

## FoM - Biology

1. What scientific study does consider the structure of living things?

- A. anthropology
- B. physiology
- C. anatomy
- D. organology

2. Anatomy is the biological discipline dealing with:

- A. structure of organs, organ systems and whole living organism
- B. study of spiders
- C. biology of humans
- D. external structure of plant body

3. What scientific study is concerned with microscopic anatomy of animal and plant tissues?

- A. anatomy
- B. cytology
- C. histology
- D. physiology

4. Histology is the biological discipline dealing with:

- A. structure of animal and plant cells
- B. study of animal tissues
- C. study of plant tissues
- D. life processes at cellular level

5. Life processes of organisms are studied by:

- A. physiography
- B. physiology
- C. physiognomy
- D. ethology

6. Physiological sciences deal with:

- A. evolutionary changes of organisms
- B. relationship that living organisms have with their natural environment
- C. life processes in organisms
- D. functions of individual organs

7. Paleontology deals with:

- A. the ontogenesis of organisms
- B. extinct organisms
- C. fossils
- D. dinosaurs

**8. Anthropology deals with:**

- A. study of humans
- B. study of spiders
- C. study of extinct plants
- D. an individual development of organisms

**9. Ethology is the biological discipline dealing with:**

- A. life processes of animals
- B. development of animals
- C. behaviour of animals
- D. animal impact on environment

**10. What scientific study does consider animal behaviour?**

- A. ethnology
- B. ecology
- C. ethology
- D. physiography

**11. Who is the founder of biology as a scientific discipline?**

- A. Ch. R. Darwin
- B. Aristotle (Aristoteles)
- C. K. Linné
- D. K. Lorenz

**12. What do Galenos, Avicena and W. Harvey (as representatives of historical biology) have in common?**

- A. they were botanists
- B. they contributed to organism classification
- C. they were physicians
- D. they dealt with pathogenic microorganisms

**13. What do M. J. Schleiden, T. Schwann and J. E. Purkyňe (as representatives of historical biology) have in common?**

- A. they were physicians
- B. they were founders of microbiology
- C. they independently observed cells for the first time in history
- D. they independently formulated the cell theory

**14. Who did perform the first public autopsy in Czech Republic?**

- A. J. E. Purkyňe
- B. J. G. Mendel
- C. J. Jesenius
- D. A. Vesalius

**15. Who did contribute to the discovery of blood types?**

- A. J. Janský
- B. J. Jesenius
- C. K. Landsteiner
- D. M. Rhesus

**16. Who from the following representatives did make the real progress in human physiology?**

- A. I. P. Pavlov
- B. W. Harvey
- C. J. E. Purkyňe
- D. J. B. Lamarck

**17. Who is the author of the theory of evolution?**

- A. I. P. Pavlov
- B. Ch. R. Darwin
- C. A. I. Oparin
- D. J. G. Mendel

**18. Who is the founder of classical genetics?**

- A. L. Pasteur
- B. Ch. R. Darwin
- C. J. G. Mendel
- D. I. P. Pavlov

**19. Who from the following representatives did contribute to the forming of the theory of evolution before Darwin?**

- A. J. B. Lamarck
- B. J. G. Mendel
- C. K. Linné
- D. T. Malthus

**20. In 1973, K. Lorenz, N. Tinbergen and K. Frisch received the Nobel Prize for:**

- A. ecology
- B. embryology
- C. ethology
- D. physiology

**21. In 1962, J. D. Watson, F. H. C. Crick and M. H. F. Wilkins received the Nobel Prize for:**

- A. forming the laws of inheritance
- B. discovering the molecular structure of nucleic acid
- C. discovering the nucleic acids function in genetic information transfer
- D. discovering the various mutation types

**22. Comparing to the observation, we can say about the experiment:**

- A. we use instruments (apparatus)

- B. the events of nature are in our control
- C. it takes place under laboratory conditions
- D. it is the scientific method

**23. If we want to avoid the random error, we must:**

- A. write down the results
- B. set a target
- C. repeat the experiment several times
- D. use the model organisms

**24. The statement that all living organisms are open systems means that they exchange:**

- A. substances, energy and information
- B. just substances and energy
- C. just information
- D. just the energy

**25. The term “metabolism” means:**

- A. the uptake of substances from environment into a cell
- B. all catabolic and anabolic processes within a cell
- C. the transformation (conversion) of substances and energy within an organism
- D. synthesis and catabolism of substances

**26. What happens within the cell during anabolic processes?**

- A. consumption of the energy
- B. releasing of the energy
- C. formation of complex substances from simple ones
- D. cleavage of complex substances to simple ones

**27. What happens within the cell during catabolic processes?**

- A. consumption of the energy
- B. releasing of the energy
- C. formation of complex substances from simple ones
- D. cleavage of complex substances to simple ones

**28. What are we talking about if complex substances are cleaved into simple ones?**

- A. anabolic processes
- B. catabolic processes
- C. assimilation processes
- D. dissimilation processes

**29. What are we talking about if complex substances are synthesized from simple ones?**

- A. assimilation processes
- B. dissimilation processes
- C. anabolic processes
- D. catabolic processes

**30. What happens with energy within the cell during anabolic processes?**

- A. it is consumed
- B. it is released
- C. it is lost
- D. it is produced

**31. What happens with energy within the cell during catabolic processes?**

- A. it is lost
- B. it is transformed
- C. it is consumed
- D. it is released

**32. What happens with energy during exergonic reactions?**

- A. it is released
- B. it is consumed
- C. it is lost
- D. it is transformed

**33. What happens with energy during endergonic reactions?**

- A. it is lost
- B. it is produced
- C. it is released
- D. it is consumed

**34. Respiration is:**

- A. a catabolic process
- B. an exergonic reaction
- C. an anabolic process
- D. an endergonic reaction

**35. Photosynthesis is:**

- A. a catabolic process
- B. an exergonic reaction
- C. an anabolic process
- D. an endergonic reaction

**36. Which of the following reactions is anabolic one?**

- A. the synthesis of ATP
- B. the protein synthesis
- C. the respiration
- D. the fermentation

**37. Which of the following reactions is catabolic one?**

- A. the respiration
- B. the fermentation of lactic acid

- C. the replication of DNA
- D. the oxidation of saccharides (carbohydrates)

**38. If the energy is consumed during the biochemical reaction within the cell, we can speak about:**

- A. anabolic reaction
- B. catabolic reaction
- C. assimilation process
- D. dissimilation process

**39. If the energy is released during the biochemical reaction within the cell, we can speak about:**

- A. assimilation
- B. dissimilation
- C. anabolism
- D. catabolism

**40. Under what conditions the biological oxidation can take place?**

- A. only in the presence of oxygen
- B. under anaerobic and aerobic conditions
- C. also in the absence of oxygen
- D. only under aerobic conditions

**41. Where does the anaerobic glycolysis take place?**

- A. in the cytoplasm of all active cells
- B. in mitochondria
- C. only in the cytoplasm of prokaryotic cells
- D. in the endoplasmic reticulum

**42. The biological oxidation means:**

- A. the definite sequence of reactions that provide the cleaving off the carbon from the biological substrate
- B. the stepwise cleavage of organic substances resulting in the release of the energy
- C. all anabolic processes (within the cell) in the presence of oxygen
- D. processes of cytoplasm oxygenation

**43. Aerobic respiration is:**

- A. the oxygen exchange between blood and lung alveoli
- B. a complete oxidation of organic substances in the presence of oxygen
- C. the blood oxygenation
- D. the cleavage of glucose in the absence of oxygen

**44. Respiratory quotient RQ means:**

- A. the oxygen uptake that is used for the glucose oxidation
- B. the intensity of breathing (respiration)
- C. the ratio of produced CO<sub>2</sub> and consumed O<sub>2</sub>
- D. the dependence of the released energy on consumed O<sub>2</sub> during the breathing process

45. What form of energy is used by cells for their life processes?
- A. luminous energy
  - B. energy of chemical bonds
  - C. thermal energy
  - D. they can use all of energy types
46. What chemical compound is known as the universal energy (transfer) molecule within the cell?
- A. ATP molecule
  - B. adenosintriphosphatic acid (adenosine triphosphate)
  - C. active chlorophyll a
  - D. adenine molecule
47. What is the ATP molecule within the cell used for?
- A. it is universal energy (transfer) molecule
  - B. it is a stimulant of chemical reactions
  - C. it is the source of nitrogenous bases
  - D. it is the energy storage
48. Is the molecule of ATP able to transfer the energy from one cell to another?
- A. yes, it is universal energy transfer molecule
  - B. yes, it is small molecule that can pass through the cytoplasmic membrane
  - C. no, it passes easily only through mitochondrial membrane to the cytoplasm
  - D. no, energetic metabolism takes place in each cell separately
49. Which of the following organisms do not have their own metabolism?
- A. algae
  - B. bacteria
  - C. viruses
  - D. endoparasites
50. Homeostasis is:
- A. equilibrium state between organisms and their environment
  - B. the ability of organisms to take in the essential substances from their environment
  - C. constancy (stability) of the inner environment of organisms
  - D. the ability to develop
51. Constancy (stability) of the inner environment of organism is called:
- A. homonomy
  - B. homeostasis
  - C. homology
  - D. isonomy
52. Which of the following options does make the self-regulation (as an ability of an organism) possible?
- A. reactions to stimuli

- B. reflexes
- C. the feed-back system
- D. the immune response

**53. Which of the following organisms are non-cellular?**

- A. viruses, bacteria and cyanobacteria
- B. just viruses
- C. just bacteria and cyanobacteria
- D. non-cellular organisms do not exist

**54. What is the cell colony?**

- A. the cell organization of *Volvox globator*
- B. protozoan cells that stay together after division
- C. bacteriophages in their host (bacteria)
- D. plasmodia in the blood of their host

**55. Organisms are divided into autotrophs and heterotrophs according to the way of:**

- A. carbon intake
- B. oxygen intake
- C. nitrogen intake
- D. potassium intake

**56. Heterotrophic organisms:**

- A. feed on organic substances
- B. produce organic substances from inorganic ones
- C. take in the carbon as a carbon dioxide
- D. take in the carbon as an organic substance

**57. Autotrophic organisms:**

- A. feed on organic substances
- B. they take in the carbon as an organic substance
- C. they produce the organic substances from inorganic ones
- D. they take in the carbon as a carbon dioxide

**58. With increasing temperature the oxygen content of water is:**

- A. decreasing
- B. increasing
- C. remains constant
- D. it does not depend on temperature

**59. For biotic factors of environment are regarded:**

- A. factors which influence living organisms
- B. components of the internal environment of organisms
- C. food and water
- D. influence of other organisms

**60. Individuals of the same species living together at the same time, in the same location, with the possibility of transfer of genetic information are called:**

- A. species
- B. community
- C. ecosystem
- D. population

**61. Population is characterised as:**

- A. individuals of the same species, living in a specifically defined area at the same time
- B. individuals of several types of species in a specifically defined area
- C. all the plants and animals on Earth, living at the same time
- D. all the individuals of one species on Earth

**62. Viruses can be observed:**

- A. by light microscopy at 1000x enlargement
- B. only by electron microscopy
- C. by light microscopy using specific dye
- D. it is not possible to observe them by microscopy

**63. The following statement is valid for prokaryotic organisms:**

- A. it's body is composed of one cell
- B. it is a virus
- C. the nucleus in the cell is without nuclear membrane
- D. they are always haploid organisms

**64. Viruses belong to:**

- A. prokaryotic organisms
- B. eukaryotic organisms
- C. nucleoprotein particles
- D. non-cellular organisms

**65. Viruses consist of:**

- A. DNA and RNA, surrounded by a protein shell
- B. DNA or RNA and protein
- C. DNA, RNA and lipid shell
- D. nucleic acid and virion from lipid particles

