

## مسابقة في الثقافة العلميّة – مادة علوم الحياة

المدة: ساعة واحدة

(باللغة الإنكليزية)

الاسم: .....

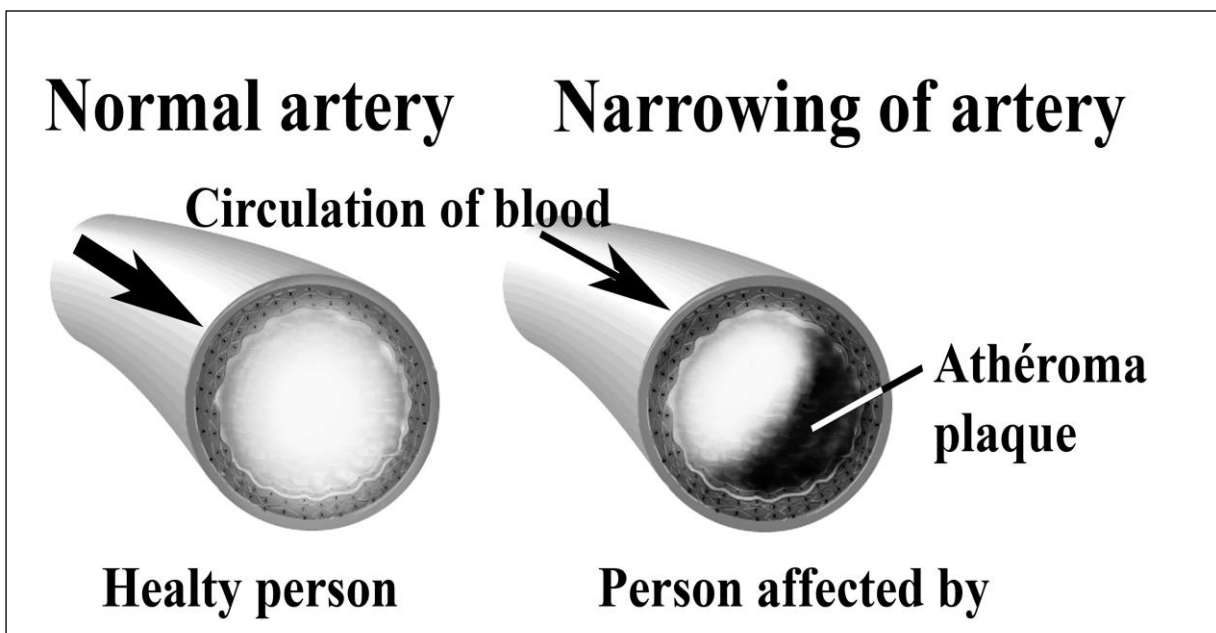
الرقم: .....

## Exercise 1 (7 points)

## Atherosclerosis

A food diet rich in lipids favors an increase in the concentration of cholesterol in blood. Consequently, lipids deposit on the walls of arteries causing the formation of atheroma plaque which is at the origin of atherosclerosis disease.

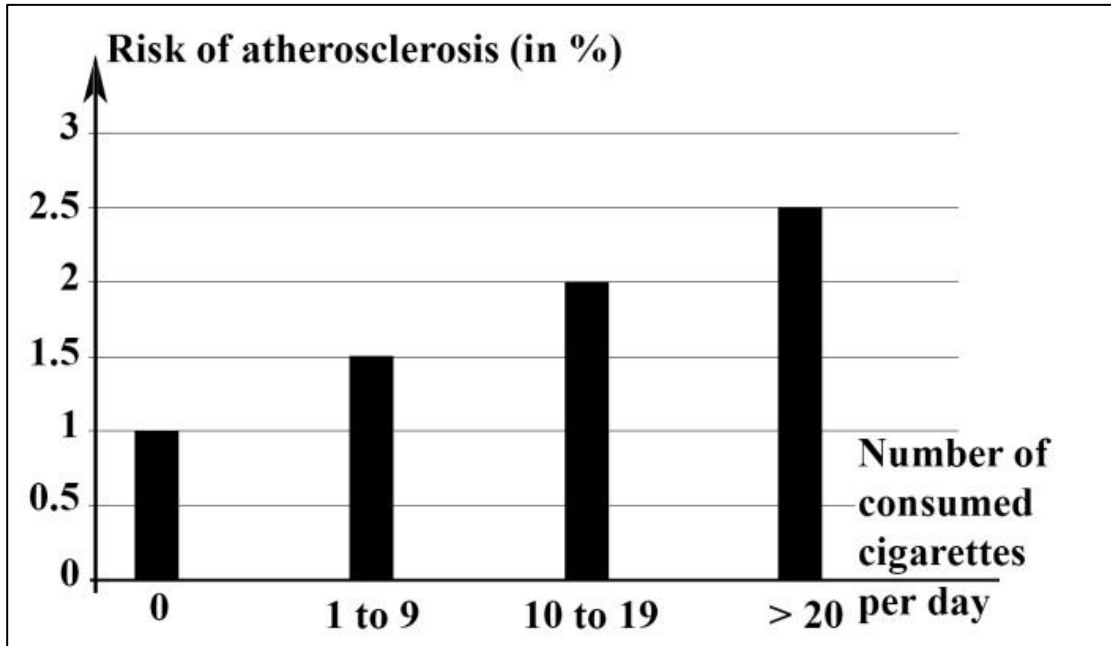
Document 1 shows a cross section of the coronary artery of a healthy person and that of an individual affected by atherosclerosis.



