

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2006
EDUCATIONAL ASSESSMENT UNIT – EDUCATION DIVISION

BIOLOGY – FORM V
 TIME: 1H 45 MIN

NAME: _____ CLASS: _____

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

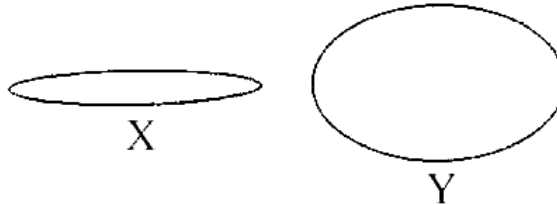
85% Theory Paper	15% Practical	100% Final Score

SECTION A

Answer **all** questions in this section.

This section carries 55 marks.

1. The following diagram shows the cross section of the bodies of two species of animals. The animals have the same body length and live in the same environment.



- a. Which species of animal would you expect:

(i) to have specialised internal gas exchange surfaces?

(ii) to have gaseous exchange across its whole body surface?

_____ (1, 1 mark)

- b. Give a reason for your answer in 'a. (ii)'.

_____ (2 marks)

- c. List **TWO** ways in which the leaf of a dicotyledonous plant is adapted for the exchange of gases.

_____ (2 marks)

Total 6 marks

2. A local environmental project called 'FORESTA 2000' involves re-forestation in an area known as it-Taflija (limits of Mellie] a). At the start of this project a survey of the local flora in the area was carried out and then rubble walls were built.



- a. Suggest a reason for the need of:

(i) the survey of the local flora

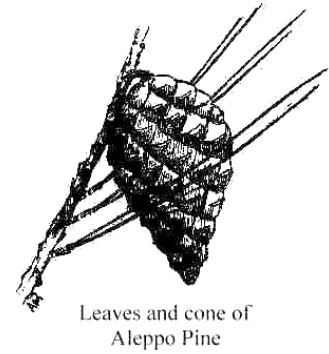
(ii) building rubble walls.

_____ (1, 1 mark)

- b. Why is such an environmental project beneficial?

_____ (1 mark)

c. Mediterranean forest species like the aleppo pine (commonly known as si[ra taž-žnuber) were planted in the area of it-Taflija. The following diagram shows the leaves and the cone of the aleppo pine.



Leaves and cone of Aleppo Pine

(i) To which phylum does the aleppo pine belong?

(1 mark)

(ii) Describe the appearance of the leaf of the aleppo pine and give **ONE** adaptation of the leaf for the dry Mediterranean environment.

 _____ (2 marks)

d. What would you expect to find in the:

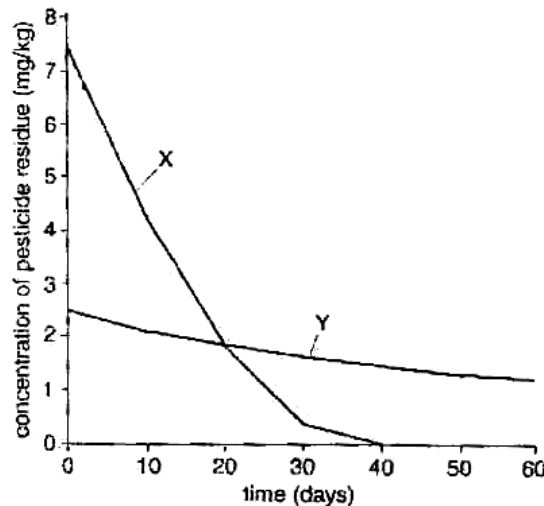
(i) male cone?

(ii) female cone several days after fertilization?

_____ (1, 1 mark)

Total 8 marks

3. The following diagram shows the results of an experiment in which two pesticides (pesticide X and pesticide Y) were sprayed onto separate sample areas of a cereal crop. The concentration of each residue remaining on the crop after spraying was measured over a period of 60 days.



a. By how many times was the concentration of pesticide X greater than that of pesticide Y, **immediately** after spraying?

_____ (1 mark)

- b. DDT is a persistent pesticide that has been used but now is banned in many countries. Which pesticide in the graph represents the DDT?

_____ (1 mark)

- c. In the 1880's citrus trees in California became heavily infested with a small sap-sucking fluffy insect called the cottony-cushion scale (*Icerya purchasi*). A biologist solved this problem by introducing a small predatory ladybird beetle called *Rodalia cardinalis*.

