

BIOLOGY

**PRACTICAL BOOK
FOR ENGLISH STUDYING INTERNATIONAL STUDENTS
OF PREPARATORY DEPARTMENT**

Minsk BSMU 2016

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ

КАФЕДРА БИОЛОГИИ

БИОЛОГИЯ

BIOLOGY

Практикум

для слушателей подготовительного отделения иностранных учащихся,
обучающихся на английском языке



Минск БГМУ 2016

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Б63

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Б63

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Включены основные термины и понятия, закрытые и открытые тесты для самоконтроля, тексты задач по цитологии и генетике, схемы и контуры рисунков, контрольные и экзаменационные вопросы.

Предназначен для слушателей подготовительного отделения иностранных учащихся, обучающихся на английском языке.

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Current marks

Of student _____

No	Topic of lesson	mark	Teacher's signature
1.	Biology as a science. Basic properties of living matter		
2.	A cell as a unit of living matter. Chemical composition of cells		
3.	Cell wall. Delivery of substances into the cell		
4.	Cell organelles. Cell metabolism		
5.	Structure of the nucleus and chromosomes		
6.	Cell proliferation. Mitosis		
7.	Meiosis		
8.	Summary lesson in the chapter "Fundamentals of cytology"		
9.	Genetics as a science. Structure and functions of nucleic acids. Proteins synthesis in the cells		
10.	Monohybrid cross. The law of hybrid uniformity. The law of segregation		
11.	Dihybrid cross. The law of independent assortment		
12.	Solving the problems of monohybrid and dihybrid cross		
13.	Genetic linkage. The chromosome theory of inheritance		
14.	Genetics of sex		
15.	Variation		

16.	Human genetics		
17.	Human hereditary diseases		
18.	Summary lesson in the chapter «Fundamentals of genetics»		
19.	Sciences of man. An overview of the human body		
20.	A structure, conjunction and growth of bones		
21.	The structure of the human skeleton		
22.	A human muscular system		
23.	An internal environment of the body. Blood and its functions		
24.	Circulatory system. Structure and work of the heart		
25.	Structure of vessels. Circulations		

Current marks

Of student _____

№№	Topic of lesson	mark	Teacher's signature
26.	Respiratory system. Structure of respiratory organs		
27.	Alimentary (digestive) system. Structure of digestive organs		
28.	Concept of enzymes. Changes of nutrients in the mouth, stomach and intestine		
29.	Excretory system. Structure and function of the kidneys. Structure and function of the skin.		
30.	Nervous system. Structure and function of the spine (spinal medulla)		
31.	Structure and function of the brain		
32.	Sensory organs. Structure and function of the visual organ		
33.	Structure and function of the hearing (acoustic) organ		
34.	Reproductive system. Structure and formation of gametes		
35.	Summary lesson in the chapter «People and health»		
36.	Concept of prokaryotes and eukaryotes. Bacteria		
37.	Description of the kingdom protists. Parasitic protists		
38.	Characteristics of phylum platyhelminthes (the flatworms)		
39.	Characteristics of the class Flukes		
40.	Characteristics of the class Tapeworms		

41.	Characteristics of the phylum Roundworms		
42.	Phylum arthropoda		
43.	Characteristics of the class Arachnida		
44.	Characteristics of the class Insecta		
45.	Characteristics of the phylum Chordata		
46.	Characteristics of class osteichthyes.		
47.	Characteristics of the class Amphibia		
48.	Characteristics of the class Reptilia		
49.	Characteristics of class mammalia		
50.	Summary lesson in the chapter «Diversity of the organic world»		

Lesson 1. Topic: BIOLOGY AS A SCIENCE. BASIC PROPERTIES OF LIVING MATTER " _____ " _____ 201__ year

Aim of the lesson: to study subject matter of biology and properties of livings.

<p style="text-align: center;">CONTROL QUESTIONS</p> <p>1. Biology as a science.</p> <p>2. Properties and characteristics of the livings.</p>	<p>4. A human body receives from the environment: a) oxygen, carbon dioxide, b) food, oxygen, c) oxygen only, d) carbon dioxide and food, e) carbon dioxide.</p> <p>5. Similarity of children and parents is: a) variability, b) heredity, c) reproduction, d) regeneration, e) reduction.</p> <p>6. Distinction of children from parents is: a) variability, b) heredity, c) reproduction, d) regeneration, e) reduction.</p> <p>7. Responsibility to the environmental effect or factor is: a) reproduction, b) heredity, c) variability, d) irritability, e) regeneration.</p> <p>8. A structural, functional and genetic unit of livings is: a) organ, b) cell, c) organelle, d) tissue, e) nucleus.</p> <p>9. A cell consists of: a) membrane, nucleus, protoplasm, b) membrane and cytoplasm, c) membrane, hyaloplasm, nucleus and organelles, d) membrane, nucleus and organelles, e) nucleus and cytoplasm.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>1. Biology –</p> <p>2. Cell –</p> <p>3. Objects of study of Biology –</p> <p>4. Irritability –</p> <p>5. Properties of living matter –</p>	<p style="text-align: center;">OPEN TESTS</p> <p style="text-align: center;">Insert missing word or concept</p> <p>1. An ability of living organisms to reproduce itself is ...</p>

TESTS FOR SELF-CONTROL

- 1. A human body receives from the environment:** a) oxygen, carbon dioxide, b) food, oxygen, c) oxygen only, d) carbon dioxide and food, e) carbon dioxide.
- 2. The body releases into the environment:** a) oxygen, food b) carbon dioxide only, c) carbon dioxide and waste substances, d) oxygen, e) waste substances only.
- 3. Reproduction is an ability of living organisms:** a) to repair damaged body parts b) to reproduce themselves, c) to change, d) to move, e) to release into the environment broken bread.
- 2.** The science of life and living organisms is called ...
- 3.** A similarity of children and parents is ...
- 4.** A distinction of children from parents is ...
- 5.** A historical development of the species is ...
- 6.** A property of organism to maintain a constant internal environment is ...
- 7.** Development of an organism from the formation of the zygote to death is ...

Teacher's signature

Lesson 2. Topic: A CELL AS A UNIT OF LIVING MATTER. CHEMICAL COMPOSITION OF CELLS " ____ " _____ 201__ year

Aim of the lesson is to study main statements of the Cell Theory; content and role of chemical elements inside cells; nonorganic (water, minerals) and organic (proteins, lipids, carbohydrates) substances.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none"> 1. The cell as a structural, functional and genetic unit of living matter. 2. Main concepts of the Cell Theory. 3. Content of chemical elements inside cells, their classification. 4. Inorganic substances: water, minerals and their role in the cells. 5. Structure and functions of proteins. 6. Structure and functions of lipids. 	<ol style="list-style-type: none"> 5. Monosacharides – 6. Inorganic substances – 7. Organic substances – 8. Development – 9. Growth – 10. Cytology –
<p>7. Structure and functions of carbohydrates.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <ol style="list-style-type: none"> 1. Hormone – 2. Macromolecule – 3. Macroelements – 4. Microscope – 5. Microelements – 	<ol style="list-style-type: none"> 11. Biopolymer – <p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <ol style="list-style-type: none"> 1. What science studies the cell as a structural and functional unit of living matter? a) Cytology, b) Histology, c) Anatomy, d) Genetics, e) Hygiene (sanitary science). 2. Main concepts of the Cell Theory were formulated in: a) 1665, b) 1809, c) 1839, d) 1917, e) 1858

3. Who formulated the main concepts of the Cell Theory? a) R. Browne, b) J. Purkinje, c) R. Hooke, d) T. Schwann, e) M. Schleiden.

4. Main concepts of The Cell Theory are: a) All living things are composed of one or more cells, b) plant's and animal's cells have similar structure and chemical composition, c) All cells come from pre-existing cells through reproduction, d) Cells are the basic life structure of a living thing or organism, e) all answers are right.

5. The formation of organism or certain organ is: a) development, b) growth, c) genetic heredity, d) metabolism, e) variability (mutation).

6. Multicellular organisms are: a) bacteria, b) Amoeba, c) Infusorian, d) animals, plants and humans, e) viruses.

7. Macro elements of cells are: a) carbon and manganese, b) carbon and calcium, c) copper and oxygen, d) oxygen and zinc, e) manganese and phosphorus.

8. Microelements of cells are: a) zinc and copper, b) carbon and sulfur, c) calcium and potassium, d) copper and carbon, e) iron and phosphorus.

9. Inorganic substances are: a) proteins and carbohydrates, b) lipids and carbohydrates, c) proteins and lipids, d) water and minerals, e) water and lipids.

10. Bone tissue contains minerals of: a) potassium and calcium, b) calcium and phosphorus, c) copper and phosphorus, d) iron and potassium, e) sodium and chlorine.

11. Muscle tissue contains a lot of: a) calcium, b) phosphorus, c) potassium, d) sodium, e) copper.

12. pH of cells is determined by: a) calcium minerals, b) potassium minerals, c) anions and cations, d) proteins, e) lipids.

13. Cell organic substances are: a) water, ATP, lipids, b) minerals, nucleic acids and carbohydrates, c) hormones, vitamins, water, d) proteins, carbohydrate and lipids, e) proteins, carbohydrates, minerals.

14. Functions of proteins are: a) structural, b) enzymatic, c) motor, transport, d) regulatory, energetic e) all answers are right.

15. Examples of simple carbohydrates: a) DNA and RNA, b) RNA and glucose, c) DNA and ribose, d) fructose, glucose, ribose, e) ATP, RNA.

16. Nucleic acids contain: a) fructose and ribose, b) ribose and deoxyribose, c) glucose and fructose, d) glucose and deoxyribose, e) fructose and deoxyribose.

17. Functions of lipids are: a) energetic, b) structural, c) thermoregulatory, d) storage, e) all answers are right.

OPEN TESTS

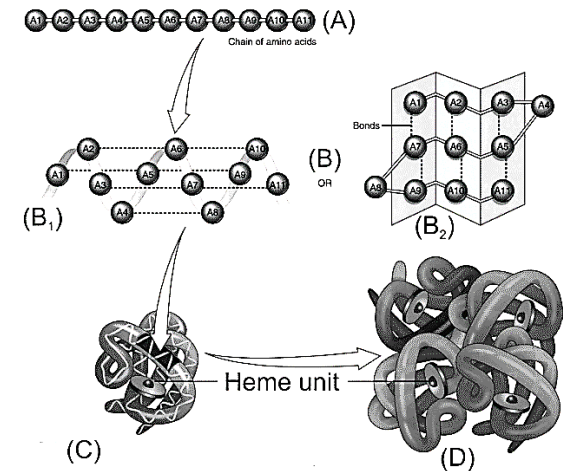
Insert missing word or concept

1. Elements in the living organisms could be a part of organic and ... substances.
2. Chemical elements that are abundant in cells are called ...
3. Main statements of the Cell Theory were formulated in 1839 by ...
4. One of the statements of the Cell Theory is: all living things consist of ...
5. A structural and functional unit of living things is ...
6. Science that deals with structure and cell vital process is ...
7. The cell consists of a cell wall, cytoplasm, ... and organelles.
8. Organisms that consist of only one cell are called ...

9. Plants, animals and human areorganisms.
10. Chemical elements that are deficient in cells are called ...
11. The cell contains ...% of water.
12. Quantity of water in the cell depends on ...
13. Cations and anions determine ... of cytoplasm.
14. Proteins, lipids, carbohydrates are ... substances.
15. Molecules that have complex structure and big molecular weight are called...
16. Protein's monomers are ...
17. Enzymatic function is typical for ...
18. Oxygen is transported into the cell by ...
19. Muscle contraction is provided by the protein ...
20. Complex carbohydrates are ...
21. Solid fats are ...
22. Liquid fats are ...

PRACTICAL WORK

Task 1. Study the level of structural organization of proteins and sign them:



A –

B –

B₁ –

B₂ –

C –

D –

Teacher's signature

Lesson 3. Topic: **CELL WALL. DELIVERY OF SUBSTANCES INTO THE CELL** " ____ " _____ 201__ year

Aim of the lesson: to study the structure, properties and functions of the plasma membrane, to get understanding of transport through the plasma membrane.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none">1. Structure of the cell.2. Models, properties and functions of the plasma membrane.3. Passive transport through the membrane.4. Active transport through the membrane.	<p>12. Pinocytosis –</p> <p>13. Plasmalemma–</p>
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BASIC TERMS AND CONCEPTS

6. Active transport –

7. Diffusion –

8. Semi-permeability –

9. Cell envelope –

10. Osmosis –

11. Passive transport –

14. Phagocytosis –

TESTS FOR SELF-CONTROL

1. A cell has: a) cell wall, b) nucleus, c) cytoplasm, d) organelles, e) all answers are right.

2. Cell's liquid substance that contains organelles is: a) cytoplasm, b) plasmalemma, c) nuclear sap (nucleoplasm), d) cell wall, e) nucleus.

3. Molecules that are included into the membrane could be: a) proteins and water, b) proteins and lipids, c) lipids and water, d) carbohydrates and water, e) carbohydrates and proteins.

4. Molecules of lipids have: a) head and body, b) head and neck, c) head and tail, d) body and neck, e) head, body and tail.

5. Hydrophobic tails of lipids are directed: a) to each other, b) to external side of membrane, c) to internal side of membrane, d) in different sides, e) to proteins.

6. Hydrophilic tails of lipids are directed: a) to each other, b) to proteins, c) to external side of membrane, d) to internal side of membrane, e) in different sides.

- 7. The main property of membrane is:** a) elasticity, b) structuredness, c) selective permeability, d) viscosity, e) stability.
- 8. Structural function of membrane is:** a) to protect cells, b) to form organelles, c) to contain enzymes, d) to transport substances into the cell, e) to take part in the metabolism.
- 9. The concentration gradient flow of substances is called:** a) phagocytosis, b) pinocytosis, c) passive transport, d) active transport, e) osmosis.
- 10. Water enters the cell through the membrane by means of:** a) phagocytosis, b) pinocytosis, c) osmosis, d) passive transport, e) active transport.
- 11. Active transport is:** a) a concentration gradient flow of substances without energy costs, b) inflow of substances inside the cell against a concentration gradient with energy expenses, c) the process of engulfing solid particles by the cell membrane and their transfer into the cytoplasm, d) the process of engulfing liquid particles by the cell membrane and their transfer into the cytoplasm, e) water supply

(transport).

OPEN TESTS

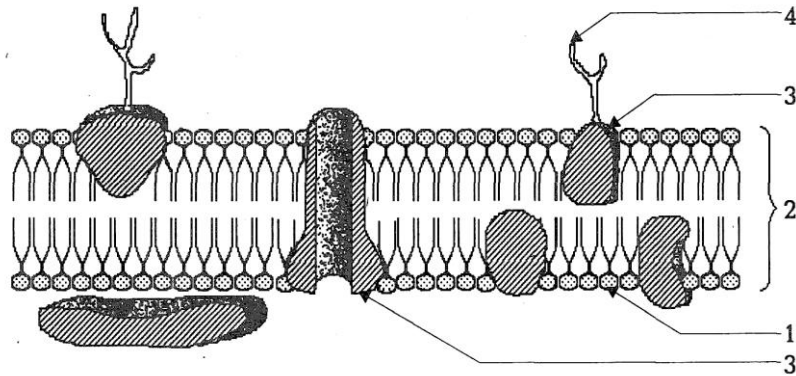
Insert missing word or concept

- 23.** Colloid solution in which organelles are located is called ...
- 24.** A cell is covered with ...
- 25.** Plasma membrane as a part of the cell wall is called ...
- 26.** Heads of lipids' molecules are ...

- 27.** Tails of lipids' molecules are ...
- 28.** The main property of the membrane is ... permeability.
- 29.** Concentration gradient flow of substances istransport.
- 30.** Transport of water through the membrane is ...
- 31.** Ways of substances supply to cells: diffusion, osmosis, active transport, ... and phagocytosis.
- 32.** Transport of solutes (dissolved substances) through the membrane is ...
- 33.** Active transport requires energy of ...
- 34.** The process of engulfing solid particles by the cell membrane is ...
- 35.** The process of engulfing liquid particles by the cell membrane is ...
- 36.** The way of bacteria engulfing by leucocytes is ...

PRACTICAL WORK

Task 1. Study a scheme of cell's membrane structure and make indications:



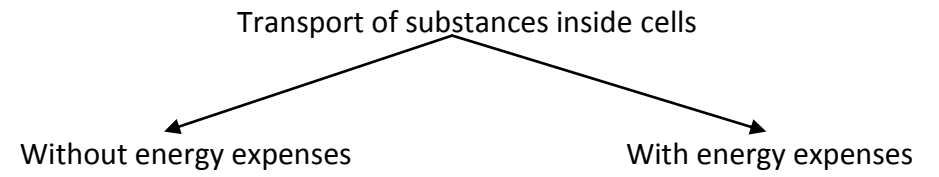
1 -

2 -

3 -

4 -

Task 2. Draw the scheme "Transport of substances inside cells":



Teacher's signature

Lesson 4. Topic: CELL ORGANELLES. CELL METABOLISM " ____ " _____ 201__ year

Aim of the lesson: to study main components of cytoplasm, structure and functions of cell organelles, process of anabolism and catabolism (energy metabolism), its correlation.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none">1. Classification of cell organelles.2. Structure and functions of general membrane organelles (endoplasmic reticulum, Golgi complex, lysosomes, mitochondria and plastids).3. Structure and functions of non-membrane organelles (ribosomes, centrosomes).4. Metabolism and energy conversion (transformation of energy) as basis of life for cells.5. Correlation between anabolism and catabolism.6. The concept of autotrophic and heterotrophic organism.	<p>15. Heterotrophic organisms –</p> <p>16. Dissimilation –</p> <p>17. Metabolism –</p>
	<p>18. Organelles –</p> <p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <p>1. Cell organelles are: a) reserve food material, b) parts of the cell that have permanent structure and function, c) impermanent parts of cell, d) groups of</p>

BASIC TERMS AND CONCEPTS

12. Autotrophic organisms –

13. Anaerobic organisms –

14. Assimilation –

15. ATP –

16. Aerobic organisms –

enzymes, e) structural component of organs.

2. Membrane-bound organelles of cell are: a) Golgi complex, ribosomes, b) ribosomes, plastids, c) Golgi complex, endoplasmic reticulum, mitochondria, d) ribosomes, e) centrosome.

3. Reduction of complex organic substances into simpler ones occurs in: a) mitochondria, b) lysosomes, c) plastids, d) ribosomes, e) centrioles.

4. Transport of substances to different parts of the cell is a function of: a) Golgi complex, b) endoplasmic reticulum, c) lysosomes, d) mitochondria, e) ribosomes.

5. Ribosomes are located: a) in cytoplasm and endoplasmic reticulum, b) Golgi complex, c) nucleus, d) the kernel, e) centrosome.

6. Functions of mitochondria are: a) lipid synthesis, b) carbohydrate synthesis, c) splitting of glucose, d) ATP synthesis, e) photosynthesis.

7. Functions of the centrosome are: a) involved in cell division b) involved in protein synthesis, c) involved in formation of lysosomes, d) ATP synthesis, e) lipid synthesis.

8. Functions of chloroplasts are: a) lipid synthesis, b) photosynthesis, c) protein synthesis, d) splitting of organic molecules, e) involved in cell division.

9. Metabolism include: a) reproduction and assimilation, b) irritability and dissimilation, c) assimilation and dissimilation, d) reproduction and dissimilation, e) growth and reproduction.

10. Anabolism includes: a) protein and carbohydrate synthesis, b) splitting of lipids, c) splitting of carbohydrates, d) splitting of proteins, e) protein, carbohydrate and lipid splitting.

11. The process of complex organic molecules formation from simple substances is called: a) diffusion, b) assimilation, c) dissimilation, d) diffusion, e) osmosis.

12. The process of complex organic molecules splitting is called: a) diffusion, b) assimilation, c) dissimilation, d) phagocytosis, e) pinocytosis.

13. Autotrophic organisms: a) fungi, b) all bacteria, c) plants, d) animals, e) human.

14. What are produced during splitting of complex organic molecules? a) energy, b) amino acids, c) glucose, d) oxygen, e) glycerol.

15. Autotrophic cells: a) form organic substances of nonorganic by self, b) are not capable of photosynthesis, c) form inorganic substances, d) split (reduce) nonorganic substances, e) all answers are false.

16. Heterotrophic cells: a) use ready-made organic substances, b) form organic substances of inorganic by self, c) are capable of photosynthesis, d) form nonorganic substances, e) form nonorganic substances.

17. In photosynthesis organic substances are formed from: a) water and carbon dioxide, b) oxygen and lipids, c) carbon dioxide and oxygen, d) oxygen only, e) carbon dioxide, water and oxygen.

18. According to the type of assimilation cells are: a) autotrophic and anaerobic, b) autotrophic and heterotrophic, c) heterotrophic and aerobic, d) heterotrophic and anaerobic, e) aerobic and anaerobic.

19. According to the type of dissimilation cells are: a) autotrophic and anaerobic, b) autotrophic and heterotrophic, c) aerobic and anaerobic, d) heterotrophic and anaerobic, e) heterotrophic and aerobic.

OPEN TESTS

Insert missing word or concept

1. Those parts of cell that are located in the cytoplasm are called ...
2. Types of endoplasmic reticulum: granular and ...
3. Membranes of granular endoplasmic reticulum have ...
4. The function of ribosomes is synthesis of...
5. The process of complex organic molecules splitting takes place in ...
6. A centrosome consists of two ...
7. The function of mitochondria is a synthesis of ...
8. Green plastids of plant cells are called ...
9. A chloroplast contains a green pigment ...
10. The process of complex organic molecules formation is ...
11. The process of complex organic molecules splitting is called ...

PRACTICAL WORK

Task 1. Study the schemes and make indications:

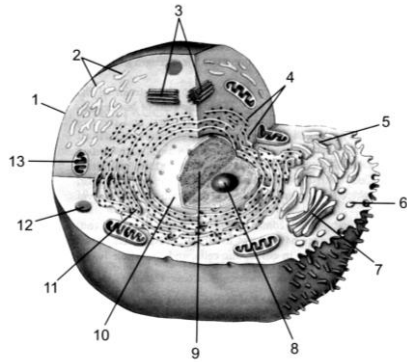


Fig.1. Internal structure of the cell:

- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -
- 7 -
- 8 -
- 9 -
- 10 -
- 11 -
- 12 -
- 13 -

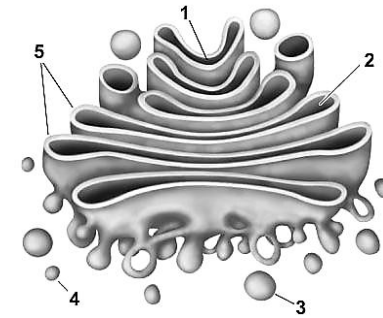


Fig.2. Golgi complex:

- 1 -
- 2 -
- 3 -
- 4 -
- 5 -

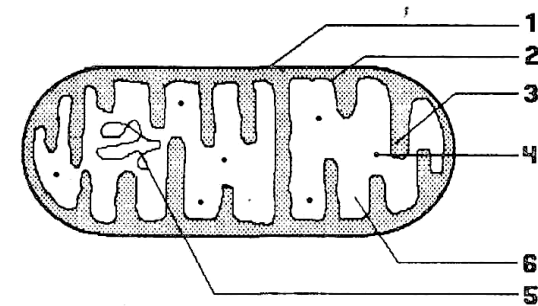


Fig.3. Mitochondrion:

- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -

Lesson 5. Topic: STRUCTURE OF THE NUCLEUS AND CHROMOSOMES " ____ " _____ 201__ year

Aim of the lesson: to study the structure and functions of an interphase nucleus and chromosomes.

CONTROL QUESTIONS

1. Structure and functions of the cell nucleus.
2. Structure of the metaphase chromosome.
3. Types of chromosomes.
4. Principles (rules) of chromosomes.

8. Pores –

9. Satellite –

10. Chromatin –

BASIC TERMS AND CONCEPTS

6. Acrocentric chromosome –

7. Genetic information –

8. Homologous chromosomes –

9. Karyoplasm –

10. Karyotype –

11. Metacentric chromosome –

12. Perinuclear space –

11. Chromosome –

12. Centromere –

TESTS FOR SELF-CONTROL

- 1. Structural components of the interphase nucleus:** a) karyolemma, b) karyoplasm, c) chromatin, d) nucleoli, e) all answers are right.
- 2. Karyolemma consists of:** a) outer membrane, b) inner membrane, c) perinuclear space, d) pores, e) all answers are right.
- 3. What are located in karyoplasm:** a) nucleoli and chromatin, b) plastids and nucleoli, c) mitochondria, d) Golgi complex, e) centrosome.
- 4. Subunits of ribosomes are formed in:** a) nucleus, b) nucleolus, c) Golgi complex, d) plastids, e) endoplasmic reticulum.
- 5. Chromatin comprises:** a) DNA and protein, b) ATP and carbohydrates, c) DNA and lipids, d) water and RNA, e) DNA and carbohydrates.
- 6. A metaphase chromosome consists of:** a) two chromatids, b) centromeres, c) chromosome arms, d) satellite, e) all answers are right.

7. Features of the metacentric chromosome are: a) arms of the same length, b) arms of the different length, c) one arm is very long, d) another arm is very short, e) all answers are false.

8. Features of the submetacentric chromosome are: a) arms of the same length, b) arms of the different length, c) one arm is very long, d) another arm is very short, e) all answers are false.

9. Features of the acrocentric chromosome are: a) arms of the same length, b) arms of the different length, c) one arm is very long while another is very short, d) has no centromere, e) all answers are false.

10. Principles of chromosomes: a) stability of quantity (constant number), b) pairing (twoness) of chromosomes, c) the individuality of chromosomes, d) continuity of chromosomes, e) all answers are right.

11. Principle of pairing of chromosomes: a) chromosomes of different pairs are identical in size, b) chromosomes of different pairs vary in form, c) each chromosome of karyotype has homologous pair, d) new daughter chromosome come from maternal one, e) cells of organism that belong to a certain species have a constant number of chromosome.

12. Functions of the nucleus: a) genetic information storage and transfer, b) protein synthesis, c) lipid synthesis, d) carbohydrate synthesis, e) ATP synthesis.

OPEN TESTS

Insert missing word or concept

1. Nucleus membrane is called ...
2. ... space is located between 2 membranes of nucleus wall.
3. Nuclear sap is kept under karyolemma and is called ...
4. Holes in the karyolemma are called ...
5. Formation of ribosome subunits takes place at ...

6. Types of chromosomes are following: metacentric, submetacentric and ...

7. The diploid set of chromosomes in the somatic cells of different organisms is called ...

8. Complex compound of DNA and nuclear proteins is ...

9. Regulation of cell metabolism is a function of ...

10. During cell division chromatin turns into ...

11. Primary chromosomal constriction is named ...

12. Secondary constriction isolates (separates) a part of the chromosome that is called ...

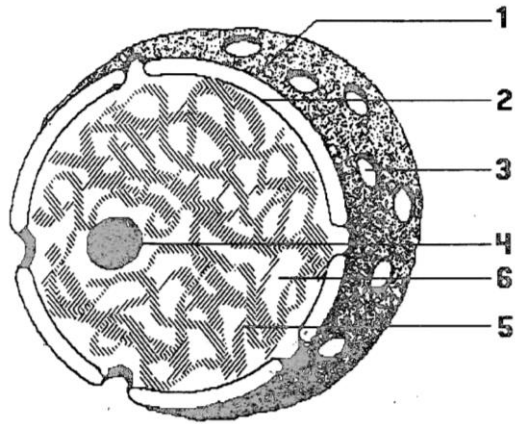
13. Chromosome with the same-length arms is called ...

14. Chromosome with one very long arm while another is very short is called ...

15. Paired chromosomes of the same shape and size are called ...

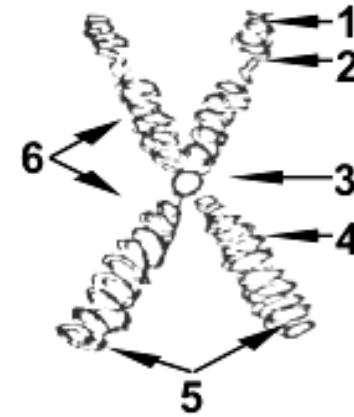
PRACTICAL WORK

Task 1. Study the scheme of the nucleus and make indications:



- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -

Task 2. Study the scheme of the chromosome and make indications:



- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -

Teacher's signature

Lesson 6. Topic: CELL PROLIFERATION. MITOSIS " ____ " _____ 201__ year

Aim of the lesson: to study processes occurring during the interphase, phases of mitosis and their significance.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none"> 1. Proliferation (reproduction) as a fundamental property of livings. 2. Periods of interphase and their characteristics. 3. Features of phases of mitosis. Biological significance of mitosis. 	<p>8. Somatic cells –</p> <p>9. Telophase –</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <ol style="list-style-type: none"> 13. Anaphase – 14. Division spindle – 15. Diploid chromosome set – 16. Interphase – 17. Metaphase – 18. Mitosis – 19. Prophase – 	<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <ol style="list-style-type: none"> 1. What takes place during during interphase? a) chromatids spiralization (helix formation), b) chromatids disjunction towards cellular poles, c) DNA synthesis, d) conjugation of chromosomes, e) crossing-over (crossover). 2. What happens with a cell during the interphase? It: a) is on the increase, b) carries out its functions, c) prepares for mitosis, d) synthesizes DNA, e) all answers are right. 3. Content of genetic material in presynthetic period of the interphase: a) 1n2chr, b) 2n1chr, c) 2n2chr, d) 1n2chr, e) 1n1chr. 4. DNA synthesis occurs during: a) prophase of mitosis, b) telophase of mitosis, c) interphase, d) anaphase, e) metaphase. 5. Mitosis is: a) formation of gametes, b) sexual reproduction (propagation), c) division of somatic cells, d) transport of substances, e) cell grows. 6. Phases of mitosis: a) prophase, b) anaphase, c) metaphase, d) telophase e) all answers are right. 7. Chromatids spiralization and centrioles disjunction towards cellular poles occur during: a) anaphase, b) telophase, c) prophase, d) metaphase, e) interphase. 8. Content of genetic material in the prophase of mitosis: a) 2n2chr, b) 1n2chr, c) 2n1chr, d) 1n1chr, e) 2n3chr.

- 9. What takes place during the metaphase?** a) chromatids spiralization (helix formation), b) chromosomes are located on the equator of a cell and spindle fibers attach to centromeres, c) chromosome is divided into 2 chromatids, d) chromatids are called daughter chromosome, e) DNA synthesis.
- 10. Content of genetic material in the metaphase of mitosis:** a) $2n2chr$, b) $1n2chr$, c) $2n1chr$, d) $1n1chr$, e) $1n3chr$.
- 11. Every chromosome is divided into 2 chromatids during:** a) anaphase, b) telophase, c) prophase, d) metaphase, e) interphase.
- 12. Content of genetic material in anaphase of mitosis:** a) $2n2chr$, b) $1n2chr$, c) $2n1chr$, d) $1n1chr$, e) $2n3chr$.
- 13. When the formation of karyolemma and division of maternal cytoplasm occur?** a) anaphase, b) telophase, c) prophase, d) metaphase, e) interphase.

OPEN TESTS

Insert missing word or concept

16. Property of living organisms to create their own kind is ...
17. Cells multiply (reproduce oneself) by ...
18. All cells of the organism except sexual are called ...
19. Somatic cells are divided by means of ...
20. Period between 2 mitoses is ...
21. Disjunction of centrioles towards cellular poles occurs in ... of mitosis.
22. During prophase karyolemma decomposes (dissolves) and ...
23. In the end of prophase chromosomes put away for (overlook) ...

24. Chromosomes are located on the equator of a cell in ...
25. Daughter chromosomes diverge to the cell poles during ... of mitosis.
26. In the telophase, nucleoli are restoring and ...
27. 2 daughters diploid cells are formed during ... of mitosis.

