

This exam consists of 2 pages and includes 4 exercises.	Results of the experiment	Beginning of the experiment	End of the experiment

Exercise 1: (5pts)

Unbalanced Diets

Indicate the true statement(s) and correct the false one(s)

1. Meat, eggs and fish are types of food rich in lipids.
2. Kwashiorkor afflicts children during weaning when they are fed exclusively with starchy food.
3. During physical activity, protein must furnish the largest portion of this energy.
4. Rickets is due to deficiency in vitamin D necessary for the fixation of magnesium in bones.
5. Water, mineral salts and vitamins are examples of functional food.

Exercise 2: (5pts)

Celiac Disease

Celiac disease is a disease caused by a reaction of the **Gliadin**: a protein of gluten present in the wheat, barley... It causes inflammation and the destruction of the internal wall of the small intestine which reduces the passage of nutrients to the blood and lymph. It is characterized by a chronic diarrhea, weight loss and fatigue, but in some cases, the disorder does not present symptoms.

1. Pick out from the above text:
 - 1.1. The cause of the celiac disease.
 - 1.2. The consequences of the celiac disease.
 - 1.3. The symptoms of celiac disease.

For the purpose of studying the cause of the variation in the level of nutrients in the blood of a normal person after a meal and another one who suffers from celiac disease, some measures are carried out. The results are presented in the adjacent table.

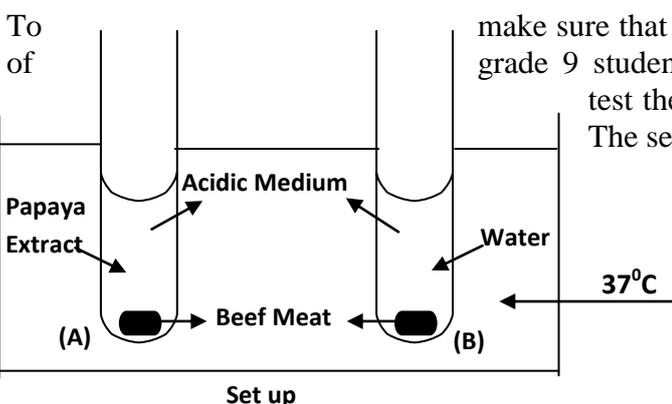
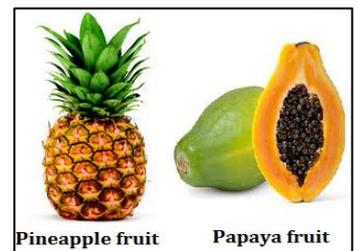
	Quantity of glucose after a meal (g/L)	
	Blood leaving the small intestine	Blood entering the small intestine
Normal person	0,8	2
Person suffering from celiac	0,4	0,8

2. Determine the cause of the variation in the amount of glucose in the blood entering and leaving the small intestine of a normal person.
 - 3.1. Compare the amount of glucose in the blood leaving the small intestine of a normal person to that of a person with celiac disease.
 - 3.2. What can you conclude?
4. Name the structure which is destroyed in the small intestine in the case of this disorder.

Exercise 3: (5 pts)

Fruits Benefits

Papaya fruit contains papain, a chemical substance that helps in breaking down proteins in meat. Pineapple fruit also contains another chemical substance called bromelain that plays the same role.



Mass of beef meat in tube (A)	5 g	0g
Mass of beef meat in tube (B)	5 g	5g

1. **Indicate** the common and the variable conditions of this experiment.
2. **Analyse** the results of the experiment from the table.
3. Do the results emphasize the information in the above text? **Justify**.

Exercise 4: (5 pts)

