JUNIOR LYCEUM ANNUAL EXAMINATIONS 2008
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**	**1**	**2**	**3**	**4**	**5**	
Max mark	5	9	7	9	8	10	7	15	15	15	15	15	
Actual mark													**TOTAL MARK**

85% Theory Paper	**15% Practical**	**100% Final Score**

Section A
Answer all questions in this Section.

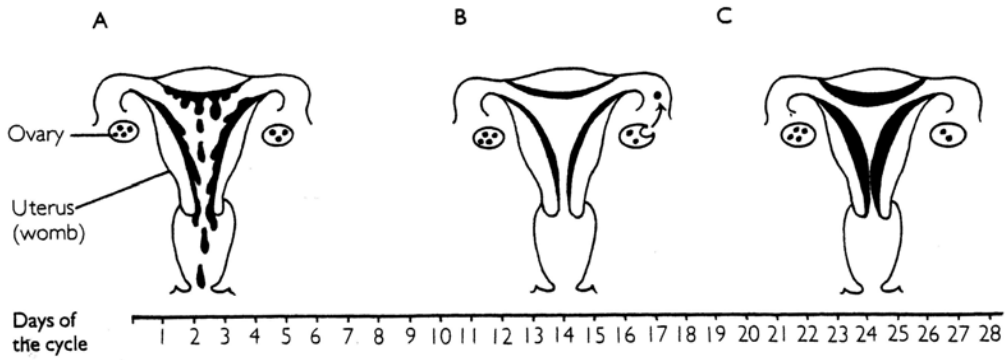
1. The hermit crab and the sea anemone are two organisms that have a symbiotic relationship.

a. List the phylum of each animal:
   (i) the hermit crab _____
   (ii) the sea anemone. _____
   (1, 1 mark)

b. Explain how the hermit crab benefits from the symbiotic relationship with the sea anemone.
   _____ (1 mark)

c. Name TWO other organisms involved in a symbiotic relationship.
   _____
   _____ (2 marks)
   Total 5 marks

2. The following three diagrams show events in the female reproductive system during the menstrual cycle.



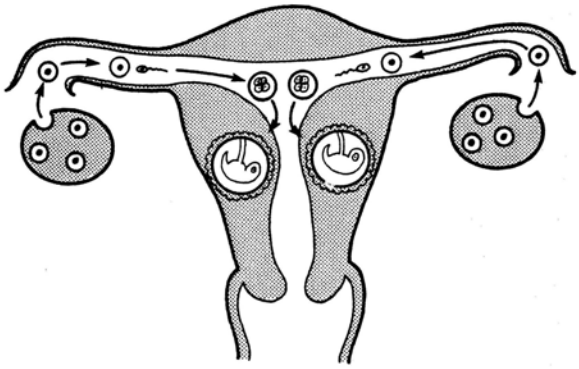
a. Name the process taking place in:
   (i) A _____
   (ii) B _____ (1, 1 mark)

b. Describe and explain the biological importance of the process shown in diagram C.

_____

_____ (2 marks)

c. The following diagram shows the formation of non-identical (fraternal) twins.



On the diagram, label the
(i) fallopian tube
(ii) cervix
(iii) ovary. (1, 1, 1 mark)

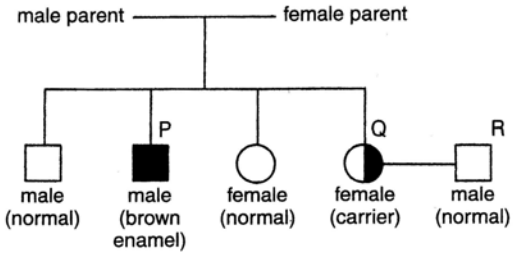
d. List TWO ways in which the formation of identical twins would be different from that of non-identical (fraternal) twins.

_____

_____ (2 marks)

Total 9 marks

3. In humans the type of tooth enamel is a sex-linked characteristic. Brown tooth enamel (e) is recessive to normal tooth enamel (E).



a. Write the genotype of
(i) Q _____
(ii) R _____ (1, 1 mark)

b. Work out the probability of a child from persons Q and R being a girl who is a carrier for the trait.

(3 marks)

c. A girl has brown tooth enamel. Write down the possible genotype of her female parent and of her male parent.

Female parent: _____

Male parent: _____ (2 marks)

Total 7 marks

4a. (i) Where is the human heart located? _____

(ii) How many times would blood from a body organ pass through the heart before reaching the same body organ again?

_____ (1, 1 mark)

b. (i) Name TWO blood vessels that have semi-lunar valves.