PRACTICAL WORK

Task 1. Study the scheme of mitosis. Define the stages, write their numbers and characteristics:

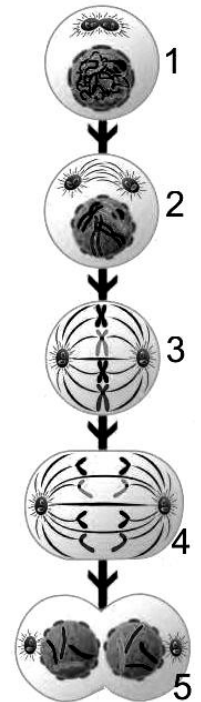
– Interphase –

– Prophase –

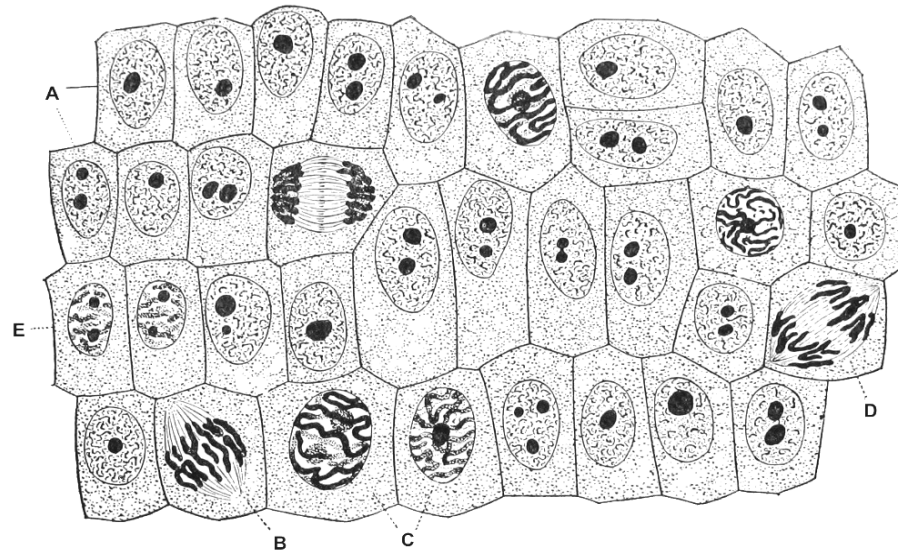
– Metaphase –

– Anaphase –

– Telophase –



Task 2. Study the scheme and define the stages of mitosis in the marked cells:



Interphase –

Prophase –

Metaphase –

Anaphase –

Telophase –

Teacher's signature

Lesson 7. Topic: **MEIOSIS** " ____ " _____ 201__ year

Aim of the lesson: to study meiosis and its biological significance.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>4.Characteristic of phases of meiosis I and meiosis II. Changes in the content of genetic material.</p> <p>5.Biological significance of meiosis.</p> <p>6.Similarity and differences in meiosis and mitosis.</p>	<p>1. What kind of cells is formed by meiosis? a) somatic, b) gametes, c) nuclear-free, d) any cells, e) diploid cells.</p> <p>2. First meiotic division is called: a) crossing-over, b) reductional division, c) mitotic, d) conjugation, e) equational division.</p> <p>3. Meiosis ends up with: a) two diploid cells, b) four haploid cells, c) two haploid cells, d) four diploid cells, e) one haploid cell.</p>

BASIC TERMS AND CONCEPTS

20. Interkinesis –

21. Conjugation –

22. Crossing-over –

23. Meiosis –

24. Gonads –

25. Reductional division –

26. Equational division –

4. Meiosis includes: a) one division, **b)** 2 divisions, **c)** 3 divisions, **d)** 4 divisions, **e)** 5 divisions.

5. Conjugation is: a) a connection of homologous chromosomes (chromosome fusion), **b)** a connection of non-homologous chromosomes, **c)** exchange between the same regions of homologous chromosomes, **d)** exchange between the different parts of homologous chromosomes, **e)** exchange of entire (whole) chromosomes.

6. Conjugation of chromosomes occurs in: a) prophase II, **b)** metaphase I, **c)** prophase I, **d)** anaphase I, **e)** prophase of mitosis.

7. Crossing-over is: a) a convergence of homologous chromosomes, **b)** a convergence of non-homologous chromosomes, **c)** exchange between the same regions of homologous chromosomes, **d)** exchange between the different parts of homologous chromosomes, **e)** chromosome fusion.

8. During what phase of meiosis homologous chromosomes are arranged in pairs on the equator of a cell? a) metaphase I, **b)** prophase I, **c)** telophase I, **d)** telophase II, **e)** anaphase I.

9. During what phase of meiosis homologous chromosomes diverge to the cellular poles? a) metaphase I, **b)** prophase I, **c)** telophase I, **d)** anaphase II, **e)** anaphase I.

10. During what phase of meiosis crossing-over occurs? a) prophase I, **b)** prophase II, **c)** metaphase I, **d)** telophase I, **e)** interkinesis.

11. Content of genetic material 1n1chr in cell is typical for: a) prophase of mitosis, **b)** telophase of meiosis II, **c)** interphase, **d)** telophase of meiosis I, **e)** metaphase of mitosis.

OPEN TESTS

Insert missing word or concept

28. Gametes are formed as a result of ...
29. First division of meiosis when number of chromosomes is halved is called ...
30. Meiosis is a division of cells ...
31. During prophase of meiosis I conjugation of homologous chromosomes and ... occur.
32. During prophase of meiosis I homologous chromosomes that consist of ... chromatids diverge to the cellular poles.
33. Period between meiosis I and meiosis II is named...
34. Connection of homologous chromosomes throughout the length is called ...
35. An exchange between the same regions of homologous chromosomes is called ...
36. Content of genetic material in the anaphase of meiosis I on each pole is ...
37. During telophase of meiosis I cells with content of genetic material ... are formed.
38. In meiosis ... cells with content of genetic material ... are formed.

PRACTICAL WORK

Task 1. Study the scheme of mitosis. Define the stages, write their numbers and characteristics:

– Interphase –

Meiosis I

– Prophase –

– Metaphase –

– Anaphase –

– Telophase –

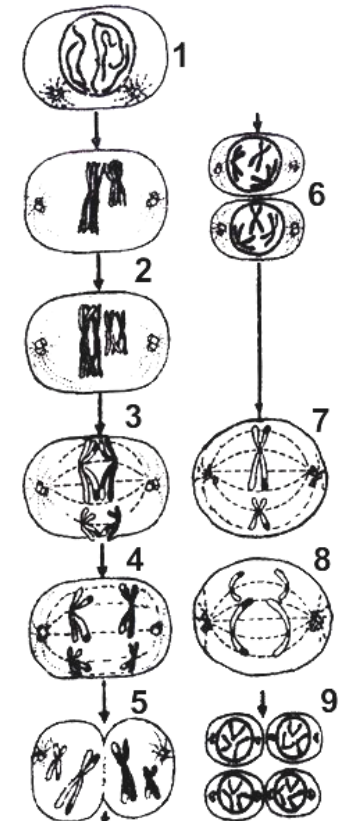
Meiosis II

– Prophase –

– Metaphase –

– Anaphase –

– Telophase –



Teacher's signature

Lesson 8. Topic: **SUMMARY LESSON IN THE CHAPTER “FUNDAMENTALS OF CYTOLOGY”** " _____ " _____ 201__ year

Aim of the lesson is to estimate the knowledge level of elaborated topics.

CONTROL QUESTIONS

7. Cell is a structural, functional and genetic unit of living things.
8. Main statements of The Cell Theory.
9. Content of chemical elements inside cells, their classification.
10. Nonorganic substance: water, minerals and their role in cells.
11. Structure and functions of proteins.
12. Structure and functions of carbohydrates.
13. Structure and functions of lipids.
14. Cell structure.
15. Plasma membrane, its models, properties and functions.
16. Passive transport through the membrane.
17. Active transport through the membrane.
18. Classification of cell organelles.
19. Structure and functions of general membrane organelles (endoplasmic reticulum, Golgi complex, lysosomes, mitochondria and plastids).
20. Structure and functions of non-membrane bound organelles (ribosomes, centrosomes).
21. Metabolism and energy conversion (transformation of energy) as basis of life for cells.
22. Correlation between anabolism and catabolism.
23. The concept of autotrophic and heterotrophic organism.
24. Structure and functions of cell nucleus.
25. Structure of a metaphase chromosome.
26. Types of chromosomes.
27. Principles (rules) of chromosomes.
28. Proliferation (reproduction) as a fundamental property of living things.
29. Periods of interphase and their characteristics.
30. Features of phases of mitosis.
31. Biological significance of mitosis.
32. Characteristic of phases of meiosis I and meiosis II. Changes in content of genetic material.
33. Biological significance of meiosis.
34. Similarity and differences in meiosis and mitosis.

Lesson 9. Topic: GENETICS AS A SCIENCE. STRUCTURE AND FUNCTIONS OF NUCLEIC ACIDS. PROTEINS SYNTHESIS IN THE CELLS

" ____ " _____ 201__ year

Aim of the lesson is to study basic terms of genetics, structure and functions of nucleic acids, process of protein synthesis.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none"> 1. Subject matter of genetics. 2. Structure and functions of nucleic acids (DNA, RNA). 3. Gene. Genetic code. 4. Biosynthesis of proteins in cells. 	<p>8. Replication –</p> <p>9. Transcription –</p> <p>10. Translation –</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <ol style="list-style-type: none"> 27. Anti-codon – 28. Gene – 29. Genetics – 30. Genetic code – 31. Variation – 32. Complementarity of nitrogenous bases – 33. Heredity – 	<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <ol style="list-style-type: none"> 1. Genetics studies: a) the laws of heredity, b) variability laws, c) mechanisms of heredity, d) variability mechanisms, e) all answers are right. 2. Heredity is a property of living organisms: a) to breed true, to hand on their own characteristics and features of the development to further descendants, b) to hand on new characteristics and feature, c) to differ from their brothers and sisters, d) to differ from their parents, e) to receive new features. 3. Types of nucleic acids: a) DNA and ATP, b) RNA and ATP, c) DNA and RNA, d) amino acids and RNA, e) amino acids and DNA. 4. DNA is located in: a) plastids and ribosomes, b) cytoplasm and centrosomes, c) nucleus, mitochondria, plastids, d) nucleus and ribosomes, e) Golgi complex and endoplasmic reticulum. 5. The nucleotides found in DNA are: a) adenine and uracil, b) thymine and lysine, c) adenine and guanine, d) uracil and cytosine, e) lysine and adenine. 6. Forces between cytosine and guanine are: a) 2 hydrogen bonds, b) 3 hydrogen bonds, c) 4 hydrogen bonds, d) 1 hydrogen bond, e) 5 hydrogen bonds.

7. Each nucleotide of DNA contains: a) ribose and nucleotide, b) deoxyribose, nucleotides, phosphoric acid, c) nucleotide, phosphate group, ribose, d) amino acid, deoxyribose, nucleotide, e) adenine, guanine, uracil.

8. Forces between thymine and adenine are: a) 2 hydrogen bonds, b) 3 hydrogen bonds, c) 4 hydrogen bonds, d) 1 hydrogen bond, e) 5 hydrogen bonds.

9. 1 amino acid in the molecule of polypeptide is determined by: a) 2 nucleotides, b) 3 nucleotides, c) 4 nucleotides, d) 1 nucleotide, e) 5 nucleotides.

10. Stages of protein synthesis are: a) replication and transcription, b) translation and replication, c) crossing-over and transcription, d) transcription and translation, e) conjugation and translation.

11. Amino acids link together in a molecule of a peptide in: a) the small ribosomal subunit, b) the large ribosomal subunit, c) centrosome, d) plastids, e) mitochondria.

OPEN TESTS

Insert missing word or concept

39.The laws of heredity and variability are studied by such a science as ...

40.Through the use of variability organisms ... to their environment.

41.Chemical matter of heredity is ...

42.A property of living organisms to breed true, to hand on their own characteristics to further descendants is...

43.A property of filial generations to receive new characteristics and to differ from their parents is ...

44.Molecule of DNA is ...

45.Monomer of DNA is ...

46.An important property of DNA is ...

47. Types of chromosomes are following: metacentric, submetacentric and ...

48.The process of DNA replication takes place with participation of ...

49.A new strand of DNA is formed on the principle of ...

50.The molecule of RNA contains ... polynucleotides chain.

51.The molecule of RNA contains ... instead of thymine.

52.The molecule of RNA contains sugar ... instead of deoxyribose.

53.A sequence of nucleotides in the DNA determining a sequence of amino acids in the protein is called ...

54.The nucleotides of DNA strands are connected by ... bonds.

55.The unit of heredity and variability is ...

56.Triplet of nucleotides is called ...

57.A main function of gene is ...

58.The process of rewriting (decoding) a sequence of nucleotides from molecule DNA into a molecule mRNA (messenger RNA) is called ...

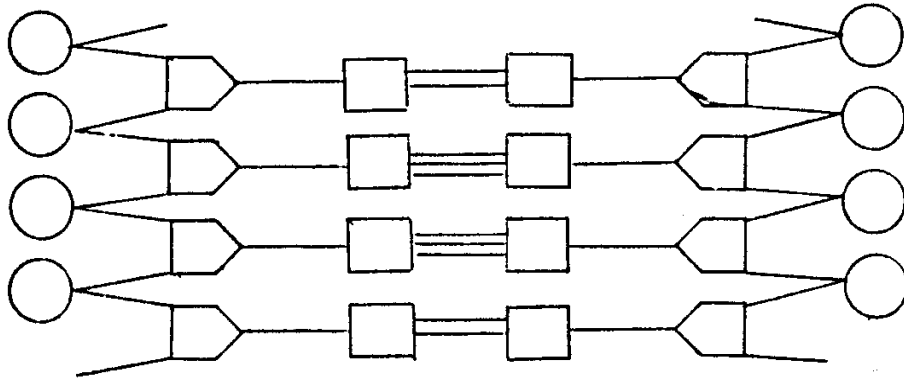
59.A gene contains information about a structure of ...

60.The process of rewriting (decoding) a sequence of nucleotides of mRNA into a sequence of amino acids of protein is called ...

61.A group of ribosomes is ...

PRACTICAL WORK

Task 1. Mark the components of the DNA nucleotides with the letters:



D - deoxyribose,

P- phosphate group,

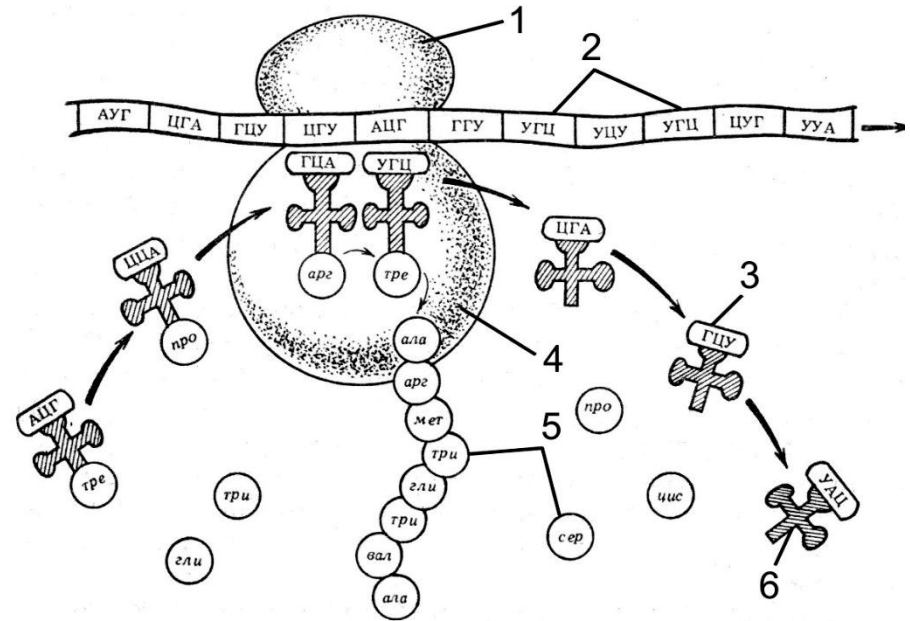
A- adenine,

T- thymine,

G - guanine,

C – cytosine

Task 2. Study the scheme and make indications:



1 –

2 –

3 –

4 –

5 –

6 –

Teacher's signature

Lesson 10. Topic: **MONOHYBRID CROSS. THE LAW OF HYBRID UNIFORMITY. THE LAW OF SEGREGATION** "___" _____201_ year

Aim of the lesson is to study Mendel's law; learn to write gametes for homozygotic and heterozygous organisms.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<ol style="list-style-type: none"><li data-bbox="203 475 929 507">1. The concept of alleles. Homozygotes and heterozygotes.<li data-bbox="203 528 851 560">2. Law of Dominance in F₁ hybrids (first filial hybrid).<li data-bbox="203 580 645 612">3. Law of Segregation in F₂ hybrids.	<ol style="list-style-type: none"><li data-bbox="1196 459 2132 528">1. The basic laws of inheritance of traits have been described by: a) R. Hooke, b) T. Schwann, c) T. Morgan, d) G. Mendel, e) R. Punnett.<li data-bbox="1196 533 2132 601">2. A complex of genes of organisms of the same species is: a) genotype, b) genome, c) genofond, d) karyotype, e) phenotype.

BASIC TERMS AND CONCEPTS

34. Allelic genes –

35. Alternative characters –

36. Genotype –

37. Heterozygous organism –

38. Hybridological method –

39. Homozygous organism –

40. Dominant character –

41. Recessive character –

42. Phenotype –

3. A complex of all features and properties of organisms: a) genotype, b) phenotype, c) gene, d) hybrid, e) phene.

4. Genes which determine alternative features are called: a) autosomic, b) allelic, c) homozygotic, d) heterozygotic, e) non-allelic.

5. A feature manifested in hybrids in the homozygous and heterozygous (state): a) recessive, b) dominant, c) homozygotic, d) heterozygotic, e) alternative.

6. Organisms that have identical allelic genes in genotype are called: a) heterozygotic, b) homozygotic, c) recessive, d) dominant, e) autosomic.

7. Organisms that give several types of gametes and segregate (give disjoining) at crossing: a) monohybrid, b) dominant, c) homozygotic, d) heterozygotic, e) recessive.

8. Monohybrid cross occurs when parent cells: a) belong to the same species, b) contain recessive genes, c) vary on one pair of alternative characters, d) vary on two pairs of alternative characters, e) contain dominant genes.

9. According to the 2nd Mendel's law the number of descendants with dominant feature is: a) 50%, b) 75%, c) 60%, d) 30%, e) 100%.

10. In humans brown eyes is dominant over blue determine the possible children's genotypes when parents both are brown-eyed heterozygous: a) AA, Aa, b) Aa, c) AA, Aa, aa, d) Aa, aa, e) AA, aa.

11. How many types of gametes could an organism with genotype Aa form? a) 1, b) 2, c) 3, d) 4, e) 5.

OPEN TESTS

Insert missing word or concept

- 62.** The basic laws of inheritance of traits have been described by....
- 63.** Features that exclude each other are
- 64.** Organism is called.....when in genotype one gene is dominant and another is recessive.
- 65.** Atrait couldn't appear in the presence of a dominant gene.
- 66.** The method of cross that was used by Mendel is called....

PRACTICAL WORK

Task 1. Solve the problems.

Problem No. 1. How many and what types of gametes could be form by organisms with genotypes:

AA **Aa** **aa**

Problem No. 2. In humans brown eyes is dominant over blue. Blue-eyed female married with brown-eyed homozygous male. What eye color will their children have?

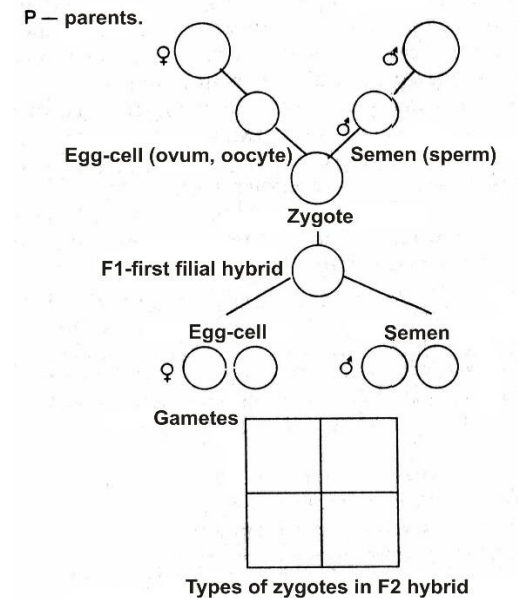
Feature	Gene	Genotype
brown eyes	B	BB; Bb
blue eyes	b	bb

Problem No. 3. Normal tomato growth dominates dwarfism gene. What descendant could be formed in F₁ and F₂ when homozygous normal growth tomato hybridizes with dwarf tomato?

Feature	Gene	Genotype
Normal growth	B	BB; Bb
Dwarfism	b	bb

Task 2. Write in a scheme that illustrates the first and second Mendel's law.

- Write down genotypes of parents (pure line).
- Point out parental gametes.
- Write the name of the process when gametes are formed.
- Write the genotype of F₁-first filial hybrid.
- What gametes are formed by F₁-first filial hybrid
- Write down genotypes of descendants derived from F₁-crosses.



Teacher's signature

Lesson 11. Topic: DIHYBRID CROSS. THE LAW OF INDEPENDENT ASSORTMENT " _____ " _____ 201__ year

Aim of the lesson is to study the 3rd Mendel's law; to write gametes in dihybrid crosses.

<p style="text-align: center;">CONTROL QUESTIONS</p> <p>1. The Law of Independent Assortment and its cytological basis.</p> <p>2. Significance of the Mendel's laws.</p>	<p>5. Sense of hypothesis of purity of gametes is that: a) genes in hybrids are not mixed and stand in a pure allele status, b) genes in hybrids are mixed, c) at meiosis gamete has 2genes from each pair of genes, d) at meiosis all chromosomes come to one gamete, e) all answers are right.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>43. Hypothesis of purity of gametes –</p> <p>44. Dihybrid cross –</p> <p>45. Law of Independent Assortment –</p> <p>46. Punnett square –</p>	<p>6. The 3d Mendel's law is: a) a law of dominance, b) a law of segregation, c) a law of independent assortment, d) hypothesis of purity of gametes, e) rules of chromosomes.</p> <p>7. At crossing of organisms with genotype AAbb x aaBB descendant with certain genotype could be produced: a) AAbb; AaBb; AaBB, b) AaBb, c) AaBB, d) aaBB, e) aabb.</p> <p>8. Specifics of the Mendel's laws: a) universality (generality), b) explain mechanisms of inheritance of alternative characters in all living organisms, c) have a statistical nature, d) laws work on a large number of organisms and allow to determine the probability of a particular trait in descendant, e) all answers are right.</p>
<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <p>1. A crossing is dihybrid when parent cells: a) belong to the same species, b) contain dominant genes, c) vary on 3 pairs of alternative characters, d) vary on two pairs of alternative characters, e) contain recessive genes.</p> <p>2. Segregation of phenotypes in dihybrid crosses of heterozygous under complete dominance is following: a) 1:2:1, b) 1:1, c) 9:3:3:1, d) 3:1, e) 13:3.</p> <p>3. Allelic genes are located in: a) non-homologous chromosomes, b) homologous chromosomes, c) sex chromosomes, d) autosomes, e) the same loci of homologous chromosomes.</p> <p>4. How many types of gametes could be produced by organism with genotype AABb? a) 1, b) 2, c) 3, d) 4, e) 8.</p>	<p style="text-align: center;">OPEN TESTS</p> <p style="text-align: center;">Insert missing word or concept</p> <p>67. Separate genes for separate traits are passed independently of one another from parents to offspring. That is, the biological selection of a particular gene in the gene pair for one trait to be passed to the offspring has nothing to do with the selection of the gene for any other trait. More precisely, the law states that alleles of different genes assort independently of one another during gamete formation. It isMendel's law.</p> <p>68. ... square is used to write down gametes and hybrid genotype.</p>

69. The cytological basis of the Mendel's law is explained by hypothesis of ...

PRACTICAL WORK

Task 1. Solve the problems.

Problem No. 1. How many and what types of gametes could be formed by organisms with genotype:

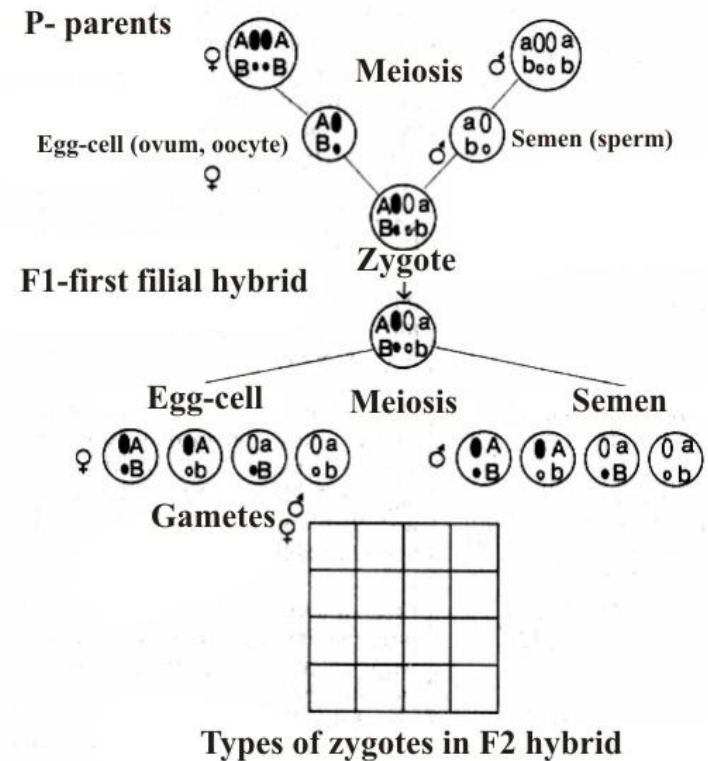
P: AAcc

AaBb

Aacc

Problem No. 2. Gene for yellow seed of peas dominates the gene for green while a gene for smooth seed dominates the gene for wrinkled seed surface. What percentage of yellow wrinkled seeds could be expected from the cross of two individuals heterozygous for both traits?

Task 2. Write in a scheme that illustrates cytological basis of the 3d Mendel's law. Write down genotypes of descendants.



Teacher's signature

Lesson 12. Topic: **SOLVING THE PROBLEMS OF MONOHYBRID AND DIHYBRID CROSS** "____" _____ 201__ year

Aim of the lesson is to study gametes and genotypes writing in monohybrid and dihybrid cross.

PRACTICAL WORK

Task 1. Solve the problems.

Problem No. 1. How many and what types of gametes could be formed by organisms with genotype:

P: **BB** **Cc** **aacc** **AaKk**

P: **AabbDd** **AaBbDd**

Problem No. 2. The gene of black coloring of cattle dominates the gene of red one. What offspring could be expected from heterozygous breeding?

Feature	Gene	Genotype

Problem No. 3. In humans gene of hexadactylism **P** is dominant over gene of pentadactylism **p**. What is the probability of pentadactyl child in family where one parent is heterozygous hexadactyl and other is pentadactyl?

Feature	Gene	Genotype

Problem No. 4. In humans gene of inherited deaf-dumbness (surdomutiasis) is a recessive towards gene of acusis. A deaf-and-dumb woman delivered a deaf-and-dumb child while a man has acusis. Determine genotypes of parents.

Feature	Gene	Genotype

Problem No. 5. Blue-eyed male married with brown-eyed female. Her father was blue-eyed and mother was brown-eyed. It's known that brown eye is dominant over blue. What offspring could be expected?

Feature	Gene	Genotype

Problem No. 6. In cats short wool dominates Angora (long) wool. Short-wooled lady-cat at crossing with Angora cat delivered 6 short-wooled and 2 Angora cat. Determine genotypes of parents.

Feature	Gene	Genotype

Problem No. 7. A rare gene **a** cause an anophthalmia (congenital absence of one or both eyes), its allele **A** determines normal eyes germination, in heterozygous globes (bulbus oculi) are smaller. Determine phenotypes and genotypes of descendant (offspring) if parents have undersized globes.

Feature	Gene	Genotype

Problem No. 8. In humans brown eyes are dominant over blue and dextrality (right-handedness) is dominant over sinistrality (left-handedness). Brown-eyed right-hander man married with blue-eyed left-handed woman. What traits could be expected in children if man is double-heterozygous?

Feature	Gene	Genotype

Problem No. 9. In dogs black wool is dominant over coffee-coloured and short wool dominates long wool. What percentage of black short-wooled puppies could be expected at crossing of 2 double-heterozygotes?

Feature	Gene	Genotype

Teacher's signature

Lesson 13. Topic: **GENETIC LINKAGE. THE CHROMOSOME THEORY OF INHERITANCE** " ____ " _____ 201_ year

Aim of the lesson is to familiarize oneself with Morgan's experiments on linked inheritance.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>4. Thomas Morgan's experiments. Genetic linkage. Complete and partial linkage.</p> <p>5. Crossing-over, crossover and non-crossover gametes.</p> <p>6. Main concepts of the Chromosome Theory of Heredity.</p>	<p>1. The law of linked inheritance was founded by: a) G. Mendel, b) T. Morgan, c) Ch. Darwin, d) Boveri, e) T. Schwann.</p> <p>2. Linkage group is a: a) diploid chromosome set, b) group of genes of a pair of homologous chromosomes, c) number of genes in chromosome, d) genes of all chromosomes, e) all genes of organisms.</p>

BASIC TERMS AND CONCEPTS

47. **Linkage group –**

48. **Crossover gametes –**

49. **Gene locus –**

50. **Non-crossover gametes –**

51. **Partial linkage –**

52. **Complete linkage –**

53. **Linked inheritance –**

3. If inheritance is linked female fly *Drosophila* with genotype AB//ab could produce gametes: a) AB, Ab, aB, ab, b) AB, ab, c) Ab, aB, d) AB, Ab, ab, e) Aa, Bb.

4. A crossing-over is an exchange of: a) dominant genes, b) same regions of homologous chromosomes, c) regions of non-homologous chromosomes, d) regions of sex chromosomes, e) recessive genes.

5. A crossing-over take place in: a) telophase of mitosis, b) prophase I of meiosis, c) anaphase I of meiosis, d) prophase II of meiosis, e) interphase.

6. Morgan's experiments show that splitting of traits when incomplete linkage of genes occurs is next: a) BbVv-25%, Bbv-25%, bbVv-25%, bbv-25%, b) BbVv-41,5%, Bbv-8,5%, bbVv-8,5%, bbv-41,5%, c) BbVv-20%,Bbv-30%, bbVv-25%, bbv-25%, d) BbVv-40%, Bbv-10%, bbVv-10%, bbv-40%, e) BbVv-15%, Bbv-15%, bbVv-35%, bbv-35%.

7. What principles are not applicable to Morgan's Chromosome Theory of Heredity: a) chromosomes are linear sequences of genes; genes are located in specific sites on chromosomes, b) genes of a pair of homologous chromosomes form a linkage group, c) a number of linkage group correspond to haploid chromosome set, d) abnormality (disorder) in linkage of genes is a result of crossing-over in prophase I of meiosis, e) linkage of genes is always complete.

8. Chromosome theory of heredity was formulated by: a) G. Mendel, b) T. Morgan, c) Ch. Darwin, d) Boveri, e) T. Schwann.

OPEN TESTS

Insert missing word or concept

70. Group of genes of a pair of homologous chromosomes is ... linkage.
71. Linkage of genes was discovered by ...
72. The results of 1st Morgan's experiment confirmed ... Mendel's law.
73. Genes of body color and length of wings are located on ... chromosome.
74. Genes located on one chromosome are called ...
75. Males of Drosophila have linkage of genes ...
76. As a result of experiments Morgan formulated ... theory of heredity.

77. Females of Drosophila have linkage of genes ...

PRACTICAL WORK

Task 1. Solve the problems.

