

الاسم:
الرقم:مسابقة في الثقافة العلمية: الكيمياء
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الاثنين 8 تموز 2013

This Exam Includes Two Exercises. It Consists of Two Pages Numbered from 1 to 2.**The Use of Non-Programmable Calculator is Allowed****Answer the Two Following Exercises:****First Exercise (10 points)****Food and Medication Interactions**

Medical treatments can affect the nutrition in the child's body. They can stimulate or suppress the appetite; they can alter the amount of nutrients absorbed and they can slow down or speed up the rate at which food passes through the digestive tract.

Always ask your pediatrician to explain whether medication should be taken with meals or on an empty stomach. There are thousands of possible drug-food interactions.

The following list represents commonly used medications and their interactions with some nutrients:

- Anti-acids: Foods lessen effects.
- Antibiotics reduce intestinal production of biotin (B vitamin), pantothenic acid (vitamin B5), and vitamin K.
- Non-steroidal Anti-inflammatory medications: such as Aspirin interferes with storage of vitamin C...
- Steroidal Anti-inflammatory medications: may promote excretion of potassium and calcium.
- Anti-depressants such as Phenobarbital Interfere with vitamin D metabolism and thus with calcium absorption; also alter absorption of folic acid.

www.healthychildren.org**Questions:**

- 1- Referring to the text, answer the following questions:
 - 1.1- Draw out the effects of medications on child's nutrition.
 - 1.2- Give the classes of anti-inflammatory drugs.
 - 1.3- Copy and complete the table below with the medication of which the suggested dietary guideline could reduce its side effects.

Medication	Dietary Guideline for reducing its side effects.
	Eat a diet that ensures adequate intake of all vitamins
	Eat foods high in vitamin D, calcium and folic acid.
	Eat foods high in potassium and calcium.

- 2- Give the role of a medicinal drug and list two of its sources.
- 3- Indicate, among the following compounds, the one that could not be present in an anti-acid: $MgCO_3$, HCl , $CaCO_3$ and $NaHCO_3$.
- 4- Assign each of the following medicinal drugs to one of the categories of drugs listed in the above text: Amoxicillin®, Advil®, Hydrocortisone® and Maalox®.
- 5- Aspirin is a non steroidal anti-inflammatory drug that possesses, from others, analgesic and anti-pyretic pharmaceutical actions. Deduce the cases of using aspirin.

- 6- Antibiotics are chemicals used to kill microorganisms.
- 6.1- Distinguish, the case of prescription of a broad spectrum antibiotic from that of a narrow spectrum one.
- 6.2- List two advantages of the use of a combination of antibiotics.
- 6.3- Define “resistant bacterium”.

Second Exercise (10 points)
Eat Dry Fruits

Dry fruits are either fruits that contain naturally a low quantity of water or dried fruits which are the product of the dehydration of fresh fruits. They are foods particularly interesting for simple, practical and light nutrition. Starting with the natural dry fruits like nuts, cashew, almond, peanut, pistachio... These fruits called” oleaginous” (oil yielding) are so calorific. They are rich in minerals and vitamins. They should be consumed in small quantities but regularly. They supply us with potassium, phosphorous, magnesium, calcium, iron, vitamin E, unsaturated fatty acids, omega 3 ... They are a tremendous source of proteins.

The dried fruits like apricots, dates, figs, prunes, raisins, bananas....., supply energy in the form of simple carbohydrates, dietary fibers, essential minerals and vitamins.

The richest in potassium and sodium are the dried apricots. Dates are recommended for its low fats content and its richness in fibers. They should be taken by women with iron deficiency...

www.objectifliberte.fr/manger-des-fruits-secs.html

Given: 1 g of carbohydrates produces 16 KJ; 1g of proteins produces 17 KJ and 1g of lipids produces 38 KJ.

Questions:

- 1- Referring to the text, answer the following questions :
- 1.1- Give the name of the transformation that produces dried fruits.
- 1.2- Specify why the consumption of naturally dry fruits should be in small quantities but regularly.
- 1.3- Draw out the virtues of date.
- 2- “Dry fruits are a tremendous source of proteins”.
- 2.1- Write the general formula of an α -amino acid.
- 2.2- List four important roles of proteins.
- 3- Assign to each carbohydrate given below, the corresponding class of carbohydrate: glucose, starch, lactose and fructose.
- 4- Complete the following schema of the digestion of polysaccharides:
- Polysaccharides $\xrightarrow{\text{Digestion}}$ $\xrightarrow{\text{Cellular oxidation}}$ + +
- 5- Given , below, the average daily requirements of minerals for human body:

Mineral	Ca	Fe	Mg	P	K
Daily Requirement	800 mg	14 mg	375 mg	700 mg	3500 mg

Choose, among those minerals, one macro mineral and on trace mineral. Justify.

