JUNIOR LYCEUM ANNUAL EXAMINATIONS 2005
EDUCATIONAL ASSESSMENT UNIT- EDUCATION DIVISION

BIOLOGY- FORM V
TIME: 1H 45 MIN

NAME: _____ CLASS: _____

Question No.	**Section A**								**Section B**					
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**	
Max mark	9	7	5	7	6	6	5	10	15	15	15	15	15	
Actual mark														**TOTAL MARK**

Section A – Answer **all** questions in this section.

1a. For **each** of the following situations give the name of the hormone responsible and the endocrine gland producing that hormone.

Situation	Hormone	Endocrine Gland
(i) a mother breastfeeding her child		
(ii) a man feeling angry during a fight		
(iii) a teenager boy during puberty		

(½ mark each : 3 marks)

b. Diabetes is a common endocrine condition among the Maltese people, affecting about 10% of the population. State what happens to the glucose level in the blood of diabetic patients and give the reason.

_____

_____(2 marks)

c. Diabetics are advised to avoid eating sweet sugary foods but to include foods such as bread and potatoes which contain starch. Explain.

_____

_____

_____

_____(4 marks)

TOTAL 9 marks

2. The Table below shows the daily energy requirements by members of the Borg family. Tom and Jane are twins.

Borg Family Members	Energy Required in Kilojoules per Day
Kate (new born baby)	1,800
Tom (11 years)	8,200
Jane (11 years)	9,400
Mr. Borg	15,000
Mrs. Borg (breastfeeding mother)	11,400

a. What type of twins are Tom and Jane? Give a reason for your answer.

_____

_____(2 marks)

b. Suggest **TWO** reasons why Jane needs more energy than Tom, even though they are twins.

_____

_____(2 marks)

c. Suggest **TWO** reasons why Mr. Borg requires approximately twice as much energy when compared to his son Tom.

_____

_____(2 marks)

d. What change in the daily energy requirement would take place when Mrs. Borg stops breastfeeding her daughter and goes back to her office work?

_____ (1 mark)

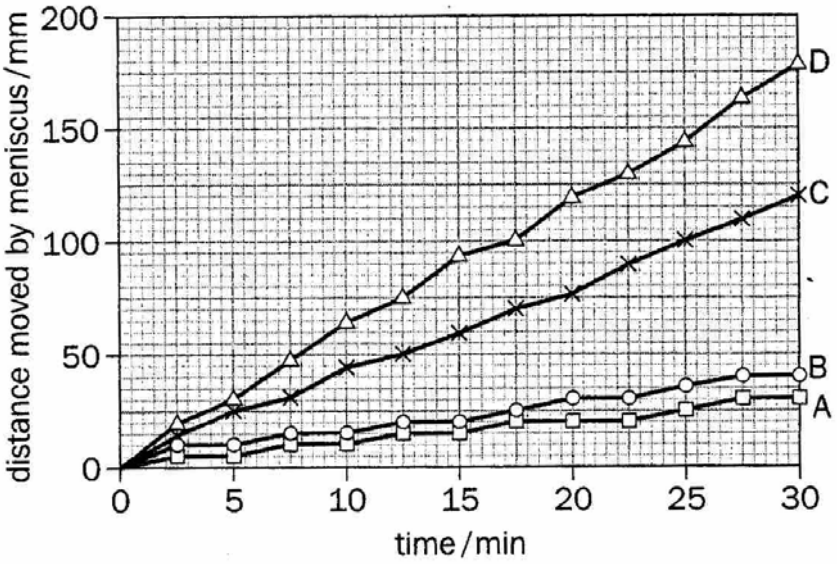
TOTAL 7 marks

3. A group of biology students carried out an experiment to investigate the uptake of water by a leafy shoot. The temperature and light intensity were kept constant during the experiment.

a. Name the apparatus necessary for such an experiment.

_____ (1 mark)

b. The results of the experiment are shown in the graph below.



