

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

Answer the following four exercises:

Exercise 1 (5 points)

Crosses and Results

Indicate the correct expressions and correct the false ones.

- 1- In case of codominance, the dominant allele masks the recessive one.
- 2- Two pure line parents having the same genotype produce only homozygous descendants.
- 3- In case of codominance, the cross between two hybrids ($F_1 \times F_1$) gives descendants having three phenotypes and three genotypes.
- 4- In case of dominance, the cross between two hybrids ($F_1 \times F_1$) gives descendants having two phenotypes and two genotypes.
- 5- In case of dominance, the cross between hybrid F_1 and an individual with a recessive phenotype gives descendants having one phenotype and one genotype.

Exercise 2 (5 points)

Transport of Respiratory Gases

In one liter of blood, more than 98% of oxygen gas is transported by red blood cells or erythrocytes and the remaining 2% of this gas is dissolved in plasma. As for carbon dioxide, 70% of this gas is transported by the elements of plasma and the remaining 30% is transported by red blood cells.

Hemoglobin, the main constituent of red blood cells, has the property of combining rapidly and in a reversible manner with O_2 gas or CO_2 .

- 1- Pick out, by referring to the text :
 - a- The property that makes hemoglobin the essential transporter of O_2 gas.
 - b- The constituent of blood where hemoglobin is present.
- 2- Indicate the constituents of blood that ensure essentially the transport of carbon dioxide. Justify the answer.
- 3- Write the chemical reaction corresponding to the combination of hemoglobin with oxygen gas.

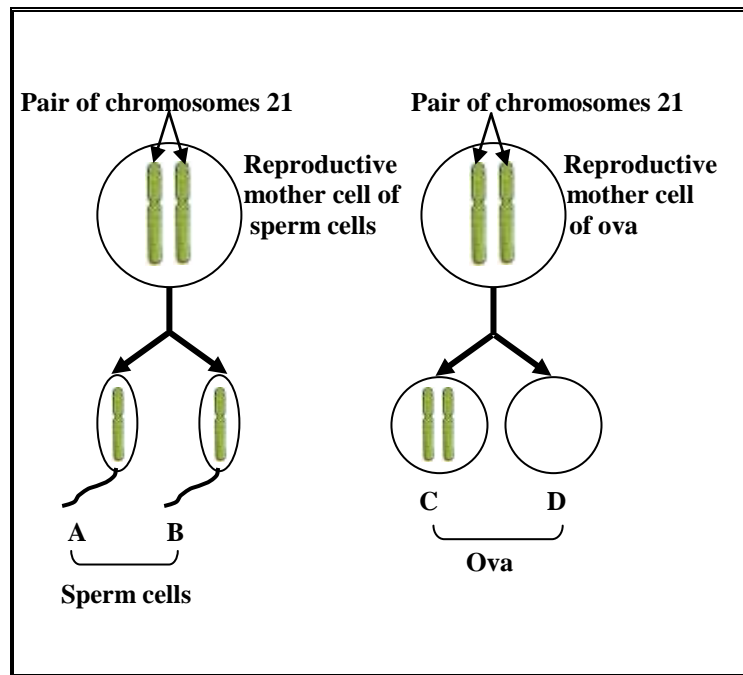
Exercise 3 (5 points)

Chromosomal Anomalies

During the formation of gametes, a certain error might occur at the moment of separation of chromosomes in reproductive cells. The adjacent **document** shows the obtained gametes in a male and a female. To simplify the diagram, only a pair of chromosomes 21 is represented.

1- Name the cell division at the origin of the formation gametes.

2- Indicate, by referring to the **document**, the mother cell where an error takes place at the moment of separation of chromosomes 21. Justify the answer.



3- Schematize the chromosomes 21 in the zygote that results from each of the following combinations:

- Sperm cell A with ovum C
- Sperm cell A with ovum D

4- Name the anomaly observed in each of the obtained zygotes.

Exercise 4 (5 points)

Role of Enzymes in Digestion

To verify that enzymes are necessary in the chemical digestion of food, a student realizes the following experiment.

- He puts 5 g of cooked starch in each of two test tubes A and B.
- He adds 1 mL of distilled water to each of the two tubes A and B.
- He adds salivary amylase to tube B.
- Then, he places the two tubes A and B in a water bath at a temperature of 37°C.

1- Schematize the steps of this experiment by using the legends in the adjacent **document**.



2- Pick out the hypothesis tested in this experiment.

