

Assessment tools for midterm assessment

“Biology”

Curriculum	31.05.01
Specialty	General Medecine
Form of education	Full-time
Designer Department	Morphology and physiology
Graduate Department	Internal Diseases

Sample tasks and tests

Term 2

Section 1. Introduction. Light microscope device and microscopy technique. The cellular level of life organization.

Topic 1.3. Light microscope design and microscopy techniques. The cellular level of organization of biological systems. The structure and function of organelles.

Task 1. List of survey questions

1. Biology is a field of natural science, a complex of scientific disciplines about life in all its manifestations.
2. The history of ideas about the world of life. Scientific basis of biology.
3. Stages of development of biology science. Goals, objectives and methods of biology.
4. Biological sciences.
5. Optical technology. Mechanical, lighting and optical parts of the microscope.
6. Strategy of life. Adaptation, progress, energy and information support.
7. The main provisions of the cell theory.
8. Differences between prokaryotic and eukaryotic types of cell organization.
9. Features of the structure and functions of the structural elements of the eukaryotic cell.
10. Features of the structure, localization and functions of chromatin of interphase chromosomes.
11. DNA, its structure and function.
12. Stages of genetic information flow in the cell.
13. DNA replication.
14. The main regularities of intracellular flows of substances and energy.

Task 2. List of test control questions with answers

1. List the elements of the mechanical part of the microscope:
a) tripod; b) tube; c) eyepiece; d) revolver; e) lens.
2. How can you increase the illumination intensity of an object with the help of a condenser and a diaphragm:
a) lower the condenser;
b) enlarge the aperture of the iris diaphragm;
c) lift the condenser;
d) reduce the aperture of the iris diaphragm;
e) change the position of the mirror?
3. List the elements of the optical part of the microscope:
a) condenser; b) eyepieces; c) mirror; d) lenses; e) diaphragm.
4. Name the low magnification lenses:
a) X 7; b) X 15; c) X8; d) X 40; e) X 90.
5. Eyepieces of what magnification the microscope has:
a) X 7; b) X 15; c) X8; d) X 40; e) X 20.
6. List the elements of the optical part of the microscope:
a) eyepieces; b) condenser; c) lenses; d) micrometric screw; e) macro screw.
7. List the elements of the microscope lighting system:
a) mirror; b) condenser; c) diaphragm; d) revolver; e) lenses.
8. What is the purpose of the rotating plate, or revolver:
a) setting the tube in motion;
b) to change lenses;
c) collecting rays of light;
d) setting under the tube of the desired lens;

- e) sets the table in motion?
9. What changes in the position of the condenser and the plates of the iris diaphragm can increase the illumination intensity of the object:
- lower the condenser;
 - to reduce the aperture of the iris diaphragm;
 - lift the condenser;
 - enlarge the aperture of the diaphragm;
 - change the position of the mirror?
10. In what direction should the microscopes be rotated if the gaze is directed to the objective?
- the tripod goes up
 - the tripod goes down
 - in any.

№ question	1	2	3	4	5	6	7	8	9	10
Answers	a,b,d	c	b,d	b,c	a,b	a,c	a,b,c	b	c,d	a

Topic 1.4. Cell membranes. Vesicular transport.

Task 1. List of survey questions

- The surface apparatus of the eukaryotic cell.
- The structure and function of the cytoplasmic membrane.
- Active and passive transport of substances through the plasma membrane.
- Transport of small particles: active and passive.
- Characteristics of vesicular transport.
- Receptor function of the membrane.
- Supramembrane and submembrane complexes.
- Liposomes, prospects for their use in medicine.
- Metabolism and energy conversion in the cell.
- Stages of energy metabolism.
- Cell pathology.
- The main ultrastructural changes in cell organelles under the influence of damaging factors.

Task 2. List of test control questions with answers

Choose one correct answer:

1. What is the position of carbohydrates in the plasma membrane?

- Contained exclusively in the outer layer
- Contained mainly in the inner layer
- Evenly distributed in both layers
- In some membranes are located outside, while in others - inside
- Plasmalemma does not contain carbohydrates

2.2. When a solution with unknown concentration was added to a drop of human blood, the solution turned red due to the destruction of erythrocytes. What solution was used in this experiment?

- Hypertensive
- Isotonic
- Anisotonic
- Hypotonic
- Physiological

3. What is the role of a secondary mediator in the interaction of the hormone with the cell receptor?

- A. it signals the cell to secrete the hormone
- B. it transmits a hormonal signal into the target cell
- C. it informs the gland whether its hormone has an effect
- D. it carries the hormone as it is in the blood
- E. it binds a hormone and blocks signaling to the cell

4. How many ATP molecules are synthesized during the complete oxidation of one glucose molecule?

- A. 2
- B. 36
- P. 38
- D. 42
- E. 180

5. On an electron micrograph of a cell of a patient with a cancer, hypertrophy of the agranular endoplasmic reticulum was found. What changes in the vital activity of the cell does this indicate?

- A. Enhancing protein synthesis
- B. Weakening of ATP synthesis
- C. Disruption of nucleic acid synthesis
- D. Decreased synthesis of carbohydrates and lipids
- E. Strengthening the processes of detoxification

Standards of answers: 1. A; 2. D; 3. B; 4. C; 5.E.

Topic 1.5. Cytoskeleton and structural proteins, intracellular transport, signaling and adhesion. Mitochondria and energy metabolism. Cellular respiration.

Task 1. List of survey questions

1. The cytoskeleton of the cell.
2. Structural proteins.
3. Intracellular transport.
4. Signaling and adhesion.
5. Mitochondria.
6. Energy metabolism.
7. Cellular respiration.

Topic 1.6. Reproduction at the cellular level. Cell cycle, mitosis, apoptosis, mechanism of cell death. Levels of gene expression regulation. Transcription. Translation.

Task 1. List of survey questions

1. Reproduction at the cellular level.
2. The cell cycle.
3. Mitosis.
4. Apoptosis.
5. The mechanism of cell death.
6. Levels of gene expression regulation.
7. Transcription.
8. Translation.

2. List of test control questions with answers

1. Choose one correct answer.
Biological cell membranes provide:

1. Compartmentization.
2. Barrier function.
3. Formation of ribosomes and polisomes.
4. Transport of substances.
5. Reception.

2. Choose one correct answer.

The resistance of certain types of bacteria to lysozyme of saliva and tears is explained by the presence in their cell wall:

1. Proteins.
2. Soft lipids.
3. Mureine.
4. Polysaccharides.

3. Choose one correct answer.

The painful properties of some types of bacteria are due to the presence in their cell wall:

1. Mureine.
2. Lipids.
3. Capsule polysaccharides.
4. Proteins.

4. According to modern cell theory, a cell is a system:

1. Open.
2. Closed.
3. Elementary.
4. Universal.
5. Holistic.

5. Choose one correct answer.

A polyploid set of chromosomes is formed as a result of:

1. Mitosis.
2. Amitose.
3. Endomitosis.
4. Meiosis.

6. Choose one correct answer.

The recombination of genes in the chromosome leads to:

1. Conjugation of chromosomes.
2. Crossing over.
3. Polyteny.
4. DNA replication.

7. Choose one correct answer.

Chromatin loops are formed by:

1. Nucleosomal thread.
2. Microfibril.
3. Chromomer.
4. Metaphase chromosome.

8. Choose multiple correct answers.

Enzymes are required for DNA replication:

1. Helicase.

2. Endonuclease.
3. Primase.
4. Revertase

9. Choose a few correct answers.

A chromosome consists of two chromatids in periods:

1. Prophase of mitosis.
2. Metaphase of mitosis.
3. Anaphase of meiosis I.
4. Telophase of mitosis.

10. Establish the correct sequence of cell cycle stages:

1. Mitosis.
2. S-stage.
3. G2-stage.
4. Differentiation.

№ test	1	2	3	4	5	6	7	8	9	10
answers	2	1	4	1	3,4	2	3	1	1,2	1234

Topic 1.7. Colloquium "The cellular level of life organization"

Task 1. List of questions for the survey.

1. Light microscope design: mechanical, lighting and optical parts.
2. Basic properties of biological systems, evolutionarily determined levels of organization of biological systems.
3. Basic provisions of the cell theory of T. Schwann, M. Schleiden, R. Virchow. The current state of the cellular theory.
4. The structure of pro- and eukaryotic cells, their basic physical and chemical properties. Life origin hypotheses.
5. Organelles and their role in the cell.
6. Inclusions and their role in the cell.
7. Molecular organization of the universal biological membrane.
8. Components of the interphase nucleus. Heterochromatin and euchromatin.
9. Methods of cell propagation.
10. Mitotic cycle. The biological essence of mitosis, its importance in the life of the organism. Phases of mitosis, their duration and the essence of the processes occurring in them.
11. Polyteny, endomitosis and polyploidy.
12. Proliferative pool and mitotic activity of tissues.
13. Types of tissues depending on their mitotic activity.
14. Life (cell) cycle.
15. Apoptosis.
16. Biological significance and essence of meiosis.
17. Features of the organization of hereditary material in pro- and eukaryotes.
18. Molecular organization and function of nucleic acids.
19. Gene. Genetic code and its properties.
20. The main stages of protein biosynthesis, their essence.
21. Mechanisms of regulation of gene activity in prokaryotes (Jacob-Monod scheme).
22. Mechanisms of regulation of gene activity in eukaryotes (Britten-Davidson scheme).

Section 2. Organism (ontogenetic) level of biological systems organization

Topic 2.5. Ontogenesis. General patterns of progenesis, embryogenesis, postembryonic period of ontogenesis.

Task 1. List of survey questions

1. Types of ontogenesis. The main stages of ontogenesis.
2. Structural features and functions of germ cells.
3. Sexual and asexual reproduction, the biological significance of these methods of reproduction.
4. The formation of germ cells. Stages of gametogenesis.
5. The role of meiosis in the recombination of genetic material.
6. Features of the structure and functions of germ cells.
7. Fertilization.
8. Essence and morphological forms of stages of embryonic development in representatives of different classes of chordates (cleavage, gastrulation, organogenesis and formation of provisional organs).
9. Features of the embryonic development of mammals.
10. Embryonic development of human organs, reflecting the evolution of ancestral groups of chordates.
11. Postembryonic development.
12. Types of postembryonic development.
13. Differences between direct development and development with metamorphosis.
14. Distinctive features of complete metamorphosis.
15. Periods of postnatal human development.
16. Factors determining the development of the human body in the postnatal period.
17. Stages of human ontogenesis included in the pre-reproductive, reproductive and post-reproductive periods.
18. Critical periods of postnatal human development.
19. Theories of aging mechanisms.

Task 2. List of test control questions with answers

Test tasks

1. Choose one correct answer.

There is no period in oogenesis:

1. Reproduction. 3. Maturation.
2. Growth. 4. Formation.

2. Choose one correct answer.

In spermatogenesis, meiosis corresponds to the period:

1. Reproduction. 3. Maturation.
2. Growth. 4. Formation.

3. Choose one correct answer.

The stage of oogenesis prophase, which is practically absent in spermatogenesis:

1. Leptotene. 3. Dictyotene.
2. Diplotena. 4. Diakinesis.

4. Choose one correct answer.

The set of chromosomes - n and the amount of DNA – in the c - ovulating oocyte:

1. $1n1c$. 3. $2n2c$.
2. $1n2c$. 4. $2n4c$.

5. Choose one correct answer.

The set of chromosomes - n and the amount of DNA - in the c -1st order spermatocytes:

1. $1n2c$. 3. $2n2c$.
2. $1n2c$. 4. $2n4c$.

6. Choose one correct answer.
The division of the ovogonia ends:
1. In embryogenesis.
 2. In the early postnatal period.
 3. With the onset of puberty.
 4. At the end of the reproductive period.

7. Choose one correct answer.
Egg cells of placental mammals and humans are:
1. Alecithal. 3. Mesolecithal.
 2. Oligolecithal. 4. Polylecithal.

8. Choose one correct answer.
In mammals monospermia is provided by the egg membrane which is:
1. Follicular. 3. Hyaline.
 2. Yolk. 4. Shiny.

