

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2008
DEPARTMENT FOR QUALITY AND STANDARDS IN EDUCATION

BIOLOGY – FORM IV
TIME: 1H 30MIN

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	5	6	6	8	7	7	10	6	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.

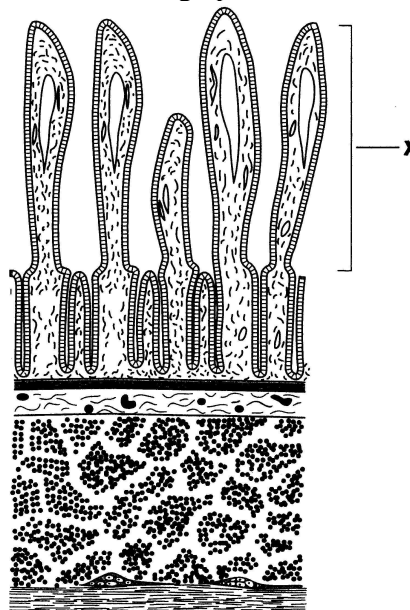
1. What passes through each of the following passages?

- a. gullet _____
- b. pancreatic duct _____
- c. trachea _____
- d. aorta _____
- e. ureter. _____

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

Total 5 marks

2. The diagram below shows a section through part of the small intestine of a mammal.



a. (i) Name Structure X. _____
(ii) What effect do the structures named in a 'i' have on the surface area of the small intestine?
_____ (1, 1 mark)

b. Name ONE structure that is present inside X that is concerned with the removal of digested food that has been absorbed. For the structure you mention name the digested food that is absorbed.

_____ (2 marks)

c. In some persons suffering from coeliac disease, the lining of the small intestine reacts with gluten proteins, causing the loss of structure X. Explain why people with coeliac disease have difficulty in gaining body mass.

_____ (2 marks)

Total 6 marks

3. When tobacco is burned in cigarettes, carbon monoxide is formed. A device called a Smokerlyzer measures the percentage of carbon monoxide gas in a person's breath. This indicates the percentage of carbon monoxide in the person's blood. Four persons tested their breath using the Smokerlyzer. They repeated the test every two hours during one day at work. The following Table shows the results obtained.

Name	Percentage of carbon monoxide in the blood			
	9am	11am	1pm	3pm
Emma	3.6	2.9	3.4	2.8
Ron	1.8	1.3	1.2	1.2
Tom	6.3	5.0	4.3	3.8
Pamela	0.5	0.3	0.3	0.3

- a. (i) From the Table above name TWO persons who have smoked tobacco before 9am.
- _____
- (ii) Suggest ONE other way (besides smoking) by which carbon monoxide could have got into the non-smokers' blood before they went to work that day.
- _____
- (iii) Explain the effect of carbon monoxide on the distribution of oxygen.
- _____
- _____

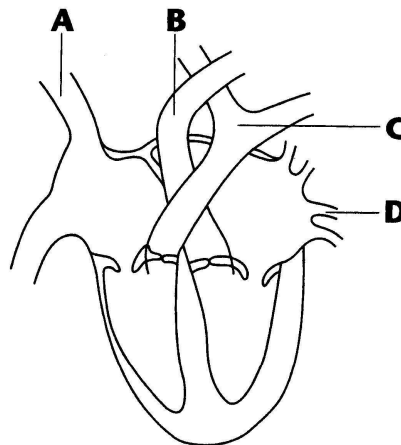
(2, 1, 2 marks)

- b. The four persons listed in the Table above were asked to run around the block. List ONE way by which you would **immediately** identify the smokers from the non-smokers.

_____ (1 mark)

Total 6 marks

4. The following diagram shows a section through the human heart.



- a. Write the letter of the blood vessel that
- (i) takes blood to the lungs _____
- (ii) gets oxygenated blood from the lungs. _____

(1, 1 mark)

- b. Is the right ventricle shown in the diagram, filling with blood or emptying? Give TWO pieces of evidence from the diagram to support your answer.

_____ (3 marks)

- c. Explain why during exercise there is an increase in the amount of blood flowing to the:
- (i) muscles

- (ii) skin.

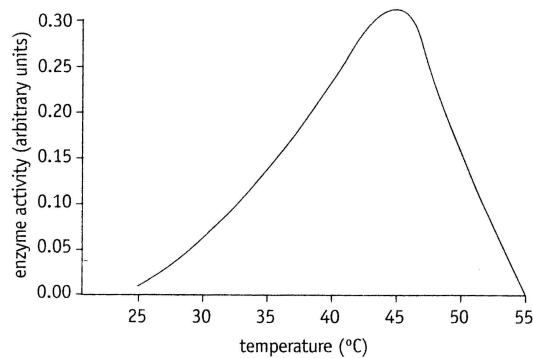
(1, 1 mark)

- d. Name ONE organ to which the blood flow does not change during rest or exercise.

