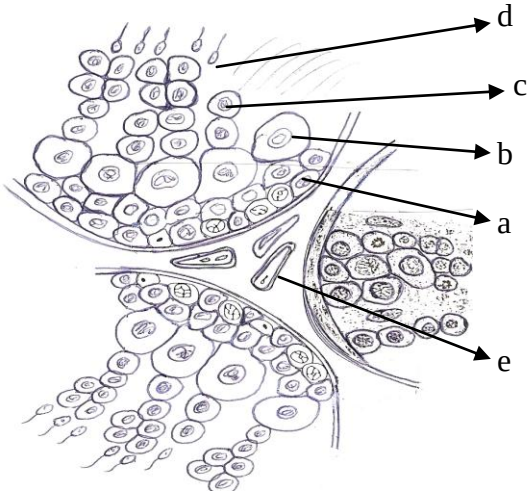
Class: **3rd Secondary/Life Science** **Duration:** **3 hours**
Subject: **Biology** **Mark:** **20 points**

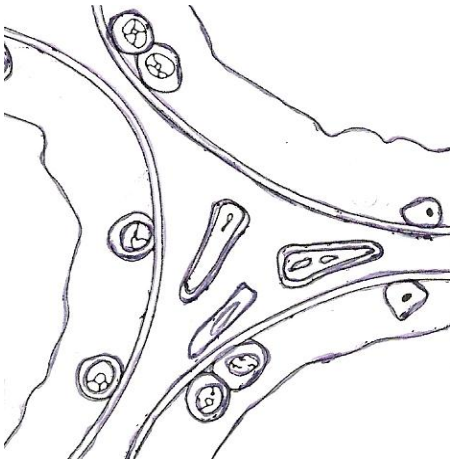
First Unified Examination

Exercise I: Origin of a disease: cryptorchidism (3.5 points)

Cryptorchidism is an anomaly that affects males of mammals (and humans in particular) reaching adulthood if their testes were developed in the abdominal cavity instead migrate into the scrotum (or scholarships), locates outside abdomen. Some secondary sexual characteristics are manifested in a cryptorchid but it is sterile.



The document-1- represents a section Performed in a normal testis

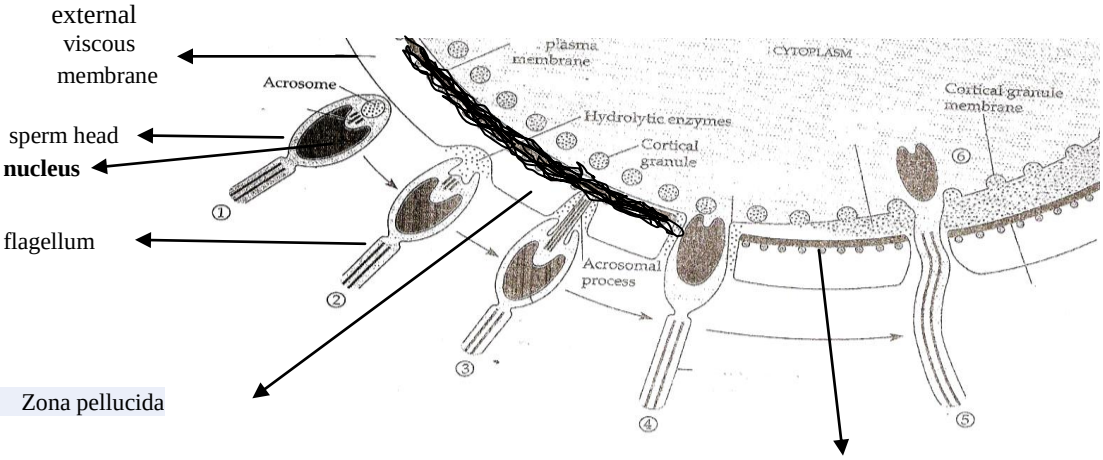


Document -2 - represents a section performed in a cryptorchid testis

1- Name the phenomenon that occurs in Document 1; at what age begins - and when it stops?
2- Label the structures represented by arrows of document-1-.
3- Compare documents 1 and 2.
4- By referring to the result of comparing the two documents and to the acquired knowledge ,explain why a cryptorchid is sterile, but it may develop secondary sexual characteristics.

