وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات	امتحانات الشهادة الثانوية العامة فرع الاداب والانسانيات	دورة سنة ٢٠٠٨ العادية

مسابقة في الثقافة العلمية مادة "علوم الحياة" المدة: ساعة واحدة	الاسم: الرقم :

Answer the following exercises.

Exercise 1 (5pts)

The document below reveals the relation between two diseases of nutritional origin: Marasmus and Kwashiorkor.

Marasmus and Kwashiorkor are two clinical forms of acute malnutrition. People suffering from Marasmus are extremely thin and do not show edemas.
Those who suffer from Kwashiorkor may also be thin, yet with many edemas all over their body that consumes its own tissues, modifies its functions, especially cellular balance. Water contained in the cells, moves within the body thus, creating pockets of water called edemas.
In these two clinical forms of malnutrition, the skin, which is extremely dehydrated, tears under pressure, and forms characteristic ulcers. Sometimes a child may show these two clinical forms at the same time.

1- Draw a comparative table showing the characteristics of each disease.
2- Pick up from the text the cause of edemas in people suffering from kwashiorkor.
3- Indicate the causes of malnutrition.
4- Specify which of the two diseases is due to under-nutrition. Justify the answer.
5- Give a nutrition advice aiming to lower the risk of occurrence of each of these diseases.

Exercise 2 (5pts)

The search for the factors at the origin of diabetes allows setting prevention measures or even treatments. The document below reveals the results of a research carried out on individuals in order to study the relative risk of diabetes as a function of body mass and physical activity.

Individuals	Normal weight		Overweight		Obesity	
	Active	Sedentary	Active	Sedentary	Active	Sedentary
Risk of diabetes	0.8	1	3.2	3.8	11	11.9

1- Formulate two hypotheses at the origin of this research.
2- Interpret the obtained results. Deduce the main factor responsible for the appearance of diabetes.
3- Suggest a prevention measure in order to lower the risk of diabetes.

Exercise 3 (5pts)
The document below shows the causes of certain nervous system diseases and their consequences on health.

Diseases	Causes and Consequences
Lateral amyotrophic sclerosis (LAS)	**Attack of certain cerebral neurons, which provokes difficulties in movements leading to gradual paralysis of all the body muscles.**
Parkinson disease	**Attack of certain cerebral neurons, which release a neurotransmitter, dopamine. Patients show tremors, muscles rigidity and difficulty in movements.**
Huntington chorea	**Attack of certain cerebral neurons, which provokes uncontrolled movements and mental capacities progressive deterioration.**

1- Pick up from the document the similarities between all these diseases.

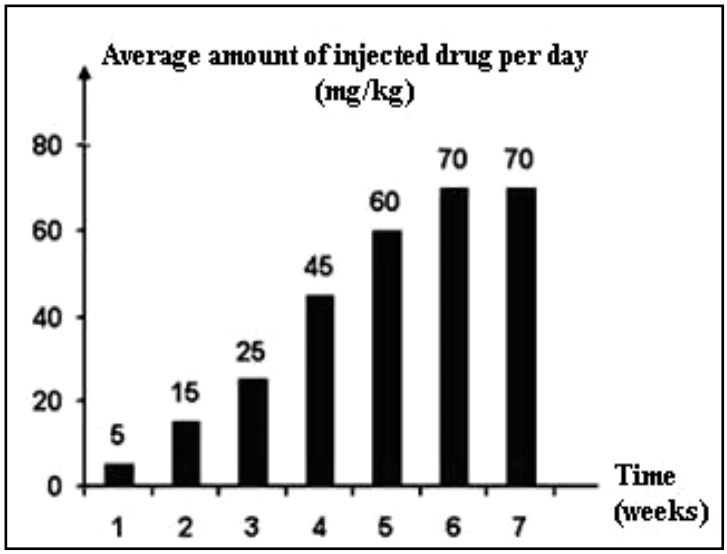
L-dopa is a molecule converted into dopamine within the cerebrum. Chlorpromazine is a molecule that has a similar spatial structure to that of dopamine, and prevents the action of this latter at the level of the synapse.

2- "L-dopa reduces the disorders observed in patients affected with Parkinson disease". Justify this statement.