_____ (1 mark)

Total 8 marks

5. The following graph shows the effect of temperature on the activity of an enzyme.



- a. Write the optimum temperature for this enzyme. _____ (1 mark)

- b. Two samples of the enzyme were taken, both were stored at 5°C for several days but one was boiled before stored. Both samples were then warmed to the optimum temperature for the enzyme. Substrate was added and the activity of the enzyme in each sample was measured. Predict what results you would expect from each sample. Give a reason for your answer.

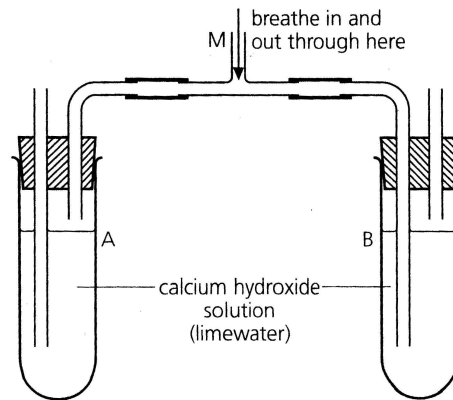
_____ (4 marks)

- c. List TWO factors that need to be kept constant to make accurate comparisons about the effects of temperature on the samples.

_____ (2 marks)

Total 7 marks

6. The diagram below shows a piece of apparatus used to compare the amount of carbon dioxide in the air you breathe in and out of your lungs.



- a. As you breathe in, air bubbles through tube A. When you breathe out, air bubbles through tube B.
- (i) What happens to limewater when carbon dioxide bubbles through it?
- (ii) What difference would you observe in the test-tubes with limewater, when the experiment has been carried out? Give a reason for your answer.

(1, 3 marks)

- b. The ribcage moves up and down during breathing. Explain.

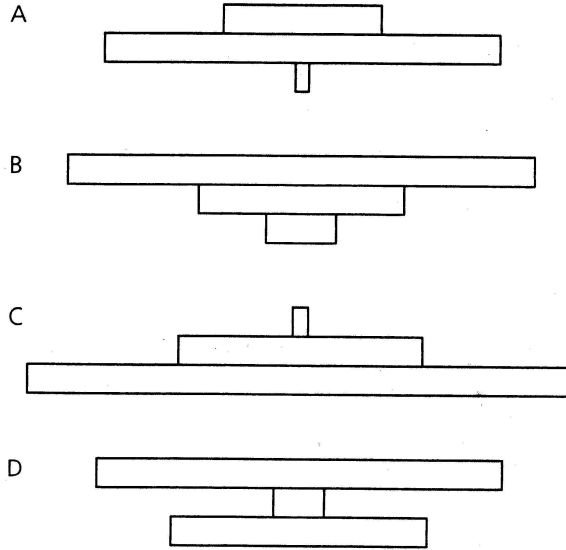
(1 mark)

- c. (i) During an asthma attack the bronchi and the bronchioles get narrower. Predict an effect of this.
- (ii) Rings of cartilage are present in the walls of the bronchi and bronchioles. Explain the importance of the cartilage rings in the bronchi and bronchioles walls.

(1, 1 mark)

Total 7 marks

7. The diagrams below show some pyramids of numbers.



a. Explain the term pyramid of numbers.

_____ (1 mark)

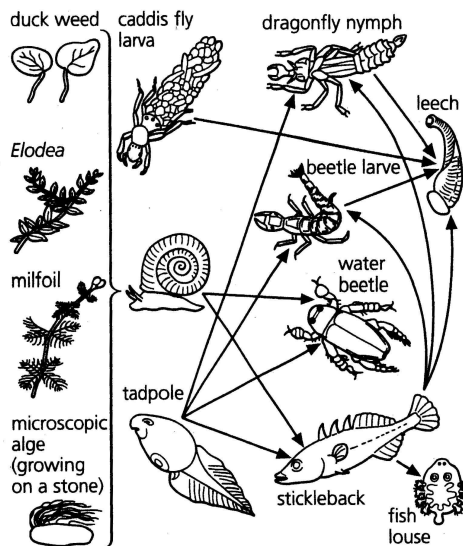
b. Write the letter of pyramid of numbers that matches each of the following food chains:

(i) grass → deer → lions _____

(ii) oak tree → caterpillars → sparrows _____

(iii) tomato plant → whitefly → parasitic microscopic gnubs _____ (1, 1, 1 mark)

c. The following diagram shows a food web for a pond ecosystem.



(i) From the food web name TWO secondary consumers.

(ii) From the food web write a food chain involving five trophic levels.

