| الاسم: | مسابقة في مادة علوم الحياة والارض |
| الرقم: | المدة ساعة واحدة |

Answer the following four exercises.

Exercise 1 (4 points)   Nutrition and Metabolism

**Indicate the true statements and correct the false ones.**
1. Digestive enzymes facilitate the transformation of food into nutrients.
2. Nutrients cross the wall of the large intestine and pass into the blood and the lymph.
3. Assimilation is a reaction that produces energy.
4. Blood transports oxygen gas and nutrients to the cells and removes their waste products.

Exercise 2 (5 points)   Digestion of Starch

A piece of bread, chewed for a certain time, mixes with saliva in the mouth and takes a slightly sweet taste.

In order to verify if saliva contains an enzyme capable of transforming the starch in bread into a sugar, an in-vitro digestion of cooked starch experiment is carried out whose conditions are represented in document 1.
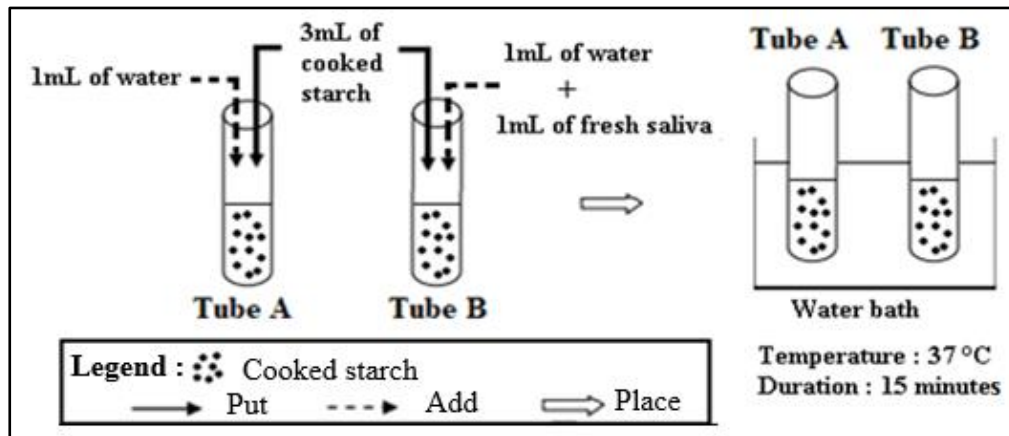
Document 1

1. Pick out, from the text, the tested hypothesis.

   Samples are taken from each tube, at the beginning and at the end of the experiment, to identify the presence of cooked starch and sugar. The obtained results are represented in document 2.

2. **2-1**. Analyze the obtained results.
   2-2. What do you conclude?
   2-3. Is the tested hypothesis valid?

3. Name :
   3-1. the enzyme contained in the fresh saliva.
   3-2. the product obtained at the end of the complete digestion of starch.

	Tube A		Tube B	
	Cooked starch	Sugar	Cooked starch	Sugar
Beginning of the experiment T= 0 (min)	+	-	+	-
End of the experiment T = 15 (min)	+	-	-	+

Document 2

(+) : presence (-) : absence

## Exercise 3 (5 points)   Pneumonia

Pneumonia is an acute respiratory infection that affects the lungs. These latter are made up of small sacs called alveoli which fill with air when a healthy person breathes. In case of pneumonia, the alveoli become inflamed and filled with fluid, which leads to breathing difficulties.

Document 1

1. Pick out, from document 1, the consequences of pneumonia.
2. Name the gases exchanged at the level of the pulmonary alveoli.
3. List the characteristics that make the alveoli an efficient surface for gas exchange.

Document 2 represents the aspect of the pulmonary alveolus in a healthy person and in another suffering from pneumonia.

4. Compare the aspect of the pulmonary alveolus in a healthy person to that in a person suffering from pneumonia, document 2.

5. Explain why the gaseous exchange at the level of the alveoli is reduced in a person suffering from pneumonia.
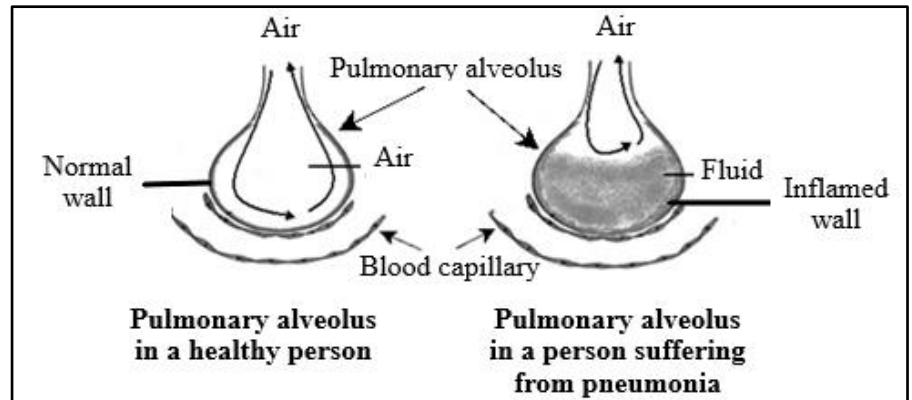
Document 2

