

الاسم:	مسابقة في مادة الثقافة العلمية (كيمياء)
الرقم:	المدة: ساعة واحدة

This Exam Includes Two Exercises. It Consists of Two Pages Numbered 1 and 2.
The Use of a Non-programmable Calculator Is Allowed.

Answer the Following Two Exercises:

First Exercise (10 points)
Nutrition

...To maintain good health it is necessary to change our eating habits and practices. Our average food diet generally ... consists of 50 % carbohydrates, 40 % fats and 10 % proteins (**this diet gives an energy value E_1**). We should start by modifying these percentages and consume 70 % carbohydrates, 15 % fats and 15 % proteins (**this diet gives an energy value E_2**).

An easy way to reach this aim will be to:

- Increase the intake of cereals, fruits, vegetables, grains and bread.
- Eat a moderate amount of lean chicken meat (without the skin), veal, fish, egg white, milk and dairy products.
- Consume in small amounts: butter, margarine, oils, candies, sugar, chocolates, egg yolk and soda water.
- Do not forget to drink water. Your body needs is between 1.5 and 2 liters of water per day.

A health food diet must include food rich in fibers.

<http://www.obesidad.net/english2002/start.shtml>.

Questions

- 1- Name the five nutrients needed for the human body.
- 2- Indicate the three main functions of nutrients in the organism.
- 3- The consumption of large amounts of butter and margarine may cause cardiovascular diseases. Justify.
- 4- Specify if fiber is considered as a nutrient.
- 5- Match items of column I to their corresponding items in column II:

Column I

- A- Diet rich in carbohydrates
- B- Diet rich in fats
- C- Diet rich in fibers

Column II

- i- Prevent cancer disease
- ii- Cause obesity
- iii- Cause tooth decay

- 6- Determine the energy values E_1 and E_2 for 100 g of each of the above food diets. **Interpret.**

Given: 1g of carbohydrates provides 16 kJ.
1g of proteins provides 17 kJ.
1g of lipids provides 38 kJ.

Second Exercise (10 points)
Antibiotics: ... “bacteria with problems”

... That was more than 50 years antibiotics are known. Antibiotics act against certain dangerous infections. Among the infectious agents we can distinguish between viruses and bacteria.

The viruses are responsible for many well-known infections like influenza, measles, mumps, diarrheas, colds ...

The bacteria cause pneumonias, meningitides, diarrheas

The antibiotics act against the bacteria but not the viruses.

But today it is time to act against a new threat.

“Bacteria with problems”:

- “Staphylococci” are secreting penicillinase in 95% of cases. Ampicillines and penicillin are thus inactive against “staphylococci”.

- “Hemophilia influenzas” are secreting stocks of the β -lactamase. The active antibiotics with these stocks are the cephalosporin's type: Cefaclor and Amoxicilline-Clavulonic acid association.

Questions

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

1.1- A bacterium with problems is a resistant bacterium. Extract from the text an example of a resistant bacteria and give its mode of action (mechanism).

1.2- A patient is under an infection. Justify if this patient has to be treated with an antibiotic.

2- Give three cases in which it is advised to prescribe a combination of two or three antibiotics. State the combination mentioned in the text.

3- Medicinal drugs are classified into categories according to their therapeutic effects.

Recopy the following table on the answer sheet and complete it:

Medicinal drug	Analgesic	Anti-inflammatory	Antibiotic	Anti-acid
Therapeutic effect		Reduces or eliminates an inflammation		Treats the problems caused by excessive gastric acid , HCl.
Name of a current medicinal drug				

First Exercise (10 points)

Part of the Q	Answer	Mark
1	The five nutrients are: carbohydrates, proteins, lipids, vitamins and minerals.	1.25
2	The three main functions of the nutrients are: - For growth and maintenance. - Suppliers of energy. - Regulatory materials.	1.5
3	Consuming a large amount of butter and margarine increases the level of bad cholesterol in the organism. This leads to cardiovascular diseases.	1.25
4	We cannot consider fiber as a nutrient. It cannot be digested in the human body due to the lack of the enzyme "collobiase" that is capable of hydrolyzing cellulose (fiber).	1
5	A – iii, B – ii and C – i.	1.5
6	Energy value = $E_{\text{carbohydrates}} + E_{\text{lipids}} + E_{\text{proteins}}$. $E_1 = 50 \times 16 + 40 \times 38 + 10 \times 17 = 2490 \text{ kJ}$ $E_2 = 70 \times 16 + 15 \times 38 + 15 \times 17 = 1945 \text{ kJ}$. $E_1 > E_2$; then, the second diet is healthier since it has a lower percentage of fats that causes cardiovascular diseases and a higher percentage of proteins are which responsible for growth and maintenance. Also the second diet has a higher percentage of carbohydrates mainly fibers that helps the stomach during digestion.	3.5

Second Exercise (10 points)

Part of the Q	Answer	Mark
1.1	A resistant bacterium like staphylococci. These bacteria secrete an enzyme the penicillinase which destroys or modifies the molecule of penicillin and makes it inactive. (Or the hemophilia influenza).	2
1.2	- No, because if the virus is the origin of the infection the antibiotic is not effective. It is effective only if the infection is caused by a bacterium.	2
2	It is advised to prescribe a combination of anti-biotics: - when the micro-organism is unknown. - to treat a mixed infection. - to avoid taking high amounts of some antibiotic. - to limit side effects. - to prevent emergence of resistant bacteria. The combination mentioned in the text is amoxicillin-clavulonic acid association.	3
3	Analgesics: Eliminate or reduce pains. Antibiotics: Are used to kill or inhibit the growth of the micro-organisms. Aspirin(panadol, paracetamol, tylenol) ; advil-Ibuprofen(voltarene-diclofenac) ; penicilin(teramicin), maalox(Rennie, and milk of magnesia)	3