Document 1

- 1- **Draw out** the consequence of the formation of atheroma plaque on blood circulation.
- 2- **Justify** the following statement: LDL is a "bad cholesterol".

Document 2 represents the results of a study showing the relation between smoking and the risk of atherosclerosis development.



Document 2

**3- Draw** a table representing the results of document 2.

**4.1- Analyze** the obtained results.

**4.2- Derive** a conclusion.

**5- Suggest** two actions that the government would take to prevent the atherosclerosis development in the population.

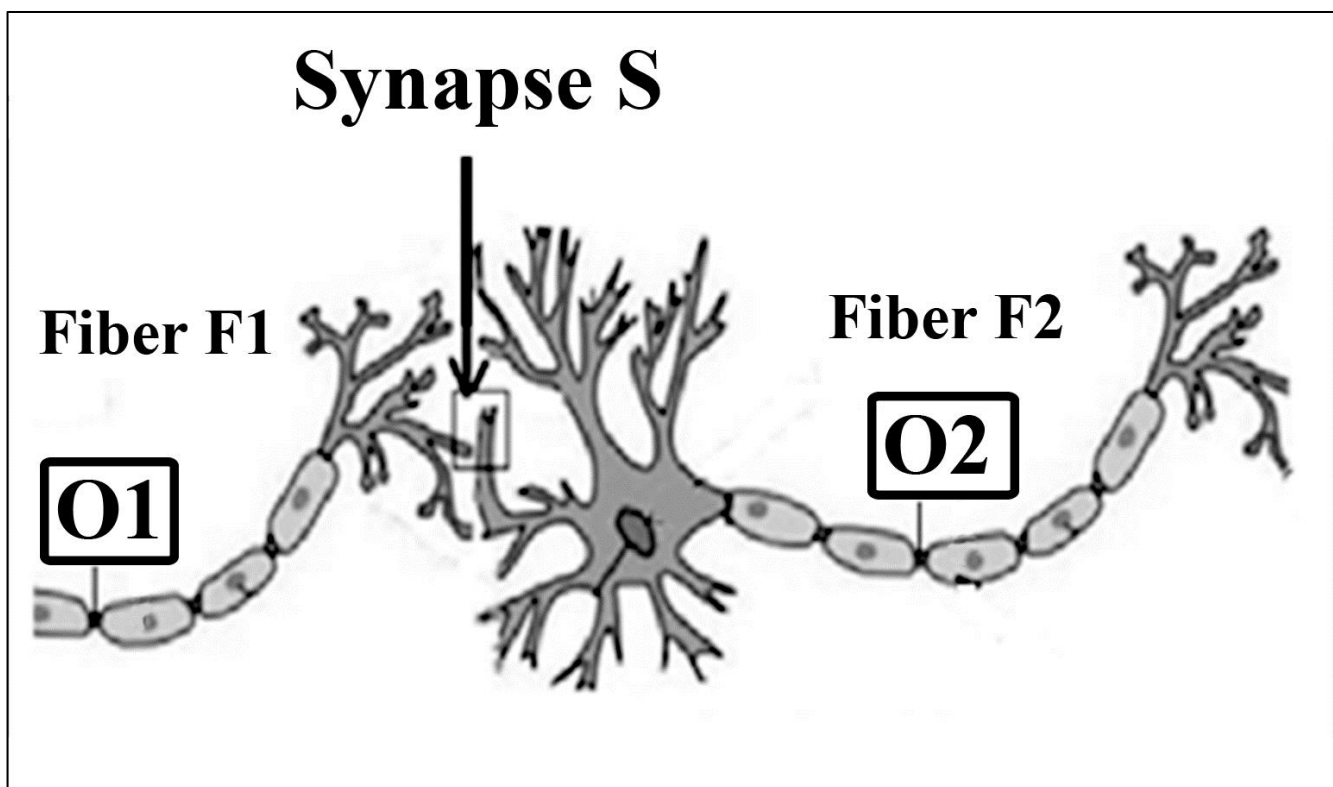
## Exercise 2 (7 points)

## Nerve Message

Sensory cells for taste are sensory receptors situated on the surface of the tongue. These receptors are involved in the detection of taste: salty, sour, bitter, and sweet.






