وزارة التربية والتعليم العالي
المديرية العامة للتربية
دائرة الامتحانات

امتحانات الشهادة الثانوية العامة
فرع الاداب والانسانيات

دورة سنة 2011 الاستثنائية

مسابقة في الثقافة العلمية
مادة "علوم الحياة"
المدة ساعة واحدة

الاسم :
الرقم :

Answer the following exercises:

Exercise 1 (5 points) **Consumption of fruits and vegetables**

Our meals are often too rich in meat and salt. However, this type of diet slightly acidifies our blood. To restore equilibrium, bones will release calcium to neutralize the increase in acidity. This loss of calcium which is low but lasts for lifetime weakens our skeleton. Fruits and vegetables make blood less acidic by providing potassium.
In addition, the maintenance of the skeleton is controlled by hormones such as estrogen. However, with aging, especially in women after menopause, these hormones are no longer produced which makes the bones less robust. This extreme fragility of bones is a disease: osteoporosis. In fruits and vegetables, some molecules called phytohormones are very similar to estrogens. Thus, a diet rich in fruits and vegetables could help to partly compensate the loss of estrogen at menopause and reduce bone weakening.

1- Pick out from the text:
1-1 - The hormone that is no more fabricated after menopause.
1-2 - The effect of a diet that is rich in meat and salt.
2- Draw out from the text:
2-1- Two reasons for regularly consuming fruits and vegetables.
2-2- The role of phytohormones in preventing osteoporosis.
3- State another advantage of consuming fruits and vegetables.

Exercise 2 (5 points) **Beriberi**

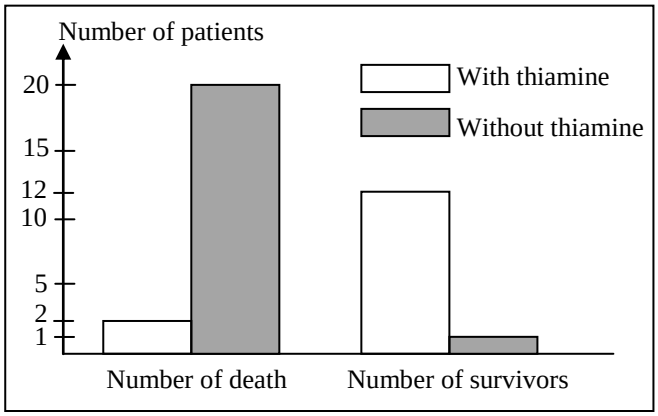
Beriberi is a nutritional disease that used to be frequent in Japan where people ate white rice. White rice is obtained from brown rice grains by industrial polishing that leads to the disappearance of their dark external envelope. Document 1 shows the amount of thiamine (vitamin B1) in certain foods in milligrams per 100g.

Food	Amount of thiamine
Lentils	0.43
White rice	0.06
Brown rice	0.37
Peas	0.3
Almonds, peanuts	0.25
Complete bread	0.25

Document 1

1- Specify whether this vitamin is hydrosoluble or liposoluble.
2- Propose by referring to Document 1, a possible origin of this disease.

A territory of the Indian Ocean has witnessed in 2004, an unusual increase in deaths among infants. Among 35 sick infants affected with beriberi, 14 have been treated by administration of thiamine. Document 2, reveals the state of patients in the presence and absence of thiamine during the urgently received treatment.



Document 2

3- Draw a table that translates the obtained results.
4- Interpret the results of document 2. What can we deduced about the origin of the disease?

Exercise 3 (5 points) **Tobacco dependency**

"Dopamine is a neurotransmitter implicated in the control of movement and pleasure. In depressed people, the concentration of dopamine is low. MAOI* are used as antidepressants; they increase the concentration of dopamine especially by preventing its degradation by specific enzymes. Acetaldehyde is a MAOI that is present in alcohol as well as in tobacco".

Document 1

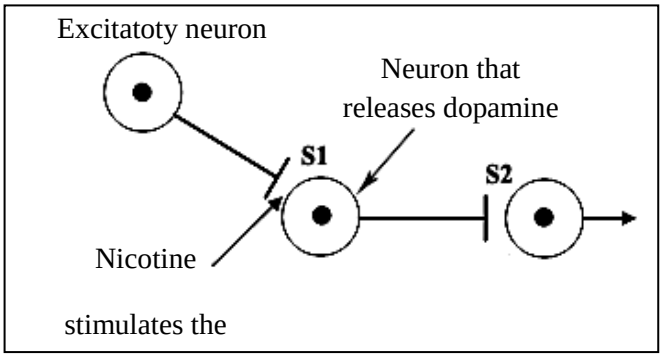
1- Pick out from the text, the mode of action of MAOI as antidepressants as well as the role of dopamine.

Document 2 represents the action of nicotine present in tobacco on the secretion of dopamine at the level of the cerebrum.

2- Draw out from document 2 the mode of action of nicotine.

3- Justify by referring to documents1 and 2 why depressed people seek excessive tobacco consumption.

4- Explain why nicotine present in tobacco is considered as a drug.



Document 2

Exercise 4 (5 points) **Response of a neuron to stimulations**

Document 1 presents synaptic junctions of three afferent neurons (A, B, C) with a motorneuron (D). We seek to study the response of neuron D following independent stimulations or simultaneous stimulations of different neurons.