Problem No. 1. How many and what types of gametes could be formed in fruit fly's (Drosophila melanogaster) with genotypes:

1. Male $\begin{matrix} A & B \\ \underline{\underline{=}} & \underline{\underline{=}} \\ a & b \end{matrix}$ 2. Female $\begin{matrix} A & B \\ \underline{\underline{=}} & \underline{\underline{=}} \\ a & b \end{matrix}$ 3. Male $\begin{matrix} AB \\ \underline{\underline{=}} \\ ab \end{matrix}$ 4. Female $\begin{matrix} AB \\ \underline{\underline{=}} \\ ab \end{matrix}$

Problem No. 2. How many and what types of gametes could be formed in fruit fly's (Drosophila melanogaster) with genotypes: If it's known that distance between genes is 26 Morgan's genetic unit?

- Male $\begin{matrix} AB \\ \underline{\underline{=}} \\ ab \end{matrix}$ Female $\begin{matrix} AB \\ \underline{\underline{=}} \\ ab \end{matrix}$

Problem No. 3. Write down genetic record of Morgan's experiments:

Gene	Trait
B	light tan body
b	black body
V	long wings
v	vestigial (short) wings

Teacher's signature

Lesson 14. Topic: **GENETICS OF SEX** " ____ " _____ 201_ year

Aim of the lesson is to study patterns of sex determination, inheritance of sex-linked characteristics; to solve tasks on sex-linked characteristics.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>7. Sex as a biological feature.</p> <p>8. Chromosomal sex determination.</p> <p>9. X- and Y-linked inheritance.</p>	<p>1. Autosomes are: a) chromosomes of the male body, b) chromosomes of the female body, c) chromosomes of gametes, d) same chromosomes in the male and female organisms, e) gametes.</p> <p>2. Sex chromosomes are: a) chromosomes of the male body, b)</p>

BASIC TERMS AND CONCEPTS

54. Autosomes –

55. Hemophilia –

56. Daltonism –

57. Zygote –

58. Fertilization –

59. Sex (gender) –

60. Sex Chromosomes (heterochromosomes) –

61. Reproduction –

chromosomes of the female body, **c)** chromosomes that are different in the male and female organisms, **d)** chromosomes of gametes, **e)** the first pair of chromosomes.

3. Human karyotype has: **a)** 48 chromosomes, **b)** 6 chromosomes, **c)** 46 chromosomes, **d)** 42 chromosomes, **e)** 22 chromosomes.

4. Number of autosomes in humans: **a)** 20 pairs, **b)** 22 pairs, **c)** 46 pairs, **d)** 2 pairs, **e)** 23 pairs.

5. Hair color and eye color in humans are determined by genes of: **a)** X-chromosome, **b)** chromosomes of the female body, **c)** Y-chromosome, **d)** X- and Y-chromosome, **e)** the first pair of chromosomes.

6. Germination of sexual organs and sexual characteristics are determined by chromosomes of: **a)** the first pair, **b)** 20th pair, **c)** 22nd pair, **d)** 23rd pair, **e)** 21st pair.

7. Chromosomes of 23rd pair in males: **a)** X and X, **b)** X, X and Y, **c)** X and Y, **d)** X, Y and Y, **e)** X, X and X.

8. From the zygote the female body develops if egg-cell is fertilized by sperm with: **a)** X-chromosome, **b)** Y- chromosome, **c)** X- and X- chromosomes, **d)** X- and Y- chromosomes, **e)** X-, X- and Y- chromosomes.

9. From the zygote the male body develops if egg-cell is fertilized by sperm with: **a)** X-chromosome, **b)** Y- chromosome, **c)** X- and X- chromosomes, **d)** X- and Y- chromosomes, **e)** X-, X- and Y- chromosomes.

10. The name of hereditary disease (inherited disease) when blood coagulates slowly: **a)** daltonism, **b)** influenza, **c)** hemophilia, **d)** Down syndrome, **e)** hypertension.

11. The name of hereditary disease when the human eye cannot distinguish colors: **a)** daltonism, **b)** influenza, **c)** hemophilia, **d)** Down syndrome, **e)** anophthalmia.

OPEN TESTS

Insert missing word or concept

78. A complex of morphological, physiological, biochemical traits that determine a reproduction of organisms is ...
79. Chromosomes that are the same in the male and female organisms are called ...
80. Chromosomes that are different in the male and female organisms are called ...
81. The child's sex is determined at the time of formation of ...
82. Gametic linkage with zygote's formation is called ...
83. Genes of hemophilia and daltonism are located on chromosome...
84. ... body develops from the zygote if egg-cell is fertilized by sperm with Y-chromosome.
85. ... body develops from the zygote if egg-cell is fertilized by sperm with X-chromosome.
86. Sex chromosomes in the male organism are ... and in the female organisms are ...
87. Sex depends on a combination of ... chromosomes in the zygote.
88. Genes of hairy ears are located on chromosome ...
89. The possibility of formation of male or female zygote is ...

PRACTICAL WORK

Task 1. Solve the problems

Problem No. 1. Recessive gene for hemophilia is localized on the X-chromosome. The girl's father was a hemophiliac. Her mother is healthy and there were no cases of hemophilia in mother's family. This girl is married with a healthy guy. What is the probability of hemophiliacs' birth?

Problem No. 2. Parents with normal vision have 2 daughters with normal vision also and a son who is daltonian. What are parents' genotypes?

Teacher's signature

Lesson 15. Topic: **VARIATION** " ____ " _____ 201_ year

Aim of the lesson is to study types of variability, properties of modification and genotypic variability.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>10. Variability, its types.</p> <p>11. The role of genotype and environment in phenotype formation.</p> <p>12. Modification, its properties. Norm of reaction.</p> <p>13. Genotypic variability.</p>	<p>1. Phenotype is based on: a) genotype under the influence of environmental conditions, b) genotype under the influence of evolution, c) genotype under the influence of physiological factors, d) genotype, e) adaptation.</p> <p>2. Adaptation of organism to the environment is: a) mutation, b) modification, c) narrow reaction norm, d) wide reaction norm, e) combinative</p>

BASIC TERMS AND CONCEPTS

62. Genome mutations –

63. Genotypic variation –

64. Gene mutations –

65. Combinative variation –

66. Mutation –

67. Norm of reaction –

68. Phenotypic variation –

variability.

3. Examples of modification: a) thick coat of animals in cold climates, **b)** different eye color, **c)** different hair color, **d)** pea seed color, **e)** hemophilia.

4. Norm of reaction is: a) a genetic variation, **b)** a range (boundary) of modification, **c)** a result of a combination of parents' genes, **d)** a gametic linkage, **e)** a change in the hereditary material.

5. Change in phenotype without changes in the structure of the genotype is: a) mutation, **b)** reaction norm, **c)** adaptation, **d)** modification, **e)** mutagens.

6. Change in phenotype caused by changes in the genotype is: a) genotypic variability, **b)** phenotypic variation, **c)** reaction norm, **d)** evolution, **e)** adaptation.

7. Mutations that alter the structure of the gene are: a) genome mutations, **b)** chromosomal mutations, **c)** gene mutations, **d)** modification, **e)** adaptation.

8. Mutations that alter the chromosome structure are: a) genome mutations, **b)** chromosomal mutations, **c)** gene mutations, **d)** modification, **e)** norm of reaction.

9. Mutations that change the number of chromosomes are: a) genome mutations, **b)** chromosomal mutations, **c)** gene mutations, **d)** modification, **e)** norm of reaction.

10. Hemophilia and albinism are: a) genome mutations, **b)** gene mutations, **c)** chromosomal mutations, **d)** modification, **e)** combination of genes.

OPEN TESTS

Insert missing word or concept

- 90. Offspring's property to differ from their parents is ...
- 91. Types of variation: phenotypic and ...
- 92. The adaptation of organisms to environmental conditions is ...
- 93. The range of modification is determined by ...
- 94. Norm of reaction is ... if a feature varies widely.
- 95. Norm of reaction is ... if a feature varies slightly.
- 96. Environmental factors that cause mutation are ...
- 97. Metabolic diseases are caused by ... mutations.
- 98. Malformation of organs and organ systems is caused by ... mutations.

PRACTICAL WORK

Task 1. Draw a scheme «classification of mutations by changes in genetic material».

Task 2. Fill in the table “differences between modifications and mutations”.

Trait	Modifications	Mutations
Heritability		
Material for natural selection		
Adaptability to the body		
Permanence		
Determinacy		
Individuality or mass character		

Teacher's signature

Lesson 16. Topic: HUMAN GENETICS " ____ " _____201_ year

Aim of the lesson is to study characteristics of human as a genetic entity and methods of human genetics.

<p style="text-align: center;">CONTROL QUESTIONS</p> <p>14.Characteristics of human as a genetic unit.</p> <p>15.Methods of human genetics (genealogical, cytogenetic, biochemical).</p>	<p>4. Content of enzymes and amino acids in the body could be determined by the following method: a) hybridological, b) cytogenetic, c) biochemical, d) genealogical, e) microbiological.</p> <p>5. Methods of human genetics: a) cytogenetic, biochemical, b) biochemical only, c) genealogical, hybridological, d) practical, e) a+b+c.</p> <p>6. Cytogenetic method allows to determine: a) metabolic diseases, b) a number of chromosomes and their structures, c) content of enzymes, d) content of amino acids, e) a probability of hereditary disease in offspring.</p> <p>7. Biochemical method determines: a) a number of chromosomes and their structures, b) sex of organism, c) metabolic diseases, d) if a certain trait is hereditary, e) a probability of hereditary disease in offspring.</p> <p>8. Method of human genetics that allows to determine the number of chromosomes and their structure: a) hybridological, b) cytogenetic, c) biochemical, d) genealogical, e) microbiological.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>69. Biochemical method –</p> <p>70. Genealogical method –</p> <p>71. Human Genetics –</p> <p>72. Human karyotype –</p> <p>73. Cytogenetic method –</p>	<p style="text-align: center;">OPEN TESTS</p> <p style="text-align: center;">Insert missing word or concept</p>

TESTS FOR SELF-CONTROL

- 1. Human genetics study:** a) normal human karyotype, b) human karyotype in various diseases, c) causes of inherited diseases, d) diagnosis of genetic diseases, e) all answers are right.
- 2. Difficulties of human genetics are:** a) many chromosomes, b) few descendants, c) impossible to conduct experiments on humans, d) impossible to create the same conditions, e) all answers are right.
- 3. Genealogical method allows to determine:** a) a number of chromosomes and their structures, b) metabolic diseases, c) if a certain trait is hereditary, d) sex of organism, e) content of enzymes in the body.

- 99.** Method of genetics that cannot be used in human genetics is ...
- 100.** Diploid number of chromosomes of somatic cells is ...
- 101.** Human karyotype is studied by ... method.
- 102.** Metabolic diseases could be determined by... method.
- 103.** Sex of organism could be determined by... method.
- 104.** Method of comparison and analysis of genealogic table is a ... method.
- 105.** Hemophilia always occurs in men because a male organism has ... X-chromosome.

PRACTICAL WORK

Task 1. Select appropriate explanations from the right column to the methods of human genetics in the left column.

1. Cytogenetic	A – method that allows to determine a content of enzymes, amino acids, various products of metabolism in normal and hereditary diseases
2. Genealogical	B – method that allows to determine a total number of chromosomes, its structures, sex of organism
3. Biochemical	C – method of comparison and analysis of genealogic table that allows to determine if a certain trait is hereditary, type of the disease inheritance, a probability of hereditary disease in offspring.

1	2	3

Task 2. Solve the exercise. Analyze a genealogic table; determine a type of inheritance and genotypes of members of the family.

Teacher's signature

Lesson 17. Topic: **HUMAN HEREDITARY DISEASES** " ____ " _____ 201_ year

Aim of the lesson is to study causes, diagnostic features and prevention of hereditary human diseases.

<p style="text-align: center;">CONTROL QUESTIONS</p> <p>16. Genetic and chromosomal diseases (albinism, phenylketonuria, daltonism, hemophilia, Down syndrome, Klinefelter syndrome, Trisomy X, Shereshevsky-Turner syndrome, cat's cry syndrome).</p> <p>17. Prevention of hereditary human diseases. Genetic counseling.</p>	<p>3. Klinefelter syndrome is caused by: a) changes in the structure of the DNA molecule, b) changes in chromosome structure, c) changes in the number of autosomes, d) change in the number of sex chromosomes, e) extra Y-chromosome.</p> <p>4. Symptoms of albinism are: a) mental deficiency, b) milky white skin, c) blue pupil, d) dark hair, e) reduced sensitivity of the skin to ultraviolet rays.</p> <p>5. Examples of chromosomal mutations in humans: a) cat's cry syndrome, b) Down syndrome, c) Shereshevsky -Turner syndrome, d) Klinefelter syndrome, e) phenylketonuria.</p> <p>6. Down syndrome is caused by: a) changes in the structure of the DNA molecule, b) changes in chromosome structure, c) extra 21nd chromosome, d) change in the number of sex chromosomes, e) no right answer.</p> <p>7. Hereditary human diseases caused by sex-linked genes: a) Down and Klinefelter syndromes, b) hemophilia and daltonism, c) albinism, d) Shereshevsky -Turner syndrome, e) phenylketonuria.</p> <p>18. The main tasks of medical-genetic consultation are: a) counseling of families and patients with infectious pathology, b) advising of all patients, c) to determine the degree of genetic risk to have an affected child, d) surgical repair of malformations, e) no right answer.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>74. Gene disorders –</p> <p>75. Genetic counseling –</p> <p>76. Monosomy –</p> <p>77. Trisomy –</p> <p>78. Chromosome disorders –</p>	<p style="text-align: center;">OPEN TESTS</p>
<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <p>1. Phenylketonuria is caused by: a) changes in the structure of the DNA molecule, b) changes in chromosome structure, c) violation of conversion of tyrosine into melanin, d) violation of conversion of phenylalanine into tyrosine, e) absence of the second sex chromosome.</p> <p>2. Shereshevsky-Turner syndrome is caused by: a) changes in the structure of the DNA molecule, b) changes in chromosome structure, c) changes in the number of autosomes, d) absence of the second sex chromosome, e) no right answer.</p>	<p style="text-align: center;">Insert missing word or concept</p> <p>106. Hereditary human diseases when phenyl-pyruvic acid is accumulated in the body is called ...</p> <p>107. Hereditary human diseases associated with the violation of color vision are ...</p> <p>108. An important field in the prevention of genetic diseases is ... consultation.</p>

PRACTICAL WORK

Task 1. Fill in the table describing these human syndromes.

The name of the disease	chromosomal abnormalities	Main symptoms of the disease
Down syndrome		
Klinefelter syndrome		
Shereshevsky -Turner syndrome		

Lesson 18. Topic: **SUMMARY LESSON IN THE CHAPTER “FUNDAMENTALS OF GENETICS”** " ____ " _____ 201__ year

Aim of the lesson is to estimate the knowledge level of elaborated topics.

CONTROL QUESTIONS

1. Subject matter of genetics.
2. Structure and functions of nucleic acids (DNA, RNA).
3. Gene. Genetic code.
4. Biosynthesis of proteins in cells.
5. The concept of alleles. Homozygote and heterozygote.
6. Law of dominance in F_1 hybrids (first filial hybrid).
7. Law of segregation in F_2 hybrids.
8. The Law of Independent Assortment and its cytological basis.
9. Significance of the Mendel's laws.
10. Thomas Morgan's experiments. Genetic linkage. Complete and partial linkage.
11. Crossing-over, crossover and non-crossover gametes.
12. Main concepts of the Chromosome Theory of Heredity.
13. Sex as a biological feature.
14. Chromosomal sex determination.
15. X- and Y-linked inheritance.
16. Variation, its types.
17. The role of genotype and environment in phenotype formation.
18. Modification, its properties. Norm of reaction.
19. Genotypic variability.
20. Characteristics of human as a genetic unit.
21. Methods of human genetics (genealogical, cytogenetic, biochemical).
22. Diseases caused by gene mutations (albinism, phenylketonuria, daltonism, hemophilia).
23. Diseases caused by chromosome mutations (cat's cry syndrome).
24. Diseases caused by genome mutations (Down syndrome, Klinefelter syndrome, trisomy X, Shereshevsky-Turner syndrome).
25. Prevention of hereditary human diseases. Genetic counseling.

Lesson 19. Topic: SCIENCES OF MAN. AN OVERVIEW OF THE HUMAN BODY _____201____ year

Aim of the lesson is to study subject matter of anatomy, physiology and hygiene; classification and features of tissues (epithelial, muscular, nervous, connective tissue); to give the concept (idea) of the organs and systems of organs.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none">1. Anatomy, physiology and hygiene are sciences that deal with a structure and functions of human body and conditions of health maintenance.2. Tissues: epithelial, muscular, nervous, connective.3. Human’s organs and systems of organs.	<ol style="list-style-type: none">7. Muscle tissue –8. Musculoskeletal system –9. Nervous tissue –10. Organ –11. Physiology –12. Respiratory system –13. Smooth muscle tissue –14. Striated muscle tissue –15. System of organs –16. Tissue –
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <ol style="list-style-type: none">1. Anatomy –2. Connective tissue –3. Diaphragm –4. Digestive system –5. Epithelial tissue (epithelium) –6. Hygiene –	

TESTS FOR SELF-CONTROL

1. **Human bodies consist of tissues:** a) epithelial and strengthening, b) muscular and conductive, c) nervous and connective, d) connective and excretive, e) meristem, connective and nervous.
2. **A blood is a tissue:** a) dense connective tissue, b) liquid connective tissue, c) loose fibrous tissue, d) epithelial, e) muscular.
3. **Bone and cartilage are examples of tissues:** a) dense connective tissue, b) liquid connective tissue, c) loose fibrous tissue, d) soft connective tissue, e) epithelial.
4. **In human nervous tissue forms:** a) skeletal muscles and nerves, b) spinal cord and skin, c) brain, spinal cord and blood, d) brain, spinal cord and nerves, e) exocrine and endocrine glands.
5. **Epithelial tissue comprises:** a) skeletal muscles and internal organs, b) internal organs and skin, c) brain and skeletal muscles, d) spinal cord, skeletal muscles and skin, e) brain, spinal cord and internal organs.
6. **Muscular tissue comprises:** a) skeletal muscles and skin, b) skin and muscles of internal organs, c) brain and skeletal muscles, d) spinal cord and skeletal muscles, e) skeletal muscles and muscles of internal organs.
7. **An organ is a part of the body that has:** a) impermanent structure, b) impermanent structure and certain function, c) permanent structure and certain function, d) permanent structure and different functions, e) impermanent structure and different functions.
8. **A diaphragm is formed by:** a) muscular and epithelia, b) muscular, c) connective, muscular and nervous, d) nervous and muscular, e) epithelial and connective.
9. **Thoracic cavity contains:** a) lungs, heart, liver, b) trachea, esophagus, stomach, c) lungs, trachea, esophagus, d) esophagus, intestine, lungs, e) stomach, intestine, kidneys.
10. **Abdominal cavity contains:** a) lungs, liver, b) trachea, esophagus, stomach, c) stomach, intestine, liver, d) heart, liver, intestine, e) kidneys, heart, liver.

OPEN TESTS

Insert missing word or concept

1. Human body is covered bytissue.
2. Brain and spinal cord are formed by.....tissue.
3. Blood is an example of.....tissue.
4. Cartilage is an example of.....tissue.
5. A stomach is located in.....cavity.
6. An esophagus is located in.....cavity.
7. A liver is located in.....cavity.

PRACTICAL WORK

Task 1. Name the parts of the body:

1.	2.	3.	4.

Task 2. Name systems of organs of the body:

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	

Task 3. Fill in the table:

“Cavities of human body”

Cavity of human body	Organs

Lesson 20. Topic: **A STRUCTURE, CONJUNCTION AND GROWTH OF BONES**_____201____ year

Aim of the lesson is to study a structure, growth and types of bone's conjunction.

CONTROL QUESTIONS

1. A structure and growth of bones.
2. Conjunction of bones: immovable, freely movable.
3. Freely movable conjunction of bones.

BASIC TERMS AND CONCEPTS

1. Bone tissue –
2. Cartilage –
3. Diaphysis –
4. Epiphysis –
5. Immobile bone connection –
6. Joint –
7. Osteoblast –

8. Osteoclast –

9. Osteocyte –

10. Osteon –

11. Red bone marrow –

12. Semi-movable bone connection –

13. Periosteum –

14. Yellow bone marrow –

TESTS FOR SELF-CONTROL

1. **Tubular bone consists of:** a) body, heads, cartilage, b) body and heads, c) body, cartilage and periosteum, d) cartilage and periosteum, e) body, heads, cartilage and periosteum.
2. **Bone body is covered with:** a) bone tissue, b) epithelial tissue, c) cartilage, d) muscular tissue, e) periosteum.
3. **Bone tissue contains:** a) blood cells, b) bone cells and intercellular substance, c) nervous cells, d) cartilage, e) adipose tissue.
4. **Nonorganic substances make bones:** a) soft, b) solid and strong, c) liquid, d) plastic, e) dynamic.
5. **Organic substances make bones:** a) soft and plastic, b) solid, c) liquid, d) plastic and strong, e) strong.
6. **What is inside flat bones?** a) yellow marrow, b) water, c) epithelial tissue, d) red marrow, e) cerebrospinal liquids.
7. **What is inside tubular bones?** a) yellow marrow, b) lymph, c) epithelial tissue, d) red marrow, e) cerebrospinal liquids.
8. **Heads of bones are covered with:** a) bone tissue, b) epithelial tissue, c) cartilage, d) muscular tissue, e) periosteum.
9. **In form bones could be:** a) flat and tubular, b) triangular, c) quadratic, d) round, e) oval.
10. **Periosteum is formed by:** a) epithelial tissue, b) nervous, c) muscular tissue, d) connective, e) epithelial and nervous.
11. **Joint consists of:** a) articular head, articular cavity, articular capsule, b) articular capsule and synovial fluid, c) articular head, articular cavity, articular capsule, synovial fluid, d) articular head, articular cavity, e) articular head, articular cavity, synovial fluid.

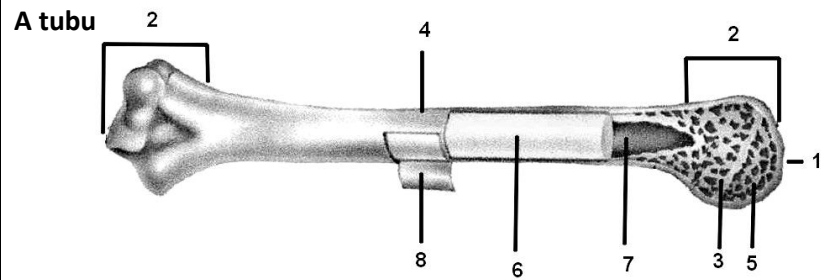
OPEN TESTS

Insert missing word or concept

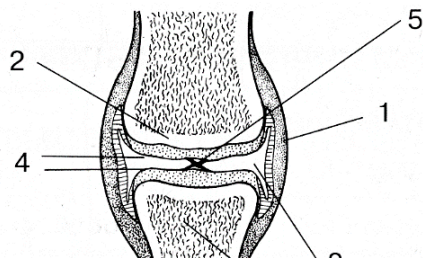
8. Bone tissue is formed byconnective tissue.
9. Organic substances make bone tissue soft and....
10. From nonorganic substances bone contains calcium salt and....
11. Blood cells are produced in.....bone marrow.
12. A tubular bone has a head and....
13. Bone grows in thickness during a division of....cells.
14. Skull bones are connected by...
15. There isconjunction between vertebrae.
16. Movable conjunction of bones is called.....
17. Bones of femur and tibia are connected by....
18. Immovable bone conjunction of small pelvis is formed by....bones.

PRACTICAL WORK

Task 1. Look at pictures and make descriptions.



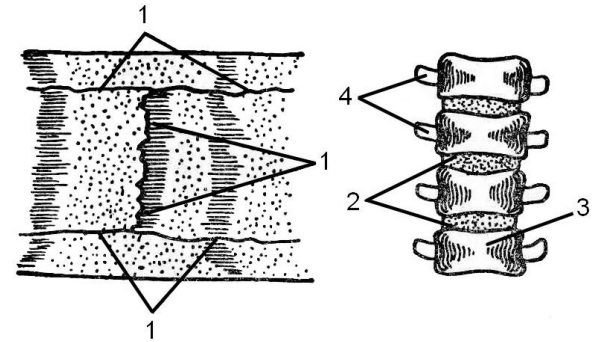
- head,
- body,
- periosteum,
- marrowy canal,
- spongy substance,
- compact substance,
- yellow marrow,
- cartilage.



Task 2. A joint structure:

- 1 –
- 2 –
- 3 –

Task 3. Immovable and slightly movable conjunction of bones:



- processes of vertebrae,
- body of vertebrae,
- cartilaginous layer between the vertebrae,
- sutures between the bones of the skull.

Teacher's signature

Lesson 21. Topic: **THE STRUCTURE OF THE HUMAN SKELETON**_____201____ year

Aim of the lesson is to study the structure of the human skeleton, its parts (skeleton of the head, the trunk, upper and lower extremities) and their functions.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. Parts of the human skeleton (the head, the trunk, extremities and their girdles).</p> <p>2. Functions of the human skeleton.</p>	<p>12. A human spine contains vertebrae: a) 12-20, b) 13-14, c) 25-28, d) 33-34, e) 60-63.</p> <p>13. How many pairs of ribs in human: a) 9, b) 10, c) 11, d) 12, e) 20.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>15. Floating ribs –</p> <p>16. Kyphosis –</p> <p>17. Lordosis –</p> <p>18. Skeleton –</p> <p>19. Skull –</p> <p>20. Vertebra –</p>	<p>14. A human spine consists of following parts: a) trunk and tail, b) cervical, trunk and sacral, c) cervical, thoracic, sacral and coccygeal, d) cervical, thoracic, lumbar, sacral and coccygeal, e) cervical, trunk, lumbar and coccygeal.</p> <p>15. A cervical spine contains vertebrae: a) 5, b) 8, c) 10, d) 7, e) 6.</p> <p>16. A pelvic girdle is formed by: a) one pelvic bone that is accreted with sacral spine, b) one pelvic bone that isn't accreted with sacral spine, c) pelvic and femoral bones, d) two pelvic bones that are accreted with sacral spine, e) two pelvic bones that aren't accreted with sacral spine.</p> <p>17. A skeleton of the free upper limb consists of following parts: a) shoulder, forearm, b) shoulder, forearm and hand, c) femur, crus (leg) and foot, d) shoulder, crus and hand, e) shoulder, forearm, foot.</p> <p>18. A thoracic cage is formed by: a) ribs and sternum, b) ribs, sternum and cervical spine, c) ribs, sternum and thoracic spine, d) ribs, sternum and scapulae, e) ribs, sternum, scapulae and clavicles.</p> <p>19. A thoracic spine contains vertebrae: a) 11, b) 5, c) 7, d) 12, e) 10.</p> <p>20. A coccygeal spine contains vertebrae: a) 4, b) 5, c) 4-5, d) 3, e) 5-6.</p> <p>21. A back skull contains bones: a) frontal, temporal, zygomatic, b) temporal, maxillary, parietal, c) occipital, temporal, parietal, d) zygomatic, temporal, frontal, e) temporal, frontal, zygomatic.</p>

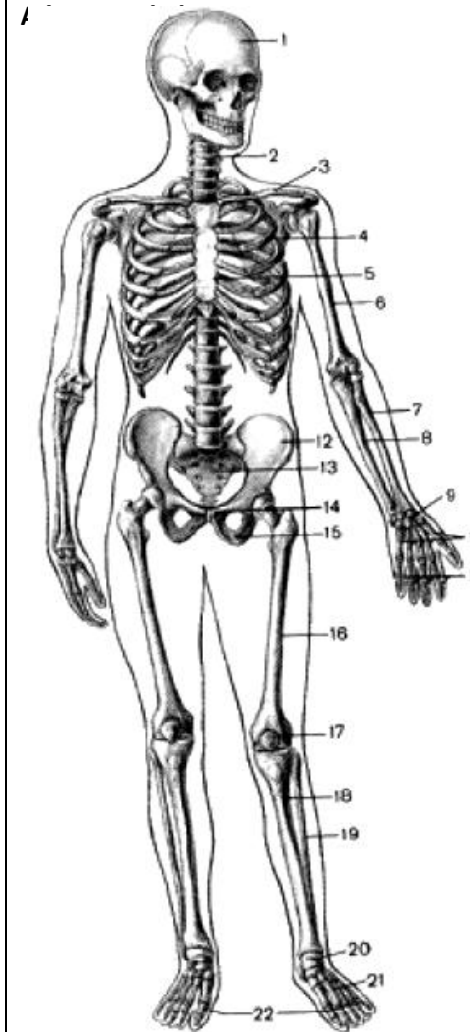
OPEN TESTS

Insert missing word or concept

1. A skeleton is ... part of loco-motor apparatus (musculoskeletal system).
2. A skull consists of and back skull.
3. Malar (zygomatic) bones are located in skull.
4. A back skull includes frontal, occipital, temporal and bones.
5. A vertebra consists of a body, and several processes.
6. A spinal cord is in canal.
7. A thoracic spine contains vertebrae.
8. A sacral spine contains vertebrae.
9. A thoracic cage (chest) are formed by ribs, and thoracic vertebrae.
10. A thoracic cage contains pairs of ribs.
11. A shoulder girdle includes scapulae and
12. A forearm includes ulna and
13. Carpals, metacarpal bones and phalanges of the fingers form....
14. A girdle of inferior extremity (lower limb girdle; pelvic girdle) grows together (accretes) with spine.
15. A skeleton of lower extremity consists of femur, and foot.
16. Tibia and fibula form

PRACTICAL WORK

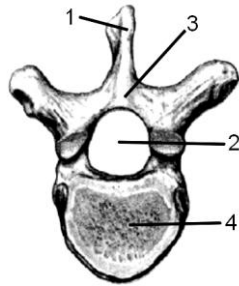
Task 1. Look at pictures and make descriptions.



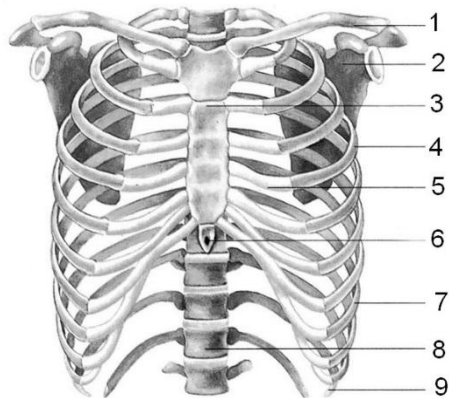
- femur,
- tibia,
- sternum (breastbone),
- clavicle (collarbone),
- carpal bones (wrist),
- metatarsal bones,
- tarsal bones,
- metacarpal bones,
- sacrum,
- pubic bone,
- ulna,
- radius,
- fibula,
- patella (knee cap),
- humerus,
- ilium,
- spine (vertebral column),
- ribs,
- ischium,

Task 2. A structure of the vertebrae:

- vertebral arch,
- spinose process,
- vertebral foramen,
- body of the vertebrae

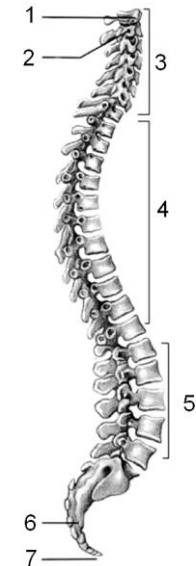
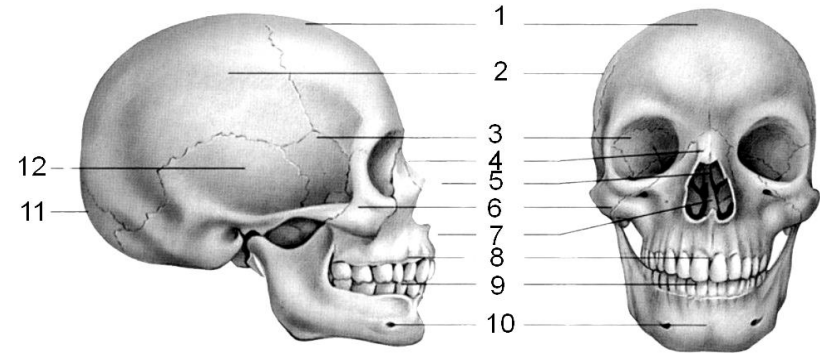


Task 3. Thorax and girdle of superior extremity:



- sternum,
- sternal ribs (true ribs),
- clavicle,
- floating ribs (slipping rib cartilages),

Task 4. A structure of the skull: A - side view, B - front view



- maxilla,
- temporal bone,
- occipital bone,
- teeth,
- sphenoid bone,
- mandible,
- nasal turbinate (nasal concha),
- nasal bone,
- malar bone (zygomatic bone),
- vomer,
- parietal bone.
- frontal bone,

Task 5. Vertebral column:

- atlas,
- thoracic vertebrae,

Lesson 22. Topic: **A HUMAN MUSCULAR SYSTEM**_____201____ year

Aim of the lesson is to study a structure, functions and functioning of skeletal muscles.

