

الامتحان الوطني الموحد للبكالوريا
المسالك الدولية – خيار إنجليزية
الدورة الاستدراكية 2019
- عناصر الإجابة -

RR32E



المركز الوطني للتقويم والامتحانات والتوجيه

3	مدة الانجاز	علوم الحياة والأرض	المادة
7	المعامل	شعبة العلوم التجريبية : مسلك علوم الحياة والأرض – خيار إنجليزية	الشعبة أو المسلك

Questions	KEY AND MARKING SCALE	Note
Section I (5 pts)		
I	(1, b) ; (2, a) ; (3, a) ; (4, c)	0.5x 4
II	<p>Two structural characteristics of the mitochondrial inner membrane</p> <ul style="list-style-type: none"> - inner membrane rich in protein - inner membrane extensions (cristae) - presence of pedunculated spheres and protein complex of electron transport chain <p>Two characteristics of fermentation</p> <ul style="list-style-type: none"> - it occurs in the absence of O₂ - it produces organic waste 	0.25x2 0.25x2
III	(a- true) ; (b- false) ; (c- false) ; (d- true)	0.25x 4
IV	(1, b) ; (2, c) ; (3, d) ; (4, a)	0.25x 4
Section II (15 pts)		
Exercise 1 (4.5 pts)		
1	<p>Comparison :</p> <ul style="list-style-type: none"> -The AAT level is low in the sick person in comparison to the healthy person and the protease level is high in the sick person compared to the healthy person. - the alveoli is weakened along with the appearance of pulmonary emphysema in the sick person, whereas in the healthy person the appearance of the alveoli and lungs are normal. <p>Highlighting the relationship between AAT and disease:</p> <p>The decrease in the concentration of AAT protein → an increase in protease levels → weakening of the alveoli walls → pulmonary emphysema → the appearance of the disease.</p>	0.25 0.25 0.5
2	<p>The amino acid sequence corresponding to part of allele in a healthy person</p> <p>m RNA : ACC AAU AUC UUC UUC UCC CCA amino acid Sequence: Thr –Asn – Ile– Phe – Phe – Ser – Pro</p> <p>The amino acid sequence corresponding to part of allele in a sick person</p> <p>mRNA: ACC AAU AUC UUC UCC CCA amino acid Sequence: Thr –Asn – Ile– Phe – Ser – Pro</p> <p>Explanation :</p> <p>Mutation by deletion of triplet AAG at of transcribed stand of DNA (deletion of triplet TTC of the untranscribed strand of DNA) →synthesis of abnormal AAT protein → AAT unable to protect alveoli from proteases → appearance BPOC disease.</p>	0.25 0.25 0.25 0.25 0.5

3

a. Codominance of two alleles: Individuals with intermediate symptoms have two alleles (morbid and normal), so there is a codominance between the two alleles studied.

0.25

-The gene is carried by autosomal chromosome: male individuals I₁ and II₄ have two alleles of the gene studied (one morbid and the other normal).

0.25

- Genotype:

individuals	II ₄	II ₃	II ₁	I ₂
Genotype	M//N	M//N	N//N	M//M

0.5

b. Probability to give birth to a healthy child (II₃, II₄)

♂II₄ x II₃ ♀

M//N x M//N

	♀ γ	M/ 1/2	N/ 1/2
♂ γ	M/ 1/2	M//M 1/4	M//N 1/4
	N/ 1/2	M//N 1/4	N//N 1/4

1

The probability is 1/4

Exercise 2 (4 pts)

1

Deduction :

F₁ is homogenous; according to Mendel's first law → the parents are of a pure lineage.

0.25

All F₁ individuals have normal eyes and normal caudal fins:

- For eyes aspect: allele responsible for normal eyes is dominant "D" and allele responsible for funny eyes is recessive "d".
- For caudal fins aspect: allele responsible for normal caudal fins is dominant "N" and allele responsible for fancy caudal fins is recessive "n".

0.5

The coming generations of the second cross are composed of four phenotypes with different percentages distributed as follows:

[N ; D] 57 % (approximately 9/16) ; [N ; d] 19.5% (approximately 3/16)

[n ; D] 18% (approximately 3/16) [n ; d] 6,5% (approximately 1/16)

The two studied genes are independent.