_____

_____

(ii) Patients with leaky heart valves are short of breath, always tired and lacking energy. Explain.

_____

_____

_____ (2, 3 marks)

c. Why is the wall of an artery thicker than the wall of a vein?

_____

_____

_____ (2 marks)

Total 9 marks

5. In Africa mammals called jackals are quite common. Jackals hunt in packs to catch their prey that include small herbivores such as Spring boks and Dik-diks. Jackals also eat larger herbivores such as Kudu that have been killed by larger predators such as Lions.

a. Name the TWO carnivores mentioned in the passage above.

_____ (2 marks)

b. Suggest ONE reason why jackals survive better when they hunt in packs.

_____ (1 mark)

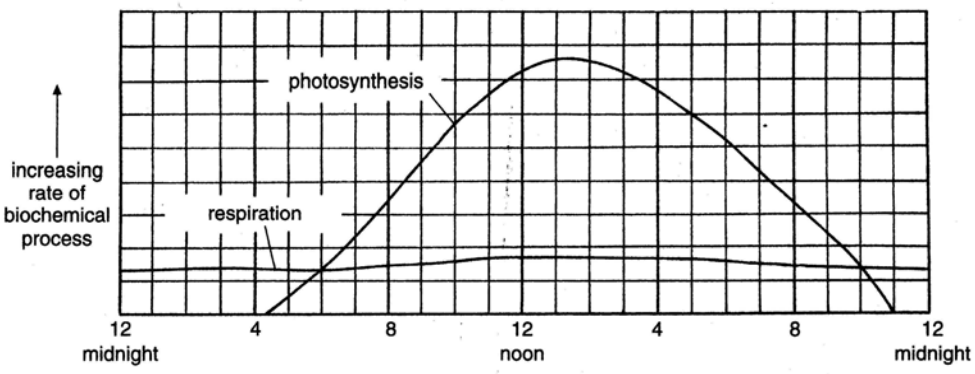
c. Some farmers in South Africa found that a number of their sheep were being killed by jackals, while feeding on grass. Jackals always kill sheep by attacking their necks. So a plastic collar was designed to fit into and cover the sheep's neck. None of the sheep fitted with these plastic collars were killed by the jackals. Suggest ONE reason why although none of the sheep were killed, the number of jackals did not decrease.

_____ (1 mark)

d. In the space below construct a food web to show the relationship between **all** the organisms mentioned in this question.

(4 marks)
Total 8 marks

6. The following diagram shows the rate of photosynthesis and respiration of a single plant during a period of 24 hours in summer. The plant is watered regularly.



a. At what time did the plant reach its compensation point in the **evening**?

_____ (1 mark)

b. Predict how your answer to 'a' would have differed if the graph had been drawn for the same plant in winter.

_____ (1 mark)

c. Suggest ONE limiting factor to the process of photosynthesis.

(i) at noon _____

(ii) at 8pm. _____ (1, 1 mark)

d. Plants present on the floor of deciduous forests produce their flowers and seed early in the year. Explain.

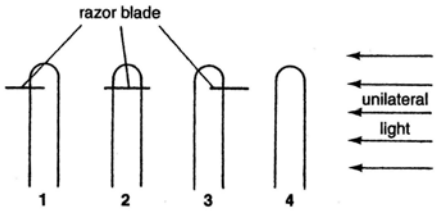
_____

_____ (2 marks)

e. In the space below draw a diagram to show the inside of a broad bean seed. In your diagram use the correct terms to label the
   (i) new shoot
   (ii) new root
   (iii) seedcoat
   (iv) store of food.

(4 marks)
Total 10 marks

7. The following diagram shows four shoot tips as set up at the start of an experiment.



a. (i) Write the numbers of the TWO shoot tips that will bend towards the light source.

_____

(ii) Suggest how the response of a shoot to light is important for successful growth of a seedling.

_____

_____ (2, 2 marks)

b. (i) Write the term that describes the growth of a shoot towards light.

_____ (1 mark)

(ii) Write the name of the plant growth substance responsible for the growth of the shoot towards a light source.

_____ (1 mark)

(iii) In which part of the shoot is the substance you name in b'ii' produced?

_____ (1 mark)
Total 7 marks

Section B

Answer question 1 from this section and choose two other questions. Answer the questions of Section B on a foolscap.