3- Explain how chlorpromazine prevents the action of dopamine at the level of a synapse.

4- Indicate the consequences of injecting chlorpromazine into the cerebrum of a normal individual and into the cerebrum of an individual affected with Parkinson disease.

Exercise 4 (5pts)
A fasting monkey is placed in a cage supplied with a lever. When the monkey hangs to the lever, it receives a drug injection. In the course of a few hours, the monkey steps on the lever repeatedly.
The average quantity of drug injected into the monkey is measured for 7 weeks. The results are shown in the next document.



1- Draw a table showing the variations of the average amount of the injected drug as a function of time.

2- Analyze this document.

3- What does "tolerance" mean with respect to drugs? By referring to the document, show that the monkey is in a state of tolerance.

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	مسابقة في الثقافة العلمية مادة "علوم الحياة" اسس التصحيح	الاسم : الرقم :

Exercise 1 (5pts)

1- (1.5pt)

Marasmus	Kwashiorkor
Individuals extremely thin	Individuals either thin or not
Absence of edemas	Presence of edemas
The extremely dehydrated skin tears under pressure and forms characteristic ulcers	The dehydrated skin tears under pressure and forms characteristic ulcers

2- The body modifies cellular balance. Water, contained in cells, moves within the body thus, creating pockets of water called edemas. **(0.5pt)**

3- Malnutrition is due to an inadequacy in food quantity and/or quality with respect to the nutritional needs of an individual. **(1pt)**

4- Marasmus **(0.5pt)** because it is due to an insufficient food intake in quantity and quality. **(0.5pt)**

5- Marasmus: Increase the food intake in carbohydrates, lipids and proteins.
Kwashiorkor: Increase the food intake in proteins of animal origin.
OR Increase the food intake in essential amino acids. **(1pt)**

Exercise 2 (5pts)

1- Hypotheses: 1- Obesity favors diabetes. **(1pt)**
2- Sedentary lifestyle favors diabetes. **(1pt)**

2- For a normal weight, the risk of diabetes is 0.8 if the person is active. It slightly increases to reach 1 if he is sedentary. Likewise, for the different weight categories, the increase in the risk is low between active and sedentary persons. On the contrary, in active persons, the risk highly increases by 0.8 if the person has a normal weight, to reach 11 if the person is obese. This implies that the risk of developing diabetes increases especially with weight increase, however for the same weight it slightly increases in sedentary people. Therefore, obesity is the main factor responsible for the appearance of diabetes.**(2pts)**

3- Preventive measure: - Change diet in order to loose weight: reduce sugars and fats consumption, do not pick at food, … **(0.5pt)**
- Exercise, do not remain seated for too long … **(0.5pt)**

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Exercise 3 (5pts)

1. Similarities:
- Attack of certain cerebral neurons **(0.75pt)**
- Motor disorders: difficult and uncontrolled movements **(0.75pt)**

2. L-dopa is converted into dopamine within the cerebrum. Since Parkinson disease is due to an attack of the dopamine neurons, then L-dopa will substitute the lacking dopamine at the level of the cerebrum and reduce the troubles in the affected person. **(1.5pt)**

3. Chlorpromazine has a similar spatial structure to dopamine and will fix to dopamine receptors located at the level of the postsynaptic membrane, preventing the fixation of dopamine thus inhibiting its action. **(1pt)**

4. Motor disorders appear in a normal individual and will be similar to those provoked by Parkinson disease. The disease will aggravate in individuals already affected with Parkinson disease. **(1pt)**

Exercise 4 (5pts)

1- (2pts)

Time (weeks)	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Average amount of drug injected per day (mg/kg)	**5**	**15**	**25**	**45**	**60**	**70**	**70**

Variations of the average quantity of injected drug versus time

2- On the first week, the quantity of the drug injected by the monkey is 5mg/kg; it increased in the course of the coming weeks to reach 70mg/kg at the 6^{th} week and remains constant until week 7. **(1pt)**

3- Tolerance is the increase in the dose of the drug consumed in order to obtain the same pleasure sensations felt with the lower previous doses. **(1pt)**
The histogram reveals that the monkey is gradually increasing the doses with time in order to obtain the same previous effects; this means the monkey is in state of tolerance. **(1pt)**