0.25

2

Phenotype : [d , N] × [d , n]

Genotypes : d//d N//n d//d n//n

Gametes : d/ N/ (1/2) ; d/ n/ (1/2) d/ n/ (1)

0.25

	♀ γ	d/ N/ (1/2)	d/ n/ (1/2)
♂ γ	d/ n/ (1)	(d//d ; N//n) [d ; N] (1/2)	(d//d ; n//n) [d ; n] (1/2)

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3	RR32E	- مادة: علوم الحياة والأرض - شعبة العلوم التجريبية مسلك علوم الحياة والأرض - خيار إنجليزية	
4			

	Percentages : - 50% fish with funny eyes and fancy caudal fins - 50% fish with funny eyes and normal caudal fins.	1
3	Hypothesis: accept any logical hypothesis establishing the relationship between guppy phenotype variation and the presence of predators in the medium.	0.25
4	- Before introducing predators: a gradual increase in the number of colored patches of male guppies in the two ponds.	0.25
	- After introducing predators: decrease in the number of colored patches of male guppies in pond 1 (from 12 to 9) but in pond 2 the average number of colored patches of guppies keeps increasing to stabilize after 10 weeks at a value 13.	0.25
5	The variation factor which acts on guppy phenotypes : naturel selection	0.25
	Justification :	
	-Guppies with numerous and large colored patches→ more exposure to predators	0.25
	-Guppies with fewer patches and smaller size→ less exposure to predators→more possibility to reproduce and multiply.	0.25
	Discussion of hypothesis: establishing the relationship between phenotype variation of guppies and predators' presence in the medium.	0.25

Exercise 3 (3.5 pts)

1	- Description : The quantity of virus in the serum increases quickly. It reaches a maximum value (3.3UA) in 3 rd day. Afterwards, it stabilizes in the 6 th day of the infection, and then is decreased to disappear in the 14 th day.	0.5
	-the antibodies concentration is zero during the first 5 days after infection, then it gradually increases to reach 3UA.	0.5
	Deduction Adaptive immune response via antibodies	0.25
2	Description: At the beginning with a low antibodies concentration (10^{-11}), the percentage of the virus fixation reached the maximum 100%, then it considerably decreased to become null when the antibodies concentration went beyond 10-10.	0.5
	The percentage of infected cells has followed the same evolution of the fixation of the viruses in proportion to the antibodies.	0.5
	deduction : Antibodies inhibit the fixation of the flu virus on the target cells preventing their infection.	0.25
3	Explanation : Anti HA is tied to the virus and forms immune complex that neutralize the virus →no fixation of the virus by HA on HA receptors of target cells→ no intracellular multiplication of the virus in the target cells→ elimination of the virus.	1

Exercise 4 (3 pts)

1	The indicators : Granodiorites linked to metamorphic rocks Metamorphic rocks spread on a big surface Presence of migmatite	0.25x3
	a- conditions of rock formation: Temperature between 200°C to 500°C	0.25

الصفحة	4	RR32E	الامتحان الوطني الموحد للبكالوريا (المسالك الدولية) - الدورة الاستدراكية 2019 - عناصر الإجابة - مادة: علوم الحياة والأرض - شعبة العلوم التجريبية مسلك علوم الحياة والأرض - خيار إنجليزية
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2	Pressure higher than 900 MPa at 30 km in depth	0.5
	b- deduction of the type of metamorphism and geodynamic context :	
	type : dynamic metamorphism because the rocks are formed under an important pressure and low temperature	0.25x2
	The geodynamic context: subduction zone.	0.25
	Steps of formation of the mountain range :	
	- Step 1: Subduction of an oceanic lithosphere under a continental lithosphere following compressive stresses (dynamic metamorphism) and disappearance of the oceanic area ;	0.25
4	Step 2: - confrontation of two continental margins leading to an ophiolite, and rock deformation→ genesis of Armorocain massive.	0.25
	Step 3: - decrease of mountain chain relief and formation magmatic and metamorphic rocks associated with migmatite following tearing forces.	0.25