

دورة سنة ٢٠٠٨ الإكمالية الإستثنائية	الشهادة المتوسطة	وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات
الاسم: الرقم:	مسابقة في مادة علوم الحياة والأرض المدة: ساعة واحدة	

Answer the four following exercises:

First exercise (5 points)

Cellular Divisions

Answer briefly the following questions :

- Name the cellular division that permits to obtain from the mother cell of $2n$ chromosomes:
 - the same number of chromosomes in all body cells.
 - half the number of chromosomes in the gametes.
- What is a chromosomic anomaly?
- What is an allele?
- What is the origin of the two alleles of a given gene in every individual ?

Second exercise (5 points)

Digestion of a lipid : olive oil

The adjacent **document** summarizes the conditions of in vitro digestion of olive oil (lipids) and the results obtained after one hour.

- Describe experiment 1 (adjacent document) .
- Analyse the two experiments 1 and 2. Derive the role of bile.
- Analyse the two experiments 2 and 3. Derive the role of pancreatic juice.

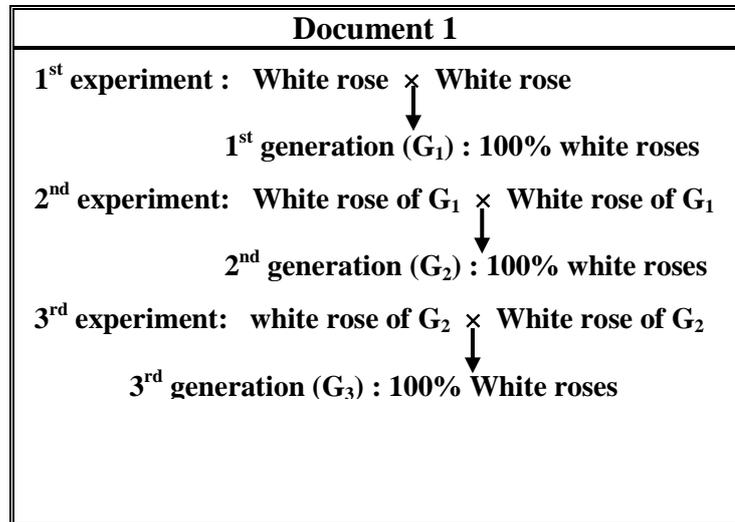
N° of experiment	experiment	Result (1 hour later)
1	<p>$T = 37^{\circ}\text{C}$</p> <p>Tube water + oil Strong mixing</p>	<p>oil layer water</p>
2	<p>$T = 37^{\circ}\text{C}$</p> <p>bile + water + oil Strong mixing</p>	<p>oil drops dispersed in water</p>
3	<p>$T = 37^{\circ}\text{C}$</p> <p>oil + water + bile + pancreatic juice Strong mixing</p>	<p>fatty acids and glycerol</p>

Third exercise (5 points)

Pure race and transmission of a hereditary character in roses

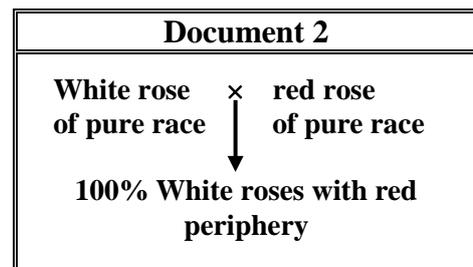
Sami has a rosebush of white flowers in his garden. He wonders if this rosebush is of pure race. To be sure, he realized several crosses as shown in **document 1**.

- 1- What is the problem posed by Sami?
- 2- Do the results of these crosses (**document 1**) solved the problem posed by Sami ? justify the answer.



Sami realized another cross as shown in **document 2**.

- 3- a- Is it the case of dominance or codominance? Justify the answer by referring to **document 2**.
- b- Designate by symbols the corresponding alleles.
- c- Write the genotype of the white roses having red periphery and precise the different types of gametes produced by these roses.



Fourth exercise (5 points)

Effect of Tobacco and intoxication by carbon monoxide

The cigarette fumes contain several toxic substances: nicotine, tar, carbon monoxide (CO: gas) ... This gas can fix easily on a hemoglobin molecule leading to the formation of a stable compound **HbCO**.