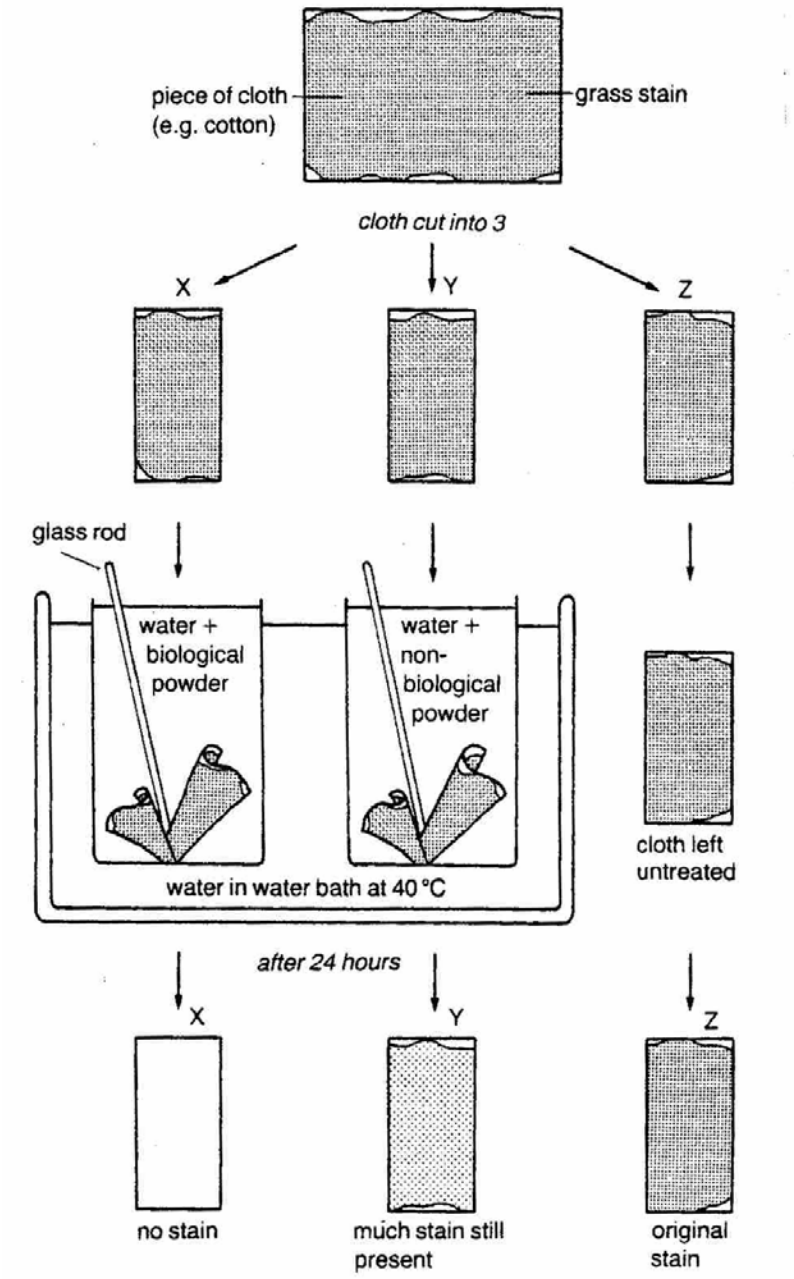
Use the letters A to D to match the water uptake by the leafy shoot in each of the following conditions.

CONDITION	LETTER
(i) Still air, leaves untreated	
(ii) Moving air, leaves untreated	
(iii) Still air, lower surface of leaf covered with grease	
(iv) Moving air, lower surface of leaf covered with grease	

(4 marks)

TOTAL 5 marks

4. A biology student carried out an experiment to compare the effects of a biological detergent to a non-biological detergent.
The diagram below shows the procedure used.



The stained cloths X and Y are left to soak for 24 hours. After 24 hours the grass stain is found to have disappeared completely from cloth X but not from cloth Y.

a. What substance makes the grass stain green?

_____ (1 mark)

b. Explain why the grass stain on cloth X was removed.

_____

_____(2 marks)

c. Suggest what would happen to
   (i) cloth X
   (ii) cloth Y
   if the experiment procedure is repeated and both cloths are kept at 100°C for thirty minutes. Give a reason for **each** answer.

