

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2007
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	8	1	2	3	4	5	
Max mark	5	5	5	6	6	9	10	9	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.

This section carries 55 marks.

1. Name:

- a. the liquid part of blood _____
- b. the tissue fluid present in lymphatic vessels _____
- c. the fluid present between the lungs and the ribs _____
- d. the sticky liquid covering the lining of air passages _____
- e. the gas produced as a waste product of respiration. _____

(1, 1, 1, 1, 1 mark)

Total 5 marks

2a. Digestion starts in the mouth. How does the mouth help in the physical (mechanical) digestion of food?

_____ (1 mark)

b. Draw a diagram to show the process of peristalsis in the gullet/oesophagus.

(2 marks)

c. What happens to:

- (i) digested food _____
- (ii) undigested matter? _____

(1, 1 mark)

Total 5 marks

3a. In some parts of the world, plants produce biomass very quickly, taking up carbon dioxide from the air and converting it into plant material by photosynthesis. For example sugar cane grows very rapidly and has a juice that is very high in carbohydrates particularly sucrose. Similarly maize (also called sweet corn) is another fast grower. When the starch in the maize kernels is treated with the enzyme amylase it is finally broken down into glucose.

From the information given above name:

- (i) ONE monosaccharide _____
- (ii) ONE disaccharide _____
- (iii) ONE polysaccharide. _____

(1, 1, 1 mark)

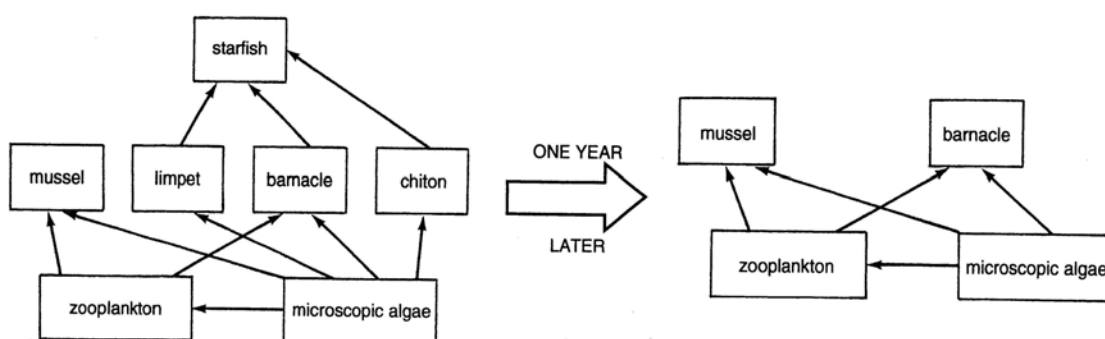
- b. When the sugar-rich products from maize are fermented anaerobically, the sugars are broken down giving ethanol and water.
- (i) Name the micro-organism necessary to bring about the fermentation process.

- (ii) The ethanol produced is extracted from the products of fermentation and it can be used in motor vehicles as a fuel. Ethanol is in many ways an ideal fuel. Suggest ONE reason for this.

(1, 1 mark)

Total 5 marks

4. The following diagram shows the effect of removing the dominant predator, starfish, from a marine food web.



- a. From the first food web write a food chain including four trophic levels.

(2 marks)

- b. (i) Which TWO prey animals have disappeared from the food web after one year?

- (ii) Explain why the two prey animals you mentioned in b(i) have disappeared.