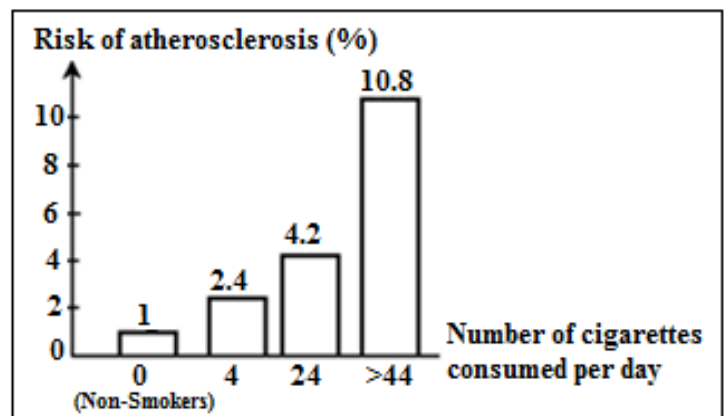## Exercise 4 (6 points)   Atherosclerosis

Atherosclerosis is a disease caused by the buildup of fat deposits and cholesterol in the inner walls of arteries. These deposits form plaques. Over time, these plaques can narrow the arteries which disrupt the blood circulation.

1. Pick out from text:
   1-1. the cause of atherosclerosis.
   1-2. the consequences of the formation of plaques.

A study is performed to verify if there is a relation between smoking and the development of atherosclerosis.
The obtained results are represented in the adjacent document.

2. Draw a table representing the variation of the risk of atherosclerosis as a function of the number of consumed cigarettes per day, adjacent document.

3. 3-1. Analyze the obtained results.
   3-2. What do you conclude concerning the effect of smoking on the risk of atherosclerosis?

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Ex	Part	Exercise 1 (4 points) Nutrition and Metabolism	Mark
1	1	True.	1
	2	False. Nutrients cross the wall of the small intestine and pass into the blood and the lymph.	1
	3	False. Assimilation is a reaction that requires energy. **Or** Oxidation is a reaction that produces energy.	1
	4	True.	1

Ex	Part	Exercise 2 (5 points) Digestion of Starch	Mark
2	1	Saliva contains an enzyme capable of transforming the starch in bread into a sugar.	1
	2-1.	At the beginning of the experiment, starch is present and sugar is absent in both tubes A and B. At the end of the experiment, no change has taken place in tube A; on the contrary, starch has disappeared and sugar has appeared in tube B, placed under the same conditions as tube A but containing fresh saliva.	1.5
	2-2.	Cooked starch has transformed into sugar by the action of fresh saliva.	1
	2-3.	Yes, the tested hypothesis is valid.	0.5
	3-1.	Salivary amylase.	0.5
	3-2.	Glucose.	0.5

Ex	Part	Exercise 3 (5points) Pneumonia	Mark
3	1	The alveoli become inflamed and filled with fluid, which leads to breathing difficulties.	0.5
	2	Oxygen gas and carbon dioxide.	1
	3	The characteristics that make the alveoli an efficient surface for gas exchange are: - large surface area - thin wall - richly vascularized wall.	1.5
	4	In a healthy person, the pulmonary alveolus has a normal wall and is filled with air, while that of the person suffering from pneumonia, the pulmonary alveolus has an inflamed wall and is filled with fluid and air.	1
	5	In the person suffering from pneumonia, the alveoli have an inflamed wall and are filled with fluid. Thus, the diffusion of oxygen gas from the alveolar air to the blood and that of carbon dioxide from the blood to the alveolar air become difficult and consequently gas exchange will be reduced.	1

Ex	Part	Exercise 4 (6 points) Atherosclerosis						Mark
4	**1-1.**	Atherosclerosis is caused by the buildup of fat deposits and cholesterol in the inner walls of arteries.						**0.75**
	1-2.	Plaques can narrow the arteries which disrupt the blood circulation.						**0.75**
	2	Number of cigarettes consumed per day	0	4	24	>44		**2**
		Risk of atherosclerosis (%)	1	2.4	4.2	10.8		
		Table representing the variation of the risk of atherosclerosis as a function of the number of consumed cigarettes per day.						
	3-1.	The risk of atherosclerosis is equal to 1% in non-smokers (when the number of cigarettes consumed per day is equal to 0). This risk increases to reach 2.4% in smokers when the number of consumed cigarettes per day increases to 4 cigarettes. Moreover, this risk increases to reach 10.8% as the number of consumed cigarettes exceeds 44 cigarettes per day.						**1.5**
	3-2.	Smoking increases the risk of developing atherosclerosis. **Or** Smoking favors the development of atherosclerosis. **Or** Smoking is a risk factor for atherosclerosis.						**1**