- 6- Calculate, in KJ, the energy value of 100 g of nuts containing: 62 g of lipids, 17 g of carbohydrates and 15 g of proteins.
- 7- Justify that dry fruits are rich in vitamin E and very low in vitamin C.

First Exercise (10 points)
Food and Medication Interactions

Part of the Q	Answer	Mark								
1.1	The effects are: <ul style="list-style-type: none"> - They can stimulate or suppress the appetite; - They can alter the amount of nutrients absorbed. - They can slow down or speed up the rate at which food passes through the digestive tract 	1								
1.2	The classes are: steroidal anti-inflammatory and non-steroidal anti-inflammatory.	0.5								
1.3	<table border="1"> <thead> <tr> <th>Medications</th> <th>Dietary Guideline for reducing its side effects.</th> </tr> </thead> <tbody> <tr> <td>Antibiotics</td> <td>Eat a diet that ensures adequate intake of all vitamins.</td> </tr> <tr> <td>Antidepressants</td> <td>Eat foods high in vitamin D, calcium and folic acid.</td> </tr> <tr> <td>Steroidal anti-inflammatory</td> <td>Eat foods high in potassium and calcium.</td> </tr> </tbody> </table>	Medications	Dietary Guideline for reducing its side effects.	Antibiotics	Eat a diet that ensures adequate intake of all vitamins.	Antidepressants	Eat foods high in vitamin D, calcium and folic acid.	Steroidal anti-inflammatory	Eat foods high in potassium and calcium.	1.5
Medications	Dietary Guideline for reducing its side effects.									
Antibiotics	Eat a diet that ensures adequate intake of all vitamins.									
Antidepressants	Eat foods high in vitamin D, calcium and folic acid.									
Steroidal anti-inflammatory	Eat foods high in potassium and calcium.									
2	Medicinal drug is a substance used for treating diseases or relieving pain Two sources of drugs are: synthesis, fermentation(microbiological cultures, extraction from animal or plant sources)	1								
3	The substance is HCl	0.5								
4	Amoxicillin®: antibiotic; Advil®: non steroidal anti-inflammatory; Hydrocortisone®: steroidal anti-inflammatory; and Maalox®: anti-acid.	1								
5	Aspirin is used: to treat inflammation (non steroidal anti-inflammatory). to reduce or eliminates pain (Analgesic) to lower or eliminates fever (Anti-pyretic).	1.5								
6.1	A broad-spectrum antibiotic is prescribed when the invading microorganism is not identified, whereas a narrow spectrum antibiotic is used when the microorganism is identified.	1								
6.2	Two advantages are: to treat mixed infection or to prevent emergence of resistant bacteria.	1								
6.3	A resistant bacterium cannot anymore be eradicated by the antibiotic	1								

Second Exercise (10 points)
Eat Dry Fruits

Part of the Q	Answer	Mark
1.1	It is the dehydration of fresh fruits.	0.5
1.2	Regularly Consumption: these fruits are very rich in minerals and vitamins. Consumption in low quantity since they are calorific.	1
1.3	Dates are recommended for its low fats content and its richness in fibers.	0.5
2.1	The general formula of an α -amino acid: $\begin{array}{c} \text{R} - \text{CH} - \text{COOH} \\ \\ \text{NH}_2 \end{array}$	1
2.2	The four important roles are : <ul style="list-style-type: none"> <li style="width: 45%;">- enzymatic activity <li style="width: 45%;">- transport role <ul style="list-style-type: none"> <li style="width: 45%;">- nutritive role <li style="width: 45%;">- regulatory role 	1
3	Monosaccharides: glucose and fructose Oligosaccharides (disaccharides) : lactose Polysaccharides : starch	1
4	$\text{Polysaccharides} \xrightarrow{\text{Digestion}} \text{monosaccharides (glucose)} \xrightarrow{\text{Cellular oxidation}} \text{CO}_2 + \text{H}_2\text{O} + \text{energy}$	1
5	A macro mineral: average daily need > 100 mg ; it is calcium A trace mineral : average daily need < 20 mg ; it is iron	1.5
6	Energy value = (62 x 38) + (17 x 16) + (15 x 17) = 2883 KJ.	1.5
7	Dry fruits are rich in vitamin E since this vitamin is liposoluble and the % of lipids in those fruits is high. Dry fruits are low in vitamin C since those fruits are already dehydrated and the vitamin C is hydrosoluble.	1