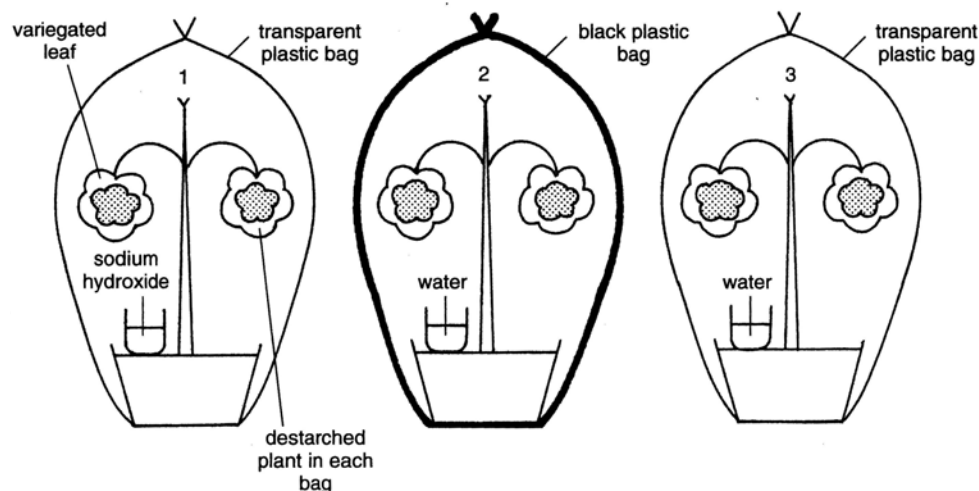
(2, 1 mark)

- c. Explain why the presence of the starfish is beneficial to the prey organisms you name in b(i).

_____ (1 mark)

Total 6 marks

5. The following diagram shows the experiments used to investigate the factors necessary for photosynthesis using a potted plant with variegated leaves.



- a. (i) Explain why the potted plant in each transparent bag is destarched before starting the experiment.

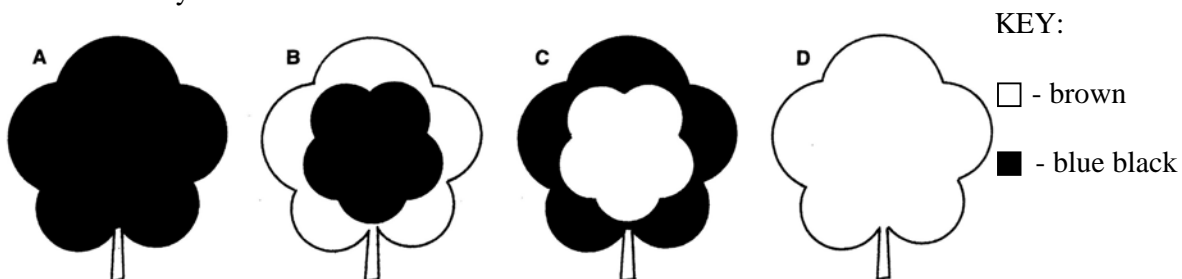
(ii) How is the plant destarched?

(1, 1 mark)

- b. The variegated leaves in each transparent bag were tested with iodine solution after two days. Why is the test with iodine solution used?

(1 mark)

- c. The following leaves show the results obtained when the iodine solution test was carried out after two days.



Write the letter showing a leaf tested with iodine solution

- (i) from plant 1 _____
(ii) from plant 2 _____
(iii) from plant 3. _____

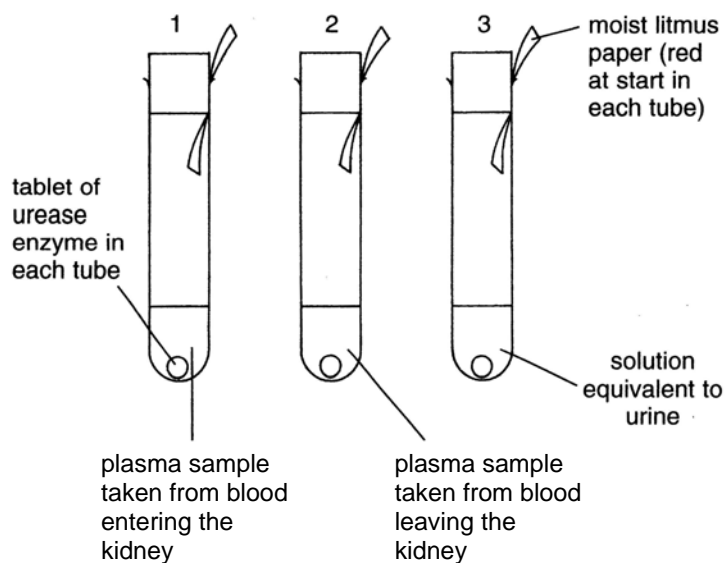
(1, 1, 1 mark)

Total 6 marks

6. Urease is an enzyme which breaks down urea as shown in the following reaction.



Ammonia is a gas which turns red litmus into blue. The following diagram shows an experimental setup used by a biology student to investigate the chemical composition of three different liquids.