CONTROL QUESTIONS

1. Skeletal and smooth muscles.
2. Skeletal muscles, their structure and functions.
3. Nervous control of muscles.

4. Functions of muscular system.

BASIC TERMS AND CONCEPTS

21. **Afferent neuron (sensory neuron) –**
22. **Antagonists –**
23. **Axon –**
24. **Dendrite –**
25. **Efferent neuron (motor neuron) —**

26. Muscle tissue –

27. Nerve impulse –

28. Receptor –

29. Reflex –

30. Reflex arc –

31. Synergists –

TESTS FOR SELF-CONTROL

- 1. Muscles are formed by:** a) bone tissue, b) muscular and epithelial tissues, c) nervous and muscular, d) muscular, e) connective and muscular.
- 2. Striated muscular tissue has following properties:** a) multinucleated cells, consists of fibers 10–12 sm in length, b) mononuclear cells, has light and dark discs, c) consists of fibers 10–12 sm in length, contracts and tires quickly, d) has light and dark discs, contracts quickly and runs continuously, e) contracts and tires slowly.
- 3. Smooth muscular tissue has following properties:** a) consists of separate mononuclear cells 0,1 mm in length, b) contracts and tires quickly, c) contracts slowly and tires quickly, d) consists of separate mononuclear cells 0,1 sm in length, contracts and tires quickly, e) consists of separate mononuclear cells 10–12 sm in length.
- 4. A length of smooth muscular cell is:** a) 1mm, b) 10–12 sm, c) 0,1 mm, d) 0,2 mm, e) 0,3 mm.
- 5. Muscular fibers (myofibrils) contain proteins:** a) actin, hemoglobin, b) actin, myosin, c) myosin, fibrinogen, myoglobin, d) fibrinogen, prothrombin, e) actin, myosin, prothrombin.
- 6. Muscles of the head are:** a) biceps, masseter, b) triceps, mimic, c) masseter and mimic, d) intercostal, e) biceps and triceps.
- 7. Determine the path in which excitation passes:** a) receptor – efferent neuron – interneuron – afferent neuron – working organ, b) working organ – afferent neuron – interneuron – efferent neuron – receptor, c) receptor – afferent neuron – efferent neuron – interneuron – working organ, d) receptor – afferent neuron – interneuron – efferent neuron – working organ, e) efferent neuron – interneuron – afferent neuron – working organ.
- 8. Muscle of the heart is formed by:** a) smooth muscular tissue, b) striated muscular tissue, c) smooth and striated muscular tissue, d) striated muscular tissue with a special structure, e) smooth and striated muscular tissue with a special structure.
- 9. A reflex arc consists of:** a) receptor, interneuron, b) afferent neuron, interneuron, working organ c) receptor, afferent neuron, interneuron, efferent neuron, working organ, d) efferent neuron, working organ, e) receptor, efferent neuron, interneuron, working organ.

OPEN TESTS

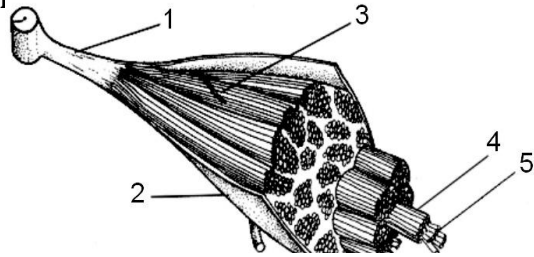
Insert missing word or concept

- 1.** A musculoskeletal system is formed by skeleton and
- 2.** An active part of musculoskeletal system is....
- 3.** A passive part of musculoskeletal system is....
- 4.** Walls of blood vessels and intestines contain ... muscular tissue.
- 5.** A length of smooth muscular cell is....
- 6.**muscles tire quickly.
- 7.**muscles tire slowly.
- 8.** Muscles contain contractile protein myosin and ...
- 9.** Membrane that covers skeletal muscle belongs totissue.
- 10.** Skeletal muscles attach to bones by means of
- 11.** The response of the organism to stimulation with the nervous system involvement is...
- 12.** In response to stimulationoccurs in (with) muscles.
- 13.** Central nervous system gets excitation (stimulation) from receptors by ...neurons.
- 14.** A reflex arc consists of receptor, an afferent neuron... an efferent neuron and working organ.

PRACTICAL WORK

Task 1. Look at pictures and make descriptions.

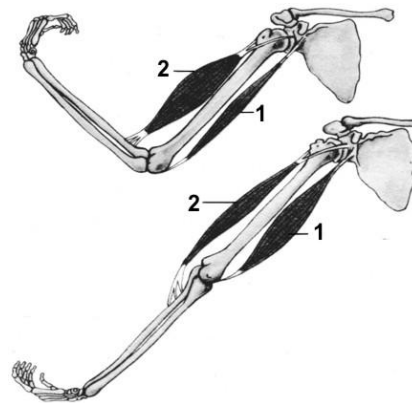
A structure



- 1 –
- 2 –
- 3 –
- 4 –
- 5 –

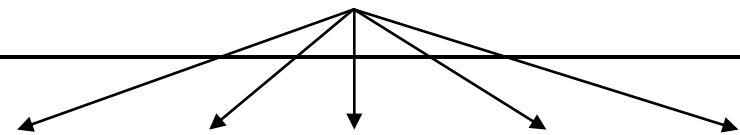
Task 2. Flexor and extensor muscles of the arm:

- Biceps (flexor);
- Triceps (extensor).

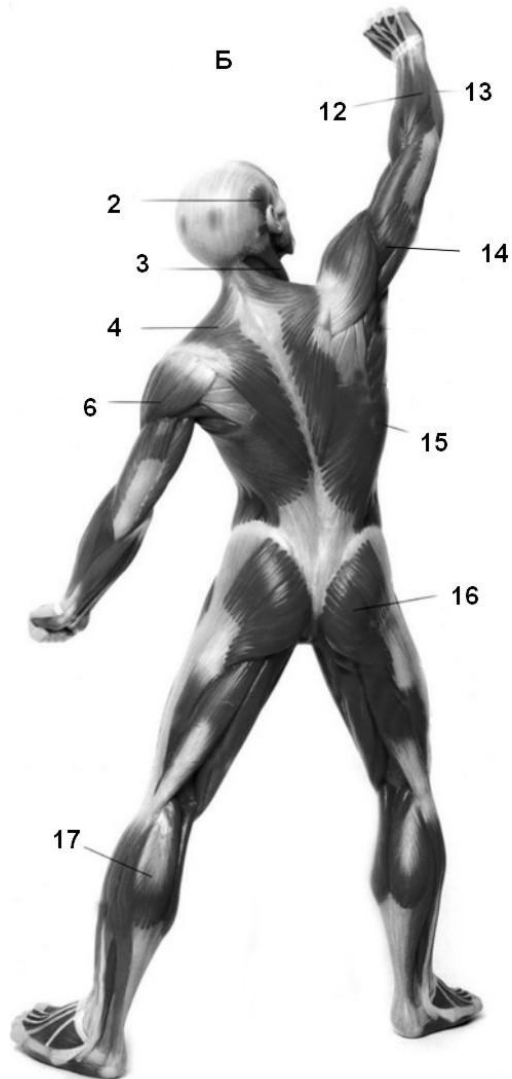
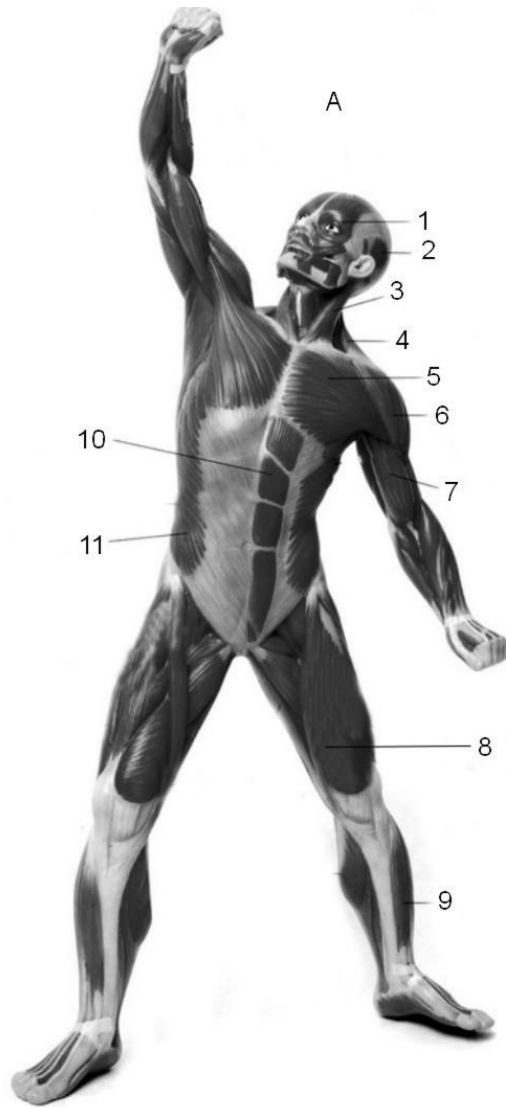


Task 3. Give the answers to following questions:

1. Name skeletal muscles according to localization.
2. What is the functioning of muscle?
3. Where the firing of neurons is transferred from receptors and from spinal cord?
4. What are the functions of muscle?



Task4. Human skeletal muscles: A- front view, B- back view.



- Pectoralis major,
- Gluteus maximus,
- Tibialis,
- Temporalis,
- Sternocleidomastoid,
- Biceps,
- Rectus abdominis,
- Wrist (hand) extensors,
- Wrist flexors,
- Trapezius,
- Triceps,
- Latissimus dorsi.
- Deltoid,
- Gastrocnemius,
- Orbicularis oculi,
- Peroneus,
- External oblique,
- Sartorius.

Teacher's signature

Lesson 23. Topic: **AN INTERNAL ENVIRONMENT OF THE BODY. BLOOD AND ITS FUNCTIONS**_____201____ year

Aim of the lesson is to consider the concept of internal environment of the body, to study a structure and functions of blood, plasma and intercellular (interstitial) fluid.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. An internal environment of the body: interstitial fluid, lymph, blood.</p> <p>2. Blood composition: plasma, blood corpuscles- red blood cells, white blood cells, platelets, their structure and functions.</p>	<p>1. Lymph is formed from: a) interstitial fluid, b) plasma and interstitial fluid, c) blood, d) plasma, e) red marrow.</p> <p>2. Lymph composition is similar to: a) interstitial fluid, b) blood, c) plasma and interstitial fluid, d) plasma, e) blood and interstitial fluid.</p> <p>3. Interstitial fluid is formed from: a) lymph and plasma, b) blood, c) lymph, d) plasma, e) blood and lymph.</p>
<p>3. Functions of blood.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>32. Antibodies –</p> <p>33. Blood –</p> <p>34. Blood plasma –</p> <p>35. Erythrocytes (red blood cells) –</p> <p>36. Hemoglobin –</p> <p>37. Interstitial fluid –</p> <p>38. Leucocytes (white blood cells) –</p> <p>39. Lymph –</p> <p>40. Thrombocytes (platelets) –</p>	<p>4. Features of leukocytes: a) unstable form, absence of a nucleus, participation in blood coagulation, b) formation of protective proteins – antibodies, presence of nucleus, c) contain the protein hemoglobin, presence of nucleus, d) take the form of a biconcave disk, have nuclei, e) form pseudopods, contain hemoglobin.</p> <p>5. Erythrocytes contain the protein: a) actin, b) myosin, c) hemoglobin, d) fibrinogen, e) prothrombin.</p> <p>6. Red blood cells are formed in: a) yellow marrow, b) red marrow, c) spleen, d) lymph nodes, e) spleen and red marrow.</p> <p>7. Platelets are formed in: a) yellow marrow, b) red marrow, c) spleen, d) lymph nodes, e) spleen and red marrow.</p> <p>8. Function of erythrocytes: a) transport, b) energetic, c) protective, d) structural, e) participate in blood coagulation.</p> <p>9. Function of platelets: a) transport, b) energetic, c) protective, d) regulatory, e) participate in blood coagulation.</p> <p>10. Human body contains blood: a) 3 l, b) 9 l, c) 5 l, d) 4 l, e) 10 l.</p>

11. Lifespan of red blood cells: a) 2-4 days, b) 120 days, c) 8-11 days, d) 10-15 days, e) 1-2 days.

12. Leukocytes are formed in: a) red marrow, b) lymph nodes, c) spleen, d) red marrow, spleen and lymph nodes, e) spleen and yellow marrow.

13. Lifespan of white blood cells: a) 120 days, b) 2-4 days, c) 8-11 days, d) 210 days, e) 15-30 days.

14. Features of erythrocytes: a) take the form of a biconcave disk, have nucleus, b) unstable form, absence of nucleus, live 2-4 days, c) take the form of a biconcave disk, absence of nucleus, d) take the round form, absence of nucleus, live 120 days, e) unstable form, absence of nucleus, formation of protective proteins – antibodies, f) live 2-4 days, have nucleus.

15. Features of platelets: a) unstable form, absence of a nucleus, b) unstable form, presence of nucleus, c) take the form of a biconcave disk, presence of nucleus, d) take the form of a biconcave disk, have nucleus, live 8-11 days, e) absence of a nucleus, live 8-11 days, participate in blood coagulation.

OPEN TESTS

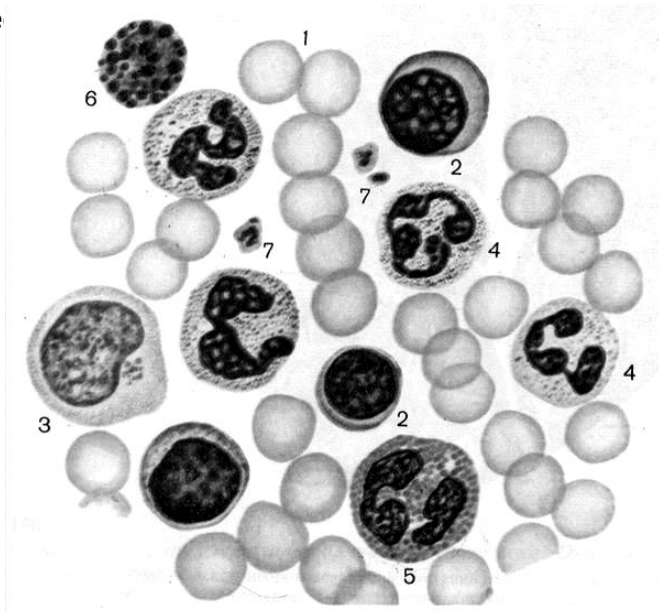
Insert missing word or concept

1. An internal environment of the body includes blood, interstitial fluid and
2. An interstitial fluid is formed from.....
3. Blood isconnective tissue.
4. In human body Liters blood.
5. Blood cells are erythrocytes, leukocytes and...
6. Erythrocytes have the form ofdisks.
7. The protein that makes blood red is....
8. Lifespan of erythrocytes isdays.
9. Leukocytes are formed in red marrow, lymph nodes and....
10. participate in blood coagulation.
11. The function of gas exchange is performed by.....
12. Lifespan of platelets isdays.

PRACTICAL WORK

Task 1. Make designations to the picture.

Forme



1 -

2 -

3 -

4 -

5 -

Teacher's signature

Lesson 24. Topic: **CIRCULATORY SYSTEM. A STRUCTURE AND HEART FUNCTIONING**_____201____ year

Aim of the lesson is to consider the concept of circulatory system, to study a structure and heart functioning, nervous and humoral control of action of the heart.

CONTROL QUESTIONS

1. A circulatory system.
2. A heart, its structure and functioning.
3. Nervous and humoral control of action of the heart.

47.Epicardium –

48.Heart –

49.Myocardium –

BASIC TERMS AND CONCEPTS

41. Atrioventricular valves –

42. Atrium –

43. Cardiac cycle –

44.Coronary arteries –

45.Diastole –

46.Endocardium –

50. Pericardium –

51. Semilunar valves –

52.Systole –

53.Ventricle –

TESTS FOR SELF-CONTROL

1. What valve is situated between right atrium and right ventricle: a) semilunar, b) bicuspid, c) tricuspid, d) quadricuspid, e) monocuspid.
2. The heart wall is formed by: a) epicardium, b) pericardium, c) epicardium and myocardium, d) pericardium, myocardium, endocardium, e) endocardium, myocardium and epicardium.
3. Epicardium is formed by tissue: a) connective, b) muscular, c) connective tissue covered by epithelium, d) epithelial, e) muscular tissue covered by epithelium.
4. Endocardium is formed by tissue: a) connective, b) muscular, c) connective tissue covered by epithelium, d) epithelial, e) muscular tissue covered by epithelium.
5. Myocardium is formed by tissue: a) connective, b) muscular, c) connective tissue covered by epithelium, d) epithelial, e) muscular tissue covered by epithelium.
6. Contraction (systole) of atria lasts: a) 0,1 sec, b) 0,2 sec, c) 0,3 sec, d) 0,4 sec, e) 0,8 sec.
7. Contraction (systole) of ventricles lasts: a) 0,1 sec, b) 0,2 sec, c) 0,3 sec, d) 0,4 sec, e) 0,8 sec.
8. Relaxation (diastole) of atria lasts: a) 0,7 sec, b) 0,2 sec, c) 0,3 sec, d) 0,8 sec, e) 0,5 sec.
9. Relaxation (diastole) of ventricles lasts: a) 0,7 sec, b) 0,3 sec, c) 0,4 sec, d) 0,5 sec, e) 0,8 sec.
10. Pericardium is formed by tissue: a) muscular, b) epithelial, c) connective, d) connective and epithelial, e) connective and muscular.
11. Duration of cardiac cycle is: a) 0,5 sec, b) 0,7 sec, c) 0,8 sec, d) 0,9 sec, e) 0,4 sec.
12. The heart wall consists of layers: a) 3, b) 2, c) 5, d) 1, e) 4.

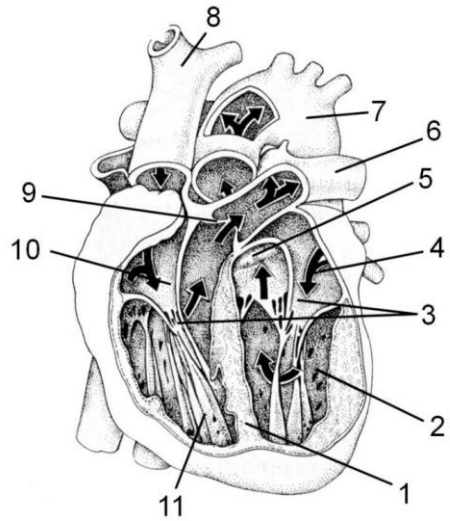
OPEN TESTS

Insert missing word or concept

1. The heart is located in cavity.
2. Pericardium is formed by connective and tissues.
3. The heart wall consists of endocardium, myocardium and
4. The internal layer of heart wall is called...
5. The external layer of heart wall is called...
6. Between left atrium and left ventricle ... valve is situated.
7. branches out (goes) from the right ventricle.
8. In places where the blood vessels branches out from the ventricles are located.
9. Diastole (relaxation) of atria lasts sec.
10. Systole (contraction) of ventricles lasts sec.
11. A cardiac cycle lasts sec.
12. A hormone strengthens the heart act.

PRACTICAL WORK

T:



Structure of the heart:

- superior vena cava,
- aortic arch,
- left pulmonary artery,
- left atrium,
- left ventricle,
- interventricular septum,
- pulmonic (pulmonary) valve,
- aortic valve,
- right atrium,
- right ventricle,

Task 2. Fill in the table: "Layers of the heart wall".

Layers of the heart wall	From which tissue is it?

Task3. Fill in the table: "Cardiac cycle"

Phase of the cardiac cycle	direction of motion of blood	Phase duration

Teacher's signature

Lesson 25. Topic: **STRUCTURE OF VESSELS. CIRCULATION**_____201____ year

Aim of the lesson is to highlight differences in structure of vessels; to study sanguimotion through the vessels; greater and lesser circulation.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. Structure of vessels (arteries, veins, capillaries).</p> <p>2. Sanguimotion through the vessels.</p> <hr/> <p>3. Systemic (greater) and pulmonary (lesser) circulation.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>54. Aorta –</p> <p>55. Arterial blood –</p> <p>56. Arteries –</p> <p>57. Capillaries –</p> <p>58. Pulmonary arteries –</p> <p>59. Pulmonary circulation –</p> <p>60. Systemic circulation –</p> <p>61. Veins –</p> <p>62. Venous blood –</p>	<p>1. Veins are the vessels which: a) spring from the heart and carry mixed blood; b) come to the heart and carry arterial blood; c) come to the heart and carry venous blood; d) come to the heart; e) spring from the heart and carry venous blood.</p> <p>2. Arteries are the vessels which: a) spring from the heart and carry mixed blood; b) come to the heart and carry arterial blood; c) come to the heart and carry venous blood; d) spring from the heart and carry arterial blood; e) spring from the heart.</p> <p>3. Asystemic circulation: a) begins from the left ventricle and ends in the left atrium; b) begins from the right ventricle and ends in the left atrium; c) begins from the left ventricle and ends in the right atrium; d) begins from the right ventricle and ends in the right atrium; e) begins from the left ventricle and ends in the right atrium.</p> <p>4. A pulmonary (lesser) circulation: a) begins from the left ventricle and ends in the left atrium; b) begins from the right ventricle and ends in the left atrium; c) begins from the left ventricle and ends in the right atrium; d) begins from the right ventricle and ends in the right atrium; e) begins from the left ventricle and ends in the right atrium.</p> <p>5. Vena cava carry: a) venous blood, to the right atrium; b) arterial blood, to the right atrium; c) venous blood, to the left atrium; d) arterial blood, to the left atrium; e) venous blood, to the right ventricle.</p> <p>6. Through the capillary wall tissues receive: a) oxygen and nutrients; b) carbon dioxide and nutrients; c) oxygen and metabolites; d) carbon dioxide and metabolites; e) oxygen only.</p> <p>7. Blood receive from tissues: a) oxygen and nutrients; b) carbon dioxide and nutrients; c) oxygen and metabolites; d) carbon dioxide and metabolites; e) carbon dioxide only.</p>

8. The capillary wall consists of: a) one layer of epithelial cells and smooth muscles; b) one layer of epithelial cells; c) two layers of epithelial cells and smooth muscles; d) elastic fibers; e) one layer of epithelial cells and elastic fibers.

9. Right heart contains: a) venous blood only; b) arterial blood only; c) venous and arterial blood; d) mixed blood; e) mixed, venous and arterial blood.

10. Left heart contains: a) venous blood only; b) arterial blood only; c) venous and arterial blood; d) mixed blood; e) mixed, venous and arterial blood.

11. In the pulmonary arteries flows: a) venous blood, to the left atrium; b) venous blood, to the right atrium; c) arterial blood, to the left atrium; d) arterial blood, to the lungs; e) venous blood, to the lungs.

12. In the pulmonary veins flows: a) venous blood, to the right atrium; b) arterial blood, to the right atrium; c) venous blood, to the left atrium; d) arterial blood, to the left atrium; e) venous blood, to the lungs.

4. Nutrients and oxygen from the blood enters the
5. Sanguimotion (movement of blood) through the vessels is
6. A greater circulation begins
7. A lesser circulation begins
8. A greater circulation ends
9. A lesser circulation ends

PRACTICAL WORK

Task 1. Fill in the table: "blood vessels"

Feature	Artery	Capillary	Vein
Structure of the wall			
Function			

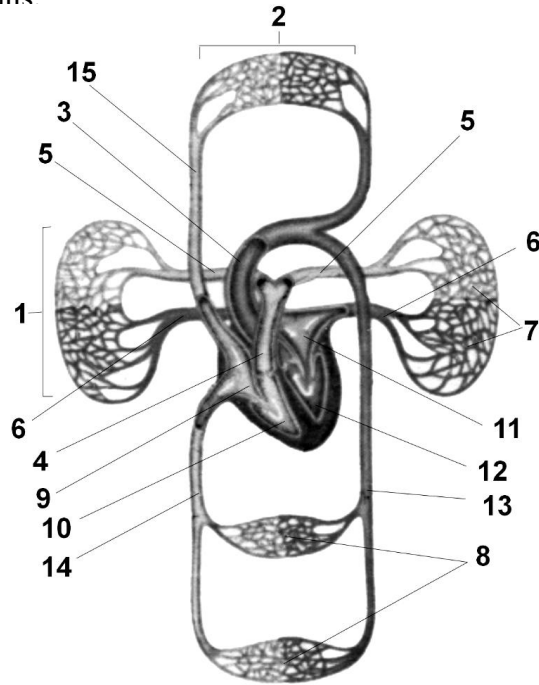
OPEN TESTS

1. Vessels that carry blood from the heart to the organs and tissues are called...
2. The arteries' wall contains smooth muscles and fibers.
3. Vessels that carry blood from the organs and tissues to the heart are called ...

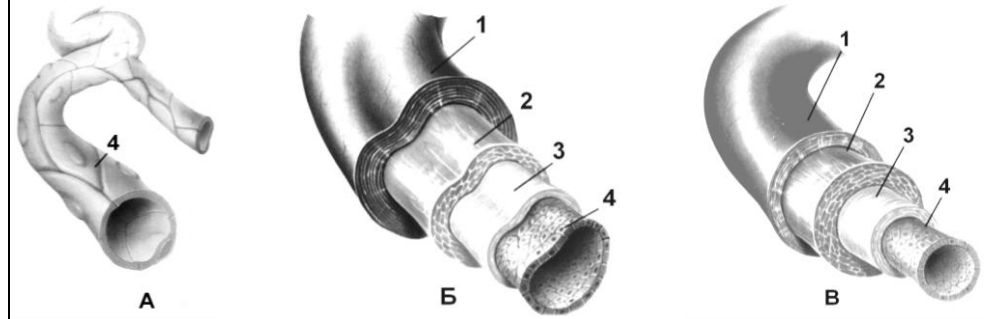
Insert missing word or concept

Task 2. Mark in pictures. A scheme of circulation:

- capillaries of inner organs
- aorta,
- greater circulation,
- abdominal aorta,
- superior vena cava,
- alveolar capillaries,
- left atrium,
- left ventricle,
- pulmonary trunk,
- pulmonary arteries,
- pulmonary veins,
- lesser circulation,
- inferior vena cava,
- right atrium,
- right ventricle.



Task 3. Mark in pictures. Blood vessels:



- capillary
- vein
- artery
- smooth muscle layer
- layer of elastic fibers
- connective tissue layer
- endothelium.

Teacher's signature

Aim of the lesson is to study structure and functions of respiratory organs and airways.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. Importance of breathing.</p> <p>2. Respiratory tract and respiratory organs, their structure and functions.</p>	<p>1. Humoral regulation of breathing is associated with changes in the content of ...in the blood: a) carbon dioxide; b) oxygen; c) carbon dioxide and oxygen; d) hormones; e) hormones and carbon dioxide.</p> <p>2. Nervous control of respiration is provided by respiratory center located in: a) forebrain; b) midbrain; c) hindbrain; d) medulla oblongata (spinal bulb); e) cerebellum (little brain).</p>
<p>3. Structure of vocal (laryngeal) apparatus.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>63. Alveoli –</p> <p>64. Breathing –</p> <p>65. Bronchi, bronchioli –</p> <p>66. Larynx –</p> <p>67. Lungs –</p> <p>68. Nasal cavity –</p> <p>69. Nasopharynx –</p> <p>70. Pleura –</p> <p>71. Respiratory system –</p> <p>72. Respiratory tract (tree) –</p>	<p>3. Determine the way in which air passes into the airways: a) nasal cavity, larynx, nasopharynx, trachea, bronchi, bronchioles; b) nasopharynx, nasal cavity, larynx, trachea, bronchioles, bronchi; c) nasal cavity, nasopharynx, larynx, trachea, bronchi, bronchioles; d) larynx, nasopharynx, trachea, nasal cavity, bronchi, bronchioles; e) nasal cavity, nasopharynx, trachea, larynx, bronchi, bronchioles.</p> <p>4. The air in nasal cavity becomes: a) warmed and humidified; b) purified from; c) purified from bacteria and warmed; d) warmed; e) warmed, humidified, purified from dust and bacteria.</p> <p>5. Alveolar walls are formed by: a) one layer of epithelial cells and blood capillaries; b) two layers of epithelial cells and blood capillaries; c) one layer of epithelial cell; d) blood capillaries and muscular fibers; e) two layers of epithelial cells and muscular fibers.</p> <p>6. In respiratory movements participate: a) intercostal muscles and the pelvic floor muscles; b) intercostal muscles and diaphragm; c) diaphragm and the muscles of the shoulder girdle; d) diaphragm and back muscles; e) intercostal muscles and muscles of the upper extremities.</p> <p>7. The tracheal wall is formed by: a) cartilaginous semirings; b) cartilaginous rings; c) muscular tissue; d) epithelial tissue; e) muscular and epithelial tissue.</p> <p>8. Epithelial membrane of nasal cavity contains: a) glands; b) blood capillaries; c) blood capillaries and glands; d) cilia, glands; e) cilia, glands and blood capillaries.</p>

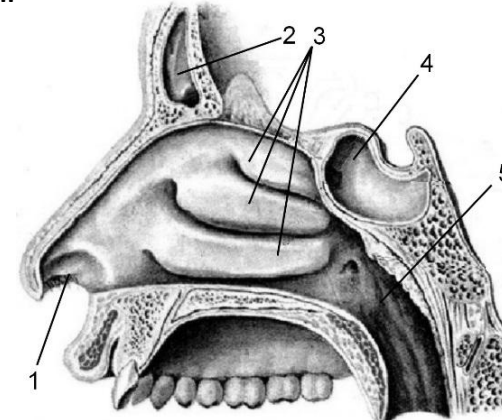
OPEN TESTS

Insert missing word or concept

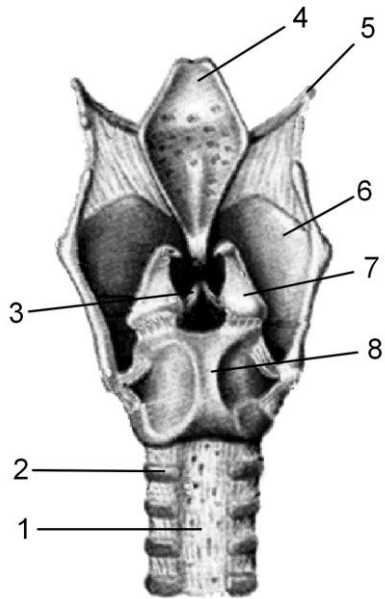
1. Airways include nasal cavity, larynx, trachea, bronchi, bronchioles and
2. Respiratory organs in human are
3. Epithelial membrane of the nasal cavity has cilia, and blood vessels.
4. Each half of the nasal cavity has nasal
5. From nasal cavity air goes to
6. Lungs are situated in cavity.
7.are found at the ends of the bronchioles.
8. Gas exchange takes place in ...
9. A respiratory center is located in
10. The biggest cartilage is
11. Entrance to the larynx is closed by.... cartilage.
12. The wall of trachea has cartilaginous
13. The wall of bronchi has cartilaginous

PRACTICAL WORK

Task 1. Mark in picture. Nasal cavity:



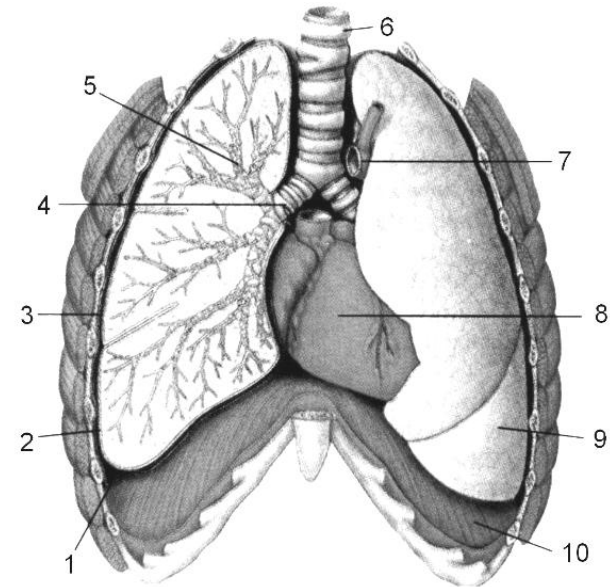
- sphenoid sinus,
- frontal sinus;
- nostril;
- nasal turbinate,
- nasopharynx.