9. Choose a few correct answers.
The motor activity of spermatozoa is blocked by:
1. Gynogamones I. 3. Androgamones I.
 2. Gynagomon II. 4. Androgamones II (fertilizins). (antifertilizins).

10. Choose multiple correct answers.
In mammals the syncarion stage is characterized by:
1. Different sizes of pronuclei. 3. Simultaneous DNA synthesis.
 2. Contact of pronuclei. 4. The beginning of mitosis.

Test number	1	2	3	4	5	6	7	8	9	10
Answers	4	3	3	1	1	4	1	4	4	2

Topic 2.6. Regulation of ontogenesis.

Task 1. List of survey questions

1. Regulatory and mosaic type of development, their differences.
2. Differentiation of cells.
3. Regulation of early stages of embryonic development. The action of genes in early development.
4. Genetic potency of cell nuclei during development.
5. Genetic regulation of differentiation.
6. Interaction of cells during cleavage, gastrulation, organogenesis.
8. Significance of contact of blastomeres which results in their separation.
9. Development of a mammalian embryo from a mixture of cells of two or three embryos.
10. The main forms of cell interaction during periods of organogenesis.
11. The essence of embryonic induction, its types.
12. Chemical structure of inductors and their mechanism of action.
13. The importance of the nervous system in the regulation of ontogenesis.
14. The essence of humoral regulation of ontogenesis, types of regulators.
15. Mechanisms of hormonal regulation in ontogenesis.
16. Significance of morphogenetic fields in embryogenesis.
17. Possible ways of action of environmental factors causing disturbance of embryogenesis.
18. Embryopathy and fetopathy.

19. The relationship of the maternal organism and the fetus, the consequences of its violation.
20. Hereditary and non-hereditary congenital diseases.
21. Phenocopy and genocopy.
22. Malformations and causes of their occurrence.
23. Critical periods of embryogenesis.
24. Teratogens; their classification, mechanism of action.

Task 2. List of test control questions with answers

1. Choose one correct answer.

The doctrine of the embryonic development of organisms through the successive formation of new structures is called:

1. Preformism.
2. Epigenesis.
3. Transformism.
4. Vitalism.

2. Choose one correct answer.

Genetic regulation of ontogenesis in vertebrates is carried out by:

1. Reducing the number of genes during development.
2. Repression of genes.
3. Derepression of genes.
4. Derepression and repression of genes.

3. Choose one correct answer.

Which genes regulate the development of the embryo during cloning?

1. Sperm.
2. Egg cells.
3. Sperm and egg cells.
4. Somatic cells.

4. Choose one correct answer.

Identical twins are formed as a result of:

1. Disconnection of embryonic cells at the gastrula stage.
2. Separation of embryonic cells at the stage of differentiation of germ layers.
3. Complete divergence of blastomeres.
4. Incomplete divergence of blastomeres.

5. Choose multiple correct answers.

During a neural tube formation one can observe:

1. Selective cell multiplication.
2. Thickening of mesodermal cells.
3. Selective cell death.
4. Cell adhesion.

6. Choose one correct answer.

Embryonic induction begins to regulate the development of vertebrates during the period of:

1. Cleavage.
2. Early gastrulation.
3. Neurulation.

4. Organogenesis.

7. Choose multiple correct answers.

The stage of dependent cell differentiation is characterized by:

1. Increased sensitivity to the action of inductors.
2. Decrease in sensitivity to the action of inductors.
3. Lack of the ability to transdifferentiate.
4. Ability to transdifferentiate.

8. Choose one correct answer.

Hormonal regulation of development in mammals begins during the period of:

1. Gastrulation.
2. Cleavage.
3. Histo and organogenesis.
4. Fetal.

9. Choose multiple correct answers.

The greatest sensitivity of the embryonic organs to the action of teratogen is during the period of:

1. Setting up of organ rudiments.
2. Setting up of new organ structures.
3. Differentiation of organ cells.
4. Organ growth.

10. Set the correspondence.

Malformations:

1. Hereditary
2. Non-hereditary

Mechanisms of occurrence:

- a) generative mutations;
- b) mutations in blastomeres;
- c) mutations in the cells of organ rudiments;
- d) dysfunction of genes;
- e) disruption of organ setting up.

Test number	1	2	3	4	5	6	7	8	9	10
Answers	3	4	4	3	2	2	1,4	4	1,2,3	1-a,d 2-b,c,e

Topic 2.7. Colloquium on the topic: "Basic laws of individual development." Homeostasis.

Task 1. List of survey questions

1. Ontogenesis. Periods of ontogenesis.
2. The prezygous period of ontogenesis - progenesis.
3. Gametogenesis. Differences between spermatogenesis and ovogenesis.
4. Meiosis. Essence and biological significance of meiosis.
5. Morphofunctional and genetic characteristics of germ cells.
6. Types of oocytes.
7. Fertilization, its phases, biological essence. Partenogenesis. Gynogenesis. Androgenesis.
8. Cleavage. The relationship between the type of eggs and the nature of their cleavage.
9. The embryo at the morula stage.
10. The embryo at the blastocyst stage. Blastocyst types.
11. The embryo at the gastrula stage. Types of gastruli. The main methods of gastrulation.

12. Methods for the formation of mesoderm.
13. Derivatives of the three germ layers.
14. Provisional organs, their difference in anamniotes and amniotes.
15. The structure and function of the placenta.
16. Postembryonic development. Types of postembryonic development.
17. Pre-reproductive period of human ontogenesis.
18. The reproductive period of human ontogenesis.
19. Post-reproductive period of human ontogenesis.
20. The concept of the theory of aging mechanisms.
21. Regulatory and mosaic type of development, their differences.
22. Genetic regulation of the development of the organism.
23. Contact interaction of cells
24. Embryonic induction.
25. Morphogenetic fields
26. Nervous regulation
27. Hormonal regulation
28. Environmental factors. Ways of action of environmental factors that cause a violation of embryogenesis. Embryopathy and fetopathy.
29. Hereditary and non-hereditary congenital diseases. Phenocopy, genocopy. Developmental defects.
30. Teratogens; their classification, mechanism of action.
31. Critical periods of embryogenesis.
32. Critical periods of postnatal human development.
33. The biological essence of homeostasis, its types. At what levels of organization is homeostasis maintained?
34. What is genetic homeostasis? Mechanisms for maintaining it.
35. Cytogenetic homeostasis
36. Somatic homeostasis
37. Ontogenetic homeostasis
38. Functional homeostasis
39. Psychological homeostasis
40. The biological essence of immunity. Constitutional immunity. Specific immune response.
41. Regeneration. Types of regeneration.
42. Physiological regeneration.
43. Reparative regeneration, its importance in the life of organisms.
44. Transplantation and its importance for medicine. Isotransplantation and its difference from allo- and xenotransplantation. Problems and prospects of organ transplantation. Methods for overcoming tissue incompatibility.
45. The phenomenon of tissue tolerance. Mechanisms for achieving it. Advantages and disadvantages of artificial materials implantation.

Section 3. Population-specific level of organization of living systems. Evolution issues.

Topic 3.3. Evolutionary teaching. Man as an object of the action of evolutionary factors. The evolution of the musculoskeletal system. Phylogenetically determined defects of the musculoskeletal system.

Task 1. List of survey questions

1. The origin of the coverings of invertebrates and chordates.
2. The role of coverings in the life of the organism.
3. Evolution of the coverings of invertebrates.
4. Functions of derived coverings in invertebrates.

5. The structure of the coverings of invertebrates having a parasitic lifestyle.
6. Evolutionary transformations of the coverings in vertebrates.
7. Origin of placoid scales, bone scales of fish, horny scales of reptiles, hairs of mammals.
8. Ontophylogenetic malformations of coverings in humans.
9. Embryonic layers of the development of the skeleton of invertebrates, notochord and skeleton of vertebrates.
10. The role of the musculoskeletal system.
11. Characteristic features of the musculoskeletal system in invertebrates.
12. Basic evolutionary transformations of the musculoskeletal system in chordates.
13. Departments of differentiation of the spine of fish, amphibians, reptiles, mammals, humans. The number of vertebrae in each section.
14. Sections of the spine bearing ribs in various classes of vertebrates. Thorax.
15. The main phylogenetic stages of development of the cerebral skull in vertebrates.
16. Principles of evolutionary transformations of the cerebral skull.
17. Origin of fish fins, shoulder and pelvic belts of terrestrial vertebrates.
18. Features of the structure of the fins of cross-finned fish. Origin of the land-type limbs.
19. Progressive transformations of limbs and somatic muscles in vertebrates.
20. The similarity of the structure of the skeleton of humans and vertebrates.
21. Features of the human musculoskeletal system.
22. Ontophylogenetic defects of the musculoskeletal system in humans and what they are caused by.

Topic 3.4. The evolution of the digestive system. Phylogenetically determined defects of the digestive system.

Task 1. List of survey questions

1. What are the functions and structure of the initial section of the digestive system of vertebrates?
2. What are the main evolutionary transformations of the initial section of the vertebrate digestive system?
3. How does the visceral skeleton of vertebrates develop?
4. What are the aromorphoses in the development of sections and organs of the initial section of the digestive system of vertebrates?
5. What are the directions of evolution of teeth and salivary glands of vertebrates?
6. What is a homodont and heterodont dental system?
7. What are pleurodont, acrodont and tecodont teeth?
8. How did the dental formula evolve in placental mammals?
9. When does a person's teeth change?
10. What is nutrition?
11. What groups are organisms divided into by type of nutrition?
12. Name the ways of getting substances into the cell.
13. What is the difference between active and passive transport of substances? Types of passive transport.
14. Application in medicine of isotonic, hypotonic and hypertonic solutions.
15. Types of active transport of substances.
16. How do biological pumps work on the example of the transfer of Na⁺ and K⁺ ions?
17. How are pinocytosis and phagocytosis carried out?
18. What is digestion? Types of digestion and their characteristics.
19. What are the functions of the digestive system? Why is the digestive system characteristic only for animals and is not characteristic for plants?
20. What are the main evolutionary transformations of the digestive system of chordates?
21. What are the morphofunctional features of the oral cavity of chordates?

22. What are the main evolutionary transformations of the mammalian oral cavity?
23. What structures increase the active surface of the digestive tract in mammals?
24. Indicate the morphofunctional features of the digestive glands (salivary, liver, pancreas) of chordate animals and humans.
25. List and justify ontophylogenetically determined defects of the digestive system.
26. What are the functions of human saliva?
27. Name the onto- and phylogenetically determined malformations of the initial section of the human digestive system.

Topic 3.5. Respiratory system evolution. Phylogenetically determined defects of the respiratory system.

Task 1. List of survey questions

1. What breathing is?
2. What are the features of gas exchange in animals without specialized respiratory organs?
3. Are the respiratory organs of invertebrates and vertebrates homologous?
4. What are the similarities between the respiratory system of noncranial and lower vertebrates?
5. What are the progressive features of gill respiration in teleost fish?
6. What are the features of respiration of cross-finned and lung-breathing fish?
7. What structural and functional features are characteristic of the respiratory system of amphibians?
8. What progressive features are inherent in the respiratory system of reptiles?
9. How is the progressive development of the respiratory system of mammals manifested in comparison with reptiles?
10. What are the main transformations in the respiratory system of chordates?
11. What are the stages of development of mammalian lungs?
12. What are the ontophylogenetically determined abnormalities of the human respiratory system based on?

Topic 3.6. Evolution of the circulatory system. Phylogenetically determined defects of the heart and blood vessels.

Task 1. List of survey questions

1. List the functions of the circulatory system.
2. How is the transport of substances carried out in animals without a circulatory system?
3. With what systems and how is the circulatory system connected?
4. How is the unity of the structure of the circulatory system manifested in invertebrates and vertebrates?
5. What are the main transformations in the development of the circulatory system in invertebrates and vertebrates?
6. How to explain the formation of congenital heart defects and blood vessels in humans?

Topic 3.7. Evolution of the excretory system. Phylogenetically determined defects of the excretory system.

