



## MATURITNÍ TÉMATA

Školní rok:	2023/2024		
Ředitel školy:	PhDr. Karel Goš		
Předmětová komise:	Biologie Chemie		
Předseda předmětové komise:	Mgr. František Brauner, Ph.D.		
Předmět:	Biology		
	VI. A6	Mgr. Markéta Letáková, Ph.D.	
	VI. B6	Mgr. František Brauner, Ph.D.	
Schváleno předmětovou komisí dne:	29. 8. 2023	Podpis:	
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Počet výtisků:	4		
Výtisk č.:			

### 1. Structure and functions of eukaryotic cells.

- Identify organelles from the diagrams and photographs. Distinguish between plant and animal cells.
- Describe the functions of the organelles identified.
- Discuss how unicellular organisms (Protozoans) are specialised for their way of life.

### 2. Skeleton. Muscles and movement in animals.

- Describe bones in the human body.
- Describe the structure of the bone and types of bone connections.
- Name types of muscles and explain how their structure is related to their function in the human body and describe the mechanism of muscle contraction.

### 3. Animal nutrition with particular reference to human diet. Healthy diet.

- With reference to the diagram indicate the parts of the digestive system and describe the main processes taking place in each part of DS.
- Describe feeding in other animals (carnivores, herbivores and ruminants).
- Discuss what a healthy diet entails.

### 4. Nutrition in green plants.

- Draw and label the structure of a leaf.
- Describe the mechanism of photosynthesis; light dependent and light independent stages and speak about factors that influence the rate of photosynthesis.
- Discuss the differences in algal photosynthetic pigments.

### 5. Blood, heart, blood vessels. Immunity.

- Name the types of blood cells and describe their functions. Blood clotting.
- Describe the anatomy of the human heart and circulatory system. Describe the cardiac cycle and explain how the beating of the heart is controlled.
- Describe the role of the immune system. Compare the non-specific and specific immunity response. AIDS

6. **Describe the location and function of different tissues and organs found in angiosperms.**
  - a. *Draw tissue types: parenchyma, collenchyma, sclerenchyma.*
  - b. *Describe the function of different tissue types.*
  - c. *Discuss growth and hormonal control in plant life cycles.*
7. **Water and mineral absorption, transport and transpiration in plants.**
  - a. *Describe the structure of the root, stem and leaves according to the passage of water through a flowering plant.*
  - b. *Name metamorphoses of plant organs.*
  - c. *Discuss how a plant controls transpiration and name factors that influence transpiration.*
8. **Gas exchange and the biochemistry of respiration. Structure and function of the respiratory organs.**
  - a. *Describe the structure of the human respiratory system and explain how each part relates to its function.*
  - b. *Describe the biochemistry of cellular respiration. Explain the difference between aerobic and anaerobic respiration. Name diseases of the human respiratory system.*
  - c. *Speak about the phylogeny of the respiratory system.*
9. **Explain the fundamental differences which exist between prokaryotes and eukaryotes.**
  - a. *Draw and describe the structure of a bacterium. Bacterial diseases.*
  - b. *Cyanobacteria.*
  - c. *Identify given species of Protozoans and name the diseases they are responsible for.*
10. **Sense organs.**
  - a. *Discuss the role of sensory organs and state the basic categories of receptors.*
  - b. *Describe the principal parts of the eye of the vertebrates and explain how the eye generates sensations. Compare vision in vertebrates and other animals. Eye diseases and conditions.*
  - c. *With reference to the diagram describe the structure and function of the human ear.*
11. **Nervous system and nervous co-ordination in humans and other animals.**
  - a. *Describe a nerve cell and the two ways signals are transmitted.*
  - b. *Describe the organisation of the nervous system in humans. Identify and name functions of main parts of the human brain and the spinal cord.*
  - c. *Phylogeny of the nervous system.*
12. **Hormones in animals**
  - a. *Name the major endocrine glands in humans and name the hormones they secrete.*
  - b. *Describe the role of these hormones and problem caused by the malfunctions.*
  - c. *Discuss the role of hormones secreted by other animals (amphibians, arthropods)*
13. **Excretory system. Mammalian kidney. The skin.**
  - a. *Describe the structure and function of the human kidney; nephron.*
  - b. *Discuss the phylogeny of excretory system in different animal phyla.*
  - c. *Describe the structure and the function of the skin using a diagram and describe other types of the body coverings in different animals.*
14. **Human reproduction, development of embryo and foetus. Human life cycle.**
  - a. *Name the parts of the reproductive systems, shown on the diagram and describe the function of major parts.*
  - b. *Describe the hormonal control of human reproduction, the menstrual cycle, pregnancy and birth.*
  - c. *Contraceptive methods.*
15. **Cell division. Mitosis in plants and animals. Meiosis and gametogenesis.**
  - a. *Discuss the importance of the cell cycle.*
  - b. *Describe the stages of mitosis and discuss its importance.*
  - c. *Describe the stages of meiosis and state its contribution to the variability. Gametogenesis.*

