ÉRETTSÉGI VIZSGA • 2005. május 20.

BIOLÓGIA
ANGOL NYELVEN

BIOLOGY

EMELT SZINTŰ
ÍRÁSBELI VIZSGA
HIGHER LEVEL
WRITTEN EXAMINATION

Az írásbeli vizsga időtartama: 240 perc
Duration of written examination: 240 minutes

JAVÍTÁSI-ÉRTÉKELÉSI ÚTMUTATÓ

MARKSCHEME

OKTATÁSI MINISZTÉRIUM
MINISTRY OF EDUCATION

Instructions – How To Mark The Higher Level Paper

1. Always use **red ink** .
2. If the answer to question is complete tick correct answers. **Each tick** is equivalent to **1 point**. You can not give half the point. Indicate with two ticks, if the candidate answered correctly an assignment of two points.
3. Please accept the answer, if it is correct, but not mentioned in the Answer Key. The same procedure should be applied in the case of synonyms (e.g.: *platelets – thrombocytes*).
4. In the Answer Key equally acceptable answers are separated with **backslash (/)** from one another.
5. At the end of the assignment **add the points up** in the grey-coloured chart.
6. At the end indicate the detailed points for each assignment **in the final summary chart** and add them up to indicate the total score.
7. In the optional essay questions mark correct answers by a tick on the margin of the page. The Answer Key contains only key content elements, terms and phrases in logical order. Please accept compositions with different order but with logical structure – unless the instruction of the question tells the contrary. Finally please add up the points of the correct answers and write it in the appropriate box (X.) of the **final summary chart**.
   In the essay question point can be awarded only for those answers which respond to the guiding questions.
8. If the candidate worked on both optional questions (A and B) then the instructions in "instructions for Candidates" are to be applied.
9. If the candidate was asked to compose whole sentences (e.g.: giving reasons or explanations) – only grammatically correct sentences are acceptable. **Please, do not deduct points for spelling mistakes**, yet **do not accept misleading compositions**.

We wish you a successful work.

I. Reproduction of a plant 10 points

1. The correct fill-out of the table 4 points
In the case of 6 or 7 correct answers: 3 points
In the case of 4 or 5 correct answers: 2 points
In the case of 2 or 3 correct answers: 1 point
In the case of 0 or 1 correct answers: 0 points

Letter	Name
A	Pollen
B	Male gametes/male sex cells/sperms/nuclei
C	Pollen tube
D	Synergid cells
E	Central cell/polar nuclei
F	Antipodal cell
G	Egg/egg nucleus
H	Embryo sac

2. wind, insects (water, animal)(only if both are named.) 1 point
3. mitosis 1 point
4. E 1 point
5. EG 1 point
6. Double fertilisation 1 point
7. Angiosperms 1 point

II. The forms of selection 10 points

1. Charles Darwin 1 point
2. AD (point can be awarded only if both correct letters are indicated) 1 point
3. X: The value of the quantitative property, e. g. the length of the beak
Y: population size or frequency
(point can be awarded only if both are correctly identified.) 1 point
4. C 1 point
5. C 1 point
6. D 1 point
7. D/B 1 point
8. B 1 point
9. "As differences grow, the less valuable specimens showing intermediate traits (…) are not bred further, thus they generally become extinct."– or phrasing it in another way. 1 point
10. B 1 point

III. The human chest (thorax, ribcage) 10 points

1. T 1 point
2. F 1 point
3. T 1 point
4. T 1 point
5. T 1 point
6. 20. 1 point
7. A 1 point
8. B 1 point
9. A 1 point
10. I. 1 point

IV. Population growth curves 8 points

1. The Golden Paramecium. 1 point
2. They reproduce until the carrying capacity of the environment is reached /They cannot utilise more food than this in a given period of time *(Other correct phrasings are also acceptable).* 1 point
3. The Common Paramecium is significantly larger in size. 1 point
4. E 1 point
5. The available food source was more efficiently utilised by the Golden Paramecium/ the Golden Paramecium has higher growth rate *(Other correct phrasings are also acceptable).* 1 point
6. The predator would feed on the currently more abundant species, so it would have a balancing/stabilising role.
Or: At overly high predator densities, the predator could wipe out both Paramecium species.
(Other correct phrasings are also acceptable.) 1 point
7. In this process only population sizes changed. 1 point
Nothing indicated the change of allele frequencies / alteration of traits. 1 point
(Even if only the second statement is written by the candidate 2 points can be awarded)
Other correct phrasings are also acceptable.

