Lamarck.**	**Interim monitoring. Botany.**	
	137	Works of Carl Linnaeus on the taxonomy of plants and animals and their importance.			
	138	The teaching of Lamarck on the evolution of nature and its significance.			
	139	The first Russian evolutionists.			
	140	Visiting Darwin Museum.			
29	141	Historical preconditions of Charles Darwin's theory.	STE. Microevolution. The population as a basic unit of evolution.Elementary factors of evolution.	1	
	142	Works of Charles Darwin. The main provisions of the Charles Darwin theory of evolution. Significance for teaching natural sciences.		2	
	143	The driving force of evolution. Heredity. Variability, variability of species. Natural selection.		3	
	144	The leading role of natural selection in evolution. The struggle for existence, its forms.		4	

	145	Artificial selection and genetic variation - the basis of selection of domestic animals and varieties of cultivated plants. Common and different between artificial and natural selection.	Speciation. Species.	5	
30	146	STE. The adaptive nature of evolution. Relative expediency. The divergent nature of evolution.Convergence.	Macroevolution.	1	
	147	Microevolution. The population as a basic unit of evolution. The concept of the ecological and genetic characteristics of the populations.		2	
	148	Elementary factors of evolution.		3	
	149	Natural selection - the guiding factor in evolution. The forms of natural selection. The creative role of natural selection.		4	
	150	Speciation - the result of microevolution. Ways of speciation. Species. Criteria of species. The structure of the species.		5	
31	151	Macroevolution. The emergence of supra-species taxa. Forms phylogeny.	The division of the earth's history into eras and periods. The development of the organic world in the Archean, Proterozoic and Paleozoic era.	1	
	152	The concept of the speed of evolution. The relationship between micro - and macroevolution. The main directions of evolution.		2	
	153	Biological progress or biological regression. Ways to achieve biological progress. The extinction of species.		3	
	154	The concept of levels of evolutionary change. Results of evolution: organic expediency, fitness of organisms, species diversity.		4	
	155	The system of plants and animals - display of evolution. Principles of modern classification of organisms. Key evidence of organic evolution: a paleontological and biogeographical regions.		5	
32	156	The main evidence of organic evolution: comparative anatomy, embryology.	The division of the earth's history into eras and periods. The development of the organic world in the Mesozoic and	1	
	157	A comparative study of the structure of modern plants and animals for proof of their historical development. Homology and analogy.		2	
	158	Rudiments and atavism in the structure of modern organisms as proof of evolution.		3	
	159	The similarity of the embryonic development of organisms as proof of the unity of their origin. Biogenetic law the Müller - Haeckel.		4	

	160	The emergence of life on Earth. Hypothesis of the origin of life.	Cenozoic era.	5	
33	161	Geological and chemical evolution (abiogenesis).	Human origin.	1	
	162	Biogenesis.		2	
	163	The main directions of evolution - the development of the organic world. The division of the earth's history into eras and periods.		3	
	164	The development of the organic world in the Archean, Proterozoic and Paleozoic era. The appearance of plants and animals - the divergence in the organic world by the process of nutrition. Space the role of green plants. Single-celled. Multicellular.		4	
	165	The emergence of plants onto land in the Paleozoic era. Psilophytes. Mosses. The causes of the blossoming fern. The appearance of gymnosperms.		5	
34	166	The emergence of animal onto land. The appearance of vertebrates by improving the organization of devices of wide importance and expansion of the habitat. Crossopterygii as the ancestors of amphibians. The emergence and flourishing of ancient amphibians. Stegocephalia - "prefabricated" form.		1	
	167	The development of the organic world in the Mesozoic era. The dominance of the gymnosperms. The emergence and spread of the angiosperms. The heyday of reptiles. The emergence of birds and mammals. The appearance of bony fishes. The reasons for the extinction of the gymnosperms and reptiles in the Mesozoic era.		2	
	168	The development of the organic world in the Cenozoic era. The dominance of angiosperms, insects, birds and mammals. The emergence in the evolution of multiple devices to a variety of habitats.		3	
	169	The hypothesis of human origins. The unity of the origin of the human races. Unscientific, reactionary nature of "social Darwinism" and racism.		4	
	170	The role of biological and social factors in human evolution.		5	
				Final exam for entrance in the 11th grade.	

Work programme and lesson planning for 11th grade (170 hours)

week number	lesson number	Content	Subject of lectures	Monitoring	
		Animals (40 hours)			
1	1	The classification of animals. The concept of a kingdom, phylum, class. order, class and species. The significance and success of modern zoology. Similarities and differences between plants and animals.	Parasitic Sarcomastigophora	1	
	2	Subkingdom Protozoa. General characteristics of the kingdom. Systematics. Type Sarcomastigophora. Class Rhizopod. Marine Sarcodina.		2	
	3	Dysentery amoeba.		3	
	4	Class flagellates. Evolutionary significance of euglenophytes and volvoxes.		4	
	5	Parasitic flagellates.		5	
2	6	Type of ciliates.	Ciliates and Spore.	1	
	7	Type of Spore.		2	
	8	Parasitic ciliates and Sporozoa. The general concept of the infection ways, changing owners, life forms, the infective stage, the cycles of parasitic ciliates and Sporozoa. Ways of eliminating malaria as a mass disease.		3	
	9	Subkingdom multicellular. Type of cloth. General characteristics of the type.		4	
	10	Type Coelenterates animals.		5	
3	eleven	Sea hydroid phase change in the life cycle.	Type Coelenterates animals.	1	
	12	Class Scyphozoa.		2	
	13	Class coral polyps.		3	

	14	Type of flat worms. General characteristics of the type. Systematics.		4	
	15	Flukes Class. General characteristics of the class. Adaptations to parasitism. Protection from infection. Change ща the hosts in the development cycle.		5	
4	16	Class Tapeworms. General characteristics of the class. Cycles of development and change of owners. Protection from infection.	Flat worms - parasites of man.	1	
	17	Tapeworms - human parasites.		2	
	18	Type Roundworms. General characteristics of the type. Ascaris. Reproduction and development of the roundworm. Prevention measures against infection.		3	
	19	Round worms - human parasites. Protection from infection.		4	
	20	Type Annelida. General characteristics of the type. Systematics. Class Polychaetes. Nereid and lobworm.Evolutionary significance of polychaete worms.		5	
5	21	Class Oligochaeta. General characteristics of the class.	Round worms - parasites of man.	1	
	22	The class of leeches. Features of the structure. The medical importance of leeches.		2	
	23	Type of Shellfish. General characteristics of the type. Systematics. Class Gastropods.		3	
	24	The class of Bivalves. General characteristics of the class. Meaning of gastropods and bivalves.		4	
	25	The class Cephalopods. Features of the structure. Meaning for humans.		5	
6	26	Type of Arthropods. General characteristics of the type. Systematics. The similarities and differences between arthropods and annelids. Aromorphoses arthropods.	Type Annelida. Main aromorphoses arthropods.	1	
	27	Class Crustaceans animals. General characteristics of the class.		2	
	28	A variety of crustaceans animals. The medical importance.		3	
	29	Class Arachnids animals. General characteristics of the class. Poisonous spider.		4	
	30	Pincers. The role of pincers in nature and their medical value. Human protection measures against ticks.		5	
7	31	The class of insects. General characteristics of the class.	Class Arachnids. The medical value of the	1	
	32	A variety of insects and their importance. The principal Order of the insects.		2	

	33	Order of insects with incomplete metamorphosis. Order Orthoptera. Representatives. Locusts as a dangerous pest of agriculture.	class.	3	
	34	Order of insects with incomplete metamorphosis. Order Hemiptera (bugs). Representatives. Significance. Protective coloration.		4	
	35	Order of insects with incomplete metamorphosis. Cockroaches squad. Representatives. Significance.		5	
8	36	Order of insects with incomplete metamorphosis. Lice Squad. Representatives. Significance.	A variety of insects and their importance.	1	
	37	Order endopterygota. The Lepidoptera. Representatives. Significance.		2	
	38	Order endopterygota. Order Coleoptera. Harmful and beneficial bugs. Warns coloring.		3	
	39	Order endopterygota. Order Diptera.		4	
	40	Order endopterygota. Order Hymenoptera. Riders as representatives of parasitic Hymenoptera. Biological method of combating harmful insects. Protection of beneficial insects.		5	
		Animals (35 hours)			
9	41	Type Chordates. General characteristics of the type. Systematics.	Type Chordates. General characteristics of the type. Fish. A systematic review of the superclass of fish.	**Interim monitoring.** Zoology of invertebrates	
	42	Class Amphioxus.			
	43	The similarity of Amphioxus with invertebrates and vertebrates.			
	44	Vertebrates subtype. Superclass Pisces. General characteristics.			
	45	Reproduction and development of fish. Fertility. The development of fish migration.			
10	46	Class Cartilaginous fish:	Class Amphibians Systematics. General characteristics of the class.	1	
	47	The class of Bony fish. Bone and cartilaginous fish (Sturgeon). Representatives, structure, significance.		2	
	48	Bony fish: Clupeiformes, Salmoniformes, Carps, Catfishes, Gadiformes, . Pleuronectiformes. Spawning conditions.		3	
	49	Lungfish.		4	
	50	Crossopterygii fish.		5	

11	51	Amphibians class. General characteristics of the class. Systematics.	Class Reptiles. Systematics.General characteristics of the class.	1	
	52	The diversity of amphibians and their meaning. The origin of amphibians.		2	
	53	Class of Reptiles. General characteristics of the class. Systematics. Adaptations to life in the terrestrial environment.		3	
	54	Snakes: snakes, vipers. Appearance. Differences from viper snake. Poisonous glands, fangs and venom viper. The action of snake venom. First aid for snakebite.		4	
	55	Modern reptiles: turtles, crocodiles.		5	
12	56	Variety of ancient reptiles. The origin of reptiles.	Class Birds. General characteristics of the class.	1	
	57	Class Birds. General characteristics of the class.		2	
	58	The fitness of the birds to fly.		3	
	59	Reproduction and development of birds. The origin of birds.		4	
	60	Perioptic. Real birds. Ostrich (ratites) birds. Features of the structure and functioning. Penguins. Features of the structure and living. Flying (Keel) birds. Lifestyle, adaptability to different conditions of existence.Nutrition, reproduction and development.		5	
13	61	Seasonal events in the life of birds: flights, nesting.	Class Mammals. Systematics. General characteristics of the class.	1	
	62	Environmental order of birds. The role of birds in nature and their significance in human life. Bird flu.		2	
	63	Class Mammals. General characteristics of the class. Systematics.		3	
	64	Features external and internal structure of mammals.		4	
	65	Reproduction and development. The origin of mammals.		5	
14	66	The diversity of mammals and their meaning. Oviparous. Platypus and echidna. Similarities and egg-laying reptiles.	Higher primates.	1	
	67	The diversity of mammals and their meaning. Marsupial mammals.		2	
	68	These beasts. Placental mammals - the most progressive group of modern vertebrates. Their diversity.		3	
	69	Order: Pitcher, Bats. Features of the structure and living.		4	

	70	Order: Rodents, Lagomorphs. Features of the structure and living.		5	
15	71	Order: Carnivorous. Features of the structure and living.	Apes.	1	
	72	Order: Pinnipeds, Cetaceans. Features of the structure and living.		2	
	73	Order: Artiodactyla, Perissodactyla. Features of the structure and living.		3	
	74	Order: Primates. Features of the structure and living.		4	
	75	Great apes. Families of Old World monkeys and Apes. Apes and humans.		5	
		Human (60 hours)			
16	76	Human sciences: anatomy, physiology, hygiene, medicine, psychology. Tissue, tissue types and their properties.	Divisions of the nervous system. Brain and spinal cord.	**Interim monitoring.** Zoology of vertebrates	
	77	Organs, organ systems. The structure and processes of the human organism. Neuro-humoral regulation of the processes of vital activity.			
	78	Structure and function of the nervous system. Nervous tissue. Divisions of the nervous system: central and peripheral. Spinal cord, its structure and function.			
	79	Reflex nature of the activity of the nervous system. The reflex arc.			
	80	Brain structure and functions.			
17	81	The somatic and autonomic nervous system. The vegetative (autonomic) nervous system, particularly its structure and functioning of the stress and its development phases: alarm, adaptation exhaustion. Preventing the negative effects of stress. Disorders of the nervous system activity and their prevention. Practical work. Experience (joint activity of sympathetic and parasympathetic systems), the experience (the cerebellum).	Somatic and vegetative (autonomic) nervous systems.Departments of the autonomic nervous system.	1	
	82	The endocrine system. Gland of external, internal and mixed secretion. Secrets and hormones. Hormones. Target organs. Concept about Hypo - and hyperfunction of endocrine glands.		2	
	83	The hormones of the pituitary, pineal gland, thyroid, parathyroid and thymus glands.		3	

	84	Hormones of the pancreas, adrenal glands and gonads. Regulation of the activities of the glands. The interaction of the nervous and humoral regulation.		4	
	85	An overview of the digestive system.		5	
18	86	Digestive enzymes. Changes of food in different parts of the alimentary canal.	The glands of internal secretion, their structure and function.	1	
	87	Experiments of Pavlov on studying digestion. Practical work. The action of saliva on starch.		2	
	88	Nervous and humoral regulation of digestion. Hygienic conditions of normal digestion. Diseases of the digestive system. Food poisoning. First aid measures. Infectious, non-infectious, acute, chronic diseases of the digestive system. Worm infestation. The concept of prevention of food-borne infections.		3	
	89	Higher nervous activity (HNA). I.M. Sechenov role in the development of the doctrine of HNA.		4	
	90	The teaching of I.P. Pavlov on conditioned reflexes. Conditioned and unconditioned reflexes. Instinct. Skill. Habit.		5	
19	91	Respiration. Structure and function of the respiratory system. Voice aid. Sound formation. Mutation of voice. Voice hygiene. Lungs. Breathing Stages. External respiration, its mechanism. Respiratory movements. Vital capacity of the lungs.	Overview of the digestive system. Digestive enzymes. Changing food in different parts of the alimentary canal.	1	
	92	Transport of blood gases. Tissue respiration. Nervous and humoral regulation of breathing. Protective breathing reflexes. The value of breathing exercises. Practical work (counting lung capacity from the formula). Respiratory hygiene. The value of proper breathing. The fight for clean air at the home, school and on the workplace. Transmission of infectious diseases through the air and their prevention. The harm from smoking.		2	
	93	Artificial respiration. The concept of the clinical and biological death. Pre-hospital recovery methods of respiration and cardiac activity. First-aid measures with carbon monoxide poisoning and suffocation.		3	
	94	Metabolism. The role of the liver in the metabolism. Food Standards. Features of power in a period of growth. The value of proper nutrition to the body. The concept of diet therapy practice. Defining energy as		4	

		heart rate.			
	95	Vitamins. Significance of vitamins. Diseases associated with vitamin deficiency in the diet.		5	
20	96	The internal environment of an organism. Homeostasis. Tissue fluid. Saline. Blood substitutes. Blood. Functions of blood. Practical work. The cells of human blood.	Breath. Structure and function of the respiratory system. Breathing Stages.	1	
	97	Composition of blood: plasma, formed elements. Role of erythrocytes in the transfer of gases. Anemia.		2	
	98	Platelets. Blood clotting as a protective reaction of the organism. Coagulation disorders: thrombosis, hemophilia. The natural anticoagulant system of the body.		3	
	99	Structure and function of leukocyte. Lymph formation. The difference of the lymph from the plasma.		4	
	100	Immunity. The immune system. Types of immunity. Doctrine of Mechnikov on the protective properties of the blood. Infectious agents: bacteria and viruses. The fight against epidemics. Stages of infection.		5	
21	101	Immunity and its types. Inoculation. Serum. Rules for the care of infectious patients.	Vitamins. Hygienic conditions of normal digestion.	1	
	102	Blood Order. The transfusion of blood and its value. Rhesus - factor. Rh disease.		2	
	103	Vascular system. The circulatory system, its functions. Blood vessels: arteries, capillaries and veins.		3	
	104	Large and small circulation.		4	
	105	Heart its structure. Heart valves.		5	
22	106	Heart Work. The properties of the heart muscle. Automata heart. Cardiac conduction system. Cardiac cycle. Pulse, its definition. Arterial pressure.	Blood. Functions of blood.Composition of blood: plasma, formed elements.	1	
	107	The lymphatic system.		2	
	108	Nervous and humoral regulation of the heart and blood vessels. Health of the cardiovascular system. Factors contributing to the normal functioning of the heart. Factors adversely affecting the cardiovascular system. Practical work. Determination of heart rate (HR) at rest and after exercise activities. Practical work. Functional tests on the reactivity of the cardiovascular system.		3	
	109	Circulatory disorders. Haemorrhage (capillary, venous, arterial, internal). First aid for bleeding.		4	
	110	Musculoskeletal system (passive and active parts). The functions of the locomotor system.		5	