Task 2. Mark in picture. Larynx:

- vocal ligament (phonatory band, chord),
- epiglottis,
- cricoid cartilage,
- hyoid bone,
- trachea,
- cartilage nussmiring,
- arytenoid cartilage,
- thyroid cartilage.

Task 3. Mark in picture. Human lungs:



- aorta,
- pleura,
- intrapulmonary bronchi,
- diaphragm,
- lower lobe of the left lung,
- pleural cavity,
- right bronchus,

Lesson 27. Topic: **ALIMENTARY (DIGESTIVE) SYSTEM. STRUCTURE OF DIGESTIVE ORGANS**_____201____ year

Aim of the lesson is to consider the concept of digestion and its significance, to study structure of oral cavity, stomach, intestine and digestive glands.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. Digestive system and its parts. Digestive glands.</p> <p>2. Structure of oral cavity.</p> <p>3. Structure of stomach.</p> <hr/> <p>4. Structure of intestine.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>1. Appendix –</p> <p>2. Bile –</p> <p>3. Digestion –</p> <p>4. Digestive gland –</p> <p>5. Digestive system –</p> <p>6. Gastric juice –</p> <p>7. Liver –</p> <p>8. Pulp –</p> <p>9. Stomach –</p> <p>10. Swallowing –</p>	<p>1. Determine the way of food promotion through the digestive tract: a) oral cavity, esophagus, pharynx, stomach, small intestine, large intestine; b) oral cavity, pharynx, small intestine, esophagus, stomach, large intestine; c) pharynx, esophagus, oral cavity, small intestine, large intestine; d) oral cavity, esophagus, pharynx, large intestine, small intestine; e) oral cavity, pharynx, esophagus, stomach, small intestine, large intestine.</p> <p>2. Stomach is located in: a) thoracic cavity above the diaphragm, b) lower part of the abdominal cavity; c) upper part of the abdominal cavity under the diaphragm; d) upper part of the abdominal cavity on the right; e) lower part of the abdominal cavity on the left.</p> <p>3. Liver is located in: a) the upper part of the abdominal cavity on the left, b) upper part of the abdominal cavity on the right; c) lower part of the thoracic cavity on the right; d) the abdominal cavity under the diaphragm; e) the abdominal cavity behind the stomach.</p> <p>4. Glands of the gastric mucosa secrete: a) pancreatic juice, b) gastric juice; c) bile; d) bile and gastric juice; e) pancreatic juice and bile.</p> <p>5. Pancreatic juice enters the: a) duodenum; b) stomach; c) duodenum and other parts of small intestine; d) stomach and small intestine; e) small and large intestine.</p> <p>6. Appendix is located: a) between stomach and small intestine; b) between small and large intestine; c) in the end of large intestine; d) between duodenum and other parts of small intestine; e) at the beginning of duodenum.</p> <p>7. Ducts of the liver enter the: a) duodenum; b) stomach; c) duodenum and other parts of small intestine; d) large intestine; e) pancreas.</p> <p>8. On each jaw, a person has large molars: a) 6; b) 2; c) 4; d) 8; e) 10.</p> <p>9. On each jaw, a person has small molars: a) 2; b) 4; c) 6; d) 8; e) 10.</p> <p>10. The total number of incisors in humans: a) 2; b) 4; c) 6; d) 8; e) 10.</p>

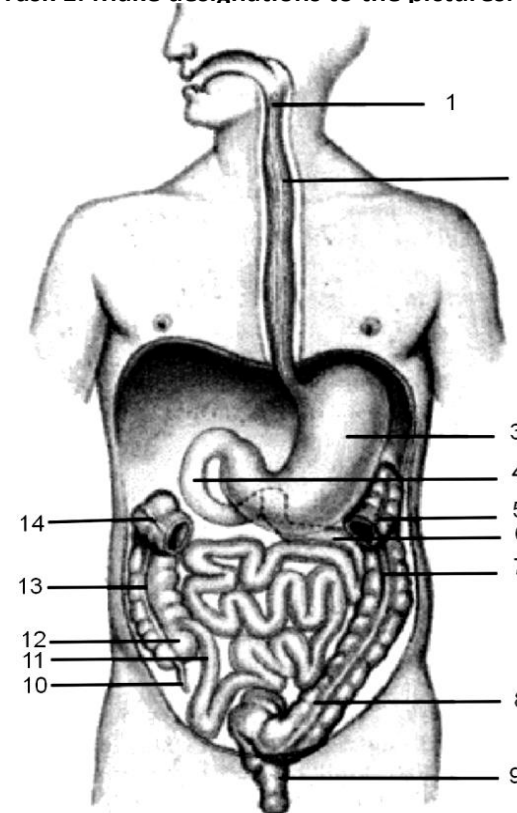
OPEN TESTS

Insert missing word or concept

1. Digestive system includes digestive canal (tract) and
2. Digestive canal consists of oral cavity, esophagus, stomach, small intestine, large intestine and ...
3. Digestive glands are salivary glands, pancreas, glands of stomach, intestine and ...
4. Human has...small molars and large molars.
5. Tooth consists of crown, and root.
6. Taste receptors are located in
7. In humans oral cavity has pairs of salivary glands.
8. Stomach is located in cavity.
9. Ducts of liver and pancreas open in
10. Liver is located in the upper part of the abdominal cavity ...
11. Mucosa of the small intestine has which provide absorption of nutrients.

PRACTICAL WORK

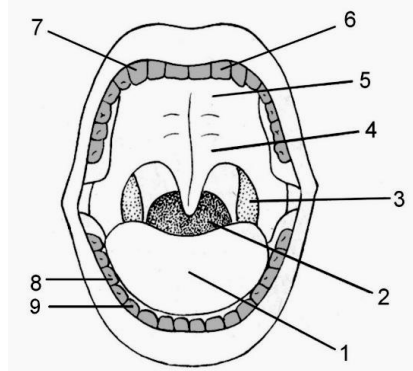
Task 1. Make designations to the pictures. Scheme of digestive tract:



- appendix,
- ascending colon,
- pharynx,

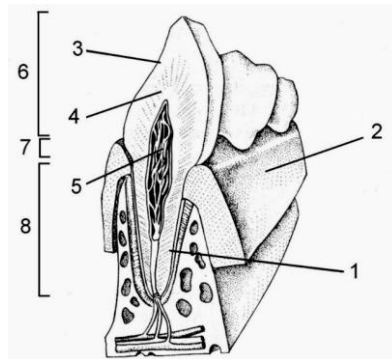
Task 2. Make designations to the pictures. Oral cavity:

- large molars,
- fauces (pharynx),
- canines,
- small molars,
- soft palate,
- tonsils,
- incisors,
- hard palate,
- tongue.



Task 3. Make designations to the pictures. Structure of tooth:

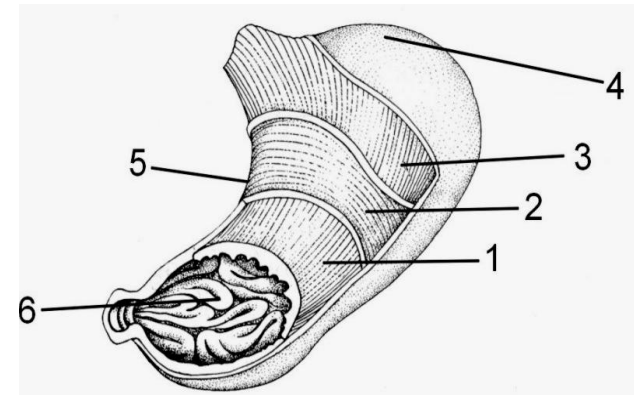
- dentine,
- gum,
- root of the tooth,
- crown of the tooth,
- pulp,
- cement,
- neck of the tooth,
- enamel.



Task 4. Fill in the table "Human teeth":

Type of tooth	Quantity

Task 5. Make designations to the pictures. Structure of stomach:



- fundus (fundal part) of stomach,
- circular muscle layer,
- oblique muscle layer,
- longitudinal layer of muscle,
- folds of mucous in the pylorus,
- body of stomach.

Teacher's signature

Lesson 28. Topic: **CONCEPT OF ENZYMES. CHANGES OF NUTRIENTS IN THE MOUTH, STOMACH AND INTESTINE**__201__ year

Aim of the lesson is to provide insight into enzymes; to study changes of nutrients in the mouth, stomach and intestine.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. Digestive enzymes and their properties. Importance of enzymes in digestion.</p> <p>2. Digestion in the mouth, stomach and intestine.</p>	<p>1. Digestion in the stomach occurs under the action of: a) enzymes of intestinal juice, b) enzymes of gastric juice, c) bile, d) enzymes of pancreatic juice, e) enzymes of gastric and pancreatic juice.</p> <p>2. Enzymes amylase and maltase split: a) carbohydrates into glucose, b) polypeptides into aminoacids, c) fats into glycerol and fatty acids, d) nucleic acids to nucleotides, e) proteins into polypeptides.</p> <p>3. Enzyme trypsin breaks down: a) carbohydrates into glucose and fructose, b) polypeptides into aminoacids, c) fats into glycerol and fatty acids, d) starch (amylum) into glucose, e) proteins into polypeptides.</p> <p>4. Enzyme lipase breaks down: a) carbohydrates into glucose and fructose, b) polypeptides into aminoacids, c) fats into glycerol and fatty acids, d) starch (amylum) into glucose, e) proteins into polypeptides.</p> <p>5. Gastric juice contains enzymes: a) amylase, b) maltase, c) pepsin, d) trypsin, e) lactase.</p> <p>6. Pepsin is active in: a) neutral environment, b) alkaliescent (weakly alkaline) environment, c) acidic environment, d) alkaline environment, e) weak acid medium.</p> <p>7. Enzymes of pancreatic juice are active in: a) weak acid medium, b) alkaliescent (weakly alkaline) environment, c) acidic environment, d) alkaline environment, e) neutral environment.</p> <p>8. Mucosa of the small intestine secretes: a) intestinal juice, b) pancreatic juice, c) gastric juice, d) hydrochloric acid, e) bile.</p> <p>9. Bile emulsifies: a) proteins, b) carbohydrates, c) fats, d) aminoacids, e) nucleic acids.</p> <p>10. Enzymes have properties of: a) specificity, b) universalism, c) uniqueness (unambiguity), d) stability, e) lability.</p> <p>11. What vitamins are synthesized in the large intestine? a) A, D, b) B, K, c) E, A, d) B, D, e) C, E.</p> <p>12. What are synthesized in the villi of the small intestine? a) polysaccharides, b) proteins, c) nucleic acids, d) fats, e) proteins and fats.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>73. Amylase –</p> <p>74. Amylolytic enzymes –</p> <p>75. Chymosin –</p> <p>76. Mechanical breakdown of food –.</p> <p>77. Chemical breakdown of food –</p> <p>78. Enzymes –</p> <p>79. Lipase –</p> <p>80. Lysozyme –</p> <p>81. Nuclease –</p> <p>82. Protease –</p> <p>83. Splitting of nutrients –</p>	

OPEN TESTS

Insert missing word or concept

1. Biologically active substances of protein nature are called ...
2. Property of enzymes to have an effect (to act) on certain organic substances is called ...
3. Salivary enzymes break down (split) starch into
4. Gastric juice contains enzymes: chymosin, lipase and
5. Digestion in the stomach lasts hours.
6. Pancreatic juice and are excreting into duodenum.
7. Pepsin is active in environment (medium).
8. Bile is produced in the and fats.
9. Pancreatic juice contains enzymes: amylase, lipase, maltase, nuclease and ...
10. Enzyme.....splits polypeptides to amino acids.
11. Pancreatic juice enzymes act in environment (medium).
12. Fats from the small intestine enter
13. Amino acids from the small intestine enter

14. Bacteria of large intestine synthesize vitamins, and

15. Cellulose is split into ...

PRACTICAL WORK

Task 1. Fill in the table "Digestive enzymes":

Digestive juice and its amount	Enzymes	pH	Function
Saliva (0,6-0,7 l per day)			
Gastric juice (1,5-2 l per day)			
Pancreatic juice (2 l per day)			

Lesson 29. Topic: **EXCRETORY SYSTEM. STRUCTURE AND FUNCTION OF THE KIDNEYS. STRUCTURE AND FUNCTION OF THE SKIN** _____201_____
year

Aim of the lesson is to study structure and functions of urinary system, skin; to consider mechanisms for the formation of primary and secondary urine.

CONTROL QUESTIONS

1. A structure of urinary organs.
2. Nephron as a structural and functional unit of the kidney. Formation of primary and secondary urine.
3. Functions of kidney.
4. Structure and function of the skin.

BASIC TERMS AND CONCEPTS

84. Cornified layer –
85. Dermis –
86. Epidermis –
87. Filtration –
88. Hair –
89. Melanin –
90. Nephron –

91. Nails –
92. Papillare stratum –
93. Primary urine –
94. Reabsorption –
95. Renal hilum –
96. Renal pelvis –
97. Sebaceous gland –
98. Secondary urine –
99. Subcutaneous adipose tissue –
100. Sweat glands –
101. Ureters –
102. Urinary bladder –
103. Urinary system –

TESTS FOR SELF-CONTROL

- 1. Prime importance in the excretion of metabolic products has system:** a) respiratory, b) endocrine, c) urinary, d) digestive, e) circulatory.
- 2. Kidneys are located in:** a) the lumbar region of thoracic cavity aback, b) the sacral region of abdominal cavity, on each side of the spine, c) the lumbar region of abdominal cavity aback, on each side of the spine, d) the sacral region of thoracic cavity, e) the lumbar region of abdominal cavity in front.
- 3. Collecting tubules open into:** a) bladder, b) ureter, c) pelvis, d) urethra, e) capsule of nephron.
- 4. Primary urine is produced in:** a) capsule of nephron by filtration of blood plasma, b) tubule of nephron by filtration of blood plasma, c) tubule of nephron by reabsorption, d) capsule of nephron by reabsorption, e) pelvis by filtration of blood plasma.
- 5. Secondary urine is produced in:** a) capsule of nephron by filtration of blood plasma, b) tubule of nephron by filtration of blood plasma, c) tubule of nephron by reabsorption, d) capsule of nephron by reabsorption, e) pelvis by filtration of blood plasma.
- 6. Micturition center is in:** a) medulla, b) spine, c) diencephalon, d) mesencephalon (midbrain), e) forebrain.
- 7. Name layers of the human skin:** a) connective, muscular, epithelial, b) epidermis, derma, c) derma, subcutaneous fat, d) epidermis, derma, subcutaneous fat, e) cortical layer, medulla.
- 8. Melanin is in the:** a) derma, b) epidermis, c) subcutaneous fat, d) epidermis, derma, e) derma and subcutaneous fat.
- 9. Hair bags are located in:** a) papillary dermis, b) reticular layer of the dermis, c) papillary and reticular dermis, d) epidermis, e) subcutaneous fat.
- 10. Sweat glands are located in:** a) papillary dermis, b) reticular layer of the dermis, c) papillary and reticular dermis, d) epidermis, e) subcutaneous fat.

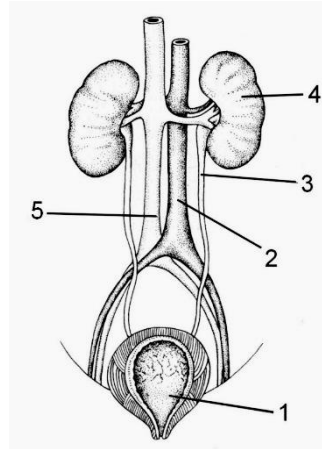
OPEN TESTS

Insert missing word or concept

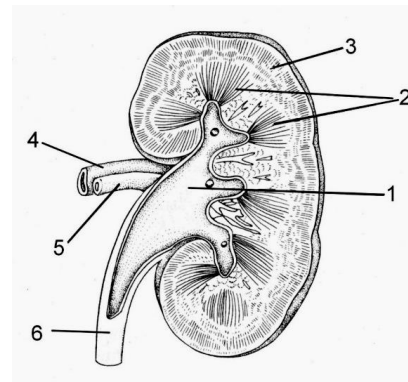
1. Urinary system consist of kidneys,, bladder and urethra.
2. Kidneys are located in cavity.
3. Inner layer of the kidney is called ...
4. Structural and functional unit of the kidney is
5. Nephron consists of capsule, glomerulus and
6. Capsules are located in layer of the kidney.
7. In capsule of nephron urine is produced.
8. Kidneys produce ... liters of primary urine per day.
9. Secondary urine is formed in of nephron.
10. Bladder volume is about ml.
11. Kidneys produce ... liters of secondary urine per day.
12. Cavity of the kidney is called ...
13. Derma has 2 layers: papillary and

PRACTICAL WORK

Task 1. Make designations to the pictures. Structure of urinary system:



- Abdominal aorta,
- Bladder,
- Ureter,
- Inferior vena cava,
- Kidney.



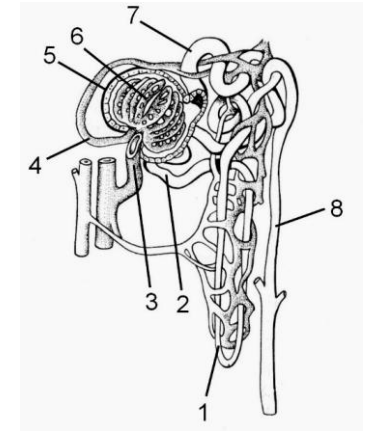
Task 2. Make designations to the pictures.

Structure of the kidney:

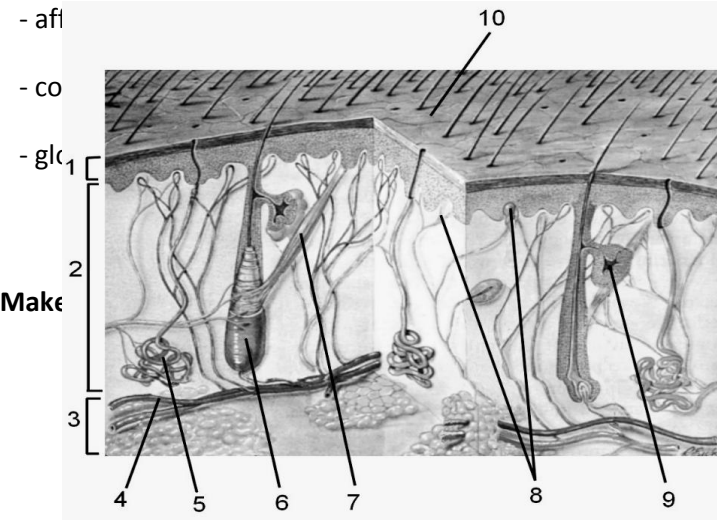
- cortical layer,
- medulla (pyramids),

Task 3. Make designations to the pictures.

Structure of nephron:



- efferent artery,
- convoluted tubules,
- capsule,
- loop of Henle,



Task 4. Make

Lesson 30. Topic: **NERVOUS SYSTEM. STRUCTURE AND FUNCTION OF THE SPINE (SPINAL MEDULLA)**_____201____ year

Aim of the lesson is to study structure and functions of the spine.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. Functions of nervous system.</p> <p>2. Structure of neuron.</p> <p>3. Structure of the spine.</p> <p>4. Functions of the spine.</p>	<p>1. The central nervous system includes: a) red marrow; b) yellow marrow, c) spinal cord and brain, d) ganglia, e) nerves and nerve endings (receptors).</p> <p>2. The peripheral nervous system includes: a) nerves and ganglia; b) red marrow, c) yellow marrow, d) spinal cord, e) brain.</p> <p>3. Posterior roots are the processes of: a) efferent (motor) neurons; b) afferent (sensory) neurons, c) efferent (sensory) neurons, d) afferent (motor) neurons, e) efferent and afferent neurons.</p> <p>4. Anterior roots are the processes of: a) efferent (motor) neurons; b) afferent (sensory) neurons, c) efferent (sensory) neurons, d) afferent (motor) neurons, e) efferent and afferent neurons.</p> <p>5. The spine has lengths of: a) 41-45 sm; b) 41-45 mm, c) 21-25 sm, d) 10-15 sm, e) 0,5-1m.</p> <p>6. What is in the spinal canal? a) joint fluid; b) spinal fluid, c) blood, d) lymph, e) interstitial fluid.</p> <p>7. A gray matter is formed by: a) bodies of neurons; b) axons, c) dendrites, d) axons and dendrites, e) bodies of neurons and dendrites.</p> <p>8. A white matter is formed by: a) bodies of neurons; b) axons, c) dendrites, d) axons and dendrites, e) bodies of neurons and dendrites.</p> <p>9. How many pairs of spinal nerves originate from the spinal cord? a) 30; b) 31, c) 32, d) 33, e) 34.</p> <p>10. Somatic nervous system is responsible for the work of: a) heart; b) stomach, c) liver, d) skeletal muscles, e) lungs.</p> <p>11. Vegetative nervous system is responsible for the work of: a) skeletal muscles; b) heart only, c) liver only, d) digestive and respiratory systems only, e) all internal organs.</p>
BASIC TERMS AND CONCEPTS	
<p>104. Central nervous system (CNS) –</p> <p>105. Dorsal (posterior) root of the spinal cord –</p> <p>106. Gray matter –</p> <p>107. Motor (descending) pathways –</p> <p>108. Nervous system –</p> <p>109. Peripheral nervous system –</p> <p>110. Sensory (ascending) pathways –</p> <p>111. Somatic nervous system –</p> <p>112. Vegetative (autonomic) nervous system –</p> <p>113. Ventral (anterior) root of spinal cord –</p> <p>114. White matter of the spinal cord –</p>	

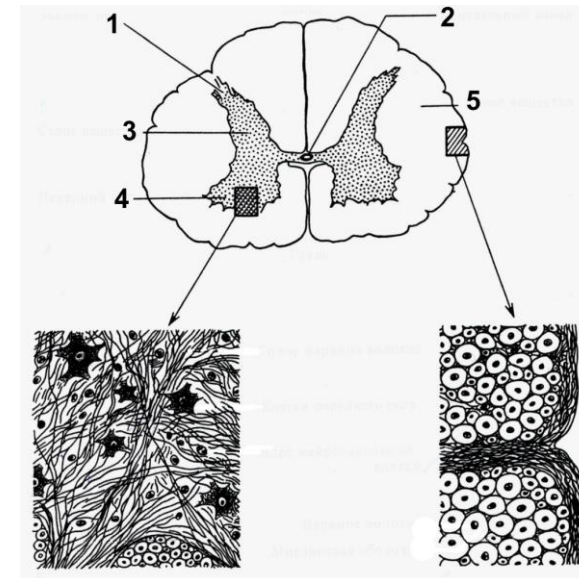
OPEN TESTS

Insert missing word or concept

1. Nervous cell is called ...
2. Neuron consists of processes and ...
3. A long process of nervous cell is called ...
4. A short process of nervous cell is called ...
5. Cinerea (gray matter) is formed by ...
6. White matter is formed by
7. Brain and spinal cord form nervous system.
8. nervous system is responsible for the work of skeletal muscles.
9. The fluid is in the spinal canal.
10. Anterior roots are the processes of ... neurons.
11. Posterior roots are the processes of ... neurons.

PRACTICAL WORK

Task 1. Make designations to the pictures: A scheme of the spinal cord (cross-section):



- dorsicornu (posterior horn);
- spinal canal;
- gray matter;
- white matter;
- ventricornu (anterior horn).

Teacher's signature

Aim of the lesson is to study structure and functions of the brain.

<p style="text-align: center;">CONTROL QUESTIONS</p>	<p style="text-align: center;">TESTS FOR SELF-CONTROL</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>115. Cerebellum –</p> <p>116. Cerebral cortex (telencephalon) –</p> <p>117. Cerebral hemispheres –</p> <p>118. Diencephalon (interbrain)–</p> <p>119. Hypothalamus –</p> <p>120. Medulla oblongata (medulla) –</p> <p>121. Midbrain (mesencephalon) –</p> <p>122. Thalamus –</p>	<ol style="list-style-type: none"> 1. How many pairs of cerebral nerves originate from the brain? a) 10; b) 11, c) 12, d) 13, e) 14. 2. Cerebral cortex contains: a) 10 million neurons; b) 10 billion neurons, c) 12 million neurons, d) 12 billion neurons, e) 14 billion neurons. 3. Diencephalon contains: a) 2 hemispheres; b) thalamus and hypothalamus, c) quadrigeminal bodies and cerebral peduncles, d) quadrigeminal bodies, e) 1 hemisphere and cerebral peduncles. 4. Midbrain contains: a) 2 hemispheres; b) thalamus and hypothalamus, c) quadrigeminal bodies and cerebral peduncles, d) thalamus, e) 1 hemisphere. 5. Cerebellum is located: a) above the midbrain; b) above the medulla, c) between forebrain and diencephalon, d) between diencephalon and midbrain, e) under the medulla. 6. Weight of the brain is: a) 1200 g; b) 1100-1200 g, c) 1200-1300 g, d) 1300-1500 g, e) 2200-2300 g. 7. Brain consists of parts: a) 3; b) 4, c) 5, d) 6, e) 7. 8. A gray substance covers following part of the brain: a) forebrain and midbrain; b) midbrain and cerebellum, c) forebrain and cerebellum, d) diencephalon, e) medulla and forebrain. 9. Area of the cerebral cortex is: a) 1500-2000 sm²; b) 2000-2500 sm², c) 3000-3500 sm², d) 3500-4000 sm², e) 4000-4500 sm². 10. A white substance covers following part of the brain: a) forebrain, midbrain and diencephalon; b) midbrain, diencephalon and medulla, c) cerebellum, d) forebrain, cerebellum, e) diencephalon, cerebellum and forebrain.

11. Medulla contains centers of regulation of: a) respiration and circulation; b) balance, c) muscular tonus, d) metabolism, body temperature, e) exocrine glands work.

12. Diencephalon contains centers of regulation of: a) respiration; b) balance, c) metabolism, body temperature, d) muscular tonus, e) circulation.

13. The thickness of the cerebral cortex is: a) 2-4 sm; b) 2-4 mm, c) 5-10 sm, d) 5-10 mm, e) 10-15 mm.

14. Subcortical centers of vision and hearing are located in: a) midbrain; b) medulla, c) diencephalon, d) cerebellum, e) forebrain.

15. Exocrine glands work is regulated by: a) diencephalon, b) forebrain, c) cerebellum, d) midbrain; e) medulla.

16. Muscular tonus is regulated by: a) midbrain; b) cerebellum, c) medulla, d) diencephalon, e) forebrain.

17. Visual area of the cerebral cortex is in the: a) frontal lobe, b) parietal lobe, c) occipital lobe, d) temporal lobe; e) central sulcus (fissure).

18. Area of skin-muscular sense is in the: a) frontal lobe, b) parietal lobe, c) occipital lobe, d) temporal lobe; e) central sulcus (fissure).

19. Hearing area of the cerebral cortex is in: a) frontal lobe, b) parietal lobe, c) occipital lobe, d) temporal lobe; e) central sulcus (fissure).

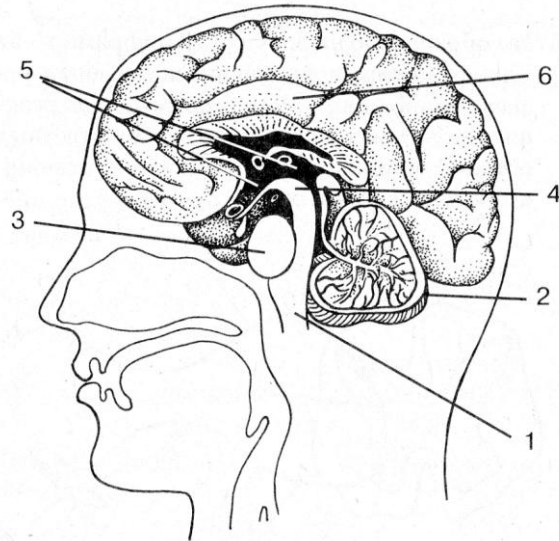
OPEN TESTS

Insert missing word or concept

1. Brain consists of anterior, middle, oblongata, posterior parts and
2. The center of respiratory regulation is in
3. Cerebellum is located above the
4. Cerebellum contains centers of regulation of balance, muscular tonus and
5. Midbrain consists of cerebral peduncles and
6. Subcortical centers of vision and hearing are located in ...
7. Thalamus and hypothalamus are the parts of
8. Main centers of sensitivity are located in
9. Metabolism and body temperature are regulated by ...

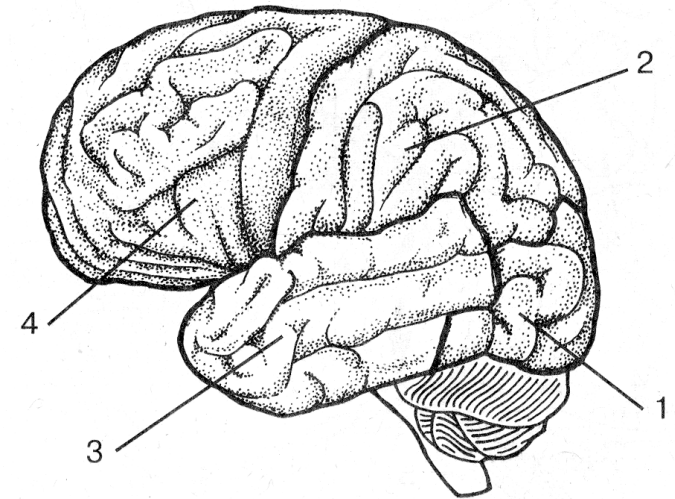
PRACTICAL WORK

Task 1. Make designations to the pictures. Sagittal section of the human brain:



- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -

Task 2. Make designations to the pictures. Lobes of the anterior part of the human brain:



- 1 -
- 2 -
- 3 -
- 4 -

Teacher's signature

Lesson 32. Topic: **SENSORY ORGANS. STRUCTURE AND FUNCTION OF THE VISUAL ORGAN**_____201____ year

Aim of the lesson is to give a concept of senses and analyzer; to study structure and functions of the visual organ.