**66. For proliferation of viruses is valid the following statement:**

- A. depends on the host cell
- B. begins with producing spores
- C. it is conducted by binary fission of the virion
- D. it usually leads to the death of host cell

**67. Characteristic for viruses from the life processes point of view is that:**

- A. they have simple metabolism

- B. their life processes depend on the host cell
- C. their metabolism begins in the S- phase of the cell cycle
- D. they do not have their own metabolism, they are not able of self reproduction

**68. Proliferation of bacteriophages is carried out:**

- A. in infected animal cells
- B. in the interstitial space in host organism's tissues
- C. in bacterial cells, where the DNA of bacteriophage penetrates
- D. on the surface of host bacteria, where the DNA replicates

**69. Is the following statement correct? Viruses can proliferate outside the host cell.**

- A. no, they do not have their own genome, that is why they have to use the host cell's DNA for their reproduction
- B. no, they do not have their own metabolism, that is why they are not able to perform any vital functions on their own
- C. yes, viruses produce spores and can proliferate also outside the host cell
- D. yes, they form infectious virions in proper conditions, which then attack the cells

**70. Which of the following diseases are caused by viruses?**

- A. flu
- B. tnsillitis
- C. tuberculosis
- D. hepatitis

**71. Oncoviruses cause:**

- A. spots on the leaf surface
- B. foot- and- mouth disease of livestock
- C. formation of malignant tumors
- D. uncontrolled cell division

**72. Childhood illnesses caused by viruses are:**

- A. flu
- B. measles
- C. chickenpox
- D. jaundice

**73. Which element is the important part of the chlorophyll?**

- A. Fe
- B. Mg
- C. Ca
- D. K

**74. Which element is the important part of the haemoglobin?**

- A. Na
- B. Ca

- C. Fe
- D. K

**75. What process is affected by inorganic salts within the cell?**

- A. the homeostasis
- B. the enzymatic regulation
- C. the water regulation
- D. the metabolism

**76. Which of the following polysaccharides does have the structural function (within the cell)?**

- A. saccharose
- B. cellulose
- C. glycogen
- D. chitine

**77. Which of the following polysaccharides is the source of energy for a cell?**

- A. glycogen
- B. glucose
- C. starch
- D. chitin

**78. What organic molecules are the most common in cells?**

- A. saccharides
- B. lipids
- C. proteins
- D. mineral substances

**79. What organic molecules do store the greatest amount of energy?**

- A. saccharides
- B. lipids
- C. proteins
- D. nucleic acids

**80. What is the function of proteins within the cell?**

- A. they provide support and structure for cells
- B. they store an energy
- C. they regulate the chemical reactions (processes) within the cell
- D. dissolved in water, they form the basic environment within the cell

**81. Fibrous proteins have:**

- A. mechanical function
- B. metabolic function
- C. immune function
- D. regulative function

**82. Globular proteins have:**

- A. metabolic function
- B. regulative function
- C. immune function
- D. mechanical function

**83. How many amino acids do proteins of living organisms contain?**

- A. 12
- B. 20
- C. 22
- D. 200

**84. What organic substances do have the structural function?**

- A. saccharides
- B. lipids
- C. proteins
- D. nucleic acids

**85. Which organic substances can serve as the energy storage?**

- A. saccharides
- B. lipids
- C. proteins
- D. nucleic acids

**86. How do animals store the glucose (as an energy source)?**

- A. as a starch
- B. as a cellulose
- C. as a glycogen
- D. as a lipid

**87. What form are saccharides in the plant organism stored in, as an energy source?**

- A. lipid
- B. starch
- C. glycogen
- D. cellulose

**88. Lipids are involved in the regulation mechanisms within a cell as a part of:**

- A. hormones
- B. vitamins
- C. chromosomes
- D. enzymes

**89. Chromatin consists of:**

- A. proteins and nucleic acid
- B. nucleic acid and saccharide

- C. protein and nuclein (dye)
- D. just nucleic acid

**90. Nucleic acids can provide:**

- A. coding of the genetic information
- B. transfer of the genetic information from parents to offspring
- C. metabolism regulation
- D. translation of the genetic information to the amino acids sequence

**91. How many ATP molecules are produced during the anaerobic cleavage of 1 glucose molecule?**

- A. 2
- B. 4
- C. 16
- D. 21

**92. Which of the following organisms are eukaryotic?**

- A. all multi-cellular and some of unicellular organisms
- B. just multi-cellular organisms
- C. all organisms with biological membranes
- D. bacteria and cyanobacteria

**93. We can say about fungi cells:**

- A. glycogen is their reserve substance
- B. their cell wall contains cellulose
- C. their cell wall contains chitin
- D. they are typical prokaryotic cells

**94. We can say about plant cells:**

- A. starch is their reserve substance
- B. their cell wall contains cellulose
- C. when they get older, they contain many vacuoles
- D. young cells contain many vacuoles

**95. What is considered to be membrane structure of the cell?**

- A. nucleus, plastids, mitochondria, endoplasmic reticulum
- B. plastids, vacuoles, ribosomes, endoplasmic reticulum
- C. chloroplasts, Golgi apparatus, mitochondria, lysosomes
- D. vacuoles, mitotic apparatus, ribosomes, lysosomes

**96. Which of the following cells does have the cell wall?**

- A. plant cell
- B. animal cell
- C. fungi cell
- D. bacteria cell

**97. We can say about cell surfaces (according to the water and substances dissolved in the water):**

- A. cell wall is permeable, cytoplasmic membrane is semipermeable
- B. cell wall is impermeable, cytoplasmic membrane is semipermeable
- C. cell wall is semipermeable, cytoplasmic membrane is impermeable
- D. the permeability of cell wall and cytoplasmic membrane is identical, it depends on the environment

**98. Which synthesis does occur in the cell nucleus?**

- A. of nucleic acids
- B. of lipids
- C. of proteins
- D. of saccharides

**99. Where is DNA located within the cell?**

- A. in chromosomes
- B. in nucleolus
- C. in plastids
- D. in ribosomes

**100. Where is the mRNA synthesis located within the cell?**

- A. in cytoplasm
- B. on ribosomes
- C. in nucleus
- D. in nucleolus

**101. Phospholipids serve as structural parts of:**

- A. biomembranes
- B. fibrous cellular structures
- C. chromosomes
- D. mitotic apparatus

**102. Which of the following structures do have double cell membrane?**

- A. nucleus, mitochondria, plastids
- B. nucleus, vacuoles, plastids
- C. just mitochondria and plastids
- D. just nucleus

**103. What cell organelles are considered to be the energetic centre of the cell?**

- A. chloroplasts, where the light energy is converted into the chemical energy
- B. mitochondria, because of the ATP formation
- C. endoplasmic reticulum, because it provides the synthesis of proteins and lipids
- D. nucleus, because it contains DNA and it is the main cell's control centre

**104. We can say about mitochondria:**

- A. they are the energetic centre of the cell

- B. they convert the energy to ATP during the respiration process
- C. there is only one mitochondrion in each cell
- D. there are hundreds or thousands of mitochondria in each cell

**105. How many mitochondria are there in a cell?**

- A. 1
- B. 2
- C. there may be hundreds of them within a single cell
- D. less than 100

**106. Calvin-Benson cycle (carbon fixation) takes place in the:**

- A. nucleus
- B. cytoplasm
- C. mitochondrial matrix
- D. stroma of chloroplasts

**107. Where are leucoplasts located most often?**

- A. in reserve organs of protozoans
- B. in reserve organs of plants
- C. in all of plant cells
- D. in leaf cells after chlorophyll loss

**108. We can say about plastids:**

- A. they are located only in plant cells
- B. they are located only in plant and animal cells
- C. most of them contain photosynthetic dyes
- D. they have their own DNA

**109. We can say about endoplasmic reticulum:**

- A. it is a membrane structure made of interconnected vesicles
- B. rough endoplasmic reticulum provides the synthesis of proteins
- C. smooth endoplasmic reticulum provides the synthesis of saccharides
- D. it provides the transport of substances

**110. What is the rough endoplasmic reticulum covered with?**

- A. nucleic acids
- B. lysosomes
- C. ribosomes
- D. enzymes

**111. Where are proteins synthesized within the cell?**

- A. nucleus, endoplasmic reticulum and ribosomes
- B. rough endoplasmic reticulum and Golgi apparatus
- C. free cytoplasm ribosomes and thylakoids
- D. endoplasmic reticulum, ribosomes and Golgi apparatus

**112. What functions do vacuoles have in plant cells?**

- A. they attend catabolic processes
- B. they are filled with reserve substances
- C. plant dyes are produced in here
- D. they determine the inner pressure of the cell

**113. Is it truth, that vacuoles are present only in plant cells?**

- A. yes, they are typical plant structures
- B. yes, similar animal structure are lysosomes
- C. no, some animal cells contain specialized vacuoles
- D. no, vacuoles are important structures of cells of protozoans

**114. What do we consider to be nonliving component of the cell?**

- A. starch grains
- B. lipid droplets
- C. inclusions
- D. cytoskeleton

**115. Microfilaments are:**

- A. thin filaments in cell cytoplasm, that provide the contraction
- B. tube like structures in the cytoplasm
- C. filaments of spindle apparatus
- D. fibrous structures

**116. Microtubules are:**

- A. fibrous structures
- B. thin filaments in cell cytoplasm, that provide the contraction
- C. tube like structures in the cytoplasm
- D. vesicles that formed the endoplasmic reticulum

**117. Fibrous structures that are not able to contract are called:**

- A. intercellular filaments
- B. intermediate filaments
- C. intermediate tubules
- D. intercellular tubules

**118. The dynamic cell skeleton consists of:**

- A. cytoskeleton
- B. cytoplasm
- C. system of crystalline inclusions
- D. network of microfilaments and microtubules

**119. Which processes of substances passing through the cytoplasmic membrane do need the energy?**

- A. osmosis
- B. active transport

- C. phagocytosis
- D. pinocytosis

**120. Active transport across the cytoplasmic membrane is provided by:**

- A. transport proteins
- B. phagocytosis
- C. pinocytosis
- D. diffusion

**121. Diffusion is:**

- A. the movement of molecules from an area of lower concentration towards an area of higher concentration
- B. substance dispersion in the solvent
- C. solvent dispersion in the substance
- D. the equalizing of the solvent and solution concentration along the concentration gradient

**122. What is the example of diffusion within living organisms?**

- A. oxygen passing from alveoli to the blood
- B. water absorption in the intestine
- C. water and minerals reabsorption in the nephron tubules
- D. carbon oxide passing from cells to the blood

**123. The process of the absorption of lipids in the small intestine is provided by:**

- A. osmosis
- B. pinocytosis
- C. phagocytosis
- D. protein canals

**124. The transport of glucose and amino acids into the cell is provided by:**

- A. pinocytosis
- B. phagocytosis
- C. transport protein
- D. ATP

**125. The transport of important ions into the cell is provided by:**

- A. diffusion
- B. osmosis
- C. endocytosis
- D. transport protein

**126. During which process(es) is the cytoplasmic membrane rebuilt?**

- A. exocytosis
- B. endocytosis
- C. pinocytosis
- D. phagocytosis

**127. The osmosis is:**

- A. the process of water passing through the semipermeable membrane towards an area of higher concentration of dissolved substance
- B. the movement of substance towards the solvent
- C. capillary inner pressure
- D. cellular inner pressure

**128. Cell plasmolysis occurs in:**

- A. hypotonic environment
- B. hypertonic environment
- C. environment with higher concentration of osmotically active substances
- D. environment with lower concentration of osmotically active substances

**129. What can we observe, when we put salt on the cucumber:**

- A. diffusion
- B. plasmolysis
- C. osmotic lysis
- D. plasmoptysis

**130. When fruit skin ruptures after long lasting rains, what is it the consequence of?**

- A. plasmolysis
- B. deplasmolysis
- C. plasmoptysis
- D. osmolysis

**131. What medium does the osmotic lysis of red blood cells occur in?**

- A. in salt solution
- B. in glucose solution
- C. in alcohol
- D. in distilled water

