مسابقة في الثقافة العلميّة: مادة الكيمياء | الاسم:
المدّة: ساعة واحدة | الرقم:

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:

Exercise 1 (10 points) **Breast milk**

Breast milk is the best diet for infants during the first months of life. It provides babies with everything they need for their optimal physical and mental development.

The principal sugar of mother's milk is lactose but 30 or more oligosaccharides are also present.

The principal mineral constituents of mother's milk are**:** sodium, potassium, calcium and magnesium.

What are the protective benefits of breast milk?

It's well known that breastfed babies get fewer infections and allergies than formula-fed babies. This is because breast milk naturally strengthens baby's immune system.

Breast milk contains "probiotics", which act as food for "good" bacteria in baby's intestine such as "intestinal floras". The "good" bacteria encourage a protective lining to form in baby's intestine, that helps prevent stomach upset and diarrhea.

Questions:

1. Referring to the text, answer the following questions:
- **1.1.** Give the role of probiotics found in mother's milk.
- **1.2.** State two protective benefits of mother's milk.
- **1.3.** Pick out the statement which justifies that mother's milk is a complete food.

2. Name the common four chemical elements that constitute protein.

3. State two functional roles for protein.

4. Lactose undergoes hydrolysis reaction in the presence of the enzyme "lactase". For many babies and people, digestion and absorption of lactose cause a problem.
- **4.1.** Write the word equation of hydrolysis reaction of lactose.
- **4.2.** Specify whether this reaction is catabolic or anabolic reaction.
- **4.3.** The deficiency of the enzyme " lactase" causes a problem.
  - **4.3.1.** Name this problem.
  - **4.3.2.** List two of its symptoms.

5. **Document-1** represents the nutritive composition of one cup of milk for feeding a baby from 6 to 11 months.

Nutrient	Mass
Carbohydrates	17g
Protein	2.9g
Total Fat	6.25g
Calcium	145 mg

Document - 1

Given:

Energy value for 1 g of nutrient: Carbohydrates: 3.75 kcal ; Lipids: 9 kcal; Proteins: 4 kcal.

A mother provides 10 months old baby with 2 cups of formula milk daily.
- **5.1.** Determine the energy value provided by this amount of milk.
- **5.2.** Babies from 6 to 11 months old need 260 mg of calcium per day.
  - **5.2.1.** Calcium is a macromineral. Justify.
  - **5.2.2.** Verify whether this amount of milk covers the baby's need of calcium.

Exercice 2 (10 points) **Medical Prescription**

Sami catches flu accompanied with headache, sharp cough, and fever. A physician gives him the following medical prescription:

- Amoxicilline® 500 mg
- Doliprane® 100 mg
- Toplexil® 0.33 mg / mL

Questions:

1. Referring to document-1 and the medical prescription**,** specify whether Sami suffers from viral or bacterial infection**.**

AMOXICILLINE® 500 mg : Capsule
This antibiotic belongs to the penicillin family. It is used for the treatment of various infections, mainly for pneumonia, bronchitis, throat and ear infections…

Document-1

2. To prevent bacteria resistance, the physician insists on taking Amoxicilline® for two weeks.

2.1. Define bacteria resistance.

2.2. List two mechanisms that make a bacterium resistant to antibiotic.

3. Answer the following questions:

3.1. Referring to documents -2, Pick out the active ingredient of Doliprane®.

3.2. Referring to documents -2, Specify the pharmaceutical class of Doliprane®.

3.3. Referring to documents -2 and 3, **w**hy the physician prescribes Doliprane® rather than Aspirin®?

DOLIPRANE® 100 mg : Divisible Suppositories
This medicinal drug contains paracetamol. It is used to lower fever and in the treatment of painful infections.

Document-2

ASPIRIN®
Aspirin is a very effective analgesic even of its risky usage. It can cause severe damage to the stomach leading to significant bleeding.

Document-3

3.4. Sami is a child of 30 Kg. He must take Toplexil® in four divided doses per day. Referring to documents -4, determine the volume in mL of each dose.

TOPLEXIL® 0.33 mg/mL: 150 mL syrup
It is used for symptomatic treatment of sharp cough. This medicine is for adults and children over 2 years of age.
For children, the daily dosage depends on the weight of the child: 1 mL of syrup per kg of body's weight per day.

Document-4

4. Referring to documents -1, 2, and 4, indicate the formulation of the three medicinal drugs prescribed for Sami. Give a possible formulation for Aspirin®.

5. Medicinal drugs can be prepared by different ways.
Match each item of column A to the corresponding item of column B.

Column A	**Column B**
a- Preparation by synthesis	i- Penicillin
b- Fermentation or microbiological culture	ii- Insulin
c- Extraction from animals	iii- Aspirin