CONTROL QUESTIONS

1. Sensory organs. Analyzers.
2. Structure and function of the visual organ.

BASIC TERMS AND CONCEPTS

123. Analyzer –

124. Blind spot –

125. Ciliary body –

126. Cornea –

127. Fibrous membrane of the eye –

128. Iris –

129. Lens –

130. Macula –

131. Photoreceptor –

132. Pupil –

133. Retina –

134. Rhodopsin –

135. Sclera –

136. Vitreous humour –

TESTS FOR SELF-CONTROL

1. **The external tunic of the eye is:** a) fibrotic tunic, b) iris, c) sclera, d) choroid; e) retina.
2. **The external tunic in anterior part of the eye forms:** a) cornea, b) iris, c) pupil, d) vitreous body; e) lens.
3. **Under the sclera is:** a) cornea, b) iris, c) choroid, d) pupil, e) retina.
4. **A vitreous body is located:** a) behind the retina, b) between lens and retina, c) between cornea and iris, d) in lens, e) in cornea.
5. **A peripheral part of analyzer consists of:** a) tracts in which impulses go from sensory organs to the brain, b) cortex, where an analysis of information takes place, c) receptors of sensory organs, d) posterior horns of spinal cord, e) anterior horns of spinal cord.
6. **A central part of analyzer is represented by:** a) cortex, b) cerebellum, c) diencephalon, d) midbrain, e) spinal cord.
7. **Pigment that colors the eye is in:** a) cornea, b) iris, c) sclera, d) retina, e) pupil.
8. **An analyzer is a system that:** a) receive information, b) transfer information, c) analyze information, d) receive and transfer information, e) receive, transfer and analyze information.
9. **The largest number of photoreceptors is in:** a) yellow spot, b) blind spot, c) choroid, d) iris, e) cornea.
10. **A sensory organ is a system that:** a) receive information, b) transfer information, c) receive and transfer information, d) analyze information, e) receive and analyze information.
11. **Visual analyzer consists of:** a) eye bulb, b) eye bulb and auxiliary apparatus, c) photoreceptors, d) photoreceptors, optic nerve and optic cortex, e) optic cortex.

OPEN TESTS

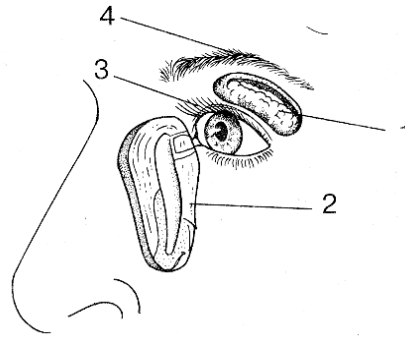
Insert missing word or concept

18. Sensory organs transfer information in the nervous system.
19. An analyzer consists of peripheral, and central parts.
20. A peripheral part of analyzer is represented by sensory organs.
21. A cortex is a part of the analyzer.
22. A cornea is a part of ... tunic of eye bulb.
23. An inner tunic of eye bulb is
24. Between lens and retina is ...
25. Visual receptors are called
26. Analysis of visual stimuli takes place in lobe of the cortex.
27. The exit site of the optic nerve is called ...
28. The spot with many visual receptors is called ...

PRACTICAL WORK

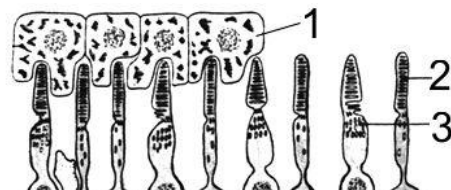
Task 1. Make designations to the pictures. Auxiliary apparatus of the visual organ:

- 1-
- 2-
- 3-
- 4-

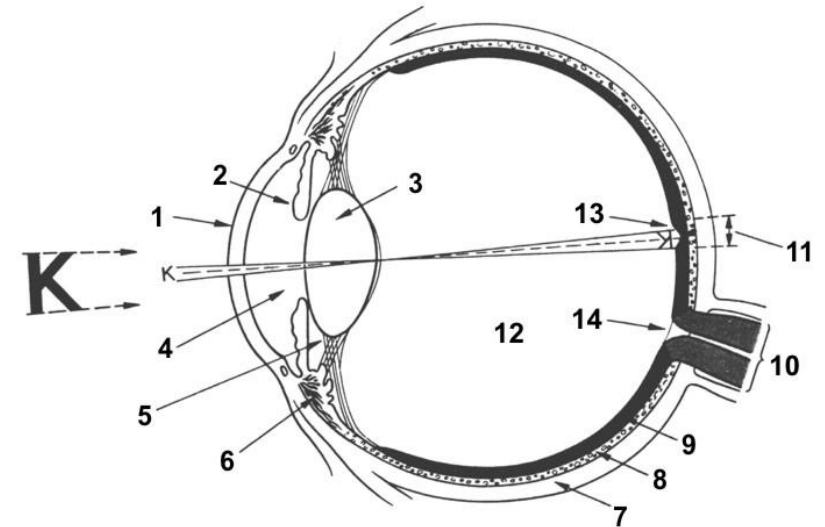


Task 2. Make designations to the pictures. A scheme of retina structure:

- pigment epithelium;
- rods;
- cones.



Task 3. Make designations to the pictures. A scheme of cross section of the right eye:



- cornea;
- anterior chamber;
- iris;
- posterior chamber;
- lens;
- ciliary muscle;

Lesson 33. Topic: **STRUCTURE AND FUNCTION OF THE HEARING (ACOUSTIC) ORGAN**_____201____ year

Aim of the lesson is to study structure and functions of the hearing (acoustic) organ.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
1. Structure and function of the external, middle and inner ear.	
<p data-bbox="497 252 862 279" style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p data-bbox="197 331 488 359">137. Auditory ossicles –</p> <p data-bbox="197 435 376 462">138. Cochlea –</p> <p data-bbox="197 539 385 566">139. Eardrum –</p> <p data-bbox="197 643 421 670">140. Endolymph –</p> <p data-bbox="197 746 474 774">141. Eustachian tube –</p> <p data-bbox="197 850 497 877">142. Hearing receptors –</p> <p data-bbox="197 954 430 981">143. Hemolymph –</p> <p data-bbox="197 1058 421 1085">144. Outer ear –</p> <p data-bbox="197 1161 430 1189">145. Perilymph –</p> <p data-bbox="197 1265 622 1292">146. Spiral organ (organ of Corti) –</p>	<p data-bbox="1182 172 2145 271">1. Vibrations of the membrane of the oval window are transmitted to the: a) drum (tympanic) membrane; b) malleus; c) incus; d) stapes; e) fluid in the cochlea.</p> <p data-bbox="1182 284 2145 422">2. The external ear consists of: a) external auditory canal (meatus) and drum (tympanic) membrane; b) external auditory canal (meatus); c) auricle and external auditory canal (meatus); d) malleus, stapes and incus; e) drum (tympanic) membrane and cochlea.</p> <p data-bbox="1182 435 2145 494">3. The inner ear is located in: a) occipital bone; b) parietal bone; c) frontal bone; d) temporal bone; e) sphenoid bone.</p> <p data-bbox="1182 507 2145 646">4. The inner ear contains: a) drum (tympanic) membrane and ear bones; b) cochlea and organ of balance (equilibration); c) auditory tube (earring trumpet) and cochlea; d) auricle and ear bones; e) organ of balance (equilibration) and ear bones.</p> <p data-bbox="1182 659 2145 718">5. The auditory tube (earring trumpet) connects nasopharynx with: a) external ear; b) middle ear; c) inner ear; d) pharynx; e) environment.</p> <p data-bbox="1182 730 2145 790">6. Vibrations of the eardrum are transmitted to the: a) stapes; b) incus; c) malleus; d) the oval window; e) fluid in the cochlea.</p> <p data-bbox="1182 802 2145 941">7. Auditory receptors receive sound vibration and transmit it through the hearing nerve to the: a) occipital lobe of the cortex; b) temporal lobe of the cortex; c) parietal lobe of the cortex; d) frontal lobe of the cortex; e) temporal and occipital lobes of the cortex.</p> <p data-bbox="1182 954 2145 1093">8. Determine the correct order of ear bones conjunction: a) malleus – incus – stapes – oval window; b) malleus – stapes – incus – oval window; c) malleus – stapes – incus – round window; d) stapes – incus – malleus – round window; e) incus – malleus – stapes – oval window.</p> <p data-bbox="1182 1106 2145 1204">9. Auditory receptors are located on the: a) basilar membrane; b) tectorial membrane; c) drum (tympanic) membrane; d) external auditory canal (meatus); e) membrane of oval window.</p> <p data-bbox="1182 1217 2145 1316">10. Fluctuation of endolymph in cochlea is transmitted to the: a) drum (tympanic) membrane; b) ear bones; c) tectorial membrane; d) membrane of oval window; e) membrane of round window.</p>

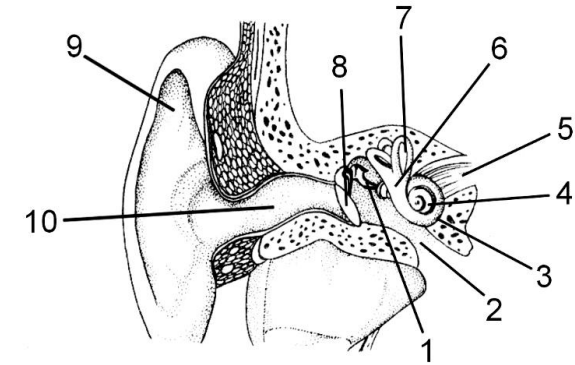
OPEN TESTS

Insert missing word or concept

1. The hearing organ consists of the external, and inner ear.
2. The length of external auditory canal (meatus) is mm.
3. Between external and middle ear is membrane.
4. The auditory tube (earing trumpet) connects the middle ear with ...
5. Ear bones (auditory ossicles) are situated at ear.
6. Membrane of the oval window (fenestra of the vestibule) connects with ear bone named
7. Auditory receptors are located on the basilar membrane of the ear.
8. Vibrations of the eardrum are transmitted to the ear bone named
9. Nerve impulses from the auditory receptors are transmitted through the auditory nerve to the lobe of the cerebral cortex.

PRACTICAL WORK

Task 1. Make designations to the picture. The scheme of structure of the hearing organ:



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Lesson 34. Topic: **REPRODUCTIVE SYSTEM. STRUCTURE AND FORMATION OF GAMETES**_____201____ year

Aim of the lesson is to study structure of reproductive organs, periods of gametes formation.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>1. Structure and function of the Male Reproductive System.</p> <p>2. Structure and function of the Female Reproductive System.</p>	<p>1. Male gonads are called: a) testis; b) fallopian tubes; c) ovaries; d) vas deferens (deferent duct); e) ejaculator duct.</p> <p>2. What are produced in testes: a) male hormones only; b) male gametes (sperm) only; c) male and female hormones; d) female gametes (eggs); e) male hormones and gametes.</p>
<p>3. Formation of gametes.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>147. Fertilization –</p> <p>148. Gametogenesis –</p> <p>149. Gonad –</p> <p>150. Oogenesis (ovogenesis) –</p> <p>151. Ovary–</p> <p>152. Sperm –</p> <p>153. Testicle –</p> <p>154. Uterus –</p>	<p>3. Female gonads are called: a) ovaries; b) fallopian tubes; c) testis; d) vas deferens; e) uterus.</p> <p>4. Female hormones are produced in: a) fallopian tubes; b) ovaries; c) testis; d) uterus; e) vas deferens.</p> <p>5. A nucleus of spermatozoon has set of chromosomes: a) haploid; b) diploid; c) triploid; d) tetraploid; e) polyploid.</p> <p>6. During the proliferative (reproductive) period cells: a) are divided by mitosis; b) increase in size; c) are divided by meiosis; d) produce gametes of a certain shape; e) are divided by amitosis.</p> <p>7. During the period of growth cells: a) are divided by mitosis; b) increase in size; c) are divided by meiosis; d) produce gametes of a certain shape; e) are divided by amitosis.</p> <p>8. During the period of maturation cells: a) are divided by mitosis; b) increase in size; c) are divided by meiosis; d) produce gametes of a certain shape; e) are divided by amitosis.</p> <p>9. During the period of formation cells: a) are divided by mitosis; b) increase in size; c) are divided by meiosis; d) produce gametes of a certain shape; e) are divided by amitosis.</p> <p>10. A size of spermatozoon is: a) 0,5-0,7 micrometers; b) 0,5-0,7 mm; c) are 1-2 micrometers; d) 2-2,5 mm; e) 1-2 mm.</p> <p>11. A head of sperm contains: a) nucleus only; b) nucleus and Golgi complex; c) centrosome; d) mitochondria; e) centrosome and nucleus.</p> <p>12. A cervix of sperm contains: a) centrosome and mitochondria; b) nucleus; c) Golgi complex and mitochondria; d) Golgi complex; e) mitochondria.</p> <p>13. Embryo develops in: a) ovaries; b) fallopian tubes; c) uterus; d) testis; e) vas deferens.</p>

OPEN TESTS

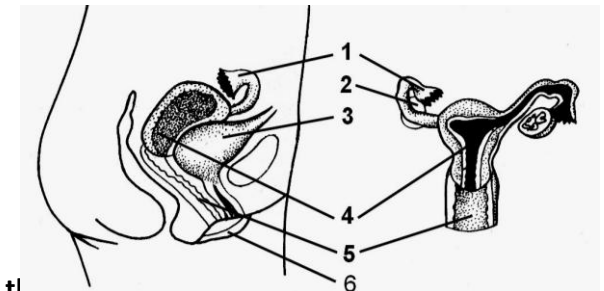
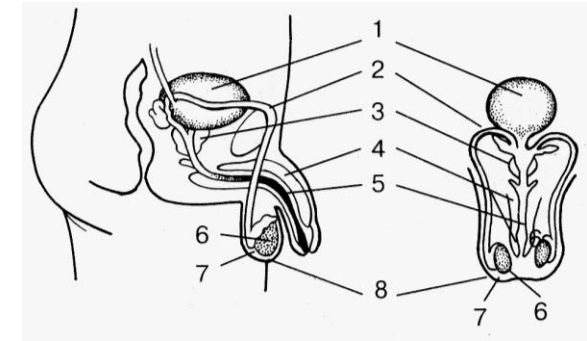
Insert missing word or concept

1. Female gonads are called
2. Female gametes are called
3. Female gametes are formed in
4. Male gonads are called
5. Male hormones are produced in
6. Spermatozoon consists of a head, and tail.
7. A head of spermatozoon contains nucleus and
8. The male reproductive System consists of testes,, ejaculatory duct and penis.
9. The process of gametogenesis is called
10. A zygote is produced in the result of ...
11. An embryo develops in

PRACTICAL WORK

Task 1. Make designations to the pictures. Structure of the male reproductive system:

- bladder
- urethra
- scrotum
- prostate
- vas deferens
- testes
- penis
- epididymis.



Task 2. Make designations to the pictures. Structure of the female reproductive system:

- vagina,
- bladder,
- ovaries,
- labia,
- uterus,
- fallopian tubes.

Lesson 35. Topic: **SUMMARY LESSON IN THE CHAPTER «PEOPLE AND HEALTH»**" ___ " _____ 201___ year

Aim of the lesson is to estimate the knowledge level of elaborated topics.

CONTROL QUESTIONS

1. Anatomy, physiology and hygiene are sciences that deal with a structure and functions of human body and conditions of health maintenance.
2. Tissues: epithelial, muscular, nervous, connective.
3. Human's organs and systems of organs.
4. A structure and growth of bones.
5. Conjunction of bones: immovable, freely movable.
6. Freely movable conjunction of bones.
7. Parts of the human skeleton (the head, the trunk, extremities and their girdles).
8. Functions of the human skeleton.
9. Skeletal and smooth muscles.
10. Skeletal muscles, their structure and functions.
11. Nervous control of muscles.
12. Functions of muscular system.
13. An internal environment of the body: interstitial fluid, lymph, blood.
14. Blood composition: plasma, blood corpuscles- red blood cells, white blood cells, platelets, their structure and functions.
15. Functions of blood.
16. A circulatory system. A heart, its structure and functioning.
17. Nervous and humoral control of action of the heart.
18. Structure of vessels (arteries, veins, capillaries).
19. Sanguimotion through the vessels.
20. Systemic (greater) and pulmonary (lesser) circulation.
21. Importance of breathing.
22. Respiratory tract and respiratory organs, their structure and functions.
23. Structure of vocal (laryngeal) apparatus.
24. Digestive system and its parts. Digestive glands.
25. Structure of oral cavity.
26. Structure of stomach.
27. Structure of intestine.
28. Digestive enzymes and their properties. Importance of enzymes in digestion.
29. Digestion in the mouth, stomach and intestine.
30. A structure of urinary organs.
31. Nephron as a structural and functional unit of the kidney. Formation of primary and secondary urine.
32. Functions of kidney.
33. Structure and function of the skin.
34. Functions of nervous system. Structure of neuron.
35. Structure of the spine. Functions of the spine.
36. Brain, its parts and functions. Significance of the cerebral cortex.
37. Sensory organs. Analyzers.
38. Structure and function of the visual organ.
39. Structure and function of the external, middle and inner ear.
40. Structure and function of the Male Reproductive System.
41. Structure and function of the Female Reproductive System.
42. Formation of gametes.

Aim of the lesson is to study the general characteristics, structure and life processes of bacteria.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none"> 1. The living conditions and the spread of bacteria. 2. Structure of the bacterial cell. 3. Processes in bacterial cells. 4. The role of bacteria in nature. 	<ol style="list-style-type: none"> 7. Chemosynthetic bacteria – 8. Pathogenic bacteria – 9. Bacterial capsule –
<ol style="list-style-type: none"> 5. Pathogenic bacteria and methods of dealing with them. <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <ol style="list-style-type: none"> 1. Bacteria – 2. Aerobic bacteria – 3. Anaerobic bacteria – 4. Autotrophic bacteria – 5. Heterotrophic bacteria – 6. Photosynthetic bacteria – 	<ol style="list-style-type: none"> 10. Bacterial spore – 11. Mesosomes – 12. Nucleoid –
	<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <ol style="list-style-type: none"> 1. The sizes of bacterial cells: a) 0,2–13 mm; b) 0,2–13 microns; c) 13–20 microns; d) 13–20 mm; e) 14–15 microns. 2. The forms of bacterial cells: a) sticks, triangles; b) cocci, commas, sticks; c) spirals, triangles; d) commas, squares; e) squares, sticks. 3. Bacteria in the form of rod sare called: a) cocci; b) bacilli; c) vibrio; d) spirilla; e) vireos.

4. **Bacteria in the form of commas are called:** a) cocci; b) bacilli; c) vibrio; d) spirilla; e) vireos.
5. **Bacteria in the form of spirals are called:** a) cocci; b) bacilli; c) vibrio; d) spirilla; e) vireos.
6. **Bacterial cell is surrounded by:** a) a capsule; b) a plasmalemma; c) a cells wall; d) a plasmalemma and capsule; e) a capsule and cells wall of the plasmalemma.
7. **Nucleoid is:** a) a capsule; b) the genetic apparatus of the cell; c) a nucleotide; d) a mitochondrial DNA; e) a nuclear membrane.
8. **Mezosomes perform function(s) of:** a) moving, b) membrane-bound organelles; c) ribosomes; d) reproduction; e) a nuclear membrane.
9. **By the way of feeding (assimilation) bacteria are divided into:** a) autotrophic and heterotrophic; b) anaerobic and autotrophic; c) autotrophic and heterotrophic; d) anaerobic; e) aerobic.
10. **By the type of dissimilation, bacteria are divided into:** a) autotrophic; b) heterotrophic; c) aerobic and anaerobic; d) autotrophic and heterotrophic; e) anaerobic and heterotrophic.
11. **Bacteria multiply by:** a) dividing into two cells; b) the division into many cells; c) forming spores; d) forming spores and dividing into two cells; e) forming spores and dividing into many cells.
12. **Bacterial spores perform the functions of:** a) sexual reproduction; b) asexual reproduction; c) survival in a hostile environment; d) sexual reproduction and survival under unfavorable environmental conditions; e) asexual reproduction and survival under unfavorable environmental conditions.
13. **Parasitic bacteria cause human disease such as:** a) flu and plague; b) cholera and tuberculosis; c) sore throat and flu; d) sore throat and AIDS; e) AIDS and plague.

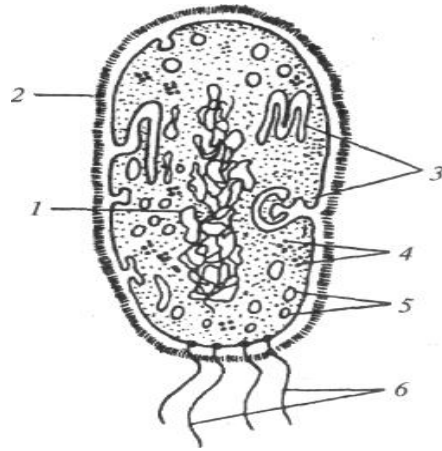
OPEN TESTS

Insert missing word or concept

1. ... are referred to prokaryotes.
2. The genetic apparatus of bacteria called ...
3. The genetic apparatus of bacteria is a circular ... molecule.
4. The functions of membrane-bound organelles in the cell of bacteria are performed by ...
5. Protein synthesis in bacteria occurs on ...
6. Lactic acid bacteria are ... by the type of assimilation.
7. Anaerobic bacteria live in ...
8. According to the type of dissimilation bacteria are ... and ...
9. Bacteria multiply by ...
10. Under unfavorable conditions bacteria form ...
11. Bacteria that cause human disease are called ...
12. Bacteria in the form of rods are called ...
13. Bacteria in the form of commas are called ...
14. Bacteria in the form of spirals are called ...

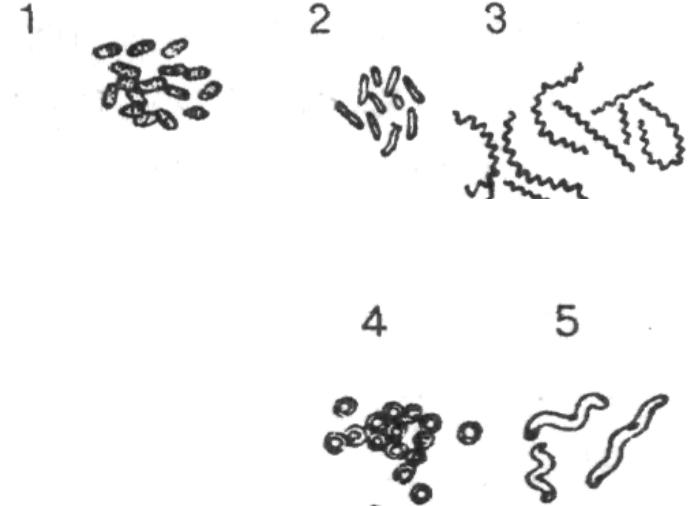
PRACTICAL WORK

Task 1. Look at pictures and make descriptions. The structure of bacterium:



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Task 2. Look at pictures and make descriptions. Forms of the bacterial cells:



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- 5 -

Teacher's signature

Aim of the lesson is to learn the structure and life processes of protists.

<p style="text-align: center;">CONTROL QUESTIONS</p> <p>1. Free-living protists: amoeba, euglena, ciliate.</p> <p>2. Features of the structure and life processes.</p>	<p>8. Taxis –</p> <p>9. <u>Ectoplasm</u> –</p> <p>10. <u>Endoplasm</u> –</p>
<p>3. Characteristics of parasitic protists.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>1. Contractile vacuole –</p> <p>2. Digestive vacuole –</p> <p>3. Pellicle –</p> <p>4. Pseudopodia, flagella, cilia –</p> <p>5. Conjugation of ciliates –</p> <p>6. Anal pore –</p> <p>7. Cyst –</p>	<p>11. Macronucleus –</p> <p>12. Micronucleus –</p> <p>13. Schizogony –</p> <p>14. Malaria –</p> <p>15. Giardiasis –</p> <p>16. Amoebic dysentery –</p> <p>17. Diagnostics –</p> <p>18. Fever –</p>

TESTS FOR SELF-CONTROL

- 1. Heterotrophs are:** a) amoebas; b) amoebas and ciliates; c) amoebas and euglenoids; d) euglenoids and ciliates; e) ciliates.
- 2. Paramecium caudatum does not have:** a) nuclei; b) pigment chlorophyll; c) digestive vacuoles; d) contractile vacuoles; e) pellicle.
- 3. Euglena does not have:** a) nuclei; b) pigment chlorophyll; c) digestive vacuoles; d) anal pore; e) contractile vacuoles.
- 4. The protist that has macronucleus:** a) amoebas; b) euglenoids; c) ciliates; d) Giardia; e) Malaria parasite.
- 5. Conjugation is:** a) cell division in two parts; b) cell division into many parts; c) the sexual process; d) the form of irritability; e) the allocation of liquid products of metabolism.
- 6. Updating the genetic information in protists occurs during:** a) copulation; b) conjugation; c) asexual reproduction; d) nutrition; e) breathing.
- 7. Remains of food are thrown in Paramecium caudatum through:** a) anal pore; b) contractile vacuoles; c) body surface; d) digestive vacuoles; e) cell mouth.
- 8. Protists form cysts for:** a) feeding; b) breathing; c) surviving; d) conjugation; e) movement.
- 9. Parasitic protists do not have:** a) nucleus; b) contractile vacuoles; c) mitochondria; d) digestive vacuoles; e) ribosome.
- 10. Symptoms of amoebic dysentery:** a) injury of skeletal muscle; b) destruction of the intestinal wall, loose stools with blood; c) the destruction of red blood cells, fever; d) destruction of liver cells, loose stools; e) inflammation of the gallbladder and duodenum.
- 11. Human infection with malaria occurs by:** a) eating fruits and vegetables with the cysts of the parasite; b) drinking water with parasites; c) the bite of the female Anopheles mosquito; d) eating poorly thermally processed beef; e) poor personal hygiene.

- 12. Phyla in kingdom protists:** a) Sarcomastigophora, Ciliophora, Flukes; b) Apicomplexa, Arthropoda; c) Sarcomastigophora, Chordata; d) Ciliophora, Sarcomastigophora, Apicomplexa; e) Round worms, Ciliophora.
- 13. Malaria parasite is a representative of type:** a) Sarcomastigophora; b) Ciliophora; c) Apicomplexa; d) Arthropoda; e) Chordata.
- 14. Euglena is a representative of type:** a) Sarcomastigophora; b) Ciliophora; c) Apicomplexa; d) Arthropoda; e) Chordata.
- 15. Protists that have changeable body shape:** a) euglenoids, amoebas; b) ciliates; c) amoebas, Giardia; d) euglenoids, ciliates; e) amoebas.
- 16. Protists that have constant body shape:** a) euglenoids, amoebas; b) ciliates, euglenoids; c) amoebas, Giardia; d) amoebas; e) ciliates, amoebas.
- 17. Locomotion organelles in Euglena:** a) pseudopodia; b) cilia; c) flagella and cilia; d) pseudopodia and cilia; e) flagellum.
- 18. Protists that have the green pigment chlorophyll:** a) ciliates; b) euglenoids; c) amoebas; d) ciliates and euglenoids; e) amoebas and euglenoids.

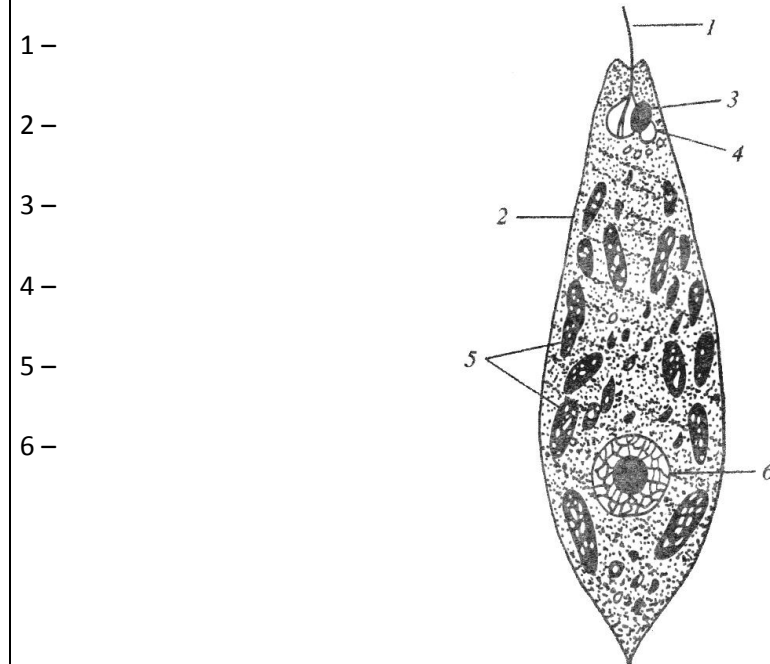
OPEN TESTS

Insert missing word or concept

1. The form of irritability of protists is called ...
2. The response of protists to various external influences is called
3. Among the representatives of protists ... has two nucleus.
4. Generative nucleus of the ciliate is called ...
5. Vegetative nucleus of the ciliate is called ...
6. Methods for determination of disease or parasite are called ...
7. Ciliate remove leftover food through the special hole ...
8. ... is an example of auto heterotrophic protist.
9. Euglena is by the type of feeding ...
10. During an asexual reproduction nucleus divides ...
11. When environmental conditions are changing protists form ...
12. The person or an animal in which organism parasite is living called ...
13. Stage of development of dysentery amoeba that infects a person called ...
14. An asexual reproduction of protists, in which the body is divided into many parts, called ...

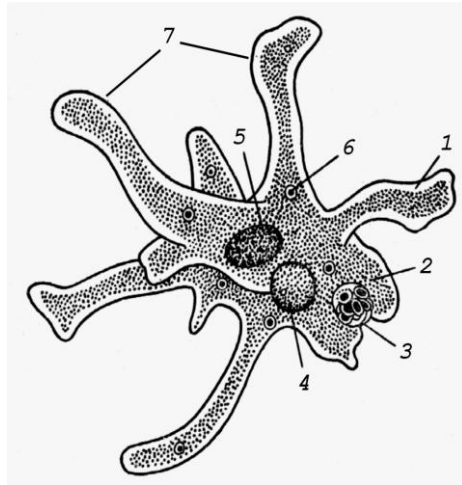
PRACTICAL WORK

Task 1. Look at pictures and make descriptions. Euglena:



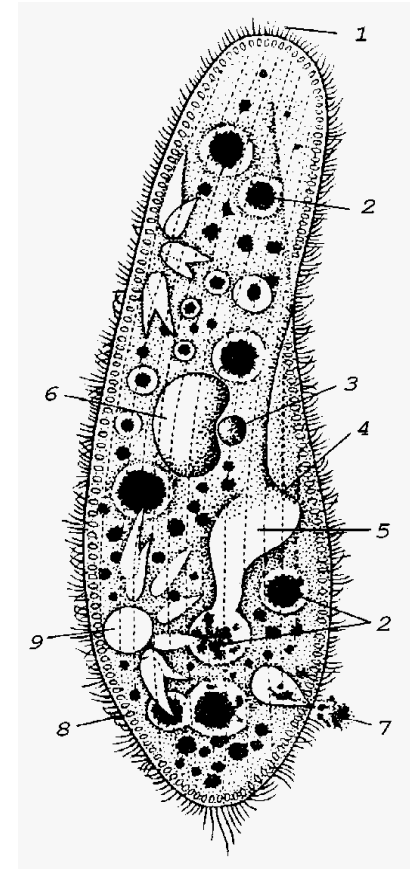
Task 2. Look at pictures and make descriptions. Amoeba:

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Task 3. Look at pictures and make descriptions. Ciliate:

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Teacher's signature

Lesson 38. Topic: CHARACTERISTICS OF PHYLUM PLATYHELMINTHES (THE FLATWORMS) "___" _____201 r

Aim of the lesson is to consider the characteristics of flatworms. Examine their external and internal structure and features of development.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none">1. General characteristics of the phylum flatworms.2. Systematics of phylum flatworms.3. Features of the structure and processes of life of flatworms.	<p>25.Parasite –</p> <p>26.Cycle of development of the parasite –</p> <p>27.Hermaphrodite –</p>
<p>4. Medical value.</p> <p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>19.Bilateral symmetry –</p> <p>20.Dermato-muscular sac –</p> <p>21.Germ layer (ectoderm, endoderm and mesoderm) –</p> <p>22.Parenchyma –</p> <p>23.Protonephridium –</p> <p>24.Sucker –</p>	

TESTS FOR SELF-CONTROL

- 1. The number of layers of dermato-muscular sac of flatworms:** a) one; b) two; c) three; d) four; e) five.
- 2. The body cavity of flatworms:** a) primary; b) secondary; c) mixed; d) the space between organs is filled with parenchyma cells; e) tertiary.
- 3. Organs of flatworms develop from germ layers:** a) ectoderm; b) ectoderm and endoderm; c) endoderm; d) endoderm and mesoderm; e) ectoderm, endoderm and mesoderm.
- 4. Flatworms have no system(s):** a) digestive; b) circulatory; c) reproductive; d) nervous; e) excretory.
- 5. Features of the digestive system of flatworms:** a) frontgut, midgut and excretory pore; b) frontgut, midgut, hindgut, excretory pore is absence; c) frontgut, midgut, hindgut and rectum; d) frontgut, midgut, excretory pore is absent; e) midgut and hindgut, excretory pore is absent.
- 6. The excretory system of flatworms is represented by:** a) metanephridia; b) Malpighian tubules; c) kidneys; d) protonephridia; e) nephridia.
- 7. The nervous system of flatworms is represented by:** a) cerebral ganglia and ventral nerve cord; b) cerebral ganglia and nerve trunks; c) the brain and spinal cord; d) the brain; e) star-shaped cells.
- 8. Flatworms have organs sensitive to:** a) touch and hearing; b) chemical and olfactory senses; c) sight and hearing; d) sight, touch and chemical senses; e) hearing and smell.
- 9. There are following classes of phylum platyhelminths:** a) Arachnids and Flukes; b) Turbellaria and Tapeworms; c) Crustaceans and Turbellaria; d) Turbellaria, Flukes and Tapeworms; e) Amphibians and Tapeworms.

