

الاسم:
الرقم:

مسابقة في الثقافة العلمية- مادة الكيمياء
المدة: ساعة واحدة

This Exam Includes Two Exercises. It Is Inscribed On Two Pages Numbered 1 and 2. The Use Of A Non-Programmable Calculator Is Allowed.

Answer the Two Following Exercises

First Exercise (10 points)

Grapefruit

Grapefruit is an excellent source of many nutrients and phytochemicals. It is low in calories, rich in fiber and vitamin C. Vitamin C helps to protect against cold.

Grapefruit is a part of food diet which helps the body's metabolism to burn fat and it lowers the cholesterol level.

On the other hand, a published study in “The British Journal of Cancer” found a correlation between the daily consumption of grapefruit and an increase in the risk of breast cancer in post-menopausal women. This study focuses on the inhibition, by grapefruit, of CYP3A4 enzyme which metabolizes estrogen. This fruit is thought to increase the levels of estrogen, the hormone which is associated with a higher risk of breast cancer. Researchers and other experts said that more researches are still needed.

The essential nutritive composition of 100 g of grapefruit is given in the table of **document-1**

Nutritive composition per 100 g			
Energy value: 33 kcal			
Nutrient	Mass	Nutrient	Mass
Sugars	7.31 g	Calcium	12 mg
Lipids	0.10 g	Zinc	0.07 mg
Proteins	0.69 g	Magnesium	9 mg
Fibers	1.1 g	Phosphorous	8 mg
Vitamin C	33.3 mg	Potassium	148 mg

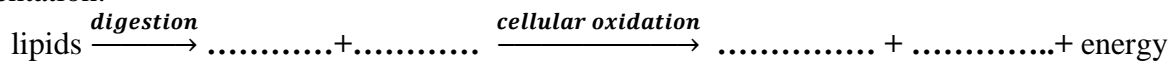
Document-1

Given: - 1 g of lipids gives 9 kcal; 1 g of proteins gives 4 kcal; 1 g of carbohydrates gives 4 kcal.
- The daily need of calcium in adults is between 600 mg and 1000 mg.

Questions

- Referring to the text, justify the following affirmations:
 - The consumption of grapefruit should be limited by women with post-menopause.
 - Grapefruit is ideal to prevent cardiovascular diseases.
 - Grapefruit possesses antioxidant properties.
- Verify the energy value produced by 100g of grapefruit.
- Choose the correct answer
 - Calcium is:
 - macro mineral
 - trace mineral
 - organic nutrient
 - Dietary fibers:
 - are digestible nutrients
 - avoid constipation
 - cause colon cancer
 - The vitamins A and E are:
 - liposoluble
 - hydrosoluble
 - energetic

4. Grapefruit helps the catabolism of lipids. Copy and complete the following schematic representation:



5. Proteins are essential nutrients for the human body; they are present in small quantities in grapefruit and in variable amounts in other foods.

- 5.1. Name the four chemical elements present in all proteins.
- 5.2. List a principal animal source and another principal vegetal source of proteins.
- 5.3. Give two functions of proteins.

Second Exercise (10 points)

Tavanic®

Active ingredient: Levofloxacin.

Tavanic® is prescribed, in adults, for the treatment of the following infections:

- Pneumonia.
- Complicated infections of the skin and soft tissues.

For the above mentioned infections, Tavanic® should not be used unless the antibiotics usually recommended as initial treatments for those infections are judged as inappropriate.

It is convenient to take into consideration the recommendations concerning the appropriate use of bactericidal antibiotics.

Tavanic® is contra-indicated for infants and adolescents in the growth period.

Tavanic® solution is administered as slow intravenous perfusion, once or twice per day. The dosage depends on the type and the seriousness of the infection.

The initial treatment of Tavanic® intravenously administered could be followed by an orally administered Tavanic® in form of coated tablets.

The treatment duration includes the intravenously treatment followed by the orally administered treatment. The duration of the intravenously treatment lasts normally between 2 to 4 days according to the medical conditions. The orally administered Tavanic® lasts from 7 to 14 days.

The side effects of Tavanic®: insomnia, nervousness, diarrhea, vomiting and nausea...

