وزارة التربية والتعليم العالي
المديريّـة العامة للتربية
دائرة الامتحانات الرسمية

امتحانات الشهادة الثانوية العامة
فرع الاجتماع والاقتصاد

دورة الـعام ٢٠١٩ الاستثنائيّة
الثلاثاء ٣٠ تموز ٢٠١٩
مكيّفة

مسابقة في الثقافة العلميّة ــ مادة علوم الحياة

المدة: ساعة واحدة

(باللغة الانكليزية)

الاسم: ....

الرقم: ....

Exercice 1 (7 points)   Fight Against Obesity

Obesity(excess of body mass) is mainly due to an energetic imbalance where the energy supply is higher than the energy expenditure.

This energetic imbalance depends at the same time on the environment, the behavior of the individual, and his genetic predisposition.

Energetic supplies consist of the energy contained in solid foods and beverages that can be metabolized (used) by the body.

Document 1

1- **Pick out** from document 1:

    1.1- The cause of obesity.

    1.2- The factors that affect the energetic balance.

    1.3- The constituents of the energetic supplies.

Obesity corresponds to the increase of the body mass due to the accumulation of fatty acids in the adipose tissue.

In order to reduce obesity, two hypotheses are formulated:

Hypothesis 1: It's preferable to adopt a **moderate physical activity** for a longer duration.

Hypothesis 2: It's preferable to adopt an **intense physical activity** for a short duration.

In order to validate one of these hypotheses, the variation of the use of fatty acids in the blood and the muscular glycogen as sources of energy is measured in the following two cases:

Case 1: A moderate physical exercise during two different durations

       (at 30 min and at 120 min). **The results** are represented in document 2.
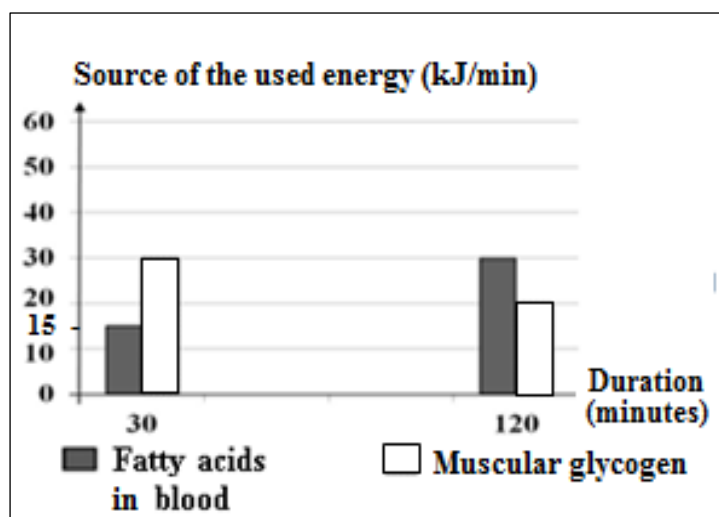
Document 2

Case 2: An **intense** physical exercise of <u>30 minute duration</u>.

The results, in this case, show <u>a weak utilization of fatty acids</u> as a source of

energy.

2- **Recopy** and **complete** a table showing the <u>variation of the source of energy</u> **used as a function** of the <u>duration of the exercise</u> (referring to document 2).

Duration (min)		30 min	120 min
Source of energy used (kJ.min^{-1})	**Fatty acids in blood**		
	Muscular glycogen		

Title : …………………………………………………………………………

3- Based on document 2, **analyze** the <u>variartion of utilization</u> of:

- fatty acids in blood

- muscular glycogen

4- <u>Hypothesis 1 is validated</u>. **Justify**.

5- **Choose** <u>two diseases</u> that are enhanced by obesity.

Diabetes - Parkinson – Alzheimer - Cardiovascular diseases.

**Exercise 2 (6.5 points)**   **A Characteristic of a Receptor**

In the framework of studying the characteristics of sensory receptors, three experiments A, B and C are performed.

Stimulations of supraliminal intensities **(above threshold)** are applied on three different receptors:

- Pacini corpuscle
- Ruffini corpuscle
- Krause corpuscle.

The obtained Aps (action potential) are recorded at the level of the nerve fiber that corresponds to each type of the receptors.