**16. Fungi.**

- a. Describe the structure of fungal body, nutrition and reproduction.
- b. Classification of Fungi.
- c. Characterise the role of Fungi in ecosystems. Trophic levels. Food pyramids.

**17. Thallobionta.**

- a. Describe the body of lower plants. Types of thallus. Characterize the division: Rhodophyta and Chlorophyta.
- b. Compare class Charophyceae and division Bryophyta and Equisetophyta.
- c. Discuss the adaptations that enabled plants to colonise the land.

**18. Cormobionta - higher plants.**

- a. Describe the life cycle of seed plants in comparison to mosses and ferns.
- b. Describe the floral structure, the pollination and the fertilisation in flowering plants, seed formation and seed development.
- c. Discuss major differences between monocot and dicot plants.

**19. Cellular and molecular basis of inheritance. Chromosomes and genes.**

- a. Describe the structure of DNA and explain DNA replication. Describe the genetic code – nucleotide, triplets that specify amino acids. Describe mechanism of transcription and translation.
- b. Describe the structure of a chromosome, autosomes and gonosomes.
- c. Discuss diseases caused by mutations.

**20. Patterns of inheritance in multicellular organisms. Monohybrid and dihybrid crosses, Mendel's Laws.**

- a. Explain terms: gene, locus, allele, chromosome, genotype, phenotype, karyotype, clone, offspring, gonochorist, mammal type and bird type.
- b. Describe Gregor Mendel's discoveries (Law of Segregation, Law of Independent Assortment). Explain the terms codominance and incomplete dominance.
- c. Name autosomal diseases and gonosomal diseases.

**21. Origin of life on Earth and human evolution.**

- a. Describe how life on Earth appeared. (Theory of evolutionary abiogenesis, endosymbiosis).
- b. Describe, with reference to the pictures, hominisation and sapientation.
- c. Identify ancestors of Homo sapiens sapiens and describe their principal characteristics.

**22. Systems of classification. Concept of species.**

- a. Explain the biological terms: artificial and natural classification, binomial nomenclature, convergent and divergent evolution, homologous, analogous structures.
- b. Describe the kingdom Chromista.
- c. Describe problematic groups that are difficult to classify (viruses, Euglena) Viral diseases.

**23. Major phyla and classes of invertebrates with examples. Body layers and body cavities.**

- a. Characterise animal kingdom and describe its features.
- b. Multicellular organisms and their development: body layers, body cavities, diploblastic, triploblastic, protostomes, deuterostomes, symmetry, segmentation. Give examples.
- c. Compare different groups of invertebrates Identify and classify given organisms and discuss how they have adapted for living in their habitats.

**24. Major groups of Chordates.**

- a. Characterise major features of Chordates.
- b. Compare different groups of animals in subphylum Vertebrata.
- c. Identify and classify given organisms and describe how they are adapted for living in a particular habitat.

**25. Ecology and environmental issues.**

- a. Describe major biotic and abiotic factors which may affect organisms and population size.
- b. Characterise an ecosystem and discuss main features of an ecosystem.
- c. Discuss current ecological issues of your choice e.g. greenhouse effect, ozone hole, deforestation, desertification, eutrophication or others.