What method of pest control is described in the passage above?

_____ (1 mark)

- d. What is the
(i) genus name of the cottony-cushion scale?

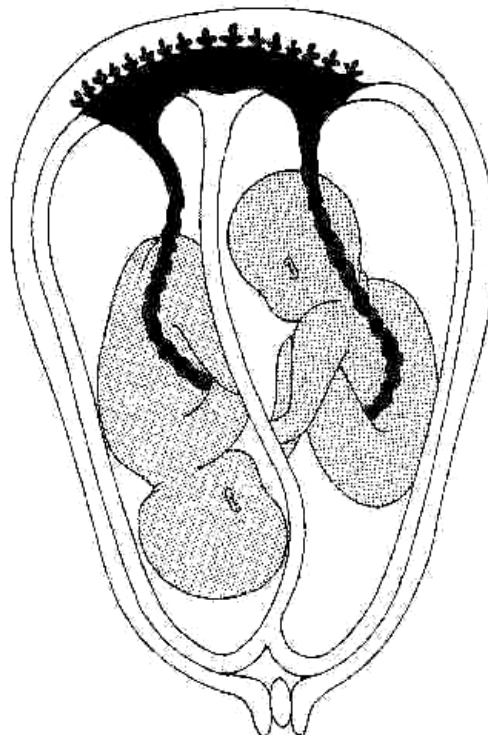
_____ (1 mark)

- (ii) species name of the ladybird beetle?

_____ (1 mark)

Total 5 marks

4. The following diagram shows twins during gestation.



- a. How many gametes were involved in the formation of the twins shown in the diagram?

_____ (1 mark)

- b. On the diagram label the:

- (i) amniotic sac
(ii) cervix
(iii) umbilical cord

(3 marks)

- c. Conjoined (siamese) twins are born joined together at some point. Sometimes they are successfully separated. Would you expect siamese twins to be of different sexes? Give a reason for your answer.

_____ (2 marks)

- d. Explain what is likely to happen to the foetus of a pregnant female who is infected with the HIV virus. (HIV is the virus leading to AIDS or Acquired Immune Deficiency Syndrome)

_____ (2 marks)

Total 8 marks

5. A group of biologists carried out a survey about coat colour in horses and leaf length of 500 leaves in geraniums. They presented the data in two Tables – Table X and Table Y as shown below.

Table X

Coat Colour	Grey	Black	Dun	Roan	Bay	Chestnut
Number of Horses	32	18	28	56	28	38

Table Y

Leaf Length/cm	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
Number of Leaves	30	38	49	75	95	68	50	45	32	18

- a. Which Table shows a pattern of:

(i) continuous variation?

(ii) discontinuous variation?

_____ (1, 1 mark)

- b. Which characteristic studied by the biologists is **not** affected by the environment?

_____ (1 mark)

- c. How is the variation shown by the leaves important for the plant's survival?

_____ (1 mark)

- d. Mutations can change the genetic make-up of an organism, therefore increasing variation within a species.

(i) Explain the term mutation.

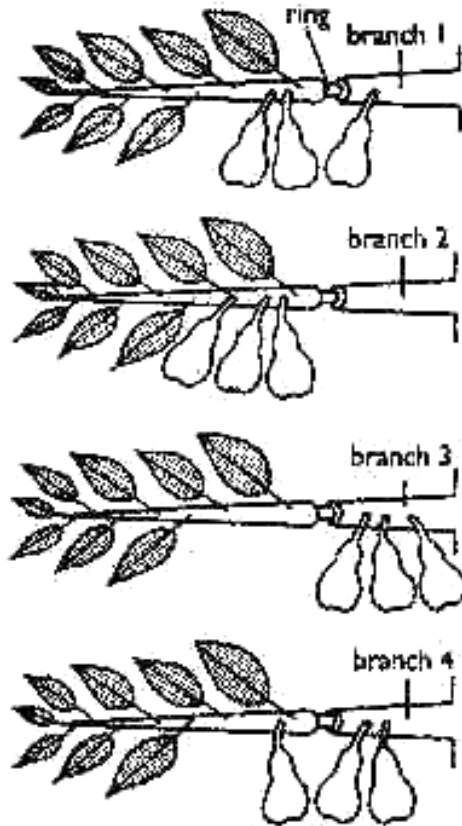
(ii) Name **ONE** factor that increases the rate of mutation.

