

This Exam Includes Two Exercises. It Is Inscribed on 2 Pages Numbered 1 and 2. The Use of A Non-programmable Calculator is Allowed.

Answer The Two Following Exercises:

**First Exercise (10 points)
Food for an Active Brain**

Being the center of our emotions and of our thoughts, the brain needs at least forty different substances (minerals, vitamins, amino acids, fatty acids...) to well-function.

The maintenance of the structure of the brain is due to the famous omega-3-fatty acids, of which salmon is one of the best sources.

At rest, the brain uses about 20% of the consumed food energy and requires mainly carbohydrates from low glycemic index starchy foods, which will maintain a long-lasting sugar level in the blood and supply the brain regularly with sugar.

The oxidation of carbohydrates requires oxygen in order to produce the energy needed by the brain.

In fact, in order for the oxygen to reach the brain, it should be transported by red blood cells. For that, these cells must contain enough iron taken from consumed foods such as: mussels, red meats, spinach, lentils...

To slow down the formation and the action of free radicals (aggressive molecules that alter the functioning of cells and accelerate their aging process) that comes from the degradation of sugar, the brain needs antioxidants present in fruits, colored vegetables, dark chocolate...

www.passeportsante.net

Questions:

- 1- Referring to the text, answer the following questions:
 - 1.1- Indicate the necessity of the presence of starchy foods with low glycemic index in our diet.
 - 1.2- Name the mineral found in red blood cells that ensures the transportation of oxygen in blood.
 - 1.3- Deduce the effect of the deficiency of antioxidants in our diet.
- 2- Glucose is the main source of energy for the brain.
 - 2.1- Copy and complete the following schematic equations:
Carbohydrates $\xrightarrow{\text{digestion}}$ $\xrightarrow{\text{oxidation}}$ + + Energy.
 - 2.2- Specify whether these transformations represent catabolic or anabolic pathways.
- 3- Given, below, the composition of 100 g of salmon:

Proteins	lipids	water	Vitamins and minerals
24.4 g	8.0 g	59.7 g	7.9 g

- 3.1- Among others, the vitamins A, B₁₂ and D are found in salmon. Justify their presence.
- 3.2- Calculate the energy value corresponding to 100g of salmon, knowing that 1 g of lipids gives 9 Kcal and 1g of proteins gives 4 Kcal.

- 4- Minerals are chemical elements needed for the functioning of human body.
 - 4.1- List the two classes of minerals.
 - 4.2 Associate to each one of the two minerals: calcium and sodium, one of the following functions: forms and maintains both bones and teeth, is a part of insulin, contributes to nerve transmission.

Second Exercise (10points)
Zika Virus

Zika virus is spread to people through mosquito bites. The most common symptoms of Zika virus disease are: fever, rash, joint pain, and conjunctivitis.

Zika's strongly suspected of causing a severe birth defect called microcephaly, which causes under-development of the head and brain.

No vaccine or medications are available to prevent or treat Zika infections.

To treat the symptoms, it is advised to: get plenty of rest, drink fluids to prevent dehydration, take over-the-counter medicinal drugs such as acetaminophen (Tylenol®) to reduce fever and pain.

Aspirin and the other non-steroidal anti-inflammatory drugs (NSAIDs), like ibuprofen (Ibuprofen®) and naproxen, should be avoided until dengue (fever) can be ruled out to reduce the risk of hemorrhage.

<http://www.cdc.gov>

Questions:

- 1- Referring to the text, answer the following questions:
 - 1.1- Give the four symptoms of Zika virus disease.
 - 1.2- Pick out one possible side effect of using NSAIDs.
 - 1.3- Explain why it is advisable for women residing in areas with active Zika virus transmission to delay their pregnancy plan.
- 2- Aspirin and paracetamol are the generic names of two over-the-counter medicinal drugs.

