JUNIOR LYCEUM ANNUAL EXAMINATIONS
Educational Assessment Unit - Education Division
2004

FORM 3 | BIOLOGY | TIME: 1½ Hours

Name: _____ Class: _____ Group: _____

SECTION A: Answer ALL questions in the spaces provided.
This section carries a total of 55 marks.

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1. Read the following passage about cells. Fill in the blanks using the most suitable word or words to complete the account. Each word may be used once, more than once, or not at all.

prokaryotic, mitochondria, cellulose, chloroplasts, bacteria, cell membrane, flagellum, glycogen granules, semi-permeable, chlorophyll, large central vacuole, organelles, eukaryotic, cell sap, nucleus, cell wall, cytoplasm, starch, food vacuole, water.

The cell is filled with a jelly-like substance called _____ . A number of structures called _____ may be found within the cell, each carrying out a specific function. For example, the _____ break down glucose, providing energy to the cell. The outer layer of the cell is called the _____ . It is a _____ layer (that is, it is selectively permeable) and controls what enters and leaves the cell. The largest structure within the cell is the _____ , which contains the genetic material of the cell. In some primitive cells, the genetic material is not enclosed within a membrane. These cells are called _____ cells. Plant cells differ from animal cells by having a _____ made from _____ that covers the whole cell and provides it with support. The _____ occupies about 80% of the whole cell and is filled with _____ . Plant cells also have _____ , which contain the pigment _____ . This allows the plant to photosynthesise.

(Total 13 marks)

2. In the table below, there is a description of some of the characteristics shown by different groups of organisms. Give the ***phylum or division*** of each group that best fits each description.

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Description	Group Name
Have sac-like body with single opening. Have tentacles with stinging cells.	
Large, frond-like leaves have spore-making sporangia on their under surface. Underground stem/rhizome.	
Flat, elongated body. Lack digestive and circulatory systems. Many are parasitic.	
Plant body has a stem-like structure (thallus) with simple leaf-like structures. Xylem and phloem absent.	
Long, segmented body without any legs. Have complete digestive tract.	
Covered with hard exoskeleton. Have jointed appendages.	
A flower-producing plant with seed enclosed in an ovary.	
Soft, unsegmented body. May be covered with a shell.	
Have spinal cord which may be enclosed in a layer of bone.	
Forms seeds within cones. Does not produce flowers.	

(Total 10 marks)

3. Read the descriptions below and fill in the correct vital function.

Description	Vital Function
One amoeba splits to form 2 individuals	
Small plant seedlings increases in height after a few days	
On a kitchen window, cress plants bend towards the light	
Cells burn food to release energy	
A student stands up and walks out of the room.	

(Total 5 marks)

4. Use the key below to identify the leaves of these common trees.

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A: _____

B: _____

C: _____

D: _____

E: _____

F: _____

1. a) Leaves simple (not divided into leaflets) ..... Go to 2
   b) Leaves compound (divided into leaflets) ..... Go to 5
2. a) Leaves divided into 5 lobes ..... Maple
   b) Leaves not divided into 5 lobes ..... Go to 3
3. a) Edge of leaf smooth ..... Privet
   b) Edge of leaf not smooth ..... Go to 4
4. a) Edge of leaf toothed ..... Silver birch
   b) Edge of leaf with rounded lobes ..... Oak
5. a) Leaflets attached to centre ..... Clover
   b) Leaflets in pairs of leaf axis ..... Mountain ash

(Total 6 marks)

5. Complete the following table by giving ***three*** structural differences between a typical plant cell and a typical animal cell.

	Plant Cell	**Animal Cell**
1.		
2.		
3.		

(Total 3 marks)

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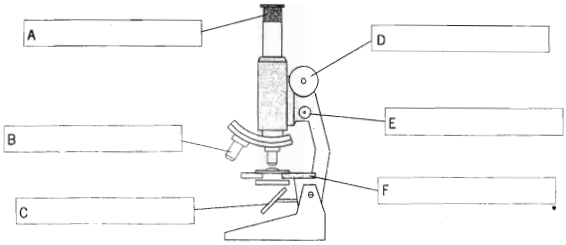
6. The diagram below shows a very useful apparatus used in biology.



a) What is this instrument called?

_____ **(1)**

b) Label parts A, B, C, D, E and F shown in the diagram. **(6)**

(Total 7 marks)

7. The environment of an organism consists of ***abiotic*** (physical) factors and ***biotic*** (biological) factors.

a) List ***two*** abiotic factors.

