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

Answer the following four exercises.

Exercise I (5points) Nutrition and Metabolism

Indicate the true statements, and correct the false ones.

1- Cellular oxidation produces oxygen gas.

2- Assimilation requires nutrients and energy.

3- Pepsin is active in an acidic medium while trypsin is active in a neutral medium.

4- At the level of the pulmonary alveoli, air is enriched with carbon dioxide.

5- The arteries are very thin vessels where blood circulates slowly.

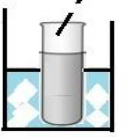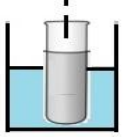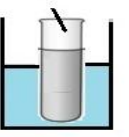## Exercise II (5points) Effect of temperature on enzymatic activity

Digestive enzymes are substances secreted by the salivary glands, cells lining the inner wall of the stomach, pancreas, and small intestine to facilitate the digestion of food. These enzymes are biocatalysts that accelerate the speed of the chemical reaction and facilitate the breakdown of complex molecules of carbohydrates, fats, and proteins into small molecules known as nutrients. Then, nutrients pass through the wall of the small intestine to the blood or the lymph where it is distributed to all body organs.

1- Pick out from the text:
  1-1. Two organs that secrete digestive enzymes.
  1-2. Two functions of digestive enzymes.
  1-3. The fate of nutrients.

In order to determine the effect of temperature on the enzymatic activity, an experiment is performed in the presence of fresh saliva which contains amylase, an enzyme that hydrolyzes starch into maltose.
The experimental conditions and the obtained results are represented in documents 1 and 2 respectively.

Document 1	Document 2

2- Draw a table showing the conditions of the experiment, document 1.
3- Deduce the optimum temperature of the activity of salivary amylase.

Tube A that was placed in a water bath at 0°C, is replaced at 37°C.
4- Indicate the result of the iodine test performed on the content of tube A after 15 minutes.
  Justify the answer.

Exercise III (5 points)   Effect of Nitrogen Dioxide on the Respiratory System

Nitrogen dioxide (NO_2) is a gas polluting the atmosphere, it is mainly released during the combustion of fossil fuels (coal, crude oil...). A study is performed to determine the effect of air pollution by NO_2 on the frequency of respiratory disease. The obtained results are represented in the following document.

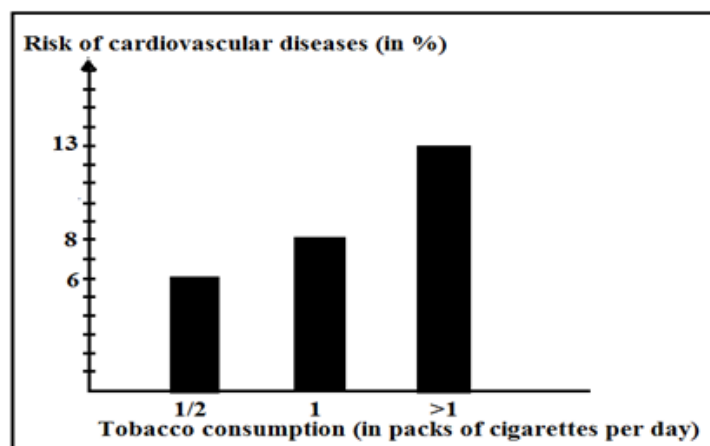| Level of NO_2 air pollution	1	2	3
	Low pollution	Moderate pollution	High pollution
Frequency of respiratory diseases per 100 hospitalized patients	6	11	16

1- Pose the problem at the origin of this study.
2-Construct the histogram (bar graph) showing the variation of the frequency of respiratory diseases in function of the level of NO_2 air pollution.
3-1.Analyze the obtained results.
3-2.What can you conclude?
4- Indicate the pathway of the inhaled air through the respiratory passages reaching the pulmonary alveoli.

Exercise IV (5 points)   Cardiovascular Diseases

Cardiovascular diseases are conditions that affect the heart or blood vessels, such as myocardial infarction which is caused by narrowing or obstruction of coronary arteries that irrigate the cardiac muscle.

1- Explain how a narrow coronary artery might lead to a myocardial infarction.

In order to determine certain risk factors for cardiovascular diseases, two studies were carried out. Document 1 shows the effect of smoking on the risk of cardiovascular diseases.

Document 1

2-1.Analyze the obtained results, document 1.
2-2.What do you conclude?

Numerous surveys have been carried out in two different countries to show the influence of the consumption of vegetables on the death rate due to cardiovascular diseases. The results of these surveys are represented in document 2.
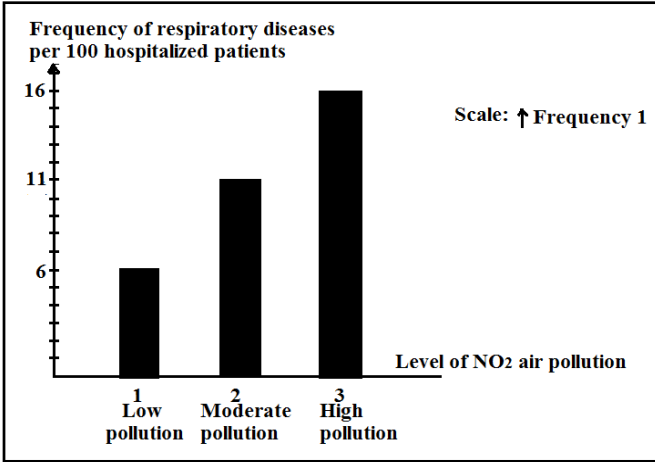
	France	Greece
Consumption of vegetables (in Kg / year / inhabitant)	180	340
Number of deaths due to cardiovascular diseases / 100000 inhabitants / year	78	9

Document 2

3-Compare, referring to document 2:
   3-1. The consumption of vegetables in France and in Greece.
   3-2. The death rate from cardiovascular diseases in the two countries.
4- Conclude the effect of vegetable consumption on the incidence of cardiovascular diseases.
5- Indicate two other risk factors of cardiovascular diseases.

