EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

2005 MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

BIOLOGY

Monday, 17 October

Subject Number: M022/I

Time Allowed: 2 h 30 mins
8:30 – 11:00 am

PAPER I
(100 marks)

Theory

1. **This paper contains 16 pages. Please check.**

2. Before beginning **fill** in your **Examination Number** at the top of the question paper and on all other sheets.

3. This paper contains sections **A, B** and **C**. Answer **all** questions in all the sections. Some can be answered quickly, but others require considerable thought and may take longer.

4. Write your answers on the question paper in the spaces provided. The maximum number of marks for each answer is indicated against each question.

Section A (20 marks)

1. a. What are "auxins"?

_____

(1 mark)

b. How does high auxin concentration affect growth of the following parts of the plants?

(i) shoots

_____

_____

(1 mark)

(ii) roots

_____

_____

(1 mark)

2. a. What role does the following play in photosynthesis?

(i) chlorophyll

_____

(1 mark)

(ii) xylem

_____

(1 mark)

b. How do plants make proteins?

_____

_____

(1 mark)

Continued/...

3. **Figure 1** is a diagram showing part of the human digestive system. Use it to answer the questions that follow.

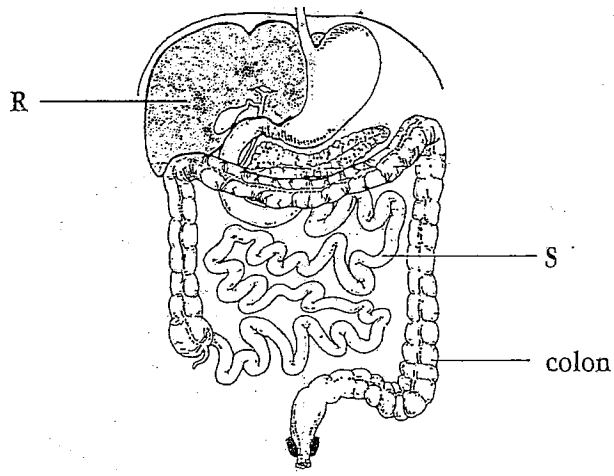

Figure 1

a. Name the parts marked **R** and **S**.

R _____ **S**_____

(2 marks)

b. Explain how part **R** ensures a steady supply of glucose to the body.

_____

_____

(2 marks)

4. What is the advantage of the following in locomotion?

a. Overlapping of scales in fish

_____

(1 mark)

b. hollow bones in birds

_____

(1 mark)

5. a. What is the function of helper T-cells in the body?

_____

(1 mark)

b. Explain the effect of HIV on helper T-cells in the body.

_____

_____

(2 marks)

Continued/...

6. **Figure 2** is a diagram showing a food web in an aquatic ecosystem. Use it to answer the questions that follow.

