This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 01
06NOV2023

Do NOT write in this box. Your MARK will be placed here.

Subject :	Biology	
Class :	11SE	
Teacher :	Christine Khalil	
Duration :	1 hour	
Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

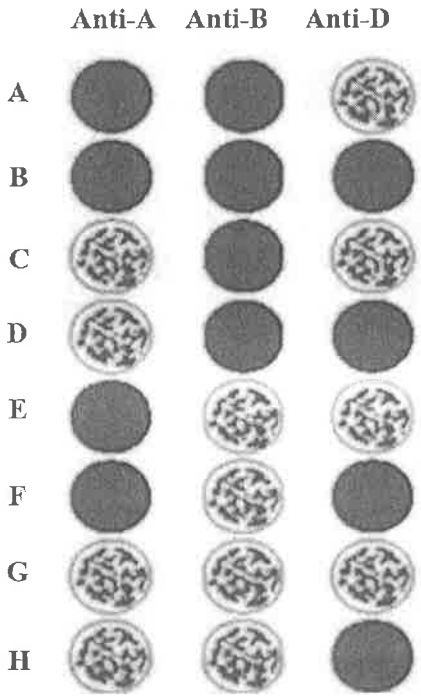
Exercise 1 (5 points)

Indicate if the following statements are true or false. Correct the false ones.

1. Rhesus compatibility is necessary for a successful blood transfusion.
2. Blood transfusion needs HLA matching between the donor and the recipient.
3. Graft rejection is immediate if the antibodies of the recipient and the antigens of the donor are corresponding.
4. HLA are oligosaccharides located on the surface of all nucleated cells.
5. Positive blood groups can receive blood from both negative and positive blood groups.

Exercise 2 (6 points)

For each of the following questions, choose the correct letter (s).



1. Indicate the letter corresponding to the universal donor. (1)
2. Indicate the letter corresponding to the universal recipient. (1)
3. Indicate the letter (s) capable of donating blood to a person having B+ as a blood type. (2)
4. Indicate the letter (s) having anti-D in their blood. (2)

Exercise 3 (8 points)

Sami saw an announcement that the hospital near his house needed a blood donor having B agglutinogens and D-agglutinins. Since Sami complies with these conditions, he decided to go and donate blood.

1. a. Indicate the blood type of Sami. (1)
   b. What can be the possible blood types of the recipient residing at that hospital? (2)

After the donation, the nurse took the blood in the intention of treating it before transferring it to the recipient. Unfortunately, the nurse forgot and the patient received the blood. The nurse was scared that the patient's blood will agglutinate.

2. What is the treatment that the nurse was supposed to do? Explain. (2)
3. Define agglutination. (1)

4. The nurse informed her boss about the mistake that occurred. He assured her that even without treating the blood, there is no fear of agglutination. Why is that? (2)

Exercise 4 (11 points)

A liver transplant is a surgical operation where a healthy liver is used to replace a damaged liver. The liver that is being donated may originate from a living donor or from a deceased organ donor. It is possible to transplant a whole liver or simply a portion of it. The liver is the only organ in the body that can regenerate, thus in a matter of weeks, a transplanted section of the liver can return to normal function.

A study was conducted to understand the relation between the graft survival rate and the number of incompatibilities at the level of the HLA genes. The results are shown in document 1.

Incompatibility Number	0	1	2	3	4
5-year survival rate of the transplant (%)	70	60	55	40	30

Document 1

N.B: Based on your acquired knowledge, HLA is coded by 6 different genes. The number of incompatibilities indicates the number of mismatching at the level of the genes coding for HLA.

Ex: 0= no mismatches=fully matching.
1= 1 gene mismatching. Etc.

1. Convert the table of document 1 into a histogram. (2)
2. Interpret the results shown in document 1. (2)
3. Based on your acquired knowledge, explain why finding a donor fully matching with the recipient is very hard. (2)

James needs an urgent liver transplant. The hospital suggested two possible donors: Angela and Ziad. A test was conducted to check the type of HLA found in each individual. The results are shown in document 2.

Individual	James	Angela	Ziad
HLA Type			

Document 2

4. Who is the best donor for James? Justify your answer. (1.5)
5. Name the type of transplantation performed. Justify your answer. (1.5)

After the surgery, the hospital prescribed to James some pills.

6. Name these pills. Why do James need to take them? (2)

Bareme for 11SE SE01

Exercise 1 (each true is 1 point, each false is 0.25 and each correction is 0.75)

1. True.
2. False. Organ transplantation needs HLA matching between the donor and the recipient.
3. True.
4. False. They are glycoproteins located on the surface of all nucleated cells.
5. True.