The results of the experiments A and B are represented in document 1.
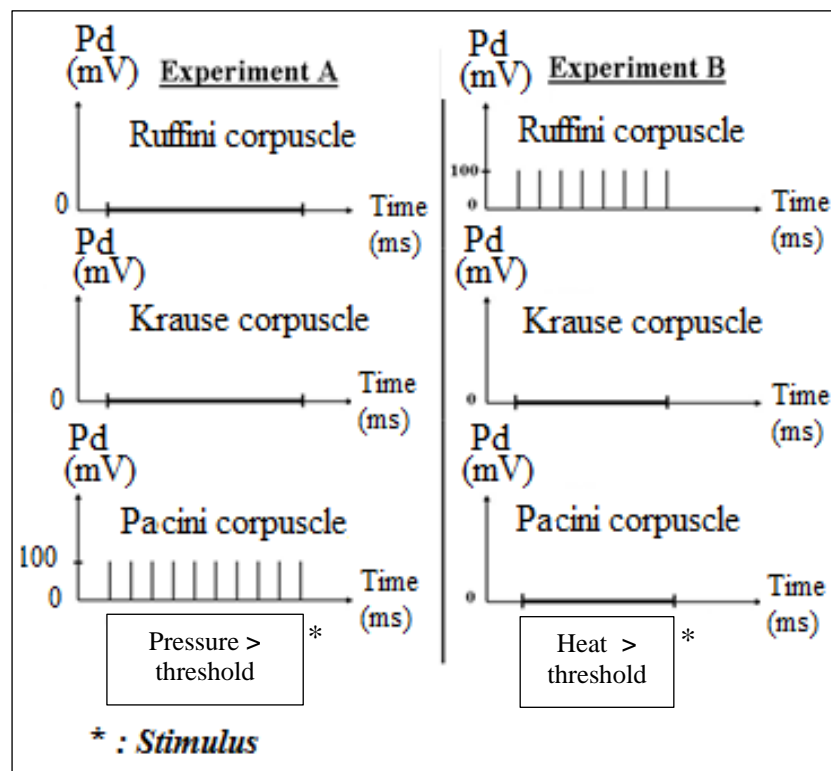
Document 1

1- **Complete** the definition of <u>threshold intensity</u>.

« The threshold intensity is the ---------------- intensity above of which a nervous message (AP) is recorded».

2- **Pick out** from document 1 <u>the stimulus </u>(framed) used in each experiment.

3- **Specify**, based on experiments A and B, the <u>receptor that is sensitive to pressure</u> and the <u>receptor that is sensitive to heat</u>.

Justify your answer.

4- **Choose** <u>the characteristic of the receptors revealed in document 1:</u>

a- a receptor is specific to one type of stimulus.

b- a receptor is sensitive to two types of stimulus.

c- a receptor is sensitive to many types of stimulus.

In experiment C, the three receptors are subjected to an intense cold.

5- Based on <u>document 1</u>, **recopy** and **complete** the table below representing the recording on Krause corpuscle receptor using, knowing that Krause corpuscle is the only receptor sensitive to cold:

──────── (no response)   **or**   ‖‖‖‖‖‖‖‖ (response).

	Pacini corpuscle	Ruffini corpuscle	Krause corpuscle
Number of AP (action potential)	────	────	

Exercise 3 (6.5 points)   **Diabetes Treatment**

Diabetes is a chronic disease characterized by a constantly high level of glucose in blood. There are different types of diabetes. type 1 diabetes, type 2 diabetes, pregnancy diabetes, and other rare types.

Type 1 diabetes is caused by the destruction of pancreatic beta cells responsible for the secretion of insulin (a hypoglycemic hormone).

Document 1

1- Pick out from document 1:

    1.1- The definition of diabetes.

    1.2- The different types of diabetes.

    1.3- The cause of type 1 diabetes.

In order to treat type 1 diabetes, insulin will be produced by a genetic engineering technique, the transgenesis. The steps of this technique are represented in document 2.
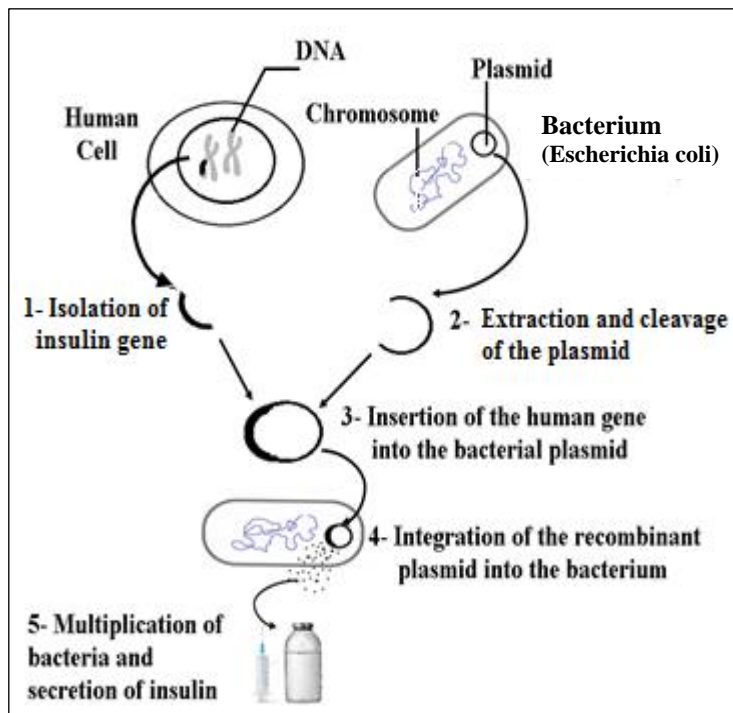
Document 2

2- Copy and **match** the following:

Donor cell   •   •   Bacteria (Escherichia coli)

Recipient cell   •   •   Human cell

3-Name the <u>enzymes used in steps 1 and 3</u>.

Enzyme used in step 1 is : ………………………..…..

Enzyme used in step 3 is : …………………….………... .

4- Complete the statements below by using the suitable term:

Bacteria is quailified as transgenis, since there is……………..of new gene from one species (Human) into ………………..(secretion of insulin).

5-State a <u>medical benefit</u> and another <u>economic benefit</u> of insulin production by transgenesis.