**132. Concentration of the hypertonic environment is:**

- A. unstable according to the environment
- B. higher than the concentration of substances dissolved in the cytoplasm
- C. identical to the concentration of substances dissolved in the cytoplasm
- D. lower than the concentration of substances dissolved in the cytoplasm

**133. Concentration of the hypotonic environment is:**

- A. identical to the concentration of substances dissolved in the cytoplasm
- B. unstable according to the environment
- C. higher than the concentration of substances dissolved in the cytoplasm
- D. lower than the concentration of substances dissolved in the cytoplasm

**134. Concentration of the isotonic environment is:**

- A. higher than the concentration of substances dissolved in the cytoplasm

- B. lower than the concentration of substances dissolved in the cytoplasm
- C. identical to the concentration of substances dissolved in the cytoplasm
- D. unstable according to the environment

**135. In the hypotonic environment, the animal cell:**

- A. takes in the water and ruptures (bursts)
- B. releases the water
- C. undergoes plasmolysis
- D. undergoes plasmoptysis

**136. In what type of environment does the red blood cell shrink?**

- A. hypotonic
- B. hypertonic
- C. isotonic
- D. in salt solution

**137. Is it true that by the bacterial throat inflammation, the gargling with concentrated NaCl solution helps?**

- A. yes, in the hypertonic environment bacteria release water and die
- B. yes, in the hypotonic environment bacteria take in the water and burst
- C. no, NaCl solution can damage the mucosa
- D. no, NaCl solution is harmless to bacteria

**138. Pinocytosis:**

- A. is the active form of substances transport across the cytoplasmic membrane
- B. is the passive form of substances transport across the cytoplasmic membrane
- C. provides the substances transport without the energy consumption
- D. provides the removal of useless substances from the cell

**139. Which of the following processes must not be considered to be a passive transport across the cytoplasmic membrane?**

- A. endocytosis
- B. pinocytosis
- C. osmosis
- D. phagocytosis

**140. Which of the following processes must not be considered to be an active transport across the cytoplasmic membrane?**

- A. diffusion
- B. pinocytosis
- C. phagocytosis
- D. osmosis

**141. How many phases does the cell cycle have?**

- A. 2

- B. 4
- C. 6
- D. 8

**142. Which cell structure is responsible for the exact distribution of chromosomes into daughter cells?**

- A. nucleus
- B. cytoskeleton
- C. mitochondria
- D. mitotic apparatus

**143. The phase of the cell cycle, where microtubules of spindle apparatus shorten, and pull the chromosomes to the centrioles, is called:**

- A. telophase
- B. interphase
- C. metaphase
- D. anaphase

**144. Chromosomes are:**

- A. morphological structures, that can be observed only during the cell division
- B. structures, that can be observed in the nucleus permanently
- C. structures, that can be observed only in S-phase of the cell cycle
- D. structures, that are formed in the nucleus at the beginning of the cell division

**145. What type of cells does the mitosis give rise to?**

- A. somatic cells
- B. cells of whole organism
- C. cells of all organisms, bacteria included
- D. only to gametes

**146. What happens during prophase of mitosis?**

- A. the chromosomes spiralization
- B. the synthesis of DNA
- C. the formation of mitotic apparatus
- D. the formation of nucleolus

**147. What happens during metaphase of mitosis?**

- A. chromosomes convene along the equatorial plane
- B. daughter chromatides diverge
- C. chromatids become separate
- D. centrioles diverge

**148. What happens during anaphase of mitosis?**

- A. chromosomes diverge to opposite ends of the cell
- B. chromatids diverge to opposite ends of the cell
- C. the nucleus division ends

D. mitotic apparatus is eliminated

**149. What happens during telophase of mitosis?**

- A. the karyokinesis ends
- B. the cytokinesis is in progress
- C. the despiralization of chromosomes
- D. forming of new DNA

**150. Which phase of cell cycle does the duplication of chromatides (single-chromatid chromosome becomes double-chromatid chromosome) occur in?**

- A. metaphase
- B. prophase
- C. S-phase
- D. G<sub>2</sub>-phase

**151. The reduction of the chromosome number is characteristic for:**

- A. heterotypic cell division
- B. homotypic cell division
- C. I. meiotic division
- D. II. meiotic division

**152. We can say about heterotypic cell division:**

- A. it is the first meiotic division
- B. it is the second meiotic division
- C. the chromosome number is reduced into a half
- D. the chromosome number does not change, this type of division is similar to mitosis

**153. We can say about homotypic cell division:**

- A. it is the first meiotic division
- B. it is the second meiotic division
- C. the chromosome number does not change, this type of division is similar to mitosis
- D. the chromosome number is reduced into a half

**154. Karyokinesis:**

- A. is the division of nucleus
- B. is the movement of the nucleus in the cytoplasm
- C. is the movement of centriols after the division
- D. is the movement of chromosomes in the anaphase

**155. Cytokinesis is the process, by which:**

- A. the cell division process after interphase begins
- B. the separating of bivalents begins
- C. the cell division process in the telophase ends
- D. the nucleus division process of the mitosis ends

**156. Which phase of the mitosis do we observe if we can see double-chromatid chromosomes convened along the equatorial plane under the microscope?**

- A. telophase
- B. metaphase
- C. cytokinesis
- D. anaphase

**157. Which phase of the mitosis do we observe if we can see enlarged nuclei with visible chromosomes under the microscope?**

- A. interphase
- B. metaphase
- C. anaphase
- D. prophase

**158. Centromere is:**

- A. a part of the spindle apparatus
- B. a location of chromosomes crossing
- C. a place on the chromosome to which the filaments of the spindle apparatus connect
- D. a place on the chromosome where a gene is located

**159. Meiosis is the process of:**

- A. bacteria division
- B. reproduction of protozoans
- C. the reduction of the chromosome number to the half
- D. the reproduction of viruses

**160. We can say about human karyotype:**

- A. it is the chromosome map of one cell
- B. it is the set of chromosomes of somatic cell
- C. it consists of 23 chromosome pairs
- D. it is the set of chromosomes of gamete

**161. Crossing-over is the process:**

- A. of the reductional division of gamete
- B. where the recombination of genes between homologous chromosomes takes place
- C. of the formation of a new chromosome with recombined set of genes
- D. which occurs during the prophase of I. reductional division

**162. What is the difference between the anaphase of the meiosis I and anaphase of the mitosis?**

- A. during the meiosis, single-chromatid chromosomes diverge
- B. during the meiosis I, chromosomes stay in double-chromatid form
- C. in the anaphase of the meiosis, chromosomes do not become separate
- D. chromosomes of meiosis I despiralitate earlier

**163. The chromosome map represents:**

- A. relative mutual gene organization on chromosome
- B. order, mutual position and the specific location of genes on chromosome
- C. the set of all cell chromosomes
- D. the number and a shape of nucleotides in chromosome

**164. How many chromosomes does the human cell have?**

- A. 46
- B. 23 pairs
- C. 23 pairs of autosomes + 2 sex chromosomes
- D. 22 pairs of autosomes + 1 pair of heterochromosomes

**165. How many chromosomes does the human cell have?**

- A. 23
- B. 23 pairs
- C. 48
- D. 48 pairs

**166. What is the genetic significance of meiosis?**

- A. the reduction of the chromosome number to a half during the gamete production
- B. the random combination of parents chromosomes in gametes resulting in a higher genetic variability
- C. the possibility of the recombination (exchange of pieces) between homologous chromosomes resulting to higher genetic variability
- D. the exact distribution of genes to offspring cells leading to the conservation of genetic information

**167. In the process of meiosis, the crossing-over may occur:**

- A. only between homologous chromosomes
- B. also between nonhomologous chromosomes
- C. only in the interphase of cell cycle
- D. only in the prophase of the first meiotic division

**168. We can say about homologous chromosomes:**

- A. they have identical content, structure and shape
- B. they are paired chromosomes, one from mother, one from father
- C. it is the set of chromosomes from one parent
- D. they are sex chromosomes

**169. Which intracellular structures do contain their own DNA?**

- A. Golgi apparatus and mitochondria
- B. endoplasmic reticulum and vacuoles
- C. mitochondria and plastids
- D. plasmids and Golgi apparatus

**170. Extranuclear heredity of animal cells is caused by the presence of:**

- A. RNA in the cell cytoplasm
- B. DNA in the nucleolus
- C. DNA in chloroplasts
- D. DNA in mitochondria

**171. Extranuclear heredity of plant cells is caused by the presence of:**

- A. RNA in the cell cytoplasm and DNA in chloroplasts
- B. DNA in the nucleolus and in the cytoplasm
- C. DNA in chloroplasts and in mitochondria
- D. DNA in plastids

**172. What types of RNA can we recognize in the organism?**

- A. genome, messenger, transfer
- B. gene, transformational, messenger
- C. messenger, transfer, ribosomal
- D. translatory, single-stranded, double-stranded

**173. Select correct pairs of complementary nitrogenous bases:**

- A. A-T, C-G
- B. A-C, T-G
- C. A-U, G-C
- D. A-G, U-C

**174. During the synthesis of DNA the adenine of one strand is attached to:**

- A. cytosine of another
- B. guanine of another
- C. thymine of another
- D. uracil of another

**175. During the synthesis of DNA the guanine of one strand is attached to:**

- A. thymine of another
- B. uracil of another
- C. cytosine of another
- D. adenine of another

**176. During the synthesis of DNA the cytosine of one strand is attached to:**

- A. uracil of another
- B. adenine of another
- C. guanine of another
- D. thymine of another

**177. During the synthesis of DNA the thymine of one strand is attached to:**

- A. cytosine of another
- B. guanine of another

- C. adenine of another
- D. uracil of another

178. Which nucleotide is present in the RNA instead of thymine?

- A. guanine
- B. uracil
- C. cytosine
- D. adenine

179. How many nucleotides are there in the codon?

- A. 2
- B. 3
- C. 4
- D. 5

180. How many STOP codons are there in the genetic code?

- A. 1
- B. 2
- C. 3
- D. 4

181. How many start codons are there in the genetic code?

- A. 1
- B. 2
- C. 3
- D. 4

182. In a process of the expression of genetic code, there is the only one start codon:

- A. AUG
- B. AGU
- C. UAG
- D. GUA

183. One strand of DNA has the following sequence of nucleotides A-C-G-G-T-A. What is the sequence of the other DNA strand?

