

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2005
EDUCATIONAL ASSESSMENT UNIT- EDUCATION DIVISION

BIOLOGY- FORM IV
 TIME: 1H 30 MIN

NAME: _____

CLASS: _____

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

85% Theory Paper	15% Practical	100% Final Score

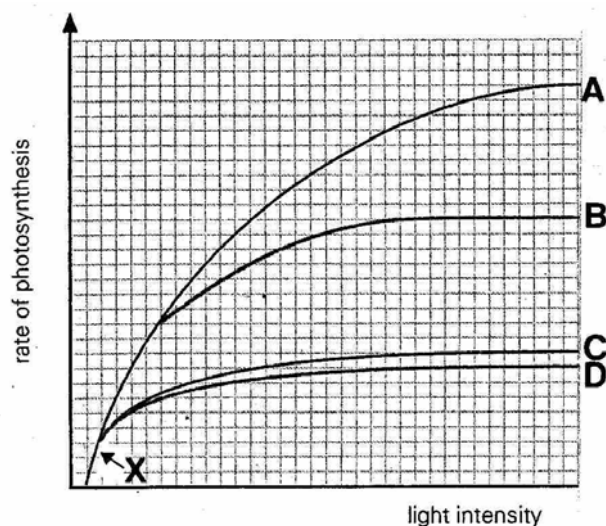
Section A – Answer ALL questions in this section.

1. Name the substance which best fits **each** of the following descriptions:

- a. produced by the stomach to provide the correct p.H. for the activation of pepsin _____
- b. the carbohydrate present in plant cell walls _____
- c. an ‘energy-rich’ compound produced in mitochondria _____
- d. the gas produced in the fermentation of sugar by yeast _____
- e. the poisonous addictive drug in cigarette smoke _____
- f. the mineral necessary for the formation of chlorophyll _____
- g. the mineral needed to prevent anaemia _____
- h. the material that prevents the collapse of the trachea _____

(Total 8 marks)

2. The following graph shows the effect of environmental factors on the rate of photosynthesis.



a. Which factor is limiting the rate of photosynthesis at point X? Give a reason for your answer.

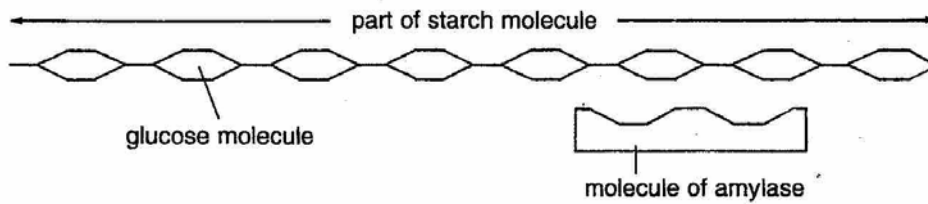
_____ (2 marks)

b. Use the letters A to D to match **each** of the set of environmental factors listed in the Table below.

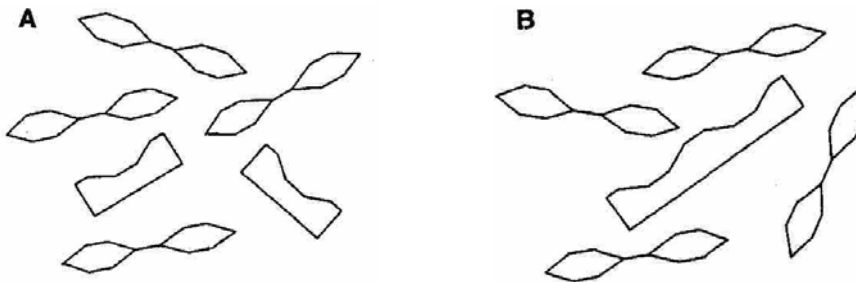
Environmental factors	Letter
0.04% CO ₂ at 25°C	
0.04% CO ₂ at 15°C	
0.14% CO ₂ at 25°C	
0.14% CO ₂ at 15°C	

(4 marks)
(Total 6 marks)

3. The following diagram shows a molecule of starch and a molecule of the enzyme amylase. Amylase digests starch to maltose. Maltose is composed of two molecules of glucose.



