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المسالك الدولية – خيار أنجليزية
الدورة الاستدراكية 2018 | RR32E
-عناصر الإجابة-

المملكة المغربية
وزارة التربية الوطنية والتكوين المهني والتعليم العالي والبحث العلمي
المركز الوطني للتقويم والامتحانات والتوجيه

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

Question	Key and marking scale	scores
	Première partie (5 pts)	
I	(1, d) ; (2, c) ; (3, c) ; (4, a)	**0.5 pt x4**
II	**Definitions** (accept any correct definition) : **1.** anatexis: the partial or incomplete melting of metamorphic rocks . **2.**metamorphic facies: a set of metamorphic mineral assemblages formed under similar pressure and temperature conditions.	**0.5 pt x2**
III	a-false ; b-true ; c-false ; d-false	**0.25 pt x4**
IV	**1. Characteristics of collisional mountain range** (accept any correct definition) **:** Crustal thickening; thermal and dynamic metamorphism; tectonic deformations. …… **2. Characteristics of obductional mountain range** (accept any correct definition) **:** The nappes; the ophiolites; the reverse faults; the tip-line folds;the folds. ……	**0.5 pt x2**
	Second section (15 pts)	
	exercise 1 (3 pts)	
1	**Description :** **Figure a :** -before addition of pyruvate, there is a stability of the O_2concentration at a value of 100% and ATP concentration at a value of 30 AU - After addition of pyruvate, the O_2 concentration decreases to a lower value of 50%, and ATP concentration increases to 100AU. - After exhaustion of pyruvate, the concentrations remained fixed at O_2 50% for O_2 and in 100AU for ATP..……..……..... **Figure b :** - before t_1, the O_2 concentration remained fixed at100% ; - After addition of pyruvate, at t_1 the O_2 concentration decreases to proximately value of 50 UA. - After addition of Antimycin A at $t_2$the O_2 concentration is stabilisedat40 UA… **Hypothesis :**(accept any hypotheses capable of explaining the relationship between Antimycin A and ATP production). Example: Antimycin A inhibiting oxidative phosphorylation in mitochondrion.	**0.5 pt** **0.5 pt** **0.5 pt**

	Antimycin A inhibits oxidation reactions respiratoires mitochondriales permettant la production d'ATP. ……	
2	**a.**the electrons are transferred through resperatory chain complex in the direction of increasing redox potentiels. …….. **b.**Antimycin A inhibit the complex III of respiratory chain and prevent electron transfer to final acceptor et empêcheO_2 that is not reduced to H_2O (not consume O_2)……..	**0.25 pt** **0.5 pt**
3	**Explain :** with Antimycin A → inhibiting electrons flow at the level of respiratory chain → stop transfer of protons H^+ from matrix to intermembrane space → proton flow back to matrix through ATP synthase →ATP are not synthetize……	**0.75 pt**
	Exercise 2 (5 pts)	
1	**Modifications during transition from interphase to prophase :** - at cytoplasmic level: centrosome move towards opposite poles of cell, emergence of spindle fibers…. … - at nuclear level : envelope nuclear break down, disappearance of nucleolus, chromosome condensed from of chromatin…	**1 pt**
2	**Comparison :** - Normal lamina A protein → normal lamina A disposition on nuclear membrane → normal nuclear form → normal cell division with repair and tissue renewal → normal phenotype ; - Abnormal lamina A protein → irregular lamina A disposition on nuclear membrane→ deformed nucleus→ abnormal cell division with Alteration of tissue reparation and renewal → Progeria. **Relationship protein-trait :** The alteration of lamina A protein leads to abnormal cell division with stopped repair and renewal tissue what causing disease ; So all modification of protein leading to modification of traits from where relations.	**1.5 pts**
3	**mRNA nucleotide Sequences and amino acid corresponding to each LMNA allele fragments :** - in healthy person mRNA : GUG GCC AAG CUU GAG GCA GCC CUA GGA amino acid sequence : val – Ala – Lys – Leu – Glu – Ala – Ala – leu – Gly - in sick person mRNA : GGG CCA AGC UUG AGG CAG CCC UAG GT Amino acid sequence:Gly– Pro–Ser –Leu–Arg – Gln– Pro. **Relationship gene-protein:** Mutation at the level 169 triplet by deletion of A nucleotide is changed reading	**1.5 pts**