- A. G-T-C-C-A-G
- B. T-G-C-C-A-T
- C. U-G-C-C-A-U
- D. T-G-C-C-U-T

184. What is the sequence of the other strand after the replication of DNA with the sequence C-G-T-G-C-A?

- A. A-T-C-T-A-G
- B. G-C-A-C-G-U
- C. G-C-A-C-G-T

D. G-C-U-C-G-T

**185. What is the sequence of nucleotides of the RNA strand that was formed according to the A-G-C-G-G-T matrix?**

A. T-C-G-C-C-A

B. U-C-G-C-C-A

C. U-C-G-C-C-U

D. T-C-G-C-C-U

**186. What is the difference between nucleotides of DNA and RNA?**

A. DNA contains a pentose (deoxyribose) and RNA contains a hexose (ribose)

B. DNA contains a pentose (deoxyribose) and RNA contains pentose (ribose)

C. DNA contains thymine and RNA contains uracil

D. adenine is complementary to uracil in DNA, but in RNA it is complementary to thymine

**187. According to what principle is the new strand of DNA or RNA formed?**

A. complementarity

B. combinatorics

C. independency

D. statistics

**188. Which nitrogenous bases are present in DNA and RNA as well?**

A. thymine, guanine, adenine

B. guanine, adenine, cytosine

C. adenine, cytosine, uracil

D. uracil, guanine, cytosine

**189. What nitrogenous bases do DNA and RNA differ in?**

A. adenine and guanine

B. thymine and cytosine

C. cytosine and uracil

D. thymine and uracil

**190. What is formed during the translation?**

A. mRNA according to the DNA matrices

B. tRNA according to the mRNA matrices

C. protein according to the mRNA matrices

D. protein according to the tRNA matrices

**191. What is synthesized during the translation?**

A. protein according to the tRNA matrices

B. tRNA according to the mRNA matrices

C. mRNA according to the DNA matrices

D. protein according to the mRNA matrices

**192. The central dogma of molecular biology says that transfer of genetic information at the cellular level runs in one direction and:**

- A. consists of three processes – replication – transcription – translation
- B. consists of three processes – replication – translation – transcription
- C. consists of two processes – from DNA to RNA and from RNA to protein
- D. consists of two processes – transcription – translation

**193. What will be the sequence of nucleotides in anticodon, when the sequence of nucleotides in codon is A-U-G?**

- A. C-A-U
- B. U-A-C
- C. U-T-C
- D. G-A-C

**194. What happens during the replication?**

- A. duplication of the genetic information
- B. synthesis of DNA molecule
- C. formation of two identical DNA molecules
- D. formation of mRNA

**195. The process during which the duplication of genetic information occurs is known as?**

- A. replication
- B. transcription
- C. duplication
- D. translation

**196. The process during which the transfer of genetic information from DNA to mRNA occurs is known as?**

- A. replication
- B. transcription
- C. duplication
- D. translation

**197. The process during which the transfer of genetic information from nucleic acid to protein occurs is known as:**

- A. replication
- B. transcription
- C. duplication
- D. translation

**198. When does the replication of DNA occur in a cell?**

- A. continuously
- B. only in the S-phase of the cell cycle
- C. only in the M-phase
- D. only during the meiosis

**199. What happens during the transcription?**

- A. synthesis of DNA molecule
- B. synthesis of RNA molecule according to the DNA matrix
- C. copying of genetic information from DNA to mRNA
- D. translation of genetic information from mRNA to sequence of amino acids

**200. Transcription refers to:**

- A. RNA synthesis according to a DNA matrix
- B. protein synthesis according to an m-RNA matrix
- C. process of transcription of genetic information from DNA to RNA
- D. process of transcription of genetic information from codon to anticodon

**201. Translation means:**

- A. translation of genetic information from the sequence of nucleotides to the sequence of amino acids
- B. protein synthesis
- C. synthesis of m-RNA
- D. transcription of genetic information from DNA to RNA

**202. Translation means:**

- A. transcription of genetic information from DNA to m-RNA
- B. process of protein synthesis as the end of gene expression
- C. translation of genetic information from m-RNA into polypeptide chain
- D. translation of genetic information from the sequence of nucleotides into the sequence of amino acids

**203. Why is the genetic code described as degenerative?**

- A. different codons can specify the same amino acid
- B. the genetic code is mutated
- C. one codon specifies always just one amino acid
- D. each triplet consists of three nucleotides

**204. Prokaryotic organisms genetic material consists of:**

- A. one circular RNA molecule
- B. several single stranded DNA molecules
- C. single stranded DNA molecule
- D. double stranded circular DNA molecule, stabilized by proteins

**205. Plasmids are:**

- A. single stranded forms of RNA in bacteria
- B. linear forms of DNA in bacteria
- C. circular forms of RNA in eukaryotic cells
- D. circular DNA molecules in bacteria

**206. The basic laws of heredity were discovered by Mendel when cross-pollinating:**

- A. peas
- B. roses
- C. corn
- D. beans

**207. Mendel's laws of heredity are valid only if:**

- A. a single gene is encoding a single trait
- B. the parents are homozygotes, one of them is dominant, the other is recessive
- C. it is an autosomal heredity
- D. when observing several traits concurrently each gene is located on a different chromosome

**208. Allele is:**

- A. mutation of a gene
- B. particular form of a gene
- C. deletion of a gene
- D. insertion in the gene

**209. What kinds of correlations of alleles can happen in a zygote?**

- A. dominancy
- B. recessivity
- C. codominancy
- D. heterocodominancy

**210. Heterozygote is individual:**

- A. with male or female sex distinguished
- B. with two different alleles for certain trait
- C. with two or more genes for certain trait
- D. with different chromosomes in pairs

**211. What is the heredity with complete dominance?**

- A. when both alleles in gene are dominant
- B. when in the phenotype of heterozygote, only the dominant allele is expressed
- C. when no recessive trait emerges
- D. when two dominant alleles are in the genotype of heterozygote

**212. If in the phenotype of a heterozygote, only the dominant allele is expressed, we can speak about:**

- A. intermediate inheritance
- B. heredity with complete dominance
- C. heredity with incomplete dominance
- D. nonhomologous heredity

**213. What is the heredity with incomplete dominance?**

- A. when no recessive trait emerges in population
- B. when dominant and recessive alleles are present in the genotype of heterozygote

C. when in the phenotype of heterozygote the dominant allele as well as recessive one is expressed

D. when in the phenotype of heterozygote both alleles are expressed

**214. If in the phenotype of a heterozygote both alleles for certain trait are expressed, we can speak about:**

A. double heredity

B. mixed heredity

C. heredity with incomplete dominance

D. intermediate inheritance

**215. How can we write down the cross of homozygous dominant individual with heterozygous individual?**

A.  $aa \times Aa$

B.  $AA \times AB$

C.  $AA \times Aa$

D.  $AA \times ab$

**216. How can we write down the cross of homozygous recessive individual with heterozygous individual?**

A.  $aa \times ab$

B.  $aa \times Aa$

C.  $AA \times Aa$

D.  $AA \times AB$

**217. Select the scheme(s) of the cross of homozygous dominant individual with heterozygous individual:**

A.  $AA \times Aa$

B.  $AA \times AB$

C.  $Aa \times ab$

D.  $AABB \times AaBb$

**218. Select the scheme(s) of the cross of heterozygous individual and homozygous recessive individual:**

A.  $AB \times aa$

B.  $Aa \times ab$

C.  $Aa \times aa$

D.  $AaBb \times aabb$

**219. Select the scheme of the cross of two heterozygous individuals:**

A.  $AA \times BB$

B.  $Aa \times Aa$

C.  $Aa \times Bb$

D.  $AaBb \times AaBb$

**220. Genotypic and phenotypic cross ratios differ when:**

- A. we speak about heredity with complete dominance
- B. we speak about heredity with incomplete dominance
- C. we speak about intermediate inheritance
- D. they always differ

**221. Genotypic and phenotypic cross ratios are identical when:**

- A. we speak about heredity with complete dominance
- B. we speak about heredity with incomplete dominance
- C. we speak about dihybridism
- D. they always differ

**222. Backcross (test cross) is the cross of:**

- A. two homozygous individuals
- B. two heterozygous individuals
- C. homozygous dominant individual and heterozygous individual
- D. homozygous recessive individual and heterozygous individual

**223. Red colour of flowers is completely dominant to white colour. What colour of flowers will the generation of hybrids have if white-flowered plants are crossed with red-flowered heterozygous plants?**

- A. only red
- B. only white
- C. pink
- D. white or red

**224. Red colour of flowers is completely dominant to white colour. What colour of flowers will the generation of hybrids have if white-flowered plants are crossed with red-flowered homozygous plants?**

- A. only red
- B. only white
- C. only pink
- D. white or red

**225. Red colour of flowers is completely dominant to white colour. What colour of flowers will the generation derived from red-flowered heterozygous plants have?**

- A. red and white in the ratio 3:1
- B. red and white in the ratio 1:1
- C. red, pink and white in the ratio 1:2:1
- D. only red

**226. Red colour of flowers is incompletely dominant to white colour. What colour of flowers will the generation of hybrids have if white-flowered plants are crossed with heterozygous plants?**

- A. 100% pink
- B. red and white in the ratio 1:1

- C. red, pink and white in the ratio 1:2:1
- D. white and pink in the ratio 1:1

**227. Red colour of flowers is incompletely dominant to white colour. What colour of flowers will the generation of hybrids have if white-flowered plants are crossed with red-flowered plants?**

- A. only red
- B. only white
- C. only pink
- D. white or red

**228. Red colour of flowers is incompletely dominant to white colour. What colour of flowers will the generation derived from heterozygous plants have?**

- A. red and white in the ratio 3:1
- B. red and white in the ratio 1:1
- C. red, pink and white in the ratio 1:2:1
- D. only red

**229. Who did discover the role the chromosomes play in heredity?**

- A. J. G. Mendel
- B. J. Watson
- C. T. H. Morgan
- D. G. H. Hardy

**230. When we speak about dihybridism, how can we write down the scheme of the cross of homozygous dominant (for both traits) with homozygous recessive (for both traits) parent?**

- A. AB x ab
- B. AABB x aabb
- C. AA x bb
- D. AA x BB

**231. When we speak about dihybridism, how can we write down the scheme of a cross of two heterozygous parents (for both traits)?**

- A. AB x ab
- B. Ab x Ab
- C. AABB x AAbb
- D. AaBb x AaBb

**232. When we speak about dihybridism, what alleles are formed by the individual, who is heterozygous for both traits?**

- A. AB, Ab, aB, ab
- B. AB, ab
- C. AA, aa, BB, bb
- D. A, a, B, b

**233. What is the number of recessive homozygotes in a panmictic population?**

- A.  $p \times p$

- B.  $p^2$
- C.  $2pq$
- D.  $q^2$

234. What is the number of heterozygotes in a panmictic population?

- A.  $pq^2$
- B.  $p + q$
- C.  $(p \times q) + (p \times q)$
- D.  $2pq$

235. What is the equation for the frequency of all genotypes in panmictic population?

- A.  $p^2 + 2pq + q^2 = 1$
- B.  $p + q = 1$
- C.  $p^2 + q^2 = 1$
- D.  $p^2 \times q^2 = 1$

236. If the gene has only two alternative forms, what is the equation of the frequency of alleles in the panmictic population?

- A.  $p^2 + 2pq + q^2 = 1$
- B.  $p + q = 1$
- C.  $p^2 + q^2 = 1$
- D.  $p^2 \times q^2 = 1$

237. Frequency of the dominant allele "A" is 50% and frequency of the recessive allele "a" is 50% in the population. What is the percentage of recessive homozygotes "aa" in this population?

- A. 25%
- B. 50%
- C. 0.5
- D. 0.25

238. Frequency of the dominant allele "A" is 50% and frequency of the recessive allele "a" is 50% in the population. What is the percentage of dominant homozygotes "AA" in this population?

- A. 25%
- B. 0.25
- C. 50%
- D. 0.5

239. Frequency of the dominant allele "A" is 50% and frequency of the recessive allele "a" is 50% in the population. What is the percentage of heterozygotes "Aa" in this population?