Task 1. List of survey questions

1. What is the role of the excretory system in maintaining homeostasis?
2. What are the main stages in the development of the excretory system in vertebrates?
3. What are the main evolutionary transformations in the excretory system of vertebrates?
4. How is the connection with the circulatory system of the prone kidney, primary and secondary kidneys carried out?
5. What are the progressive features in the structure and function of the nephron of the primary kidney in comparison with the nephron of the pronephron?

6. What are the progressive features in the structure and function of the nephron of the secondary kidney in comparison with the nephron of the primary kidney?
7. What features of the excretory system in different classes of vertebrates can be considered adaptive?
8. How can we explain the replacement (substitution) of the prone kidney with more progressive primary and then secondary kidneys?
9. What is the relationship between the excretory system and the reproductive system in vertebrates?
10. What is the function of the paramesonephric duct (Müllerian canal) in males and females of anamniotes?
11. What is the function of the mesonephric duct and the paramesonephric duct (Wolf and Müllerian canals) in male and female amniotes?
12. How to explain the development of some congenital anomalies of the excretory and reproductive systems?

Topic 3.8. The evolution of integration systems: nervous, endocrine. Phylogenetically determined defects of integration systems.

Task 1. List of survey questions

1. What is the role of the nervous system in the life of the body?
2. What are the features of the functions of the human nervous system?
3. What are the main trends in the evolution of the invertebrate nervous system?
4. Name the features of aromorphoses and idioadaptations in the structure of the nervous system of invertebrates.
5. What are the structural features of the nervous system in various vertebrates?
6. What characterizes each type of structure of the brain.
7. Name the main congenital phylogenetically determined malformations of the brain and spinal cord in humans.
8. How to explain the formation of congenital malformations of the brain and spinal cord in humans?
9. What is the function of the endocrine system?
10. What is the mechanism of action of hormones?
11. Why did some glands develop on the basis of the nervous system?
12. What types of animal world is inherent only in neurosecretion?
13. What are neurohemal organs?
14. What types of animal world have endocrine glands?
15. What structures of higher vertebrates are inherent in the hormonal function?
16. Which part of the human CNS has a neurosecretory function?
17. What human endocrine gland is a neurohemal formation?
18. What is the origin of various human endocrine glands?
19. What are the ways of evolution of the human endocrine system?
20. How to explain the occurrence of malformations of the human endocrine glands?

Topic 3.9. Colloquium on the topic: "Evolution of organ systems."

Task 1. List of survey questions

1. Biological evolution. The history of the formation of evolutionary ideas. The essence of Charles Darwin's ideas about the mechanisms of evolution of living nature.
2. Synthetic theory of evolution. The main methods of studying the evolutionary process: paleontological, biogeographic, morpho- logical, embryological, ecological, biochemical, molecular biology, taxonomy, modeling.
3. The doctrine of microevolution is the central section of the synthetic theory of evolution (Filipchenko Yu.A., Dobrzhansky FG, Timofeev Resovsky NV).

4. Population is an elementary unit of evolution. The main characteristics of the population as an ecological-genetic system: population area, number of individuals and its dynamics, sex and age structure, morphological and ecological unity.
5. Gene pool of natural populations, genetic heterogeneity, genetic unity, dynamic equilibrium. Frequencies of alleles and genotypes, Chacon Hard - Weinberg.
6. Elementary evolutionary material. Mutations of different types. Genetic combinatorics. An elementary evolutionary phenomenon is a change in the genotypic characteristics of a population. Elementary evolutionary factors.
7. Mutational process and its significance in evolution. Population waves. Periodic and aperiodic changes in population size. Genetic - automatic processes (gene drift). The importance of population waves in changing the genotypic structure of populations. Isolation, its forms and significance in evolution.
8. Natural selection is the driving and directing force of evolution. His field of action, elementary object, point of application, unit, efficiency, speed of action. Forms of natural selection: stabilizing, driving, disrupting. The creative role of natural selection in evolution.
9. Genetic polymorphism and hereditary diversity of natural populations. Forms of polymorphism. Genetic load and its evolutionary significance.
10. The adaptive nature of the evolutionary process. Mechanisms of adaptation, classification, relative character. Biological feasibility.
11. The species is the result of microevolution. Definition, structure and criteria of the species. Genetic unity, integrity of the species. Ways and methods of speciation.
12. Population structure of humanity. Demographic characteristics and its importance in the medical and genetic assessment of populations. The role of the marriage system in the distribution of alleles in the population. The use of Hardy Weinberg's laws in characterizing the genetic structure of human populations. Features of the action of elementary evolutionary factors in human populations.
13. Mutational process and genetic combinatorics in the formation of genetic heterogeneity of populations and the uniqueness of individuals. The danger of induced mutagenesis. Mutational load, its biological essence and biological significance.
14. Waves of number in the change of the gene pool of human populations. Population migration, mixed marriages, hybrid populations as gene flow between populations. Genoclines and clinal variability in human populations. Territorial and social form of isolation in human populations. Gene drift. Dem. Isolate. Consanguineous and assorted marriages. Features of the gene pools of isolates. Distribution and frequency of hereditary diseases in different populations of people.
15. The specificity of the action of natural selection in human populations. Selection against homo and heterozygotes.
16. Adaptive and balanced polymorphism, their role in maintaining the adaptive potential of human populations. Genetic polymorphism is the basis for intra- and interpopulation variability of a person, the significance of genetic polymorphism in predisposition to diseases, to reactions to allergens, drugs, food, etc. The significance of genetic diversity in the future of humanity.
17. Macroevolution is the process of formation of supraspecific taxa. Its relationship with microevolution.
18. Levels of organization of groups of living organisms as various forms of their relationship with the environment.
19. Elementary forms of phylogenesis: phyletic and divergent evolution. Forms of relative evolution of groups: convergent and parallel evolution, synchronous or asynchronous parallelism. Types of group evolution. Allogenesis and idioadaptation. Specialization. Arogenesis and aromorphoses. Morphophysiological regression. The existence of organisms of different levels in nature.
20. Biological progress and biological regression, their main criteria. The rules of thumb for the evolution of groups and their genetic basis.

21. Correlation between ontogeny and phylogeny. K. Baer's law of embryonic similarity. The basic biogenetic law of F. Müller and E. Haeckel. Recapitulation and their genetic basis. Ontogenesis as the basis of phylogenesis. Cenogenesis as phylogenetically significant adaptation of embryos and larval stages to specific environmental conditions. The teachings of A.N. Severtsev on phylembryogenesis. Genetic and epigenetic mechanisms of their occurrence. Anaboliias, deviations and arhallaxis. Heterochrony and heterotopy of biological structures in the evolution of ontogeny. Correlation of cenogenesis, phylembryogenesis, heterochronies and heterotopies in phylogenesis. General patterns in the evolution of organs and systems. Provisional and definitive, homologous and similar organs.
22. Differentiation and integration of biological structures in phylogenesis. Polyfunctionality and quantitative changes in the functions of biological structures. Correspondence of structure and function in living systems. Principles of activation and intensification of organ functions. Poly-oligomerization and tissue substitution of biological structures.
23. Weakening of functions, reduction and disappearance of organs in phylogenesis. Rudimentary formations in the body, morphogenetic and genetic mechanisms of their preservation in ontogenesis.
24. The law of homological series of N.I. Vavilov, allogeneic anomalies and malformations in humans. Relative transformations of organs. Phylogenetic coordination, their types. The relationship of coordination and correlation in development.
25. Substitution of organs, heterobathmia, function compensation. Their evolutionary significance. The organism as a whole in historical and individual development. The modern system of the organic world. Key points in the progressive evolution of animals.
26. Systematics and characteristics of the Chordate type.
27. Phylogenesis of the body's coverings, musculoskeletal systems.
28. Phylogenesis of the digestive system.
29. Phylogenesis of the respiratory system.
30. Phylogenesis of the circulatory system.
31. Phylogenesis of the urinary and reproductive systems.
32. Phylogenesis of the endocrine and nervous systems.
33. Main tendencies of progressive evolution and phylembryogenesis. Ontophylogenetic prerequisites for congenital malformations of organ systems in humans.

Task 2. List of test control questions with answers

1. A set of microorganisms isolated from a specific source and having specific physiological and biochemical characteristics is called
 1. species
 2. breed
 3. cultivar
 4. strain

2. Are the following judgments about the results of evolution correct?
 - A. The result of evolution is species diversity.
 - B. Population waves and gene drift are the results of evolution.
 1. Only A is true
 2. only B is true
 3. Both statements are true
 4. Both statements are wrong

3. Are the judgments about speciation correct?
 - A. In the course of speciation, two processes are carried out: the emergence of adaptation in response to changes in environmental conditions and isolation based on the isolation of new species.
 - B. Allopatric speciation is associated with the biological isolation of populations. Sympathetic speciation is associated with the spatial isolation of populations.
 1. Only A is true
 2. Only B is true
 3. Both statements are true
 4. Both statements are wrong

4. Are the following judgments about the main directions of evolution correct?
- A. The transition of organisms to a sedentary or parasitic lifestyle leads to biological regression.
 B. The development in a group of organisms of fundamentally new traits and properties that allow it to move to another adaptive zone, leads to biological progress.
1. Only A is true
 2. only B. is true
 3. Both statements are true
 4. Both judgments are wrong.
5. Are the following judgments formulated by J.-B. Lamarck about the driving forces of evolution correct?
- A. According to Lamarck, the giraffe's long neck is the result of constant exercise while eating the leaves of the upper tier from the trees.
 B. According to Lamarck, various forms of the leaf blade of the arrow-leaf arose under the direct (direct) influence of the environment on the plant.
1. Only A is true
 2. Only B
 3. Both statements are true
 4. Both statements are wrong.
6. The statement that adaptations have arisen as a result of new mutations, waves of numbers, interbreeding of organisms belongs to
1. K. Beru
 2. Ch. Darwin
 3. J.-B. Lamarck
 4. K. Linnaeus
7. In the process of evolution the types and classes of animals arose as a result of
1. aromorphosis
 2. degeneration
 3. divergences
 4. idioadaptation.
8. A population is a group of individuals of one
1. species
 2. order
 3. genus
 4. family.
9. The inability to interbreed with each other of two species of black rats with different sets of chromosomes - 38 and 42, but identical in external structure, lies at the heart of the ----- criterion.
1. biochemical
 2. genetic
 3. physiological
 4. ethological.
10. Species that have partially or completely overlapping ranges are called
1. allopatric
 2. cosmopolitan
 3. relict
 4. sympatric.

№ test	1	2	3	4	5	6	7	8	9	10
Answers	4	1	1	2	3	2	1	1	2	4

Task 3. List of essay topics:

1. Biological species. The concept of a species.
2. The concept of the population.
3. Frequencies of alleles. Hardy-Weinberg's law.
4. Mutational process.
5. Population waves.
6. Insulation.
7. Natural selection.
8. Genetic-automatic processes (gene drift).
9. Speciation.
10. Hereditary polymorphism of natural populations. Genetic load.
11. Adaptation of organisms to their environment.
12. The origin of biological expediency.
13. Population of people. Dem isolate.
14. Influence of elementary evolutionary factors on the gene pools of human populations.
15. Genetic polymorphism in human populations.
16. Genetic load in human populations.
17. Evolution of groups of organisms.
18. Correlation between ontogeny and phylogeny.
19. General patterns of organ evolution.
20. The organism as a whole in historical and individual development. Relative transformations of organs.
21. Types of food and main groups of living organisms in nature.
22. Origin of multicellular animals.
23. The main stages of the progressive evolution of multicellular animals.
24. Characteristics of the Chordate type.
25. Systematics of the Chordate type.
26. Subtype Cranial Acrania.
27. Subtype Vertebrates Vertebrata.
28. The place of man in the system of the animal world.
29. Methods for studying human evolution.
30. Characteristics of the main stages of anthropogenesis.
31. Intraspecific differentiation of humanity.
32. Phylogenesis of chordate organ systems.
33. External integuments.
34. The musculoskeletal system.
35. Digestive and respiratory systems.
36. The circulatory system.
37. Genitourinary system.
38. Integrating systems.

Section 4. Human genetics and anthropogenesis.

Topic 4.2. Human genetics. The role of genetic factors and the environment in the formation of the phenotype. Genotype is an evolutionarily developed system of genes.

