المركز التربوي للبحوث والإنماء	الهيئة الأكاديميّة المشتركة قسم : العلوم	المادة: الكيمياء الشهادة: الثانوية العامة الفرع: الأداب والانسانيات- الاجتماع والاقتصاد نموذج رقم -١- المدّة : ساعة واحدة

نموذج مسابقة (يراعي تعليق الدروس والتوصيف المعدّل للعام الدراسي ٢٠١٦-٢٠١٧ وحتى صدور المناهج المطوّرة)

This exam is composed of two exercises. It is inscribed on two pages. The use of a non programmable calculator is allowed.

Answer the questions on the following two exercises.

Exercise 1 (10 points) The Vegan

There is not a vegetarian diet but vegetarian diets:

- The ovo-lacto- vegetarian diet which includes intakes of dairy products and eggs.
- The lacto-vegetarian diet with intakes of dairy products only.
- The vegetarian diet without intake of milk or eggs (vegan). Only the latter is really unbalanced.

The vegan diet has the advantage of lowering the risk of cardio-vascular diseases since such a diet is poor in cholesterol and rich in fiber and complex carbohydrates. Conversely, since it is poor in proteins, vitamin B12, vitamin D (found in milk) and iron, this may cause serious health problems especially for pregnant women and children. The recommended dietary allowance (RDA) of iron is 18 mg/day for an adult....In fact, some essential amino acids (tryptophan, lysine and methionine) are only found in animal products. Moreover the caloric intake of animal proteins is considerably more important,...

It is necessary to replace the meat with other foods also rich in proteins: legumes including beans like soybeans, chickpeas, lentils, etc. The consumption of milk (and its derivatives) and eggs can partially resolve this lack of protein (limit to 3 eggs per week, the yolk is the food richest in cholesterol). Deficiency in vitamin B12 causes atrophy of the intestinal villi, and neurological signs...Iron deficiency leads to anemia,...

Adapted from *"Etre ou ne pas être végétarien? médecine et santé»*

Food categories	Protein contributions
Cereals: wheat, rice, corn...	10% of proteins, rich in sulfur-containing- amino acids (methionine and cysteine), poor in isoleucine and lysine
Legumes: lentils, white beans, peas, chickpeas, fava beans...	20% of proteins rich in lysine and poor in sulfur- containing-amino acids.
Oilseeds: peanuts, walnuts, almonds, sunflower, soy...	15 to 35% of proteins, poor in lysine.
Meat, fish, eggs.	About 20% of proteins, containing all sorts of amino acids.

Document 1 : Contribution in proteins of some categories of foods.

Nutrition: Principes et conseils, Laurent Chevallier

1. Referring to the text, answer the following questions:

1.1. Pick out the benefits of the vegan diet on health.

1.2. Extract the possible deficiencies in strict vegans.

1.3. To what class of minerals does iron belong? Justify.

1.4. Explain, **by referring to document 1**, how a vegan must choose his/her food to properly cover his/her protein needs.

1.5. Give, **by referring to document 1**, the foods that provide all kinds of amino acids.

2. Vitamins are nutrients essential for the proper functioning of the body.

2.1. Give the two classes of vitamins.

2.2. Explain the meaning of each class of vitamins.

2.3. Indicate to which of these two classes vitamin D belongs.

3. List two roles of **proteins** in the human body.

4. The vegan diet is rich in carbohydrates. Saccharose is a non reducing sugar. Choose among the following, the product(s) of the hydrolysis reaction of saccharose:

a- glucose only b- glucose and galactose

c- glucose and fructose d- galactose and fructose

5. Referring to **document 1 and to the text**, specify the disadvantage of adopting a vegetarian diet rich in grains and oilseeds on health.

Exercise 2 (10 points) Classification of Drugs

Drugs can be classified according to their chemical structures or their pharmaceutical activities.

Read the following leaflets of three drugs, and then answer the questions below.

Document 1

Leaflet 1: Augmentin

* 100 mg 12.5 mg per mL: powder for oral suspension.
*Clavulanic Acid, Amoxicillin Trihydrate .
* Flavor: caramel, tropical.

This drug is active on more germs than the simple penicillin. The addition of clavulanic acid prevents the destruction of amoxicillin by certain bacteria .

It is used in the treatment of various infectious diseases, including lungs, bronchus, nose, throat or ears, urinary system, reproductive tract, gums and teeth.

Extract from the leaflet of Augmentin by Ivax.

Leaflet 2: Aspegic.

* Injection. Powder and solution for parental use.
* 900 mg of lysine acetylsalicylate.
* Lubricant qsp a vial of 1 g of powder.