V. The investigation of the differences between proteins 10 points

1.	The transcribed (active) strand of DNA	**C**	**C**	**C**	**C**	**G**	**T**	**C**	**G**	**G**	**A**	**A**	**A**	**C**	**C**	**A**	**C**	**G**	**A**
2.	The non-transcribed (silent) strand of DNA	**G**	**G**	**G**	**G**	**C**	**A**	**G**	**C**	**C**	**T**	**T**	**T**	**G**	**G**	**T**	**G**	**C**	**T**

Each row faultlessly filled in: 1–1 point 2 points
3. The possible codons of Gly: **GGU, GGC, GGA, GGG** 1 point
4. The possible codons of Tyr: **UAU, UAC** 1 point

5.	2. mRNA	G	G	G	**G**	**G**	**A**	G	C	C	**U**	**A**	**U**	G	G	U	G	C	U

If both deviations are correct 2 points
(If one deviation is correct: 1 point)
6. In the case of aminoacid No. 113 one G changed for C 1 point
7. In the case of aminoacid No. 115 one A changed for T 1 point
8. Point mutation (mutation) 1 point
9. Chemicals (or the naming of a specific mutagenic compound), radiation (radioactive radiation, UV radiation, X-ray radiation); effect of heat; aging. 1 point
(The point can be awarded only if two mutagenic agents are named.)

VI. The regulation of circulation 14 points

1. B 1 point
2. cardiac output 1 point
3. 180/ minute*70cm^3 *5 minutes = 63000 cm^3 method of calculation 1 point
correct final result 1 point
4.

Name of the pace maker centre	Location of the pace maker centre
Sinoatrial (SA) node	Located in the wall of the right atrium
Atrioventricular (AV) node	Above the atrio-ventricular boundary. (Though it is incorrect, because of the inaccurate textbook figures the following answer is also acceptable: In the septum separating atria and ventricles.)

Rows are reversible 4 points

5. lower 1 point
6. medulla/medulla oblongata/brain stem 1 point
7. rises 1 point
8. F 1 point
9. T 1 point
10. F 1 point

VII. Fight with pathogens 8 points

Only in the case of full and correct letter rows can a point be awarded

1. B 1 point
2. C 1 point
3. BD 1 point
4. AC 1 point
5. ABD 1 point
6. AD 1 point
7. A 1 point
8. ABC 1 point

VIII. Selfish and altruistic marmots 10 points

1. AA and Aa: whistles („altruistic")
aa: does not whistle („selfish")
(Only in the case of the correct presentation of all three genotypes and their naming can 1 point be awarded). 1 point

2. The allele frequency of both alleles is 0,5. (p=q=0,5)
The frequency of selfish individuals is $q^2 = 0{,}25$ (25%), that is 25 individuals. 1 point
The frequency of "altruistic" individuals is $p^2 + 2pq = 0{,}75$ (75%), that is 75 individuals. 1 point
The indication of frequencies by letters other than „p" and „q" is also acceptable.
The frequency of "altruistic" individuals can be calculated by simple subtraction ($1-q^2$).

3. Due to: selection / alleles are not of equal value/ 1 point
and due to small population size/ or: genetic drift. 1 point

4. In the colonies of the Olympic Marmots the gene pool of the individuals living close to each other partly overlap because they are relatives, 1 point
therefore the frequency of the gene variety that codes whistling can increase even if some whistling individuals fall a victim to predators. 1 point
In the populations of wood marmots the spatial distribution of individuals does not depend on the degree of kinship, so "altruism" does not survive. 1 point

5. While human altruism is partly learned / it is based on personal decision / can be founded on moral, religious grounds / can be motivated by mutual benefits *(any of these phrasings are acceptable),* 1 point
animal (altruistic) behaviour is mostly inherited / non-conscious /
and it is not governed by moral decision. 1 point

IX. Optional questions

Question A)

The pathway and role of oxygen in the human body 20 points

Oxygen is transported in red blood cells/red blood corpuscles 1 point
by haemoglobin 1 point
Anaemia can be the result of deficiency of iron/ haemoglobin deficiency/
low red blood cell count/Vitamin B_{12} deficiency
disorders of red blood cell production/genetically inherited disease:
sickle-cell anaemia (Any of them is acceptable.) 1 point
From the lungs through the pulmonary vein/veins 1 point
Through the left atrium then through the left ventricle 1 point
into the aorta 1 point
then into smaller arteries, then finally into capillaries. 1 point
(Only answers in the correct order are acceptable. None of the elements in the wrong order can be awarded by points.)