_____ (1, 1 mark)

e. Explain why clones are used to study the influence of the environment on variation.

_____ (2 marks)
Total 8 marks

6. The diagrams below shows four branches of a pear tree at the start of a ringing experiment, in which a ring of bark has been cut away, before the pears matured.



a. Name the plant vascular tissue that is **NOT** affected by cutting away the ring of bark.

_____ (1 mark)

b. The Table below shows the **total mass** of the **three** pears per branch several months later. Complete the Table by writing the branch number for each result shown.

Total mass of three pears per branch	Branch Number
75 g	
300 g	
525 g	
750 g	

(4 marks)
Total 5 marks

7. The following Table shows the effects of two diets – diet A and diet B, on the amount of glycogen stored in muscles. Both diets supply normal and equal levels of protein and fat.

Type of Diet	Amount of glycogen stored in muscle (g per 100 g muscle)						
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Diet A	1.8	1.7	1.6	1.5	1.4	1.3	1.2
Diet B	2.0	2.2	2.4	2.6	2.8	3.0	3.1

- a. Name **ONE** other site in the body where glycogen is stored.

_____ (1 mark)

- b. Which diet is a:

(i) high carbohydrate diet?

(ii) low carbohydrate diet?

(1, 1 mark)

- c. Give reasons for your answer in 'b (ii)'.

(2 marks)

- d. Which diet would you recommend to an athlete during training for the few days before a race? Give a reason for your answer.

(2 marks)

Total 7 marks

8. The following Table shows the rate of blood flow in various parts of a person's body under different conditions of exercise.

	rate of blood flow (cm ³ /min)		
	at rest	light exercise	strenuous exercise
Skeletal muscle	1200	4500	12500
Gut	1400	1100	600
Skin	500	1500	1900
Kidneys	1100	900	600
Brain	750	750	750
Heart muscle	250	350	750

- a. Compare the effect of increasingly strenuous exercise on the blood flow to the skeletal muscle and to the gut. Give a reason for your answer.

_____ (3 marks)

- b. Name the hormone that brings about an increase in heart rate.

_____ (1 mark)

- c. In what way would the appearance of the skin of the face change as a result of strenuous exercise? Give a reason for your answer.

_____ (2 marks)

- d. (i) From the Table above name the body part in which the rate of blood flow remains unaffected by exercise.

_____ (1 mark)

- (ii) Give a reason why the rate of blood flow in the body part you mention in 'd(i)' is not affected.

_____ (1 mark)

Total 8 marks

Section B

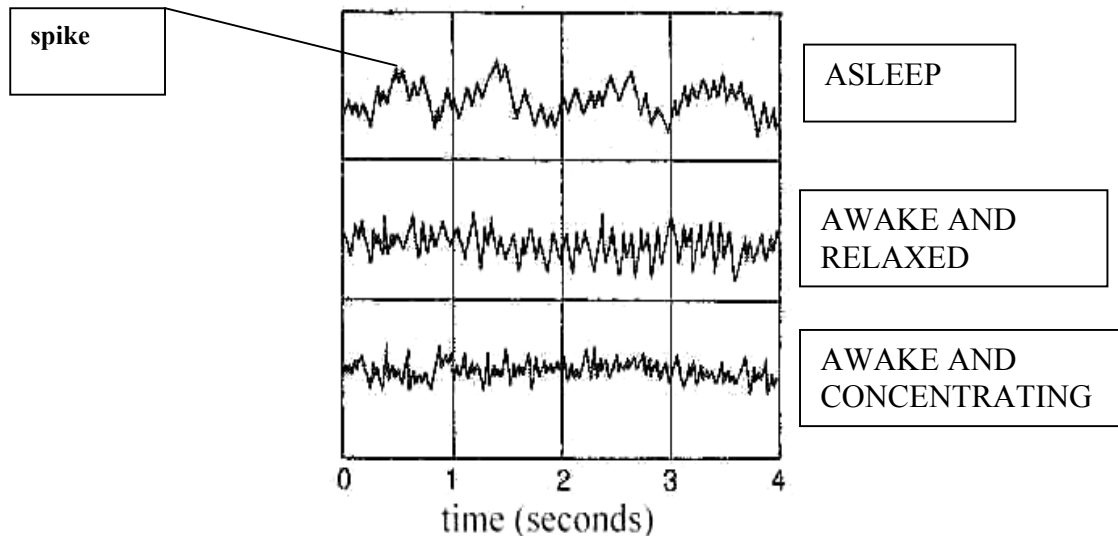
Answer question 1 and any **TWO** other questions from this section.