- a. Maltose, starch and glucose are all carbohydrates. Maltose is a disaccharide. What type of carbohydrate is:
- (i) glucose? _____
- (ii) starch? _____ (2 marks)
- b. (i) Define the term enzyme. _____ (1 mark)
- (ii) Give **ONE** site in the human body where amylase is produced. _____ (1 mark)
- c. Two biology students drew two diagrams to represent the molecules at the end of the reaction as shown below.



Identify the correct diagram which represents the molecules at the end of the enzyme reaction, and give a reason for your answer.

 _____ (2 marks)

- d. Suggest a food test that you would carry out to test for the presence of starch.

 _____ (2 marks)
(Total 8 marks)

4. An investigation was carried out to compare the maximum oxygen intake of males from different age brackets. Some of the males taking part in the investigation were athletes while some others were not. The results obtained were sorted in two groups, as shown in the Table below.

Age (years)	Maximum Oxygen Intake of Group A (litre/min)	Maximum Oxygen Intake of Group B (litre/min)
20-29	4.8	3.2
30-39	4.6	2.9
40-49	4.0	2.7

- a. Suggest which group included the athletes. Give a reason for your answer.
- _____
- _____ (1, 2 marks)
- b. What difference in the level of lactic acid formed after prolonged exercise, would you expect between an athlete and a non-athlete?
- _____
- _____ (2 marks)
- c. Name the process which produces lactic acid in the muscles after prolonged exercise.
- _____ (1 mark)
- d. After prolonged exercise, breathing becomes deeper and more rapid. Explain why this takes place.
- _____
- _____ (2 marks)
- (Total 8 marks)**

5. The small intestine is structurally suited to the function of food absorption

- a. Name: (i) the part of the small intestine where most of the digested food is absorbed.
- _____ (1 mark)
- (ii) the process that moves partially digested food along the small intestine.
- _____ (1 mark)
- b. The small intestine has a large surface area over which diffusion and active transport can take place. List **TWO** features of the small intestine that serve to increase the surface area.
- _____
- _____ (2 marks)
- c. Blood rich in amino acids and glucose from the small intestine is transported to the liver. Explain what happens to amino acids and glucose once they reach the liver.
- _____
- _____
- _____ (2, 2 marks)
- (Total 8 marks)**

6. During an outdoor activity on a cold winter day, a child felt very cold, looked pale and began to shiver. The mother of the child suggested to the child to curl up in a ball-shape position as shown in the following diagram.



- a. How does shivering help to keep the body warm?

(2 marks)

- b. Explain why the mother suggested to the child to take the ball-shape position.

(2 marks)

- c. Explain why the child looked pale.

(2 marks)

- d. What changes take place in the hair and erector muscle, in cold weather?

(2 marks)

- e. How can subcutaneous fat, help in temperature control?

(1 mark)
(Total 9 marks)

7. A group of biology students carried out a project about the adaptations of the beaver and the kangaroo rat. The beaver lives in an aquatic habitat, while the kangaroo rat lives in deserts. The students found out that the length of the kidney tubules in the beaver is short, while in the kangaroo rat the kidney tubules are very long.

- a. Explain why the length of the kidney tubules in the kangaroo rat is much longer than that in the beaver.

(2 marks)

- b. (i) Name the main waste substance in urine.

(1 mark)

(iii) What path does urine take from the time it is produced by the kidneys, until it is expelled to the outside?

_____ (3 marks)

c. Explain why urine in a healthy person does not contain

(i) protein

_____ (1 mark)

(ii) glucose

_____ (1 mark)

(Total 8 marks)

Section B – Answer question ONE and any TWO other questions.