- A. 25%
- B. 0.25
- C. 50%
- D. 0.5

**240. 25% of population members carry the recessive trait. What is the frequency of members carrying the dominant trait in this population?**

- A. 75%
- B. 50%
- C. 0.75
- D. 0.25

**241. Polygenic system consists of:**

- A. neutral and recessive alleles
- B. quantitative alleles
- C. genes of small and large effect
- D. genes of small effect

**242. Phenotype of quantitative traits is the result of:**

- A. the combination of genotype and the environment effect
- B. the combination of genes of small effect and large effect
- C. the variability of polygenic system
- D. the sum of neutral and active alleles and the environment effect

**243. Heritability is:**

- A. the proportion of observable differences in a trait (quantitative) between individuals within a population that is due to genetic differences
- B. the relationship between neutral and active alleles
- C. the proportion of quantitative traits in the phenotype
- D. relationship between genotype and phenotype

**244. What does it mean if the heritability quotient for human height is  $h^2 = 0.7$ ?**

- A. dependence of human height on genotype is 70%, and on environment 30%
- B. 70% of alleles for human height is active and 30% is neutral
- C. human height is quantitative trait
- D. phenotypic variability of human height is 30%

**245. What does it mean if the heritability quotient is  $h^2 = 0$ ?**

- A. this trait does not depend on genotype
- B. it is the qualitative trait
- C. the trait depends only on environment
- D. the trait depends only on heredity

**246. What does it mean if the heritability quotient is  $h^2 = 1$ ?**

- A. this trait does not depend on genotype
- B. it is the quantitative trait
- C. the trait depends only on environment
- D. the trait depends only on genotype

**247. Is it true that all mammal females do have mammary glands in common?**

- A. yes, they produce milk, the basic nourishment for young offspring
- B. yes, but not all mammal females do have nipples
- C. no, egg laying mammals do not have lactic glands
- D. no, all mammals have the fur and female nipples (lactic) in common

**248. What is a meaning of the formation of septa in heart during the evolution?**

- A. it gave rise to small circulation, so the blood could get from lungs to the heart faster
- B. the blood circulation could be regulated better by heart valves
- C. oxygenated and deoxygenated blood was separated, so the efficiency of the use of oxygen increased
- D. simultaneously with increased blood volume in the heart of terrestrial animals, the blood pressure has been decreased

**249. Is it true that herbivores do have more complex digestive system than carnivores do?**

- A. no, the structure of digestive system depends on evolutionary level of an animal
- B. no, more complex digestive system is characteristic for carnivores, because meat food is more difficult to be digested
- C. yes, herbivore's stomach consists of 4 chambers and their intestine is longer
- D. yes, plants food is more difficult to be digested

**250. Which animals do have amniotic sac, that protects the foetus?**

- A. all of vertebrates
- B. just mammals
- C. egg laying animals
- D. terrestrial vertebrates

**251. Vertebrates are characteristic by lactation and nourishing of young offspring. Is it true that all vertebrates do have lactic glands?**

- A. no, they are not developed among egg laying mammals
- B. no, they are characteristic for placental mammals
- C. yes, but there is a difference in the development of nipples (lactic)
- D. yes, but egg laying mammals do not produce milk

**252. What are basic types of animal tissues?**

- A. epithelial, connective, muscle, nervous
- B. epithelial, osseous, muscle, nervous, blood
- C. epithelial, connective, chondral, osseous, blood, nervous, muscle
- D. squamous, osseous, chondral, muscle, nervous

**253. Ciliated epithelium of human body:**

- A. occurs in upper respiratory tract
- B. occurs in oviducts
- C. is located to three places in woman's body
- D. occurs in the organ of Corti

**254. What is the characteristic feature of epithelia?**

- A. stratified cell organization
- B. nourishment of upper cell levels is supplied by lower cell levels
- C. there is a lot of intercellular space
- D. they contain very little of intercellular matrix

**255. Which of the following options represents the real epithelium type?**

- A. absorptive
- B. adipose
- C. fibrous
- D. ciliated

**256. What types of muscle tissue do we know?**

- A. striated (excluding cardiac) and smooth
- B. striated, smooth and cardiac
- C. striated, involuntary and cardiac
- D. skeletal and smooth

**257. Skeletal muscle cell:**

- A. has the only one nucleus
- B. has more nuclei
- C. does not have the nucleus
- D. does not have mitochondria

**258. Cardiac muscle is (according to the structure):**

- A. striated, identical to skeletal
- B. a specific type of striated muscle
- C. the combination of skeletal and smooth muscle
- D. smooth with more nuclei

**259. Which of the following options is considered to be the set of supporting tissues?**

- A. connective tissue, cartilage, bone
- B. bone, collagen, periosteum
- C. epithelium, connective tissue, cartilage
- D. periosteum, collagen, connective tissue

**260. What does the absorptive epithelium provide?**

- A. substances uptake
- B. absorption
- C. excretion
- D. protection

**261. What do glandular epithelium cells provide?**

- A. absorption
- B. secretion

- C. excretion
- D. substances uptake

**262. What types of epithelia can be found in the digestive system of human body?**

- A. tectorial
- B. glandular
- C. absorptive
- D. sensory

**263. What type of epithelium does occur in respiratory tract?**

- A. respiratory epithelium
- B. ciliated epithelium
- C. mucin
- D. absorptive epithelium

**264. Which of the following options does provide the ability of contraction of muscle cells?**

- A. actin and myosin
- B. nervimuscular junction
- C. nerve fibres
- D. myofibrils

**265. Smooth muscles form the locomotion system of:**

- A. all protostomes
- B. flat worms, roundworms, annelids (ring worms) and molluscs
- C. flat worms and roundworms only
- D. protostomes, echinoderms and tunicates

**266. Striated (skeletal) muscles form the locomotion system of:**

- A. arthropods and vertebrates
- B. vertebrates only
- C. molluscs, arthropods and vertebrates
- D. terrestrial animals

**267. What fibres do form the striate muscle?**

- A. mononuclear fibres
- B. multinuclear fibres
- C. nonnuclear fibres
- D. fibres that originated from the fusion of several cells

**268. How many muscle fibres are there in the striated muscle (skeletal) fascicle?**

- A. 10 – 100
- B. no more than 10
- C. several hundreds
- D. more than 1000

**269. How do we call the state of muscle tension?**

- A. muscle contraction
- B. muscle cramp
- C. muscle tone
- D. muscle excitability

**270. Tendons and protective capsules of vital organs consist of:**

- A. cartilage
- B. connection tissue
- C. epithelium
- D. tissue

**271. Cartilage occurs:**

- A. in intervertebral discs
- B. on the surface of bones
- C. in an epiglottis
- D. in teeth

**272. Periosteum provides:**

- A. protection as a bone capsule composed of connective tissue
- B. bone thickening and regeneration
- C. blood cells production
- D. the nourishment supply for the bone

**273. Spongy osseous tissue occurs:**

- A. in flat bones
- B. in the middle of long bones
- C. in heads of long bones
- D. on the surface of bones

**274. We can say about bone marrow:**

- A. when young, it is red, by ageing turns yellow
- B. it provides haematopoiesis in all bones during lifetime
- C. during adulthood, it provides haematopoiesis in certain bones
- D. it nourishes the bone

**275. What has to be joined if we speak about complex joints?**

- A. 2 bones by connective tissue
- B. 3 and more bones
- C. at least 4 bones
- D. bones and tendons

**276. What is the most complex joint in human body?**

- A. elbow joint
- B. hip joint

- C. neck joint
- D. knee joint

**277. How are bones connected to each other, besides the joints?**

- A. by epithelial tissue
- B. by fibrous connective tissue
- C. by osseous tissue
- D. by cartilage

**278. What parts of long bones do we distinguish?**

- A. the middle part- diaphysis
- B. expanded joint ends – epiphysis
- C. growth plates – hypophysis
- D. upper and lower parts – paralysis

**279. How many bones does the adult human skeleton consist of?**

- A. 103
- B. 206
- C. 312
- D. 316

**280. Which bones do form the neurocranium (brain case)?**

- A. occipital, zygomatic, temporal, parietal, frontal
- B. occipital, sphenoid, temporal, parietal, frontal
- C. occipital, sphenoid, zygomatic, frontal
- D. temporal, palate, parietal, zygomatic

**281. Which bones do form the splanchnocranium (facial skeleton)?**

- A. vomer
- B. lacrimal
- C. sphenoid
- D. zygomatic

**282. Girdle of the upper limb consists of:**

- A. humerus and scapula
- B. sternum (breastbone) and humerus
- C. clavicle and scapula
- D. clavicle and sternum

**283. Girdle of the lower limb (pelvic girdle) consists of:**

- A. 2 pelvic bones and sacrum
- B. 2 pelvic bones, pubic bone and sacrum
- C. 1 pelvic bone, pubic bone and coccyx
- D. 1 pelvic bone, sacrum and pubic bone

**284. How many vertebrae does the backbone (spine) consist of?**

- A. 5 cervical, 12 thoracic, 5 lumbar, 7 sacral and 4-5 coccygeal
- B. 7 cervical, 12 thoracic, 5 lumbar, 5 sacral and 4-5 coccygeal
- C. 7 cervical, 12 thoracic, 7 lumbar, 5 sacral and 4-5 coccygeal
- D. 5 cervical, 7 thoracic, 5 lumbar, 5 sacral and 4-5 coccygeal

**285. Rib (thoracic) cage consists of:**

- A. 12 thoracic vertebrae, 12 rib pairs and sternum (breast bone)
- B. 12 rib pairs, sternum (breast bone) and 1 pair of scapulae
- C. 12 pairs of thoracic vertebrae, sternum (breast bone) and 12 ribs
- D. 12 rib pairs, diaphragm and sternum (breast bone)

**286. Which vertebrae are fused in adults?**

- A. sacral and coccygeal
- B. lumbar and sacral
- C. iliac, ischiac and pubic
- D. sacral and pelvic

**287. What bones is the hand consisted of?**

- A. 7 carpal bones, 5 metacarpal bones and 15 phalanges
- B. 8 carpal bones, 5 metacarpal bones and 14 phalanges
- C. 8 carpal bones, 4 metacarpal bones and 14 phalanges
- D. 7 carpal bones, 4 metacarpal bones and 12 phalanges

**288. Pelvis consists of 3 individual bones:**

- A. pubic bone, ischium and sacrum
- B. ischium, sacrum and ilium
- C. ischium, pubic bone and ilium
- D. pubic bone, ilium and sacrum

**289. Which spinal curvature may cause health problems?**

- A. kyphosis
- B. scoliosis
- C. osteoporosis
- D. lordosis

**290. Diaphysis is:**

- A. the middle part of long bone
- B. the head of long bone
- C. the growth plate
- D. the inner part of bone

**291. Epiphysis is:**

- A. the head of the joint of long bone
- B. the middle part of long bone

- C. the sigmoid curvature of the spine
- D. the spot of connection of two bones

**292. Knee joint consists of:**

- A. femur
- B. fibula
- C. tibia
- D. patella (knee cap)

**293. Which bone does not form the knee joint?**

- A. femur
- B. fibula
- C. radius
- D. tibia

**294. Meniscus is:**

- A. the tendon that tightens the calf muscle to the heel
- B. the connective tissue in the knee joint
- C. is scientific term for knee cap
- D. semilunar cartilage between femur and tibia

**295. How is the disease resulting to bones getting thin called?**

- A. rachitis
- B. osteoporosis
- C. lordosis
- D. scoliosis

**296. What is connected by the connective tissue?**

- A. flat bones of the skull
- B. teeth and dental alveoli in lower and upper jaw
- C. bones of pelvis
- D. ribs and sternum (breast bone)

**297. What is connected by a cartilage?**

- A. ribs and sternum (breast bone)
- B. vertebrae of sacrum and coccyx
- C. bodies of vertebrae
- D. bones of girdles (lower and upper)

**298. What is the difference between atlas (vertebra) and other vertebrae?**

- A. it does not have a body
- B. it is formed only by the anterior and posterior arch
- C. its body is projected into the dens, by which it is connected with axis (vertebra)
- D. there is a fossette (for axis dens) in the anterior arch

