

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:

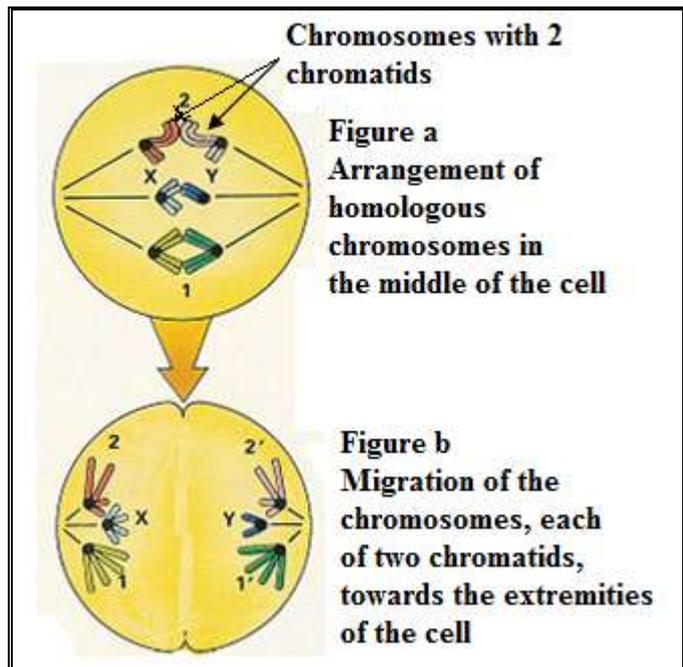
- figure a
- figure b

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".





	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	Mark
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	Mark
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 correspond to a male.	1
3-a	The number of cells obtained at the end of meiosis is 4 cells	0.5
3-b	The number of chromosomes in each of the obtained cells at the end of meiosis is 23 chromosomes or n chromosomes	0.5
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.	1

### Exercise 3 (5 points)

Part of the Q	Answer	Mark																								
<b>1</b>	<table border="1"> <thead> <tr> <th>Conditions Tube</th> <th>2 g of lipids</th> <th>Intestinal lipase</th> <th>pH</th> <th>Temperature in °C</th> <th>Duration in hours</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>+</td> <td>+</td> <td>3</td> <td>37</td> <td>3</td> </tr> <tr> <td>B</td> <td>+</td> <td>+</td> <td>7</td> <td>37</td> <td>3</td> </tr> <tr> <td>C</td> <td>+</td> <td>+</td> <td>8</td> <td>37</td> <td>3</td> </tr> </tbody> </table>	Conditions Tube	2 g of lipids	Intestinal lipase	pH	Temperature in °C	Duration in hours	A	+	+	3	37	3	B	+	+	7	37	3	C	+	+	8	37	3	<b>2.5</b>
	Conditions Tube	2 g of lipids	Intestinal lipase	pH	Temperature in °C	Duration in hours																				
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	B	+	+	7	37	3																				
C	+	+	8	37	3																					
(+) presence Table showing the experimental conditions.																										
<b>2</b>	The posed problem is : Does the enzymatic activity depend on the pH of the medium?	<b>1</b>																								
<b>3</b>	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.	<b>1.5</b>																								

### Exercise 4 (5 points)

Part of the Q	Answer	Mark
<b>1-a</b>	The color of blood entering the muscle is bright red color	<b>0.5</b>
<b>1-b</b>	The color of blood leaving the muscle is dark red color	<b>0.5</b>
<b>2-a</b>	The volume of O <sub>2</sub> 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 <sub>2</sub> increases from 48 mL/100 ml of blood till 53mL/100mL of blood during the same period.	<b>1.5</b>
<b>2-b</b>	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.	<b>1</b>
<b>3-a</b>	Red blood cells	<b>0.75</b>
<b>3-b</b>	Plasma.	<b>0.75</b>