In order to determine the characteristics of the nerve message, NaCl solutions of increasing concentrations are applied on a taste receptor.

Two oscilloscopes O1 and O2 are connected to the nerve fibers F1 and F2 respectively (document 1). F1 belongs to the sensory neuron issued from the sensory taste receptor, and F2 belongs to the neuron synapsing with this sensory neuron.



Document 1

The conditions and the recordings registered at the level of O1 are shown in document 2.

Concentration of NaCl solution (mmol/L)	1	3	10	30	100
Recordings registered at the level of O1					
Number of A.P	<b>0 A.P</b>	<b>1 A.P</b>	<b>5 A.P</b>	<b>8 A.P</b>	<b>12 A.P</b>

**Document 2**

**A.P: Action Potential**

- 1- **Specify** the threshold intensity of fiber F1.
- 2- **Show that** the nerve message at the level of fiber F1 is coded by frequency of action potential and not by amplitude.

Oscilloscope O2 records a nervous message for a concentration of the NaCl solution which is equal or above 10 mmol/L.

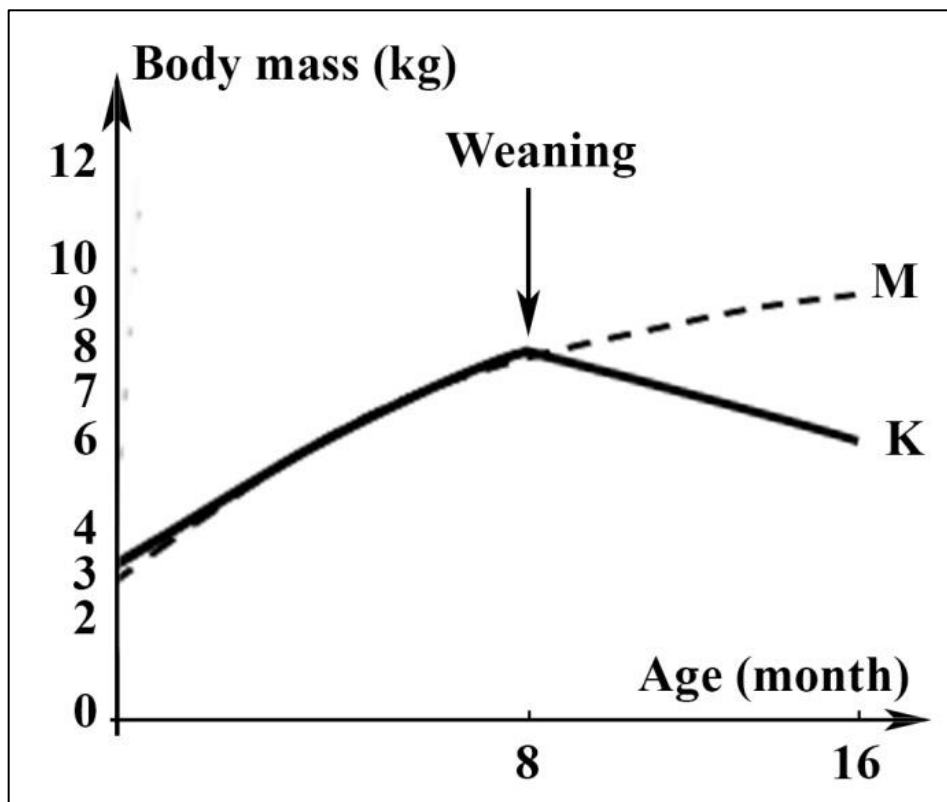
- 3- **Indicate** if synapse S is excitatory or inhibitory. Justify the answer.
- 4- **List** the steps of the transmission of the nerve message at the level of the synapse.

### Exercise 3 (6 points)

### Kwashiorkor Disease

Kwashiorkor is a disease which affects infants post weaning (arrest of breast feeding) in poor countries.

Document 1 represents the variation of the body mass of an infant (K) affected by kwashiorkor and that of the normal average mass (P).



Document 1

1.1- Analyze document 1.

1.2- Draw out a symptom associated with this disease.

2- Formulate a hypothesis which explains the origin of this disease.

This disease affects infants which are nourished mainly by sweet potato and manioc, post weaning.

Document 2 represents the composition of maternal milk and manioc in organic material.

<b>Value (g per 100 g)</b>	<b>Proteins</b>	<b>Carbohydrates</b>	<b>Lipids</b>
<b>Maternal milk (dry mass)</b>	11	55	30
<b>Manioc</b>	1	86	1

**Document 2**

- 3- Indicate**, by referring to document 2, the food which is the richest in each of these components: proteins, carbohydrates and lipids. Justify the answer.
- 4- Explain** the variation of the body mass of infant (K) post weaning.