This drug is recommended in severe pain, fever and inflammatory rheumatism.

. *Extract of the leaflet of Aspegic by Savont aventis.*

Leaflet 3: Maalox.

* Box of 40 Tablet chewable**.**
* 400 mg to 400 mg of magnesium hydroxide and aluminum hydroxide.
* Carbohydrates such as sorbitol and maltitol.

This medication works by neutralizing acids secreted by the stomach. It is used in the treatment of the sour stomach, heartburn and acid reflux.

*Extract from the leaflet of Maalox by self-medication**.***

Referring to the leaflets and based on your own knowledge, answer the following questions:

1. Copy and complete the following table:

Medication	Formulation	Active ingredient (s)	Class (es) according to the pharmaceutical activity
Augmentin			
Aspegic			
Maalox			

2. The three leaflets indicate the ingredients of a drug. Copy and complete the following sentence:

A drug contains 2 kinds of ingredients: ---------- ingredient and ----------ingredients.

3. Give the role of caramel in a medicinal drug.

4. Antibiotics are classified according to their spectrum of activity. Identify the spectrum of Augmentin.

5. Pick out the importance of the association of clavulanic acid to amoxicillin Trihydrate.

6. A patient suffering from acid reflux got a lung infection. Identify a combination therapy of two of these three drugs to treat the infection and to neutralize the acidity.

7. The antibiotic resistance crisis has been attributed to the overuse and misuse of antibiotics. List two mechanisms of antibiotic resistance in bacteria.

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أسس التصحيح (تراعي تعليق الدروس والتوصيف المعدّل للعام الدراسي ٢٠١٦-٢٠١٧ وحتى صدور المناهج المطوّرة)

Exercise 1(10 points) The vegan
Expected answers

1.

1.1. The vegan diet has the advantage of lowering the risk of cardio-vascular diseases since such a diet is poor in cholesterol and rich in fiber and complex carbohydrates. **(1pt)**

1.2. The vegan diet is poor in proteins, vitamin B12, vitamin D and iron. **(4 x 0. 25pt)**

1.3. Iron is a trace mineral **(0.25pt)** since it is needed by the body, in amounts less than 20 mg per day **(0.5pt).**

1.4. A vegan must choose the following foods to properly cover his protein needs:

Cereals that provide 10% protein, rich in sulfur- containing- amino acids (methionine and cysteine), legumes which provide 20% of protein rich in lysine, eggs and dairy products. **(2x0.75pt)**

1.5. The foods that provide all kinds of amino acids are: meat, fish, eggs**. (0.5pt).**

2.

2.1. Vitamins are classified into hydrosoluble and liposoluble**. (1pt)**

2.2. Hydrosoluble: soluble in water, liposoluble: soluble in fats. **(1 pt).**

2.3. Vitamin D is liposoluble. **(0.25pt)**

3. Proteins provide the cell structure (plastic role) and have different biological functions (enzyme activity, transport proteins, nutritional protein) **(2 x 0. 75pt).**

4. c- glucose and fructose **(0.5 pt).**

5. Both categories of foods are low in lysine (essential amino acid) which is brought by animal products and animal protein caloric intake is much more important. **(1 pt)**

Exercise 2 (10 points) Classification of Drugs
Expected answers

1. **(13 x 0.25pt)**

Medication	Formulation	Active Ingredient(s)	Class (es) According to the pharmaceutical activity
Augmentin	Powder	Amoxicillin and clavulanic acid	Antibiotic
Aspegic	Powder and solution	Lysine Acetylsalicylate	Anti-inflammatory Analgesic
Maalox	Tablet	Aluminum hydroxide and magnesium hydroxide.	Antacid

2. Active ; inert. **(1pt) (0.5pt each)**

3.The role of caramel is to give flavor **(0.5pt)**

4. Augmentin acts against a wide range of disease causing bacteria, **(0.75pt)** so it is a broad spectrum antibiotic**. (0.5pt)**

5. The association of clavulanic acid to amoxicillin Trihydrate helps prevent the destruction of amoxicillin by some bacteria. **(1pt)**

6. To treat kidney infection, the patient should take Augmentin. **(0.75pt)**
Then the patient is suffering from acid reflux, he must take Maalox to neutralize the acidity**. (0.75pt)**

7. Resistant Bacteria act according to different mechanisms:

- Bacteria have the ability to produce enzymes that make the antibiotic inactive.
- Bacteria are able to grow by changing their permeability to the antibiotic.
- Bacteria can change the structure of their site of action.
- Bacteria can reach a State of tolerance.

Note: any 2 mechanisms (2 x 0.75pt)