

# JUNIOR LYCEUM ANNUAL EXAMINATIONS 2002

Educational Assessment Unit - Education Division

FORM 4

BIOLOGY

TIME: 1h 30min

Comment:

Name : \_\_\_\_\_ Class \_\_\_\_\_

SECTION A : This section carries **55 marks**

ANSWER **ALL** QUESTIONS IN THE SPACES PROVIDED.

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1. Explain why each of the following is needed in the human diet. Name **one** good source for each.

a. Calcium: \_\_\_\_\_  
\_\_\_\_\_ (1)

Source: \_\_\_\_\_ (1)

b. Iron : \_\_\_\_\_  
\_\_\_\_\_ (1)

Source: \_\_\_\_\_ (1)

c. Vitamin C: \_\_\_\_\_  
\_\_\_\_\_ (1)

Source: \_\_\_\_\_ (1)

(total 6 marks)

2. From every one square metre of grass it eats, a cow obtains 3000kJ of energy. It uses 150 kJ for growth, 1350kJ are lost as heat and 1500kJ are lost as faeces.

(a) What **percentage** of the energy in one square metre of grass

(i) is used in GROWTH: \_\_\_\_\_  
\_\_\_\_\_ (2)

(ii) passes through the alimentary canal and is NOT ABSORBED?  
\_\_\_\_\_ (2)

(b) What is the ultimate source of ENERGY for keeping the Cow alive?  
\_\_\_\_\_ (1)

(total 5 marks)

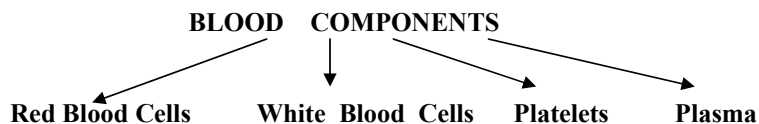
3. State if the following statements are true (T) or false (F).

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STATEMENTS	True (T) or False (F)
1. Bile breaks down fats to fatty acids and glycerol.	
2. Arteries carry blood away from the Heart at high pressure.	
3. Aerobic respiration occurs only in green plants.	
4. In a leaf, the waxy cuticle absorbs all the light energy.	
5. Producers are able to build up their own food.	

( total 5 marks)

4. The composition of Blood is shown below:



Use the blood components given above to fill in the following:

- Fights infection in a septic wound : \_\_\_\_\_ . (1)
- Largest blood cell that contains a nucleus is the \_\_\_\_\_ . (1)
- Haemoglobin is a component of \_\_\_\_\_ . (1)
- Contains about 92% water : \_\_\_\_\_ . (1)
- A network of fibrin is formed in a blood clot by \_\_\_\_\_ . (1)

(total 5 marks)

5. The table below shows the results of observations made on the breathing of a 20 year old woman.

	Volume of single inspiration in cm <sup>3</sup>	Breaths per minute
At rest, before exercise	500	12
During a strenuous exercise	1000	30

From the table calculate the total volume of air inspired per minute:

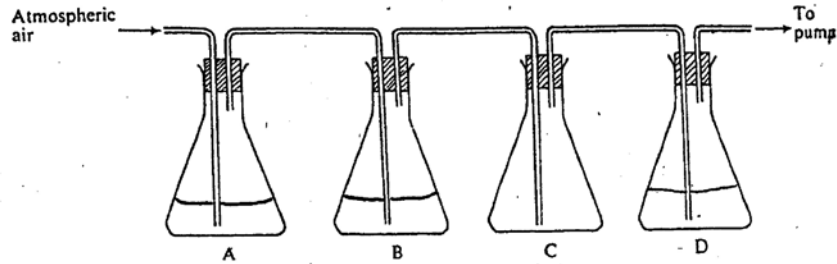
(Show your working)

- (i) At rest, before exercise : \_\_\_\_\_  
 \_\_\_\_\_ Answer: \_\_\_\_\_ (3)

- (ii) During a strenuous exercise : \_\_\_\_\_  
 \_\_\_\_\_ Answer: \_\_\_\_\_ (3)

(total 6 marks)

6. The apparatus below could be used to demonstrate that a small mammal such as a mouse releases carbon dioxide.



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- a. Name the contents of each flask:

A: \_\_\_\_\_ B: \_\_\_\_\_  
C: \_\_\_\_\_ D: \_\_\_\_\_ (4)

- b. Give a suitable control to this experiment.

\_\_\_\_\_ (1)

- c. How would you alter the original apparatus to show that a small green plant or a leafy twig releases carbon dioxide when respiring.

\_\_\_\_\_  
\_\_\_\_\_ (1)

- d. Write a balanced equation showing the process of aerobic respiration.

\_\_\_\_\_ (3)

(total 9 marks)

7. The diagram below represents the chambers of the human heart.

Complete the labelling of the chambers and delete the incorrect alternatives.