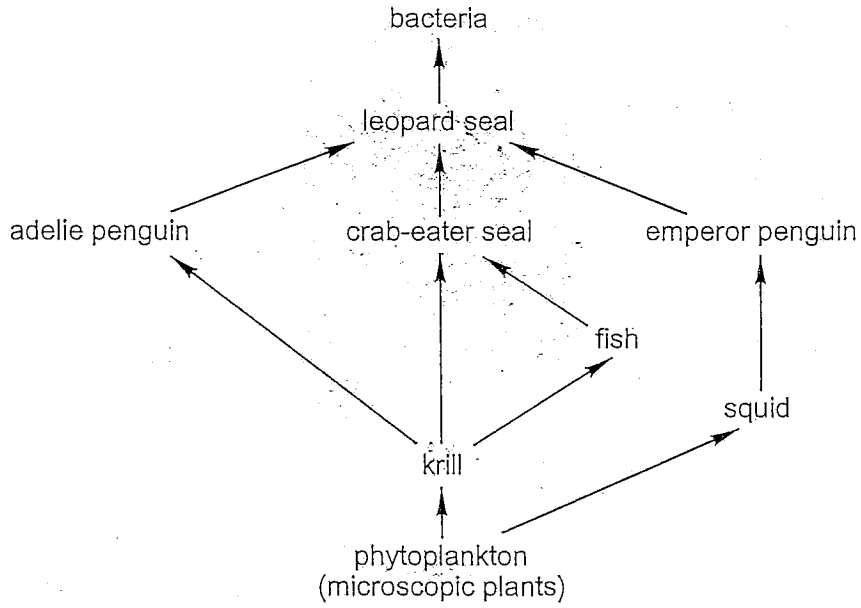

Figure 2

a. Name **one** organism which represents a:

(i) Herbivore _____ **(1 mark)**

(ii) Decomposer _____ **(1 mark)**

b. From the food web draw **one** food chain of **six** organisms.

(2 marks)

c. Why would bacteria **not** belong to a specific feeding level?

_____

_____

(1 mark)

Continued/...

Section B (50 marks)

Answer **all** questions in this section.

7. **Figure 3** shows diagrams **A** and **B**. Diagram **A** shows the results of what happened when a shoot was illuminated from one side for 48 hours. Diagram **B** shows cells **P** and **Q** which were taken from parts of the shoot in diagram **A**.

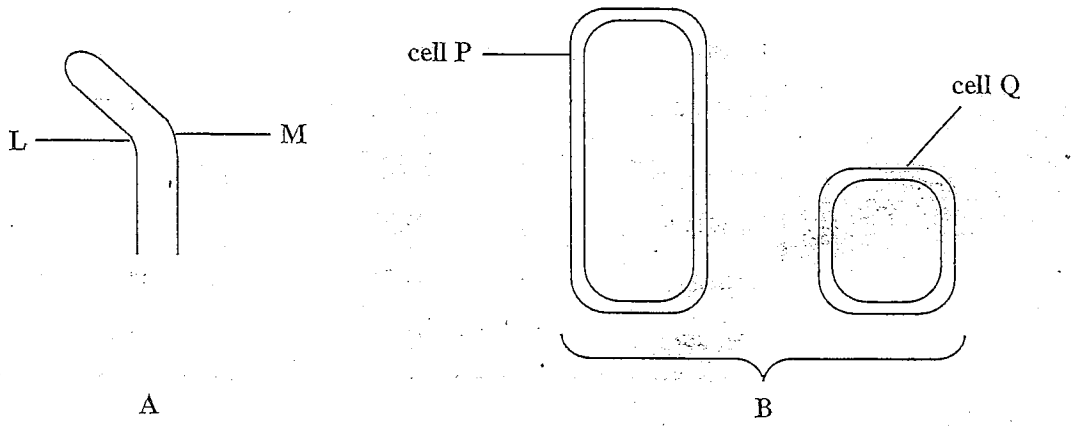

Figure 3

a. Which side of the shoot in diagram **A** was illuminated?

_____

(1 mark)

b. (i) Which cell was taken from the part marked **M**.

_____

(1 mark)

(ii) Explain your answer to b.(i).

_____

_____

(2 marks)

Continued/...

8. **Table 1** shows the composition of human blood and urine. Use it to answer the questions that follow.

Table 1

Substance	Blood (%)	Urine (%)
Water	90	96
Protein	9	0
Glucose	0.1	0
Urea	0.03	2
Uric acid	0.003	0.05
Creatinine	0.001	0.1
Chloride	0.37	0.6
Sodium	0.35	0.35 → 0.6
Potassium	0.02	0.15

a. (i) Give **one** substance which is present in blood but is completely absent in urine.

_____

(1 mark)

(ii) Apart from urea and water, mention **two** substances which are more concentrated in urine than in blood.

_____

(1 mark)

b. Which hormone regulates water concentration in the blood?

_____

(1 mark)

c. Why is urea excreted in large quantities?

_____

_____

_____

(3 marks)

Continued/...

9. **Figure 4** is a diagram showing a summary of the process of respiration. Use it to answer the questions that follow.

