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

Answer the four following exercises:

Exercise 1 (5 points)

Albinism

In humans, several genes located on autosomes control the pigmentation of the skin. We study the transmission of one of these genes that has two alleles:

- The dominant allele **A** determines a normal colored skin which is characterized by the synthesis of melanin.
- The recessive allele **a** determines albinism which is characterized by the arrest (stoppage) of the synthesis of this pigment.

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

- 1- The genotype of an albino individual is Aa.
- **2-** Melanin allows the normal coloration of the skin.
- **3-** The genotype of an albino female is the same as that of an albino male.
- 4- The genotype of an individual having a normal colored skin is aa.
- **5-** The gene that controls the pigmentation of the skin is localized on a sex chromosome.

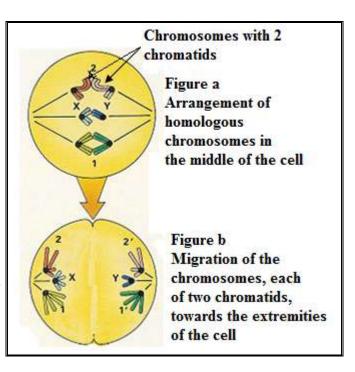
Exercise 2 (5 points)

Meiosis

The adjacent **document** shows the behavior of chromosomes during the first meiotic division in humans.

For simplification, only three pairs of chromosomes are presented.

- **1-** Identify the phase of meiosis presented in:
- figure a
- figure b
- **2-** Determine the sex of the individual which is at the origin of this cell.
- **3-**Indicate:
- **a**. the number of cells obtained at the end of meiosis.
- **b.** the number of chromosomes in each of the obtained cells at the end of meiosis.
- **4-**Justify this statement: "Meiosis is a reductional division".

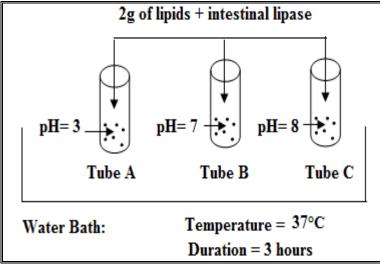


Exercise 3 (5 points)

Effect of pH on Enzymatic Activity

To verify that the enzymatic activity depends on pH of the medium, we perform in vitro digestion of animal lipids in the presence of intestinal lipase: an enzyme that acts on lipids.

The experimental conditions and the obtained results are presented in **documents 1** and **2** respectively.



Document 2:	Results	ΟI	tne	experiment

Tube

A

2

2

At the beginning

of the experiment
At the end of the

experiment

Quantity of animal

lipids (in g)
Tube

В

2

2

Tube

 \mathbf{C}

2

0

Document 1: Conditions of the experiment

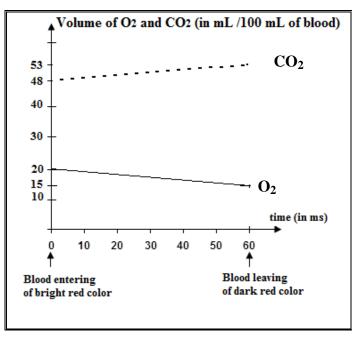
- **1-** Draw a table showing the conditions of the experiment.
- **2-** Pose the problem studied in this experiment.
- **3-** Deduce the convenient pH for the activity of intestinal lipase.

Exercise 4 (5 points)

Gaseous Exchange at the Level of Organs

To determine the gaseous exchange at the level of organs, we measure the volumes of O_2 gas and CO_2 in the blood entering and leaving the muscle (organ) at rest. The measured results are presented in the adjacent **document**.

- 1- Pick out the color of blood:
 - a. entering the muscle
 - **b**. leaving the muscle.
- **2-a**. Analyze the obtained results.
 - **b.** What do you conclude concerning the gas exchange at the level of the muscle?
- **3-** Name the blood constituent that transports most of the:
 - a. oxygen gas
 - **b.** carbon dioxide.



	الشهادة المتوسطة	وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات
الاسم: الرقم:	مسابقة في مادة علوم الحياة والأرض المدة ساعة	مشروع معيار التصحيح

Answer the four following exercises:

Exercise 1 (5 points)

Part of the Q	Answer		
1	False, the genotype of an albino individual is aa.	1	
2	Correct	1	
3	Correct	1	
4	False, the genotype of an individual having a normal colored skin is AA or Aa.	1	
5	False, the gene that controls the pigmentation of the skin is localized on		
	an autosome.	1	

Exercise 2 (5 points)

Part of the Q	Answers				
1	Figure a: It is metaphase I because the homologous chromosomes are arranged at the middle of the cell.				
	-Figure b: It is anaphase I because the chromosomes, each of two chromatids, migrate towards the extremities of the cell.	2			
2	Figures a and b show the presence of two gonosomes X and Y that				
	orrespond to a male.				
3-a	The number of cells obtained at the end of meiosis is 4 cells				
3-b	The number of chromosomes in each of the obtained cells at the end of				
	meiosis is 23 chromosomes or n chromosomes				
4	Meiosis is a reductional division because the number of chromosomes in				
	the mother cell (2n) or 46 chromosomes is reduced to half and becomes				
	n) chromosomes or 23 chromosomes in the gametes.				

Exercise 3 (5 points)

Part of the Q	Answer					Mark	
1	Conditions 2 g of Intestinal Temperature Duration						
	Tube	lipids	lipase	pН	in °C	in hours	
	A	+	+	3	37	3	
	В	+	+	7	37	3	
	С	+	+	8	37	3	
	(+) presence						
	Table showing the experimental conditions.						2.5
2	The posed problem is:						
	Does the enzymatic activity depend on the pH of the medium?					1	
3	Only tube C, where the pH=8, shows a decrease in the quantity of animal						
	lipids from 2g till 0g. Therefore, pH=8 is the convenient pH for the activity of intestinal lipase.				1.5		

Exercise 4 (5 points)

Part of the Q	Answer				
1-a	The color of blood entering the muscle is bright red color				
1-b	The color of blood leaving the muscle is dark red color				
2-a	The volume of O_2 decreases from 20 mL/100 ml of blood till 15mL/100mL of blood from 0 ms till 60 ms. On the contrary, the volume of CO_2 increases from 48 mL/100 ml of blood till 53mL/100mL of blood during the same period.	1.5			
2-ь	We conclude that at the level of the muscle, oxygen gas passes from the blood to the muscle and carbon dioxide passes from the muscle to the blood.	1			
3-a	Red blood cells	0.75			
3-b	Plasma.	0.75			