   (i) cloth X _____

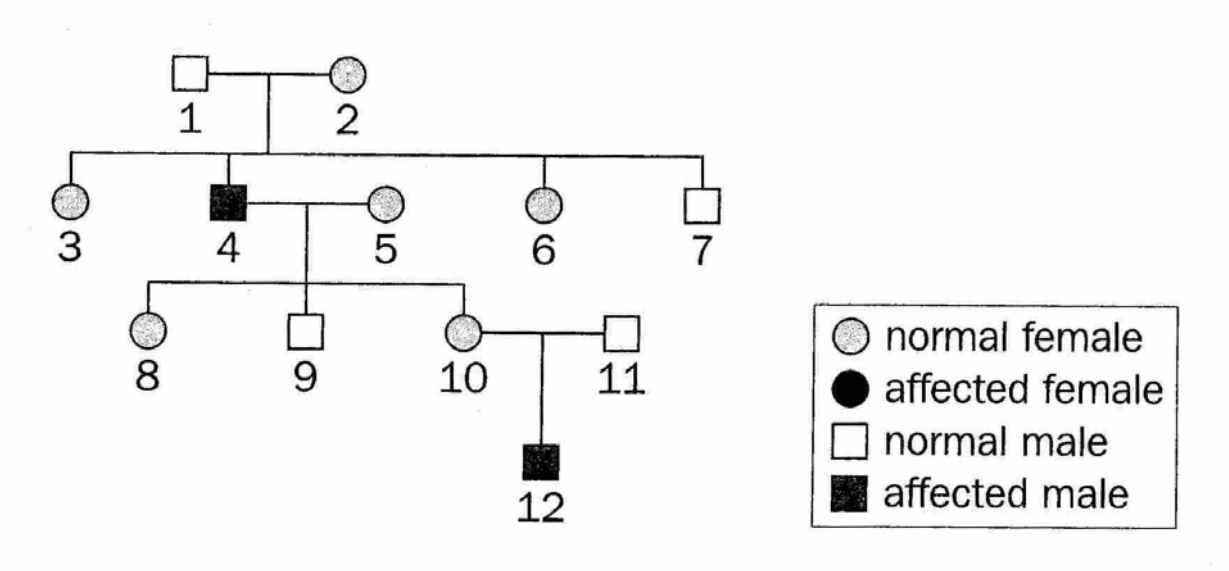
   _____

   (ii) cloth Y _____

   _____

(2, 2 marks)
TOTAL 7 marks

5. Pituitary dwarfism is a sex-linked inherited condition in humans in which affected individuals have very short limbs.
   The allele for pituitary dwarfism **d** is recessive to the allele for normal limbs **D**. The following diagram shows the pedigree of an affected family.



a. Write the numbers which on the diagram indicate the individuals who **must** have the genotype X^DX^d.

_____(3 marks)

b. A relative of couple 10 and 11 has told them that if they have a second son, he will **surely** be a normal unaffected boy. State whether the relative's statement is correct and give a reason for your answer. (Use genetic diagrams in your answer.)

_____

_____

_____

_____

_____

_____

_____(3 marks)
TOTAL 6 marks

6. The fennec fox lives in the Sahara and Arabian deserts. It digs extensive burrows one metre deep and up to eleven metres long. It emerges at night to prey on rats and lizards. Explain how **each** of the following adaptations help the fennec fox to survive in the desert.

a. dry faeces _____

b. yellow / white fur _____

c. large ears _____

_____

d. thick fur _____

e. nocturnal (night) activity _____

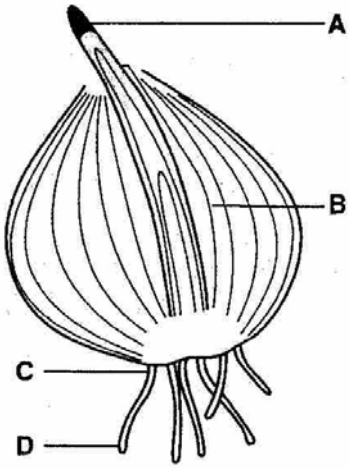
TOTAL 6 marks

7. The number of chromosomes varies from one species to another; for example the chromosome number in an onion is 16.

a. What is the chromosome number in the cheek cells of a human being?

_____ (1 mark)

b. The following diagram shows a section through an onion bulb.



(i) Which of the parts A to D of this onion bulb would you use for the preparation of a slide showing mitosis? Give a reason for your answer.

_____

_____

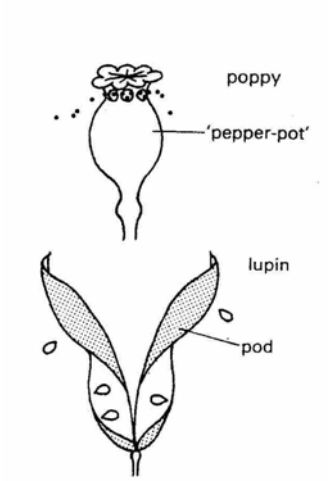
_____(3 marks)

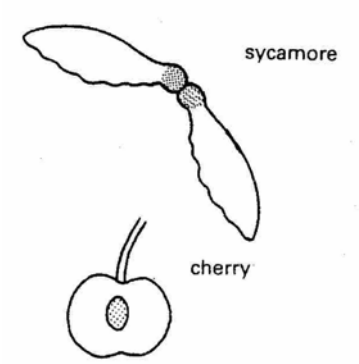
(ii) Suggest **ONE** part of the human body in which mitosis occurs.

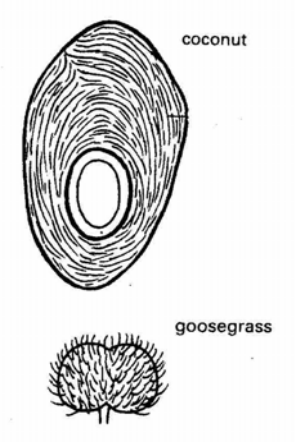
_____ (1 mark)

TOTAL 5 marks

8. Look at the following diagrams showing the fruits of different plants.







a. From which part of the flower are:
   (i) fruits formed?