Task 1. List of questions for the survey:

1. Is a gene a structural or functional unit of genetic material? What are the properties of a gene?
2. What are alleles of genes, and what is the mechanism of their occurrence?
3. List the levels of organization of the genetic material. What is the biological significance of each level?

4. What is a "karyotype" and how is it characterized?
5. What is a "phenotype"? What hereditary and environmental factors are involved in its formation?
6. What is a "genotype" and how is it characterized?
7. In what case can the genotype of an individual be determined by its phenotype? In what way is this not possible?
8. What are allelic genes?
9. What is homo- and heterozygosity of an organism for the studied trait?
10. The main patterns of behavior of traits and allelic genes during monohybrid crossing?
11. What are the forms of interaction of allelic genes, how does this affect the results of crossing?
12. What is multiple allelism? Give examples.
13. What is the essence of the law of independent combination of signs?
14. What are the conditions for performing an independent combination of signs?
15. Forms of interaction of non-allelic genes.
16. What is the epistatic effect of genes?
17. What is the complementary gene interaction?
18. What is polymerization?
19. What are the characteristics of a person as an object of genetic research?
20. What methods are used in anthropogenetics, and what is their essence?
21. List the features of pedigrees for different types of monogenic inheritance.
22. What is medical genetic counseling, and what are its objectives?

Task 2. List of test control questions with answers

Choose one correct answer.

1. According to Mendel's second law, genotype splitting occurs as ratio:
1) 1:1 2) 1:2:1 3) 3:1 4) 9:3:3:1

2. According to the law of independent inheritance of traits, phenotype cleavage occurs as ratio:
1) 1:1 2) 1:2:1 3) 3:1 4) 9:3:3:1

3. When crossbreeding individuals with the Aa genotype, splitting occurs in the offspring according to the genotype with ratio:
1) 1:1 2) 3:1 3) 9:3:3:1 4) 1:2:1

4. The law of independent inheritance of a trait is
1) Mendel's first law
2) Mendel's second law
3) T. Morgan's law
4) Mendel's third law

5. Cataract (a) and deaf-dumbness (b) in humans are transmitted as autosomal recessive non-sex-linked signs. Select the genotype of the deaf person.
1) aaBB 2) AAbb 3) AaBb 4) aaBb

- 6.G. Mendel was:
1) English monk
2) American geneticist
3) the founder of genetics
4) introduced the fruit flies into the practice of genetic research
5) the author of the hypothesis of the purity of gametes
6) deduced the law of linked inheritance.

7. How are allelic genes distributed during meiosis?

1. end up in the same gamete
2. end up in different gametes.

8. With monohybrid crossing in the second generation, hybrids exhibit genotype splitting in accordance with

- 1) 1:2:1
- 2) 3:1
- 3) 9:3:3:1
- 4) 1:1

9. At what type of cross does the phenotype splitting go according to the formula 9: 3: 3: 1

1. monohybrid with full dominance
2. monohybrid with incomplete dominance
3. dihybrid with full dominance
4. dihybrid with incomplete dominance

10. Splitting by genotype in monohybrid crossing with incomplete dominance goes according to the formula:

1. 9: 3: 3: 1
2. 1: 1
3. 3: 1
4. 1: 2: 1

№ test	1	2	3	4	5	6	7	8	9	10
Answers	2	4	4	4	2	3	2	1	3	4

Task 3. Examples of genetic problems.

Task number 1:

There are two types of hereditary blindness, each of which is defined by its own recessive gene (a or b). Both alleles are on different pairs of chromosomes and do not interact with each other. Determine the genotypes of parents suffering from various types of blindness (dihomozygous), possible genotypes and phenotypes of offspring, the likelihood of having blind children from such a marriage.

Variants of answer:

- 1) genotypes of parents suffering from various types of blindness: ♀ (mother) - AAbb (gametes Ab), ♂ (father) - aaBB (gametes aB);
- 2) phenotypes and genotypes of offspring - all have normal vision, AaBb;
- 3) the probability of the birth of blind children in this family is 0%, since the recessive genes of two types of blindness have passed into a heterozygous state and do not appear in the phenotype of children.

Topic 4.3. Linked inheritance. Genetics of sex. Sex-linked inheritance.

Task 1. List of survey questions

1. The cell cycle.
2. Mitosis.
3. Meiosis.
4. Chromosomal types of sex determination.
5. Inheritance of sex-linked traits.
6. Primary nondisjunction of sex chromosomes.
7. Secondary nondisjunction of sex chromosomes.
8. Chromosomes - gene linkage groups.
9. The theory of heredity by T.G. Morgan.

10. Types of inheritance of traits.
11. Autosomal dominant type of inheritance.
12. Autosomal recessive type of inheritance.
13. Dominant, sex-linked type of inheritance.
14. Recessive, sex-linked type of inheritance.
15. Holandric type of inheritance.

Task 2. List of test control questions with answers

In tasks 1-8 choose one or more correct answers.

1. The chromosomal theory of heredity was created by an American geneticist:
a) T. Morgan b) G. Mendel c) A. Weismann d) K. Correns

2. A gene is:
a) a section of a protein b) a unit of a species c) a unit of hereditary information d) a part of a genome

3. Genes located linearly on one chromosome form
a) linkage b) allele c) linkage group d) allelic group

4. Coupling can be: a) complete b) incomplete c) partial

5. An important source of new gene combinations is
a) conjugation b) mitosis c) meiosis d) crossing over

6. For a unit distance between genes located on the same chromosome, 1% crossing over is taken. This unit was named:
a) allele b) locus c) morganiad d) cohesion force

7. Coupling is broken as a result of crossing over, the frequency of which is ... the distance between genes in the chromosome. a) directly proportional b) inversely proportional.

8. Each biological species is characterized by a certain set of chromosomes - a) phenotype b) karyotype c) genotype.

9. Answer the question. Why can there be only one homologous chromosome in each gamete?

10. Give the definition of the GENOTYPE.

№ теста	1	2	3	4	5	6	7	8	9	10
ОТВЕТЫ	a	b	b	ab	г	b	a	б	Gametes are always haploid	Genotype is a set of genes obtained from parents

Task 3. Examples of genetic problems.

When crossing spotted normal-haired rabbits with completely colored Angora rabbits, the hybrids were spotted normal-haired. In the offspring from the analyzing crossing, the following was obtained:

52-spotted angora;

288 - completely dyed Angora;
46 - solid colored normal-haired;
314 spotted normal-haired.
Explain the results. Give the solution.
Answer: 14%

Topic 4.4. Variability and its forms.

Task 1.1. Questions for oral questioning

1. Determination of variability and its main forms.
2. What is the reaction rate, what is its dependence on the genotype?
3. Examples of modification variability of traits in humans.
4. The practical significance of the group nature of modifications.
5. What is the essence of the statistical method for studying modification variability?
6. What is the difference between mutations and modifications?
7. What types of genotypic variability are there?
8. What is combinative variability? What are the reasons for it?
9. What is the role of combinative variability in the diversity of individuals and the manifestation of traits?
10. What are the principles of classification of mutations?
11. What are the causes of mutations?
12. What is the role of mutations in human pathology?
13. What is the evolutionary significance of various forms of variability?

Task 2.2. List of test control questions with answers

1. Choose one correct answer. Disruption of the protein structure can occur when the nucleotide sequence changes:
1. Promoter. 2. Exon. 3. Intron. 4. Spacer.
2. The following processes reduce the frequency of gene mutations:
1. Reparation. 2. Replication. 3. Regeneration. 4. Crossing over.
3. Choose several correct answers. The genotype may be changed due to action of:
1. Mutations. 2. Modifications. 3. Phenocopies. 4. Genocopies.
4. Chromosomal mutations include:
1. Transitions. 2. Translocations. 3. Inversions. 4. Polyploidy.
5. Substitution of one nucleotide in the exon of a gene can lead to changes in the molecule of the encoded protein:
1. Replacement of one amino acid.
2. Changes in all (many) amino acids, starting from the site of mutation.
3. Loss of all amino acids starting from the site of mutation.
4. The protein will not change.
6. Spontaneous mutations result from:
1. Errors in DNA replication.
2. Errors in transcription.
3. Displacement of mobile elements of the genome.
4. Environmental pollution with mutagens.
7. The mutation that caused hemophilia in a man could occur at the level of:
1. his mother. 2. his father. 3. his grandmother. 4. his grandfather.

8. Mutations can cause:

1. Hereditary diseases.
2. Spontaneous abortion.
3. Congenital malformations.
4. Cancer diseases.

9. Set the correspondence.

Variability: Process:

1. Mutational. a) crossing over;
2. Combinative. b) translocation;
3. Modification. c) gene expression;
- d) reparation.

10. Set the correspondence.

Mutations: Diseases:

1. Genetic. a) Down syndrome;
2. Chromosomal. b) hemophilia;
3. Genomic. c) phenylketonuria;
- d) syndrome of "cat cry".

№ test	1	2	3	4	5	6	7	8	9	10
Answers	2	1	1	3	1	4	3	1,2,3	b,a,c	d,b,a

Task 2.2. Examples of genetic tasks.

Task 1:

Otosclerosis (damage to the ossicles) is inherited as a dominant trait (autosomal) with a penetrance of 30%. The absence of the upper lateral incisors is inherited as a recessive trait linked to the X chromosome with full penetrance. Determine the probability of having children with both anomalies at the same time in a family where the mother is heterozygous for both traits, and the father is normal in both pairs.

Answer: 3.75%.

Task 2: Congenital dislocation of the hip is inherited in an autosomal dominant manner with 25% penetrance. What is the probability of having a sick child from parents, one of whom is heterozygous for this trait?

Answer: 12.5%.

Task 3: The recessive gene **d** determines the predisposition to diabetes mellitus. The penetrance of this trait is 20% (i.e., only 20% of people with the **dd** genotype get sick).

The husband has diabetes, and the wife's father has diabetes. Determine the likelihood of the predisposition and the likelihood of their child getting diabetes.

Answer: predisposition - 50%, disease - 10%.

Topic 4.5. Anthropogenesis.

Task 1. List of survey questions

1. On what grounds does a person belong to the order of Primates?
2. What methods are used to study the origin and further evolution of humans?
3. What are the main mechanisms of anthropogenesis?
4. Which continent is the ancient homeland of mankind?
5. What methods are used to study the origin and evolution of humans?
6. Describe the main stages of anthropogenesis.

7. Is Neanderthal man the direct ancestor of Homo sapiens? Justify the answer.
8. Intraspecific differentiation of humanity: races and anthropological types.
9. The concept of the racial classification of humanity.
10. Adaptive types of a person and their origin.
11. Evidence of natural human origin based on comparative anatomy data (homologous organs, rudiments and atavisms), embryology (law of embryonic similarity, biogenetic law), biochemistry, immunology. Cytogenetics.
 1. The systematic position of human in the genealogical tree of the animal world.
 2. Characteristics of the main stages of anthropogenesis (Australopithecus, Homo sapiens, Archanthropus, Paleoanthropus, Neoanthropus). The way of life and work activity of these ancestral forms. Features of the structure of their skull, teeth, brain, skeleton of the spinal column, upper and lower extremities.
 3. The action of evolutionary factors in the process of a person's formation as a biosocial being: biological (mutations, population waves, isolation, gene drift, natural selection) and social (labor activity, abstract thinking, the development of a second signaling system, education, training, expansion of forms of communication) ...
 4. The importance of environmental factors in anthropogenesis (climatogeographic, dietary habits, etc.).
 5. Distinctive features of morphofunctional and mental transformations of a person in the course of his evolution in comparison with other mammals (development of upright walking, improvement of the hand as a tool of labor, a significant increase in the volume of the cerebral hemispheres, complication of the organization of the neocortex, the development of abstract thinking, the second signal system, communication skills, altruism, lengthening of the period of childhood, an increase in the life expectancy of one generation, etc.).
 6. Evolutionary transformations of jaws and teeth in fossil hominids in the process of anthropogenesis in connection with a change in the nature of nutrition.
 7. Race as a morphological concept. Morphofunctional adaptations of races to different climatic and geographical conditions of existence.
 8. The population concept of race. Race structure.
 9. Factors of race formation: biological (mutations, mass migration, isolation, gene drift, natural selection) and social (systems of marriage relations, customs, social barriers - linguistic, cultural, psychological, state borders, etc.).
 10. Primary foci of racial differentiation and the formation of the main racial stems. Hypotheses of monocentrism and polycentrism.
 11. Stages of race formation. The race-forming process in the modern era.
 12. Concepts about adaptive climatogeographic types of people. Morphofunctional, biological, immunological characteristics of various adaptive types (arctic, tropical, temperate, mountainous, arid).
 13. Influence of elementary biological and social evolutionary factors on the gene pool of modern human populations. Genetic-automatic processes in modern human populations. The role of stabilizing selection in maintaining the unity and diversity of the gene pool of human populations.
 15. The future of humanity and medicine. Medical and genetic counseling as prevention of congenital malformations and hereditary diseases.