23	111	Bone. The structural unit of bone - osteon. Structure and classification of bones. Organic and inorganic bone substance. Bone growth in length and width.	Immunity and its types.	1	
	112	Connection of bones. The structure of the joint.		2	
	113	The structure of the human skeleton.		3	
	114	The muscular system of the person. Muscle tissue, its types. Muscle tissue properties.		4	
	115	Skeletal muscle, their structure and function. Contraction of skeletal muscles. Reflex nature of the muscle activity.Coordination of movements.		5	
24	116	Work of muscles. Fatigue according to Sechenov. Features of the musculoskeletal system of children and adolescents. The significance of physical education and sport for the proper formation of the skeleton and muscles. The negative effects of physical inactivity on health. Practical work. Comparing the static and dynamic operation. Practical work.Determination of harmonious physical development.	Heart its structure and operation. The mechanism of blood flow through the vessels. The bodies of the urinary system.	1	
	117	First aid for fractures, dislocations and sprains. Violations of the skeleton (scoliosis, flat feet). Warning curvature of the spine and the development of flatfoot. Correct seating position, posture and working posture.		2	
	118	Leather. Functions of the skin. The structure of the skin.		3	
	119	Derivatives of skin.		4	
	120	The role of the skin in the heat exchange regulation. Sweating. Practical lesson. Body temperature. First aid for supercooling (the total freeze, frostbite), burns, heat and sunstroke. The significance of hardening of the body. Natural factors tempering and rules for using them. Health skin and clothing. Prevention of allergic, pustular, fungal infections, scabies.		5	
25	121	Analyzers. The works of Pavlov on the analyzers. Meaning of analyzers for the perception of the surrounding world. Skin Analyzer (touch).	Higher nervous activity (GNI). IMSechenov role in the development of the doctrine of GNI. The teaching of	1	
	122	The structure of the eye.		2	
	123	Image perception. Accommodation. Binocular. The optical system of the eye. Construction of the image on the retina. Practical work. The blind spot on the retina.		3	

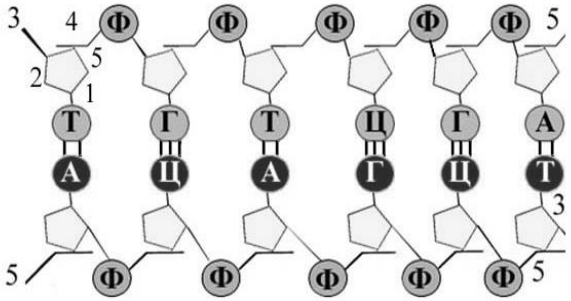
	124	The visual analyzer. The photosensitive apparatus of the eye.	IP Pavlov on conditioned reflexes.	4	
	125	Myopia, hyperopia, astigmatism, cataracts, glaucoma and their correction. Hygiene of view.		5	
26	126	The structure of the organ of hearing and hygiene.	Analyzers. The teachings of Pavlov on the analyzers.Leather. Functions of the skin. The structure of the skin. Derivatives skin.	1	
	127	Hearing analyzer. The mechanism of perception of sounds. The organ of Corti. Practical work. Determining severity of hearing through speech.		2	
	128	Otolith apparatus and the semicircular canals.		3	
	129	The vestibular analyzer.		4	
	130	Analyzer muscular sense. Analyzers of smell and taste.		5	
27	131	Organs of the urinary system. The value of excretory organs in maintaining the constancy of the internal environment of the body. Hygiene of the organs of excretion. The spread of infections in the urinary tract (descending and ascending infection).	Eye, its structure and functions. Body of hygiene.	1	
	132	The development of the human body. Reproductive system (male and female). Sex organs (internal and external).		2	
	133	Gonads. The sex cells, their structure and development. Ovulation. Ejaculation. Embryonic period. Fertilization role of chromosomes in the transmission of hereditary characteristics. Splitting. Gastrulation. Implantation.Embryonic shell.		3	
	134	The similarity of the early stages of development of the embryo of man and vertebrates. The law of embryonic similarity of K. Bera. The nutrition of the embryo. The placenta (child seats). The concept of pregnancy and childbirth. Neuro-humoral regulation of these processes.		4	
	135	Post-embryonic development of human. Features of the development of children and youth organisms. The value of physical culture and sport for the normal development and strengthen the body.		5	
		Ecology (35 hours)			
28	136	Ecology Ecology Problems. Habitat.	Ecology - the science of the laws governing the	**Interim monitoring.** Anatomy	
	137	Environmental factors.			

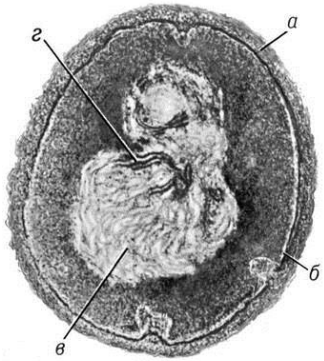
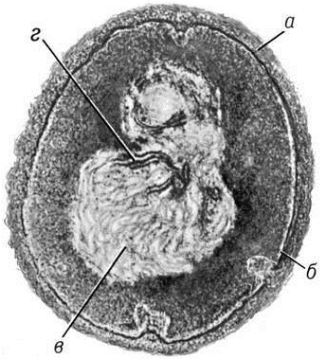
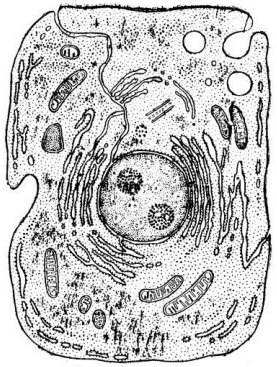
	138	The laws of functioning of environmental factors.	relationships of organisms with the environment.		
	139	Stenobiont. The combined effects of factors on the body.			
	140	Eurybionts. The combined effects of factors on the body.			
29	141	Major climatic factors. Shine. The effect of light on the body.	Community or biocenosis biotope (ecotope).	1	
	142	Major climatic factors. Temperature. The effect of temperature on body.		2	
	143	Major climatic factors. Humidity. The effect of humidity on the body.		3	
	144	Limiting factors.		4	
	145	Biological rhythms.		5	
30	146	Condition of winter dormancy (suspended animation). Cold-resistance. Factors that control the seasonal development.		1	
	147	Photoperiodism.		2	
	148	The ecological characteristics of species.		3	
	149	The ecological characteristics.		4	
	150	The ecological niche.		5	
31	151	Population structure: sex, age, spatial and behavioral.	Concepts biogeocoenosis.	1	
	152	The growth of the population. Survival curves. Regulation of population size. The ecological niche.		2	
	153	Community or biocenosis (phytocoenosis, zoocenoses, microbiocenosis). Biotope (ecotope).		3	
	154	A variety of communities.		4	
	155	Concepts of biogeocoenosis. Special, spatial and trophic structure biogeocoenose.		5	
32	156	The concepts of the ecosystem. Special, spatial and trophic structure of the ecosystem.	The concepts of the ecosystem.	1	
	157	The components of the ecosystem (producers, consuments, destructors). Chains and food networks.		2	
	158	Types of food chains.		3	
	159	Terms of the ecological pyramid.		4	

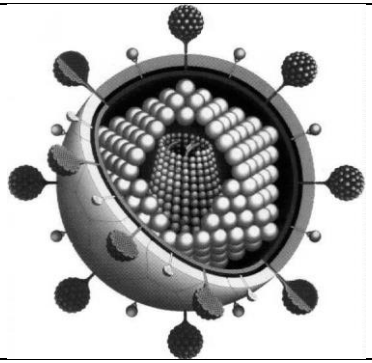
	160	Self-regulation in biogeocoenose.		5	
33	161	Changing of ecosystems (succession). Climax community.	Biosphere - a global ecosystem. Teachings V.I. Vernadsky on the biosphere.	1	
	162	Agro-ecosystems.		2	
	163	Biosphere - a global ecosystem. Teachings VI Vernadsky on the biosphere. The boundaries of the biosphere. The components of the biosphere (living, biogenic, bone, biokostnoe, radioactive substances and cosmogenic scattered atoms).		3	
	164	The functions of living matter (gas, concentration, redox, biochemical and biogeochemical). Biomass. The biological cycle. Biogenic migration of atoms (for example, carbon cycle and nitrogen).		4	
	165	The evolution of the biosphere.		5	
34	166	Global anthropogenic changes in the biosphere (the population explosion).	The evolution of the biosphere. Global human-induced changes in the biosphere. Protection of Nature.Noosphere.	**The final examination of 11th grade**	
	167	Global anthropogenic changes in the biosphere (the use of natural resources, habitat modification, pollution).			
	168	The Nature Conservancy (protected natural territories and objects of nature monuments, zoos).			
	169	The Nature Conservancy (international organizations and programs, environmental monitoring, MAC rules).			
	170	Noosphere.			

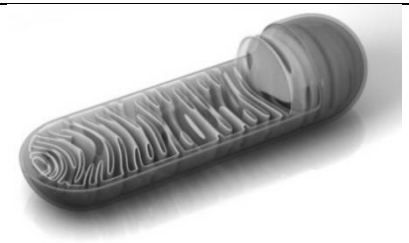
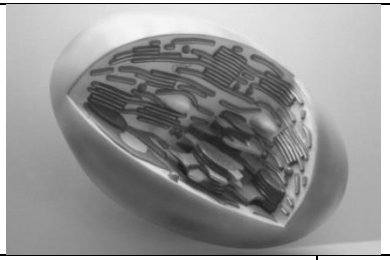
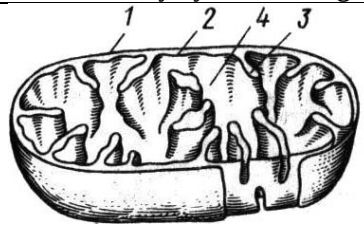
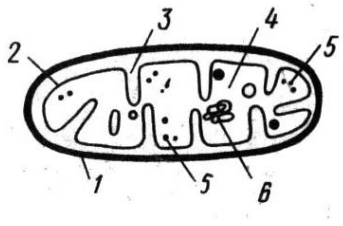
Demo versions of tests of intermediate monitoring

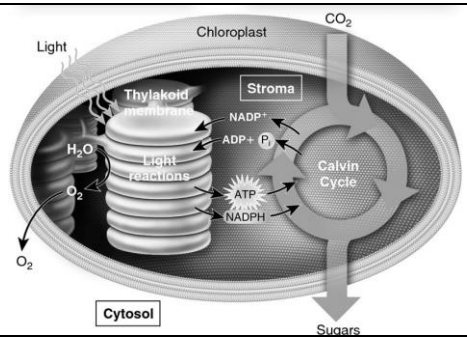
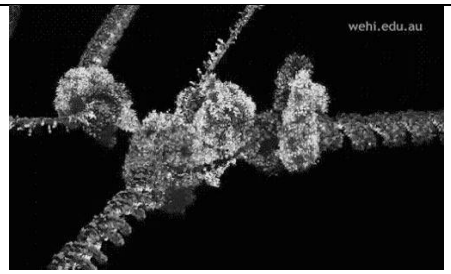
1 Demo. Interim monitoring. Cytology.			
№	**Question**	**Variants**	**Answer**
Select one correct answer of the questions:			

1	Reduplication of DNA is the basis of the process		1) Reproduction 2) Respiration 3) Excreta 4) Nutrition	**1**
	Select one correct answer of the questions:			
2	In DNA the number of nucleotides with guanine is 10% of the total. How many nucleotides adenine are in this molecule?		1) 10% 2) 20% 3) 40% 4) 90%	**3**
Select all the correct answers of the questions:				

3	**3 prokaryotic cells are characterized by:**		1) Ribosomes 2) Mitochondria 3) Formed nucleus 4) Plasma membrane 5) Endoplasmic reticulum 6) One circular DNA	**146**
	Select all the correct answers of the questions:			
4	Similarities of animal cells and bacteria are that they have: 		1) Formed nucleus 2) the Cytoplasm 3) Mitochondria 4) Plasma membrane 5) Glycocalyx 6) Ribosomes	**246**
	Establish conformity by the table:			

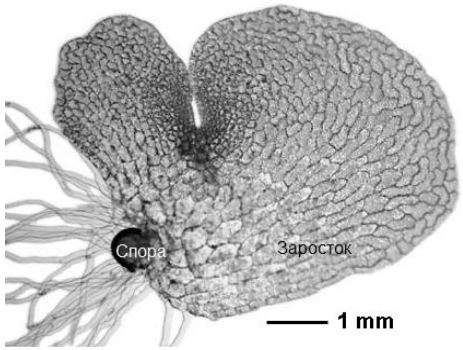
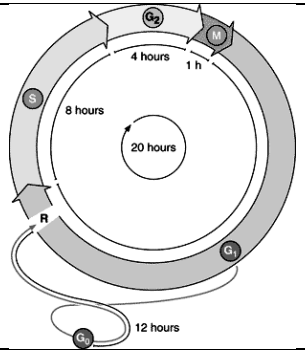
5				
	The feature of the structure		**The organization of matter**	
A	The presence of ribosomes	**1**	Viruses	**211212**
B	The lack of plasma membrane	**2**	Bacteria	
C	Do not have their own metabolism			
D	Most heterotrophs			
E	Reproduction only in a host cell			
F	Reproduction by cell division			
6	**Establish conformity by the table::**			

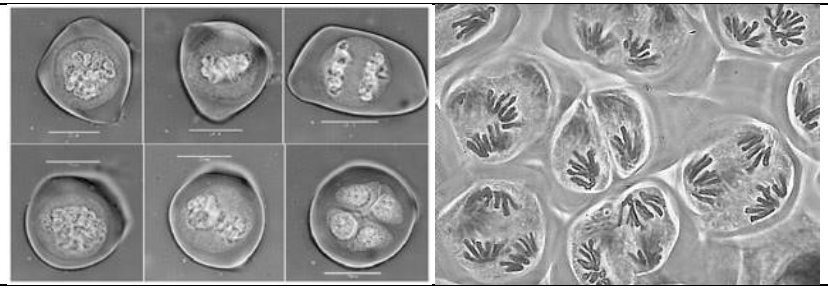
					
	Structure and function organoid			**Organoid**	
A	Contains grains		**1**	Mitochondria	**2121212**
B	Contains cristae		**2**	Chloroplast	
C	Ensures the formation of oxygen				
D	Provides the oxidation of organic substances				
E	Contains green pigment				
F	Contains the matrix				
G	Contains stroma				
7	**Establish conformity by the drawing::**				
1.	**а**	**A**	Matrix	 	**EFDABC**
2.	**б**	**B**	The ribosome		
3.	**в**	**C**	Circular DNA		
4.	**г**	**D**	Krista		

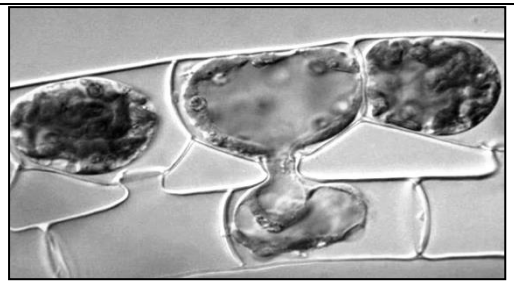
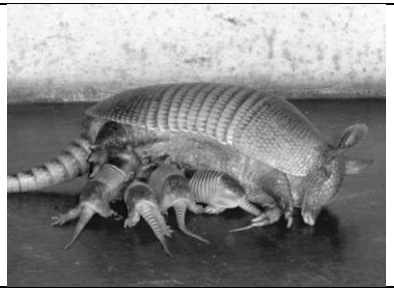
5.	**д**	**E**	The outer membrane		
6.		**F**	Inner membrane		
Determine the order of events:					
8	**Set the sequence of processes of photosynthesis.**				
A	Excited chlorophyll molecules				**AECDB**
B	The synthesis of glucose				
C	Electronic Link to NADP + and H +				
D	Fixation of carbon dioxide				
A	Photolysis of water				
Determine the number of incorrect judgments:					
9	**Determine the number of incorrect judgments:**				
1	DNA Reduplication occurs in the synthetic period of interphase. 245				**245**
2	Both chains two DNA double helix are doubled at the same speed.				
3	3 Both chains of the double helix of DNA double on the principle of complementarity.				
4	4 Both chains of the double helix of DNA double shuttle method.				
5	5 Reduplication of DNA only occurs in the cell nucleus.				
6	DNA reduplication 6 occurs with the participation of the enzyme DNA polymerase.				
10	**Determine the number of incorrect judgments:**				

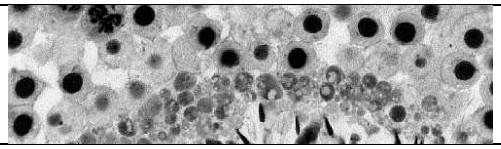
2. Demo version. Interim monitoring. Reproduction and development.			
№	**Question**	**Possible answers**	**Answer**
Choose the correct answer from the answers:			

1	As a result of energy metabolism in the cell is formed the energy of ATP.	**246**
2	Glycolysis takes place in mitochondria makriks.	
3	Splitting of organic substances completes in the Krebs cycle.	
4	Glycolytic reactions occur only in the presence of oxygen.	
5	During respiration carbon dioxide is released into the environment.	
6	With the assistance of the lysosomal proteins are cleaved to nucleotides, carbohydrates to monosaccharides, lipids into fatty acids and glycerol.	