Exercise 2 (6 points)

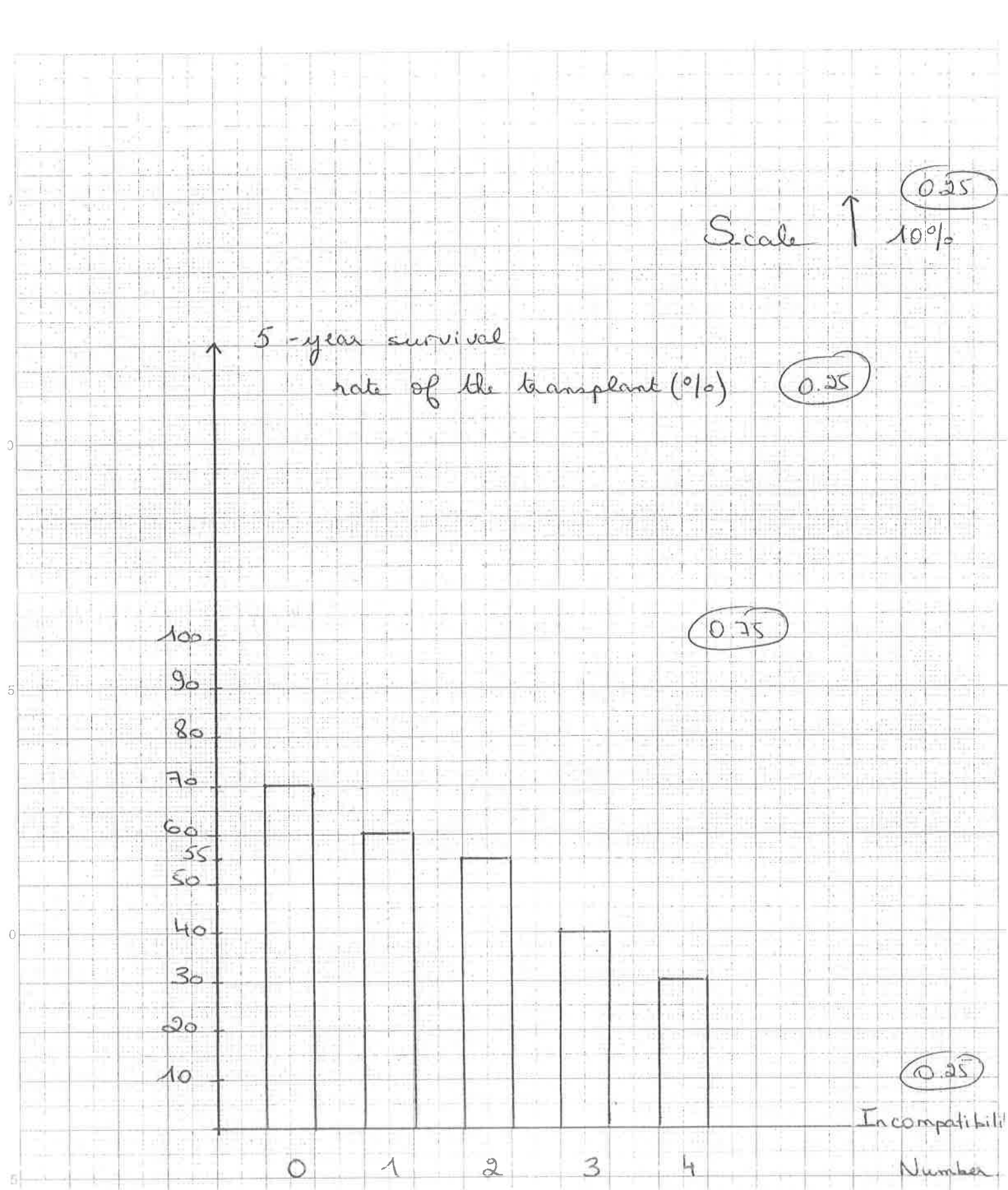
1. B (1)
2. G (1)
3. E, F, A and B (each is 0.5)
4. B, D, F and H (each is 0.5)

Exercise 3 (8 points)

1. a. B- (1)
   b. B-, B+, AB+ and AB- (each is 0.5)
2. Blood component therapy/ Centrifugation (1). The different parts of the blood will be separated and only the parts needed by the recipient will be transferred which are usually RBCs and platelets. Therefore, antibodies will not even be transmitted to the recipient. (1)
3. Binding of the antibody to its corresponding antigen. (1)
4. Even if the antibodies were transferred to the recipient, their amount in the donated blood will be so small that they will get diluted in the recipient's circulation and not cause any agglutination. (2)

Exercise 4 (11 points)

1. (2)
2. As the number of incompatibilities increases from 0 to 4, the 5-year survival rate of the transplant decreases from 70 to 30%. (1) This indicates that HLA matching is necessary for graft survival. (1)
3. To find a donor fully matching with the recipient's HLA requires that both alleles for the 6 genes coding for HLA to be the same. However, each gene of these 6 is highly polymorphic which means it has several alleles/possibilities which makes it impossible for 2 individuals other than identical twins to have the exact 2 alleles among many for each of the 6 genes. (2)
4. Angela (0.5) Since the type of her HLA is closer to James than that of Ziad (1)
5. Allograft (0.5) it is a graft between 2 individuals belonging to the same species (1)
6. Immunosuppressants (1) because the recipient's immune system can detect the smallest difference between the HLA of the donor and the recipient. To prevent the grafted organ from being attacked by the immune system of the recipient, its activity should be lowered which requires immunosuppressants (1)



Title: Histogram showing the variation of the 5 -year survival rate of the transplant as a functio of the incompatibility number of HLA. (0.5)