5.2. List of test control questions with answers

1. Choose several correct answers.

How is the human skeleton different from the skeleton of mammals?

1. spine without bends
2. the foot is arched
3. spine S is shapedly curved
4. facial part of the skull prevails over the cerebral

5. the chest is compressed in the dorsal-abdominal direction
6. the chest is compressed from the sides.

2. *Choose multiple correct answers.*

What factors of anthropogenesis are biological?

1. use and manufacture of tools
2. complication of higher nervous activity
3. hand development
4. increase in mass and volume of the brain
5. education and training
6. Transfer of the accumulated experience to descendants.

3. *Establish the sequence of stages of human evolution.*

1. australopithecus
2. neanderthal
3. pithecanthropus
4. driopithecus
5. Cro-Magnon
6. a skilled person.

4. *Choose one correct answer.*

For mammals, animals, unlike humans, are not characterized by:

1. reasoning activity
2. conditioned reflexes
3. thinking and speaking
4. instincts.

5. *Choose one correct answer.*

The main manifestations of human higher nervous activity are associated with:

1. speech and thinking
2. reasoning activity
3. Instinct
4. conditioned reflexes.

6. *Choose multiple correct answers.*

Neanderthals:

1. were producing and maintaining fire
2. had a well-defined brow ridge
3. transferred skills to descendants
4. had a brain volume of 1200-1400 cm³
5. began to domesticate animals and engage in agriculture
6. built dwellings and put on tailored clothes.

7. *Choose several correct answers.*

Representatives of the black race have:

1. solid black straight hair
2. fat lips
3. protruding cheekbones
4. the presence of an epicanth
5. black curly hair
6. wide flat nose.

8. Choose one correct answer.

Anthropogenesis is

1. the driving forces of evolution
2. use and creation of tools
3. Historical development of species
4. the process of the emergence and evolution of man.

9. Choose one correct answer.

The human races stood out at the stage:

1. Australopithecus
2. Archanthropus
3. Paleoanthropus
4. Neoanthropus

10. Choose one correct answer.

Racism is:

- 1 - the science of races;
- 2 - the science of human origins;
- 3 - the doctrine of the inequality of human races;
- 4 - the doctrine of the division of society into classes.

№ test	1	2	3	4	5	6	7	8	9	10
Answers	235	234	416325	3	1	146	256	3	4	3

Section 5. Biogeocenotic and biospheric levels of organization of biological systems.

Topic 5.2. General ecology, human ecology, medical ecology

Task 1. List of questions for the survey:

1. Questions of general ecology, its tasks.
2. What is an ecosystem?
2. What is the essence of the concept of biosphere, its structure?
3. How are living organisms distributed in the biosphere and what are their functions?
4. What are the main abiotic environmental factors?
5. What are the biotic environmental factors?
6. What is the law of biological resistance?
7. What groups are living organisms divided into according to their ecological plasticity?
8. What are the main components of the biogeocenosis?
 10. How are the main flows of energy and matter in the ecosystem carried out?
 11. How is energy distributed in a particular link in the food chain?
 12. What are ecological pyramids, their types?
 13. Indicate what processes determine the cycle of nutrients in the ecosystem?
 14. What biological reactions of an organism can be under the influence of an ecological factor? What is the difference between anthropic factors?
14. What forms of influence does a person have on biological systems? The concepts of "habitat" and "environmental factors".
15. Classification of environmental factors.
 1. Biogeocenosis, its structure and functioning.
 2. General properties of biogeocenoses: stability and ability to evolve.
 3. Regularities of the evolution of biogeocenoses. Ecological succession.
 4. Characteristics of the human habitat: its natural and anthropogenic components.
 5. Human adaptation to the environment: biological and social aspects.
 6. Man as an environmental factor. Cities, agrocenoses. Their differences from natural ecosystems.

7. Human influence on the evolution of natural ecological systems.
8. What is the difference between the concepts of "living environment" and "living environment"?
9. What are the features of the modern human habitat?
10. What kind of impact do abiotic factors have on the human body?
11. What are the forms of biotic connections between humans and other organisms?
12. What is the medical significance of environmental factors?
13. What is the essence of social factors?
14. What are the features of anthropogenic ecosystems, their classification?
15. How are the main flows of energy and matter carried out in anthropogenic ecosystems?
16. What are the types of human adaptation to environmental factors?
17. What are ecological types of people?
18. Adaptation to what environmental factors led to the emergence of ecological types of people?
19. What are the main ecological types of people distinguish?
20. What is called anthropic pollution of the environment?
21. What is the classification of anthropic pollution?
22. What kind of impact do anthropic factors have on the human body?
23. What are the ways of getting pollutants into the human body?
24. What happens to pollutants in the body?
25. What are the ways of excretion of xenobiotics?
26. What pollutants and why can accumulate in the environment?
27. What kind of impact does radiation have on the human body?
28. What is the danger of the mutagenic action of radionuclides?
29. Why is chronic exposure dangerous?
30. What are the main forms of the impact of environmental pollutants on the human body?

Task 2. List of test control questions with answers

Test 1.

1. Choose one correct answer.

Community ecology studies:

1. Demecology.
2. Autecology.
3. Synecology.
4. Geoecology.

2. Choose multiple correct answers.

The living matter of the earth's biosphere forms:

1. A thin layer on the surface of the planet.
2. The film of life.
3. Thickening of life.
4. Islands of life.

3. Choose one correct answer.

The stability of the biogeocenosis is mainly determined by:

1. By consumables.
2. Producers.
3. Reducers.
4. Great species diversity.

4. Choose one correct answer.

The succession is characterized by:

1. By changing the biotope of the ecosystem.

2. Directed change of the community.
3. Seasonal change of community.
4. Undirected change of the community.

5. Choose several correct answers.

Reducers include:

1. Insects are coprophages.
2. Nitrogen-fixing bacteria.
3. Rotting bacteria.
4. Mushrooms.
5. Animals that inhabit the soil.

6. Choose one correct answer.

In each subsequent link in the food chain, the amount of energy:

1. Increases by 3%.
2. Increases by 10%.
3. Decreases by 3%.
4. Decreases by 10%.

7. Choose a few correct answers.

The turnover of nutrients mainly occurs between:

1. Living organisms, soil, water and rocks.
2. Soil and water.
3. Living organisms, organic detritus, soil and water.
4. Limestone, rocks, soil and water.
5. Peat, oil, coal, soil, water, organic detritus.

8. Set the match.

Interspecies mechanisms of occurrence:

Interspecies biotic factors:

1. Antibiosis.
2. Parasitism.

Mechanisms of occurrence:

- a) antagonism between individuals of different species, determined by the desire to get the same food;
- b) compulsory cohabitation, in which each type receives relatively equal benefits;
- c) the life of some organisms at the expense of the tissues and juices of others;
- d) suppression by one population by another without a reverse negative influence from the suppressed one.

9. Choose one correct answer.

When exposed to an ecological factor of low intensity, most of the individuals of the population:

1. Is adaptable.
2. Is in the stage of compensation.
3. Is in the stage of decompensation.
4. Dies.

10. Choose multiple correct answers.

Ecologist B. Commoner formulated the laws of ecology:

1. Everything is connected with everything.
2. Everything has to disappear somewhere.

3. Nature knows best.
4. The development of society depends on the global ecology.
5. Nothing is given for free.

№ test	1	2	3	4	5	6	7	8	9	10
Answers	3	1	4	1	34	4	3	аб	1	1235

Test 2.

Choose one correct answer.

1. Anthropogenic environmental factors include (are)

- 1.volcanic eruption
- 2.biological methods of plant protection
- 3.the rotation of the earth
4. allelopathy.

2. Which of the anthropogenic environmental factors is a direct action factor?

- 1.destruction of habitats
- 2.shooting of animals
- 3.pollution of the environment
4. anxiety.

3. Which of the anthropogenic environmental factors is an indirect factor?

- 1.destruction of habitats
- 2.shooting of animals
- 3.mowing the grass
4. deforestation.

4. The relationship between influenza virus and humans is an example

- 1.competition
- 2.parasitism
- 3.predation
4. commensalism.

5. What is the reason for the deterioration of the natural environment?

- 1.development of scientific and technological progress
- 2.strengthening environmental education and training
- 3.reduction of human needs
4. God's punishment.

6. Human activity is a powerful factor in biological progress

- 1.iron wood
- 2.sable
- 3.Ussuri tiger
4. the AIDS virus.

7. Which of the human impacts on nature is direct (immediate)?

- 1.greenhouse effect
- 2.depletion of the ozone layer
- 3.hunting and fishing
4. soil erosion.

8. Air pollution in a large city is

- 1.local ecological disaster
- 2.Local ecological crisis
- 3.global ecological disaster
4. regional ecological crisis.

9. Which of the environmental situations is related to the global environmental crisis?

- 1.pollution of Lake Baikal
- 2.the problem of overpopulation
- 3.AIDS epidemic
4. the crisis in Iraq.

10. An increase in the content of hemoglobin in human blood with a lack of oxygen in high altitude conditions is ... an adaptation.

- 1.physiological
- 2.morphological
- 3.behavioral
4. ontogenetic.

№ test	1	2	3	4	5	6	7	8	9	10
Answers	2	2	1	2	1	4	3	2	2	1

Task 3. Examples of situational tasks.

Task 1: Read the text "Habitat" and look for sentences that contain biological errors. Write down the numbers of these sentences first, and then formulate them correctly.

Habitat.

1. Habitat is a part of nature that surrounds living organisms and has a certain impact on them. 2. On our planet, living organisms have mastered five habitats. 3. These are aquatic, terrestrial, air, soil and organismic habitats. 4. The first to be populated was the aquatic environment. 5. The second was mastered terrestrial habitat.

Answer: 1. 2-on our planet, living organisms have mastered four habitats.

2. 3.- This is an aquatic, ground-air, soil and organismic habitat.

3. 5-second was mastered the organismic habitat.

Task 2: Read the text "Biogeocenosis and Ecosystem" and find sentences that contain biological errors. Write down the numbers of these sentences first, and then formulate them correctly.

Biocenosis and ecosystem.

1. "Ecosystem" and "biogeocenosis" are close concepts, but not synonyms. 2. Biogeocenosis is a more general concept. 3. Each biogeocenosis is an ecosystem, but not every ecosystem is a biogeocenosis. 4. A drop of water with living organisms in it is a biogeocenosis, but not an ecosystem. 5. The single ecosystem of our planet is called biogeocenosis.

Answer: 1. 2-ecosystem is a more general concept.

2. A 3-drop of water with living organisms in it is an ecosystem, but not a biogeocenosis.

3. The 5-unit ecosystem of our planet is called the biosphere.

Task 3: Read the text "Peculiarities of agrocenoses" and find sentences in it that contain biological errors. Write down the numbers of these sentences first, and then formulate them correctly.

Features of agrocenoses.

1. Considerable species diversity. 2. Short power supply circuits. 3. Complete circulation of substances. 4. The source of energy is only the sun. 5. Lack of self-regulation.

Answer: 1. ultraviolet rays in small doses are necessary for living organisms (bactericidal effect, stimulation of cell growth and development, synthesis of vitamin D, etc.), in large doses they are destructive due to their ability to cause mutations;
2. visible rays - a source of energy for photosynthesis;
3. Infrared rays are the main source of thermal energy.

Task 4: What properties of an ecosystem change during the anthropogenic transformation of a natural ecosystem into an agroecosystem?