OPEN TESTS

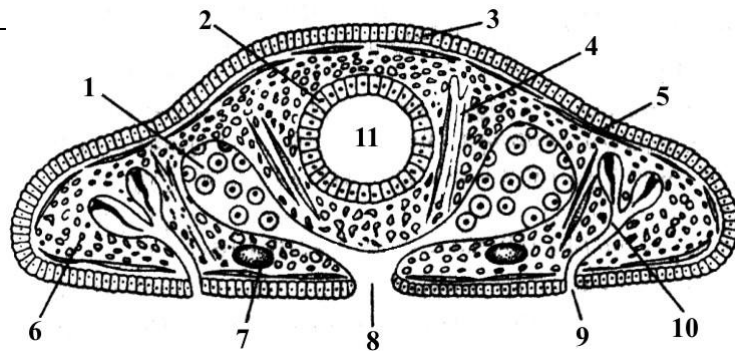
Insert missing word or concept

1. There are following classes of phylum flatworms: Roundworms, ... and Tapeworms.
2. The type of excretory system of flatworms is
3. Flatworms have digestive, excretory, ... and nervous system.
4. The dermato-muscular sac of flatworms consist of 3 layers of smooth muscles: ring, diagonal and
5. The space between organs is filled with ...
6. ... gut is missing in the digestive system of flatworms.
7. ... an organ able to turn out through the mouth.
8. ... trunks are mostly developed in the nervous system of flatworms, extend along the body.
9. In the anterior part of the digestive system planarian has a
10. Planarians are characterized by ... development. Young planarians leave eggs, which are postponed, in cocoons.

PRACTICAL WORK

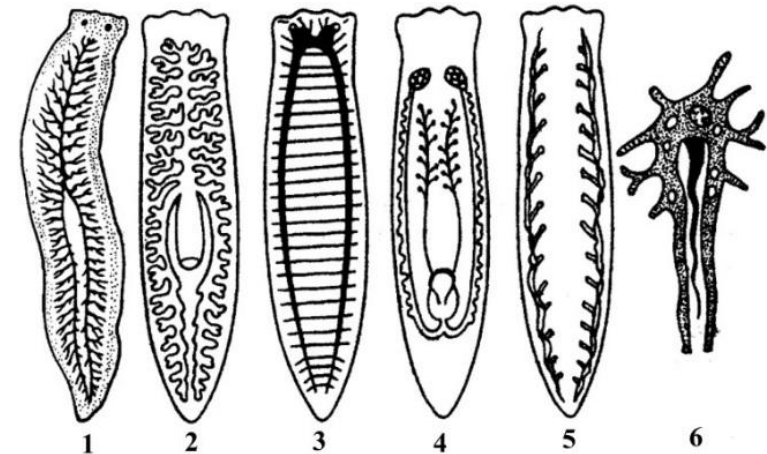
Task 1. Look at pictures and make descriptions. Cross-section of a body of a flatworm:

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Task 2. Look at pictures and make descriptions. Organ systems of planarian:

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Teacher's signature

Aim of the lesson is to consider the characteristics of the class. The liver fluke as an example. Explore the structure and development of the parasites.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none"> 1. Features of the external and internal structure of the liver fluke. 2. Features of the life cycle of the liver fluke. 3. Prevention of the fascioliasis. 	<p>35. Cercariae –</p> <p>36. Fascioliasis –</p> <p>37. Adolescaria –</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>28. Cuticle –</p> <p>29. Helminths –</p> <p>30. Helminthiasis (helminth infection) –</p> <p>31. Host of a parasite –</p> <p>32. Main host –</p> <p>33. Intermediate host –</p> <p>34. Miracidium –</p>	<p>38. Prophylaxis (prevention) –</p> <p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <ol style="list-style-type: none"> 1. Fasciola hepatica can reach in length: a) 3–5 mm; b) 3–5 cm; c) 1–2 cm; d) 6–10 cm; e) 10–12 mm. 2. Fasciola hepatica parasitize in: a) small intestine; b) large intestine; c) passages of the liver; d) lungs; e) skeletal muscles. 3. The outer layer of dermato-muscular sac of flukes is: a) ciliated epithelium; b) cuticle; c) hypodermis; d) epidermis; e) derm. 4. The main host of a liver fluke is (are): a) only human; b) human and cattle; c) only cattle; d) cats; e) snails. 5. The intermediate host of a liver fluke is (are): a) only human; b) human and cattle; c) only cattle; d) cats; e) snails. 6. Larva of a liver fluke, that is formed in water from an egg is called: a) cercariae; b) oncosphere; c) finn; d) miracidia; e) redia. 7. The human can get fascioliasis by: a) eating poorly thermally processed beef; b) swallowing adolescaria with water; c) eating poorly thermally processed pork; d) eating dirty vegetables and fruits; e) eating poorly thermally processed fish.

8. Basic characteristics of fascioliasis: a) destruction of the liver ducts and tissue; b) destruction of lung tissue; c) destruction of muscle tissue; d) destruction of the intestinal mucosa; e) pneumonia.

9. Features of reproduction and development of parasitic flatworms: a) complex life cycles with the change of owners, direct development; b) life cycles without changing owners, direct development; c) life cycles without changing owners, the development with a metamorphosis; d) complex life cycles, the development with a metamorphosis; e) asexual reproduction,

direct development.

OPEN TESTS

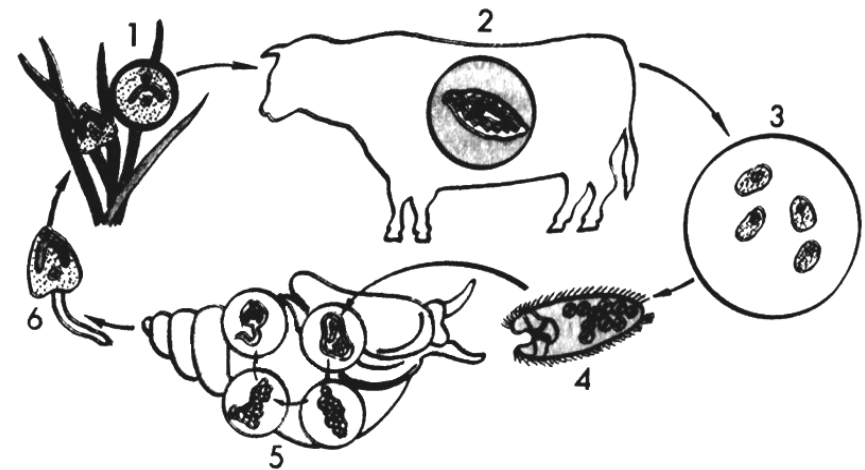
Insert missing word or concept

1. The shape of the body of the liver fluke ...
2. In the body of the main host liver fluke is fixed by ...
3. The outer layer of skin-muscular sac of flukes is called ...
4. The body in which the mature form of the parasite lives, is called ...
5. The larva with cilia, which comes out of the egg in the water, is called ...
6. The body, in which the asexual reproduction of the parasite attends, is called ...
7. The intermediate host of the liver fluke is ...
8. The disease that is caused by the liver flukes, is called ...
9. The methods of protection against parasites - are ...

PRACTICAL WORK

Task 1. Look at pictures and make descriptions. The life cycle of *Fasciola hepatica*:

- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -



Teacher's signature

Lesson 40. Topic: **CHARACTERISTICS OF CLASS TAPEWORMS (CESTODA).** "___" _____201 r

Aim of the lesson is to consider the characteristics of tapeworms. Explore the features of the structure and life cycle of the beef tapeworm.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>BASIC TERMS AND CONCEPTS</p> <p>39. Scolex –</p> <p>40. Neck –</p> <p>41. Microvilli –</p> <p>42. Immature segments (proglottids) –</p> <p>43. Mature segments (proglottids) –</p> <p>44. Oncosphere –</p> <p>45. Finn –</p> <p>46. Cestodosis –</p>	<p>1. The body of tapeworms consist of: a) scolex, neck, tail; b) body and tail; c) scolex, neck, and strobila; d) scolex and strobila; e) scolex, body, tail.</p> <p>2. Tapeworms have special organs of attachment to the body of the host: a) cuticular lips; b) oral and ventral suckers; c) teeth; d) suckers and hooks; e) only hooks.</p> <p>3. The sizes of the beef tapeworm are: a) 5 m; b) 10 m; c) 10 cm; d) 3–5 cm; e) 1–2 m.</p> <p>4. The beef tapeworm parasitize in human in: a) intestine; b) liver; c) liver ducts; d) lungs; e) skeletal muscles.</p> <p>5. The scolex of beef tapeworm has: a) two suckers and hooks; b) three suckers; c) three suckers and hooks; d) four suckers and hooks; e) four suckers.</p> <p>6. Hermaphroditic segments of tapeworms are located: a) in front of the body; b) in the middle of the body; c) in the rear part of the body; d) in the front and middle of the body; e) in the middle and at the end of the body.</p> <p>7. Mature segments of tapeworms are located: a) in front of the body; b) in the middle of the body; c) in the rear part of the body; d) in the front and middle of the body; e) in the middle and at the end of the body.</p> <p>8. Mature segments contain: a) female reproductive system; b) male reproductive system; c) male and female reproductive system; d) uterus with eggs; e) all organ systems, except reproductive.</p> <p>9. The intermediate host of the beef tapeworm is (are): a) snail; b) cattle; c) human; d) pig; e) cattle and human.</p> <p>10. The main host of the beef tapeworm is (are): a) snail; b) cattle; c) human; d) pig; e) cattle and human.</p>

11. The correct sequence of stages in the life cycle of the beef tapeworm: a) egg – finn – oncosphere – adult tapeworm; b) oncosphere – finn – adult tapeworm; c) egg – oncosphere – finn – adult tapeworm; d) finn – egg – oncosphere – adult tapeworm; e) egg – miracidia – finn – adult tapeworm.

OPEN TESTS

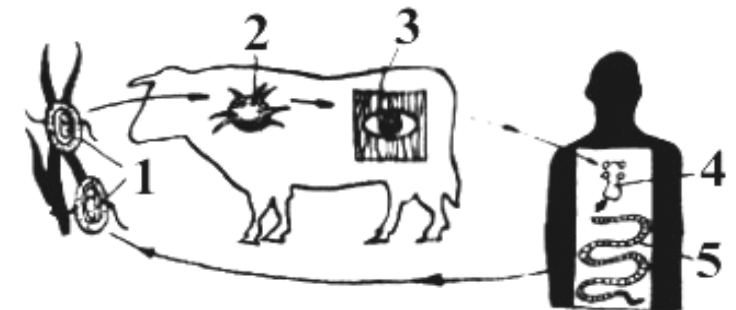
Insert missing word or concept

1. The body of tapeworms consists of: scolex, neck, and
2. Tapeworms have special organs of attachment to the body of the host: suckers and ...
3. Zone of growth of tapeworms is ...
4. In the ... part of the body of beef tapeworm each segment is hermaphroditic.
5. Segments of the ... part of the body are mature.
6. ... segments contain uterus with a large amount of eggs.
7. The main host of the beef tapeworm is...
8. From the egg of the beef tapeworm develops larva, called ...
9. The larva, which enters the body and infects it, is called ...

PRACTICAL WORK

Task 1. Look at pictures and make descriptions. The life cycle of *Taeniarhynchus saginata*:

- 1 –
- 2 –
- 3 –
- 4 –
- 5 –



Teacher's signature

Aim of the lesson is to consider the characteristics of roundworms. Explore the features of the structure and life cycle of Ascaris.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<ol style="list-style-type: none"> 1. General characteristics of the phylum roundworms. 2. Structure and vital processes of ascaris. 3. The life cycle of the roundworm. 4. Prevention of ascariasis. 	<ol style="list-style-type: none"> 1. Roundworms are: a) only free-living; b) only parasites; c) free-living and plants parasites; d) free-living and animal parasites; e) free-living and plants and animal parasites. 2. The dermato-muscular sac contains: a) only cuticle; b) only hypodermis; c) cuticle and a single layer of muscle cells; d) hypodermis and a two layers of muscle cells; e) cuticle, hypodermis and a single layer of muscle cells. 3. The hypodermis is a tissue: a) epithelial; b) muscle; c) connective; d) nervous; e) muscle, covered with epithelial. 4. The body cavity of roundworms: a) primary; b) secondary; c) mixed; d) the space between organs is filled with parenchyma cells; e) tertiary. 5. The digestive system contains: a) oral sucker; b) stomach; c) mouth and anus; d) mouth and stomach; e) liver. 6. The excretory system of roundworms is represented by: a) skin glands; b) star-shaped cells with cilia; c) nephridia; d) kidneys; e) coxal glands. 7. The nervous system of roundworms consists of: a) star-shaped cells of hypodermis; b) ventral nerve cord; c) circular nerve ring surrounding the pharynx and nerve trunks; d) brain; e) brain and spinal cord. 8. The circulatory system of roundworms: a) has a tubular heart on the dorsal side; b) has a tubular heart on the ventral side; c) is missing; d) has sacciform heart; e) has a two-chambered heart.
BASIC TERMS AND CONCEPTS	
<p>47. Bulbus –</p> <p>48. Primary body cavity –</p> <p>49. Hypodermis (hypoderm) –</p> <p>50. Dimorphism sexual –</p> <p>51. Nematodosis (nematode infection) –</p> <p>52. Ascariasis –</p>	

9. Terms and conditions of development of Ascaris eggs: a) soil temperature 25 ° C, humidity; b) the human body; c) water, temperature 15 ° C; d) humidity, temperature -10 ° C; e) soil, humidity, temperature 0°C.

10. Determine the migration path of roundworm larvae in the human body: a) mouth - gut - blood - heart - liver - lungs - bronchi - trachea - mouth - intestine; b) mouth - blood - liver - heart - lungs - larynx - throat - intestine; c) mouth - throat - blood - lungs - bronchi - trachea - mouth - intestine; d) mouth - intestine - blood - liver - heart - lungs - bronchi - trachea - mouth - intestine; e) mouth - intestine - blood - lungs - trachea - throat - intestine.

11. Prevention of ascariasis is: a) personal hygiene, eating pure fruits and vegetables; b) eating a well-thermally treated pork; c) eating a well heat-treated beef; d) eating a well-processed fish; e) eating washed vegetables, fruits and good heat-treated pork and beef.

OPEN TESTS

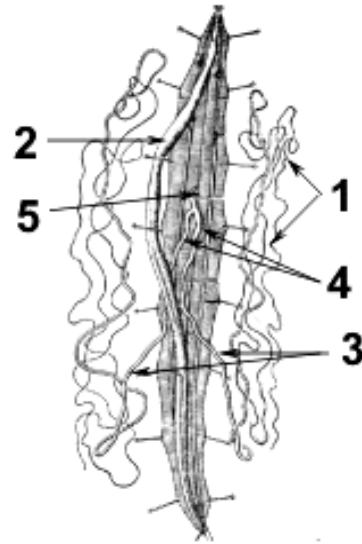
Insert missing word or concept

1. The dermato-muscular sac of roundworms contains one layer of ... muscles.
2. The outer layer of the dermato-muscular sac of ascaris is called ...
3. The body cavity of roundworms is ...
4. ... intestine appears in the digestive system of roundworms for the first time.
5. The excretory system of roundworms is represented by glands.
6. The female ascaris can reach ... cm in length.
7. The larva becomes an adult ascaris in the human gut in ...
8. Ascaris causes human disease called ...
9. The larva of ascaris parasitize in ...
10. An adult ascaris parasitize in ...
11. Diseases caused by roundworms are called ...
12. Undigested food is removed through the ...

PRACTICAL WORK

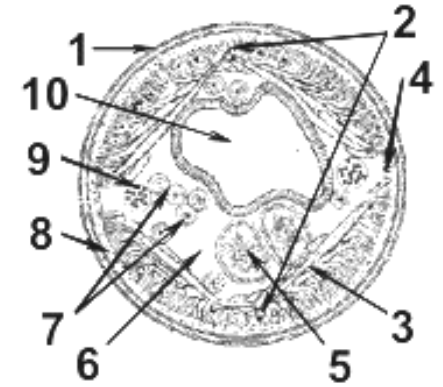
Task 1. Look at pictures and make descriptions. Autopsied female ascaris:

- ovaries,
- oviducts,
- uteri,
- vagina,
- gut.



Task 2. Look at pictures and make descriptions. Cross section of ascaris:

- cuticle,
- nerve trunks,
- muscle cells,
- channel of excretory system,
- uterus,
- primary body cavity,
- ovaries,
- hypodermis,
- oviducts,
- gut



Teacher's signature

Aim of the lesson is to study general characteristics of the phylum Arthropoda and features of structure and vital processes of its representatives.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none"> 1. General characteristics of phylum Arthropoda. 2. Systematic of the phylum. 3. Features of arthropod structure and vital activity. 	<p>57. Molting –</p> <p>58. Mixocoel –</p> <p>59. Incomplete metamorphosis –</p> <p>60. Complete metamorphosis –</p> <p>61. Metamorphosis –</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>53. Cephalothorax –</p> <p>54. Chitin –</p> <p>55. Coxal glands –</p> <p>56. Gills –</p>	<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <ol style="list-style-type: none"> 1. Classes of Phylum Arthropoda are: a) Crustaceans, Insects, Arachnids; b) Ticks; c) Scorpions; d) Beetles; e) Beetles and Ticks. 2. Limbs of arthropods do not perform functions of: a) flying; b) locomotion; c) griping of food; d) protection from other animals; e) sensory. 3. The body wall of arthropods is formed from: a) hypoderm; b) a skinny-muscular sac; c) chitin; d) skin; e) epithelium covered with cilia.

4. **The body cavity of arthropods is:** a) absent; b) primary; c) secondary; d) tertiary; e) mixed.
5. **Functions of arthropod's chitin are:** a) respiration; b) sensory; c) digestion; d) protection and exoskeleton functions; e) protection only.
6. **The digestive system of arthropods is represented by:** a) foregut and midgut; b) Malpighian tubules; c) hindgut; d) foregut and digestive glands; e) foregut, midgut, hindgut and digestive glands.
7. **Excretory organs of arthropods are:** a) metanephridia; b) protonephridia; c) skin glands and Malpighian tubules; d) skin glands only; e) Malpighian tubules only.
8. **Features of the circulatory system of arthropods are:** a) closed, the heart is at the dorsal side; b) open, the heart is at the dorsal side; c) open, the heart is at the ventral side; d) arthropods do not have the heart; e) closed, the heart is at the ventral side.
9. **Respiratory organs of arthropods are:** a) book lungs only; b) gills only; c) Malpighian tubules; d) book lungs, gills and tracheae; e) bronchi.
10. **The nervous system of arthropods is represented by:** a) the neural tube that is at the dorsal side; b) the ventral nerve chord; c) lengthwise nerve trunks; d) the brain and the spinal cord; e) the neural tube that is on the ventral side.

OPEN TESTS

Insert missing word or concept

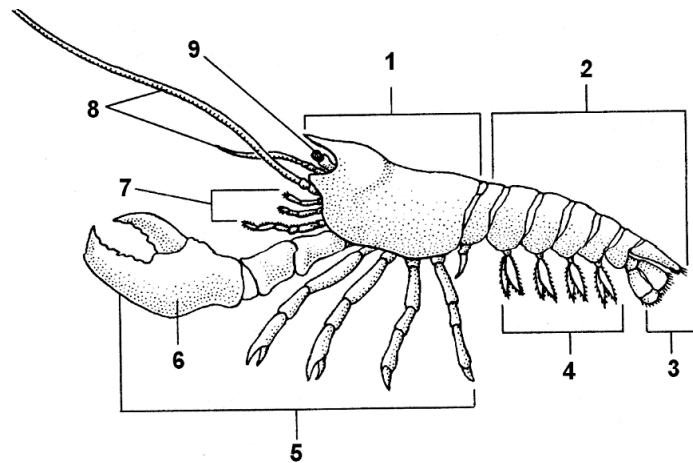
1. The excretory system of arthropods is represented by coxal glands and ...
2. Arthropods grow in some of ...

3. Body portions of arthropods are head, thorax and ...
4. Bodies of arthropods are covered with organic compound – ...
5. The body cavity of arthropods is ...
6. The digestive system of arthropods includes foregut, ... and hindgut.
7. Hearts of arthropods are located at the ... side of the body.
8. Blood of arthropods is colorless, red or ...
9. Respiratory organs of water arthropods are ...
10. The nervous system of arthropods includes head ganglion ... nerve ring and ... nerve cord.
11. Visual difference between individuals of different sex of one species is called sex ...
12. If arthropod undergoes egg and larval stage its development goes with ...
13. Spiders belong to the class ...
14. Crawfishes belong to the class ...

PRACTICAL WORK

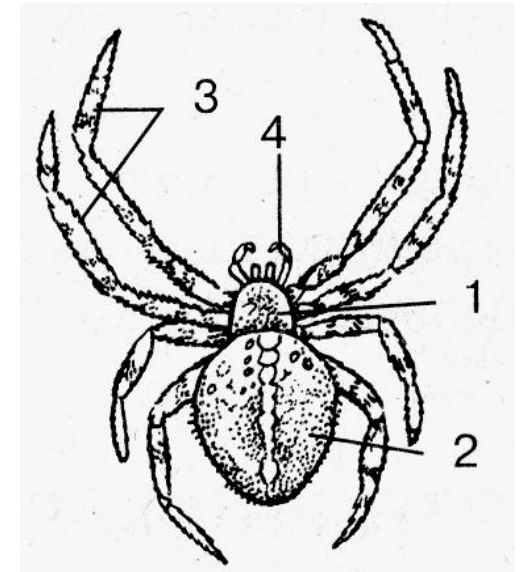
Task 1. Look at pictures and make descriptions. Morphology of a European crawfish:

- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -
- 7 -
- 8 -
- 9 -



Task 2. Look at pictures and make descriptions. Morphology of a spider:

- 1 -
- 2 -
- 3 -
- 4 -



Teacher's signature

Lesson 43. Topic: CHARACTERISTICS OF CLASS ARACHNIDA. "___" _____201 r

Aim of the lesson is to consider general characteristics of the class Arachnida; to study features of structure, vital activity and reproduction of it's representatives.

<p style="text-align: center;">CONTROL QUESTIONS</p> <ol style="list-style-type: none"> 1. General characteristics of the class. 2. Features of structure and vital processes that are linked with terrestrial way of living. 3. Features of the structure and vital processes of ticks. 4. Ticks as transmitters and causative agents of diseases. 5. Measures of protection from ticks. 6. Natural and medical significance of arachnids. 	<p>66. Spiracles –</p> <p>67. Ventral nerve cord –</p> <p>68. Proboscis –</p> <p>69. Scabies –</p> <p>70. Encephalitis –</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>62. Chelicerae –</p> <p>63. Pedipalps –</p> <p>64. Malpighian tubules –</p> <p>65. Tracheae –</p>	<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <ol style="list-style-type: none"> 1. Bodies of arachnids consist of: a) head and abdomen; b) thorax and abdomen; c) cephalothorax and abdomen; d) head, abdomen and tail; e) head, thorax and tail. 2. The number of pairs of appendages near the arachnid mouth is: a) two; b) three; c) four; d) five; e) six. 3. The number of walking arthropod's legs pairs is: a) two; b) three; c) four; d) five; e) six.

4. Representatives of the class Arachnoidea are: a) louse, ixodes tick; b) spider, scorpion, flea; c) spider, scorpion, argasidae tick; d) lobster, cockroach, Sarcoptes scabiei; e) Scorpio, shrimp, grasshopper.

5. Excretory organs of arachnids are: a) protonephridiae; b) coxal glands and Malpighian tubules; c) coxal glands only; d) Malpighian tubules only; e) kidneys.

6. Respiratory organs of arachnids are: a) bronchi; b) book lungs; c) gills; d) lungs and tracheae; e) the body surface.

7. Features of the circulatory system of arthropods are: a) closed, tube-shaped heart is at the dorsal side; b) open, tube-shaped heart is at the ventral side; c) open, there is no heart; d) closed, there is no heart; e) open, tube-shaped heart is at the dorsal side.

8. Arthropod's organs of vision are: a) simple eyes at the cephalothorax; b) compound eyes at the cephalothorax; c) simple eyes at the abdomen; d) compound and simple eyes; e) compound eyes at the abdomen.

9. Features of ticks are: a) the body consist of 3 portions; b) the body is not subdivided into portions, development is direct; c) the body consists of 2 portions; d) the body is not subdivided into portions, development goes with metamorphosis; e) the development is direct.

10. Ticks transmit causative agents of: a) scabies; b) encephalitis and influenza; c) encephalitis and typhus; d) scabies and typhus; e) influenza and scabies.

11. Features of the digestive system of arthropods are: a) 3 portions of gut, liver ducts are opened to the foregut; b) 2 portions of gut, liver ducts are opened to the midgut; c) 3 portions of gut, liver ducts are opened to the midgut; d) 3 portions of gut, there is no liver; e) 2 portions of gut, there is no liver.

OPEN TESTS

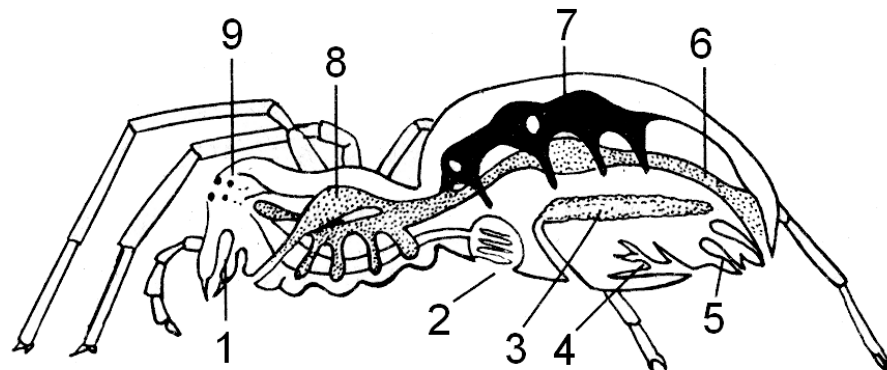
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1. Arachnids that feed by other animals are ...
2. The first pair of arachnid appendages where ducts of venom glands are opened is called ...
3. The first pair of arachnid appendages that help to hold a prey is called ...
4. The digestion that is typical for spiders is ...
5. The number of arachnid's walking legs is ...
6. Excretory organs of arachnids are Malpighian tubules and ... glands.
7. Liver ducts of spiders are opened into ... gut.
8. A heart of arachnids is ... -shaped.
9. Respiratory organs of arachnids are book lungs and ...
10. Simple eyes of arachnids are situated at ...
11. Development of spiders is ...
12. Ixodes ticks transmit causative agents of ... and ...
13. Scabies is caused by ... tick.
14. Walking legs of a spider are attached to ...

PRACTICAL WORK

Task 1. Look at pictures and make descriptions. Internal structure of a spider:

- 1 -
- 2 -
- 3 -
- 4 -
- 5 -
- 6 -
- 7 -
- 8 -
- 9 -



Teacher's signature

Aim of the lesson is to study general characteristics of insects, their structural, vital and reproduction features; to consider their development types.

<p style="text-align: center;">CONTROL QUESTIONS</p> <p>1. General characteristics and features of structure and vital activity.</p> <p>2. Reproduction and development types of insects.</p> <p>3. Significance of insects.</p>	<p>3. The number of insect's wings is: a) one pair; b) two pairs; c) one or two pairs; d) three pairs; e) two or three pairs.</p> <p>4. Legs of insects are situated: a) at the head; b) at the dorsal side of the thorax; c) at the ventral side of the thorax; d) at the dorsal side of the abdomen; e) at the ventral side of the abdomen.</p> <p>5. The number of walking legs of insects is: a) two pairs; b) three pairs; c) four pairs; d) one or two pairs; e) two or three pairs.</p> <p>6. Chewing insects are: a) beetles; b) lice; c) flies; d) fleas; e) mosquitoes.</p> <p>7. Fat body of insects is: a) digestive organ; b) organ that collect dissimilation products; c) reproductive organ; d) part of respiratory system; e) organ that store nutritive substances.</p> <p>8. Insect mouthparts consist of: a) upper and lower lips; b) upper and lower jaws; c) upper and lower lips and upper and lower jaws; d) upper jaw and lip; e) lower jaw and lip.</p> <p>9. Digestive system of an insect consists of: a) mouth, pharynx, stomach; b) mouth, esophagus, gut; c) mouth, pharynx, esophagus, gut; d) mouth, pharynx, esophagus, stomach, gut; e) mouth, stomach, gut.</p> <p>10. The respiratory system of an insect consists of: a) book lungs; b) tracheae; c) book lungs and tracheae; d) gills; e) gills and tracheae.</p> <p>11. Features of insect circulatory system are: a) the heart is at the dorsal side of the thorax, blood is colorless; b) the heart is at the dorsal side of the abdomen, blood is red; c) the heart is at the dorsal side of the abdomen, blood is colorless; d) no heart, colorless blood; e) the heart is at the abdominal side of the thorax, blood is colorless.</p> <p>12. The stage which is absent in case of incomplete metamorphosis is: a) egg; b) larva; c) pupa; d) adult; e) larva and pupa.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>71. Antennae –</p> <p>72. Fat body–</p> <p>73. Compound eye –</p> <p>74. Larva –</p> <p>75. Pupa –</p>	
<p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <p>1. Insect's body consists of: a) cephalothorax and abdomen; b) head, thorax and abdomen; c) head and abdomen; d) trunk and tail; e) head and tail.</p> <p>2. Insect's wings are situated: a) at the dorsal side of the thorax; b) at the dorsal side of the abdomen; c) at the thorax and the abdomen; d) at the ventral side of the thorax; e) at the ventral side of the abdomen.</p>	

OPEN TESTS

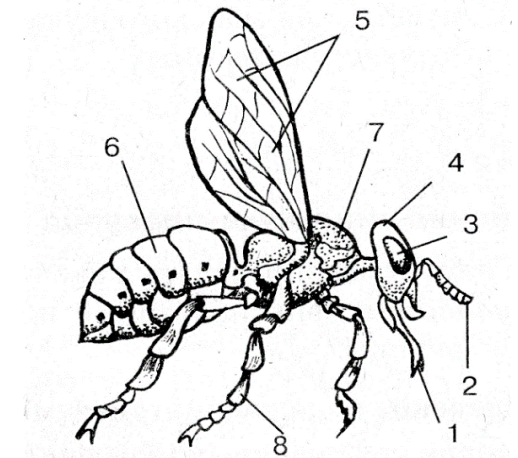
Insert missing word or concept

1. The number of insect's walking legs is ... pairs.
2. Mouthparts type of beetles is ...
3. The main excretory organ of insects is ...
4. Respiratory organs of insects are ...
5. Wings of insects are situated at the dorsal side of ...
6. Parasitic insects which don't have wings are fleas and ...
7. Digestion and absorption of nutrients takes place in ...
8. Insect blood is named ...
9. ... is responsible for complex behavior of insects.
10. A heart of an insect is situated at the ... side of the abdomen.
11. Touch organs of insects are ...
12. Development of insects goes with complete and incomplete ...
13. Causative agents of plague are transmitted by ...