1	The basis of the formation of organs in a multicellular organism is a process		1) Meiosis 2) Mitosis 3) Fertilization 4) Conjugation	**2**
	Choose the correct answer from the answers:			
2	In interphase before mitosis in a cell		1) The chromosomes line up in the equatorial plane 2) The chromosomes disperse to poles of the cell 3) The number of DNA molecules decrease twice 4) The number of DNA molecules doubles	**4**
Choose all the correct answer from the answers:				

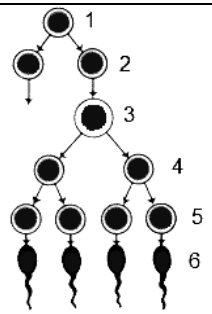
3	During meiosis occurs		1) The division of eukaryotic cells 2) Formation of prokaryotic cells 3) Reduction of the number of chromosomes in half 4) Save of the diploid number of chromosomes 5) The formation of two daughter cells 6) Development of four haploid cells	**136**
	Choose all the correct answer from the answers:			
4	What factors influence the development of the human embryo?		1) Its external structure 2) The genetic information in the zygote 3) Interaction of the parts of the embryo 4) The presence of three germ layers 5) The impact of external factors 6) Presence of fetal villi in the shell	**235**
5	**Establish conformity by the table::**			

5				
	The method of reproduction		**Type of reproduction**	
A	Parthenogenesis	**1**	Sexual	**12212**
B	Gemmation	**2**	Asexual	
C	Fragmentation			
D	Copulation			
E	Schizogony			

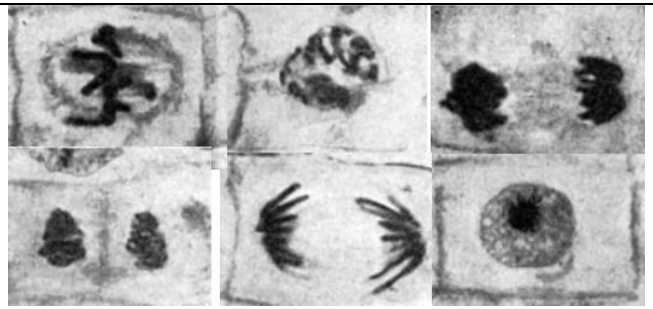
6	**Establish conformity by the table::**				
	Phase of spermatogenesis			**Characteristics of phases of meiosis**	
A	Puberty (the first division of meiosis)		**1**	2n4c	**21433**
B	Growth		**2**	n2c	

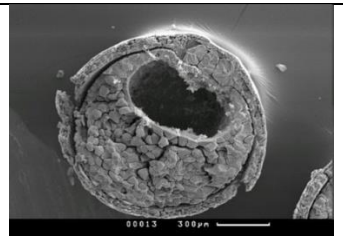
C	Reproduction		**3**	nc	
D	The formation		**4**	2n2c	
E	Maturation (second division of meiosis)				

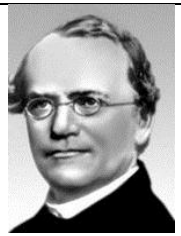
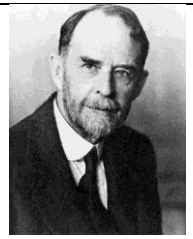
7 **Establish conformity by the drawing::**

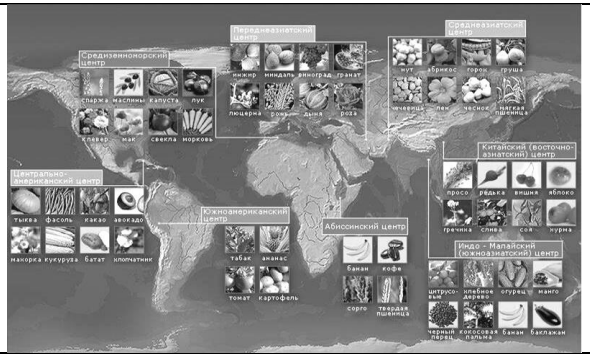
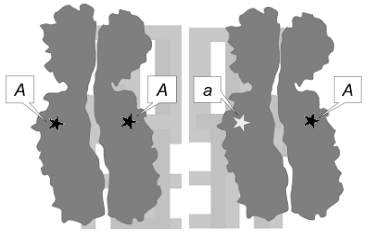
	1	**A**	2n2c		**BABCDD**
	2	**B**	2n4c		
	3	**C**	n2c		
	4	**D**	nc		
	5	**E**	4n4c		

Determine the order of events:

8	**Set the sequence of events:**		
A	The divergence of sister chromatids		**EBCAD**
B	Dissolution of the nuclear envelope		
C	Formation of metaphase plate		
D	The division of the cytoplasm		
E	Helix (compaction) of chromosomes		
	Determine the number of incorrect judgments:		
9	**Determine the number of incorrect judgments:**		
1	In favorable conditions, bacteria divide by mitosis, in adverse conditions – meiosis.		**125**
2	To asexual methods of reproduction include budding, fragmentation, parthenogenesis.		
3	In sexual reproduction, the process usually involves two individuals.		
4	Sexual reproduction necessarily involves sex cells.		
5	Growth of the organism provide mitosis and meiosis.		
10			

	Determine the number of incorrect judgments:		
1	From the ectoderm is formed the nervous system and sensory organs.		**235**
2	The neural tube is laid between the chord and the intestine of the embryo.		
3	From the mesoderm are formed bone, muscle, lung and blood.		
4	Gastrula wall consists of two layers: ectoderm and endoderm.		
5	Deuterostome animals are chordates, arthropods and molluscs.		

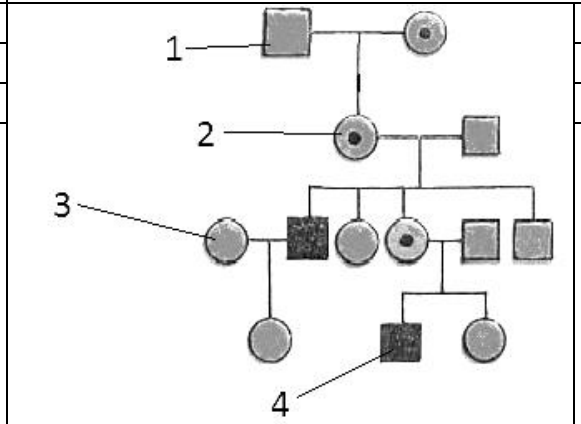
3. Demo Interim monitoring. Genetics.					
№	**Question**	**Possible answers**			**Answer**
Choose one correct answer out of the suggested ones:					
1					

1	The phenomenon of the genes adhesion studied in the lab	1) G. Mendel 2) T. Morgan 3) S.Chetverikov 4) F. Crick	**2**
2	**Choose one correct answer out of the suggested ones:**		
2	Knowledge of the centers of origin of cultivated plants breeders use when		1) Determine the type of genes adhesion 2) Determine the number of mutant genes in species 3) Selecting source material for a new species 4) The study of the allele frequency in a population	**2**
Select all the correct answers from the following answers:				
3	Homozygote:	1) The organism, forming one type of gamete 2) The organism, forming two types of gametes 3) Cell containing only identical alleles of the gene 4) The cell containing the different allelic genes 5) The cell containing the same or different alleles of a gene 6) Cell containing only a single allelic gene		**13**

4	**Select all the correct answers from the following answers:**			
4	What methods are used in studying human heredity	1) Hybridologic 2) Evolutionary 3) Biochemical 4) Cytogenetic 5) Experimental 6) Genealogical 7) Population-statistical		**3467**

5	**Establish conformity using the table:**			
	The nature of mutations		**The type of mutation**	
A	The inclusion of two extra nucleotides in a DNA molecule	**1**	Chromosomal	**2321233**
B	Change of the number of chromosomes in separate pairs	**2**	Genetic	
C	Doubling of nucleotides in the DNA	**3**	Genomic	
D	The 180° turn of the segment of a chromosome			
E	Violation of the sequence of amino acids in a protein molecule			
F	Fold increase in the number of chromosomes in the haploid cell			
G	The decrease in the number of chromosomes in somatic cell			

6	**Establish conformity using the table:**				
	Расщепление		**The type of crossing, genotype parents**		
A	Phenot ype 1:1	**1**	Monohybrid, parents are heterozygotic, complete dominance		**54213**
B	Phenot ype 3:1	**2**	Monohybrid, parents are heterozygotic, incomplete dominance		
C	Phenot ype 1:2: 1	**3**	Monohybrid, parents are homorozygotic, complete dominance		

D	Phenot ype 1:2: 1	**4**	Monohybrid, parents are heterozygotic, complete dominance		
E	No cleavage on genotype and phenot ype	**5**	Monohybrid, one parent is homozygous, the other - heterozygous.		
7	**Establish conformity using the picture:**				
1.		**A**	X^DX^D	**BCAD**	
2.		**B**	X^DY		
3.		**C**	X^DX^D		
4.		**D**	X^dy		
Determine the order of events:					
8	**Set the sequence of processes that accompany obtaining seeds with the effect of heterosis.**				
A	Breeding of pure lines			**DABC**	
B	Breeding of plants of pure lines				
C	Getting hybrid seeds				
D	Selection of parental forms				
Determine the numbers of wrong judgments:					

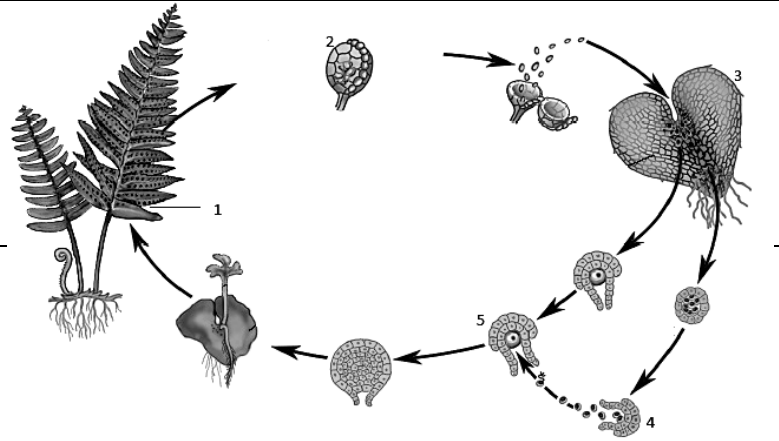
9	**Determine the numbers of wrong judgments:**	
1	Crossbreeding, in which is analyzed only one feature is called monohybrid	**234**
2	A variety of phenot ypes arising from organisms influenced by environmental conditions is called hereditary variability	
3	The features which do not appear in the first generation of hybrids, are called dominant	
4	Crossbreeding of different varieties of plants belonging to the same species, is called distant hybridization	
5	Hemizygous organism carries only one allele of a gene	
6	The child of parents, who have the first group of blood, can not be born with the second group of blood	
10	**Determine the numbers of wrong judgments:**	
1	Cleavage of the phenot ype with analyzing breeding diheterozygous male in the experiments of Morgana is: 41,5:8,5:8,5:41,5	**134**
2	If color-blind child is born, but the parents distinguis colours, then the mother is heterozygous according to this feature.	
3	In an individual with genotype AAввCC three types of gametes are formed	
4	Birds have the homozygotic female gender	
5	Чистые линиand – это растения, в потомстве которых пand самоопылении, not наблюдается разнообразия по изучаемому признаку	
6	Epistasis is one of the types of interaction of non-allelic genes	

4 Demo monitoring. Interim monitoring. Botany.			
№	**Question**	**Possible answers**	**Answer**
Choose one correct answer out of the suggested ones:			

1	What plants are referred to as diclinous		1) Having two different types of fruit 2) Having flowers on one plant of one sex only 3) One plant with flowers of both sexes 4) Having two types of inflorescences on one plant	**2**
2	**Choose one correct answer out of the suggested ones:**			
2	Cells from which are formed xylem vessels (wood) during active functioning of the plant:		1) Dead 2) Alive, only their cell membranes get lignified 3) Alive, but their nucleus disappears 4) Alive, the cytoplasm remains only near cell membrane	**1**
Select all the correct answers from the following answers:				

3	How mushrooms can be distinguished from other animals?		1) Eat organic substances 2) Have a cellular structure 3) Grow throughout life 4) Have a body consisting of hyphae strands 5) Absorb nutrients by body surface 6) Have limited growth	**345**
4	**Select all the correct answers from the following answers:**			
4	Select tissues that can be found in the root of wheat		1) Xylem (wood) 2) The phloem (bast) 3) Chlorenhima 4) Aerenchyma 5) Storing Parenchyme 6) Crust	**125**
5	**Establish conformity using the table:**			

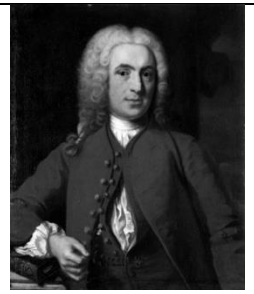
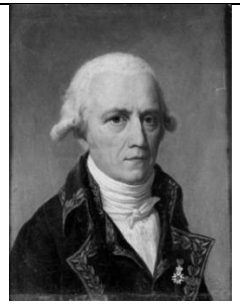
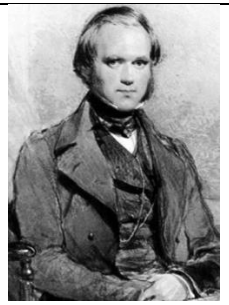
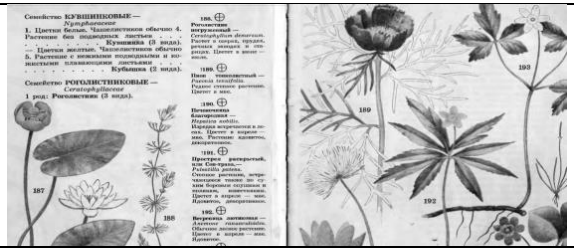
5				
	Characteristic		**Class Angiosperms**	
A	During germination of the seed the main root dies	**1**	Monocotyledons	**12211**
B	The number of flower parts multiples to five	**2**	Dicotyledon plants	
C	The number of flower parts multiples to four			
D	The absence of Cambium in vegetative organs			
E	Arc or parallel nervation of leaves			
6	**Establish conformity using the table:**			

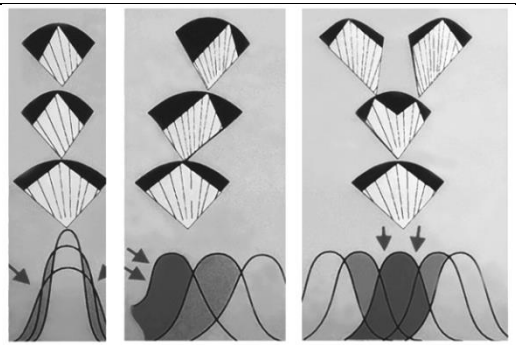
6				
	Fruit type		**Characteristic**	
A	Berry	**1**	Dry, indehiscent fruit. Pericarp is leathery, fused with the seed coat	**34521**
B	Stone-fruit	**2**	Juicy, polyspermous fruit. The outer layer of the pericarp lignifies, seeds lie in the juicy pulp	
C	Boll	**3**	Succulent pericarp with lots of seeds inside	
D	Melon	**4**	The inner layer of the pericarp (endocárpium) is woody and surrounded by juicy pulp (intercárpium)	
E	Caryopsis	**5**	Dry, indehiscent, multi-cavity, multi-seeded fruit	
7	**Establish conformity using the picture:**			
1.			**A** Generation,that produces haploid spores	**AHEBD**
2.			**B** Organ in which spermatozoa are formed as a result of mitosis	
3.			**C** Organ in which spermatozoa are formed as a result of meiosis	
4.			**D** Archegonium	
5.			**E** Prothallium	
			F Generation, producing diploid spores	
			G Organ in which diploid spores are formed	

