

**BIOLOGY-2025-05**  
**UNIVERSITY OF HRADEC KRALOVE – Faculty of Science –**  
**Department of Biology**

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**Written part of the BIOLOGY entrance exam**

Department of BIOLOGY ☒  
**Variant: 05**

Date: .....



**Surname and first name:** .....

Birthdate: .....

Application number: .....

Previous study: .....

<b>TASK (question):</b> <i>There is <b>ONLY ONE CORRECT ANSWER</b> in each task unless a different number of solutions (answers) is explicitly required in the task specification.</i>	Point assessment
<b>1. The branch of science dealing with the study of reptiles and amphibians is called:</b> a) entomology, b) acarology, c) ichthyology, d) ornithology, e) malacology, f) herpetology	5 points
<b>2. Who is considered the founder of evolutionary biology?</b> a) Rosalind Franklin, b) James Watson, c) Louis Pasteur, d) Charles Darwin	5 points
<b>3. Lysosomes of animal cells serve:</b> a) as cell energy centres, b) as sites of photosynthesis, c) as sites of decomposition processes, d) as cell synthetic centres	5 points
<b>4. The nucleolus disappears:</b> a) in prophase, b) in metaphase, c) in anaphase, d) in telophase	5 points
<b>5. The native crayfish species in the Czech Republic <u>INCLUDE</u>:</b> a) spiny crayfish ( <i>Faxonius limosus</i> ), b) stone crayfish ( <i>Austropotamobius torrentium</i> ), c) signal crayfish ( <i>Pacifastacus leniusculus</i> ), d) marsh crayfish ( <i>Astacus leptodactylus</i> )	5 points
<b>6. Our largest butterfly is:</b> a) <i>Pieris brassicae</i> , b) <i>Vanessa atalanta</i> , c) <i>Saturnia pyri</i> , d) <i>Acherontia atropos</i> , e) <i>Inachis io</i>	5 points
<b>7. In which of the following species are the eggs covered by an ootheca?</b> a) <i>Libelloides macaronius</i> , b) <i>Oryctes nasicornis</i> , c) <i>Xylocopa violacea</i> , d) <i>Mantis religiosa</i>	5 points
<b>8. <i>Cuculus canorus</i> <u>BELONGS</u> to:</b> a) facultative food parasites, b) facultative brood parasites, c) obligate brood parasites, d) obligate food parasites, e) facultative endoparasites	5 points
<b>9. Birds have:</b> a) 1 auditory ossicle, b) 2 auditory ossicles, c) 3 auditory ossicles, d) 4 auditory ossicles, e) have no auditory ossicle	5 points