1. **Antibiotics**

Antibiotics are chemicals produced by micro-organisms (mainly bacteria and fungi), which at low concentrations have the ability to inhibit or destroy disease-causing organisms. The first antibiotic was Penicillin. Penicillin stops the action of enzymes that are involved in the formation of the bacterial cell wall. Many bacteria that were once susceptible to antibiotics have become resistant due to random mutations. This is the case with penicillin-resistant bacteria which are able to synthesise the enzyme penicillinase. This enzyme is able to break down the antibiotic. Repeated exposure to antibiotics has led to more bacteria surviving and passing on resistant genes.

a. Define the terms
   (i) gene
   (ii) mutation
   (iii) enzyme. (1, 1, 1 mark)

b. *Bacillus subtilis* is a bacterium commonly used in laboratory investigations. Draw an outline of the shape of this bacterium. (1 mark)

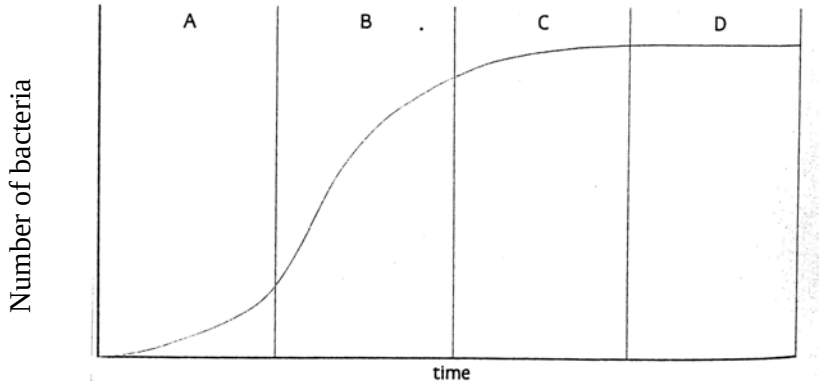
c. Explain why oxygen is necessary for the growth of micro-organisms like bacteria. (2 marks)

d. List TWO body natural defence mechanisms against micro-organisms. (2 marks)

e. Explain how the lack of the cell wall formation affects the bacterium. (1 mark)

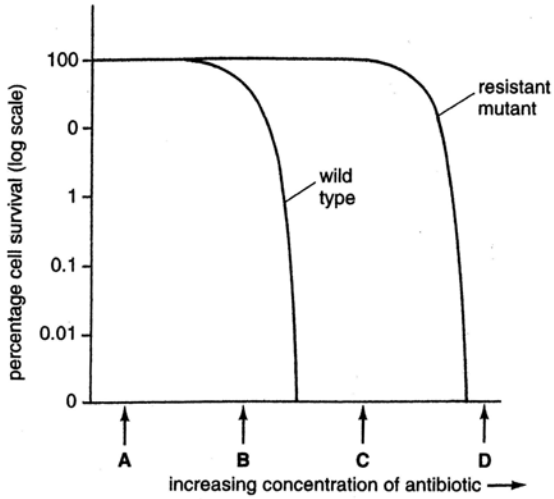
f. Explain why the inappropriate and widespread use of antibiotics should be avoided. (1 mark)

g. The following graph shows the four main phases of the growth of bacteria.



   (i) Explain why the bacteria population increases rapidly in phase B.
   (ii) Describe what happens to the bacteria population in phase D. Give ONE reason for your answer. (1, 2 marks)

h. The following graph shows the effect of an antibiotic on two strains (types) of a species of bacterium.



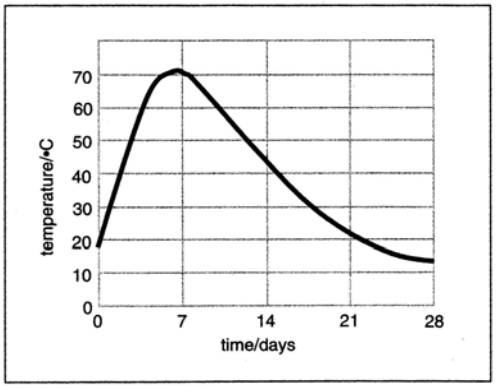
(i) Which concentration of antibiotic **least** affects neither strain of bacterium?
(ii) Explain why it is advisable to use concentration D of the antibiotic. (1, 1 mark)

Total 15 marks

2. A group of biology students observed the characteristics of ferns, mosses, horsetails, liverworts and trees such as firs and pines in a garden.

a. From the plants listed above name the:
(i) pteridophytes
(ii) bryophytes
(iii) gymnosperms. (2, 2, 2 marks)

b. The students discussed the benefits of having a compost heap in a corner of the garden. The following diagram shows the temperature changes that occurred in the middle of the compost heap over a month.



Explain the changes in temperature. (2 marks)

c. Give ONE main use of the compost heap. (1 mark)

d. Explain why it is suggested that
(i) lime is added to the compost heap.
(ii) the compost heap is kept moist. (1, 1 mark)

e. The students have placed old cabbage stalks in the compost heap. The teacher advised them to break the cabbage stalks into small pieces before they add them to the compost heap. Explain why.