		H	Organ of sporulation	
8	**Arrange sequentially the steps of seed formation in angiosperm**			
A	Seed formation			**CEBDA**
B	Double fertilization			
C	Pollination			
D	The formation of the embryo and endosperm			
E	The formation of pollen tubes			
9	**Determine the numbers of wrong judgments:**			
1	An annual ring consists of the annual increment of phloem and wood.			**123**
2	Mossy plant gametes are haploid, since formed by meiosis.			
3	The embryo of the seed of flowering plants is formed from the fertilized central cells of the embryo sac.			
4	Fabaceae seeds are rich with protein.			
5	Onions and garlic give off phytoncides.			
6	Wheat, oats, rye-plants with fibrous root system			
10	**Determine the numbers of wrong judgments:**			
1	Fruit bodies of basidiomycetes are formed by dikaryotic mycelium			**236**
2	Formational tissue is located in the zone root growth			
3	Water and mineral salts move in the bast			
4	Pine seeds ripen in the fall			
5	The fruit protects the seeds and their distribution			
6	Lycopodiophyta plants reproduce by seeds			

5 Demo Interim monitoring. The evolution.				
№	**Question**	**Possible answers**		**Answer**
1	**Choose one correct answer out of the suggested ones:**			
1	Representatives of different populations of a single species:		1) Can interbreed with each other and give fertile offspring 2) Cannot interbreed 3) Can interbreed with each other, but cannot give fertile offspring 4) Can interbreed with each other only in the absence of reproductive isolation	**1**
2	**Choose one correct answer out of the suggested ones:**			
2	Most scientists think that Neanderthals are deadlock branch in human evolution. This view is based primarily on a comparison of the		1) Structure of the skulls of Neanderthals and modern man 2) Constitution of Neanderthals and modern man 3) Brain volumes of Neanderthals and modern man 4) Nucleotide sequences of mitochondrial DNA of Neanderthal and modern man	4
3	**Select all the correct answers from the following answers:**			

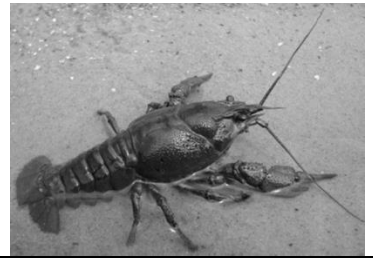
3	Select examples related to combat of unfavourable external environment		1) The mating of capercaillie in early spring during the breeding season 2) The struggle of the birds of one flock for nesting 3) Under favorable conditions the Chlamydomonas reproduces asexually, and in unfavourable - sexually 4) Short growing season for most plants of the tundra 5) Pine seedlings grown in sterilized soil, significantly lag behind in growth from plants grown in natural conditions 6) The change in winter color and thickness of wool of squirrels	**346**
4	**Select all the correct answers from the following answers:**			
4	The result of evolution is		1) Genetic drift 2) Diversity of species 3) Mutational variability 4) Adaptation of organisms to conditions of external environment 5) Improving the organization of living creatures 6) The struggle for existence	**245**
5	**Establish conformity using the table:**			

5					
	Ideas, attitudes, opinions			**The names of the scientists**	
A	Claimed that the species really exist and change		**1**	K. Linnaeus	**331212**
B	Proved that new species have arisen through natural selection		**2**	J.b. Lamarck	
C	Introduced the principle of dual nomenclature in systematics		**3**	Ch. Darwin	
D	Created the first theory of evolution				
E	In classification took into account morphological signs that do not often a genuine kinship				
F	Believed that the change Wednesday is always a useful organisms change				
6	**Establish conformity using the table:**				
	Features		**Criteria**		
A	Wild potato is found only in South America	**1**	Morphological		**2131423**
B	Flower of plants belonging to the genus Tulip, have simple perianth	**2**	Geographical		
C	Nettle is a typical representative of the plants belonging to the Sinanthropus	**3**	Environmental		
D	Lily seeds have one cotyledon	**4**	Genetic		
E	There are 46 chromosomes in human cells				

F	Bison, a close relative of the European bison ,lives in North America.				
G	The lifestyle of the tick - parasite				
7	**Establish conformity using the picture:**				
A	Changes the average norm of reaction	**1**	 **1 2 3**		**2123123**
B	Manifests itself in an unchanged environment	**2**			
C	The emergence of weeds that are resistant to the effects of herbicides	**3**			
D	The appearance of the races of early-flowering and late-flowering plants on a meadow with regular mowing				
E	A great survival rate of whelps with average body weight				
F	In the parks of the city appeared squirrels taking food from human hands				
G	The existence of long-winged and wingless insects on oceanic Islands				
8	**Establish the sequence of geographic speciation**				
					
A	The emergence of isolation between populations of the same species				**BACDEF**
B	The extension or the dismemberment of the species habitat				
C	The appearance of mutations in populations				
D	Preservation of the natural selection of individuals with signs, useful in specific environmental circumstances				

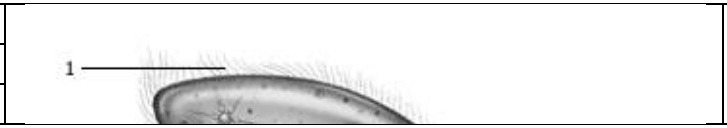
E	The loss of individuals from different populations of ability to interbreed	
F	The emergence of new species	
9	**Determine the numbers of wrong judgments:**	
1	Species - is genetically closed system	**245**
2	Signs, emerging in the process of natural selection, beneficial to the environment	
3	The intensity of the reproduction and the limited resources of the life is a prerequisite for the struggle for existence	
4	Nocturnal life of Groundhog ordinary refers to the morphological criteria of the species	
5	The gene pool of a population is the totality of all morphological characteristics of its constituent individuals	
6	Prokaryotes appeared in the Archean era	
10	**Determine the numbers of wrong judgments:**	
1	The appearance of the organisms' adaptations to the environment occurs due to the direct influence of the environment	**136**
2	Phylogenetic range of a horse referres to the paleontological evidence of evolution	
3	Organs that have lost their original function during evolution, called atavism	
4	The emergence of a new species shows the occurrence of reproductive isolation among populations	
5	According to molecular biology, the most late in the course of evolution branches of human and chimpanzee diverged	
6	Bipedalism of human ancestors have contributed to the emergence of speech	

6 Demo. Interim monitoring. Invertebrate zoology.				
№	**Question**	**Possible answers**		**Answer**
Choose one correct answer out of the suggested ones:				
1	Lime gland of the earthworm serve to:		1) formation of egg shell 2) Neutralization of acid soil 3) Strengthen of bristles 4) formation of cocoon shell	**2**

2	**Choose one correct answer out of the suggested ones:**				
	Truncatula, living in water, breathes by			1) Trachea 2) Skin gills 3) Lung sacs and gills 4) a part of the mantle cavity, densely supplied with blood vessels	**4**
3	**Select all the correct answers from the following answers:**				
3	Select signs River crayfish, characterizing it as a representative of the arthropods:			1) two pairs of antennae 2) Green gland 3) Chitinous cover 4) Heteronomic segmentation 5) Dioecism 6) Jointed limbs	**346**
5	**Establish conformity using the table:**				
	Insect		**Development type**		**112112**
A	Honey bee	**1**	With a complete transformation		
B	Chafer	**2**	With an incomplete transformation		
C	Migratory locust				
D	Pontia edusa				
E	An ordinary mosquito				

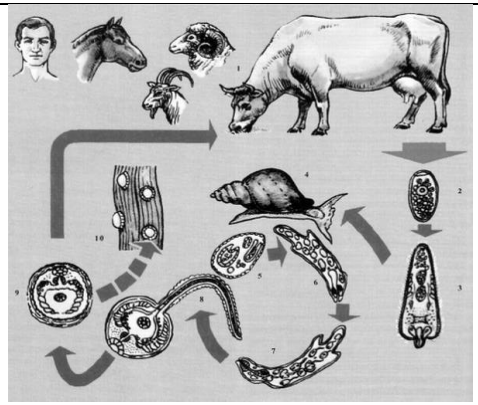
F	Green grasshopper				
6	**Establish conformity using the table:**				

	Function		**Type of cell**		**313123**
A	The defeat of the victim	**1**	Epithelial-muscular		
B	Able to contract	**2**	Interstitial		
C	Have sensitive hair	**3**	Stinging		
D	Movement in space				
E	Can replace any cell of the body				
F	Die after accomplishing its functions				

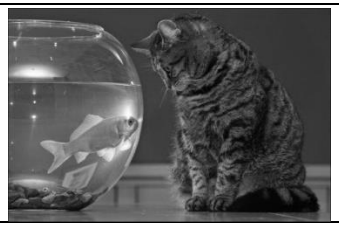
7	**Establish conformity using the picture:**				
	1	**A**	Makronukleus		**GCAEDFB**
	2	**B**	Anal pore		
	3	**C**	Digestive vacuole		

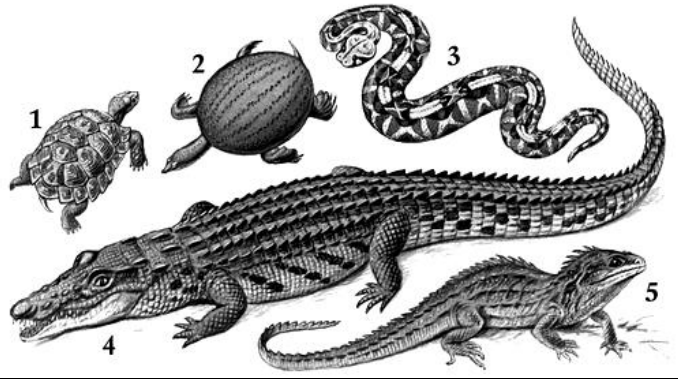
	4	**D**	Contractile vacuole		
	5	**E**	Mikronukleus		
	6	**F**	Citostome		
	7	**G**	(9 x 2) +2		

Determine the order of events:

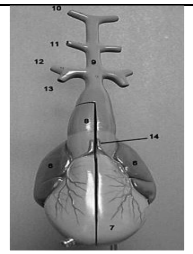
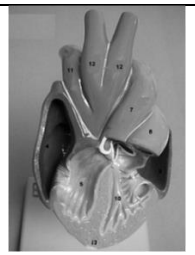
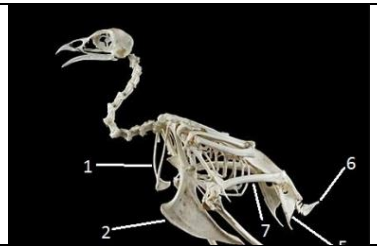
8	**Set the sequence of stages of the development cycle of liver fluke, beginning with the fertilized egg.**		
A	Exit of fertilized eggs into the environment		**AECBFD**
B	Exit of cercariae larvae.		
C	The larva in the body of a pond snail.		
D	The cyst in the intestine of cattle.		
E	Выход личинок-мирацидиев.		
F	The formation of cysts in water plants.		
9	**Determine the numbers of wrong judgments:**		
1	All representatives of ciliates actively move		**146**

2	Germ cells in cnidarian polyps are formed in the ectoderm	
3	Some representatives of flat worms can move using Cilia	
4	Annelids have not closed circulatory system	
5	Woodlices live on land and breathe with gills	
6	Spider Araneus and chafer have one pair of antennae	
10	**Determine the numbers of wrong judgments:**	
1	The carrier of the pathogen of sleeping sickness is a dung fly	**134**
2	The venom of some jellyfish is deadly to humans	
3	Human infection of bullish tapeworm occurs in the use of raw water	
4	Roundworm larva with blood enters the human brain	
5	Female spiders weave the web	
6	Bee venom is used in the preparation of certain ointments	

7 Demo. Interim monitoring. Vertebrate Zoology.				
№	**Question**	**Possible answers**		**Answer**
1	**Choose one correct answer out of the suggested ones:**			
1	Unlike amniotes , anamniotes		1) has a rib cage 2) Skeleton is mainly bony 3) Has no amnion (germ) 4) circulatory system is closed	**3**
2	**Choose one correct answer out of the suggested ones:**			

2	Snakes can swallow prey many times larger than the diameter of the body, because of		1) small number of teeth and large stomach 2) Flattened head and wide mouth 3) mobile connection of the jawbones 4) large size of head and body	**3**
3	**Select all the correct answers from the following answers:**			
3	The characteristics of reptiles, as of true terrestrial animals:		1) Closed circulatory system 2) Туловищные почки 3) Internal fertilization 4) Embryonic shell-amnion 5) neural tube is divided into the brain and spinal cord 6) Ovum with a large reserve of nutrients	**346**
4	**Select all the correct answers from the following answers:**			
	Features characteristic of birds as animals, capable to fly:		1) Hollow bones 2) No bladder	**125**

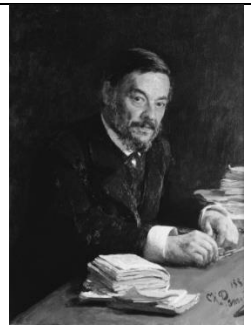
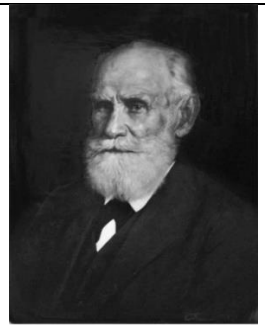
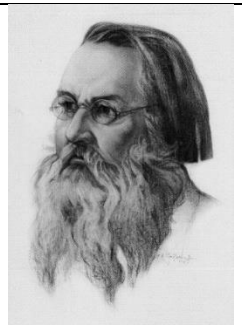
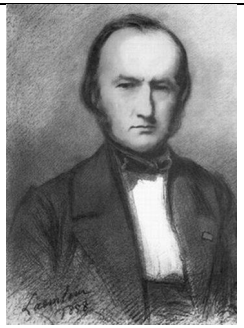
		3) Internal fertilization 4) Embryonic shell-amnion 5) Dual breath 6) Ovum with a large reserve of nutrients		
5	**Establish conformity using the table:**			
	Feature		**Fish class**	
A	Gill slits open outside	**1**	Cartilaginous fish	**121221**
B	Bone skeleton	**2**	Костные рыбы	
C	Mouth is shifted to the ventral side of the body			
D	Most representatives have swim bladder			
E	The gills are covered by gill covers			
F	Characteristic of placoid scales			
6				

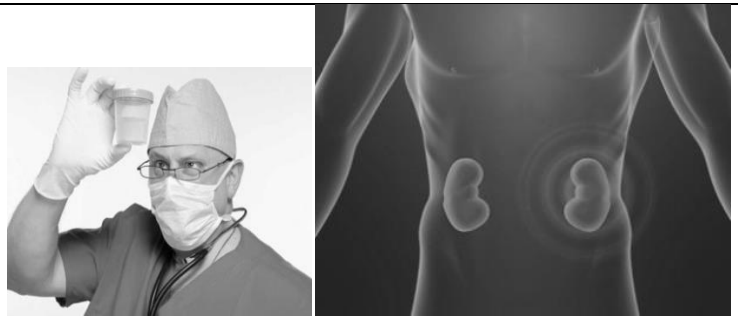
	Establish conformity using the table:					
	The representative of the		**Feature of the structure of the heart**			**231323**
A	Crested newt	**1**	Three-chambered with a partial septum in the ventricle			
B	Black Rat	**2**	Three-chambered without a partial septum in the ventricle			
C	Sand lizard	**3**	Four-chambered			
D	Blue whale					
E	Pool frog					
F	Peregrine Falcon					
7	**Establish conformity using the picture:**					
1	**A**	Thigh				**CDGEFBA**
2	**B**	Great Cormorant				
3	**C**	The Clavicle (Breastbone)				
4	**D**	Keel bone				
5	**E**	Tarso-metatarsus				
6	**F**	Pelvic bone				

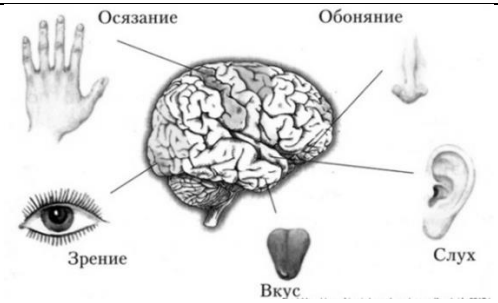
7	**G**	Shin		
8	**Set the sequence of steps of the food reflex of the carp.**			
A	The emergence of nerve impulses in the organs of smell receptors at the appearance of food			**ADBDB**
B	Analysis and synthesis of nerve impulses in the brain			
C	The movement to food			
D	Muscle excitation by motor neuron			
E	The transfer of excitation in the prosencephalon			
9	**Determine the numbers of wrong judgments:**			
1	Branchiostoma don't have light-sensitive organs			**126**
2	In connection with the parasitism of lampreys and mixin jaw bones are well developed			
3	Toads had a greater reliance on lung breathing than newts			
4	The final product of disintegration of proteins in reptiles is uric acid			
5	Mammals are characterized by the presence of sebaceous glands			
6	Birds and mammals has left aortic arch			
10	**Determine the numbers of wrong judgments:**			
1	Sturgeon belong to bone fish			**345**
2	Some amphibians have no limbs			