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<p><b>10. Match exactly one organism from the left column of the table (A to E) to one related expression from the right column of the table (1 to 7).</b></p> <p><i>Note: Assign exactly one number (1 to 7) for each letter (A to E), i.e. that at least two terms from the right column of the table (1-7) remain unassigned.</i></p> <p><b>PLACE FOR YOUR ANSWER: A....., B....., C....., D....., E.....</b></p> <table><tr><td>A) larva of sponges</td><td>1) nauplius</td></tr><tr><td>B) larva of jellyfish</td><td>2) trochophore</td></tr><tr><td>C) larva of crustaceans</td><td>3) redia</td></tr><tr><td>D) larva of annelids</td><td>4) planula</td></tr><tr><td>E) larva of molluscs</td><td>5) gemmule</td></tr><tr><td></td><td>6) veliger</td></tr><tr><td></td><td>7) amphiblastula</td></tr></table>		A) larva of sponges	1) nauplius	B) larva of jellyfish	2) trochophore	C) larva of crustaceans	3) redia	D) larva of annelids	4) planula	E) larva of molluscs	5) gemmule		6) veliger		7) amphiblastula	5 x 1 point
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<p><b>11. Which statement about sharks <u>IS TRUE</u>?</b></p> <p>a) they have (in proportion to body size) the largest swim bladder (<i>vesica natatoria</i>) of all aquatic vertebrates, b) they have external fertilization, c) they belong to <i>Actinopterygii</i>, d) the largest species are fed by filtration</p>		5 points														
<p><b>12. The main products of nitrogen excretion in most reptiles are:</b></p> <p>a) urea, b) uric acid, c) ammonia, d) neither answer is correct</p>		5 points														
<p><b>13. Mark the planktonic organism.</b></p> <p>a) <i>Volvox globator</i>, b) <i>Fucus vesiculosus</i>, c) <i>Cetraria islandica</i>, d) <i>Morchella esculenta</i></p>		5 points														
<p><b>14. What is the importance of fungi in nature?</b></p> <p>a) they are important producers of oxygen, b) they help decompose organic substances, c) they are the main predators in forests, d) they participate in photosynthesis, e) they fundamentally affect the global sulphur cycle</p>		5 points														
<p><b>15. What are the main groups of algae?</b></p> <p>a) green, red, brown, b) green, blue, red, c) cyanobacteria, blue-green, brown, d) green, red, yellow, e) brown, red, cyanobacteria</p>		5 points														
<p><b>16. Choose which of the following plant species <u>IS NOT</u> invasive in the Czech Republic.</b></p> <p>a) <i>Heracleum mantegazzianum</i>, b) <i>Pinus sylvestris</i>, c) <i>Reynoutria japonica</i>, d) <i>Impatiens glandulifera</i>, e) <i>Robinia pseudoacacia</i></p>		5 points														
<p><b>17. Decide whether each of the five statements (A to E) is true, then circle either YES (if you think the statement is true) or NO (if you think the statement is false) next to the statement in the right-hand column of the table.</b></p> <table><tr><td>A) Rabies is a viral disease.</td><td>YES/NO</td></tr><tr><td>B) Syphilis is a viral disease.</td><td>YES/NO</td></tr><tr><td>C) Lyme disease is a viral disease.</td><td>YES/NO</td></tr><tr><td>D) Tick-borne encephalitis is a viral disease.</td><td>YES/NO</td></tr><tr><td>E) Chagas disease is a viral disease.</td><td>YES/NO</td></tr></table>		A) Rabies is a viral disease.	YES/NO	B) Syphilis is a viral disease.	YES/NO	C) Lyme disease is a viral disease.	YES/NO	D) Tick-borne encephalitis is a viral disease.	YES/NO	E) Chagas disease is a viral disease.	YES/NO	5 x 1 point				
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<b>18. Which of the following families of vascular plants is represented only by trees in the Czech Republic?</b> a) <i>Rosaceae</i> , b) <i>Salicaceae</i> , c) <i>Cactaceae</i> , d) <i>Euphorbiaceae</i> , e) <i>Fagaceae</i>	5 points										
<b>19. What are the names of specialised formations based on legume (<i>Fabaceae</i>) roots that allow a symbiotic relationship with nitrogen-fixing bacteria?</b> a) adventitious roots, b) nodules, c) rhizomes, d) haustoria, e) rhizoids	5 points										
<b>20. Rest (dormancy due to internal causes) of tree shoots is caused by high levels of plant hormones:</b> a) cytokinins, b) abscisic acid, c) gibberellins, d) auxins	5 points										
<b>21. Mark the correct number of lumbar vertebrae in a healthy person.</b> a) 3, b) 5, c) 7, d) 12	5 points										
<b>22. Pylorus is a name for:</b> a) the first part of the small intestine, b) the end part of the small intestine, c) the inlet part of the stomach, d) the end part of the stomach	5 points										
<b>23. Which carbohydrate serves as a storage source of energy for muscle activity and is stored in muscle and liver cells at the same time?</b> a) glucose, b) fructose, c) glycogen, d) starch	5 points										
<b>24. Mark the <u>CORRECT</u> statement.</b> a) the adrenal cortex produces only glucocorticoids, b) the adrenal cortex produces not only glucocorticoids but also mineralocorticoids, c) the adrenal cortex cannot produce androgens, d) adrenaline and noradrenaline are produced in the adrenal cortex	5 points										
<b>25. Match exactly one plant from the left column of the table (A to E) to one characteristic from the right column of the table (1 to 2).</b> <i>Note: Assign exactly one number (1 to 2) for each letter (A to E).</i>  <b>PLACE FOR YOUR ANSWER: A....., B....., C....., D....., E.....</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">A) <i>Gagea lutea</i></td><td style="width: 50%;">1) undergoes secondary thickening</td></tr> <tr> <td>B) <i>Quercus robur</i></td><td>2) does not undergo secondary thickening</td></tr> <tr> <td>C) <i>Prunus spinosa</i></td><td></td></tr> <tr> <td>D) <i>Saccharum officinarum</i></td><td></td></tr> <tr> <td>E) <i>Musa acuminata</i></td><td></td></tr> </table>	A) <i>Gagea lutea</i>	1) undergoes secondary thickening	B) <i>Quercus robur</i>	2) does not undergo secondary thickening	C) <i>Prunus spinosa</i>		D) <i>Saccharum officinarum</i>		E) <i>Musa acuminata</i>		5 x 1 point
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<b>26. A vitamin supporting the activity of the gonads is:</b> a) vitamin K, b) vitamin A, c) vitamin D, d) vitamin E	5 points										
<b>27. Quantitative features:</b> a) they are controlled by major genes, b) they are often monogenic in traits, c) they are fluent in inheritance, d) they have only a few alternative expressions	5 points										
<b>28. Gene expression is:</b> a) the process of regulating gene activities in time and space, b) the transfer of genetic information from DNA to phenotype, c) the process leading to changes in gene quality and quantity, d) the degree to which the gene is expressed in the phenotype	5 points										
<b>29. An organism that obtains energy from sunlight and carbon from carbon dioxide is called:</b> a) photoautotrophic, b) chemoautotrophic, c) photoheterotrophic, d) chemoheterotrophic, e) chemolithotrophic, f) photolithotrophic	5 points										

