

## مسابقة في مادة علوم الحياة والأرض

المدة: ساعة واحدة

(إنكليزي)

الاسم: .....

الرقم: .....

**Answer the following four exercises.**

**Exercise 1 (5 points)**

**Cellular Divisions**

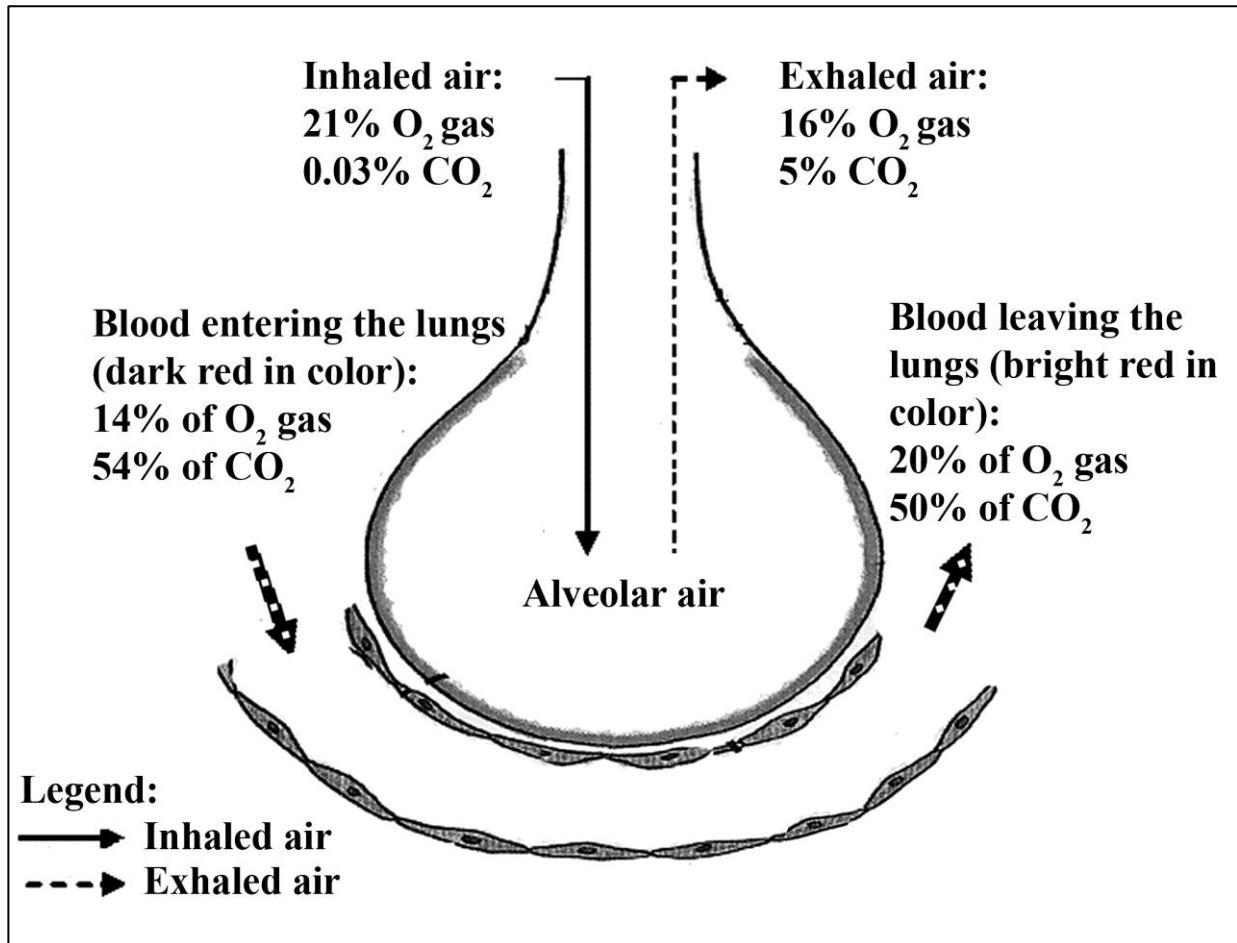
**Correct the following statements.**

1. During prophase of mitosis, each chromosome is of one chromatid.
2. The homologous chromosomes separate during anaphase of mitosis.
3. At the end of mitosis, a mother cell gives four daughter cells.
4. Meiosis II is a reductional division.
5. Decondensation of chromosomes takes place during prophase of mitosis.