3	Snakes and lizards belong to different orders	
4	The penguins have no keel	
5	Hare belongs to rodents	
6	Hedgehogs are plantigrade	

8 Demo Interim monitoring. Human Anatomy and physiology.

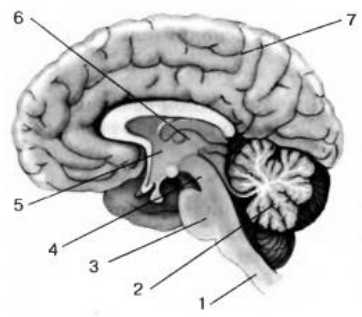
№	**Question**	**Possible answers**	**Answer**
	Choose one correct answer out of the suggested ones:		
1		  	
1	The influence of physical activity on health and the onset of muscle fatigue first was studied by:	1) Ivan Mikhailovich Sechenov 2) Ivan Petrovich Pavlov 3) Alexey Alexeyevich Ukhtomsky 4) Claude Bernard	**1**
2	**Choose one correct answer out of the suggested ones:**		

2	The reason for seeking medical attention may be the appearance in the urine:		1) Sodium chloride 2) Urea 3) Protein 4) Salts of uric acid	**3**
3	**Select all the correct answers from the following answers:**			
3	Disruption of thyroid gland leads to the development		1) Diabetes mellitus 2) Basedow disease 3) Bronze disease 4) Myxedema 5) Rickets 6) Cretinism	**246**
4	**Select all the correct answers from the following answers:**			

4	In what structures of the sensory organs are located peripheral units of analyzers		1) The eardrum 2) Retina 3) Olfactory nerve 4) Hair cells of the cochlea 5) The lens of the eye 6) Papillae of the tongue	**246**

5	**Establish conformity using the table:**			
	Characteristic		**Elements of blood**	
A	Have no definite shape	**1**	Red blood cells	**2111221**
B	Do not contain a nucleus in a mature state	**2**	Leukocytes	
C	Contain hemoglobin			
D	Have the shape of a biconcave disk			
E	Capable of active movement			
F	Capable of phagocytosis			
G	Carry oxygen			

6	**Establish conformity using the table:**			
	Characteristic		**Organ of digestive system**	
A	Carries out digestion in an acidic environment	**1**	Stomach	**1432244**
B	Carries out digestion in an alkaline environment	**2**	Liver	
C	Participation in the work of the endocrine system	**3**	The pancreas	
D	Blood purification	**4**	Small intestine	
E	Located in the right upper quadrant			
F	Absorption of nutrients			

G	Carries out parietal digestion				
7	**Establish conformity using the picture:**				
1		**A**	Large cerebral hemispheres		**CBFDEA**
2		**B**	The cerebellum		
3		**C**	Medulla oblongata		
4		**D**	Midbrain		
5		**E**	The thalamus		
7		**F**	Pons cerebelli		
8	**Set the sequence of passage of blood in a small circle of blood circulation of a man, from the chambers of the heart with venous blood and ending with the chamber of the heart with arterial blood**				
A	Lung veins				**DBIGHAE**
B	Lung artery				
C	Left ventricle				
D	Right ventricle				
E	Left atrium				
F	Right atrium				
G	Capillaries				
H	Venules				
I	Arterioles				
9	**Determine the numbers of wrong judgments:**				
1	Intervertebral discs are formed by hyaline cartilage				**123**
2	Bone growth occurs only at the expense of the periosteum				

3	The aorta - a blood vessel that has the largest diameter of all the vessels of the circulatory system of the person, so it has the highest rate of blood flow	
4	In the bronchi there are cartilaginous rings, and in trachea - cartilaginous semiring	
5	In the oral cavity begins digestion of carbohydrates	
6	The rear roots of the spinal cord are mainly formed by processes of sensitive neurons	
10	**Determine the numbers of wrong judgments:**	
1	In the occipital lobes of the cerebral hemispheres there are auditory areas are responsible for perception of sounds	**136**
2	The neurons that control the functioning of internal organs, constitute the autonomic nervous system	
3	The spine has three bending: cervical, thoracic and lumbar	
4	Vision with two eyes allows us to perceive a three-dimensional image of objects and to estimate their relative distance in space	
5	Immunity acquired after vaccination or injection of a therapeutic serum is called artificial	
6	Dreams are typical for the period of the slow phase of sleep	

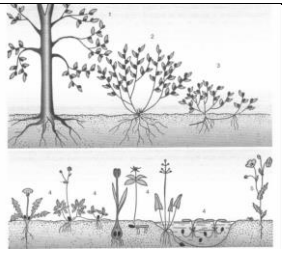
9 Demo. Interim monitoring. Ecology.			
№	**Question**	**Possible answers**	**Answer**
1	**Choose one correct answer out of the suggested ones:**		

1	The limiting factor is the one, which:	1) beyond the limits of endurance of the species 2) the most favourable for the life of the organism 3) if the value is above or below the optimal reduces the viability of organism 4) Leads to infertility		**1**
2	**Choose one correct answer out of the suggested ones:**			
2	With the energy movement along the food chain happens its:	1) preservation 2) Increase 3) decrease 4) Alternately increase		**3**
3	**Select all the correct answers from the following answers:**			

3	Agrocenosis unlike biogeocena is characterized by		1) Short nutrition chains 2) branched nutrition chains 3) Closed nutrient cycle 4) dominance of monocultures 5) Open nutrient cycle 6) Large species diversity	**145**
4	**Select all the correct answers from the following answers:**			
4	In the mixed forest ecosystem competitive relationship is established between:		1) Birches and aspens 2) Blueberries and duckweed 3) Aphids and ladybirds 4) Hedgehogs and foxes 5) birch and birch mushrooms 6) bird cherry and rowan	**16**
5	**Establish conformity using the table:**			

	Environmental factor		**Kind of environmental factor**	
A	The constancy of the gaseous composition of the atmosphere	**1**	Abiotic	**113232**
B	Change of air humidity in the evening in the forest	**2**	Biotic	
C	Change the thickness of the ozone layer over the past 50 years	**3**	Anthropogenic	
D	Changing the number of producers as a result of the drought			

E	Changing of the number of producers in the cultivation of lands			
F	The increase in the number of parasites while increasing the number of protein			
6	**Establish conformity using the table:**			
	Biological process		**The function of the living matter**	**211212**
A	The accumulation of silicon in the vegetative organs of horsetails	**1**	Redox	
B	The conversion of atmospheric nitrogen into nitrates rhizobia	**2**	Concentration	
C	The formation of carbon dioxide in the energy metabolism of glucose			
D	Deposition of calcium in the skeletons of animals			
E	Participation of oxygen in respiration			
F	Iodine accumulation in Brown algae			

7	**Establish conformity using the picture:**			
1	**A**	Annual grass		**BCDEA**
2	**B**	Trees		
3	**C**	Shrubs		
4	**D**	Bushes		
5	**E**	Perennial grasses		
8	**Set the sequence of biogeocoenoses change.**			
A	Meadow			**CDADB**
B	Mixed forest			
C	Lake			
D	Birch grove			

E	Swamp		
9	**Determine the numbers of wrong judgments:**		
1	Longer daylight hours, causing seasonal changes in organisms, are referred to as abiotic factors		**235**
2	Between elk and bison there is competition, because they belong to mammals		
3	The field should be considered as agrocenoses, since it, unlike natural biogeocoenose, is inhabited by different species		
4	In the food chains of terrestrial ecosystems from link to link biomass decreases		
5	In connection with the aquatic lifestyle, cetaceans have evolved a breathing with atmospheric air		
6	Horsetail, cells of which accumulate silicon, in the biosphere performs the concentration function		
10	**Determine the numbers of wrong judgments:**		
1	Factors determining the limits of the survival of the species, called optimum		**123**
2	Lichens are causing significant damage to trees, settling on their trunks		
3	Preservation of ecosystems is ensured by the abundance of predators		
4	Red algae can be attributed to a group of producers		
5	Non-simultaneous development of plants in the forest ecosystem - adaptation to joint dwelling		
6	Global environmental problems is considered to be an expansion of the ozone hole, as the biosphere receives greater UV rays		
Demo. Admission to the 10th class of the medical profile.			
№	**Question**	**Possible answers**	**Answer**	**Score**
Choose one correct answer:				
1	Organs of attachment of polytrichum common:	1) None 2) Rhizoids 3) Rhizome 4) lateral roots 5) subordinate roots	**2**	**1**
2	Sympetalous corolla is common to all members of the family:	1) Cereals 2) Solanaceae 3) Crucifers	**2**	**1**

		4) Rosales 5) Liliaceae		
3	Direct type development is characteristic for:	1) Liver Fluke 2) Bovine tapeworm 3) Dairy planarian 4) Wide lentetsa 5) Crab	**3**	**1**
4	The primary body cavity is typical for representatives of type	1) Annelida 2) Round worms 3) Flat worms 4) Molluscs 5) Coelenterata	**2**	**1**
5	Centers of indicative visual reflexes are located in:	1) cortex 2) Cerebellum 3) medulla oblongata 4) midbrain 5) Intermediate brain	**4**	**1**
6	Formation of primary urine occurs in:	1) tissue fluid 2) Tubules of the nephron 3) Renal pelvis 4) Capsule of nefrona 5) ureter	**4**	**1**
7	Proof of origin mosses plants from algae are:	1) Reproduction by spores 2) presence of protonemy stage 3) The presence of rhizoids 4) the presence of chloroplasts 5) General plan of structure	**2**	**1**
8	An example is aromorfoza:	1) various forms of corolla 2) Diversity of pollen	**4**	**1**

			3) modification of shoots 4) emergence of seed 5) Modifications of leaves		
	Establish conformity using the table:				
9	**Set the correspondence between the plant and the characteristic for it dominant generation.**				
A	Polytrichum common	**1**	Sporophyte (asexual generation)	**211211**	**7**
B	Spruce	**2**	Gametophyte (sexual generation)		
C	Lycopodium				
D	Sphagnum				
E	Horsetail				
F	Male fern				
10	**Set the correspondence between a representative of worms and its intermediate host.**				
A	Beef tapeworm	**1**	Cattle	**13233**	**7**
B	Dairy planaria	**2**	Clam		
C	Liver fluke	**3**	None		
D	Ascaris				
E	Earthworm				
11	**Set the correspondence between the gland and its secretion product.**				
A	The thyroid gland	**1**	Growth hormone	**41325**	**7**
B	Hypophysis	**2**	Sex hormone		
C	The pancreas	**3**	Insulin		
D	Ovary	**4**	Iodine-containing hormone		
E	Adrenal glands	**5**	Adrenaline		
12	**Set the correspondence between the example and view of comparative anatomical evidence of evolution, to which it belongs.**				
A	Linden leaves and spruce needles	**1**	Homologous organs	**122112**	**7**
B	The eyes of a spider and a dragonfly	**2**	Similar organs		
C	The wings of a butterfly and the wings of a titmouse				
D	Running limb of flies and digging limb of a mole cricket				

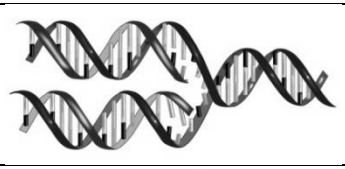
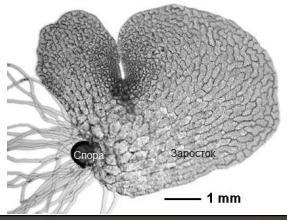
E	The wing of a bird and walrus flippers				
F	Potato tubers and root of beet				
Determine the order of events:					
13	**Set the correct sequence of pine development cycle from the stage after the seed.**				
A	Pollination			**BCADE**	**8**
B	Asexual generation (Sporophyte).				
C	Formation of male and female cones.				
D	Fertilization.				
E	The ripening of the seeds.				
14	**Set the correct sequence of the life cycle of roundworm, starting from the egg stage.**				
A	Larvae in the gut.			**DAEFGBC**	**8**
B	Larvae in the trachea.				
C	Sexually mature specimens in the gut.				
D	The egg in the external environment.				
E	Larvae in the bloodstream.				
F	Larvae in the lungs.				
G	Larvae in the bronchi.				
15	**Select the correct sequence of the reflex arc.**				
A	Sensitive neuron.			**CADBE**	**8**
B	Motor neuron.				
C	Receptor.				
D	Interneuron.				
E	Working organ.				
16	**Set the sequence of stages of evolution of the circulatory system in chordates.**				
A	One circle of blood circulation, two-chambered heart.			**CADBE**	**8**
B	Two circles of blood circulation, heartthree-chambered with a partition in the ventricle.				
C	One circle of blood circulation, no heart.				
D	Two circles of blood circulation, two-chambered heart.				

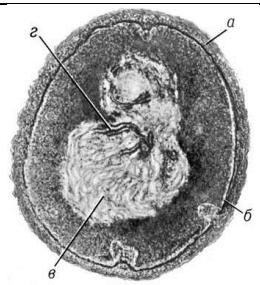
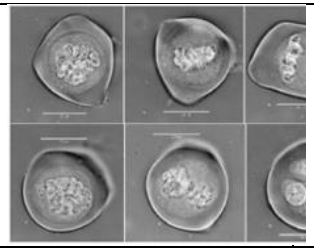
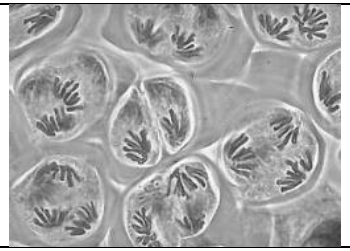
E	Two circles of blood circulation, four-chambered heart.		
17	**Determine the numbers of wrong judgments:**		
1	Subordinate roots are formed on the main root.	**135**	**8**
2	Organ of gas exchange, photosynthesis and transpiration is a leaf.		
3	Potato tuber - underground root modification.		
4	Shoot is a stem with leaves and buds.		
5	Perianth consists of stamens and pistils.		
18	**Determine the numbers of wrong judgments:**		
1	Annelid worms have a closed circulatory system.	**345**	**8**
2	Insects have three pairs of walking limbs.		
3	All arthropods have a worm-like larva, proving their descent from annelids.		
4	Bony fish have four sections of spine.		
5	External fertilization is a characteristic of fishes, amphibians and reptiles.		
6	Some mammals can fly.		
19	**Determine the numbers of wrong judgments:**		
1	For the formation of artificial active immunity, the patient must be vaccinated or inject serum into the blood.	**134**	**8**
2	Respiratory reflex Center is located in the medulla oblongata.		
3	Alien protein bodies in the human body are called antibodies.		
4	Carbohydrates begin to be digested in the intestine.		
5	In the formation of a thrombus platelets and the protein fibrinogen are involved.		
6	A large circulation circle begins in the left ventricle.		
20	**Determine the numbers of wrong judgments:**		
1	Multimammate - an example of atavism in humans.	**345**	**8**
2	Various forms of lyфa plate in angiosperm is an example of idiazabal.		
3	Recessive traits are manifested only in heterozygous condition.		
4	Population is formed by individuals of different species.		
5	In the lake the beginning of the food chain is water.		
6	Speech is one of the social factors of evolution.		

Федеральное государственное бюджетное образовательное учреждение высшего образования Первый Московский государственный медицинский университет имени И.М. Сеченова Министерства здравоохранения Российской Федерации

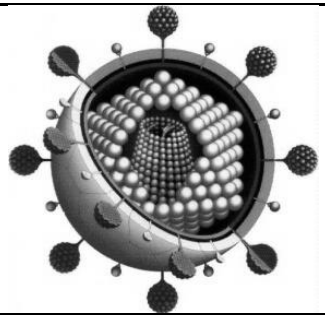
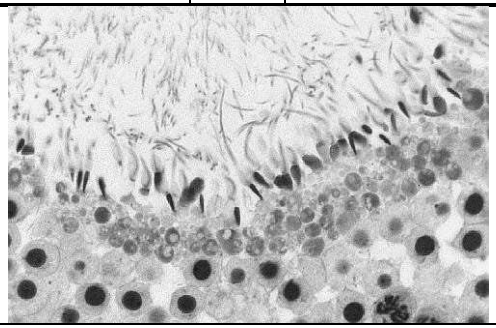
		Total points:	**100**

Demo. Admission to the 11th class of the medical profile.