After 20 minutes, he adds to the contents of both tubes several drops of iodine water having brown orange color. The content of tube A becomes dark blue in color while the content in tube B remains brown orange.

3- Indicate the tube in which digestion of cooked starch takes place. Justify the answer.

4- Name the substance resulting from the complete digestion of starch.

Answer the four following exercises:

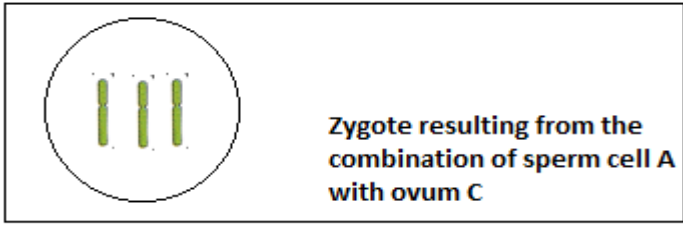
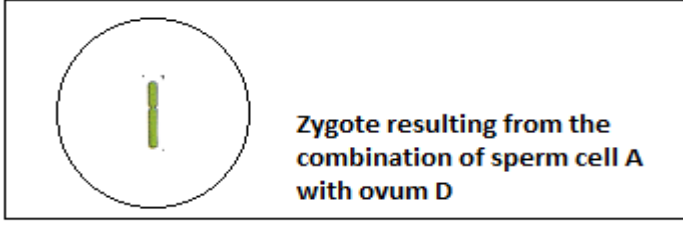
Exercise 1 (5 points)

Part of the Q	Answer	Mark
1	False. In case of dominance, the dominant allele masks the recessive one.	1
2	True	1
3	True	1
4	False. In case of dominance, the cross between the two hybrids ($F_1 \times F_1$) gives descendants having two phenotypes and three genotypes.	1
5	False. In case of dominance, the cross between the hybrid F_1 and an individual with a recessive phenotype gives descendants having two phenotypes and two genotypes.	1

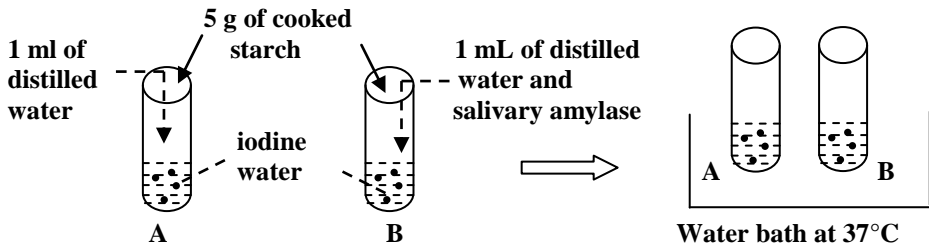
Exercise 2 (5 points)

Part of the Q	Answer	Mark
1-a	Hemoglobin has the property of combining rapidly and in a reversible manner with O_2 gas or CO_2 .	1
1-b	Hemoglobin is the main constituent of red blood cells.	1
2	The constituent of blood that ensures essentially the transport of carbon dioxide is the elements of plasma, since 70% of carbon dioxide gas is transported by the elements of plasma more than the remaining 30% transported by red blood cells..	2
3	Hemoglobin + oxygen \rightarrow oxyhemoglobin	1

Exercise 3 (5 points)

Part of the Q	Answer	Mark
1	Meiosis	0.5
2	The mother cell of ova is the mother cell where an error in the separation of chromosomes occurs, because it gives an ovum C that contains two chromosomes 21 instead of 1 chromosome 21. OR it gives an ovum D without any chromosome 21 instead of 1 chromosome 21.	2
3-a	 <p>Zygote resulting from the combination of sperm cell A with ovum C</p>	0.75
3-b	 <p>Zygote resulting from the combination of sperm cell A with ovum D</p>	0.75
4	The anomaly observed in the zygote resulting from the combination of A and C : Trisomy 21 Or 3 chromosomes 21. The anomaly observed in the zygote resulting from the combination of A and D : Monosomy 21 Or 1 chromosome 21.	1

Exercise 4 (5 points)

Part of the Q	Answer	Mark
1	Schema showing the steps of the experiment. 	2
2	Hypothesis : The enzymes are necessary for the chemical digestion of food.	1
3	Digestion of cooked starch took place in tube B , since after 20 minutes, the content of tube B that has salivary amylase remains brown orange color with iodine test indicating the absence of starch which means that digestion of starch took place.	1.5
4	Glucose	0.5