- a. In which TWO test-tubes would the red litmus paper turn blue? Give a reason for your answer.

 _____ (3 marks)

- b. (i) From which type of food is urea produced?

 (ii) Which is the site of production of **urea**?

(1, 1 mark)

- c. Name the blood vessel taking blood

(i) to the kidney _____

(ii) away from the kidney. _____

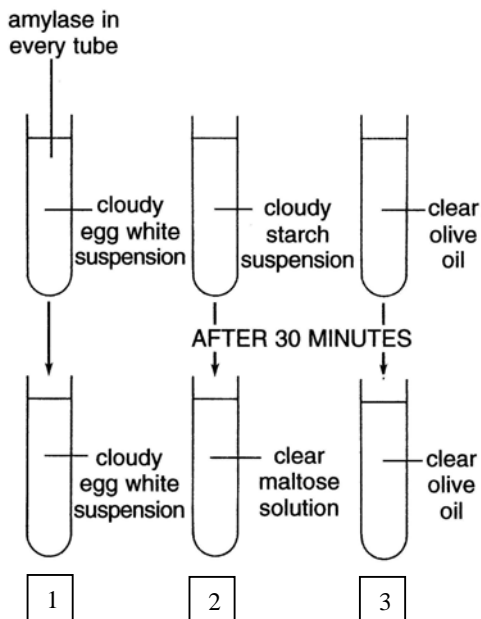
(1, 1 mark)

- d. An amount of water is always lost in urine.
 Name TWO other ways how water is lost from the body.

 _____ (2 marks)

Total 9 marks

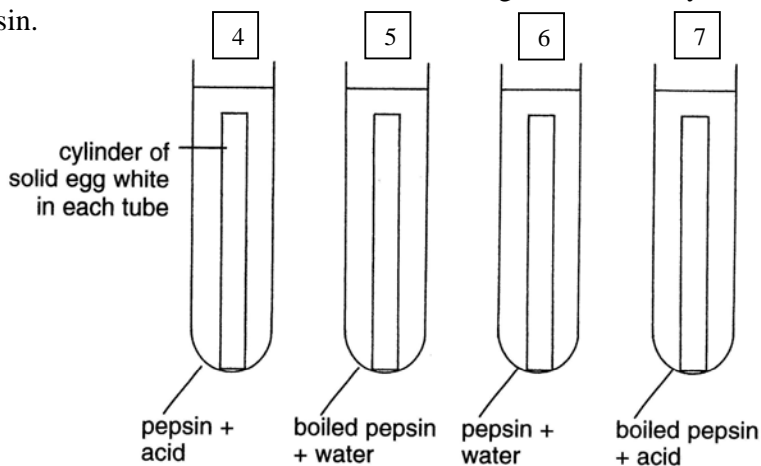
7. A biology teacher set up the following experiment to investigate the effect of the enzyme amylase. All test-tubes were kept at the same temperature in a water bath and their contents were maintained at a p.H.7



- a. (i) Which variable factor is being investigated in this experiment?
-
- (ii) In which test-tube would you expect a positive result when testing for the presence of reducing sugars using Benedict's solution?
-

(1, 1 mark)

- b. Albumin is a protein found in egg white. The biology teacher carried out other experiments to investigate the effect of acid and the effect of boiling on the activity of the protein digesting enzyme pepsin.



Which TWO test-tubes should be compared at the end of the experiment to draw a conclusion about:

- (i) the effect of acid on pepsin's activity
-
- (ii) the effect of temperature on pepsin's activity?
-

(2, 2 marks)

- c. In which test-tube would you expect the enzyme-catalysed reaction to take place?