№	Question		Possible answers	Answer	Score
Choose one correct answer out of the suggested ones:					
1	DNA reduplication is the basis of the process		1) Reproduction 2) Breathing 3) Secretion 4) Nutrition	**1**	**1**
2	In the basis of the formation of organs of multicellular organism lies process of		1) Meiosis 2) Mitosis 3) Fertilization 4) Conjugation	**2**	**1**
3	Knowledge of the centers of origin of cultivated plants breeders use when		1) Creating chemical protection from pests 2)Determine the number of mutant genes in species 3)Selecting source material for a new species 4) Studying allelic genes drift in populations	**2**	**1**
4	What plants are referred to as diclinous		1)Having two different types of fruit 2)Having flowers on one plant of one sex only 3)One plant with flowers of both sexes 4)Having two types of inflorescences on one plant	**2**	**1**

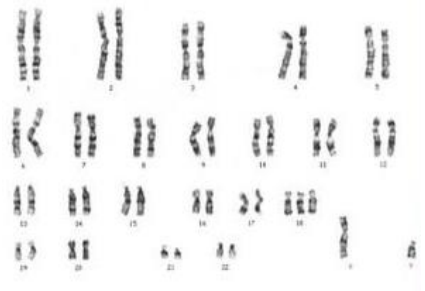
5	Representatives of different populations of a single species:		1)Can interbreed with each other and give fertile offspring 2)Cannot interbreed 3)Can interbreed with each other, but cannot give fertile offspring 4)Can interbreed with each other only in the absence of reproductive isolation	**1**	**1**
Select all the correct answers from the following answers:					
6	Prokaryotic cells are characterized by:		1) ribosom 2) mitochondria 3) formed nucleus 4) plasma membrane 5)endoplasmic reticulum 6) one circular DNA	**146**	**3**
7	In the process of meiosis takes place  		1) Division of eukaryotic cells 2) prokaryotic cell formation 3) half - reduction in the number of chromosomes 4) preservation of the diploid number of chromosomes 5)formation of two daughter cells 6) development of four haploid cells	**136**	**3**

8	What methods are used in studying human heredity		1) Hybridologic 2) Evolutionary 3) Biochemical 4) Cytogenetic 4) Experimental 5) Genealogical 6) Population-statistical	**3467**	**3**
9	How mushrooms can be distinguished from other animals?		1) Eat ready organic substances 2)Have a cellular structure 3)Grow throughout life 4)Have a body consisting of hyphae strands 5) Suck nutrients by the surface of the body 6)Have limited growth	**345**	**3**
10	Select examples related to combat of unfavourable external environment		1)The mating of capercaillie in early spring during the breeding season 2)The struggle of the birds of one flock for nesting 3)Under favorable conditions the Chlamydomonas reproduces asexually, and in unfavourable - sexually 4) Short growing season for most plants of the tundra 5)Pine seedlings grown in sterilized soil, significantly lag behind in growth from plants grown in natural conditions 6)The change in winter color and thickness of wool of squirrels	**346**	**3**

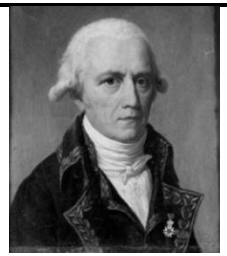
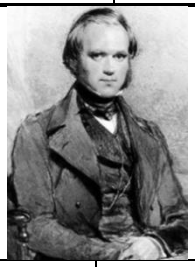
11						
11	**Feature of structure**			**Organization of matter**		
A	The presence of Ribosomes		**1**	Viruses	**122121**	**4**
B	The absence of plasma membrane		**2**	Bacteria		
C	Do not have their own metabolism					
D	Most are heterotrophs					
E	Reproduction only in the owner's cell					
F	Reproduction by cell division					
12						
12	**Phase of spermatogenesis**		**Characteristics of phases of meiosis**			

A	Maturation (first division of meiosis)	**1**	2n4c	**21433**	**4**
B	Growth	**2**	n2c		
C	Reproduction	**3**	nc		
D	Formation	**4**	2n2c		
E	Maturation (second division of meiosis)				

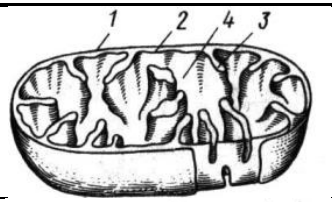
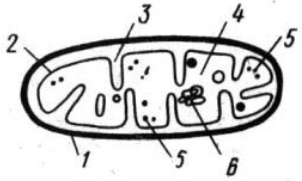
13

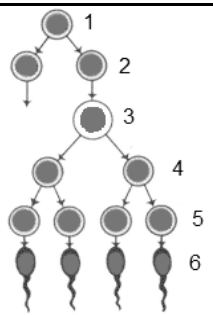


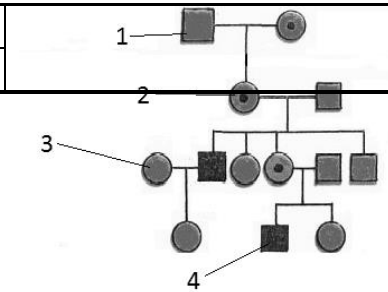
13	**The nature of mutations**		**The type of mutation**		
A	The inclusion of two extra nucleotides in a DNA molecule	**1**	Chromosomal	**2321233**	**4**
B	Change of the number of chromosomes in separate pairs	**2**	Genetic		
C	Doubling of nucleotides in the DNA	**3**	Genomic		
D	The 180° turn of the segment of a chromosome				
E	Violation of the sequence of amino acids in a protein molecule				
F	Fold increase in the number of chromosomes in the haploid cell				
G	The decrease in the number of chromosomes in somatic cell				

14						
14	**Characteristic**		**Class Angiosperms**			
A	During germination of the seed the main root dies	**1**	Monocotyledons		**12211**	**4**
B	Flower parts are multiples of five	**2**	Dicotyledon plants			
C	Flower parts are multiples of four					
D	The absence of Cambium in vegetative organs					
E	Arc or parallel nervation of leaves					
15						
15	**Ideas, attitudes, opinions**			**Scientist**		
A	Claimed that the species really exist and change		**1**	K. Linnaeus	**331212**	**4**
B	Proved that new species have arisen through natural selection		**2**	J.b. Lamarck		
C	Introduced the principle of dual nomenclature in systematics		**3**	Ch. Darwin		
D	Created the first theory about the variability of species					
E	In the classification took into account 1-3 features that often do not reflect the true relationship					

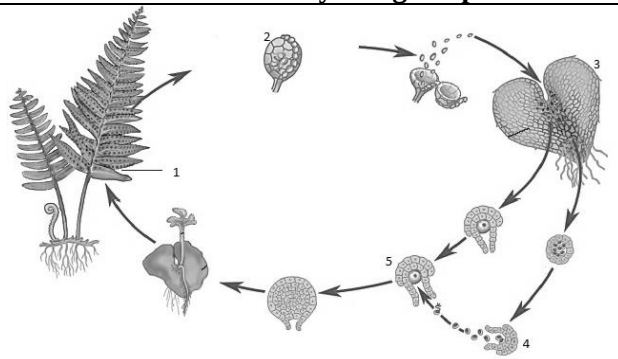
F	Believed that the change Wednesday is always a useful organisms change				

16	**Establish conformity using the picture:**					
1.		**A**	Matrix	**EFDABC**	**4**
2.		**B**	The Ribosome		
3.		**C**	Circular DNA		
4.		**D**	Crista		
5.		**E**	Outer membrane		
6.		**F**	Inner membrane		

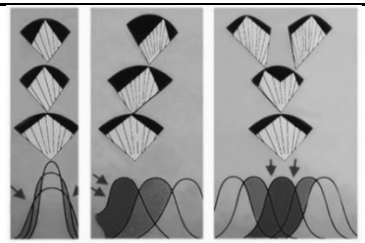
17	**Establish conformity using the picture:**				
1		**A**	2n2c	**BABCDD**	**4**
2		**B**	2n4c		
3		**C**	n2c		
4		**D**	nc		
5		**E**	4n4c		
6					

18	**Establish conformity using the picture:**				
1.		**A**	X^DX^D	**BCAD**	**4**
2.		**B**	X^DY		

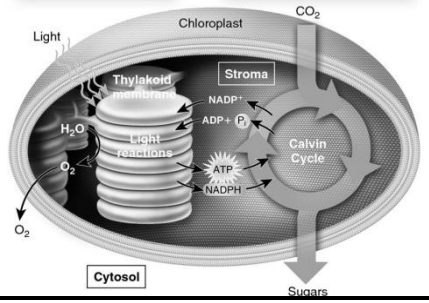
3.		**C**	X^DX^D		
4.		**D**	X^dy		

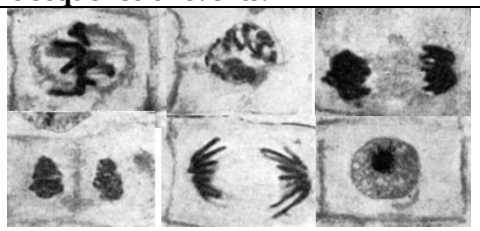
19	**Establish conformity using the picture:**				
					
1.	**A**	Generation,that produces haploid spores		**AHEBD**	**4**
2.	**B**	Organ in which spermatozoa are formed as a result of mitosis			
3.	**C**	Organ in which spermatozoa are formed as a result of meiosis			
4.	**D**	Archegonium			
5.	**E**	Prothallium			
	F	Generation, producing diploid spores			
	G	Organ in which diploid spores are formed			
	H	Organ of sporulation			

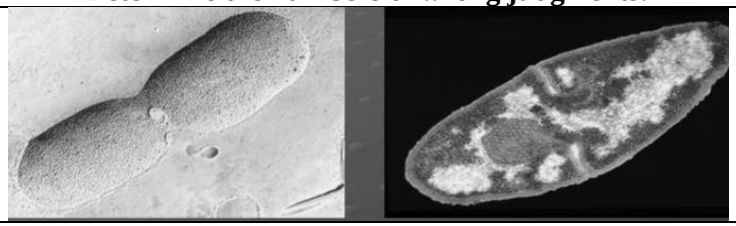
20	**Establish conformity using the picture:**				
1.	**Forms of natural selection**	**A**	Directed against the average norm of reaction	**2123123**	**4**
2.		**B**	Manifests itself in an unchanged environment		

3.	 **1 2 3**	**C**	The emergence of weeds that are resistant to the effects of herbicides		
		D	The appearance of the races of early-flowering and late-flowering plants on a meadow with regular mowing		
		E	A great survival rate of whelps with average body weight		
		F	In the parks of the city appeared squirrels taking food from human hands		
		G	The existence of long-winged and wingless insects on oceanic Islands		

Determine the order of events:

21	**Set the sequence of the processes of photosynthesis.**			
A	Excitation of molecules of chlorophyll		**AECDB**	**4**
B	Synthesis of glucose			
C	The coupling of the electrons with NADP+ and H+			
D	Carbon dioxide fixation			
E	Photolysis of water			

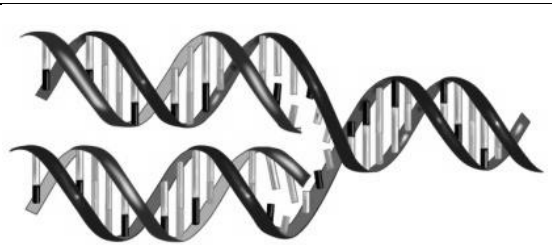
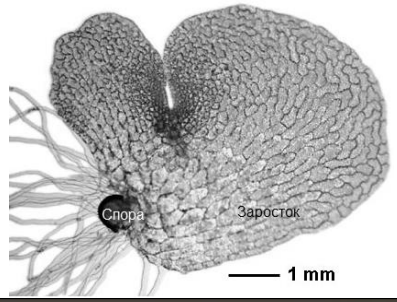
22	**Set the sequence of events:**			
A	The divergence of the sister chromatids		**DBCAD**	**4**
B	Dissolution of the nuclear shells			
C	Formation of metaphase plate			
D	Division of the cytoplasm			
E	Helix formation (compaction) of chromosomes			
23	**Set the sequence of processes that accompany obtaining seeds with the effect of heterosis.**			
A	Breeding of pure lines		**DABC**	**4**
B	Breeding of plants of pure lines			
C	Getting hybrid seeds			
D	Selection of parental forms			
24	**Arrange sequentially the steps of seed formation in angiosperm**			
A	Seed formation		**CEBDA**	**4**
B	Double fertilization			
C	Pollination			
D	The formation of the embryo and endosperm			
E	The formation of pollen tubes			
25	**Choose the correct sequence of the appearance of plants aromorphoses in the history of life on Earth**			
A	The appearance of vessels		**CDADB**	**4**
B	The formation of pollen tubes			
C	Differentiation of the body plant on tissues			
D	The dismemberment of the body of plant on organs			

E	The emergence of the flower and fruit		
26	**Determine the numbers of wrong judgments:**		
1	Reduplication of DNA occurs in the synthetic period of interphase.	**245**	**4**
2	Both chains of the DNA Double Helix are doubled with the same speed.		
3	Both chains of the DNA Double Helix are doubled on the principle of complementarity.		
4	Both chains of the DNA Double Helix are doubling in the shuttle way.		
5	DNA reduplication occurs only in the cell nucleus.		
6	Reduplication of DNA takes place in the presence of the enzyme DNA polymerase.		
27	**Determine the numbers of wrong judgments:**		
27			
1	In favourable conditions, bacteria divide by mitosis, in adverse conditions- by meiosis.	**125**	**4**
2	Asexual ways of reproduction include budding, fragmentation, parthenogenesis.		
3	In sexual reproduction, the process usually involves two individuals.		
4	Sexual reproduction necessarily involves sex cells.		
5	The growth of the organism provides the mitosis and meiosis.		
28	**Determine the numbers of wrong judgments:**		
1	Crossbreeding, in which is analyzed only one feature is called monohybrid	**234**	**4**
2	A variety of phenot ypes arising from organisms influenced by environmental conditions is called hereditary variability		
3	The features which do not appear in the first generation of hybrids, are called dominant		
4	Crossbreeding of different varieties of plants belonging to the same species, is called distant hybridization		

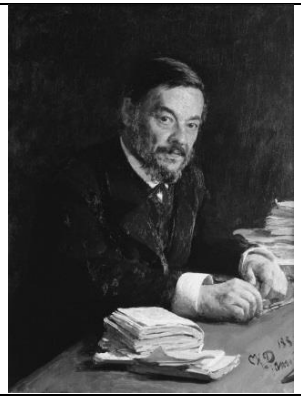
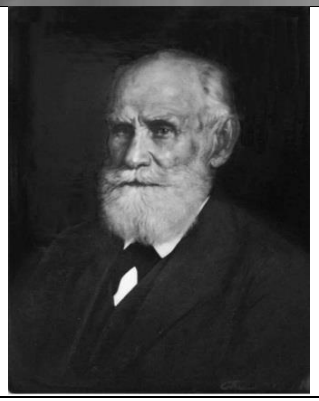
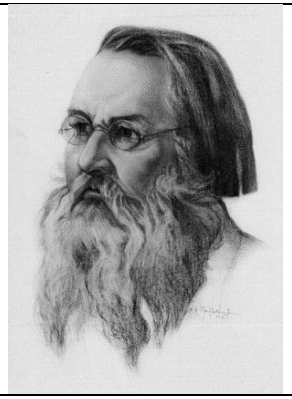
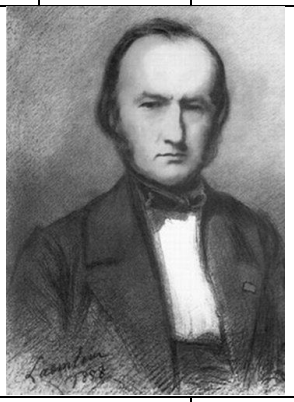
5	Hemizygous organism carries only one gene of the analyzed allele			
6	The child of parents, who have the first group of blood, can not be born with the second group of blood			
29	**Determine the numbers of wrong judgments:**			
1	An annual ring consists of the annual increment of phloem and wood.	**123**	**4**	
2	Mossy plant gametes are haploid, since formed by meiosis.			
3	The embryo of the seed of flowering plants is formed from the fertilized central cells of the embryo sac.			
4	Fabaceae seeds are rich with protein.			
5	Onions and garlic give off phytoncides.			
6	Wheat, oats, rye-plants with fibrous root system			
30	**Determine the numbers of wrong judgments:**			
1	Species - is genetically closed system	**245**	**4**	
2	Signs, emerging in the process of natural selection, beneficial to the environment			
3	The intensity of the reproduction and the limited resources of the life is a prerequisite for the struggle for existence			
4	Nocturnal life of Groundhog ordinary refers to the morphological criteria of the species			
5	The gene pool of a population is the totality of all morphological characteristics of its constituent individuals			
6	Prokaryotes appeared in the Archean era			
	Total points:		**100**	

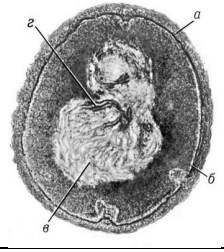
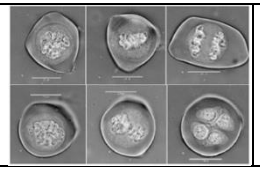
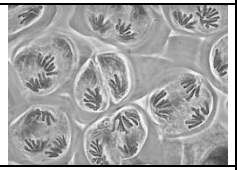
Demo. Graduation Monitoring of 11th medical class.