- 299. What is the difference between axis (vertebra) and other vertebrae?**
- A. there is a fossette (for axis dens) in the anterior arch
  - B. its body is projected into the dens, by which it is connected with atlas (vertebra)
  - C. it is formed only by the anterior and posterior arch
  - D. it does not have a body
- 300. Osteoporosis is disease resulting in:**
- A. periosteum damage
  - B. the higher risk of fracture
  - C. the low bone density
  - D. the knee joint abrasion
- 301. How many skeletal muscles are there (approximately) in the human body?**
- A. 300
  - B. 400
  - C. 600
  - D. 800
- 302. What percentage of total body mass do muscles form?**
- A. 36% (men)
  - B. 32% (women)
  - C. 36% (both sexes)
  - D. 30% (both sexes)
- 303. What does it mean if we say that muscles are antagonistic to each other?**
- A. one acts against the other
  - B. if one is contracted, the other is relaxed
  - C. they cooperate
  - D. they are complementary
- 304. What does it mean if we say that muscles are synergic to each other?**
- A. they are complementary during their motion
  - B. one acts against the other
  - C. their interaction is not possible
  - D. they work co-ordinately
- 305. What muscles are used for the facial (mood) expression?**
- A. just mimic
  - B. just masticatory
  - C. mimic together with masticatory
  - D. mimic and cervical
- 306. Trapezius muscle provides:**
- A. the position of scapula
  - B. movements of upper limb

- C. the movement of knee joint
- D. breathing movements

**307. Achilles tendon attaches:**

- A. calf muscle to knee
- B. sartorius muscle to the tibia
- C. calf muscle to calcaneus (heel bone)
- D. straight muscle of thigh (rectus femoris muscle) to calcaneus (heel bone)

**308. What is the longest muscle in the human body?**

- A. quadriceps femori muscle
- B. sartorius muscle
- C. triceps surae muscle (calf muscle)
- D. deltoid muscle

**309. What does the “muscle tonus” mean?**

- A. the state of residual muscle tension
- B. process of muscle contraction
- C. muscle tiredness (muscle fever)
- D. the state by which the metabolites are cumulated in muscles

**310. What is the role of supra- and subhyoid muscles?**

- A. they assist in mastication and swallowing
- B. they assist in eye moving
- C. they assist in coordinated tongue moving
- D. they assist in holding the head in the upright position

**311. Trunk muscles consist of:**

- A. back muscle group, chest muscle group, abdomen muscle group and pelvic floor muscle group
- B. chest muscle group and abdomen muscle group
- C. back muscle group and chest muscle group
- D. back muscle group, chest muscle group and abdomen muscle group

**312. What muscles do belong to the surface back muscle group?**

- A. trapezoid muscle
- B. latissimus dorsi muscle
- C. deltoid muscle
- D. rotatores muscles

**313. What are the major muscles that control inhaling?**

- A. external intercostal muscles
- B. internal intercostal muscles
- C. diaphragm
- D. abdominal muscles

**314. What are muscles that control exhaling?**

- A. diaphragm
- B. external intercostal muscles
- C. abdominal muscles
- D. internal intercostal muscles

**315. We can say about diaphragm:**

- A. it separates the chest and abdominal cavity
- B. it separates the abdominal cavity and pelvic floor muscles
- C. its movement downward helps the exhalation
- D. its movement upward helps the inhalation

**316. What do abdominal muscles provide?**

- A. they form the abdominal press
- B. they help to defecate
- C. they help to empty the bladder
- D. they help to inhale

**317. We can say about deltoid muscle:**

- A. it belongs to the pelvic floor muscle group
- B. it belongs to the back muscle group
- C. it forms the upper limb girdle
- D. it helps to stretch arms sideways

**318. We can say about sartorius muscle:**

- A. it belongs to the anterior femur muscle group
- B. it is the flexor of femur
- C. it is the extensor of femur
- D. it is quadriceps

**319. What morphological parts can we recognize on muscle?**

- A. head, belly and a tail
- B. head and body
- C. body and projection
- D. body, fascicles and muscle fiber

**320. What is the functional element of locomotion system?**

- A. interconnection of muscle and bone
- B. nervimuscular junction
- C. motor unit (interconnection between nerve and muscle)
- D. myofibrile

**321. The main energy source for the muscle contraction is:**

- A. sugar (saccharide)
- B. protein

- C. lipid
- D. nucleic acid

**322. What is formed by the muscle contraction?**

- A. nervimuscular junction
- B. myoglobin
- C. musculin
- D. actin-myosin complex

**323. What basic proteins do myofilaments (muscle fibers) contain?**

- A. actin and proline
- B. myosin and arginine
- C. actin, arginine and proline
- D. actin and myosin

**324. Muscle fever originates from:**

- A. the metabolites cumulation in muscle fibres
- B. the deficiency of oxygen
- C. the formation of actin-myosin complex failure
- D. the muscle tiredness

**325. How many primary teeth (milk teeth; deciduous teeth) does human have?**

- A. 32
- B. 20
- C. 14
- D. 24

**326. What teeth are never included in primary teeth (milk teeth; deciduous teeth)?**

- A. canines
- B. premolars
- C. molars
- D. incisors

**327. What teeth are included in primary teeth (milk teeth; deciduous teeth)?**

- A. 4 incisors, 8 molars, 4 premolars
- B. 8 incisors, 2 canines, 6 molars
- C. 8 incisors, 4 canines, 8 molars
- D. 4 incisors, 8 canines, 8 molars

**328. Peristaltic contractions are:**

- A. contractions of esophagus wall that propel food from esophagus towards the stomach
- B. reflex contractions during the food swallowing
- C. contractions of stomach wall as a result of the defensive mechanism causing vomiting
- D. contractions of stomach wall providing the food mixing

**329. Which of salivary glands are be considered to be large salivary glands?**

- A. subhyoid, submandibular, parotid
- B. sublingual, submandibular, parotid
- C. submandibular, submaxillary, parotid
- D. parotid, suhyoid, maxillary

**330. Saliva contains:**

- A. ptyalline
- B. chymosine
- C. amylases
- D. lysozyme

**331. Is it true that in buccal (oral) cavity the absorption takes place?**

- A. no, only mechanical and chemical digestion take place here
- B. no, the very beginning place of absorption is the stomach
- C. yes, the saccharides absorption starts here
- D. yes, some poisons and drugs are absorbed here

**332. What is the name of the flap that encloses the entrance of the larynx during swallowing?**

- A. epiglottis
- B. hyoid bone
- C. pharynx
- D. esophagus

**333. What is the average stomach volume of adult human?**

- A. 0.5 – 1l
- B. 1 – 2l
- C. 2 – 3l
- D. 3 – 5l

**334. What is stomach wall consisted of?**

- A. mucosa and 3 layers of smooth muscle
- B. mucosa, submucosa, smooth muscle and cartilage cover
- C. mucosa, submucosa and 3 layers of smooth muscle
- D. 3 layers of muscle covered with mucosa

**335. Mucin is:**

- A. protective layer of stomach wall formed by connective tissue
- B. alkaline (basic) mucus
- C. contained in gastric juice
- D. the activator of pepsinogen

**336. What role does the hydrochloric acid play in digestion?**

- A. it activates the inactive pepsinogen
- B. it modifies minerals substances chemically

- C. it prevents the C vitamin destroying
- D. it prevents B vitamin group destroying

**337. What enzymes are secreted by stomach mucosa?**

- A. pepsin, chymosine and lipase
- B. pepsin, mucin and HCl
- C. lipase, amylase and pepsin
- D. mucin, pepsin, lipase and chymosin

**338. Which of the following ducts (veins, arteries) does enter the duodenum?**

- A. common bile duct
- B. pancreatic duct
- C. portal vein
- D. hepatic artery

**339. The most intense absorption occurs in:**

- A. stomach
- B. large intestine
- C. pancreas
- D. small intestine

**340. What is the most important organ of absorption in vertebrates?**

- A. large intestine
- B. small intestine
- C. buccal cavity
- D. rectum

**341. The digestive gland(s) is:**

- A. villi and microvilli
- B. liver
- C. gall bladder
- D. salivary glands

**342. We can say about bile:**

- A. it is produced by liver
- B. it is produced by gall bladder
- C. it emulsifies fats and helps their digestion
- D. it contains the lipase (enzyme)

**343. Gall bladder provides:**

- A. the bile production
- B. the lipase production
- C. the bile storage
- D. the bile decomposition

**344. What enzyme is present in saliva of vertebrates?**

- A. trypsin
- B. trypsinogen
- C. lipase
- D. amylase

**345. What enzymes are involved in saccharide digestion?**

- A. ptyaline
- B. lipase
- C. chymosin
- D. amylase

**346. What part of digestive tract does the saccharide digestion start in?**

- A. buccal cavity
- B. stomach
- C. duodenum
- D. small intestine

**347. What parts of digestive tract does the carbohydrates digestion occur in?**

- A. buccal (oral) cavity
- B. stomach
- C. duodenum
- D. pancreas

**348. Which enzymes are involved in protein digestion?**

- A. pepsin
- B. trypsin
- C. mucin
- D. lysozyme

**349. What parts of digestive tract does the protein digestion occur in?**

- A. buccal cavity
- B. stomach
- C. liver
- D. duodenum

**350. What is the function of HCl in the gastric juice?**

- A. it activates pepsinogen
- B. it prevents the destroying of B and C vitamins
- C. it protects the stomach wall against self-digestion
- D. it destroys pathogenic microorganisms

**351. What is the function of mucin in the digestive system?**

- A. it activates pepsin together with HCl
- B. it protects the mucosa against the effect of pepsin and HCl

- C. it breaks down proteins
- D. it is effective against bacteria

**352. What is gastric juice consisted of?**

- A. HCl, pepsin, trypsin, mucin
- B. mucin, HCl, pepsin, lysozyme
- C. HCl, pepsin, mucin
- D. pepsin, amylase, ptyaline

**353. What enzymes does the gastric juice contain?**

- A. pepsin, lipase, chymosin
- B. pepsin, mucin, ptyaline
- C. chymosin, mucin, pepsin
- D. amylase, lipase, trypsin

**354. What is the largest gland in the human body?**

- A. pancreas
- B. thyroid gland
- C. parotid salivary gland
- D. liver

**355. Which parts is small intestine consisted of?**

- A. duodenum
- B. jejunum
- C. pancreas
- D. ileum

**356. What parts of digestive tract does the fat digestion occur in?**

- A. buccal (oral) cavity
- B. stomach
- C. small intestine
- D. large intestine

**357. What is the role of chymosin (enzyme) in digestion?**

- A. it helps to curdle the milk (by infants)
- B. it breaks down fats
- C. it helps to digest carbohydrates
- D. it activates pepsinogen

**358. What enzymes are important in fat digestion?**

- A. bile
- B. lipase
- C. amylase
- D. trypsin

**359. What enzymes are present in pancreatic juice?**

- A. trypsin, amylase, ptyalin
- B. pepsin, trypsin, lipase
- C. bile, lipase, ptyalin
- D. lipase, amylase, trypsin

**360. Where does the digestion (chemical food processing) begin?**

- A. in buccal (oral) cavity
- B. in esophagus
- C. in stomach
- D. in small intestine

**361. Bile contains enzymes that help to break down:**

- A. carbohydrates
- B. fat
- C. proteins
- D. it does not contain any enzyme

**362. Pancreas is a gland that produces:**

- A. only hormones
- B. only pancreatic juice with enzymes
- C. hormones and digestive(pancreatic) juice
- D. it is not a gland

**363. The gastric juice of human contains:**

- A. HCl, mucin, pepsin, lipase, chymosin
- B. HCl, mucin, pepsin, amylase
- C. only HCl, pepsin and chymosin
- D. only HCl, lipase, chymosin and pepsin

**364. We can say about taste cells (receptors) in buccal (oral) cavity of human:**

- A. they can distinguish 5 various taste qualities
- B. they can distinguish 4 various taste qualities
- C. all of them are evenly distributed in the buccal (oral) cavity
- D. they are stored in taste buds of tongue

**365. Which of the following options does contain salivary glands that open into the buccal (oral) cavity?**

- A. sublingual, submaxillar, zygomatic
- B. parotic, submaxillar, zygomatic
- C. submaxillar, sublingual, parotic
- D. submandibular, sublingual, parotic