Right	
Atrium	

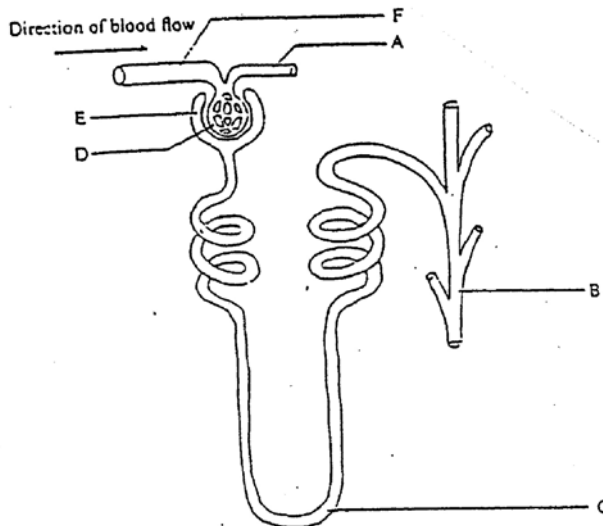
blood *collecting/pumping* chambers

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blood *collecting/pumping* chambers

deoxygenated/ oxygenated blood		deoxygenated/ oxygenated blood
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(total 7 marks)

8. The diagram below shows a mammalian kidney tubule (nephron).



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- a. Name the parts labelled A, B, C, D, E, F.

A: \_\_\_\_\_; B: \_\_\_\_\_;  
C: \_\_\_\_\_; D: \_\_\_\_\_;  
E: \_\_\_\_\_; F: \_\_\_\_\_; (6)

- b. What is the importance of the difference in diameter between tube A and tube F in the functioning on the kidney.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

- c. Name the process occurring at the region between D and E.

\_\_\_\_\_ (1)

- d. Name the fluid passing at point B \_\_\_\_\_ (1)

- e. Name two major constituents present in the fluid named in question (d):

(i) \_\_\_\_\_ (ii) \_\_\_\_\_ (2)

(total 12 marks)

**SECTION B :** This section carries 45 marks.

(Answer on the separate paper provided) .

Answer Question ONE and any other TWO questions .

**Question 1:** Read the following paragraph and then answer the set questions.

For a long time there has been a lot of argument over whether smoking really does cause harm to our health. Now, there is a lot of evidence to show what the effects of smoking are. A number of serious *diseases* have been shown to be connected with smoking and air pollution.

All human beings need to breathe in air to get oxygen. For *aerobic* respiration to occur, *alveolar gaseous exchange* must follow inhalation. Active smoking directly affects gaseous exchange. However, *passive smokers* are also in danger.

- a. What do you understand by ‘passive smokers’ ? (1)
- b. Name two diseases that are linked with smoking and write a short note about one of them . (2, 2)
- c. State two differences between aerobic and anaerobic respiration. (2)
- d. Describe, with the help of a clear labelled diagram, alveolar gaseous exchange in humans. (3)
- e. Name two characteristics of an efficient respiratory surface. (2)
- f. Describe briefly the mechanism involved during ‘breathing in’ (INHALING). (3)

(total 15 marks)

2.
  - a. Draw a transverse section through the root to show the position of the xylem and phloem. (3)
  - b. State one function (role) of:
    - (i) xylem (ii) phloem (1, 1)
  - c. Design an experiment to find out where water is transported in stems. (5)
  - d. Describe, with the help of diagrams, three structural differences between arteries and veins. (2,3)

(total 15 marks)
  
3.
  - a. What are enzymes? (2)
  - b. Name an enzyme found in the alimentary canal of humans. State where this enzyme is found and the substrate on which it acts. (1, 1, 1)
  - c. Describe briefly the chemical composition of:
    - (i) Carbohydrates (ii) Lipids (2, 2)
  - d. Describe briefly how you would test for the presence of:
    - (i) Proteins (ii) Reducing Sugar (3,3)

(total 15 marks)
  
4.
  - a. Write an equation (in words or symbols) summarising the process of photosynthesis. (3)
  - b. (i) Name two environmental factors that can affect the rate of photosynthesis.  
 (ii) Briefly explain how change in the amount of each named factor varies the rate of photosynthesis. (2, 2)
  - c. Explain why only 10% of the energy is transferred from one trophic level to another. (2)
  - d. Name one type of cell found within the leaf that can perform the process of photosynthesis. (1)
  - e. Describe an experiment to show that carbon dioxide is needed for photosynthesis to occur. (5)

(total 15 marks)
  
5.
  - a. State what is meant by: (i) 'endothermic' (homoiothermic) animals. (1)  
 (ii) 'exothermic' (poikilothermic) animals. (1)
  - b. Draw a large labelled diagram of the human skin. (4)
  - c. Describe two ways in which the human skin is adapted for temperature regulation. (2,2)
  - d. Describe an experiment you would design to prove that 'fur, feathers and other insulators are essential for certain animals to keep warm' (5)

(total 15 marks)