_____ (2, 2 marks)

- d. Predict what will happen if all the water beetles were taken out of the pond.

(2 marks)
Total 10 marks

- 8a. A student grew a tomato plant in sand. After a month the student compared it with another tomato plant growing in potting compost. Both plants had been watered regularly but the plant in sand was shorter, had much smaller leaves and the lower leaves were yellow. Suggest reasons for these differences.

(2 marks)

- b. A plant was put in a black plastic bag and left for 24 hours. The leaves were then tested for starch. Explain why you would not expect to find starch in the leaves even during the day.

(2 marks)

- c. A biology student noticed streams of tiny bubbles rising to the surface of a pond while having a morning walk. What gas would these bubbles contain and where does the gas come from?

(2 marks)
Total 6 marks

Section B

Answer question 1 in this section and choose any TWO others.

This section carries 45 marks.

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

A human adult's body contains about 4.5 litres of blood. During its continuous circulation round the body, blood repeatedly enters the kidneys and undergoes filtration. Each day a human adult's kidneys filter a total of around 1500 litres of blood and produce about 180 litres of glomerular filtrate. However the daily production of urine is only about 1-2 litres. The difference between the volumes of glomerular filtrate and urine produced daily is accounted for by the fact that about 99% of the water in the glomerular filtrate is reabsorbed back into the bloodstream.

- a. From the passage name the liquid containing the highest concentration of urea. (1 mark)
- b. List TWO reasons why the daily output of the liquid you name in 'a' varies. (2 marks)
- c. (i) If a man produces 180 litres of glomerular filtrate in one day, calculate the volume of glomerular filtrate in millilitres produced per minute.
- (ii) Name the process by which water is reabsorbed back into the bloodstream. (1, 1 mark)
- d. The chemical compositions of blood plasma and glomerular filtrate are very similar except for plasma proteins. Explain. (2 marks)

e. Draw a labelled diagram to show the human urinary system. (4 marks)

f. The following table shows the maximum urine concentration of five mammals A to E.

Mammal	Maximum Urine Concentration
A	52
B	110
C	140
D	300
E	550

Which mammal would you expect to be the

(i) kangaroo rat living in the desert

(ii) beaver living in an aquatic environment? Give a reason for **each** answer. (2, 2 marks)

Total 15 marks

2a. Give a biological explanation for **each** of the following statements:

(i) Proteins are digested both in the stomach as well as in the small intestine.

(ii) Chewing food and the production of saliva both help in the process of digestion. (4, 3 marks)

b. State how the conditions necessary for the digestion of proteins in the stomach are different from those in the small intestine. (2 marks)

c. When carbohydrates have been digested excess glucose is stored.
Name the substance that acts as a store of glucose and state ONE site where it is stored. (2 marks)

d. In persons suffering from Irritable Bowel Syndrome, the muscles of the colon wall go into spasm (tighten) and their peristaltic movements fail to coordinate. The result is pain in the lower left side of the abdomen with diarrhoea or constipation. This condition is painful but it may be eased by more fibre in the diet.
(i) Distinguish between diarrhoea and constipation.
(ii) Explain why fibre can help persons suffering from Irritable Bowel Syndrome. (2, 2 marks)

Total 15 marks

3. Tissue fluid surrounds cells in tissues and is formed from substances which leave the plasma in blood capillaries. Compared to plasma it has a lower concentration of carbon dioxide, no blood cells or platelets.

a. (i) List TWO substances present in blood plasma.
(ii) Name the other TWO types of blood vessels (besides blood capillaries) and draw a cross-section of **each**. (2, 4 marks)

b. What are platelets and what is their function? (2 marks)

c. (i) Red blood cells are quite small in fact they can just squeeze through a capillary. What is the advantage of this?
(ii) Describe the shape of the red blood cell and explain its significance.
(iii) Name the site where red blood cells are produced. (2, 2, 1 marks)

- d. Capillaries are the most numerous type of blood vessel in the body. Explain why they are referred to as exchange vessels. (2 marks)

Total 15 marks

4. Discuss the cause and symptoms of **each** of the following conditions:

- (i) anaemia
- (ii) scurvy
- (iii) obesity
- (iv) rickets
- (v) emphysema.

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

Total 15 marks

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

- a. Above 40°C the process of photosynthesis stops altogether.
- b. Gardeners prefer to plant their vegetable crops in sunny places rather than shady ones.
- c. A farmer observed that the wheat in the field close to a coal-burning factory grows taller than the wheat furthest away from the factory.
- d. Yeast is a necessary ingredient for a wine-maker.
- e. Respiratory surfaces are permanently moist and well supplied with blood.
- f. The small intestine of the cow is as long as 40 metres.
- g. Sprinters often hold their breath during a 100 metre race, but marathon runners don't during a marathon.

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

Total 15 marks