**366. What is the length of human large intestine?**

- A. cca 1.5 m

- B. cca 2.5 m
- C. cca 0.5 m
- D. cca 3 m

**367. What happens in large intestine?**

- A. reabsorption of water and salts
- B. intestinal gas production by intestinal bacteria
- C. completion of nutrients absorption (carbohydrates, fats, proteins)
- D. completion of fat absorption

**368. The end product of the digestion of saccharides is:**

- A. glucose
- B. fructose
- C. galactose
- D. maltose

**369. The end products of the digestion of fats are:**

- A. fatty acids
- B. amino acids
- C. glycerol
- D. glucose

**370. The end products of the digestion of protein are:**

- A. mono peptides
- B. amino acids
- C. nucleotides
- D. fatty acids

**371. Vitamins form the important part of nutrition because:**

- A. they serve as antioxidants in an organism
- B. they prevent the breakdown of proteins
- C. they catalyse the biochemical reactions
- D. they support the resistance of organism

**372. The lack of C vitamin causes:**

- A. hypervitaminosis
- B. scurvy (scorbut)
- C. rachitis
- D. colour blindness

**373. The excess of a vitamin in an organism is known as:**

- A. avitaminosis
- B. hypovitaminosis
- C. multivitaminosis
- D. hypervitaminosis

**374. What does the lack of vitamin in an organism cause?**

- A. avitaminosis
- B. hypovitaminosis
- C. multivitaminosis
- D. hypervitaminosis

**375. The important factor of blood coagulation is:**

- A. B vitamin
- B. D vitamin
- C. E vitamin
- D. K vitamin

**376. Vitamin D is:**

- A. anticoagulant
- B. anti-rachitic vitamin
- C. anti-infective vitamin
- D. anti-scurvy vitamin

**377. Components of the upper respiration tract are:**

- A. paranasal sinuses, nasopharynx, pharynx
- B. nasal cavity and paranasal sinuses
- C. nasal cavity and nasopharynx
- D. nasal cavity and pharynx

**378. Lower respiration tract consists of:**

- A. pharynx, larynx and bronchial tubes
- B. nasopharynx, pharynx and bronchial tubes
- C. larynx, trachea and bronchial tubes
- D. trachea and bronchial tubes

**379. Vocal folds (plica vocalis) are:**

- A. stored in laryngeal cavity
- B. 2 vocal cords surrounding an opening between true vocal folds
- C. made of thin membranous epithelium
- D. longitudinal laryngeal cartilages

**380. Visceral (pulmonary) pleura is:**

- A. delicate serous membrane that covers the surface of the lung
- B. artery that carries the oxygenated blood to lungs
- C. vein that carries the oxygenated blood out of lungs
- D. a part of trachea that enters lungs

**381. Alveoli are:**

- A. branched capillaries in lungs
- B. vesicles in lungs

- C. places of gas interchanging in lungs
- D. olfactory receptors in nasal cavity

**382. Pulmonary ventilation is:**

- A. the interchange of respiratory gases between alveoli and blood
- B. the pulmonary examination with spirometer
- C. the air interchange between lungs and the environment
- D. the alternation of inhaling and exhaling

**383. Vital capacity of lungs is:**

- A. the total volume of lungs
- B. the respiratory surface of lungs
- C. the volume of the air interchanged in lungs in 1 minute
- D. maximum amount of air that can be expelled from the lungs after a maximum inhalation

**384. External respiration is:**

- A. the gas interchange between lungs and the environment
- B. the gas interchange between alveoli and the blood
- C. the gas diffusion through the alveolar-capillary membrane
- D. the alternation of inhale and exhale

**385. Internal breathing is:**

- A. passing of the oxygen from lungs to the blood
- B. the gas interchange between the blood and tissues
- C. the cell breathing process(es)
- D. the formation of oxy-hemoglobin

**386. Respiratory centre of human body is:**

- A. in diencephalon
- B. in medulla oblongata and pons
- C. on the floor of 4<sup>th</sup> brain ventricle
- D. in temporal brain lobe

**387. What muscles are important for breathing of vertebrates?**

- A. abdominal muscles
- B. intercostal muscles
- C. pectoral muscles
- D. diaphragm

**388. The interchange of gases across the alveolar-capillary membrane is provided:**

- A. by osmosis
- B. by diffusion
- C. by ionic interaction
- D. along the concentration gradient

**389. What components of blood do provide the CO<sub>2</sub> transport from tissues to the blood?**

- A. red blood cells
- B. white blood cells
- C. blood plasma
- D. lymph

**390. During the gas interchange the carbon dioxide in alveoli:**

- A. is bonded to heme
- B. is bonded to globin
- C. is bonded to plasma
- D. diffuses from blood to the alveolar space

**391. During the inflammatory disease the erythrocyte sedimentation rate:**

- A. increases
- B. decreases
- C. does not change
- D. is irregular

**392. What is the percentage of water in blood plasma?**

- A. 91 – 92%
- B. 80 – 90 %
- C. 70 – 80%
- D. 93 – 97%

**393. What are the functions of red blood cells?**

- A. transfer of respiratory gases
- B. nutrition transfer
- C. pH maintaining
- D. thermoregulation

**394. What is oxygen in red blood cells bonded to?**

- A. heme
- B. agglutinin
- C. iron
- D. hemoglobin

**395. What group of animals does have red blood cells without the nucleus?**

- A. all mammals
- B. all birds
- C. none of vertebrates
- D. only fish and amphibians do have nucleus in red blood cells

**396. We can say about red blood cells of mammals:**

- A. they do not have any organelles
- B. they are of discoid shape

- C. they do not have a nucleus
- D. they contain hemoglobin

**397. What is red blood cell functional lifetime?**

- A. 12 days
- B. 120 days
- C. 1200 days
- D. more than 1200 days

**398. Red blood cells are produced:**

- A. in bone marrow
- B. also in liver at the beginning of embryogenesis
- C. also in lymphatic nodes at the beginning of embryogenesis
- D. in spleen

**399. Where are red blood cells degraded?**

- A. in liver
- B. in spleen
- C. in lymphocytes
- D. in lymphatic nodes

**400. Hematocrit is:**

- A. the amount of red blood cells
- B. the amount of white blood cells
- C. red blood cells and white blood cells ratio
- D. percentage of red blood cells in a total blood volume

**401. Thrombocytes (blood platelets) are produced:**

- A. in liver
- B. in spleen
- C. in lymphatic nodes
- D. in bone marrow

**402. What processes do help to stop bleeding?**

- A. vasoconstriction
- B. hemocoagulation
- C. agglutination
- D. activation of trombocytes

**403. What is vasoconstriction?**

- A. it is the reaction of vessel after injury
- B. it is the process of red blood cell passing to tissues
- C. it is the reaction of agglutininogen and agglutinine
- D. it is the conversion of fibrinogen to fibrin

**404. What is hemocoagulation?**

- A. it is examination prior to blood transfusion
- B. it is sedimentation of red blood cells
- C. it is a formation of a blood clot
- D. it is a rection of blood vessel to injury

**405. Which of the following organs participate in immunity?**

- A. thymus
- B. spleen
- C. lymph nodes
- D. bone marrow

**406. Thymus serves for:**

- A. maturation of T-lymphocytes
- B. maturation of B-lymphocytes
- C. destruction of worn-out red blood cells
- D. production of hormones

**407. We can say about thymus (sweetbread):**

- A. it is the central organ of lymphatic system
- B. T-cells mature there to form imunocompetent cells
- C. in the adulthood the lymphatic tissue is substituted with adipose tissue
- D. in the adulthood it turns to spleen

**408. The lymphatic system consists of:**

- A. the system of open lymphatic vessels
- B. the thin capillaries opened into blood circulatory system
- C. lymphatic nodes
- D. liver

**409. B-lymphocytes provide:**

- A. the cell immunity
- B. the antibody immunity
- C. the cytotoxic reaction
- D. the allergic reaction

**410. What cells do provide the antibody immunity?**

- A. T-lymphocytes
- B. B-lymphocytes
- C. H-lymphocytes
- D. memory cells

**411. Natural (inborn) immunity depends:**

- A. just on T-lymphocytes
- B. just on B-lymphocytes

- C. on genetics
- D. on active immunity

**412. Passive antibodies are:**

- A. produced after the infection
- B. produced after vaccination
- C. delivered into the organism as ready-made or are obtained from mother
- D. are produced after conquering the infective disease

**413. How do we know that there are some inflammatory processes in our body?**

- A. the sedimentation is of higher rate
- B. the sedimentation is of lower rate
- C. there is an increase in number of white blood cells
- D. there is an increase in number of red blood cells

**414. How many blood types do humans have?**

- A. 2
- B. 3
- C. 4
- D. 5

**415. Where is the antigen of blood type located?**

- A. on the surface of white blood cells
- B. on the surface of red blood cells
- C. on the surface of blood platelets
- D. in blood plasma

**416. If the agglutinin is B and agglutinin anti A, what blood type are we speaking about?**

- A. B
- B. A
- C. 0
- D. AB

**417. If the agglutinin is A and agglutinin anti B, what blood type are we speaking about?**

- A. A
- B. B
- C. 0
- D. AB

**418. If there is no agglutinin on the surface of erythrocytes, and if there is agglutinin anti A and anti B in blood plasma, what blood type are we speaking about?**

- A. B
- B. A
- C. 0
- D. AB

**419. What blood types can patient with blood type of AB receive?**

- A. AB
- B. A
- C. 0
- D. B

**420. During the cardiac cycle:**

- A. the ventricular systole and atrial diastole alternate
- B. the atrial systole and ventricular diastole alternate
- C. the systole of right heart side and the diastole of left heart side alternate
- D. systole and diastole alternate

**421. Veins are vessels that:**

- A. carry blood towards the heart
- B. carry blood towards the right side of heart
- C. carry just deoxygenated blood
- D. have valves

**422. Arteries are vessels that:**

- A. carry blood towards left side of heart
- B. carry just oxygenated blood
- C. carry blood away from the heart
- D. have thicker walls than veins

**423. Capillaries are vessels that:**

- A. form the distributional system of vessels
- B. are formed only by one cell layer
- C. provide the nutrition interchange between the blood and tissues
- D. form the open system of vessels

**424. Coronary arteries form:**

- A. vessel network around alveoli
- B. their own cardiac cycle
- C. the blood cycle in kidneys
- D. capillary network anywhere in organism

**425. The normal resting heart rate of healthy human is:**

- A. 50 per minute
- B. 70 per minute
- C. 90 per minute
- D. 100 per minute

**426. Minute volume of the heart is:**

- A. amount of blood expelled per minute
- B. amount of blood which is oxygenated per minute

- C. 5 liters of blood in average
- D. 2 liters of blood in average

**427. Blood pressure is measured by:**

- A. spirometer
- B. sphygmomanometer
- C. at a person's upper arm (vein)
- D. at a person's upper arm (artery)

**428. Aorta originates from:**

- A. the left atrium
- B. the left ventricle
- C. the right ventricle
- D. the right atrium

**429. Pulmonary circulation starts:**

- A. in the right heart atrium
- B. in the right heart ventricle
- C. in the left heart ventricle
- D. in lungs

**430. The primary urine production is connected with:**

- A. renal corpuscle
- B. glomerular filtration
- C. Bowman's capsule
- D. canalicules of nephron

**431. Definitive urine is produced by:**

- A. renal tubules
- B. Bowman's capsule
- C. loop of Henle
- D. the process of reabsorption

**432. Homeostasis is:**

- A. stagnation in the organism development
- B. stable blood overflow through the heart
- C. the identical genome of mother and offspring
- D. the stability of an inner environment

**433. What substances should not be present in the urine of healthy person?**

- A. blood and pus
- B. proteins and carbohydrates
- C. a lot of proteins
- D. increased amount of carbohydrates