Each question carries 15 marks.

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

ELECTROENCEPHALOGRAMS (EEG's)

An EEG is a record of the cerebrum's electrical activity. It is made using information from impulses picked up by electrodes placed on different regions of the scalp. Different brain wave patterns indicate different levels of mental activity as shown in the figure below.



The more densely packed the 'spikes' in the pattern, the higher the level of electrical activity present in the brain.

- a. (i) Name the cell that conducts electrical impulses. (1 mark)
(ii) Draw a diagram of the cell you name in 'a(i)' (3 marks)
(iii) Name the substance that helps to insulate the cell you name in a (i). (1 mark)
- b. In human beings the surface of the cerebrum is highly folded. What is the benefit of this? (2 marks)
- c. The cerebrum can be divided into three types of functional areas:
- sensory area
 - association area
 - motor area

Which area :

- (i) analyses and interprets impulses?
(ii) sends impulses to the appropriate effectors?
(iii) receives information from the body's receptors? (3 marks)
- d. A person who drinks large quantities of alcohol shows the following symptoms as the blood alcohol level increases: slurred speech, inability to walk in a straight line and finally difficulty of breathing.
Name **TWO** other parts of the brain (besides the cerebrum) that are also affected by alcohol consumption. (2 marks)

e. From the figure above comment on the difference between the brain wave pattern of a student when asleep and when studying for an exam. (1 mark)

f. The Superman star Christopher Reeve fell off his horse during a horse riding competition. Hitting the ground Reeve crushed the top two vertebrae in his neck, cutting the sensitive spinal cord underneath. In a split second he became paralyzed. Explain why. (2 marks)

Total 15 marks

2a. Explain the importance of the following adaptations of the camel:

(i) camels can close their nostrils

(ii) camels excrete concentrated urine and dry faeces. (2 marks)

b. Describe a food test you would carry out for the presence of protein in urine. (2 marks)

c. Alport Syndrome is a hereditary disease in which there is damage to the glomeruli of the kidneys. The syndrome is caused by a dominant allele (A) which is **not** sex-linked.

(i) Name **TWO** other hereditary disease that you have studied about. (2 marks)

(ii) Explain the term allele (1 mark)

d. Ann has Alport Syndrome. Her mother, Mrs. Bugeja also suffers from Alport Syndrome, however Ann's father, Mr. Bugeja, and Ann's husband, Tom, do not suffer from this condition. What are the **TWO** possible genotypes of Ann's mother (Mrs. Bugeja)? (2 marks)

e. Write the genotype of **each** of the following:

(i) Ann

(ii) Ann's father (Mr. Bugeja) (2 marks)

f. Work out the percentage chance that Ann and her husband Tom have a child suffering from Alport Syndrome.

(N.B. Your answer should include genetic diagrams). (4 marks)

Total 15 marks

3. Give a biological explanation for **each** of the following statements.

a. Deeper soils have a better chance to produce better crops. (2 marks)

b. Forests help to maintain the atmospheric balance of carbon dioxide and oxygen. (2 marks)

c. Many alien species introduced into a country by accident can become pests. (2 marks)