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دائرة الامتحانات الرسمية

أسس تصحيح مسابقة في علوم الحياة والأرض

Ex	Part	**Exercise I (5 points)** **Nutrients and Cellular Activity**	Mark
1	1	False, Cellular oxidation produces carbon dioxide.	1
	2	True	1
	3	False, pepsin is active in an acidic medium while trypsin is active in a basic medium.	1
	4	True	1
	5	False, the capillaries are very thin vessels where blood circulates slowly.	1

Ex	Part	**Exercise II (5 points)** **Effect of temperature on Enzymatic activity**	Mark
2	1-1.	Two organs that secrete digestive enzymes are: Salivary glands, stomach or pancreas or small intestine.	0.5
	1-2.	Two functions of digestive enzymes: - accelerate the speed of the chemical reaction. - facilitate the breakdown of complex molecules of carbohydrates, fats and proteins into small molecules known as nutrients.	0.5
	1-3.	Nutrients pass through the intestinal wall to the blood or the lymph where it is distributed to all body organs.	0.5
	2	<table><tr><th>Conditions Tube</th><th>Cooked Starch</th><th>Fresh Saliva</th><th>pH</th><th>Temperature (in°C)</th><th>Duration (in minutes)</th></tr><tr><td>A</td><td>+</td><td>+</td><td>7</td><td>0</td><td>15</td></tr><tr><td>B</td><td>+</td><td>+</td><td>7</td><td>20</td><td>15</td></tr><tr><td>C</td><td>+</td><td>+</td><td>7</td><td>37</td><td>15</td></tr></table> (+) presence **Title:** The conditions of the experiment	1.5
	3	Only tube C, placed at a temperature of 37 ℃, shows a yellowish color with the iodine test after 15 minutes, indicating the presence of maltose that results from the complete digestion of the starch. Therefore, the optimum temperature of the activity of salivary amylase is 37 ℃.	1
	4	A yellowish color appears in tube A with the iodine test. Because the temperature 0℃ renders the enzyme inactive (temporarily stops the enzyme activity). The enzyme resumes activity at 37℃. Thus, cooked starch is hydrolyzed by amylase or fresh saliva to maltose which gives a yellowish color when tested with iodine test.	0.25 0.75

Ex	Part	**Exercise III (5 points)** **Effect of Nitrogen Dioxide on Respiration**	Mark
	1	What is the effect of air pollution by NO_2 on the frequency of respiratory diseases?	**0.5**
	2	 **Title:** Histogram showing the variation of the frequency of respiratory diseases in function of the level of NO_2 air pollution	**1.5**
	3-1.	The frequency of respiratory diseases increases from 6 to 16 per 100 hospitalized patients as the level of NO_2 air pollution increases from level1 (Low pollution) to level 3 (High pollution).	**1**
	3-2.	Air pollution by NO_2 provokes (causes, favors) respiratory diseases.	**0.5**
	4.	Pathway of the inhaled air: Nasal cavities (or oral cavity) ➜ Pharynx ➜ Larynx ➜ Trachea ➜ Bronchi ➜ Bronchioles ➜ Pulmonary alveoli. *(0.25 pt for each term)*	**1.5**
Ex	**Part**	**Exercise IV (5 points)** **Cardiovascular Diseases**	**Mark**
	1.	Coronary arteries irrigate the heart muscle. If one of these arteries is partially clogged, the area of the heart that is normally supplied with blood from this artery would be deprived of nutrients and oxygen gas.(0.5 pt)This area stops contracting and eventually dies. (0.25 pt)This is the beginning of an infarction. (0.25 pt)	**1**
	2-1.	The risk of cardiovascular diseases increases from 6% to 13% when tobacco consumption increases from ½ pack of cigarettes smoked per day to a value greater than one pack of cigarettes (> 1) smoked per day.	**1**
4	**2-2.**	Therefore, smoking is a risk factor for cardiovascular diseases. Or smoking favors cardiovascular diseases.	**0.5**
	3-1.	In France, the consumption of vegetables (180 kg / year / inhabitant) is lower than that is consumed in Greece (340 Kg / year / inhabitant)	**0.5**
	3-2.	The death rate from cardiovascular diseases in France (78 / 100,000 inhabitants / year) is higher than that in Greece (9 / 100,000 inhabitants / year).	**0.5**
	4.	The consumption of vegetables lowers the risk of cardiovascular diseases.	**0.5**
	5.	The two other factors of cardiovascular diseases: Obesity, Diabetes, **OR** Sedentary life **OR** Stress **OR** Heredity **OR** Diet rich in animal fats **OR** Hypertension *(0.5pt for each factor)*	**1**