Answer: 1. species diversity decreases;
2. the food chains are shortened;
3. the stability of the ecosystem decreases.

Task 5: Which properties does the resistance of ecosystems to anthropogenic impacts depend on?

Answer: 1. reserves of living and dead organic matter;
2. the efficiency of organic matter or vegetation production;
3. species and structural diversity.

Task 6: What are the main reasons for unsustainable use of natural resources?

Answer: 1. insufficient knowledge of the laws of ecology;
2. weak material interest of producers;
3. low ecological culture of the population.

Topic 5.3. Colloquium on the topic: "Human Genetics. Anthropogenesis. Ecology".

Task 1. List of questions for the survey.

1. Heredity and variability are fundamental properties of living things.
2. Levels of organization of the genetic apparatus of eukaryotes.
3. Gene level of organization of the genetic apparatus. Determination of gender. Trait as a genetic concept.
4. Property of the gene. Environment as a genetic concept.
5. Allelic state of genes. Forms of interaction of allelic genes.
6. Variability of DNA nucleotide sequences. Gene mutations.
7. Functional genetic classification of gene mutations.
8. Biological significance of the genetic level of organization of the genetic apparatus.
9. Chromosomal level of organization of the genetic apparatus
10. Chromosomal theory of heredity. Basic provisions.
11. Changes in the structural organization of chromosomes. Chromosomal mutations.
12. Biological significance of the chromosomal level of the organization of the genetic apparatus.
13. Genomic level of organization of the genetic apparatus.
14. Forms of interaction of non-allelic genes.
15. Functional and genetic characteristics of DNA nucleotide sequences (sites, genes).
16. Genomic level and biological variability. Genomic mutations.
17. Biological significance of the genomic level of organization of the genetic apparatus.
18. The concept of a karyotype.
19. Cellular mechanisms that determine the types of inheritance of traits controlled by nuclear genes.
20. Monogenic independent inheritance: autosomal and sex-linked.
21. Linked inheritance.
22. Interaction of non-allelic genes.
23. Heredity and biological variability of people.
24. Biological species. Population structure of the species.

25. Speciation in nature. Elementary evolutionary factors.
26. The action of elementary evolutionary factors in human populations.
27. The place of man in the system of the animal world.
28. Methods for studying the origin and evolution of man.
29. Characteristics of the order of primates.
30. Origin of the Hominid family.
31. The value of genome changes in the origin and further evolution of man.
32. Progressive evolution of hominids and human origins.
33. Intraspecific differentiation of humanity.
34. Questions of general ecology.
35. Introduction to human ecology.

Section 6. General and medical parasitology.

Topic 6.3. Fundamentals of medical protozoology. Sarcodina class. Class Flagellates.

Task 1. List of questions for the survey.

1. Characteristics and classification of the Protozoa type.
2. Features of parasitism of protozoa, depending on their localization in the host's body.
3. Protozoa living in hollow organs. Ways of infection, preventive measures.
4. Protozoa that live in tissues. Ways of infection, preventive measures.
5. Features of the geographical distribution of parasitic protozoa and the corresponding parasitic diseases.
6. Class Sarcodina.
7. How are the measures of public and personal prevention related to the methods of transmission of the parasite?
8. Class Flagellata.

Task 2. List of test control questions with answers.

Test tasks

1. Choose one correct answer.

PROTOZOAN WHICH INHABIT THE ORAL CAVITY IS NAMED:

1. *Entamoeba gingivalis*.
2. *Lamblia intestinalis*.
3. *Trichomonas tenax*.
4. *Entamoeba histolytica*.

2. Choose one correct answer.

PARASITE IN THE SMALL INTESTINE IS CALLED:

1. *Balantidium coli*.
2. *Lamblia intestinalis*.
3. *Entamoeba histolytica*.
4. *Trichomonas tenax*.

3. Choose one correct answer.

CYST CARRIER STATE IS POSSIBLE IN CASE OF:

1. Pneumocystosis.
2. Trypanosomiasis.
3. Malaria.
4. Amoebiasis.
5. Leishmaniasis.
6. Balantidiasis.

4. Choose one correct answer.

AIRBORNE ROUTE OF INFECTION IS POSSIBLE FOR:

1. *Giardia intestinal*.
2. *Plasmodium malaria*.
3. *Amoeba dysentery*.
4. *Leishmania visceral*.
5. *Pneumocystis*.

5. Choose multiple correct answers.

PATHOGENIC FORMS IN AMEBIASIS IS:

1. 4-nuclear cyst.
2. 8-nuclear cyst.
3. Large vegetative form.
4. Small vegetative form.
5. Tissue form.

№ test	1	2	3	4	5
Answers	1,3	2,3	6,4	5	1

Task 3. Examples of situational tasks.

Task 3: In a woman a smear of vaginal discharge revealed protozoa with four flagella and an undulating membrane. What kind of invasion can be assumed?

Answer: *Trichomonas vaginalis* which causes trichomaniasis.

Topic 6.4. Class Sporozoa. Class Infusoria

Task 1. List of questions for the survey.

1. Subject and objectives of medical parasitology.
2. Forms of interspecies biotic relationships in biocenoses.
3. The prevalence of parasitism in nature.
4. Classification of parasitism and parasites.
5. The origin of parasitism.
6. Adaptation to a parasitic lifestyle. Main trends.
7. The cycle of development of parasites and the host organism.
8. Factors of host susceptibility to the parasite.
9. The action of the host on the parasite.
10. Resistance of parasites to host immune responses.
11. Relationships in the parasite-host system at the population level.
12. Specificity of parasites in relation to the host.
13. Natural focal diseases.
14. Class of Infusoria.
15. Parasitic ciliates (Type Ciliophora, class Ciliata).
16. General characteristics of balantidium. Balantidiasis.
17. What explains the ability of dysentery amoeba and balantidia to invade intact intestinal walls.
18. People, what profession are more likely to get balantidiasis and why?
19. Class Sporozoa.
20. General characteristics of parasitic sporozoans (Apicomplexa type).
21. General characteristics of plasmodia. Characterization of malaria vectors.
22. Which stages of the plasmodium are invasive for the final host, which stage is for the intermediate?
23. Malaria: three-day, four-day, tropical, schizontous.

24. How can you explain the possibility of recurrence of malaria?
25. What are the ways of Toxoplasma infection? What is its life cycle?
26. Toxoplasmosis.
27. Sarcocystosis.
28. Cryptosporidiosis.
29. General characteristics of microsporidia.
30. Protozoa that live in the oral cavity.
31. Protozoa living in the small intestine.
32. Protozoa that live in the colon.
33. Protozoa that live in the genitals.
34. Single-celled parasites that live in the lungs.
35. Protozoa that live in tissues and are transmitted non-transmissively.
36. Protozoa that live in tissues and are transmitted transmissively.
37. Protozoa are facultative human parasites.

Task 2. List of test control questions with answers.

1. Choose one correct answer.

Protozoa that live in the oral cavity:

1. *Entamoeba gingivalis*.
2. *Lamblia intestinalis*.
3. *Trichomonas tenax*.
4. *Entamoeba histolytica*.

2. Choose one correct answer.

In the lungs of a person parasitizes:

1. *Plasmodium falciparum*.
2. *Leishmania tropica*.
3. *Pneumocystis carinii*.
4. *Lamblia intestinalis*.

3. Choose one correct answer.

Parasitizes in the small intestine:

1. *Balantidium coli*.
2. *Lamblia intestinalis*.
3. *Entamoeba histolytica*.
4. *Trichomonas tenax*.

4. Choose one correct answer.

Invasive stage of malarial plasmodium for humans is:

1. Schizont. 4. Microgametocyte.
2. Ookinete. 5. Macrogametocyte.
3. Sporozoite.

5. Choose one correct answer.

Transplacental infection of the fetus is possible with:

1. Amoebiasis. 4. Pneumocytosis.
2. Balantidiasis. 5. Toxoplasmosis.
3. Giardiasis.

6. Choose one correct answer.

Vector-borne transmission of pathogens is usual for:

1. Malaria.

2. Toxoplasmosis.
3. Balantidiasis.
4. Giardiasis.
5. Leishmaniasis.

7. Choose one correct answer.

Cystosis is possible in case of:

- | | |
|---------------------|-------------------|
| 1. Pneumocystosis. | 4. Amoebiasis. |
| 2. Trypanosomiasis. | 5. Leishmaniasis. |
| 3. Malaria. | 6. Balantidiasis. |

8. Choose one correct answer.

You can get infected by airborne droplets containing:

1. *Giardia intestinalis*.
2. *Plasmodium malariae*.
3. *Amoeba dysentery*.
4. *Leishmania visceralis*.
5. *Pneumocystis*.

9. Choose multiple correct answers.

In the human body intracellularly parasitize:

- | | |
|--------------------------|-------------------------|
| 1. Intestinal amoeba. | 4. Visceral Leishmania. |
| 2. Oral amoeba. | 5. Malarial plasmodium. |
| 3. Cutaneous leishmania. | 6. Toxoplasma. |

10. Choose multiple correct answers.

Pathogenic forms with amebiasis are:

- | | |
|---------------------------|---------------------------|
| 1. 4-nuclear cyst. | 4. Small vegetative form. |
| 2. 8-nuclear cyst. | 5 Tissue form. |
| 3. Large vegetative form. | |

№ test	1	2	3	4	5	6	7	8	9	10
Answers	1	3	2	3	5	1	4	5	3456	1345

Task 3. Examples of situational tasks.

Task 1: A patient with indigestion was delivered to the clinic. Microscopy of the contents of his duodenum revealed pear-shaped protozoa with two nuclei and several flagella. What protozoal disease can be suspected? What biological material should be examined for diagnosis?

Answer: Giardiasis caused by *Lambliia intestinalis*. Duodenal contents.

Task 2: A person arrived from Africa was hospitalized with recurrent (every 72 hours) attacks of fever. Blood smear microscopy revealed ring-shaped and amoeba-shaped parasites within erythrocytes. What disease can we talk about? What was the way of invasion?

Answer: Malaria, the causative agent is *Plasmodium vivax*, is transmitted to humans through the bite of an *Anopheles* mosquito.

Section 7. General and medical helminthology.

Topic 7.2. Fundamentals of helminthology. Type Flatworms. Fluke class. Systematics and morphology. Life cycle.

Task 1. List of questions for the survey:

1. Plathelminthes flatworms. The Trematoda Fluke class.

2. Characteristics and classification of the type of Flatworms.
3. The Fluke class. Features of parasitism, development cycles, ways of infection, methods of diagnosis and prevention.
4. Flukes with one intermediate host living in the digestive system.
5. Flukes with one intermediate host, living in blood vessels.
6. Flukes with two intermediate hosts.

Task 2. List of test control questions with answers:

1. *Choose one correct answer.*

THE INVASIVE STAGE OF A CAT FLUKE FOR HUMAN IS:

1. Miracidium. 3. Metacercarium.
2. Adolescarium. 4. Egg.

2. *Choose one correct answer.*

INVASIVE FOR MAN IS THE CERCARIUM OF:

1. Pulmonary fluke.
2. Schistosome.
3. Lancet fluke.
4. Pancreatic fluke.

3. *Choose one correct answer.*

THE INTERMEDIATE HOST OF THE LIVER FLUKE IS:

- | | |
|---------------------------|------------|
| 1. Terrestrial shellfish. | 3. Fish. |
| 2. Freshwater shellfish. | 4. Cattle. |

4. *Choose multiple correct answers.*

THE FINAL HOSTS OF THE LANCET FLUKE ARE:

1. Carnivores.
2. Herbivores.
3. Shellfish.
4. Man.

5. *Choose several correct answers.*

TO DETECT THE PRESENCE OF EGGS OF THE LUNG FLUKE IN A HUMAN ONE SHOULD STUDY:

1. Blood.
2. Feces.
3. Sputum.
4. Saliva.

6. *Set the correspondence.*

FLUKES:

1. Lancet.
2. Hepatic.
3. Schistosoma.
4. Feline.

INVASIVE STAGE FOR HUMAN:

- a) an egg;
- b) cercarium;
- c) metacercaria;
- d) adolescaria.

