

الإسم: مسابقة في الثقافة العامة (مادة الكيمياء)
الرقم: المدة: ساعة واحدة

**This Exam Includes Two Exercises. It is Inscribed in Two Pages Numbered From 1 to 2.
The Use of a Non –programmable Calculator Is Allowed.**

Answer The Two Following Exercises:

**First Exercise (10 points)
Breakfast and Academic Performance**

The impact of eating breakfast on cognitive and academic performance and school attendance has been studied widely.

Skipping breakfast may result in a span of 15 or more hours without food. During this time, the human body depletes a large amount of its carbohydrates stores and the student risks to feel tired and to have a fall in the morning's attention and memory.

Glucose is the primary energy source for the brain. Breakfast has the effect of rising blood glucose levels that increases the concentration of a neurotransmitter called acetylcholine. For the research workers, it seems that acetylcholine plays a role in the memory mechanisms, since it has been found that medicinal drugs that block its synthesis impairs memory....

It is estimated that a balanced breakfast must provide, among others, an energetic value close to 600 Kcal.

Given below some indications of a breakfast cereal box:

Ingredients per 30 g cereal serving
with 125 mL of semi-skimmed milk.

Protein	9 g
Carbohydrate	29 g
lipid	2.5 g
Fiber	0.8 g

Vitamin D, vitamin C, thiamine (B₁), riboflavin (B₂),
vitamin B₆, vitamin B₁₂, iron, sodium, calcium...

Given: 1 g of protein provides 4 Kcal, 1 g of carbohydrate provides 3.75 Kcal and 1 g of lipid provides 9 Kcal.

Questions:

- 1- Referring to the text, answer the following questions:
 - 1.1- Name the primary energy source for the brain.
 - 1.2- List two possible disadvantages of skipping breakfast.
 - 1.3- Pick up the role of acetylcholine.
- 2- Choose, among the vitamins listed above, one hydrosoluble vitamin and one liposoluble vitamin.
- 3- Without breakfast, the brain must rely on energy from body carbohydrates stores for morning activities.
 - 3.1- Name the carbohydrate that provides this energy.
 - 3.2- Write the schematic equations representing the energy release from this carbohydrate.
- 4- For many children, the digestion and the absorption of the milk sugar is a problem.
 - 4.1- Name this problem and list two of its symptoms.
 - 4.2- Write the word equation of the digestion of the milk sugar.
- 5- A student takes the following breakfast: 30 g serving of the cereal given above with 125 mL of semi-skimmed milk.
 - 5.1- Calculate the energy value of this breakfast.
 - 5.2- Deduce if this breakfast can be considered as balanced breakfast.

6- Match the items in the column I to those in the column II

Column I

- a- Vitamin D
- b- Vitamin B₁
- c- Iron
- d- Calcium

Column II

- i- involved in the metabolism of carbohydrates.
- ii- promotes calcium absorption in the intestine.
- iii- involved in blood clotting.
- iv- is a component of hemoglobin.

Second Exercise (10 points)

Rheumatoid Arthritis

Rheumatoid arthritis is a chronic inflammatory disease that causes pain, stiffness, redness and swelling in joints.

Generally, the pain of rheumatoid arthritis is described as a dull ache, similar to that of a headache.

Certain medications relieve the symptoms of rheumatoid arthritis, while other medications slow the progress of the disease.

Non-steroidal anti-inflammatory drugs (NSAIDs), including Aspirin[®], ibuprofen (Advil[®] and Motrin[®]) and naproxen (Anaprox[®] and Naxen[®]), can help relieve symptoms of this disease.

Side effects, due to the regular use of this anti-inflammatory drugs, occur in a minority of patients. These include upset stomach, ulcers, hypertension and reduced kidney function...

Newer (NSAIDs), such as celecoxib (Celebrex[®]), may provide the same benefits for arthritis as older (NSAIDs) medications but with less risk of ulcers...

Corticosteroids, such as cortisone and prednisone (Deltasone[®]), are effective medicinal drugs to reduce inflammation. They can also slow the progress of the rheumatoid arthritis. However, they have little lasting benefit and come with a long list of troubling side effects, such as easy thinning of the bones, cataracts, puffy face ...