The Asthma

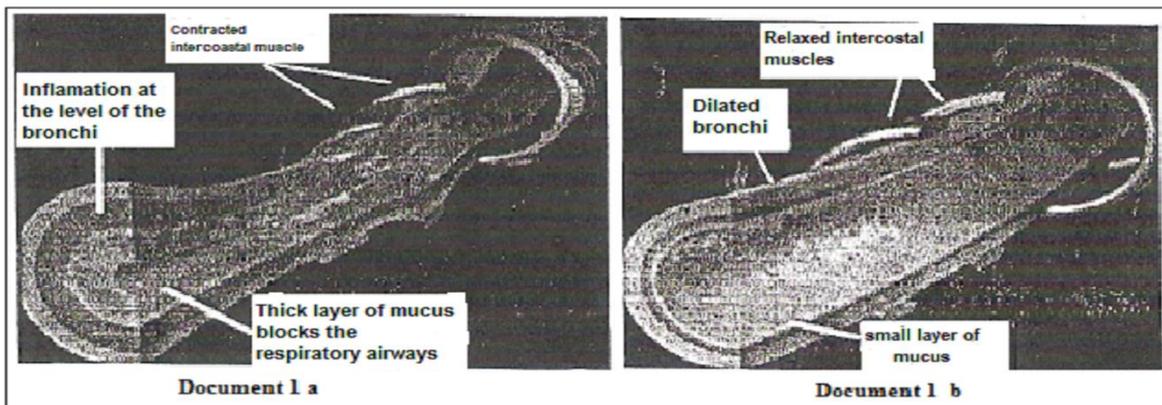
When breathing normally, air circulates in the nose, descends by the trachea and reaches the respiratory tract more and more small, the bronchi. In some cases, such as asthma, the smooth muscle that surrounds the bronchial tubes can be contracting and there is an increase in the rate of mucus. The Breathing becomes difficult.

In order to clarify the effect of this disease, we measure the change in the content of the blood in the dioxygen in function of the partial pressure in dioxygen, among a normal individual A and a diseased with respiratory difficulty. The results are presented in the following table.

PO ₂ (in mmHg)		0	2	4	6	8	10	12
Content of blood in O ₂ (mL/100 mL of blood)	Normal individual A	0	5	12	16	17	18	18
	Diseased individual B	0	2	5	7	9	10	10

- 1.1. Compare the maximum content of blood in dioxygen among two subjects A and B.
- 1.2. What can we conclude?

In general, we treat this person by medicines called bronchodilateurs. The document (1a) represents the bronchi affected before treatment and the document (1b) represents the bronchi after treatment by drugs.



2. Draw out, referring to the documents (1a) and (1b), the mode of action of drugs.
3. State three characteristics that permit the gaseous exchanges at the level of the lungs.

Exercise 1 (1 pt. each)

1. F, Meat, eggs and fish are types of food rich in proteins.
2. T
3. F, during physical activity, carbohydrates must furnish the largest portion of this energy.
4. F, Rickets is due to deficiency in vitamin D necessary for the fixation of calcium in bones.
5. T

Exercise 2(5pt)

1. 1.1. The celiac disease is caused by a reaction to gliadin, a gluten protein present in wheat, barley (0.5 pt)
1.2. It causes inflammation and destruction of the inner wall of the small intestine which reduces the passage of nutrients to the blood and lymph. (0.5 pt)
1.3. It is characterized by chronic diarrhea, weight loss and fatigue. (0.5 pt)
2. Since the amount of glucose in the blood entering the small intestine is 0.8 g / L and it increases to 2 g / l in the blood leaving the small intestine, this indicates that the blood is enriched with glucose. So this variation is due to the absorption of glucose by the blood in the intestine. (1.5 pt)
3. 3.1. The amount of glucose in the blood leaving the small intestine of a normal person is 2 g / l greater than that in a person suffering from the disease 0.8 g / l. (1 pt)
3.2. Therefore absorption is reduced in individuals suffering from celiac disease. (0.5 pt)
4. Intestinal villi. (0.5 pt)

Exercise 3(5)

1. The common conditions are beef meat and acidic medium. The variable conditions are the papaya extract and the water. (2)
2. The mass of meat beef in tube A was 5g at the beginning of the experiment which decreases to 0g at the end of the experiment. However, this mass stays the same in tube B. (1.5)
3. Yes, since in tube A, upon adding the papaya extract to the piece of beef meat. After a period of time all the meat disappears while in tube B, upon adding water, the beef meat stays the same. (1.5)

Exercise 4(5)

1. 1.1. The maximum blood content of dioxygen is 18 ml / 100 ml of blood in the normal individual A which is greater than that in the diseased individual B 10 ml / 100 ml of blood. (1 pt)
1.2. Thus in an asthmatic person, the transport of dioxygen is reduced. (1 pt)
2. Bronchodilator drugs, dilate the bronchi, relax the muscles and help get rid of the mucus. (1.5 pt)
3. Thin wall, richness of blood vessels, large exchange area due to the large number of alveoli. (1.5 pt)