7. Set the correspondence.

FLUKES:

1. Pulmonary.
2. Feline.
3. Schistosoma.
4. Hepatic.

WAYS OF INFECTION:

- a) eating poorly fried fish;
- b) when swimming in reservoirs;
- c) the use of garden herbs washed in pond water;
- d) eating poorly cooked freshwater crayfish and crabs.

8. Set the correspondence:

1. Fascioliasis.
2. Paragonimiasis.
3. Dicrocoeliosis.
4. Opisthorchiasis.

FOR DETECTING PARASITES ONE SHOULD STUDY:

- a) sputum;
- b) blood;
- c) feces;
- d) duodenal contents.

9. Establish the correct sequence

LIVER FLUKE LIFE CYCLE STAGES:

1. Miracidium.
2. Cercarium.
3. Sporocyst.
4. Adolescarium.
5. Egg.
6. Redia.

№ test	1	2	3	4	5	6	7	8	9
Answers	3	2	2	4,2	3	1-c,2-d,3-b,4-c	1-d,2-a,3-b,4-c	1-c,2-a,3-c,4-c,d	5,1,3,6,2,4

Task 3. Examples of situational tasks.

Task 1: What adaptations do parasitic worms have? Indicate at least four adaptive features. Explain the answer.

Answer: 1. protective covers that protect against digestion in the host's body;

2. attachment organs (hooks, suction cups);

3. simplification of some systems (nervous, digestive, sensory organs);

4. high fertility, predominant development of the reproductive system, complex developmental cycles with a change of host.

Topic 7.3. Fundamentals of helminthology. Type Flatworms. Class Tapeworms. Systematics and morphology. Life cycle.

Task 1. List of questions for the survey:

1. Characteristics of the class of tapeworms Cestodea.
2. Class Tapeworms, features of parasitism.
3. Cycles of development, ways of infection and methods of prevention of tapeworms.
4. Human, the ultimate and intermediate host of tapeworms.
5. Tapeworms whose life cycle is associated with the aquatic environment.
6. Tapeworms, the life cycle of which is not associated with the aquatic environment.
7. Tapeworms, which pass through the entire life cycle in the human body.

Task 2. List of test control questions with answers:

1. *Choose one correct answer.*

The causative agent of diphyllbothriasis is:

1. Bovine tapeworm. 3. Broad tapeworm.
2. Dwarf tapeworm. 4. Pork tapeworm.

2. *Choose one correct answer.*

THE INVASIVE STAGE OF ECHINOCOCCUS FOR HUMAN IS:

1. Egg.
2. Coracidium.
3. Bladder worm.
4. Plerocercoid.

3. *Choose one correct answer.*

THE FINAL HOST OF THE PORK TAPEWORM IS:

1. Pig. 3. Herbivore.
2. Carnivore. 4. Human.

4. *Choose multiple correct answers.*

ANALYSIS OF HUMAN FECES FOR THE PRESENCE OF EGGS IS USED TO DETECT:

1. Broad tapeworm.
2. Dwarf tapeworm.
3. Pork tapeworm.
4. Echinococcus.

5. *Choose multiple correct answers.*

THE INVASIVE STAGES OF THE BROAD TAPEWORM FOR INTERMEDIATE HOSTS ARE:

1. Egg.
2. Coracidium.
3. Plerocercoid.
4. Proceroid.

6. *Set the correspondence between:*

INVASION:

1. Teniosis.
2. Cysticercosis.
3. Diphyllbothriasis.
4. Echinococcosis.

and CAUSE OF INFECTION:

- a) non-compliance with the rules of a personal hygienics;
- b) the use of poorly cooked or fried fish in food;

- c) the use of poorly heat-treated pig meat for food;
- d) autoinvasion.

7. *Set the correspondence.*

BROAD TAPEWORM:

- 1. Echinococcus.
- 2. Pork tapeworm.
- 3. Dwarf chain.
- 4. Wide tape

FOR ITS DETECTION IN HUMAN ONE SHOULD APPLY:

- a) examination of feces for the presence of eggs;
- b) fluoroscopic studies;
- c) examination of feces for the presence of segments;
- d) immunological study.

8. *Establish the correct sequence*

THE STAGES OF THE LIFE CYCLE OF THE WIDE LINE:

- 1. An adult.
- 2. Coracidium.
- 3. Plerocercoid.
- 4. Egg.
- 5. Proceroid.

№ test	1	2	3	4	5	6	7	8
Answers	3	1	1	1,2,3	2,3	1-c, 2-d, 3-b, 4-a	1-b,d, 2-c,d, 3-a,d, 4-a,d	4,2,5,3,1

Task 3. Examples of situational tasks.

Task 4: How is the adaptation of helminths to a parasitic lifestyle manifested? Indicate at least four features.

- Answer: 1. attachment organs - suckers and hooks;
 2. protective covers and the release of antienzymes;
 3. high fertility and complex development cycles (host change);
 4. simplification or reduction of several organs and systems.

Task 5: What signs serve as evidence of the biological progress of parasitic organisms?

- Answer: 1. great variety and number;
 2. wide distribution;
 3. the emergence of new species, high specialization in the parasitic way of life.

Topic 7.4. Roundworms. Class True Roundworms. Systematics and morphology.

Task 1. List of questions for the survey:

- 1. The type of roundworms Nematelminthes. Class true roundworms Nematoda.
- 2. Characteristic of the Roundworm type.
- 3. Give the definition of bio- and geo-helminths.
- 4. Roundworms - geohelminths. Features of life cycles, ways of infection and preventive measures.

5. Roundworms - biohelminths. Features of life cycles, ways of infection and preventive measures
6. Are fascioliasis, teniasis, alveococcosis, ankylostomiasis, ascariasis, trichinosis, enterobiasis and necatoriasis natural focal diseases?
7. Roundworms that carry out only migration in the human body.
8. What progressive morphophysiological features are characteristic of nematodes?
9. What are the characteristic features of the life cycles of nematodes?
10. What is the role of migration in the development of nematodes?
11. The life cycle of which nematodes is especially proven for the origin of parasites from free-living forms?
12. What kind of nematodes larvae migrate through the human body? What are their migration routes?
13. Which nematodosis has focal nature?
14. Which nematodoses are characterized by autoinvasion and reinvasion?
15. What is the percutaneous method of infection and for which nematodes is it typical?
16. What is deworming? What is devastation?

Task 2. List of test control questions with answers:

1. *Choose one correct answer.*

The class true roundworms include helminths:

1. Ascaris and hookworm.
2. Echinococcus and American hookworm.
3. Guinea worm and schistosome.
4. Strongyloides stercoralis and broad tapeworm

.

2. *Choose one correct answer.*

Localization of larvae in human skeletal muscles is possible when:

1. Trichocephalosis.
2. Enterobiasis.
3. Dracunculiasis.
4. Trichinosis.

3. *Set the correspondence between:*

Sexually mature form of helminth:

1. Guinea worm.
2. Ascarid.
3. Whipworm.
4. Hookworm.
5. Trichinella.

And localization in the human body:

- a) muscles;
- b) subcutaneous tissue;
- c) small intestine;
- d) cecum;
- e) duodenum.

4. *Choose one correct answer.*

Which parasite develops with a host change?

1. Pinworm.
2. Trichinella.

3. Guinea worm.

4. Whipworm.

5. *Choose multiple correct answers.*

Geohelminths are:

1. Trichinella and pinworm.

2. Ascaris and hookworm.

3. Strongyloides stercoralis and whipworm.

4. American hookworm and filaria

5. Guinea worm and Toxocara.

6. *Choose multiple correct answers.*

Development is carried out during the migration of the larva within the human body for:

1. Pinworms.

2. American hookworm.

3. Strongyloides stercoralis.

4. Ascaris.

5. Whipworm.

7. *Set the correspondence between:*

Invasive form for humans are:

1. Egg.

2. Larva

And human parasitic helminthes are:

a) hookworm;

b) roundworm;

c) pinworm;

d) trichinella;

e) whipworm.

8. *Choose one correct answer.*

The pathway of human infection with enterobiasis is:

1. Eating thermally unprocessed beef.

2. Drinking raw water from a natural reservoir.

3. Failure to comply with the rules of personal hygiene.

4. Walking barefoot on the ground.

9. *Set the correspondence between:*

Helminthiasis:

1. Enterobiasis.

2. Ascariasis.

3. Dracunculiasis.

4. Trichinosis.

And its diagnostics:

a) allergic intradermal tests;

b) feces study;

c) muscle biopsy;

d) scraping from perianal folds;

e) serological method.

10. Set the correspondence between

Helminths:

1. Ascaris.
2. Ancylostoma.
3. Whipworm.
4. Pinworm.

And the diseases which these helminthes cause:

- a) enterobiasis;
- b) ankylostomiasis;
- c) dracunculiasis;
- d) ascariasis;
- e) trichinosis (trichinellosis).

№ test	1	2	3	4	5	6	7	8	9	10
Answers	1	4	bcdea	3	2,3	4	1- bc; 2- eda	3	dbac	dba

Task 3. Examples of situational tasks.

Task 1: In a smear from the perianal folds of the perineum of children from one of the kindergartens, transparent, colorless oval eggs, somewhat asymmetric in shape, up to 50 microns in length, were found. What kind of nematodosis can be suspected? What preventive measures need to be followed?

Answer: Disease enterobiasis, helminth pinworm *Enterobius vermicularis*. Observe the rules of personal hygiene.

Task 2: In a kindergarten after taking anthelmintic drugs in a number of children, small white nematodes, about 1 cm in size, were found in feces, and in one child, larger white-pink nematodes with a length of 15-20 cm were found. What nematodosis were children infected with?

Answer: Enterobiasis and ascariasis.

Task 3: During the operation the patient was found to have a ball of helminths that caused intestinal blockage. The extracted worms had a spindle-shaped body 15-40 cm long. At what nematodosis can there be such a complication?

Answer: Ascariasis.

Topic 7.5. Type Roundworms. Class of Leeches.

Task 1. List of questions for the survey:

1. General characteristics of the annelid worms type.
2. What are the features of adaptation of leeches to a semi-parasitic lifestyle?
3. What is the medical significance of leeches?
4. What are the biologically active substances that make up the secretion of the leech's salivary glands?
5. What types of leeches harm humans?
6. Is it possible to use other types of leeches as a remedy, besides medical?

Section 8. General and medical arachnoentomology.

Topic 8.2. Type Arthropods. Subtype Gill-breathing. Class of Crustaceans.

Task 1. List of survey questions

1. What caused the biological progress of arthropods?
2. What are the characteristic morphophysiological features of different classes of arthropods? How are they related to the environment?
3. Name the representatives of arachnids, which are obligate synanthropic animals, note their medical significance.

Topic 8.3. Type Arthropods. Subtype Chelitserata. Class Arachnids

Task 1. List of survey questions

1. Class Arachnids Arachnoidea. Order Acari tick.
2. Ticks are temporary blood-sucking ectoparasites.
3. Ticks are inhabitants of human dwellings.
4. Ticks are permanent human parasites.
5. What are the characteristic morphophysiological features of the order of ticks? How are they related to the environment?
6. Name the types of ticks that are pathogens and carriers of vector-borne diseases.

Task 2. List of test control questions with answers

1. Choose one correct answer.

Synanthropic arachnids include:

1. Mole mite.
2. Mite dermacentor.
3. Itch mite.
4. Food mites.

2. Choose one correct answer.

The developmental cycle of a tick with three hosts is typical for:

1. Ixodid ticks.
2. Dermacentor.
3. Itch mite.
4. Food mites.

3. Choose one correct answer.

In representatives of arthropods, the method of transmission of the pathogen through the egg to the offspring is called:

1. Transmissive.
2. Transovarian.
3. Contamination.
4. Inoculation.

4. Choose multiple correct answers.

Specialization traits for blood feeding in ticks:

1. Piercing-sucking mouth apparatus and saliva anticoagulants.
2. The undividedness of the body by department.
3. Gonotrophic cycle.
4. Skin folds.