_____ (1 mark)

- d. Name:

(i) the site where pepsin is produced

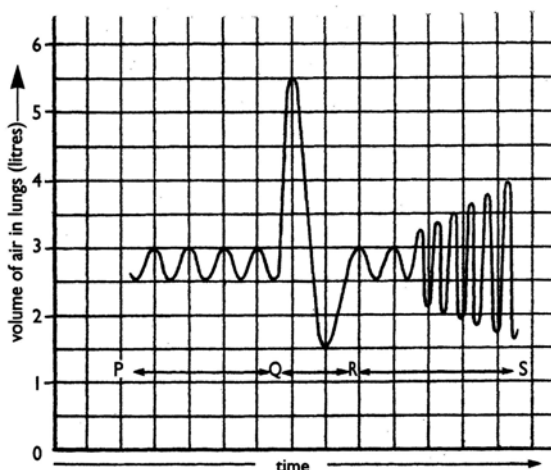
(ii) the product of the reaction catalysed by pepsin

(iii) ONE other protein digesting enzyme.

(1, 1, 1 mark)

Total 10 marks

8. The volume of air entering and leaving the lungs can be measured by an apparatus called a Spiro meter, in which **a pen moves up and down** on a revolving drum making a trace **as the person breathes in and out**. The following graph shows such a trace.



- a. (i) What is the volume of air (in litres) inhaled at **each** breath during the period P to Q?

(ii) If the breathing rate is 10 breaths per minute, what is the volume of air breathed in during the period P to Q?

(iii) What is the volume of air (in litres) exhaled during the period Q to R?

(1, 1, 1 mark)

- b. Underline ONE activity from the following that could result in the trace recorded during the period R to S on the graph.

A: nodding off to sleep

B: beginning an exercise programme

C: coming to rest after exercise.

(1 mark)

c. Describe the changes taking place in **each** of the following during **inspiration**:

- (i) ribcage _____
- (ii) diaphragm _____
- (iii) external intercostal muscles _____
- (iv) volume of thorax _____
- (v) pressure inside thorax. _____

(1, 1, 1, 1, 1 mark)

Total 9 marks

Section B

Answer question 1 and choose any TWO other questions.

Write your answers on a foolscap.

1. Hypothermia

Hypothermia is defined as a drop in the core body temperature to 35°C or below. The condition is very common and regularly seen in elderly people or people who have been immersed in cold water such as those caught in shipwrecks. In mild hypothermia there is uncontrolled intense shivering, the movements become clumsy causing pain and discomfort. One of the body's first responses to cold temperatures is vasoconstriction and one of the first measures used with a hypothermia victim is to wrap the victim in a blanket.

- a. What is the normal core body temperature of humans? (1 mark)
- b. Explain why a person suffering from mild hypothermia shivers. (1 mark)
- c. What is vasoconstriction and how does it help a person suffering from mild hypothermia? (2 marks)
- d. Suggest ONE reason why the elderly are more prone to suffer from hypothermia. (1 mark)
- e. A cold windy day feels a lot worse than a cold still day even when the actual air temperature is the same. Explain. (1 mark)
- f. (i) Explain the benefit of wrapping a person suffering from mild hypothermia in a blanket. (2 marks)
(ii) Describe how the skin of a patient suffering from mild hypothermia would feel and look. (2 marks)
- g. A first aider who sees a patient suffering from mild hypothermia would measure the patient's pulse.
 - (i) What is the pulse rate indicating?
 - (ii) Suggest ONE way of measuring the patient's pulse. (1, 1 mark)

- h. Alcohol gives a person a warm 'glow' making the skin and face look rosy, because it causes vasodilation. Explain why a person suffering from hypothermia should not be given an alcoholic drink. (1 mark)
- i. Compare the surface area to volume ratio of a baby with that of an adult human being and state who would suffer more rapid heat loss if exposed to a very cold environment. (2 marks)