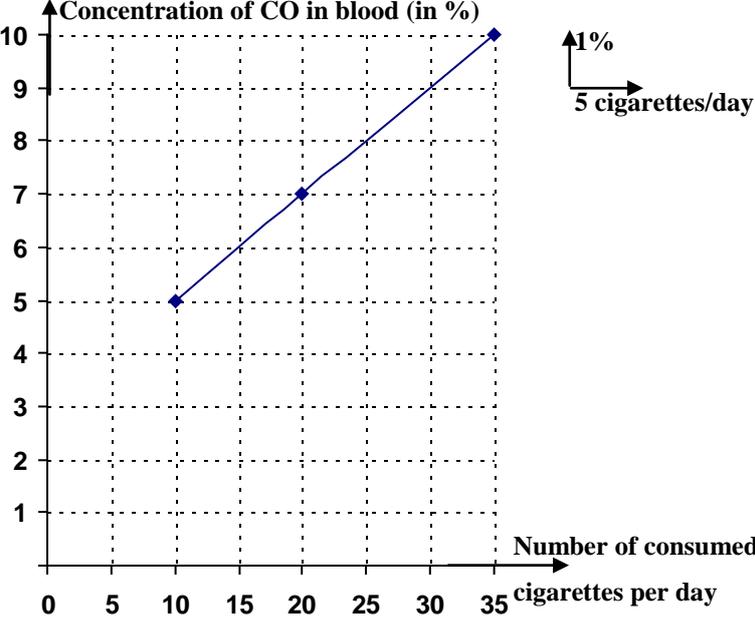
Among smokers, the concentration of CO in blood varies in function of the number of consumed cigarettes per day, as shown in the adjacent table.

Variation in the concentration of CO in blood in function of the number of consumed cigarettes per day			
Number of consumed cigarettes per day	10	20	35
Concentration of CO in blood (%)	5	7	10

- 1- Trace a curve showing the variation of the concentration of CO in blood in function of the number of consumed cigarettes per day.
- 2- Interpret the given in the above table.
- 3- Based on the provided information and the acquired knowledge, explain how can CO, in high concentration in blood, cause intoxication.

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Part of the Q	Answer	Mark
First exercise (5 points)		
1-a	It is mitotic division.	1
1-b	It is reductional division of meiosis.	1
2	It is an error in the number of chromosomes.	1
3	It is one version of a gene.	1
4	The origin of the 2 alleles of a given gene in every individual is one of paternel origin and the other of maternal origin.	1
Second exercise (5 points)		
1	In experiment 1, we put oil and water in a tube at a temperature of 37°C. We mix strongly. One hour later, the oil forms a layer at the surface of water.	1
2	One hour after mixing, in experiment 1, the oil forms a layer at the surface of water where there is only oil and water. Where as in experiment 2, we add bile, the oil is dispersed as droplets in water. The bile permits the dispersion of lipids into droplets or it helps in emulsification of lipids.	2
3	One hour after mixing, oil is dispersed as droplets in water in experiment 2 where bile is present. However, in experiment 3 where we add pancreatic juice, oil is transformed into fatty acid and glycerol. The pancreatic juice permits the digestion of lipids or its transformation into fatty acid and glycerol.	2
Third exercise (5 points)		
1	Is this rosebush of pure race?	1
2	Yes, because in the three generations, Sami obtains white roses only.	1.25
3-a	It is a case of codominance, because this cross gave a new phenotype : white rose with red periphery, where the red and white alleles are both expressed.	1.5
3-b	Symbol of the alleles: W : white R : red	0.5
3-c	Genotypes of the white rose with red periphery : WR . The rose that has the genotype WR gives two types of gametes : ▪ W ▪ R .	0.75

Part of the Q	Answer	Mark
Fourth exercise (5 points)		
1	 <p style="text-align: center;">Graph showing the variation in the concentration of CO in blood in function of the number of consumed cigarettes per day.</p>	2
2	<p>The concentration of CO in blood is 5% when the number of consumed cigarettes per day is 10. This concentration increases with the increase in the number of consumed cigarettes per day to reach 10% when the number of consumed cigarettes is 35. This shows that the concentration of CO in blood increases with the number of consumed cigarettes per day.</p>	2
3	<p>The hemoglobin molecules that fix CO forms a stable compound HbCO. That's why hemoglobin molecules can no more fix oxygen gas indispensable for cell. This leads to intoxication by CO.</p>	1