Questions

- 1. By referring to the text, answer the following questions:
 - 1.1. Indicate the active ingredient of Tavanic®.
 - 1.2. List two cases where the patient should be treated by Tavanic®.
 - 1.3. Give two formulations of Tavanic®.
 - 1.4. Pick out three side effects of Tavanic®.
- 2. For each of the following propositions, justify the correct one and correct the false one.
 - 2.1. Tavanic® is a bactericidal antibiotic.
 - 2.2. A patient, who suffers from a headache, takes Tavanic®.
 - 2.3. An infant of 4 years old, suffers from chronic pneumonia, is treated with Tavanic®.

3. Copy and complete the following table:

Medicinal drug	Aspirin®	Maalox®	Cortisone®
One pharmaceutical effect			
One side effect			

- 4. A patient who suffers from pneumonia is treated by intravenously administered followed by oral treatment of Tavanic® for 5 days.
 - 4.1. Specify whether this duration of treatment is sufficient.
 - 4.2. A patient takes Tavanic® for the prescribed duration without being cured due to bacteria resistance. Define bacteria resistance and give one of the mechanisms that make a bacterium resistant to Tavanic®.

مشروع معيار التصحيح
المادة: كيمياء

Exercice 1 (10 points)

Grapefruit

Part	Expected answer	Mark
1.1	The consumption of grapefruit should be limited, particularly in women with post-menopause, because it increases the risk of breast cancer. (It inhibits the enzyme CYP3A4, which metabolizes estrogen).	1
1.2	(Grapefruit is an ideal fruit because it is low in calories and rich in fibers. This fruit is a part of diet which helps the body to realize a metabolism that burns fat) and lowers the cholesterol level which is the principle cause of cardiovascular diseases.	1
1.3	Grapefruit possesses an antioxidant property since it is rich in vitamin C which is an antioxidant.	1
2	$E = (7.31 \times 4) + (0.1 \times 9) + (0.69 \times 4) = 33 \text{ Kcal}$	1.5
3.1	a- macro mineral	0.5
3.2	b- avoid constipation	0.5
3.3	a- liposoluble	0.5
4	$\text{Lipids} \xrightarrow{\text{Digestion}} \text{fatty acids} + \text{glycerol} \xrightarrow{\text{cellular oxidation}} \text{CO}_2 + \text{H}_2\text{O} + \text{energy}$	1
5.1	Carbon, hydrogen, oxygen and nitrogen.	1
5.2	The principal animal sources of protein: meat, poultry, fish, milk and dairy products Eggs,..... The principal plant sources of protein: Cereales, leguminous plants (soya, peanuts, fava...), and potatoes,.....	1
5.3	Enzymatic, transport, nutritive, contraction, defense, regulatory protein and structural proteins.	1

Exercice 2 (10 points)

Tavanic®

Part	Expected answer	Mark
1.1	Levofloxacin.	0.25
1.2	- Pneumonia - Complicated infections of the skin and soft tissues.	1
1.3	Intravenous solution and coated tablets.	1
1.4	insomnia, nervousness, diarrhea ...	0.75
2.1	Bactericidal antibiotic. It is convenient to take into consideration the recommendations concerning the appropriate use of bactericidal antibiotics	1
2.2	False, he should take an analgesic.	1
2.3	False, since it is contra-indicated by infants and adolescent during the growth period	1

3	Medicinal Drug	Aspirin[®]	Maalox[®]	Cortisone[®]	2
	One pharmaceutical effect	Analgesic	Antiacid	Anti-inflammatory	
	One side effect	Nausea (or gastric disorder)		Fluid retention, (unwanted hair, depression)	
4.1	No, the treatment is not sufficient since the intravenous treatment is between 2 and 4 days followed by oral treatment of 7 to 14 days. Thus the whole treatment requires from 9 to 18 days.				1
4.2	Definition: the capacity of the bacterium to tolerate the activity of an antibiotic. Mechanism: - by producing enzymes which modify or break down the molecules of the antibiotic and render it inactive. (<u>Or</u> change the structure of their site of action so the antibiotic will not be able to kill them, or they acquire a state of intolerance.) (<u>Or</u> the bacteria modify their permeability to the antibiotic.)				1