(2 marks)

f. List TWO items that can be added to the compost heap. (2 marks)

Total 15 marks

3. The following diagram shows the creosote bush that grows in deserts in North America. It has small (0.5 – 1.5cm) pointed, yellow-green leaves which close their stomata during the day and open them at night. Some of these waxy leaves may be lost during an extreme drought.

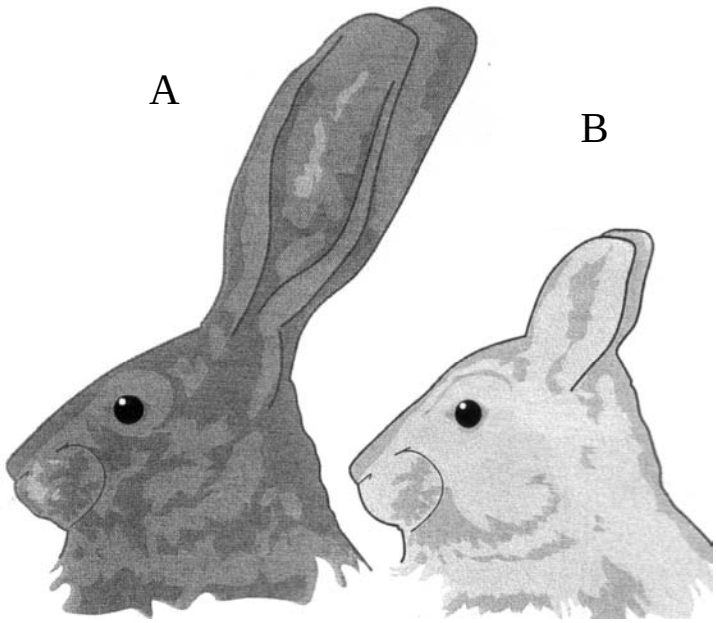
a. The creosote bush has several characteristics that help it to survive in dry desert regions. One of these adaptations is that the stomata close during the day and open at night.
   (i) Explain the benefit of this adaptation.
   (ii) Explain how a stomatal pore opens. (2, 2 marks)

b. From the description of the creosote bush above, list TWO other adaptations of the plant to survive in the desert. (2 marks)

c. The leaves of the creosote bush contain a resin that makes the leaves taste unpleasant. What is the benefit of this? (1 mark)

d. Give a biological explanation for each of the following:
   (i) Many desert animals have a long loop of Henle in their kidneys.
   (ii) Many desert mammals tend to be quite small and with relatively little fur.
   (iii) Mammals like seals have an extra thick layer of fat built up under their skin called blubber.
   (2, 2, 2 marks)

e. Which of the following rabbits would you expect to live in extremely cold regions like the Arctic? Give a reason for your answer. (2 marks)



Total 15 marks

4. The term anabolic steroids refers to male sex hormones and their derivatives produced pharmaceutically. When taken into the body as pills or by injection, these hormones increase the muscle mass and strength of people who exercise intensively and consume a high protein diet.

a. (i) Define the term hormone.
(ii) Name the male sex hormone. (2, 1 marks)

b. (i) List TWO food sources important in high protein diet.
(ii) List TWO functions of proteins in the human body. (2, 2 marks)

c. Consumption of anabolic steroids in women brings about masculinisation. Name TWO masculine features that women taking anabolic steroids would develop. (2 marks)

d. The oral contraceptive pill normally contains synthetic progesterone sometimes combined with synthetic oestrogen.
Explain the effect of these two hormones present in the oral contraceptive pill on:
(i) the secretion of FSH (follicle-simulating hormone)
(ii) ovulation. (1, 1 mark)

e. Compare the production of progesterone in a pregnant female with that in a non-pregnant female exactly after the menstrual cycle. (2 marks)

f. (i) The cervical mucus secreted in the vagina during the fertile period is thin and watery. Explain.
(ii) Name ONE other physical change that occurs during the fertile period in a female.
(1, 1 mark)

Total 15 marks

5. Give a biological explanation for each of the following statements:

a. People who do not make much gastric juice are more likely to suffer from food poisoning.

b. Nutritionists stress the importance of milk in the diet of children.

c. An old-fashioned way of killing slugs in the garden was to sprinkle salt on them.

d. Some components of blood increase in concentration during infections.

e. Two brothers are usually very different from each other.

f. Some animals are well camouflaged.

(3, 2, 2, 3, 3, 2 marks)

Total 15 marks