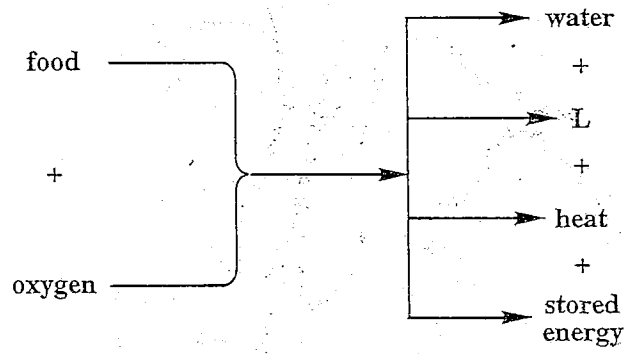

Figure 4

a. Name the product represented by the letter **L**.

_____ **(1 mark)**

b. (i) What type of respiration is shown in **Figure 4**?

_____ **(1 mark)**

(ii) Give a reason for your answer to **b.(i)**.

_____

_____

(1 mark)

c. State any **two** ways in which the stored energy may be used.

_____

_____

(2 marks)

Continued/...

10. **Figure 5** shows a cross section of the heart and its associated blood vessels.

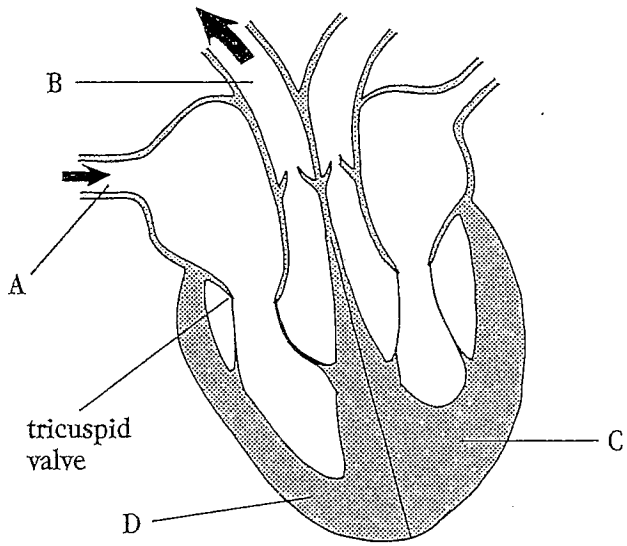

Figure 5

a. Name the parts marked **A** and **B**.

A _____

B _____ (2 marks)

b. (i) What is the structural difference between the walls of the parts marked **C** and **D**?

_____

_____

(1 mark)

(ii) Give a reason for the difference stated in **b.(i)**.

_____

_____

(1 mark)

Continued/...

11. **Figure 6** shows a developing human foetus inside the womb.

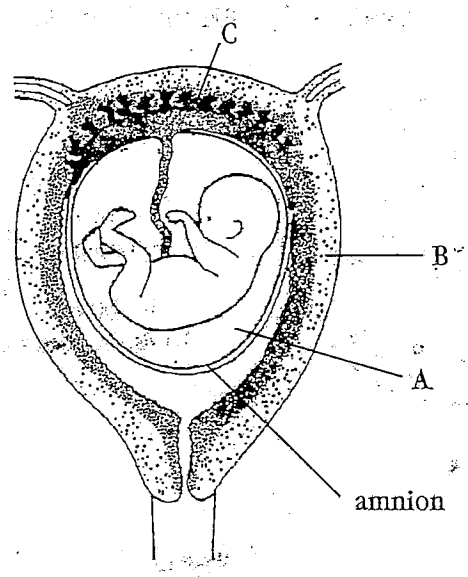

Figure 6

a. Name the parts marked **B** and **C**.

B _____ (1 mark)

C _____ (1 mark)

b. State **two** roles played by the part marked **A** during the development of the foetus.

_____

_____

(2 marks)

Continued/...