Other pain relievers, such as acetaminophen (Tylenol[®]), are sometimes prescribed with these anti-inflammatory drugs to reduce pain when it is sharp.

www.Drugs.com

Questions:

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

- 1.1- Define rheumatoid arthritis.
- 1.2- Indicate the advantage of using newer (NSAIDs) instead of older (NSAIDs).
- 1.3- Justify that Anaprox[®] and Naxen[®] have the same pharmaceutical action.
- 1.4- Copy and fill the following table:

Trade name	Generic name	Pharmaceutical action	One possible side effect
Aspirin [®]			
Tylenol [®]			
Deltasone [®]			

- 2- Aspirin[®] is formulated into tablets while Celebrex[®] is formulated into capsules.
 - 2.1- Compare the composition of these two formulations.
 - 2.2- Indicate why pharmaceutical manufacturers prefer to market their products in tablet form.
 - 2.3- List two other formulations of medicinal drugs.
- 3- Anti-inflammatory drugs are prescribed sometimes in the treatment of virus infections, while bacterial infections are treated with antibiotics.
 - 3.1- Define an antibiotic medicinal drug.
 - 3.2- Antibiotics are classified according to the microorganisms they act against. Give the two corresponding classes of antibiotics.
 - 3.3- Identify the case in which physicians prescribe a narrow spectrum antibiotic and that in which they prescribe a broad spectrum one.
- 4- Corticosteroids are steroidal anti-inflammatory drugs. List two of their overdose effects.

معيار التصحيح في مادة الثقافة العلمية (كيمياء)

First exercise (10 points)
Breakfast and Academic Performance

Part of the Q	Answer	Mark
1.1	The primary energy source for the brain is glucose	0.5
1.2	Children who Skip breakfasts are more likely to feel tired and to have a fall in the morning's attention and memory.	0.5
1.3	Acetylcholine plays a role in the memory mechanisms, since it has been found that medicinal drugs that block its synthesis impairs memory.	0.5
2	A hydrosoluble vitamin is vitamin C and a liposoluble vitamin is vitamin D.	0.5
3.1	The carbohydrate that represents this energy is glycogen.	1
3.2	The energy is produced according to the following schematic equations: Glycogen $\xrightarrow{\text{Hydrolysis}}$ Glucose $\xrightarrow{\text{Oxidation}}$ CO ₂ + H ₂ O + Energy	1.5
4.1	The problem is lactose intolerance. Nausea and diarrhea are two symptoms of lactose intolerance.	1
4.2	The word equation of the hydrolysis of lactose is: Lactose + water \rightarrow glucose + galactose	1
5.1	The energy value = (9 × 4) + (29 × 3.75) + (2.5 × 9) = 167.25 Kcal	1.5
5.2	The energy value is less than 600 Kcal, so this breakfast cannot be considered as balanced breakfast.	1
6	a \rightarrow ii b \rightarrow i c \rightarrow iv d \rightarrow iii	1

Second exercise (10 points)
Rheumatoid Arthritis

Part of the Q	Answer	Mark																
1.1	Rheumatoid arthritis is a chronic inflammatory disease that causes pain, stiffness, redness and swelling in joints.	0.5																
1.2	Newer NSAIDs, have less risk of ulcers than older ones.	0.5																
1.3	Anaprox and Naxen have the same pharmaceutical action since they contain the same active ingredient: naproxen.	1																
1.4	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Trade name</th> <th>Generic name</th> <th>Pharmaceutical action</th> <th>One possible side effect</th> </tr> </thead> <tbody> <tr> <td>Aspirin[®]</td> <td>Aspirin</td> <td>Non-Steroidal Anti-inflammatory</td> <td>Upset stomach ...</td> </tr> <tr> <td>Tylenol[®]</td> <td>Acetaminophen</td> <td>Analgesic</td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>Deltasone[®]</td> <td>Prednisone</td> <td>Steroidal Anti-inflammatory</td> <td>cataracts ...</td> </tr> </tbody> </table>	Trade name	Generic name	Pharmaceutical action	One possible side effect	Aspirin [®]	Aspirin	Non-Steroidal Anti-inflammatory	Upset stomach ...	Tylenol [®]	Acetaminophen	Analgesic		Deltasone [®]	Prednisone	Steroidal Anti-inflammatory	cataracts ...	2
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Aspirin [®]	Aspirin	Non-Steroidal Anti-inflammatory	Upset stomach ...															
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2.1	Tablets contain the active ingredient and inert ingredients such as binders, lubricants, disintegrators... while capsules are usually made of the active ingredient and a gelatinous container.	1.5																
2.2	Pharmaceutical manufacturers prefer to market their products in tablet form because tablets are less expensive.	0.5																
2.3	Other formulations of drugs include liquids, ointments...	0.5																
3.1	An antibiotic drug is a chemical produced by one microorganism or by chemical synthesis to kill or inhibit the growth of other microorganisms.	1																
3.2	Antibiotics are classified according to the microorganism they act against into bactericidal and fungicidal.	0.5																
3.3	Physicians usually prescribe a narrow spectrum antibiotic when the invading microorganism is identified and a broad spectrum antibiotic is prescribed when the invading microorganism is unknown.	1																
4	The two overdose effects of steroidal anti-inflammatory drugs are: hypertension, obesity....	1																