Copy and complete the table below:

Generic name	Trade name	Pharmaceutical actions
Aspirin	- - -
Paracetamol	- -

- 3- Antibiotics are chemicals used to kill or inhibit the growth of microorganisms.
 - 3.1- Specify whether antibiotics can be used to treat Zika virus disease.
 - 3.2- Give one advantage and one disadvantage of using a large spectrum antibiotic.
 - 3.3- Nowadays bacteria resistance represents one of the most serious threaten issue for the human health.
List two mechanisms that make a bacterium resistant to antibiotic.
- 4- Prednisone® and Ibuprofen® belong to two different anti- inflammatory drug groups.
 - 4.1- Name the group of anti –inflammatory drugs to which Prednisone® belongs.
 - 4.2- List four formulations of a medicinal drug.
 - 4.3- Choose, from the following side effects, those that may result from the use of Prednisone®: unwanted hair, coma, muscle rigidity, fluid retention, respiratory paralysis and mental depression.

First Exercise (10 points)

Question	Answer	mark
1.1	Low glycemic index starchy foods maintain a long-lasting sugar level in the blood and supply the brain regularly with sugar.	1
1.2	The mineral that ensures the transportation of oxygen in blood is the iron.	1
1.3	The deficiency of antioxidants in our diet does not help to slow down the formation and the action of free radicals that alter the functioning of cells and accelerate their aging.	1
2.1	carbohydrates <u>digestion</u> → glucose <u>oxidation</u> → CO ₂ + H ₂ O + Energy	1
2.2	These transformations represent catabolic pathways since large molecules are transformed into small ones with release of energy.	1
3.1	Salmon contains water that justifies the presence of vitamin B ₁₂ . Salmon contains lipids that justify the presence of vitamins A and D.	1.5
3.2	The energy value of 100g of salmon = (24.4 x 4) + (8 x 9) = 169.6 Kcal.	1.5
4.1	The two classes are: macrominerals and trace-minerals.	1
4.2	Calcium: forms and maintains both bones and teeth. Sodium: contributes to nerve transmission.	1

Second Exercise (10 points)

Question	Answer	Mark									
1.1	The four symptoms of Zika virus disease are: fever, rash, joint pain, and conjunctivitis.	1									
1.2	NSAIDs can cause hemorrhage (bleeding).	0.5									
1.3	Women residing in areas with active Zika virus transmission are advised to delay their pregnancy plan in order to prevent possible severe birth defect called microcephaly.	1									
2	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Generic name</th> <th style="text-align: center;">Trade name</th> <th style="text-align: center;">Pharmaceutical actions</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Aspirin</td> <td style="text-align: center;">...Aspirin.....</td> <td> <ul style="list-style-type: none"> - .Analgesic..... - Anti-pyretic..... - Anti-inflammatory..... </td> </tr> <tr> <td style="text-align: center;">Paracetamol</td> <td style="text-align: center;">...Panadol</td> <td> <ul style="list-style-type: none"> - Analgesic..... - Anti-pyretic..... </td> </tr> </tbody> </table>	Generic name	Trade name	Pharmaceutical actions	Aspirin	...Aspirin.....	<ul style="list-style-type: none"> - .Analgesic..... - Anti-pyretic..... - Anti-inflammatory..... 	Paracetamol	...Panadol	<ul style="list-style-type: none"> - Analgesic..... - Anti-pyretic..... 	1.75
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3.1	No, since antibiotics are used against bacteria or fungi and cannot treat virus diseases.	1									
3.2	One advantage: treat the infection caused by an unknown microorganism. One disadvantage: it may kill some beneficial bacteria such as intestinal floras.	1.5									
3.3	Two mechanisms are: - Production of enzyme that renders the antibiotic inactive. - Change its permeability to antibiotic.	1									
4.1	Prednisone® belongs to the group of steroidal anti-inflammatory drugs.	0.5									
4.2	Four formulations of a medicinal drug are: liquids, sprays, ointments, suppositories.	1									
4.4	The side effects of Prednisone® are: fluid retention, unwanted hair and mental depression.	0.75									