12. To determine the blood group of a donor, a drop of blood was added to plates containing anti-A serum and anti-B serum respectively. **Figure 7** shows results of the test.

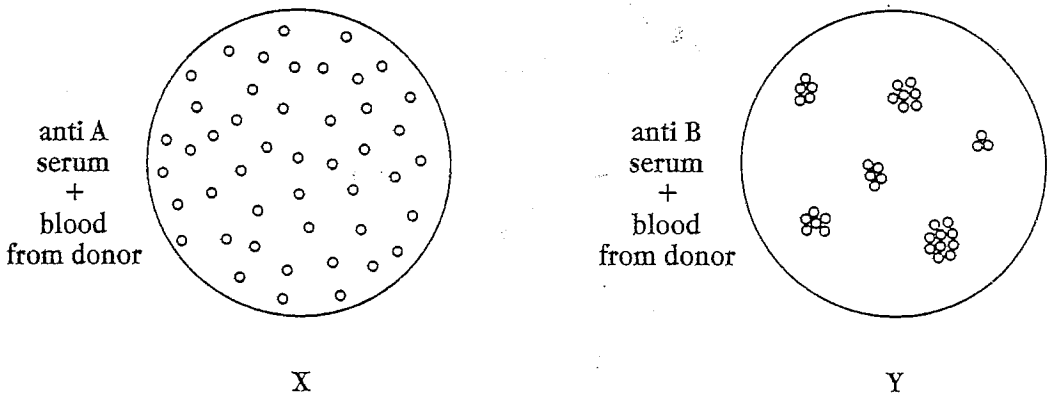

Figure 7

a. What is "serum"?

_____

_____

(1 mark)

b. (i) State the results shown in

(1) **X** _____

(2) **Y** _____

(1 mark)

(ii) What was the blood group of the donor?

_____

(1 mark)

(iii) Give a reason to support your answer in **b.(ii).**

_____

_____

(2 marks)

c. Why is it necessary to test the blood group of the donor before transfusion?

_____

_____

(2 marks)

Continued/...

13. Data below are the birth masses of 12 babies (in kg). Use it to answer the questions that follow.

3.1	3.4	3.0
2.5	2.5	3.5
3.0	2.6	2.0
3.5	3.4	3.5

a. Calculate the average birth mass.

(3 marks)

b. (i) Using the above information , complete the table below.

Birth mass (kg)	**2.0-2.4**	**2.5-2.9**	**3.0-3.4**	**3.5-3.9**
Number of Babies				

(1 mark)

(ii) Using the table in b.(i), draw a histogram to compare the mass and number of babies of each range.

(4 marks)

c. What is the model birth mass range?

_____ **(1 mark)**

d. What type of variation is birth mass?

_____

(1 mark)

Continued/...

14. In mice a gene for coat colour has two alleles. There is a dominant allele, **G**, for grey colour and a recessive allele, **g**, for white colour.

a. Complete the table below using the information provided.

Colour of mice	Genotype of mouse
Grey (homozygous)	
Grey (Heterozygous)	
White (Homozygous)	

(3 marks)

b. (i) Using a genetic diagram show the results of a cross between a grey heterozygous and a white homozygous mouse.

(3 marks)

(ii) State the phenotypes in F1 generation.

_____

_____

(2 marks)

(iii) If the mice produced 24 offsprings, how many mice would be white? Show your working.

(2 marks)

Continued/...

Section C: (30 marks)

Essay Questions

Answer **all** questions in this section.

15. Write an essay stating **five** components of human blood and explain their functions.

Continued/...

16. Describe an experiment you would do to show that transpiration from leaves affects uptake of water. Your answer should be in an essay form.

(10 marks)

Continued/...

17. Suppose there is an outbreak of diarrhoea in a boarding school. Describe how you would establish the cause of the outbreak. Your answer should be in an essay form.

Continued/...

END OF QUESTION PAPER

NB: This paper contains 16 pages.