Exercise II: Status of fertilization (4 points)

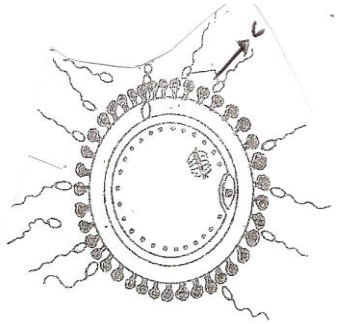
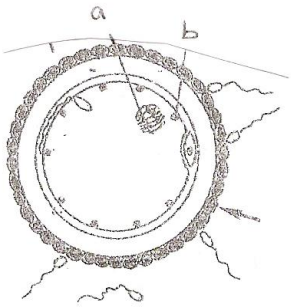
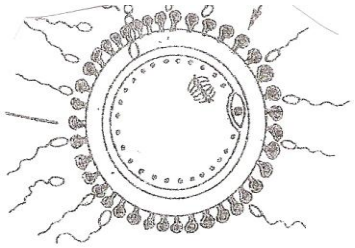
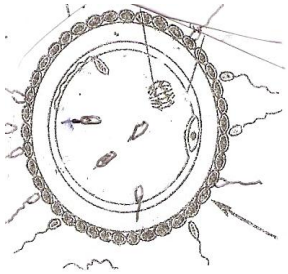
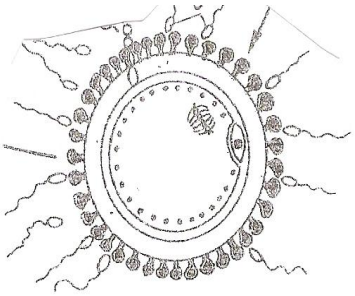
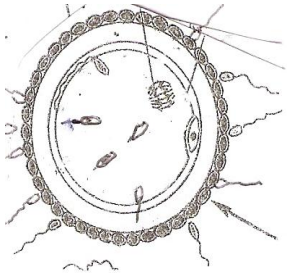
A- The following represents various stages of fertilization



fertilization membrane

1-Describe the events depicted in this document**.**

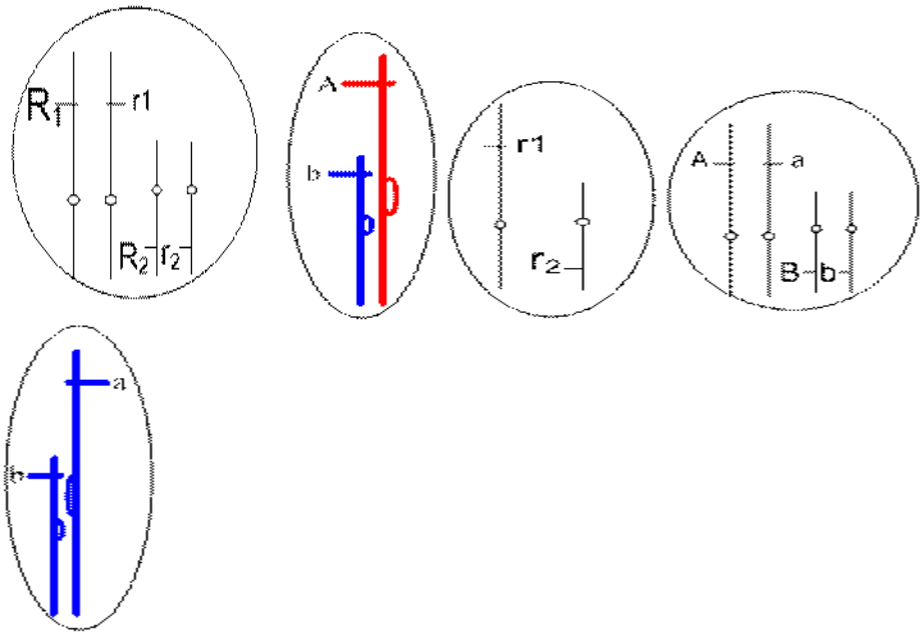
B- In orders to study the process of fertilization, several experiments are performed in vitro on oocyte and sperm. The conditions of some of these experiments and their results are shown in the following documents:

conditions		**Results**
	**Experience 1** Oocyte II in the presence sperm (All conditions favoring fertilization are insured) **Document 1**	
	**Experience 2** The cortical granules of the oocyte are destroyed **Document 2**	
	**Experience 3** An inhibitor of an enzyme E is found in cortical granules is added to the medium **Document 3**	

1. Annotating the structures of document-1 .
2. Interpret both experiments 1 and 2 of documents 1 and 2.
3. Formulate a hypothesis explaining the role of the enzyme E in the document 3.