	frame → synthesis of modified mRNA compare to normal mRNA→ synthesis of short amino acid sequence → altered Lamina A protein →appearance of disease.	
4	**a- RNA antisense Action :** RNA antisense binds in a complementary way to mRNA encoding for abnormal protein → stopped mRNA translation → stopped abnormal protein production responsible of disease. **b- suggestion of a technique :** Introducing a DNA sequence encoding for RNA antisense in genome of sick cells →genetically modified cells capable of to produce RNA antisense in permanent way.	**1 pt**
	Exercise 3 (4 pts)	
1	a)-from of first cross ,Mendel's first law has been verified : the parents are pure lineage and F1 homogenous composed of pink shell individuals without stripes, so : •the dominant alleles are responsible for pink colour and absence stripes. •the recessive alleles are responsible for yellow colour and presence stripes. b) -from second cross which is test cross. The generation obtained from second cross is composed of four phenotypes distributed in different way. The two genes are linked.	**0.5 pt** **0.5 pt**
2	Chromosomal interpretation **First cross :** **Phenotypes** [r , B]×[R , b] **Genotypes** $\frac{r\ B}{r\ B}$ $\frac{R\ b}{R\ b}$ **Gametes** r B R b (100 %) (100 %) $\frac{Rb}{r\ B}$ [R , B] 100 % F_1 **Second cross :** **Phenotypes** F1 [R , B]×[r , b] **Genotypes** $\frac{R\ b}{rB}$ $\frac{rb}{rb}$ **Gametes** R br BR Br br b 39 % 41 % 9 % 11 % 100 % **Punnet square** Gametes: R b (39 %) / r B (41 %) / R B (9 %) / r b (11 %)	**0.5 pt** **0.5 pt** **0.5 pt**

	<table><tr><td>r b 100%</td><td>R b r b [R ; b] 39 %</td><td>r B r b [r ; B] 41 %</td><td>R B r b [R ; B] 9 %</td><td>r b r b [r ; b] 11 %</td></tr></table>	
3	**Comparison**: In the forest, the snails striped shells is more prey by the song thrush than the snails without striped shells. However, in meadows the snails without striped shells are more exposed to prey fall by song thrush than those who striped.	**0.5 pt**
4	**The evolutionary factors affecting the snail population** : natural selection **Explain:** •the forest is homogenous medium (uniform and dark) composed of dead grass → camouflage of snails without striped shells however the snails striped shells are most visible→ the snails striped shells are more exposed to prey fall by song thrush than those who without striped •in meadow :heterogeneous and herbaceous medium (dark and clear) → camouflage of the snails striped shells however the snails without striped shells are most visible→ the snails without striped shells are more exposed to prey fall.	**0.5 pt** **0.25 pt** **0.25 pt**
	Exercise 4 (3 pts)	
1	**a- Show the relationship** The decrease in viral load is expressed in copies of the viral genome/ml of blood between 6 week and 12 week associated to increases of lymphocytes T4 concentration in blood. **b-Description :** occurs the opportinistic deseases , appearence phase , the viral load increases quickly from 10^3 to 10^7 (copies of viral genome/ml of blood) in contrary to T4 lymphocytes in blood which decreases quickly by 300 LT4/µL of blood to cancel at the end of this phase.	**1 pt**
2	**Explain :** - in different batches from2to 6 : the time required to eliminate the virus is less than that observed in the control batch.. - in different batches from 2 to 6 : in comparison control batch, the lymphocyte survival rate (%) in 3,4 and 6 batches is null and at50% in batch5 while is at 100% in batch 2. The efficiency immune response required three types of lymphocytes T4;T8; B cell	**0.5**
3	**Description :** **Document 3 :** - for interleukin concentrations between 10 et 10^2 we has a low increase of lymphocytes B number ; - for interleukin concentrations beyond 10^2 we has a high increase of lymphocytes B number which reach 1000 plasma cells for 4.10^4intial cells. **Document 4 :** - before infection the number of lymphocytes CD8+T in spleen of mutant mice (deficient in interleukin 2) is slightly higher than that of normal mice	**0.75**

	approximately 15.10^6 of lymphocytes CD8+T in spleen. - after7 days after infection the number of lymphocytes CD8+T in mutant mice spleen decrease and continue to decrease to reach half of initial value in contrary of normal mice where decrease the number of lymphocytes CD+8T that 45.10 lymphocytes CD8+ T in spleen **Deduction :** The interleukin-2 boosts multiplication of lymphocytes B and lymphocytes CD8+T**.**	
4	An explanatory scheme illustrating the central role of LT4 in the immune response process.	**0.75 pt**