Total 15 marks

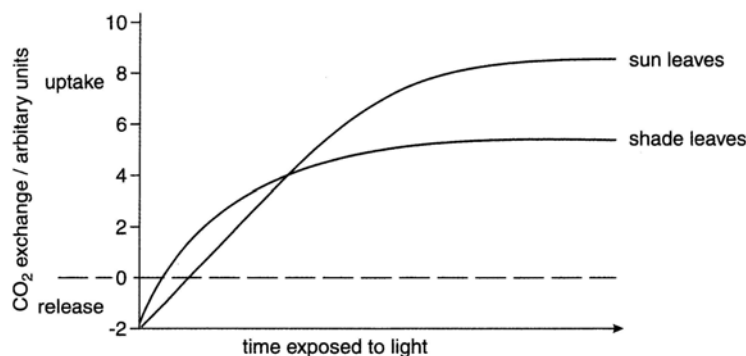
- 2. Fish, fruit and olive oil are three main components of the traditional diet of people living in Mediterranean countries such as Malta, Italy and Greece. However in recent years, local people have developed a taste for hamburgers, chips and butter which have become readily available in takeaway shops. As a result the incidence of heart disease in these countries have increased, in the last twenty years.
 - a. Explain why fish and fruit are two important components of a balanced diet. (2 marks)
 - b. Suggest how the change in diet has brought about an increase in heart disease. (3 marks)
 - c. Suggest TWO other risk factors (besides a change in diet) that can also contribute to heart disease. (2 marks)
 - d. The heart is divided into four chambers: two atria and two ventricles. The right atrium receives deoxygenated blood from all parts of the body through the vena cava. List the route taken by the deoxygenated blood after entering the right atrium until it is pumped out of the heart via the aorta. (4 marks)
 - e. (i) Compare the thickness of the muscular layer in the wall of an artery with that in the wall of a vein.
(ii) Give a reason for the difference in the thickness of the muscle layer of the two blood vessels you described in e(i). (2, 2 marks)

Total 15 marks

- 3. Give a biological explanation for **each** of the following statements.
 - a. The surfaces where diffusion takes place are usually folded. (2 marks)
 - b. Most of the limestone statues found in places with heavy traffic need to be restored because of the erosion of various parts. (3 marks)
 - c. There are almost no cases of rickets in tropical countries. (2 marks)
 - d. Arm and leg muscles can feel painful following a long period of swimming. (2 marks)
 - e. People suffering from emphysema find it difficult to walk up hills or to climb stairs. (3 marks)
 - f. The heart beat speeds up during exercise. (3 marks)

Total 15 marks

4. The following graph shows the effect of light intensity on carbon dioxide exchange by plants adapted to live in the shade and plants adapted to live in direct sunlight.



- a. Use the graph to explain the uptake of carbon dioxide by the two different types of leaves. (4 marks)
- b. (i) Write the term that describes the time at which the rate of photosynthesis equals the rate of respiration.
(ii) Which type of leaf reaches the time you name in b(i) first? (1, 1 mark)
- c. Suggest what would happen to the curve of the sun leaves if the plant was placed in a higher carbon dioxide environment. Give a reason for your answer. (2 marks)
- d. Write TWO structural features that you would find in plants living in dry conditions. (2 marks)
- e. Explain the importance of **each** of the following leaf characteristics:
(i) the upper epidermis makes a waxy cuticle
(ii) in the palisade layer the cells are tightly packed together
(iii) there are large air spaces between the cells in the spongy layer. (3 marks)
- f. Many plants such as potatoes and strawberries are grown in open fields in soil that is covered by a sheet of black polythene (plastic). Shoots of the plants grow into the air through slits in the polythene. Suggest TWO reasons why covering the soil with black polythene increases the yield of the crop. (2 marks)

Total 15 marks

5. Describe **each** of the following processes and explain the biological importance of each:

- (i) emulsification
- (ii) production of antibodies
- (iii) sweating
- (iv) excretion
- (v) coughing
- (vi) cellular respiration.

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

Total 15 marks