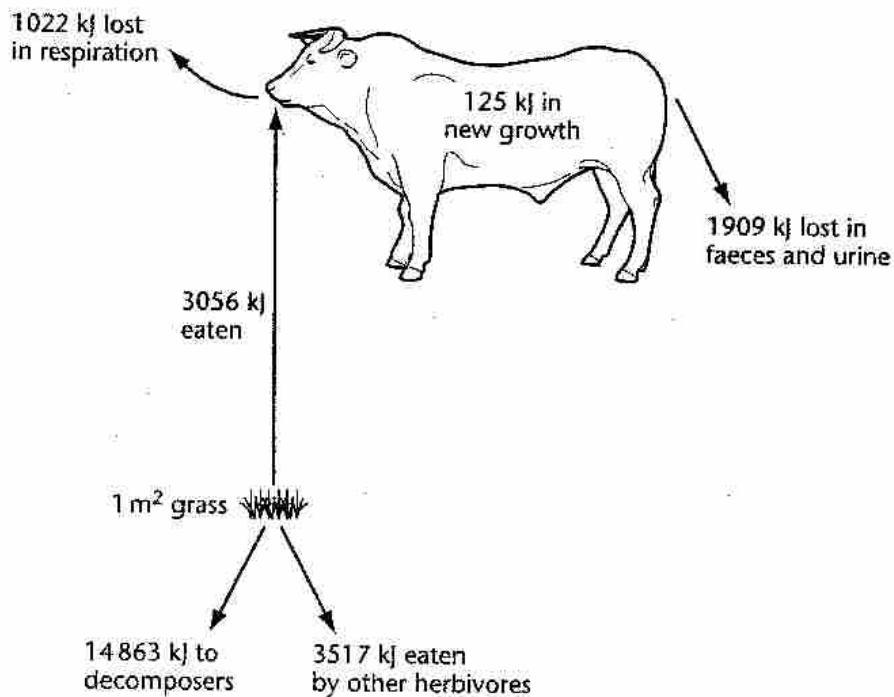
d. It doesn't matter in which direction, a seed is planted. (3 marks)

e. In drought conditions a plant produces seeds rather than grow new plantlets. (2 marks)

f. Some plants produce light and smooth pollen grains while others produce pollen grains that are sticky and with a rough surface. (4 marks)

Total 15 marks

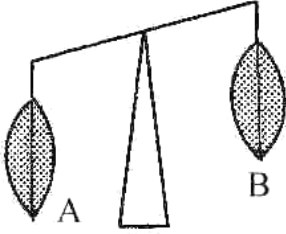
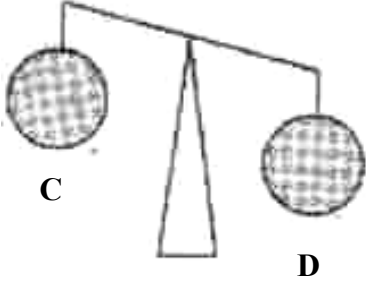
4. The following diagram shows what happens to the energy in 1m^2 of grass in a field when it is grazed by a bull. Bulls are raised for beef.



- Calculate:
 - the percentage of the energy eaten by the bull that is lost in respiration.
 - the percentage of the energy eaten by the bull that is changed into new growth. (2 marks)
- Why is respiration necessary? (2 marks)
- Explain why most of the animals reared for food are herbivores rather than carnivores. (2 marks)
- A farmer can increase the yield of beef obtained from one field by providing shelter to the bull.
 - Explain the importance of providing shelter to the bull in order to increase the yield of beef.
 - Suggest **ONE** other way which the farmer can use in order to increase the yield of beef obtained from one field. (2, 1 marks)
- Beef is an important component of a balanced diet for young children. Explain why. (2 marks)
- Explain the importance of decomposers within an ecosystem. (2 marks)
 - Explain why decomposition does not take place at very low temperatures, such as during the cold season in the Poles. (2 marks)

Total 15 marks

- 5a. Draw a diagram to show an open stoma. (3 marks)
- b. List **TWO** environmental factors that affect the opening and closing of stomata. (2 marks)
- c. In an experiment to investigate water loss in two plants, two different types of leaves were attached to simple balances as shown in the following diagram.

	at start		after several hours
Experiment 1	Privet leaf with lower surface coated with Vaseline	privet leaf with upper surface coated with Vaseline	
Experiment 2	Waterlily leaf with lower surface coated with Vaseline	waterlily leaf with upper surface coated with Vaseline	

Which leaf lost most water:

- (i) in experiment 1?
 (ii) in experiment 2?

(1, 1 mark)

d. On which side of the leaf would you expect the highest number of stomata in:

- (i) the privet leaf?
 (ii) the waterlily leaf?

Give reasons for your answers.

(4 marks)

e. Water from the soil enters the root hair cells by osmosis. The root hair cell is a specialised cell. Name **TWO** other specialised cells and explain how the structure of **each** is adapted to the function.

(2, 2 marks)

Total 15 marks