5. Choose one correct answer.

A specific vector of spirochetes - pathogens of tick-borne relapsing fever is:

1. Dog tick.
2. Itch mite.

3. Taiga tick.
4. Settlement tick.

6. Choose multiple correct answers.

Synanthropic insects include:

1. Pubic louse.
2. Flea.
3. Head louse.
4. Book louse.
5. Mosquito.
6. Red cockroach.

7. Choose several correct answers.

Specialization traits of blood-sucking insects:

1. Piercing-sucking mouth apparatus.
2. The presence of a goiter.
3. Gnawing mouth apparatus.
4. Loss of wings.
5. The presence of specific enzymes in saliva.

8. Choose multiple correct answers.

Temporary human ectoparasites are:

1. Common mosquito.
2. The pubic louse.
3. Mosquito.
4. Autumn flare.
5. Flea.

9. Set the correspondence between:

Characteristics of Arthropod organ systems:

- | | |
|-----------------|--|
| 1. Circulatory. | a. two sections of the digestive tube; |
| 2. Excretory. | b. closed circulatory system; |
| 3. Digestive. | c. three sections of the digestive tube; |
| 4. Respiratory. | d. gills, lungs, trachea; |
| | e. altered metanephridia; |
| | f. Malpighian vessels; |
| | g. open circulatory system; |
| | h. only tracheae. |

10. Set the correspondence.

Specific vectors

vs

Pathogens:

- | | |
|-----------------|------------------------------|
| 1. Head louse. | b. anthrax; |
| 2. Human flea. | b. American trypanosomiasis; |
| 3. Kissing bug. | c. African trypanosomiasis; |
| 4. Tsetse fly. | d. The plague; |
| | e. tularemia; |
| | f. relapsing fever. |

№ test	1	2	3	4	5	6	7	8	9	10
Answers	3	1	2	1	4	1236	15	1345	bfcd	fdbc

9.3. Examples of tasks.

Task 1: In one of the districts of Kazakhstan, a number of cases of oriental sore were registered. With what it can be connected; which personal and social prevention measures should be taken?

Answer: The carrier of this disease is the mosquito *Phlebotomus papatasi*

Task 2: Dysentery cases have appeared in student construction brigades located in the neighborhood having different places of public use. What is it connected with; which preventive measures should be taken?

Answer: The carrier of this disease is the housefly *Musca domestica*. One should observe food hygiene, keep flies away from living quarters.

Task 3: There is an increase in the number of cases of sleeping sickness among the inhabitants of the African village. How does this disease spread?

Answer: Via bites of tse-tse fly *Glossina*.

Topic 8.4. Type Arthropods. Subtype Tracheata. Class Insects

Task 1. List of survey questions

1. Class Insecta.
2. Synanthropic insects that are not parasites.
3. Insects are temporary blood-sucking parasites.
4. Insects are persistent blood-sucking parasites.
5. Insects - tissue and cavity endoparasites.

Topic 8.5. Colloquium on the topic: "Fundamentals of medical parasitology"

Task 1. List of survey questions

1. General characteristics of parasitism as a form of interspecies relationships in nature. The origin of parasitism. Forms of parasitism. Universal adaptations to a parasitic lifestyle.
2. The life cycle of a parasitic organism. The final and intermediate hosts of the parasites. Reservoir masters. Ways of penetration of parasites into the host organism.
3. Environmental foundations for the prevention of parasitic diseases.
4. Adaptation of parasites to a parasitic lifestyle.
5. Interactions in the "parasite - host" system at the level of organisms.
6. Interaction of parasites and hosts at the population level.
7. Natural focal diseases. The structure of the natural hearth. Fundamentals of prevention of natural focal diseases.
8. What does medical arachnoentomology study?
9. Can arachnids and insects be permanent human parasites?
10. What arachnids and insects are the causative agents of human pathological conditions?
11. Are taiga encephalitis, malaria, sleeping sickness, tick-borne relapsing fever, typhus, plague, amoebic dysentery and demodicosis natural focal diseases?
12. What is the medical significance of the following synanthropic arthropods: house tick, cockroaches, demodex, housefly, wolfart fly, house ant, meal beetle, human flea, pubic louse, kissing bug, bed bug, mosquito of the genus *Culex*, mosquitoes, autumn flies ?
13. Why is veterinary control at border checkpoints necessary?
14. Give examples of the expansion of the habitats of dangerous parasites, vectors and reservoir hosts of pathogens of parasitic and vector-borne diseases due to anthropogenic factors.
15. What is the transovarial and transphase transmission of pathogens?
16. What is the contribution of academician E.N. Pavlovsky and his school in the study of vector-borne diseases and their relationship with natural foci?
17. What representatives of the Arthropod type belong to the group of synanthropic organisms?
18. What conditions contribute to the spread of synanthropic arthropods?

19. What measures are used in the fight against synanthropic arthropods?
20. What determines the biological progress of arthropods?
21. What are the characteristic morphophysiological features of different classes of arthropods? How are they related to the environment?
22. Name the representatives of arachnids, which are obligate synanthropic animals, note their medical significance.
23. What are the structural features of insects as the most highly organized animals among arthropods?
24. How are the morphophysiological characteristics of insects related to their habitat?
25. What changes in the structure of insects are associated with adaptation to parasitism?
26. What are the insect adaptations associated with a parasitic lifestyle?
27. What insects are the causative agents of diseases?
28. Name the insects that are mechanical carriers of gastrointestinal infections and invasions.
29. What types of insects are vectors of vector-borne diseases?
30. Which method of transmission of the pathogen is called inoculation, and which is called contamination?
31. What is the nature of the interaction of synanthropic organisms with humans?
32. Which of the representatives of insects are synanthropic and facultative-synanthropic animals? Putrefaction of what products do they cause?

Test

List of essay topics:

1. Stages of development of biology.
2. Strategy of life. Adaptation, progress, energy and information support.
3. Properties of life.
4. The origin of life.
5. Origin of the eukaryotic cell.
6. The emergence of multicellularity.
7. Hierarchical system. Levels of life organization.
8. Manifestation of the main properties of life at different levels of its organization.
9. Features of the manifestation of biological laws in humans. The biosocial nature of man.
10. Cell theory.
11. Types of cellular organization.
12. Structural and functional organization of the eukaryotic cell.
13. Regularities of the existence of a cell in time.
14. Heredity and variability are fundamental properties of living things.
15. Gene level of organization of the genetic apparatus.
16. Chemical organization of the gene.
17. Properties of DNA as a substance of heredity and variability.
18. The role of RNA in the implementation of hereditary information.
19. Features of the organization and expression of genetic information in prokaryotes and eukaryotes.
20. A gene is a functional unit of hereditary material.
21. Chromosomal level of organization of genetic material.
22. Chromosomal theory of heredity.
23. Physicochemical organization of eukaryotic cell chromosomes.
24. Manifestation of the main properties of the material of heredity and variability.
25. The importance of chromosomal organization in the functioning and inheritance of the genetic apparatus.
26. Biological significance of the chromosomal level of the organization of genetic material.
27. Genomic level of organization of the teaching material.

28. Genome. Genotype. Karyotype.
29. Manifestation of the properties of hereditary material at the genomic level of its organization.
30. Features of the organization of hereditary material in pro and eukaryotes.
31. Evolution of the genome.
32. Characterization of the genotype as a dose-balanced system of interacting genes.
33. Regulation of gene expression at the genomic level of the organization of hereditary material.
34. Biological significance of the genomic level of organization of hereditary material.
35. Molecular genetic mechanisms of heredity and variability in humans.
36. Cellular mechanisms of ensuring heredity and variability in humans.
37. Methods and forms of reproduction.
38. Sexual reproduction.
39. Sex cells. Gametogenesis. Meiosis.
40. Stages, periods and stages of ontogenesis.
41. Modifications of the periods of ontogenesis that have ecological and evolutionary significance.
42. Morphological and evolutionary features of chordate eggs.
43. Fertilization and parthenogenesis.
44. Embryonic development.
45. Embryonic development of mammals and humans.
46. Phenotype of an organism. The role of heredity and environment in the formation of the phenotype.
47. Modification variability.
48. The role of hereditary and environmental factors in determining the sex of the organism.
49. Realization of hereditary information in individual development. Multigenic families.
50. Monogenic inheritance of traits. Autosomal and sex-linked inheritance.
51. Simultaneous inheritance of several traits. Independent and linked inheritance.
52. Inheritance of traits due to the interaction of non-allelic genes.
53. Regularities of inheritance of extra-nuclear genes. Cytoplasmic inheritance.
54. The role of heredity and environment in the formation of a normal and pathologically altered phenotype of a person.
55. Hereditary human diseases.
56. Features of a person as an object of genetic research.
57. Methods for studying human genetics.
58. Prenatal diagnosis of hereditary diseases.
59. Medical genetic counseling.
60. Basic concepts in the biology of individual development.
61. Mechanisms of ontogenesis.
62. Integrity of ontogeny.
63. Regeneration.
64. Old age and aging. Death as a biological phenomenon.
65. Dependence of the manifestation of aging on the genotype, conditions and lifestyle.
66. Hypotheses explaining the mechanisms of aging.
67. Introduction to the biology of human life expectancy.
68. Critical periods in human ontogenesis.
69. Classification of congenital malformations.
70. The value of the violation of the mechanisms of ontogenesis in the formation of malformations.
71. Biological species. The concept of the species.
72. The concept of the population.
73. Frequencies of alleles. Hardy-Weinberg's law.
74. Mutational process.
75. Population waves.

76. Isolation.
77. Natural selection.
78. Genetic-automatic processes (gene drift).
79. Speciation.
80. Hereditary polymorphism of natural populations. Genetic load.
81. Adaptation of organisms to their environment.
82. The origin of biological expediency.
83. Population of people. Dem isolate.
84. Influence of elementary evolutionary factors on the gene pools of human populations.
85. Genetic polymorphism in human populations.
86. Genetic load in human populations.
87. Evolution of groups of organisms.
88. Correlation between ontogeny and phylogeny.
89. General patterns of organ evolution.
90. The organism as a whole in historical and individual development. Relative transformations of organs.
91. Types of food and main groups of living organisms in nature.
92. The origin of multicellular animals.
93. The main stages of the progressive evolution of multicellular animals.
94. Characteristics of the Chordate type.
95. Systematics of the Chordate type.
96. Subtype Cranial Acrania.
97. Subtype Vertebrates Vertebrata.
98. The place of man in the system of the animal world.
99. Methods for studying human evolution.
100. Characteristics of the main stages of anthropogenesis.
101. Intraspecific differentiation of humanity.
102. Phylogenesis of chordate organ systems.
103. External integuments.
104. The musculoskeletal system.
105. Digestive and respiratory systems.
106. The circulatory system.
107. Genitourinary system.
108. Integrating systems.
109. Biogeocenosis is an elementary unit of the biogeocenotic level of life organization. Evolution of biogeocenoses.
110. Human habitat.
111. Man as an object of action of environmental factors. Human adaptation to the environment.
112. Anthropogenic ecological systems.
113. The role of anthropogenic factors in the evolution of species and biogeocenoses.
114. Toxicity of animals as an ecological phenomenon.
115. Subject and objectives of medical parasitology.
116. The prevalence of parasitism in nature.
117. Classification of parasitism and parasites. The origin of parasitism.
118. Adaptation to a parasitic lifestyle. Main trends.
119. Cycles of development of parasites and the host organism.
120. Relationships in the parasite-host system at the population level.
121. Natural focal diseases.
122. Type Protozoa.
123. Class Sarcodidae Sarcodina.
124. Class Flagellate Flagellata.
125. Class Infusoria Infusoria.

126. Class Sporozoa Sporozoa.
127. Protozoa inhabiting the cavity organs communicating with the external environment.
128. Protozoa living in tissues.
129. Protozoa are facultative human parasites.
130. The type of flatworms Plathelminthes.
131. Class Trematoda Flukes.
132. Class Cestoidea tapeworms.
133. The type of roundworms Nemathelminthes.
134. Class Arachnids Arachnoidea.
135. Squad Acari Pincers.
136. Class Insects Insecta.
137. Modern concepts of the biosphere.
138. The structure and functions of the biosphere.
139. Evolution of the biosphere.
140. Biogenesis and noogenesis.
141. Ways of human influence on nature.
142. Environmental crisis.