**434. What is the difference between female and male urethra?**

- A. female one is much shorter
- B. both are of the same length but part of female urethra is located in abdominal cavity
- C. female urethra provides only removing of urine from the body
- D. there is no difference between them

**435. According to what principle does the excretory system of humans work?**

- A. filtration of blood in kidneys
- B. excretion of blood to kidneys
- C. reabsorption of blood from kidneys
- D. dialysis of blood in kidneys

**436. Renal tubules enter:**

- A. the bladder
- B. the renal calyx
- C. the renal pelvis
- D. the efferent vein

**437. What pigment does cause the skin coloration?**

- A. keratin
- B. melanin
- C. tubulin
- D. melatin (melatonin)

**438. What receptors are there in human skin?**

- A. warm and cold receptors, touch, pressure and pain receptors
- B. warm receptors and tactile receptors
- C. positional, balance, touch and pain receptors
- D. thermoreceptors, radioreceptors and mechanoreceptors

**439. When we speak about skin derivatives, what are we speaking about?**

- A. just hair, nails and hairs
- B. just hair and nails
- C. hair, nails, hairs, cutaneous glands and lactic glands
- D. just hair, nails, hairs and cutaneous glands

**440. Myelin sheath:**

- A. covers the axon
- B. covers dendrites as well
- C. covers only a body of neuron
- D. covers neuroglia

**441. Cerebrospinal fluid fills:**

- A. the space between dura mater and arachnoid mater
- B. the brain ventricles and central canal of spinal cord

- C. 2 ventricles of fore brain
- D. the central canal of spinal cord and the space between maters

**442. What type of nerves does the vagus nerve belong to?**

- A. cranial nerves
- B. thoracic nerves
- C. spinal nerves
- D. autonomic nerves

**443. How many cranial nerves does the human have?**

- A. 7 pairs
- B. 14
- C. 20
- D. 12 pairs

**444. How many lumbar nerves does the human have?**

- A. 10 pairs
- B. 7 pairs
- C. 5 pairs
- D. 8 pairs

**445. What part of central nervous system is the evolutionary youngest?**

- A. diencephalon
- B. midbrain
- C. cerebral cortex
- D. medulla oblongata

**446. What brain part is considered to be the main control centre of inner organs?**

- A. medulla oblongata
- B. hypothalamus
- C. cerebral cortex
- D. cerebellum

**447. What nerve centre is involved in the balance maintenance of human body?**

- A. cerebral cortex
- B. medulla oblongata
- C. diencephalon
- D. cerebellum

**448. Where is the coordination centre located?**

- A. in diencephalon
- B. in thalamus
- C. in cerebellum
- D. in medulla oblongata

**449. Cerebellum contributes to the control of:**

- A. movement coordination
- B. motoric reflexes
- C. balance maintenance
- D. face mimics

**450. How many brain ventricles are there in the brain?**

- A. 2
- B. 4
- C. 6
- D. 3

**451. Medulla oblongata contributes to the control of:**

- A. movement coordination
- B. face mimics
- C. vital reflexes
- D. the heart and vessels activity

**452. Pons (pons Varolii) serves as:**

- A. the centre of movement coordination and balance maintenance
- B. the centre of digestion reflexes
- C. the interconnection between the spinal cord and diencephalon with other brain parts
- D. the centre of unconditioned reflexes

**453. What are the brain and spinal cord covered with?**

- A. dura mater
- B. arachnoid mater
- C. tela chorioidea
- D. pia mater

**454. Hormones are substances from chemical point of view:**

- A. lipids
- B. phospholipids
- C. proteins
- D. carbohydrates

**455. The basic principle of hormonal regulation is:**

- A. aktivation of biochemical processes
- B. inhibition of biochemical processes
- C. feedback principle
- D. maintenance of constant hormone levels

**456. Where do endocrinal glands secrete their product?**

- A. blood
- B. surrounding tissue

- C. lymph
- D. cerebrospinal fluid

**457. Insulin is produced:**

- A. in the islets of Langerhans in liver
- B. in the islets of Langerhans in pancreas
- C. in Malpighi cells of adrenals
- D. in Purkinje cells of cerebellum

**458. What gland does produce the melatonin hormone?**

- A. anterior pituitary (fore part of hypophysis)
- B. posterior pituitary (hind part of hypophysis)
- C. pancreas
- D. pineal gland (epiphysis)

**459. What does the suprarenal gland produce?**

- A. androgenic hormones
- B. cortisone
- C. adrenalin and noradrenalin
- D. cortisone and hydrocortisone

**460. What gland is the thyrotrophic hormone produced by?**

- A. thyroid gland
- B. pituitary gland (hypophysis)
- C. pineal gland (epiphysis)
- D. adrenal gland

**461. What is the role of adrenalin?**

- A. it helps to break the stress
- B. it increases the blood pressure
- C. it increases the blood sugar level
- D. it calms the nervous system down

**462. Which hormone does cause the blood sugar level decrease?**

- A. glucagon
- B. insulin
- C. adrenalin
- D. amygdalin

**463. Which hormone does provide the glycogen cleavage in the liver and production of the glucose from amino acids?**

- A. glucose
- B. insulin
- C. adrenalin
- D. glucagon

**464. What hormone does regulate the blood sugar level?**

- A. glucose
- B. insulin
- C. adrenalin
- D. cortisone

**465. We can say about somatotrophic hormone:**

- A. it is the growth hormone
- B. it is produced by anterior pituitary (adenohypophysis)
- C. it is species specific
- D. its insufficiency in pubescence causes the acromegaly

**466. The excess of the growth hormone may cause:**

- A. nanism
- B. cretinism
- C. gigantism
- D. acromegaly

**467. What gonadotrophic hormones do we know?**

- A. pineal gland (epiphysis) hormones
- B. reproductive gland hormones
- C. hormones, that stimulate the activity of reproductive glands
- D. adenohypophysis hormones

**468. We can say about epiphysis (pineal gland):**

- A. it occurs in diencephalon
- B. it occurs in cerebellum
- C. it produces the melatonin hormone
- D. it produces the somatotrophic hormone

**469. The insufficiency of hormone of thyroid gland may cause:**

- A. nanism
- B. cretinism
- C. goiter (struma)
- D. acromegaly

**470. What type of receptors do thermoreceptors belong to?**

- A. mechanoreceptors
- B. photoreceptors
- C. chemo receptors
- D. radioreceptors

**471. We can say about proprioreceptors:**

- A. they are scattered throughout the corium (dermis)
- B. they inform about body position

- C. they occur in muscles and tendons
- D. they inform about pressure changes

**472. Which of the following options is mechanoreceptor?**

- A. static receptor (inner ear)
- B. organ of Corti
- C. proprioceptors
- D. ear bones

**473. Organ of Corti occurs in:**

- A. kidneys
- B. inner ear
- C. outer ear
- D. cochlear membranous labyrinth

**474. What does the Eustachian tube provide?**

- A. the perception of body position
- B. equalizing of the pressure between middle ear and nasopharynx
- C. the vibration of tympanic membrane (eardrum) during the sound perception
- D. the protection of vocal cords

**475. Tympanic membrane (eardrum) is located between:**

- A. external auditory canal and middle ear
- B. middle ear and cochlea
- C. Eustachian tube and middle ear
- D. cochlea and Eustachian tube

**476. Ear bones transmit the sound in the direction:**

- A. tympanic membrane (eardrum) - incus (anvil), malleus (hammer) - stapes (stirrup)
- B. tympanic membrane (eardrum) – malleus – incus – stapes
- C. malleus – incus – stapes – tympanic membrane (eardrum)
- D. tympanic membrane (eardrum) – stapes – malleus – incus

**477. Inner ear consists of:**

- A. Eustachian tube
- B. cochlea and semicircular canals
- C. three ear bones and cochlea
- D. cochlear membranous labyrinth

**478. What retinal receptors are used for colour perception (vision)?**

- A. rods
- B. cones
- C. chromatin
- D. chlorophyll

**479. Where are receptors for the perception of body position located?**

- A. in diencephalon
- B. in inner ear
- C. in middle ear
- D. in medulla oblongata

**480. Human vision is:**

- A. one-dimensional
- B. two-dimensional
- C. three-dimensional
- D. four-dimensional

**481. When do women start to produce egg cells?**

- A. during embryonic development
- B. in puberty
- C. after birth
- D. after achieving the ability to reproduce

**482. The men's spermatogenesis starts:**

- A. before birth
- B. after birth
- C. during puberty
- D. with sexual life

**483. How long does a sperm cell live?**

- A. 12 hours
- B. 24 hours
- C. 2 days
- D. 5 days

**484. How many sperm cells are formed during the spermatogenesis from one germ cell?**

- A. 2
- B. 3
- C. 4
- D. 5

**485. Prostate gland is:**

- A. paired endocrine organ
- B. unpaired exocrine organ
- C. unpaired organ made of connective tissue
- D. not a gland

**486. How long does the women's pregnancy last?**

- A. 260 days
- B. 270 days

- C. 280 days
- D. 290 days

**487. What days of menstrual cycle do provide the highest probability of woman being fertilized?**

- A. 12 – 16
- B. 17 – 21
- C. 22 – 26
- D. 27 – 31

**488. When is baby's gender determined?**

- A. in the first month of embryonic development
- B. in the third month of embryonic development
- C. by the birth
- D. in the moment of fertilization

**489. How many egg cells do mature in ovaries during the woman's reproductive phase?**

- A. 300
- B. 400
- C. 500
- D. 600

**490. Corpus luteum is formed:**

- A. from matured egg cell
- B. before egg cell maturation
- C. during ovulation
- D. from the cracked follicle

**491. What hormone does corpus luteum produce?**

- A. estrogene
- B. progesterone
- C. luteotrophic hormone
- D. testosterone

**492. Where is the corpus luteum formed?**

- A. on the kidney
- B. in testicle
- C. on ovary
- D. in the placenta

**493. Corpus luteum produces the progesterone:**

- A. during first 4 months of pregnancy
- B. during first 6 months of pregnancy
- C. during all pregnancy period
- D. it does not produce the progesterone

**494. What phases is ovarian cycle divided to?**

- A. ovogenesis, follicular and ovulation phase
- B. follicular, ovulation and luteal phase
- C. ovulation and menstrual phase
- D. progressive and regressive phase

**495. What phases is uterine cycle divided to?**

- A. menstrual, proliferative, secretory and ischemic phase
- B. ovulation, proliferative and secretory phase
- C. follicular, proliferative, secretory and ovulation phase
- D. secretory, menstrual, proliferative and ischemic phase\

**496. How many days after fertilization does the implantation of the fertilize ovum in the endometrium (nidation) take place?**

- A. during first 2 days after fertilization
- B. 2 – 4 days after fertilization
- C. 6 – 7 days after fertilization
- D. more than 10 days after fertilization

**497. The nutrition, respiration and excretion during the intrauterine development of foetus are provided by:**

- A. blastocyst
- B. placenta
- C. amnion
- D. umbilical cord

**498. Placenta is attached to uterus by:**

- A. chorionic villi
- B. umbilical cord
- C. placenta is the part of uterus
- D. the individual blood cycle

**499. How long does the embryonic development last?**

- A. from 1<sup>st</sup> – 5<sup>th</sup> week of development
- B. from 1<sup>st</sup> – 6<sup>th</sup> week of development
- C. from 1<sup>st</sup> – 8<sup>th</sup> week of development
- D. from 1<sup>st</sup> – 10<sup>th</sup> week of development

**500. How long does the foetal development last?**

- A. from 6<sup>th</sup> – 20<sup>th</sup> week of development
- B. from 9<sup>th</sup> – 35<sup>th</sup> week of development
- C. from 9<sup>th</sup> – 40<sup>th</sup> week of development
- D. from 10<sup>th</sup> – 40<sup>th</sup> week of development