№	Question	Possible answers	Answer	Score
Choose one correct answer out of the suggested ones:				

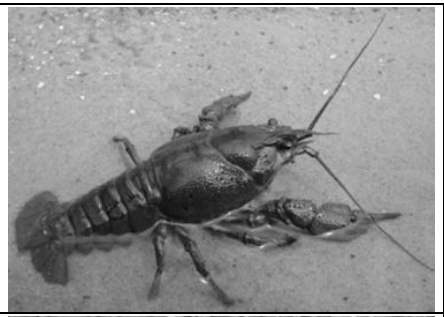
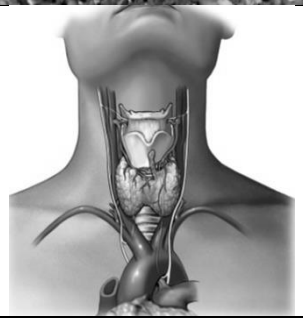
1	DNA reduplication is the basis of the process		1) Reproduction 2) Breathing 3) Secretion 4) Nutrition	**1**	**0.93**
2	In the basis of the formation of organs of multicellular organism lies process of		1) Meiosis 2) Mitosis 3) Insemination 4) Conjugation	**2**	**0.93**
3	Knowledge of the centers of origin of cultivated plants breeders use when		1) Creating chemical protection from pests 2)Determine the number of mutant genes in species 3)Selecting source material for a new species 4) Studying allelic genes drift in populations	**2**	**0.93**

4	What plants are referred to as diclinous		1)Having two different types of fruit 2)Having flowers on one plant of one sex only 3)One plant with flowers of both sexes 4)Having two types of inflorescences on one plant	**2**	**0.93**
5	Representatives of different populations of a single species:		Can interbreed with each other and give fertile offspring Cannot interbreed Can interbreed with each other, but cannot give fertile offspring Can interbreed with each other only in the absence of reproductive isolation	**1**	**0.93**
6	Truncatula, living in water, breathes by		1) trachea 2) skin gills 3) lung sacs and gills 4) a part of the mantle cavity, densely supplied with blood vessels	**4**	**0.93**

7	Snakes can swallow prey many times larger than the diameter of the body, because of		1) small number of teeth and large stomach 2) Flattened head and wide mouth 3) Подвижностand челюстных костей 4) large size of head and body	**3**	**0.93**
8					
8	The influence of physical activity on health and the onset of muscle fatigue first was studied by:		1. Ivan Mikhailovich Sechenov 2. Ivan Petrovich Pavlov 3. Alexey Alexeyevich Ukhtomsky 4. Claude Bernard	**1**	**0.93**

9	The limiting factor is that:		1) beyond the limits of endurance of the species 2) the most favourable for the life of the organism 3) if the value is above or below the optimal reduces the viability of organism 4) the absence of which precludes the possibility of the existence of the organism.	**1**	**0.93**
Select all the correct answers from the following answers:					
10	Prokaryotic cells are characterized by:		1) ribosom 2) mitochondria 3) formed nucleus 4) plasma membrane 5)endoplasmic reticulum 6) one circular DNA	**146**	**1.85**
11	In the process of meiosis takes place  		1) Division of eukaryotic cells 2) prokaryotic cell formation 3) half - reduction in the number of chromosomes 4) preservation of the diploid number of chromosomes 5)formation of two daughter cells 6) development of four haploid cells	**136**	**1.85**
12	What methods are used in studying human heredity		1) Hybridologic 2) Evolutionary 3) Biochemical	**3467**	**1.85**

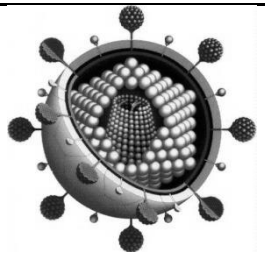
			4) Cytogenetic 4) Experimental 5) Genealogical 6) Population-statistical		
13	How mushrooms can be distinguished from other animals?		1) Eat ready organic substances 2)Have a cellular structure 3)Grow throughout life 4)Have a body consisting of hyphae strands 5) Suck nutrients by the surface of the body 6)Have limited growth	**345**	**1.85**
14	Select examples related to combat of unfavourable external environment		1)The mating of capercaillie in early spring during the breeding season 2)The struggle of the birds of one flock for nesting 3)Under favorable conditions the Chlamydomonas reproduces asexually, and in unfavourable - sexually 4) Short growing season for most plants of the tundra 5)Pine seedlings grown in sterilized soil, significantly lag behind in growth from plants grown in natural conditions 6)The change in winter color and thickness of wool of squirrels	**346**	**1.85**

15	Which of the following signs of crayfish is distinctive for representatives of the phylum Arthropoda.		1) two pairs of antennae 2) compound eye 3) chitinous cover 4) heteronomic segmentation 5) five pairs of walking feet 6) jointed limbs	**346**	**1.85**
16	Features, characteristic of acranial animals:		1) chord is present for a lifetime 2) in adults chord is replaced by spine 3) the brain is not expressed 4) the organs of excretion are similar to the organs of excretion of annelids 5) neural tube is divided into the brain and spinal cord 6) the main sense organs are well developed	**346**	**1.85**
17	Disruption of thyroid gland leads to the development		1. Diabetes mellitus 2. Basedow disease 3. Bronze disease 4. Myxedema 5. Rickets 6. Cretinism	**246**	**1.85**

18	Agrocenosis unlike biogeocena is characterized by		1) Short nutrition chains 2) branched nutrition chains 3) Closed nutrient cycle 4) dominance of monocultures 5) незамкнутым круговоротом веществ 6) Large species diversity	**145**	**1.85**

Establish conformity using the table:

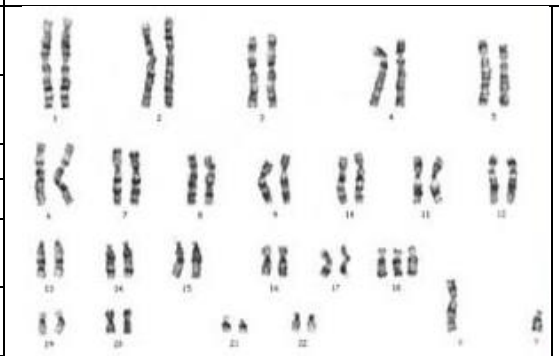
19



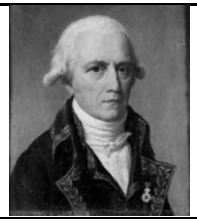
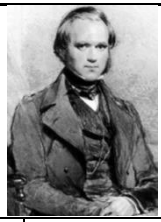
19	**Feature of structure**		**Organization of matter**		
A	The presence of Ribosomes	**1**	Viruses	**122121**	**1.85**
B	The absence of plasma membrane	**2**	Bacteria		
C	Do not have their own metabolism				
D	Most are heterotrophs				
E	Reproduction only in the owner's cell				
F	Reproduction by cell division				

20	**Phase of spermatogenesis**		**Characteristics of phases of meiosis**			
A	Maturation (first division of meiosis)	**1**	2n4c		**21433**	**1.85**
B	Growth	**2**	n2c			

C	Reproduction	**3**	nc			
D	Formation	**4**	2n2c			
E	Maturation (second division of meiosis)					

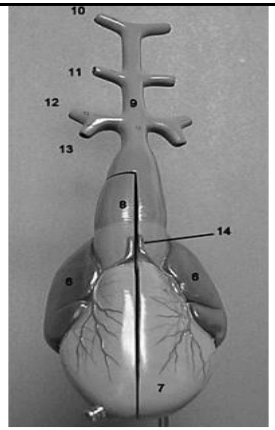
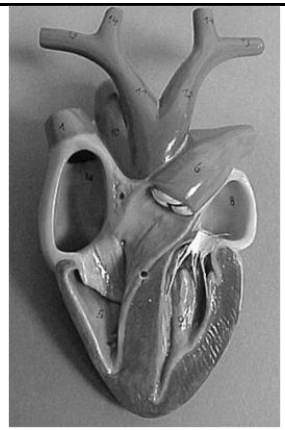
21	**The nature of mutations**		**The type of mutation**			
A	The inclusion of two extra nucleotides in a DNA molecule	**1**	Chromosomal		**2321233**	**1.85**
B	Change of the number of chromosomes in separate pairs	**2**	Genetic			
C	Doubling of nucleotides in the DNA	**3**	Genomic			
D	The 180° turn of the segment of a chromosome					
E	Violation of the sequence of amino acids in a protein molecule					
F	Fold increase in the number of chromosomes in the haploid cell					
G	The decrease in the number of chromosomes in somatic cell					

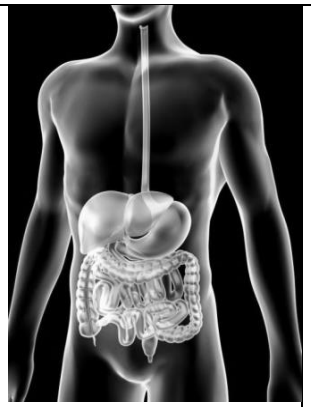
22	**Characteristic**		**Class Angiosperms**		
A	During germination of the seed the main root dies	**1**	Monocotyledons	**12211**	**1.85**
B	Flower parts are multiples of five	**2**	Dicotyledon plants		
C	Flower parts are multiples of four				
D	The absence of Cambium in vegetative organs				
E	Arc or parallel nervation of leaves				

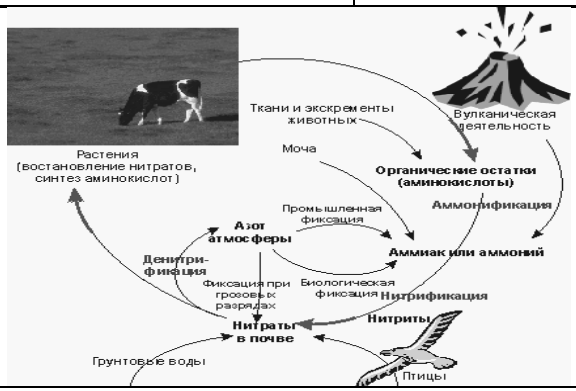
23			

23	Ideas, attitudes, opinions		Scientist		
A	Claimed that the species really exist and change	**1**	K. Linnaeus	**331212**	**1.85**
B	Proved that new species have arisen through natural selection	**2**	Ж-В. Ламарк		
C	Introduced the principle of dual nomenclature in systematics	**3**	Ch. Darwin		
D	Created the first theory about the variability of species				
E	In the classification took into account 1-3 features that often do not reflect the true relationship				
F	Believed that the change Wednesday is always a useful organisms change				

24	Function		Type of cell		313123	1.85
A	The defeat of the victim	**1**	epithelial-muscular			
B	Able to contract	**2**	interstitial			
C	Have sensitive hair	**3**	stinging			
D	The organism response to stimulation					
E	Can replace any cell of the body					
F	Die after accomplishing its functions					

25					
25	**The representative of the**		**Feature of the structure of the heart**	**231323**	**1.85**
A	Crested newt	**1**	three-chambered with a partial septum in the ventricle		
B	Black Rat	**2**	three-chambered without a partial septum in the ventricle		
C	Sand lizard	**3**	four-chambered		
D	Blue whale				
E	Pool frog				
F	Peregrine Falcon				

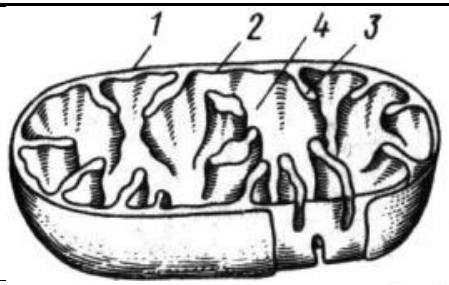
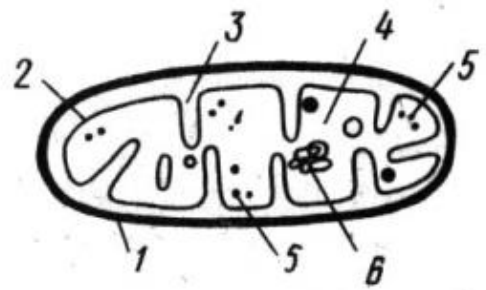
26	Characteristic		Organ of human digestive system			
A	Carries out digestion in an acidic environment	**1**	Stomach		**1432244**	**1.85**
B	Carries out digestion in an alkaline environment	**2**	Liver			
C	Participation in the work of the endocrine system	**3**	The pancreas			
D	Purification of blood, the maintenance of constancy of substances in the blood plasma	**4**	Small intestine			
E	Located in the right upper quadrant					
F	Absorption of nutrients					
G	Carries out parietal digestion					

27	Biological process		The function of the living matter			
A	the accumulation of silicon in the vegetative organs of horsetails	**1**	redox		**211212**	**1.85**
B	the conversion of atmospheric nitrogen into nitrates rhizobia	**2**	concentration			
C	the formation of carbon dioxide in the energy metabolism of glucose					
D	deposition of calcium in the skeletons of animals					
E	participation of oxygen in respiration					

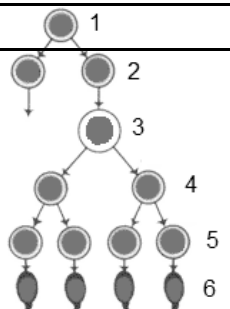
F	iodine accumulation in brown algae					

28

Establish conformity using the picture:

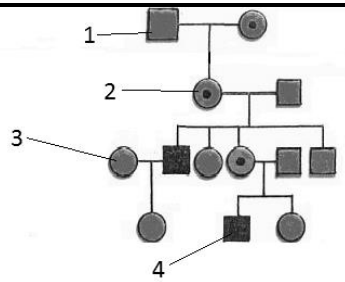
1.		**A**	Matrix	**EFDABC**	**1.85**
2.		**B**	The Ribosome		
3.		**C**	Circular DNA		
4.		**D**	Crista		
5.		**E**	Outer membrane		
6.		**F**	Inner membrane		

29 **Establish conformity using the picture:**

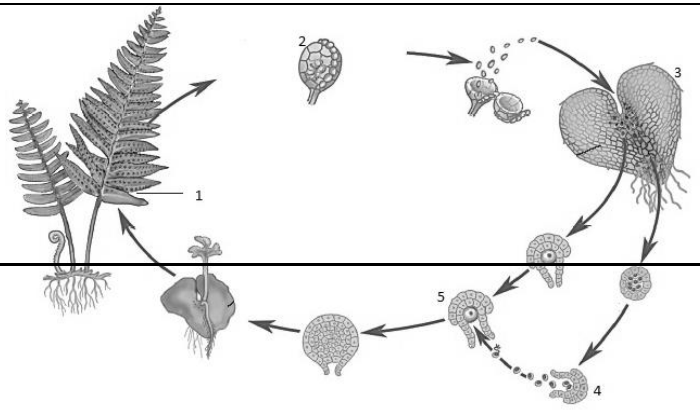
1		**A**	2n2c	**BABCDD**	**1.85**

2			**B**	2n4c		
3			**C**	n2c		
4			**D**	nc		
5			**E**	4n4c		
6						

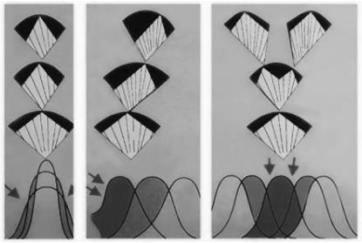
30 **Establish conformity using the picture:**

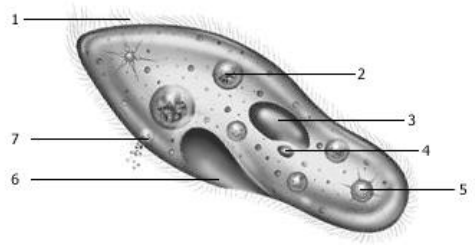
1.		**A**	X^DX^D	**BCAD**	**1.85**
2.		**B**	X^DY		
3.		**C**	X^DX^D		
4.		**D**	X^dy		