   _____

   (ii) seeds formed?

   _____

   (2 marks)

b. Why is the strawberry referred to as a false fleshy fruit?

   _____ (1 mark)

c. Use the diagrams above to answer the following.
   Name
   (i) **ONE** fruit dispersed by water _____ (1 mark)
   (ii) **TWO** fruits dispersed by wind _____ _____(2 marks)
   (iii) **TWO** fruits dispersed by animals _____ _____(2 marks)

d. Give **TWO** reasons why seed dispersal is important.

   _____

   _____(2 marks)

TOTAL 10 marks

---------- END OF SECTION A ----------

Section B – Answer Question 1 and choose **two** others.

1. *Read the following passage and then answer the questions that follow.*

   In an open field, there is little that farmers can do to speed up photosynthesis – they cannot change the degree of cloud cover or warm up the air for example. However in an enclosed environment such as a greenhouse, it is possible to control the factors affecting photosynthesis and so get the maximum yield from crops. This requires an understanding of the limiting factors that control photosynthesis. Maximum photosynthesis means maximum plant growth.

a. Explain the term limiting factor. (2 marks)

b. Which limiting factor is most likely to affect photosynthesis:
   (i) on a cloudy, spring day?
   (ii) on a bright, sunny day in summer? (2 marks)

c. Given that the concentration of carbon dioxide in the atmosphere is approximately 0.035% suggest why farmers burn paraffin in greenhouses that are used to raise commercial crops. (2 marks)

d. Suggest what happens to the rate of photosynthesis if the temperature in the greenhouse reaches $50^{\circ}C$. (2 marks)

e. In a greenhouse artificial lighting systems are used. Give **ONE** advantage and **ONE** disadvantage of this. (2 marks)

f. At dawn and dusk plants do not take up or give out either carbon dioxide or oxygen. Explain. (3 marks)

g. Give **TWO** ways in which a greenhouse ecosystem is different from a natural ecosystem. (2 marks)

TOTAL 15 marks

2a. Between breathing and aerobic respiration. (4 marks)

b. Explain the changes taking place in:
(i) the intercostal muscles
(ii) the diaphragm
during the process of inspiration. (4 marks)

c. Give **TWO** changes which occur to air as it passes through the nasal passages during inspiration. (2 marks)

d. During times of great muscular activity the cells need more oxygen than the body can supply. The lungs cannot take in oxygen fast enough.

Explain what happens to an athlete if s/he continues with heavy exercise. (3 marks)

e. Occasionally we read of incidents of people who have died as a result of carbon monoxide poisoning. The death is not actually caused by poisoning but by tissue suffocation. Explain. (2 marks)

TOTAL 15 marks

3. Osmosis is a physical process which has a great effect on the biology of both plants and animals.

a. What is osmosis? (2 marks)

b. The process of osmosis causes a problem to the *Amoeba*. Describe the problem and explain the mechanism that helps the *Amoeba* to solve the problem. (4 marks)

c. Plants must absorb water by osmosis. Name the cell for the uptake of water by osmosis and explain **TWO** ways in which the cell you mention is adapted for water absorption. (1, 4 marks)

d. Some plants live in conditions where water is scarce. Such plants have a number of adaptations for survival. Give a biological explanation for **each** of the following adaptation.
(i) presence of a very thick waxy cuticle (1 mark)
(ii) rolling up of leaves (2 marks)
(iii) closing of stomata during daylight. (1 mark)

TOTAL 15 marks

4a. Draw a well labelled diagram of Mucor. (5 marks)

b. Some types of fungi are used in biotechnology.
(i) What do you understand by the term biotechnology? (2 marks)
(ii) Give **TWO** uses of fungi in biotechnology. (2 marks)

c. Describe the difference between the asexual reproduction of *Yeast* and that of *Mucor*. (4 marks)

d. Suggest why toadstools (a type of mushroom) are likely to be found in dark areas of woodland where green plants are very limited. (2 marks)

TOTAL 15 marks

5a. Suppose a particular sperm fertilizes an egg, list in the correct order, the structures through which the sperm passes from where it is produced to where it meets the egg. (4 marks)

b. Describe the events taking place from the time of fertilization to the time the zygote reaches the uterus lining. (4 marks)

c. Copulation four days prior to ovulation is more likely to lead to pregnancy than copulation two days after ovulation. Explain.

d. What effect would you expect anaemia in a pregnant mother, to have on her foetus? (3 marks)

e. Pregnant mothers are encouraged to avoid smoking. Explain. (2 marks)

TOTAL 15 marks

---------- END OF SECTION B ----------

END OF PAPER