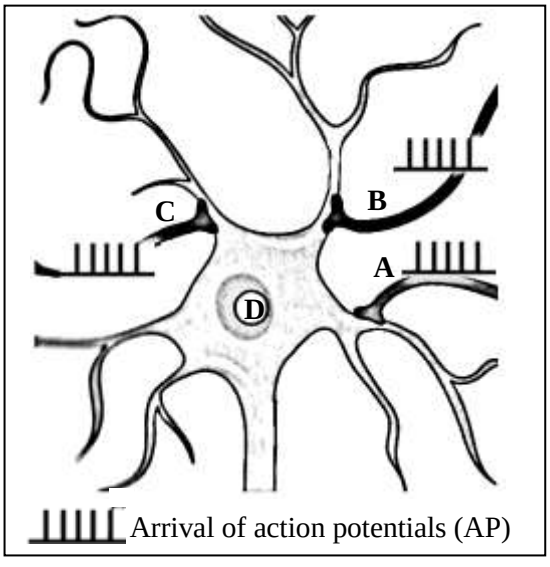
Document 2 shows the obtained results.

1- Specify in each of the cases 1, 2 and 3 whether neuron D is excited or inhibited. Justify the answer.

2- Determine whether the synapse between C and D is excitatory or inhibitory.

3- Specify the role of neuron D that is revealed in this experiment.

4- List the steps of the transmission of nerve message at the level of synapse A.



Document 1

Case	1	2	3
Stimulated neurons	A	A + B	A + B + C
Results in D	**+**	**-**	**+**
+ = presence of action potentials		**-** = absence of action potentials	

Document 2

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اسس التصحيح
الثقافة العلمية
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الاسم :
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Part of the Ex	Answer key	Mark
	Exercise 1 (5 points)	
1-1	Estrogens.	**0.5**
1-2	This type of diet slightly acidifies our blood.	**1**
2-1	Regular consumption of fruits and vegetables is recommended because their consumption compensates blood acidification linked to excessive consumption of meat and salt thus preventing the release of calcium from the bones and their weakening. In addition, they help preventing osteoporosis in postmenopausal women since they contain Phytohormones.	**1.5**
2-2	Phytohormones partly compensate the loss of estrogen after menopause and reduce the weakening of bone.	**1**
3	The fibers that are found in fruits and vegetables improve the intestinal transit. **Or** Fruits and vegetables are rich in vitamins and mineral salts that are indispensable for the well functioning of the body.	**1**

Part of the Ex	Answer key	Mark
	Exercise 2 (5 points)	
1	Hydrosoluble.	**0.5**
2	The white rice, an essential food in Japan, is poor in thiamine 0.06 mg per 100g with respect to brown rice 0.37 and lentils 0.43; it can be at the origin of the disease.	**1**
3	<table><tr><td></td><td colspan="2">Number of patients</td></tr><tr><td>Treatment</td><td>Number of death</td><td>Number of survivors</td></tr><tr><td>With thiamine</td><td>2</td><td>12</td></tr><tr><td>Without thiamine</td><td>20</td><td>1</td></tr></table> The state of patients as a function of treatment: with thiamine or without thiamine.	**2**
4	Out of the 14 infants treated with thymine, 12 have survived and two died; while out of the 21 infants not treated with thiamine, a higher number of infants died(20) and a lower number of infants survived(1). This shows that thiamine increases the resistance of patients against beriberi. Therefore the origin of beriberi is related to deficiency in thiamine.	**1.5**

Part of the Ex	Answer key	Mark
	Exercise 3 (5 points)	
1	-MAOI increases the concentration of dopamine, especially by preventing its degradation by specific enzymes.**(0.75 pt)** -Dopamine is a neurotransmitter implicated in the control of movement and pleasure.**(0.75 pt)**	**1.5**
2	Nicotine stimulates dopamine neuron at the level of S1to increases the liberation of dopamine at the level of S 2.	**1**
3	Depressed people have low concentration of dopamine. Tobacco contains acetaldehyde which is a MAOI that increases the amount of dopamine, especially by preventing its degradation by specific enzymes; and it contains nicotine that also increases the liberation of dopamine .Therefore, smoking tobacco increases the concentration of dopamine and corrects the effect of depression.	**1.5**
4	Nicotine is considered as drug because it acts at the level of the synapse and modifies its function in addition to inducing physical and psychic dependence and tolerance.	**1**

Part of the Ex	Answer key	Mark
	Exercise 4 (5 points)	
1	In the case of the stimulation of neurons(A+ B), neuron D is inhibited **(0.5 pt)** because there is absence of AP in neuron D.**(0.5 pt)** However, in the case of the stimulation of neuron A or neurons (A+B+C), neuron D is excited **(0.5 pt)** because APs appear in neuron D.**(0.5 pt)**	**2**
2	The synapse between C and D is excitatory **(0.5 pt)** because the stimulation of neurons (A+B) does not result in the generation of any AP; however, the stimulation of the same neurons (A+B) simultanously with neuron C leads to the generation of AP in neuron D **(1pt)**.	**1**
3	The role revealed at the level of neuron D is an integrating role of the nerve messages coming from different afferent neurons (A, B and C).	**0.5**
4	The afferent nerve message reaches the terminal buds of the presynaptic neuron. It triggers, by exocytosis, the liberation of the neurotransmitter to the synaptic cleft. The liberated neurotransmitters fix on specific receptors on postsynaptic membrane and trigger an excitatory postsynaptic potential. The neurotransmitters are degraded by specific enzymes and/or are recaptured by the presynaptic membrane.	**1.5**