31 **Establish conformity using the picture:**

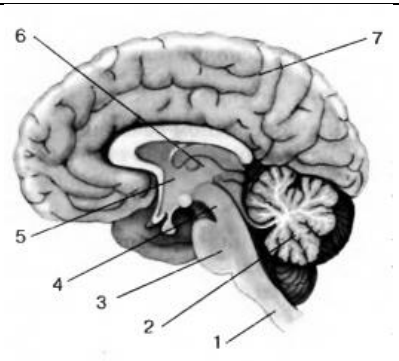
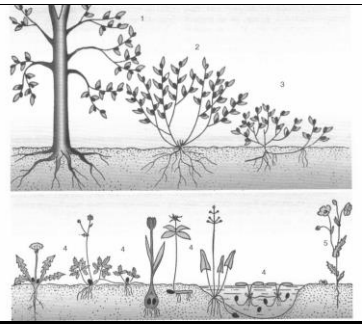
1.	**A**	Generation,that produces haploid spores		**AHEBD**	**1.85**
2.	**B**	Organ in which spermatozoa are formed as a result of mitosis			
3.	**C**	Organ in which spermatozoa are formed as a result of meiosis			
4.	**D**	Archegonium			
5.	**E**	Prothallium			

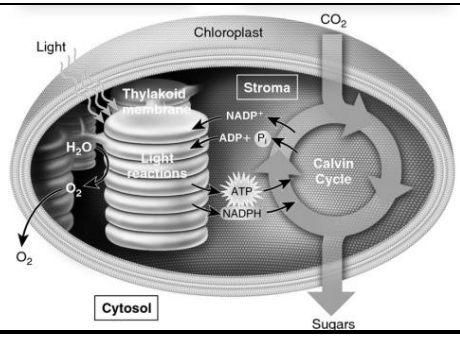
	F	Generation, producing diploid spores			
	G	Organ in which diploid spores are formed			
	H	Organ of sporulation			

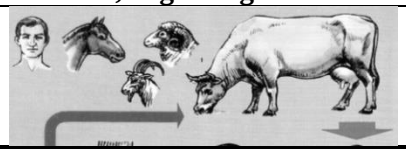
32	**Establish conformity using the picture:**				
1.	**Forms of natural selection**  **1 2 3**	**A**	Directed against the average norm of reaction	**2123123**	**1.85**
2.		**B**	Manifests itself in an unchanged environment		
3.		**C**	The emergence of weeds that are resistant to the effects of herbicides		
		D	The appearance of the races of early-flowering and late-flowering plants on a meadow with regular mowing		
		E	A great survival rate of whelps with average body weight		
		F	In the parks of the city appeared squirrels taking food from human hands		
		G	The existence of long-winged and wingless insects on oceanic Islands		

33	**Establish conformity using the picture:**				
1		**A**	Makronukleus	**GCAEDFB**	**1.85**
2		**B**	Anal pore		
3		**C**	Digestive vacuole		
4		**D**	Contractile vacuole		
5		**E**	Mikronukleus		
6		**F**	Citostome		
7		**G**	(9 x 2) +2		

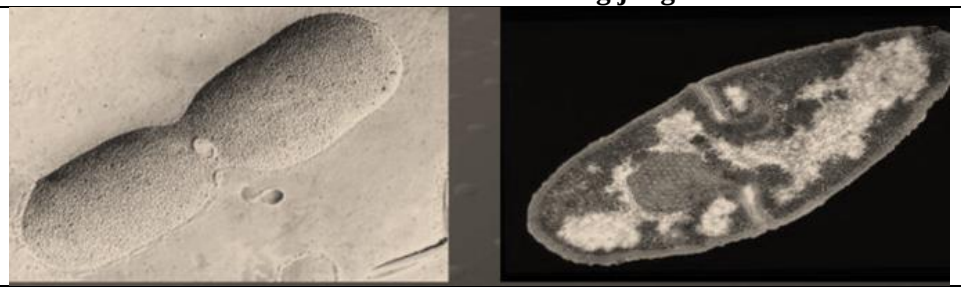
34	**Establish conformity using the picture:**				
1.		**A**	Thigh	**CDGDFBA**	**1.85**
2.		**B**	Great Cormorant		
3.		**C**	Collarbone		

4.		**D**	Keel bone			
5		**E**	Tarso-metatarsus			
6		**F**	Pelvic bone			
7		**G**	Shin			
35	**Establish conformity using the picture:**					
1		**A**	Large cerebral hemispheres	**CBGDFEA**	**1.85**
2		**B**	The cerebellum		
3		**C**	Medulla oblongata		
4		**D**	Midbrain		
5		**E**	The thalamus		
6		**F**	The hypothalamus		
7		**G**	Pons cerebelli		
36	**Establish conformity using the picture:**					
1.		**A**	annual grass	**BCDEA**	**1.85**
2.		**B**	trees		
3.		**C**	shrubs		
4.		**D**	bushes		
5		**E**	perennial grasses		
Determine the order of events:						

37	**Set the sequence of the processes of photosynthesis.**			
A	Excitation of molecules of chlorophyll		**AECDB**	**1.85**
B	Synthesis of glucose			
C	The coupling of the electrons with NADP+ and H+			
D	Carbon dioxide fixation			
E	Photolysis of water			
38	**Set the sequence of events:**			
A	The divergence of the sister chromatids		**DBCAD**	**1.85**
B	Dissolution of the nuclear shells			
C	Formation of metaphase plate			
D	Division of the cytoplasm			
E	Helix formation (compaction) of chromosomes			
39	**Set the sequence of processes that accompany obtaining seeds with the effect of heterosis.**			
A	Breeding of pure lines		**DABC**	**1.85**
B	Breeding of plants of pure lines			
C	Getting hybrid seeds			

D	Selection of parental forms			
40	**Arrange sequentially the steps of seed formation in angiosperm**			
A	Seed formation		**CEBDA**	**1.85**
B	Double fertilization			
C	Pollination			
D	The formation of the embryo and endosperm			
E	The formation of pollen tubes			
41	**Select the correct sequence of the appearance of aromorphoses plants in the history of life on Earth**			
A	The appearance of vessels	**BDAEB**		**1.85**
B	The formation of pollen tubes			
C	Differentiation of the body plant on tissues			
D	The dismemberment of the body of plant on organs			
E	The emergence of the flower and fruit			
	Set the sequence of stages of the development cycle of liver fluke, beginning with the fertilized egg.			
A	Exit of fertilized eggs into the environment		**AECBFD**	**1.85**
B	Exit of cercariae larvae.			
C	The development of larva in the body of a pond snail.			
D	The getting of cysts in the intestine of cattle.			

E	Exit of miracidia larvae.			
F	Attaching the larvae to water plants and transformation into cysts.			
43	**Set the sequence of steps of the food reflex of the carp.**			
A	The emergence of nerve impulses in the organs of smell receptors at the appearance of food		**ADBEC**	**1.85**
B	Analysis and synthesis of nerve impulses in the brain			
C	The movement to food			
D	Muscle excitation by motor neuron			
E	The transfer of excitation in the prosencephalon			
44	**Set the sequence of passage of blood through a small circle of human blood circulation from the heart chambers and ending at chambers of the heart**			
A	Lung veins		**DBIGHAC**	**1.85**
B	Lung artery			
C	Left ventricle			
D	Right ventricle			
E	Left atrium			
F	Right atrium			
G	Capillaries			
H	Capillary veins			
I	Small artery			
45	**Set the sequence of biogeocoenoses change.**			
A	meadow		**BEADB**	**1.85**
B	mixed forest			
C	lake			

D	birch grove			
E	swamp			
46	**Determine the numbers of wrong judgments:**			
1	Reduplication of DNA occurs in the synthetic period of interphase.		**245**	**2.78**
2	Both chains of the DNA Double Helix are doubled with the same speed.			
3	Both chains of the DNA Double Helix are doubled on the principle of complementarity.			
4	Both chains of the DNA Double Helix are doubling in the shuttle way.			
5	DNA reduplication occurs only in the cell nucleus.			
6	Reduplication of DNA takes place in the presence of the enzyme DNA polymerase.			
47	**Determine the numbers of wrong judgments:**			
47				
1	In favourable conditions, bacteria divide by mitosis, in adverse conditions- by meiosis.		**125**	**2.78**
2	Asexual ways of reproduction include budding, fragmentation, parthenogenesis.			
3	In sexual reproduction, the process usually involves two individuals.			
4	Sexual reproduction necessarily involves sex cells.			
5	The growth of the organism provides the mitosis and meiosis.			

48	**Determine the numbers of wrong judgments:**		
1	Crossbreeding, in which is analyzed only one feature is called monohybrid	**234**	**2.78**
2	A variety of phenot ypes arising from organisms influenced by environmental conditions is called hereditary variability		
3	The features which do not appear in the first generation of hybrids, are called dominant		
4	Crossbreeding of different varieties of plants belonging to the same species, is called distant hybridization		
5	Hemizygous organism carries only one gene of the analyzed allele		
6	The child of parents, who have the first group of blood, can not be born with the second group of blood		
49	**Determine the numbers of wrong judgments:**		
1	An annual ring consists of the annual increment of phloem and wood.	**123**	**2.78**
2	Mossy plant gametes are haploid, since formed by meiosis.		
3	The embryo of the seed of flowering plants is formed from the fertilized central cells of the embryo sac.		
4	Fabaceae seeds are rich with protein.		
5	Onions and garlic give off phytoncides.		
6	Wheat, oats, rye-plants with fibrous root system		
50	**Determine the numbers of wrong judgments:**		
1	Species - is genetically closed system	**245**	**2.78**
2	Signs, emerging in the process of natural selection, beneficial to the environment		
3	The intensity of the reproduction and the limited resources of the life is a prerequisite for the struggle for existence		
4	Nocturnal life of Groundhog ordinary refers to the morphological criteria of the species		
5	The gene pool of a population is the totality of all morphological characteristics of its constituent individuals		
6	Prokaryotes appeared in the Archean era		
51	**Determine the numbers of wrong judgments:**		
1	All representatives of ciliates actively move	**146**	**2.78**
2	Hydroid germ cells are formed in the ectoderm		
3	Some representatives of flat worms can move using Cilia		

4	Annelids have not closed circulatory system		
5	Woodlices live on land and breathe with gills		
6	Spider Araneus and chafer have one pair of antennae		
52	**Determine the numbers of wrong judgments:**		
1	Sturgeon belong to bone fish	**3456**	**2.78**
2	Some amphibians have no limbs		
3	Snakes and lizards belong to different orders		
4	In connection with the inability to fly the penguins there have no keel		
5	Hare belongs to rodents		
6	In autumn hedgehogs can stockpile food for the winter		
53	**Determine the numbers of wrong judgments:**		
1	In the occipital lobes of the cerebral hemispheres there are auditory areas are responsible for perception of sounds	**136**	**2.78**
2	The neurons that control the functioning of internal organs, constitute the autonomic nervous system		
3	The spine has three bending: cervical, thoracic and lumbar		
4	Vision with two eyes allows us to perceive a three-dimensional image of objects and to estimate their relative distance in space		
5	Immunity acquired after vaccination or injection of a therapeutic serum is called artificial		
6	Dreams are typical for the period of the slow phase of sleep		
54	**Determine the numbers of wrong judgments:**		
1	Factors determining the limits of the survival of the species, called optimum	**123**	**2.78**
2	Lichens are causing significant damage to trees, settling on their trunks		
3	Preservation of ecosystems is ensured by the abundance of predators		
4	Red algae can be attributed to a group of producers		
5	Non-simultaneous development of plants in the forest ecosystem - adaptation to joint dwelling		
6	Global environmental problems is considered to be an expansion of the ozone hole, as the biosphere receives greater UV rays		
		Total points:	**99.9**

Approximate timetable for the monitoring.

10 class	
Week number	
9	**Cytology** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
13	**Reproduction and development** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
19	**Genetics** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
28	**Botany** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
34	**Transfer exam (**testing, colloquium) Chair of biology and general genetics I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
11 class	
9	**Zoology of invertebrates** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
16	**Zoology of vertebrates** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
28	**Human Anatomy and Physiology** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY
34	**Final exam** (testing, colloquium)I.M. SECHENOV FIRST MOSCOW STATE MEDICAL UNIVERSITY

Approximate list of lectures.

	10 class
Week number	**The theme of the lecture**
2	Cell-structural and functional unit of life. The main structural components of eukaryotic cells: cellular shell, cytoplasm and nucleus. Organelles and inclusions. Single-membrane organelles Vacuolar system.
3	Double-membrane organelles Non-membrane organelles Inclusions. Prokaryotic and eukaryotic cells.
4	Structure and functions of the nucleus. Chromosomes, their chemical composition and structure. Nucleic acids-non-recurrent biopolymers. DNA and RNA.
5	Metabolism. Plastic and energy exchanges. Plastic exchange. Protein biosynthesis.
6	Autotrophs and heterotrophs. Photosynthesis. Biological significance of photosynthesis.
7	Энергетический обмен. Glycolysis. Fermentation. Cellular respiration.
10	Мейоз. Biological significance of meiosis. Gametogenesis – spermatogenesis and oogenesis.

11	Fertilization-the process of restoring the diploid set of chromosomes. Individual development of organisms (splitting, gastrulation, histo-and organogenesis).
13	The basic concepts of genetics. Mendel's Laws.
14	The interaction between allelic and nonallelic genes.
15	Chromosome theory of heredity t. Morgan. Types of sex determination. Sex-linked inheritance.
16	Variability and its form.
17	Human genetics. Methods of studying human heredity.
19	Plant Taxonomy. Plant cell. The tissue of plants in connection with the functions performed in the whole organism.
20	Algae. General characteristics. Systematics. Significance to humans.
21	Fungi and lichens. Features of structure and functioning. Role in nature and human life.
22	Mossy plants and Ferns. Features of the structure. Alternation of generations. Significance to humans.
23	Gymnosperms. Structure, reproduction and development cycle on the example of pine.
24	Angiosperms plants. The flower. Double fertilization in flowering plants and its mechanism. The formation of the seed and the fruit.
25	Plant vegetative organs.
26	Dicotyledonous and Monocotyledonous class of plants. Characteristics of classes and the main features of the families.
28	General characteristics of the pre-Darwinian biology period. Works of Carl Linnaeus. The Teachings Of G. B. Lamarca.
29	СТЭ. Microevolution. Population as the basic unit of evolution. Basic factors of evolution. Speciation. Species
30	Macroevolution.
31	Division of the history of the Earth and periods. The development of the organic world in Archean, Proterozoic and Paleozoic era.
32	Division of the history of the Earth and periods. The development of the organic world in the Mesozoic and Cenozoic era.
33	The origin of man.
	11 class
Week number	**The theme of the lecture**
1	Parasitic Sarcomastigophora.
2	Ciliates and Sporozoa.
3	Coelenterata type animals.
4	Flat worms- human parasites.
5	Roundworms – human parasites.

6	Annelid worms. Main aromorphoses of arthropods.
7	Class Arachnida. Medical importance of class.
8	Diversity of insects and their importance.
9	Type Chordates. General characteristics of the type. The Fish. A systematic review of the superclass of fish.
10	Class Amphibian Systematics. General characteristics of the class.
11	Classes Of Reptiles. Systematics. General characteristics of the class.
12	Class Birds. General characteristics of the class.
13	The Class Of Mammals. Systematics. General characteristics of the class.
14	Higher primates. Anthropoid ape
15	Parts of the nervous system. Spinal cord and brain.
16	Somatic and vegetative (autonomic) nervous system. Departments of the autonomic nervous system.
17	Endocrine glands, their structure and function.
18	Overview of the digestive system. Digestive enzymes. Change of food in different parts of the alimentary canal.
19	Respiration. Structure and function of the respiratory system. Stages of respiration.
20	Vitamins. Hygienic conditions of normal digestion.
21	Blood. Functions of blood. Blood composition: plasma, shaped elements.
22	Immunity and its types.
23	Heart, its structure and work. The mechanism of the movement of blood through the vessels.
24	Organs of the urinary system. Skin. Functions of the skin. The structure of the skin. Derivatives of the skin.
25	Higher nervous activity (HNA). The I. M. Sechenov role in the development of the doctrine of HNA. The teachings of I.p. Pavlov on conditional reflexes.
26	Teaching of I. P. Pavlov on analyzers.
27	Eye, its structure and function. Hygiene of organ of vision.
28	Ecology - the science about the regularities of relationships of organisms with the environment.
29	Community or biocoenosis. Biotope (ecotope).

31	The concept of biogeocenoz.
32	The concept of the ecosystem.
33	The biosphere - the global ecosystem. The Teachings Of The V.I. Vernadsky about biosphere.
34	The evolution of the biosphere. Global anthropogenic changes in the biosphere. Protection of nature. Noosphere.