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<b>30. When a virus genome is inserted into a chromosome of a host cell, it is called:</b> a) retrovirus, b) virion, c) provirus, d) viroid, e) bacteriophage, f) prion	5 points										
<b>31. <i>Trichinella spiralis</i> infects:</b> a) only humans, b) only domestic animals, c) rats, pigs, carnivores, humans, d) only rodents	5 points										
<b>32. Abiotic factors in nature <u>DO NOT</u> include:</b> a) inorganic soil substrate, b) stone in a meadow, c) climate changes, d) water precipitation, e) hurricane, f) land use by humans	5 points										
<b>33. Commensalism is a relationship between populations that is:</b> a) beneficial for one population, but does not have a significant effect on the other population, b) beneficial for both populations, c) harmful to both populations, d) harmful to one population, but not significantly affecting the other population, e) harmful to one population, beneficial to the other population	5 points										
<b>34. When did life on Earth arise approximately?</b> a) in the Archean era, b) in the Proterozoic era, c) in the Paleozoic era, d) in the Mesozoic era	5 points										
<b>35. Mark the metamorphic rock.</b> a) sandstone, b) travertine, c) granite, d) gneiss	5 points										
<b>36. What is the name of the weed-killing pesticide group?</b> a) rodenticides, b) algaecides, c) molluscicides, d) herbicides, e) fungicides, f) acaricides	5 points										
<b>37. Which vitamin is known as pyridoxine?</b> a) vitamin A, b) vitamin B1, c) vitamin B6, d) vitamin B9, e) vitamin C, f) vitamin D	5 points										
<b>38. Which of these elements can be released from the soil as a result of acid rain and negatively affect plants?</b> a) Ca, b) Mg, c) K, d) Al, e) N, f) Na	5 points										
<b>39. Decide whether each of the five statements (A to E) is true, then circle either YES (if you think the statement is true) or NO (if you think the statement is false) next to the statement in the right-hand column of the table.</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">A) Extracellular fluid includes only lymph and tissue fluid.</td><td style="padding: 2px;">YES/NO</td></tr> <tr> <td style="padding: 2px;">B) Blood plasma does not contain organic substances but only inorganic substances and water.</td><td style="padding: 2px;">YES/NO</td></tr> <tr> <td style="padding: 2px;">C) The number of erythrocytes in 1 mm<sup>3</sup> of blood of a healthy individual is not more than 8 million.</td><td style="padding: 2px;">YES/NO</td></tr> <tr> <td style="padding: 2px;">D) Granulocytes are divided into basophilic, eosinophilic and neutrophilic.</td><td style="padding: 2px;">YES/NO</td></tr> <tr> <td style="padding: 2px;">E) Monocytes are the smallest leukocytes.</td><td style="padding: 2px;">YES/NO</td></tr> </table>	A) Extracellular fluid includes only lymph and tissue fluid.	YES/NO	B) Blood plasma does not contain organic substances but only inorganic substances and water.	YES/NO	C) The number of erythrocytes in 1 mm <sup>3</sup> of blood of a healthy individual is not more than 8 million.	YES/NO	D) Granulocytes are divided into basophilic, eosinophilic and neutrophilic.	YES/NO	E) Monocytes are the smallest leukocytes.	YES/NO	5 x 1 point
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<b>40. Polydactyly (an autosomal dominant disease) runs in the family. Both mother and father are heterozygous for this characteristic. What is the probability of having a child with polydactyly?</b> a) 0 %, b) 25 %, c) 50 %, d) 75 %, e) 100 %, f) cannot be precisely determined from this assignment	5 points										