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

A lighted cigarette produces a number of substances that are harmful. Some of these chemicals irritate the membrane lining of the upper respiratory tract, and stop the cilia from beating. Extra mucus forms in the trachea and bronchi causing ‘smoker’s cough’. Smoking weakens the walls of the alveoli and repeated coughing can destroy the alveoli.

a. What is the role of:

(i) mucus

(ii) cilia

in the upper respiratory tract?

(1, 2 marks)

b. Name:

(i) the chemical that irritates the membrane lining of the upper respiratory tract;

(ii) the dangerous gas produced in cigarette smoke.

(1, 1 mark)

c. What is the effect of the gas you mention in b(ii)?

(2 marks)

d. Name the condition resulting from destroyed alveoli and give its effects.

(4 marks)

e. Children of smoking parents are likely to suffer from bronchitis in the first two years of life. Explain.

(2 marks)

f. Life insurance companies ask their clients to state whether they smoke. Why is such information important to insurance companies?

(2 marks)

(Total 15 marks)

2. Human beings have a double circulation of blood.
- Give **TWO** reasons why a double circulation is essential. (4 marks)
 - Blood flows through the heart in one direction only. Explain how this is brought about. (2 marks)
 - Name the tissue largely present in the heart and explain why it is considered as a specialised tissue. (2 marks)
 - Normally when you bleed from a cut, the blood soon hardens and a clot forms.
 - Name the blood cell responsible for blood clotting and state where it is produced in the body. (1, 1 mark)
 - Give **TWO** reasons why blood clotting is important. (2 marks)
 - A nurse feels the pulse of a patient.
 - What is the pulse-rate indicating?
 - Give **ONE** place where a nurse can feel a patient's pulse. (2, 1 marks)
- (Total 15 marks)**

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

- A nutritionist suggested to a vegetarian to include soya beans in the diet. (2 marks)
 - Long-distance swimmers are advised to eat a chocolate bar before swimming. (3 marks)
 - Wholemeal bread is considered healthier than white bread. (3 marks)
 - Nutrition guidelines suggest that fat should account for no more than 30% of the daily calories. (4 marks)
 - Parents are often advised to give their children a glass of milk instead of a packet of fruit juice. (3 marks)
- (Total 15 marks)**

- 4a. The smoke pollution caused by bonfires leads to reduced photosynthesis and reduced crop yield. State **TWO** effects of smoke pollution that result in reduced photosynthesis. (2 marks)
- One of the best natural places for photosynthesis is the tropical rain forest. Give **TWO** conditions present in a tropical rain forest environment that favour the process of photosynthesis. (2 marks)
 - Give **THREE** reasons why only a small percentage of sunlight energy is converted to chemical energy through photosynthesis. (3 marks)
 - Explain why in a food chain there are fewer secondary consumers than primary consumers. (2 marks)
 - Ecological pyramids represent relationships between successive trophic levels.
 - Distinguish between a *pyramid of biomass* and a *pyramid of numbers*. (4 marks)
 - Give **TWO** situations when an inverted pyramid of numbers can occur. (2 marks)
- (Total 15 marks)**

- 5a. Draw a well-labelled diagram of a vertical section through an incisor. (5 marks)
- b. (i) What is plaque?
(ii) What are the effects of plaque? (1, 2 marks)
- c. Herbivores and carnivores have the dentition adapted for their diet.
(i) Distinguish between herbivores and carnivores. (2 marks)
(ii) The teeth of herbivores grow continuously throughout the herbivore's life.
Why is this essential? (1 mark)
(iii) Explain why the canines of carnivores are long and pointed. (2 marks)
- d. In a herbivore the upper and lower jaw fit together very loosely while in a carnivore the upper and lower fit together so closely that they cannot be dislocated.
Explain the importance of this jaw structure in:
(i) the herbivore
(ii) the carnivore (1, 1 mark)
- (Total 15 marks)**