<u>Exercise II</u>: Production of cyanide by plants(7 POINTS)

A -1- Write the genotypes of the following cells, and specifying whether haploid cells (gametes) or diploid.



Cross 2	
F1 ◊	Variety Z
Plants riche in cyanide	Plants poor in cyanide
Result : generation F2	
74,6 % Plants rich in cyanide	25,4 % Plants rich in cyanide

B-Some strains of clover (plants) are rich in cyanide and others are poor**.**

Document 1: The synthetic role of cyanide and its control.

The character (cyanide production) resulting from operating a biosynthesis chain in two steps:

Forerunner —(enzyme E_A / Gene A)→ **substance Q** —(enzyme E_B / Gene B)→ **cyanide**

Document-1-

The production of cyanide is important only if the clover cells have active enzymes E_A and E_B: if production is low.

The A gene has two alleles:

-a^+ code for a functional enzyme and a^- code for a non functional enzyme.

The a^+ allele is dominant over the allele a-

The B gene has two alleles:

-b^+ code for a functional enzyme and b- code for a non functional enzyme.

The allele b^+ is dominant over the allele b-.

The two genes A and B are not on the same chromosome.

1 - Write the different theoretical genotypes of the origin of low production of cyanide**.**

Document 2: result of crossing two plant varieties low in cyanide.

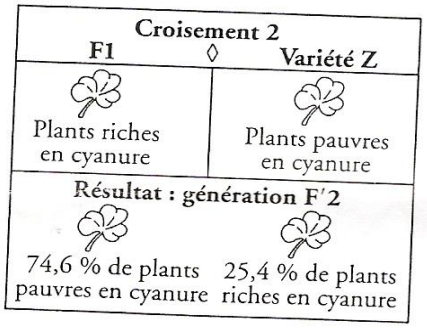
The varieties X and Y are both homozygous for genes A and B:
they produce a small amount of cyanide.

The variety X is homozygous for the allele $a^+$and b-

2 - Verify by factorial analysis the result of this cross.

3- Explain why the hybrid F1 are rich in cyanide .

Cross 1	
Variety X ◊	Variety Y
Plants poor in cyanide	Plants poor in cyanide
Result : generation F1	
Plants rich in cyanide	



Document-2-

Document 2

Document 3: results of a test cross between the variety Z and generationF1 (Document 2)

4. Give the genotype and gametes of the variety Z.
5. Name the type of mixing (assortment) occurring during gamete formation of F1 and illustrate it by an explanatory diagram.
6. Verify by factorial analysis the obtained experimental results.

Document- 3-

Exercise IV: Mode of transmission of certain characters in the Drosophila .(5.5 points)

Drosophila: The red-eye dominant color purple.
The right wings dominates the curved wings and the normal antenna dominates the atrophied antenna.

I. The cross between a female Drosophila with (red-eyes and right wings) and a male with(purple eyes and curved wings) gives: 400 flies red eyes and curved wings
400 Drosophila violet eyes and curved wings
100 drosophila red eyes and curved wings
100 Drosophila violet eyes and right wings

1. Write the genotypes of the bidominant female and justify the answer.
2. How can we explain these results?
3. Calculate the percentage of gametes produced by F1 females.
4. Make a necessary chromosomal analysis to verify the percentages of the phenotypic experimental results.
5. Predicting the theoretical phenotypic proportion of a cross between F1 male and female with birecessive purple eyes and curved wings .
Make a necessary chromosomal analysis to verify the prediction.

II- The cross between a male Drosophila homozygous for purple eyes and atrophied antennae with a female hybrid F1 with red eyes and normal antennae gives 12% of recombinant individuals.
1-Calculate the distances between the two genes.
2-Propose a 3rd crossing, which may indicate the relative location of the 3 genes above.
3-The proposed crossing in the previous question may give two theoretical results. What are they? Establish on the basis of these results the two corresponding maps.