_____ **(2)**

b) Write a description of the following biotic factors, and give ***one*** example of each:

i) Predator-prey relationships: _____

_____

_____ **(2,1)**

ii) Parasitism: _____

_____

_____ **(2,1)**

iii) Mutualism: _____

_____

_____ **(2,1)**

(Total 11 marks)

SECTION B: Answer question ONE and ANY OTHER TWO questions on the papers provided. This section carries a total of 45 marks.

1. Read the following paragraph and answer the questions below:

Soil is one of the most important natural resources on land. Like air and water, soil is necessary to life on Earth. Without it, plants could not grow and plant-eating animals could not live; meat-eating animals would also perish. Civilizations depend on the quality of their soil to grow their food and to serve as a living filter that purifies the wastes they produce.

Soils are usually divided into three groups, ***clay*** soils, ***sandy*** soils and ***loams***, depending on the mixture of soil particles present.

Although soil may look dull and lifeless, it contains millions of organisms that are moving, growing, reproducing and competing with each other for food. These include micro-organisms (bacteria, fungi, and protists) as well as 'larger' organisms like nematodes, arthropods and earthworms.

Some of these organisms are important economically since they improve the soil quality. Others are considered to be harmful since they damage plants being grown by humans.

a) List ***three*** components of a fertile soil. **(3)**

b) Give ***two*** differences between ***clay*** soils and ***sandy*** soils. **(2)**

c) Describe an experiment to find the amount of water in a soil sample. **(4)**

d) A soil sample weighing 250g was found to contain 25g of water. Calculate the percentage water content of this soil. Show your working. **(2)**

e) The earthworm is an example of a beneficial soil organism. List ***three*** beneficial effects that earthworms have on soil. **(3)**

f) Give ***one*** example of a harmful soil organism. **(1)**

(Total 15 marks)

2. Flowering plants consist of a ***stem***, a ***root***, ***leaves*** and ***flowers***. Certain differences in these structures allow us to separate flowering plants into two classes: ***monocotyledons*** (monocots) and ***dicotyledons*** (dicots).

a) Give ***three*** differences between ***monocots*** and ***dicots***. Present your results in table form. **(3)**

b) Draw a ***large, well-labelled diagram*** to show the internal structure of a leaf of a flowering plant. **(6)**

c) Give ***one*** function of the stem and ***one*** function of the flower. **(2)**

d) Give ***two*** functions of the leaves and ***two*** functions of the root. **(4)**

(Total 15 marks)

3. Unicellular organisms like ***Amoeba*** and ***Euglena*** do not need transport systems, but multicellular organisms like flowering plants cannot survive without them.

   a) Explain why multicellular organisms need transport systems while unicellular organisms do not. **(2)**

   b) Name ***two*** transport tissues found in flowering plants. **(2)**

   c) Name ***one*** substance which is carried in each transport tissue mentioned in (b) above. **(2)**

   d) Substances can move in or out of cells by ***diffusion*** or by ***active transport***. Give ***two*** ways in which diffusion differs from active transport. **(2)**

   e) Give ***one*** example of diffusion and ***one*** example of active transport in ***plants***. **(2)**

   f) Give ***one*** example of diffusion and ***one*** example of active transport in ***animals***. **(2)**

   g) Describe a simple experiment to demonstrate diffusion in air. **(3)**

(Total 15 marks)

4. a) Draw ***large, well-labelled diagrams*** of a typical virus and a typical bacterial cell. **(3, 4)**

   b) Why are viruses considered to be ***borderline*** between living and non-living and non-living organisms. **(3)**

   c) List ***two*** differences between viruses and bacteria. Give your answer in table form. **(2)**

   d) List ***two*** beneficial uses and ***one*** harmful effect of bacteria. **(3)**

(Total 15 marks)

5. a) Give a definition of ***osmosis***. **(2)**

   b) What do you understand by a ***semi-permeable*** membrane? **(2)**

   c) Describe what happens to a ***plant*** cell if it is placed in a ***concentrated sugar solution***. You may use a diagram to help your explanation. **(3)**

   d) Describe what happens to an ***animal*** cell if it is placed in ***distilled water***. You may use a diagram to help you explanation. **(3)**

   e) You are given the following apparatus and materials:

      Visking (dialysis) tubing, string, a concentrated sugar solution, distilled water.

      Using ***all*** of the above items and any other apparatus which you require, describe a simple experiment to demonstrate the process of osmosis. In your answer, include a diagram of how you would use the apparatus, the method you would follow, and the results you would expect to obtain. **(5)**

(Total 15 marks)