PRACTICAL WORK

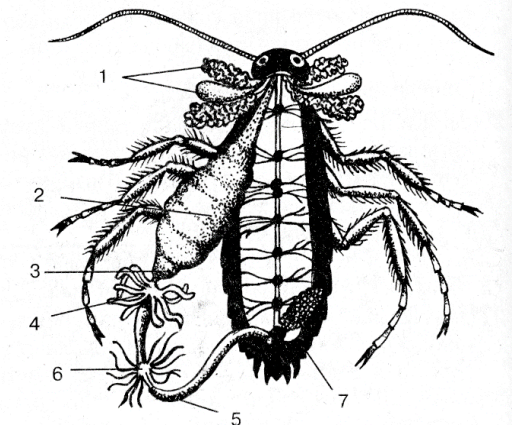
Task 1. Look at pictures and make descriptions. Morphology of an insect:

- 1-
- 2-
- 3-
- 4-
- 5-
- 6-
- 7-
- 8-



Task 2. Look at pictures and make descriptions. Internal structure of an insect:

- 1-
- 2-
- 3-
- 4-
- 5-
- 6-



Lesson 45. Topic: **CHARACTERISTICS OF THE PHYLUM CHORDATA.** " ____ " _____201 r

Aim of the lesson is to consider general characteristics of the phylum and to study vital and structural features of lancelets.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<p>BASIC TERMS AND CONCEPTS</p> <p>76. Notochord –</p> <p>77. Coelom –</p> <p>78. Fin –</p> <p>79. Nephridium –</p> <p>80. Neurocoel –</p> <p>81. Oral cirri –</p>	<p>1. Animals, which refer to chordates, are: a) roundworms; b) amphibians; c) crustaceans; d) insects; e) arachnids.</p> <p>2. Features of lancelet’s feeding are: a) feeding is passive, food parts get to the mouth with water; b) lancelets actively look for the food; c) lancelets slowly look for the food; d) lancelets actively grip the prey by tentacles; e) lancelets do not feed.</p> <p>3. The organ that replaces the notochord in higher chordates is: a) the spinal cord; b) the spine; c) skeleton muscles; d) the intestine; e) long bones.</p> <p>4. Sensory organs of the lancelet are: a) olfactory fossa; b) simple eyes; c) hearing organ; d) taste receptors in the mouth; e) compound eyes.</p> <p>5. Digestive system features of chordates are: a) gill slits at the anterior region of digestive tube; b) gill slits at the posterior region of digestive tube; c) linked with excretory system; d) don’t linked with respiratory system; e) don’t includes the esophagus and a stomach.</p> <p>6. Lancelet’s circulatory system is: a) absent; b) open; c) closed; d) compose from the heart and blood vessels; e) abdominal aorta performs the function of the heart.</p> <p>7. Body integument of the lancelet is: a) epidermis and dermis; b) epidermis only; c) derma only; d) skinny-muscular sac; e) cuticle.</p> <p>8. Lancelet’s excretory organs are: a) metanephridia; b) protonephridia; c) nephridia; d) kidneys; e) Malpighian tubules.</p> <p>9. The nervous system of the lancelet is represented by: a) the brain and the spinal cord; b) the neural tube; c) neural trunks; d) the ventral nerve cord; e) the suprapharyngeal ganglion and the ventral nerve cord.</p>

OPEN TESTS

Insert missing word or concept

1. The ... body cavity is typical for chordates.
2. Internal axial organ of larvae and embryos of chordates is ...
3. ... is situated over the lancelet's notochord.
4. Excretory organs of the lancelet are ...
5. Axial organ of the lancelet is ...
6. The cavity of the chordate's nerve tube is called ...
7. Gill slits are situated at ... portion of the alimentary canal.
8. A heart of chordates is situated at the ... side of the body.
9. External layer of lancelet's skin is ...
10. Derma is formed by ... (tissue)
11. Lancelets refer to subphylum ...
12. Digestion of the lancelet occurs in ...
13. The function of the heart is performed by ... aorta.

PRACTICAL WORK

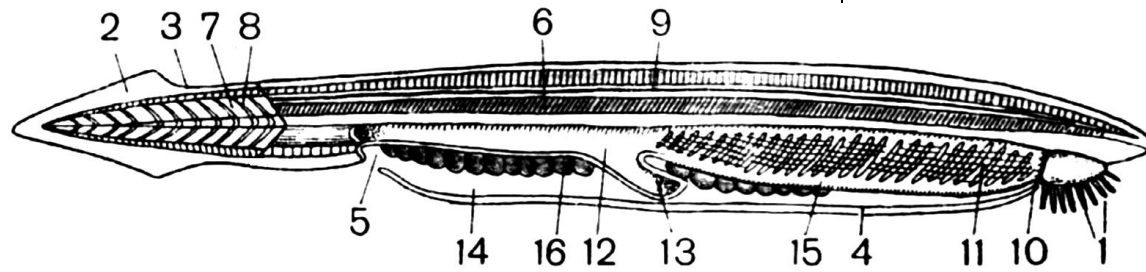
Characteristics of invertebrates	Common characteristics of invertebrates and vertebrates	Characteristics of vertebrates

Task 1. List lancelet's characteristics of invertebrates and vertebrates:

Task 2. Look at pictures and make descriptions. Structure of lancelet:

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Teacher's signature

Lesson 46. Topic: **CHARACTERISTICS OF CLASS OSTEICHTHYES.** " ____ " _____ 201 r

Aim of the lesson is to study typical signs of representatives of the class Osteichthyes, their fitness to the water environment.

<p style="text-align: center;">CONTROL QUESTIONS</p> <p>1. General characteristics of the class.</p> <p>2. Features of structure and vital processes of fishes linked with waterway of living.</p>	<p>3. Fish body portions are: a) cephalothorax and abdomen; b) head, thorax and abdomen; c) head, trunk and trunk; d) trunk and tail; e) head and trunk.</p> <p>4. Features of the structure of fish integument are: a) fishes are covered ciliated epithelium; b) fishes have hypoderm; c) fishes are covered with scales; d) fishes do not have scales; e) fishes are covered with cuticle.</p>
<p style="text-align: center;">BASIC TERMS AND CONCEPTS</p> <p>82.Lateral line –</p> <p>83.Scales –</p>	<p>5. The spine of the fish is subdivided into: a) cervical and thoracic portions; b) head, trunk and tail portions; c) trunk and tail portions; d) trunk, lumbar and tail portions; e) cervical, trunk and tail portions.</p> <p>6. Features of reproduction and development of fishes are: a) separate sexes, sexual reproduction, internal fertilization; b) hermaphrodite, sexual reproduction, development occurs in water; c) asexual reproduction, development occurs in water; d) separate sexes, fertilization and development occurs in water; e) internal fertilization, development occurs in water.</p> <p>7. Fish excretory organs are: a) protonephridia; b) metanephridia; c) nephridia; d) trunk kidneys; e) pelvic kidneys.</p>
<p>84.Swim bladder –</p> <p style="text-align: center;">TESTS FOR SELF-CONTROL</p> <p>1. The digestive system of the fish consists of: a) the mouth, pharynx, stomach; b) the mouth, pharynx, small and large intestines; c) the mouth, pharynx, stomach, small and large intestines; d) the mouth, stomach, small and large intestines; e) the mouth, pharynx, stomach, small intestine.</p> <p>2. Specific sensory organs that present only in fishes are: a) tactile organs; b) olfactory organs; c) taste organs; d) lateral lines; e) vision organs.</p>	<p>8. Features of the fish circulatory system: a) 1-chambered heart, 1 circulation pathway; b) 2-chambered heart, 1 circulation pathway; c) 3-chambered heart, 2 circulation pathway; d) 3-chambered heart, 1 circulation pathway; e) 2-chambered heart, 2 circulation pathway.</p> <p>9. Respiratory organs of fishes are: a) tracheae; b) lungs; c) bronchi; d) gills; e) Malpighian tubules.</p>

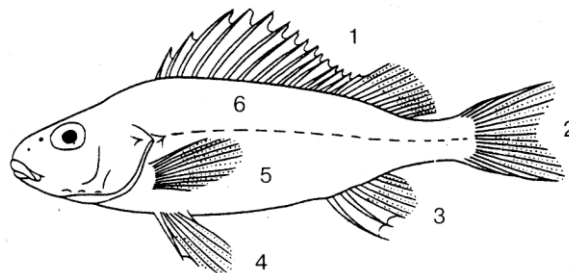
OPEN TESTS

Insert missing word or concept

1. Locomotor organs of a fish are ...
2. Fish skin is covered with ...
3. Portions of the fish spine are ...
4. The skeleton of the fish is subdivided into head, trunk and ... skeletons.
5. Ribs are attached to vertebrae of ... spine portion.
6. The excretory system of fishes is represented by ... kidneys.
7. A heart of the fish is ...-chambered.
8. There is ... blood in the fish heart.
9. Fish organ that identify the direction of water flow is ...

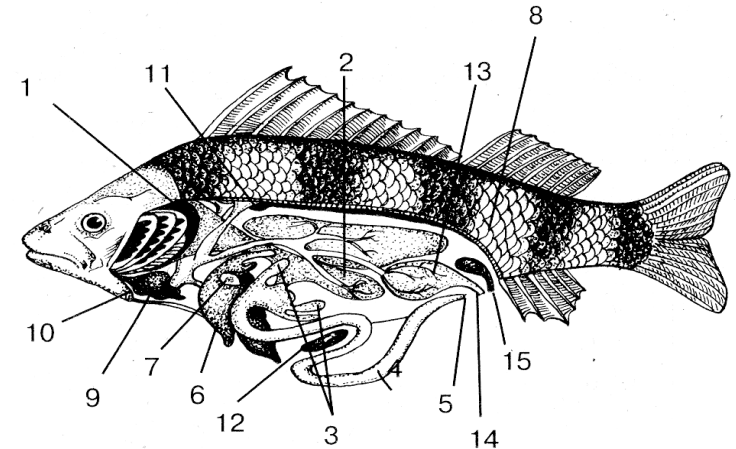
PRACTICAL WORK

Task 1. Look at pictures and make descriptions. Morphology of a fish:



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Task 2. Look at pictures and make descriptions. Internal structure of a fish:



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Lesson 47. Topic: **CHARACTERISTICS OF CLASS AMPHIBIA.** "___" _____201 r

Aim of the lesson is to study typical signs of representatives of the class Amphibia, their structure features linked with terrestrial way of living.

CONTROL QUESTIONS

1. General characteristics of the class: features of structure and vital processes, reproduction and development of amphibians.

2. Significance of amphibians.

BASIC TERMS AND CONCEPTS

85. Cold-blooded animals –

86. Cloaca –

87. Five-fingered limb –

88. Girdle of upper extremity –

89. Girdle of lower extremity –

90. Lungs –

91. Oropharyngeal cavity –

92. Tadpole –

93. Three-chamber heart –

TESTS FOR SELF-CONTROL

- 1. Animals that not refer to amphibians are:** a) lizards, crocodiles; b) toads; c) newts; d) frogs; e) toads and newts.
- 2. Features of amphibian's integument are:** a) it is dry; b) it is wet; c) there are no glands in it; d) it covered with scales; e) it doesn't participate in gas exchange.
- 3. Features of the respiratory system of the amphibian are:** a) larvae and adult individuals have lungs with thin wall; b) larvae have gills, adult individuals have lungs and skin participating in breathing; c) larvae and adult individuals breathe with gills; d) skin don't participate in breathing; e) larvae have lungs, adult individuals have gills.

4. The spine of amphibians can be subdivided into: a) cervical, thoracic, caudal portions; b) cervical, lumbar, sacral, caudal portions; c) lumbar, sacral, caudal portions; d) cervical, trunk, sacral, caudal portions; e) cervical, trunk, lumbar, caudal portions.

5. Pectoral girdle of amphibians consists of: a) the scapula and clavicle; b) bones of the forearm and the upper arm; c) the breastbone, coracoids, scapula and clavicle; d) the scapula, clavicle and humerus; e) coracoids, scapula and clavicle.

6. Digestive glands of amphibians are: a) absent; b) a liver and a pancreas only; c) salivary glands and the liver only; d) salivary glands, the liver and the pancreas; e) salivary glands and the pancreas only.

7. Features of the excretory system of the amphibian are: a) abdominal kidneys, ureters opens into the urinary bladder; b) pelvic kidneys, ureters opens into the cloaca; c) abdominal kidneys, ureters opens into the cloaca; d) head kidneys, ureters opens into the urinary bladder; e) head kidneys, ureters opens into the cloaca.

8. Features of the circulatory system of the amphibian are: a) a 2-chambered heart; b) a 3-chambered heart, 2 circulation pathways, all organs get arterial blood; c) a 3-chambered heart, 2 circulation pathways, the brain get arterial blood; d) 1 circulation pathway, venous blood in the heart; e) 2 circulation pathways, all organs get mixed blood.

3. A tongue of the amphibian is situated in ... cavity.

4. Ureters of amphibians are opened into ...

5. Pelvic girdle is formed by bones: ...

6. Terminal part of the gut of the amphibian is called ...

7. Anterior portion of the amphibian's digestive system is called ...

8. Excretory organs of amphibians are ... kidneys.

9. A larva of the amphibian is called ...

10. The heart of the amphibian consist of ... atrium(s) and ... ventricle(s).

11. Large circulation pathway of amphibians begins from ...

12. Small circulation pathway of amphibians begins from ...

13. Organs of amphibians get ... blood.

14. The heart of the amphibian larva is ...

OPEN TESTS

Insert missing word or concept

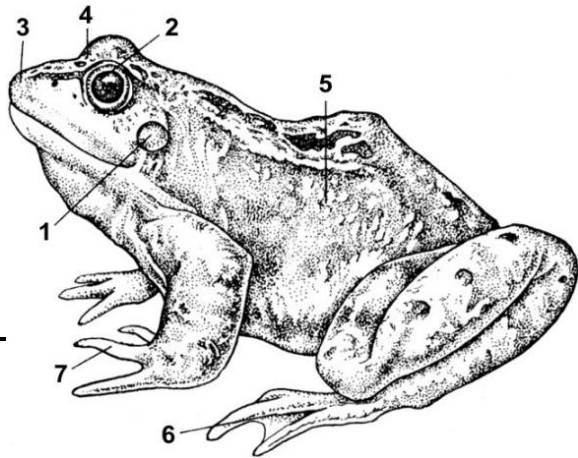
1. Amphibians originate from ...

2. Amphibian are the first class in evolution where cervical and ... portion of the spine are emerged.

PRACTICAL WORK

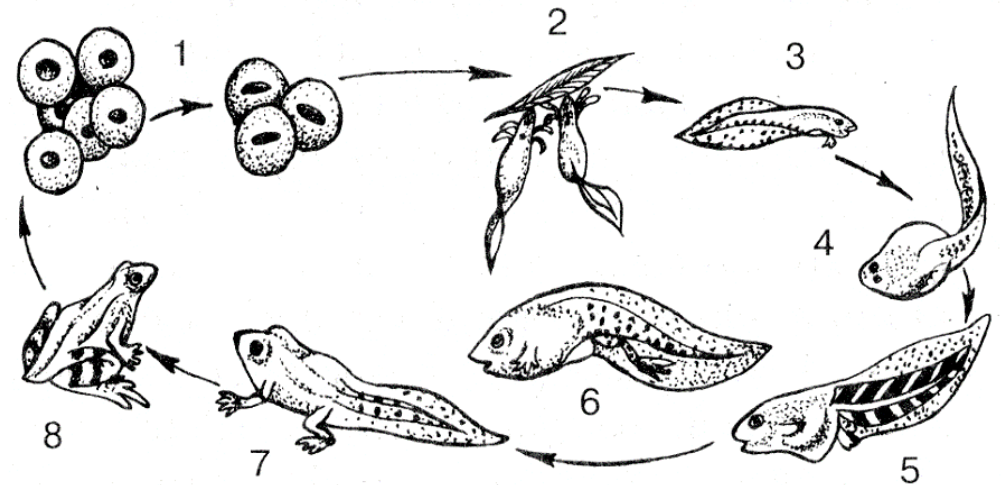
Task 1. Look at pictures and make descriptions. Morphology of a frog:

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Task 2. Look at pictures and make descriptions. Development of an amphibian:

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Teacher's signature

Aim of the lesson is to study typical characteristics of representatives of the class Reptilia and their vital activity features.

CONTROL QUESTIONS	TESTS FOR SELF-CONTROL
<ol style="list-style-type: none"> 1. General characteristics of the class. 2. Features of structure and vital processes; reproduction and development of reptiles. 3. Significance of reptiles. 	<ol style="list-style-type: none"> 1. Reptile skin is: a) dry, do not contains glands, covered with corneous scales; b) wet, contains glands; c) dry, contains glands; d) wet, don't contains glands. 2. Organisms which don't belong to the class Reptilia are: a) lizards; b) snakes; c) crocodiles; d) turtles; e) newts. 3. Portions of the reptile spine are: a) cervical, thoracic, caudal; b) cervical, thoracic, sacral, caudal; c) cervical, thoracic, lumbar, sacral, caudal; d) cervical, thoracic, lumber; e) thoracic and caudal. 4. Features of the reptile skeleton: a) 3 portions of spine, the chest, 2 pairs of limbs with girdles; b) 5 portions of spine, no chest; c) 5 portions of spine, 2 pairs of limbs with girdles, the chest; d) 2 portions of spine, no chest, no girdles of limbs; e) 4 portions of spine, the chest, no limbs. 5. Reproduction of reptiles occurs: a) at land; fertilization is internal; b) at land; fertilization is external; c) at water; fertilization is internal; d) at water; fertilization is external e) asexually. 6. The digestive system of reptiles consists of: a) the oropharyngeal cavity with teeth and gut; b) the oral cavity, pharynx, small and large intestines with rudimentary caecum; c) the oral cavity, pharynx, esophagus, stomach, small and large intestines with rudimentary caecum and cloaca; d) the oropharyngeal cavity, stomach, rectum and anus; e) the oropharyngeal cavity, gut and cloaca. 7. Excretory organs of reptiles are: a) ureters that is opened into urinary bladder; b) trunk kidneys and ureters opened into cloaca; c) ureters, urinary bladder, and urethra; d) trunk kidneys, ureters opened into urinary bladder; e) pelvic kidneys, ureters and an urinary bladder; urine is excreted through the cloaca.
BASIC TERMS AND CONCEPTS	
<ol style="list-style-type: none"> 94. Pelvic kidney (metanephros) – 95. Predator – 96. Regeneration – 	

8. Features of the reptile circulatory system: a) two-chambered heart; b) three-chambered heart, incomplete septum in the ventricle, the brain get arterial blood; c) three-chambered heart, 1 circulation pathway; d) two-chambered heart, 1 circulation pathway; e) two-chambered heart, 2 circulation pathways.

9. Respiratory tract of reptiles is: a) a trachea and choanes, b) a trachea, bronchi and bronchioles; c) alveolar passages d) a trachea and two bronchi; e) bronchial tree.

10. Features of the reptile brain: a) consist of 5 portions; there are a well-developed cerebellum and cortex in its structure; b) consist of 4 portions, there is no cortex in it; c) the cerebellum is developed weakly; d) consist of 3 portions, there is a well-developed cerebellum in its structure; e) the medulla oblongata is absent.

11. An auditory organ of reptiles consists of: a) external and inner ears; b) an inner ear only; c) external and middle ears; d) middle and inner ears; e) external, middle and inner ears.

12. Features of reproduction and development of reptiles are: a) hermaphroditism, sexual reproduction; b) two genders, asexual reproduction; c) fertilization is internal, direct development; d) fertilization is internal, development goes with; e) fertilization is external.

OPEN TESTS

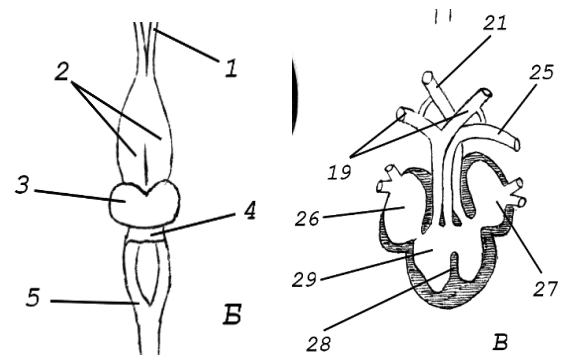
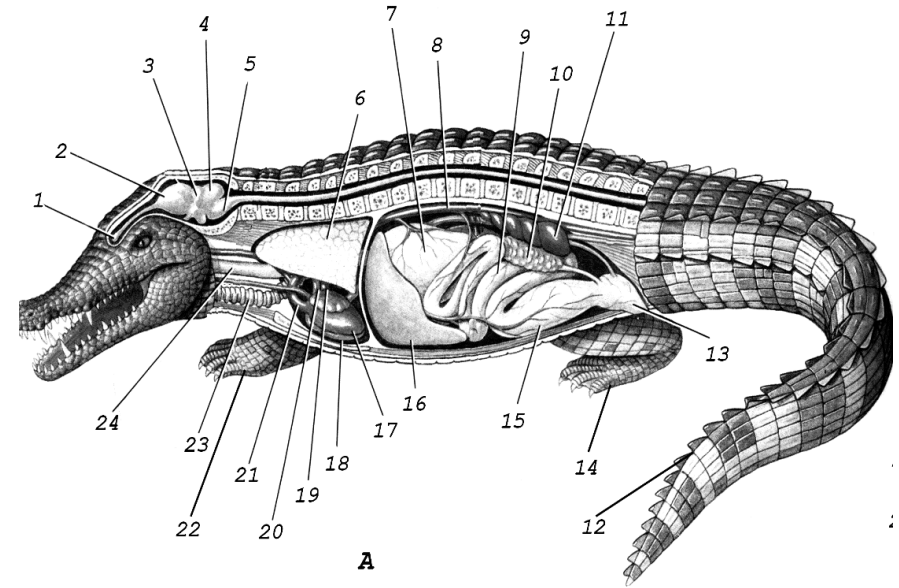
Insert missing word or concept

1. Body portions of reptiles are head, ..., trunk, tail and two pairs of limbs.
2. A spine of reptiles consists of ... portions.
3. A chest of reptiles is formed by thoracic vertebrae, ribs ...
4. The skeleton of the reptile forelimb consists of bones of an upper arm, a forearm and ...
5. The pectoral girdle of the reptile is formed by coracoids, clavicles, scapulae and ...
6. The pelvic girdle of the reptile is formed by ... bones.
7. There is a ... between the small and large intestines of reptiles.
8. The ending of the alimentary canal of the reptile is ...
9. The excretory system of reptiles includes ... kidneys.
10. Ureter and urinary bladder of the reptile is opened ...
11. Respiratory tract of reptiles is a trachea and...
12. The auditory organ of reptiles is middle and ... ear.

PRACTICAL WORK

Task 1. Look at pictures and make descriptions. Internal structure of a reptile. A – crocodile, B – brain, C – heart:

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Teacher's signature

Lesson 49. Topic: **CHARACTERISTICS OF CLASS MAMMALIA.** " ____ " _____ 201 г

Aim of the lesson is to study typical signs of representatives of the class Mammalia, their vital processes, reproduction and development.

CONTROL QUESTIONS

1. Systematics of the class.
2. Characteristics of the class: features of structure and vital processes of mammals.
3. Reproduction and development of the class.
4. Significance of mammals.

BASIC TERMS AND CONCEPTS

97. Placenta –

98. Warm-blooded animals –

TESTS FOR SELF-CONTROL

1. **Features of mammal's digestive system:** a) homogeneous teeth, intestines ends by anus; b) differentiated teeth, intestines ends by cloaca; c) differentiated teeth, intestines ends by anus, well-developed cecum; d) no stomach, homogeneous teeth; e) a well-developed cecum, intestines ends by cloaca.
2. **Only mammal's skin has:** a) glands; b) hairy integument; c) epidermis; d) dermis; e) no corneous scales.
3. **Features of the excretory system of mammals:** a) ureters are opened into the urinary bladder; b) ureters are opened into the cloaca; c) pelvic kidneys, excretion of urine goes through the uretra; d) trunk kidneys; e) pelvic kidneys, ureters are opened into the cloaca.

4. **Features of the circulatory system of mammals are:** a) a four-chambered heart, 1 circulation pathway; b) a three-chambered heart, 2 circulation pathways; c) a four-chambered heart, 2 circulation pathways; d) a two-chambered heart, 1 circulation pathway; e) a three-chambered heart, 1 circulation pathway.
5. **Muscles taking part in breathing are:** a) intercostal and dorsal ones; b) dorsal, thoracic ones and a diaphragm; c) a diaphragm and intercostals ones; d) intercostal muscles and muscles of the upper limbs; e) intercostal muscles and muscles of the lower limbs.
6. **Features of the excretory system of mammals:** a) ureters are opened into the urinary bladder; b) ureters are opened into the cloaca; c) pelvic kidneys, excretion of urine goes through the uretra; d) trunk kidneys; e) pelvic kidneys, ureters are opened into the cloaca.
7. **Features of the circulatory system of mammals are:** a) a four-chambered heart, 1 circulation pathway; b) a three-chambered heart, 2 circulation pathways; c) a four-chambered heart, 2 circulation pathways; d) a two-chambered heart, 1 circulation pathway; e) a three-chambered heart, 1 circulation pathway.
8. **Muscles taking part in breathing are:** a) intercostal and dorsal ones; b) dorsal, thoracic ones and a diaphragm; c) a diaphragm and intercostals ones; d) intercostal muscles and muscles of the upper limbs; e) intercostal muscles and muscles of the lower limbs.
9. **Feature(s) that is (are) not typical for mammal's development:** a) intrauterine development; b) offspring are fed on milk; c) fertilization is internal; d) development is direct; e) fertilization is external, development goes with metamorphosis.
10. **Subphylum Prototheria doesn't include:** a) bats; b) kangaroos; c) platypuses; d) elephants; e) wolfs.
11. **Subphylum Placentalia doesn't include:** a) mice; b) hares; c) tigers; d) kangaroos; e) bats.

OPEN TESTS

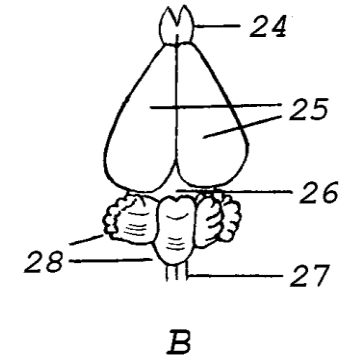
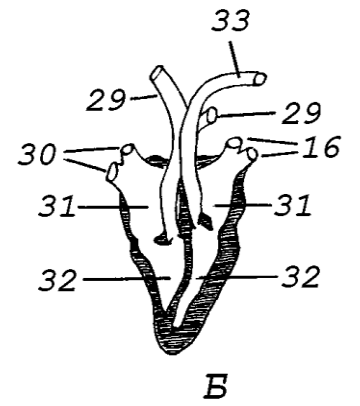
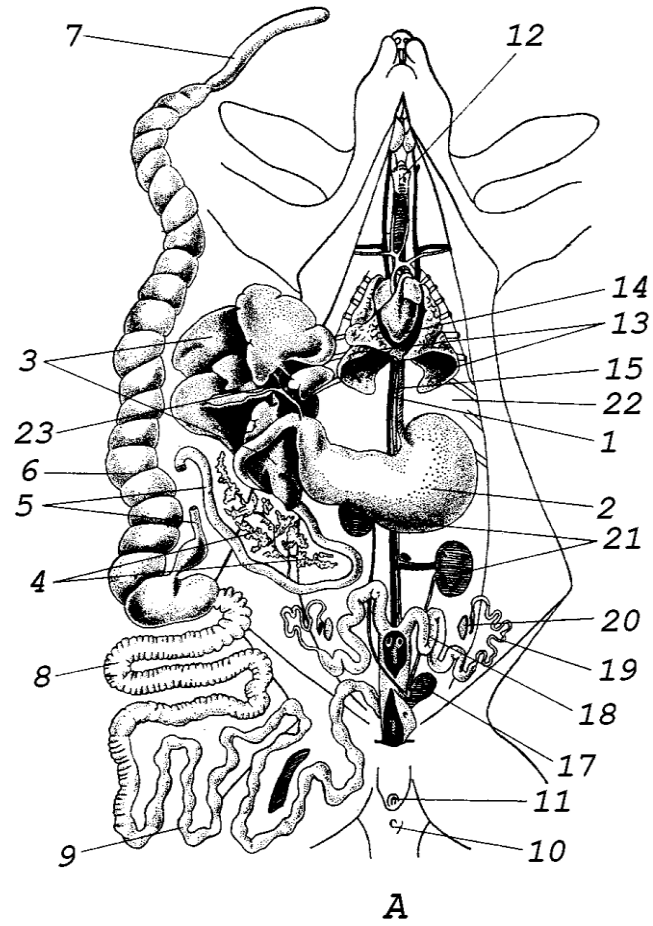
Insert missing word or concept

1. Only mammal's fingers have ...
2. Mobility of the mammal head depends on degree of development of ...
portion of the spine.
3. Teeth of mammals are represented by cutters, ..., molars.
4. Ureters of mammals are opened into ...
5. A heart of mammals consists of ... chambers.
6. «Lung bubbles» is called ...
7. A muscular septum between thoracic and abdominal cavities is called ...
8. The main structure of the central nervous system of mammals is ...
9. The development of mammal's embryo occurs in ...

PRACTICAL WORK

Task 1. Look at pictures and make descriptions. Internal structure of a mammal. A – rabbit, B – brain, C – heart:

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16 -

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Teacher's signature

Aim of the lesson is to reveal knowledge level of considered topics.

CONTROL QUESTIONS	
<ol style="list-style-type: none">1. Life conditions and spread of bacteria.2. Structure features of bacterial cell.3. Vital processes of bacteria.4. Role of bacteria in the nature.5. Pathogenic bacteria and methods to combat them.6. Free-living protists: amoeba, euglena, paramecium caudatum. Features of their structure and vital processes.7. Characteristics of parasitic protists.8. General characteristics of the phylum flatworms. Systematics of the phylum.9. Features of structure and vital processes of tapeworms. Medical significance.10. Morphology and anatomy features of the liver fluke.11. Features of life cycle of the liver fluke.12. Prophylaxis of fascioliasis.13. Characteristics of tapeworms.14. Features of structure and life cycle of the biff tapeworm.15. General characteristics of roundworms.16. Features of structure and vital processes of ascaris.17. Life cycle of ascaris. Prophylaxis of ascariasis.18. General characteristics of arthropods. Systematics of the phylum Arthropoda.19. General characteristics of the class. Features of structure and vital processes that are linked with terrestrial way of living.20. Features of the structure and vital processes of ticks.	<ol style="list-style-type: none">21. Ticks as transmitters and causative agents of diseases. Measures of protection from ticks.22. Role of arachnids in the nature and their medical significance.23. General characteristics of the class Insecta. Features of structure and vital activity.24. Insect reproduction and types of reproduction.25. Significance of insects.26. General characteristics of chordates.27. Classification of the phylum Chordate.28. Characteristics of the Lancelets.29. General characteristics of bony fishes.30. Features of structure and vital processes of fishes linked with water way of living.31. General characteristics of amphibians: features of the structure and vital processes; the reproduction and the development of amphibians.32. Significance of amphibians.33. General characteristics of the class Reptilia.34. Features of structure and vital processes, the reproduction and the development of reptiles.35. Significance of reptiles.36. Systematics of mammals.37. Characteristics of Mammals: features of the structure and vital processes of mammals.38. Reproduction and development of mammals.39. Significance of mammals.

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БИОЛОГИЯ

BIOLOGY

Практикум

для слушателей подготовительного отделения иностранных учащихся,

обучающихся на английском языке

На английском языке

Ответственный за выпуск В. Э. Бутвиловский

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