Within cells in mitochondria 1 point
In terminal oxidation (electron transport chain, chemiosmotic/oxidative phosphorylation) 1 point
It turns into water. 1 point
The function of this process is energy/ATP production. 1 point

By the increase of the CO_2 concentration/pH decrease of the blood / the chemoreceptors of the brain 1 point
are stimulated and trigger inhalation/inspiration/breathing in . 1 point
By the stretching of alveoli/bronchioles the mechanoreceptors of the lung are stimulated 1 point
and they trigger exhalation/expiration/breathing out. 1 point
Brief oxygen deficit induces an increase in ventilation rate/changes cardiac output. 1 point

The trained body increases the volume of inhalation/exhalation 1 point
while the untrained increases the frequency of ventilation.
Oxygen debt in skeletal muscles causes:
fatigue / muscular strain / lactic acid production / energy deficit. 1 point
A blood clot that got stuck in the coronary blood vessel causes prolonged
oxygen/nutrient deficit, 1 point
that results in the necrosis of cardiac muscle (myocardial infarct). 1 point
Other correct answers are also acceptable but one symptom can be given credit for only once (e.g. the onset of lactic acid production).

Question B)

The forest types of the medium-height mountains of Hungary (20 points)

	Elevation above sea level	Letter of forest type e
1.	250 – 450 m	**B**
2.	400 – 600 m	**C**
3.	Above 600 m	**A**

2 points

If only 1 answer is correct 1 point should be awarded.

4. C 1 point
5. ACB 1 point
6.

Forest type	Number of canopy layers
Beech forest	**1**
Turkey oak-Sessile oak forest	**1**
Horn beam-Sessile oak forest	**2**

1 point

	Letter of forest type	Species	Ecological indicators	
			T	W
7.	**A/C**	Ash*	5	5
8.	**X**	Flowering ash	6	2
9.	**C**	Field maple	5	4
10.	**B**	Wild pear	5	3

3 points

4 correct answers = 3 points
3 correct answers = 2 points
2 correct answers = 1 point
1 or 0 correct answer = 0 points

11. Ecological indicator: W value/water need 1 point

IX. B) continued
The shrub and herb layers in the forest types of medium mountains 11 point

The development level and diversity of the shrub and herb layers of certain forest types is primarily determined by the amount of light penetrating through the canopy layer. 1 point
Of the three forest types occurring in the medium mountains of Hungary the Turkey oak-Sessile oak forest features the most developed shrub and herb layers. 1 point
Herbaceous plants blossoming from spring to autumn are typical here 1 point
The shrub layer of beech forest is often missing, the herb layer is species poor. 1 point
In the herb layer of Beech forest/Hornbeam-Sessile oak forest tuberous, bulbous and rhizomous plants are abundant before frondescence (development of canopy), they comprise the spring geophyton (tuberous, bulbous and rhizomous) aspects. 1 point
This is caused by the seasonal changes in the amount of light penetrating through the canopy layer. 1 point
Not only the canopy layer disappears after clear-cutting 1 point
but the shrub and herb layers are also altered. Species diversity and biomass decreases sifnificantly (Species diversity may increase temporarily) 1 point
Species diversity and biomass significantly decrease. 1 point
Soil erosion increases since the sudden downpour of rain is not intercepted/taken up by canopy and litter. 1 point
The process is degradation/erosion 1 point

The essay with same content but with different logical structure can also be accepted.

Sources of quotations and pictures :

II. Charles Darwin: A fajok eredete. Typotex. 2001. Kampis György fordítása.
III. Emberi mellkas rajza: Dr. Mándi Barnabás: Anatómia, élettan
Grafikon: Dr. Hársing László: Élettan-kórélettan nyomán.
IV. G. F. Gause: The struggle for Existence. Baltimore, 1934.
VIII. Rajz: In: David P. Barash: Szociobiológia és viselkedés. Natura, 1980.