وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات	امتحانات الشهادة الثانوية العامة فرع الاداب والانسانيات	دورة سنة 2008 االاكمالية- الاستثنائية
	مسابقة في الثقافة العلمية مادة "علوم الحياة" المدة ساعة واحدة	الاسم : الرقم :

Answer the following exercises.

Exercise 1 (5pts)

Document 1 reveals a study carried out on the role of calcium in the body.

Calcium is indispensable for the body. It ensures in particular the rigidity of the skeleton and participates in muscle contraction as well as in the transmission of nerve messages. In spite of daily calcium elimination through urine, the body maintains the amount of calcium in the blood around a constant normal value of 100mg.L $^{-1}$.

A low amount of calcium in the blood is very frequent among patients hospitalized for serious illnesses. Apart from these seriously ill patients, the primary cause of the low amount of calcium in the blood is a lack of vitamin D....

Document 1

1- Formulate a hypothesis that explains the maintenance of the constant amount of calcium in the blood in spite of its elimination through urine.

2- Pick up from the text: **2.1-** The use of calcium at the level of the body.

2.2- The primary cause that is at the origin of a low amount of calcium in the blood.

3- Specify the role of vitamin D in the body.

Document 2 reveals the calcium reserves in the body of a man weighing 70kg.

4- In reference to document 2 and acquired knowledge, justify how a deficiency in calcium is related to a deficiency in vitamin D.

	Bones	Inner medium	Other tissues
Quantity of calcium (g)	990	0.5	10

Document 2

5- Name two foods rich in calcium and vitamin D at the same time.

Exercise 2 (5pts)

The document below reveals the importance of omegas 3 and 6. They are recommended in many food diets, and appear in many advertisements; however they are rare in daily consumed food.

Among the fatty acids that constitute lipids, we find the linoleic acid called "omega 3" and alpha-linoleic acid called "omega 6 ".

These fatty acids are known as "essential", they cannot be synthesized by our body, and therefore must be supplied by food. They are the main constituents of cell membranes and the epidermis of the skin. They intervene in blood coagulation through the production of blood platelets, in the activities of the immune system, and the absorption of certain liposoluble vitamins (A, D, E and K). They allow the synthesis of hormones those of which intervene in reproduction, growth… They ensure cold resistance and protect vital organs.

Although important, an excessive consumption or unbalanced ratios of omegas 3 and 6 can prevent the desired effects.

1- Pick up from the text the category of lipids to which omegas 3 and 6 belong, and their role at the level of the body.

2- "A woman with a diet very poor in lipids shows functional problems in reproduction". Justify this statement.

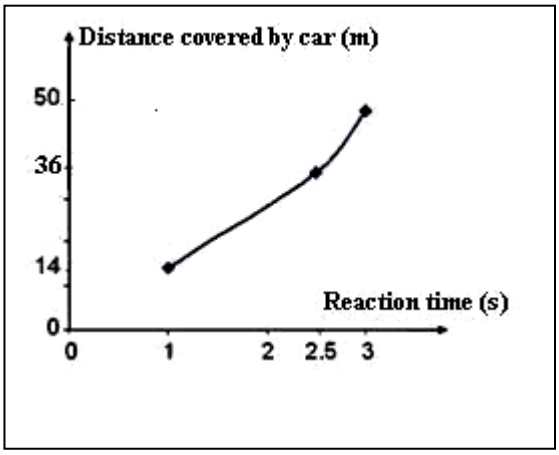
3- Explain why lipids are indispensable as much as they are dangerous.

Exercise 3 (5pts)

Studies were carried out in order to show the effects of alcohol on car driving. The results are shown in document 1.

Alcoholemia (g/L)	Effects on car driving
0.3 to 0.5	**- The driver takes risks while driving.** **- Wrong estimation of distances.** **- Reduced field of vision.**
0.5 to 0.8	**- Longer reaction time.** **-The driver has much difficulty in distinguishing road panels and the people crossing the road.**
> 0.8	**-Difficulties in taking decisions and adapting driving to different circumstances.** **-The coordination and synchronization of gestures are not totally controlled.**

Document 1



Document 2

1- Based on the analysis of document 1, draw out the relation between alcoholism and its effects on car driving.

2- Justify that alcohol disturbs brain functioning.

The distance crossed by a car driver was measured during the reaction time*. The results are shown in document 2.

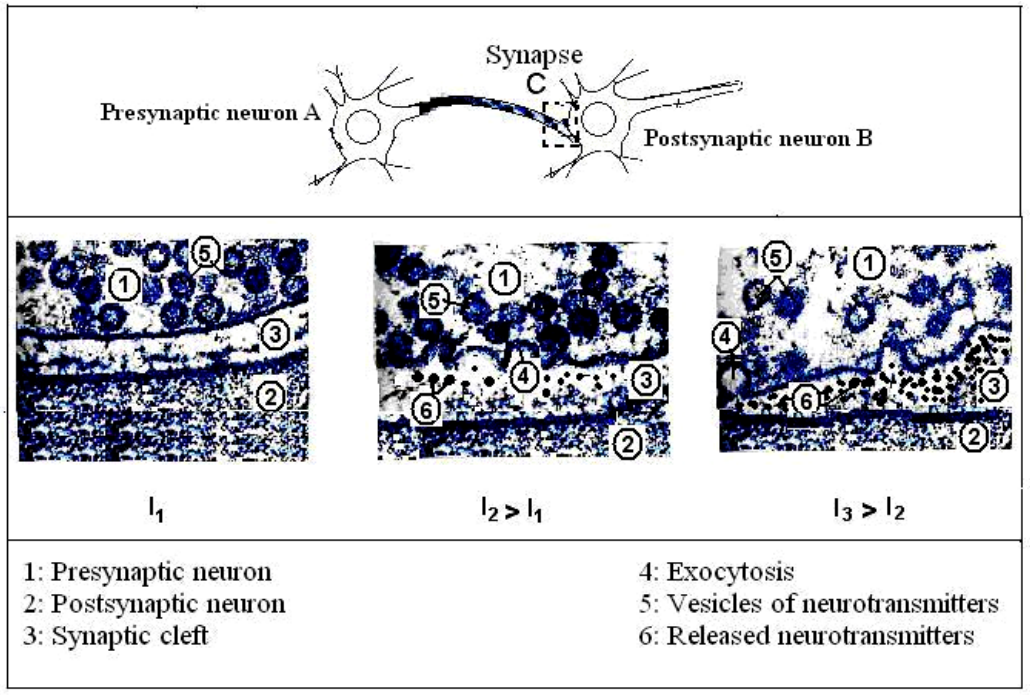
3- Draw up in a table the variation of the distances covered by car as a function of reaction time.