## Exercise 2 (5 points)

## Respiratory Gas Exchange

The exchange of oxygen gas ( $O_2$ ) and carbon dioxide ( $CO_2$ ) takes place between alveolar air and blood. The document below represents the percentage of oxygen gas and carbon dioxide in the inhaled air and that in the exhaled air, as well as that in the blood entering and in the blood leaving the lungs.



By referring to the document below, answer the following questions:

- 1-1. Pick out the color of blood entering the lungs.
- 1-2. Pick out the color of blood leaving the lungs.
- 2-1. Compare the percentage of oxygen gas in the inhaled air to that in the exhaled air.
- 2-2. Compare the percentage of carbon dioxide in the inhaled air to that in the exhaled air.
- 2-3. What do you **conclude**?
- 3-1. Show that the blood leaving the lungs is enriched in oxygen gas.
- 3-2. Show that the blood leaving the lungs is impoverished ( becomes poor) in carbon dioxide.
4. Draw out the direction of the passage of oxygen gas and that of carbon dioxide at the level of the pulmonary alveoli.

**Exercise 3 (5 points)****Digestion of Sucrose**

Sucrose is a non-reducing sugar formed of two simple sugars: glucose and fructose. It is digested at the level of the digestive tube in the presence of a specific enzyme, sucrase.

**1-1. Pick out** from the text the constituents of sucrose.

**1-2. Pick out** from the text the specific enzyme for the digestion of sucrose.

In order to know if sucrose is digested by brewer's yeast, a unicellular fungus, the following experiment is performed:

In three test tubes A, B and C placed in a water-bath at 37°C, sucrose and water are put. Then, sucrase is added into tube B and brewer's yeast into tube C. These tubes are left in the water-bath for duration of 40 minutes.

**2. Choose the problem** that is at the origin of this experiment, among the following three problems:

- a- Can the brewer's yeast digest sucrose?
- b- Does the enzyme need a convenient medium?
- c- Does the enzyme require an optimal temperature to function?

**3. Complete the following table** showing the conditions of this experiment.

<b>Conditions</b> <b>Tubes</b>	<b>Sucrose</b>	<b>Water</b>				
<b>A</b>						
<b>B</b>						
<b>C</b>						

**Title :** .....

The Fehling test permits the identification of reducing sugars such as simple sugars and disaccharides except sucrose. This test is performed on the three test tubes at the beginning and at the end of the experiment. The obtained results are represented in the document below.

<b>Tubes</b>	<b>A</b>	<b>B</b>	<b>C</b>
At the beginning of the experiment	-	-	-
At the end of the experiment	-	+	+

**(+): Presence of a reducing sugar**

**(-): Absence of a reducing sugar**

**4-1. Compare** the results at the beginning and at the end of the experiment in each of the three tubes A, B and C.

**4-2. Choose the correct conclusion:**

- a-** Sucrose is not digested by brewer's yeast.
- b-** Sucrose is digested by brewer's yeast.
- c-** Brewer's yeast is digested by sucrose.

**Exercise 4 (5 points)****Transmission of an Autosomal Hereditary Trait**

The cross between two pure lines of tomato plants, one having **large** fruits and the other having **small** fruits, gives 100% tomato plants having **small** fruits.

**1. Indicate** the dominant allele and the recessive one. **Justify** the answer

**2. Designate** by symbols the corresponding alleles.

Two other crosses A and B are performed as shown in the following document.

Cross			Results
<b>A</b>	Tomato plant having <b>small</b> fruits	x Tomato plant having <b>small</b> fruits	75% Tomato plants having <b>small</b> fruits 25% Tomato plants having <b>large</b> fruits
<b>B</b>	Tomato plant having <b>large</b> fruits	x Tomato plant having <b>small</b> fruits	50% Tomato plants having <b>small</b> fruits 50% Tomato plants having <b>large</b> fruits

**3. Make a factorial analysis** to verify the results of cross A.

**4-1.** Write the **genotype** of the parent tomato plant having **large** fruits in cross B. **Justify** the answer.

**4-2.** Write the **genotype** of the parent tomato plant having **small** fruits in cross B. **Justify** the answer.

**5.** Name cross B.