4- In reference to document 2 and the information drawn out from document 1, show that alcohol increases the risk of car accidents.

**** Reaction Time: Time taken by the driver to brake and stop the car after the appearance of an obstacle.***

Exercise 4 (5pts)

Three stimulations of increased intensity are applied on a presynaptic neuron A. Microphotographies of synapse C are taken during each of these stimulations. The next document reveals the synapse and the microphotographies obtained.



1- Compare the aspect of the synapse during these three stimulations. Draw out how the intensity of a stimulus is coded at the level of a synapse.

2- How can the aspect of the synapse be explained if the used intensity was I_1?

3- Specify the mode of action of a neurotransmitter at the level of the postsynaptic neuron and its fate.

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Exercise 1 (5pts)

1- **Hypothesis:** Calcium is ensured by daily supplied food. **(1pt)**

2- **2.1-** Calcium ensures the rigidity of the skeleton and takes part in the muscle contraction and the transmission of the nerve messages**. (0.5pt)**
2.2- A lack of vitamin D. **(0.5pt)**

3- Vitamin D: Favors the intestinal absorption of calcium and its fixation in the bone tissue. It ensures a normal development of the skeleton, prevents rickets in children and osteoporosis in adults. **(1pt)**

4- Document 2 reveals that bones are the main organs of calcium storage, 990g. Vitamin D favors the absorption of calcium and its fixation in bone tissue. A lack of vitamin D decreases calcium absorption and its fixation in bones. Thus, calcium deficiency is related to a deficiency in vitamin D. **(1.5pts)**

5- Milk and fish. **(0.5pt)**

Exercise 2 (5pts)

1- Omega 3 and omega 6 belong to essential fatty acids.**(0.5pt)**
Role: They intervene in blood coagulation through the production of blood platelets, in the activities of the immune system, and the absorption of certain liposoluble vitamins (A, D, E, and K). They allow the synthesis of hormones those of which intervene in reproduction, growth… They ensure cold resistance and protect vital organs. **(1pt)**

2- A diet poor in lipids does not supply the body with omegas 3 and 6 that are indispensable for the synthesis of the hormones that intervene in reproduction. Thus, a woman following this diet may present functional disturbances in reproduction by a lack of hormones. **(1.5pts)**

3- Lipids contain essential fatty acids such as omegas 3 and 6 that are not synthesized by the body and must be supplied by food; therefore they are indispensable. However an excess in the consumption of lipids is dangerous because they are at the origin of several diseases such as cardiovascular diseases and hypercholesterolemia. **(2pts)**

Exercise 3 (5pts)

1- For alcoholemia between 0.3 and 0.5g/L, the driver does not estimate distances correctly and visual field is reduced. As alcoholemia increases to overcome 0.8g/L, the coordination and synchronization of gestures for adapting driving to different circumstances are not totally controlled. This shows that disturbances increase with alcohol consumption. **(1pt)**

2- Coordination and synchronization of movements, vision, and reaction time…. All these functions depend on the brain. Therefore, alcohol disturbs brain functioning. **(1pt)**

3- (2pts)

Reaction time (seconds)	**1**	**2. 5**	**3**
Distance covered by car during reaction time (m)	**14**	**36**	**50**

Variation of the distance traveled by car as a function of reaction time

4- Document 2 reveals that as the reaction time taken for the car to stop when an obstacle appears increases from 1 to 3 seconds, the distance traveled increases from 14m to 50m. Document 1 reveals that the consumption of alcohol increases the reaction time. Therefore, a driver who consumed alcohol increases his reaction time which prevents the car to stop at the required time, increasing the risks of car accidents. **(1pt)**

Exercise 4 (5pts)

1- At intensity I_1, the vesicles containing the neurotransmitters are many and intact within the presynaptic nerve endings of the presynaptic neuron, there is no exocytosis and none of the neurotransmitters is found in the synaptic cleft. At intensity I_2, few vesicles containing the neurotransmitters were subjected to exocytosis. The others are close to the plasma membrane of the presynaptic neuron and we find in the synaptic cleft some released neurotransmitters. At intensity I_3, the number of vesicles that are subjected to exocytosis is higher than that with intensity I_2, the number of vesicles of the presynaptic neuron is less than before and the quantity of neurotransmitter released is very high.
This means that as the intensity of stimulation increases the quantity of released neurotransmitter increases. Thus, the intensity of stimulation is coded by the concentration of the neurotransmitter released in the synaptic cleft. **(2pts)**

2- Intensity I_1 is below the threshold of stimulation. This is because no nerve message propagated along the presynaptic neuron. It did not reach the vesicles and thus did not allow exocytosis. **(1pt)**

3- The neurotransmitter fixes on their specific postsynaptic receptors triggering PSP. **(1pt)**
The neurotransmitter is degraded by an enzyme. **(1pt)**