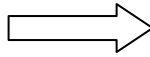


Write your Examination Number here



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

LEAVING CERTIFICATE EXAMINATION, 2008

BIOLOGY – HIGHER LEVEL

THURSDAY, 12 JUNE – MORNING, 9.30 TO 12.30

Section A Answer any **five** questions from this section.
Each question carries 20 marks.
Write your answers in the spaces provided on **this examination paper**.

Section B Answer any **two** questions from this section.
Each question carries 30 marks.
Write your answers in the spaces provided on **this examination paper**.

Section C Answer any **four** questions from this section.
Each question carries 60 marks.
Write your answers in the **answer book**.

It is recommended that you spend not more than 30 minutes on Section A and 30 minutes on Section B, leaving 120 minutes for Section C.

You must return this examination paper with your answer book at the end of the examination.

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Section A

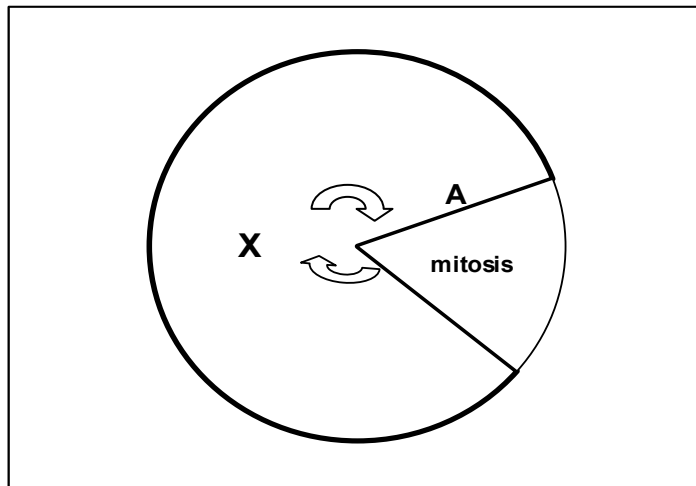
Answer any **five** questions.

Write your answers in the spaces provided.

1. Answer **five** of the following by filling in the blank spaces.

- (a) Biomolecules of the general formula $C_x(H_2O)_y$ are examples of
- (b) Give **two** functions of water in a living organism.
1.
2.
- (c) Is energy release a feature of anabolic or catabolic reactions?
- (d) How do fats differ from oils at room temperature?.....
- (e) Name the test or give the chemicals used to detect the presence of protein in a food sample
-
- (f) Name a structural polysaccharide

2. The diagram represents the cell cycle.



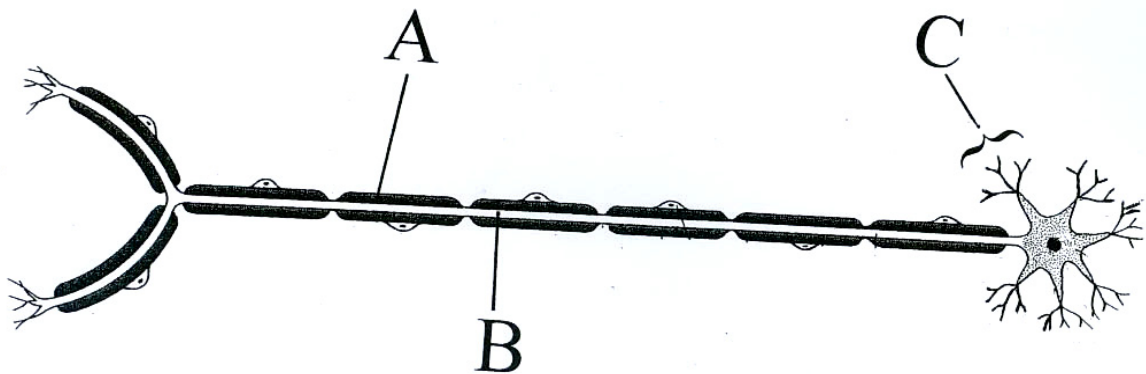
- (a) What stage of the cycle is represented by X?
- (b) Give the names of the two processes involving DNA which take place during stage X.
- 1..... 2
- (c) For convenience of study, mitosis is divided into four stages. List these in order starting at A.
-
- (d) In which of the stages of mitosis that you have listed in (c) would you expect to see the spindle fibres contracting?
- (e) Explain the term diploid number
-
- (f) What term is used to describe a group of disorders of the body in which cells lose the normal regulation of mitosis?

3. Answer the following, which relate to the scientific method, by completing the blank spaces.

- (a) As a result of her observations a scientist may formulate a
 She will then progress her investigation by devising a series of
 and then carefully analysing the resulting
- (b) Why is a control especially important in biological investigations?
- (c) If a scientist wished to determine the effect of a certain herbicide on weed growth she would include a control in the investigation. Suggest a suitable control in this case.

- (d) The use of replicates is an important aspect of scientific research. What, in this context, are replicates?
- (e) Suggest where a scientist may publish the results of her investigations

4. The diagram shows a motor neuron.



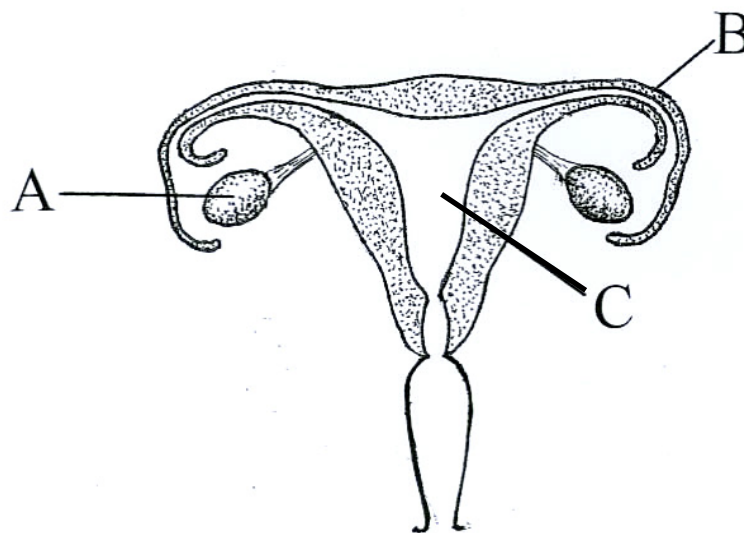
- (a) Identify parts A, B and C.
 A..... B..... C.....
- (b) Give a function of A
- (c) Place an arrow on the diagram to show the direction of the impulse.
- (d) Give a function of C
- (e) Place an X on the diagram at a point at which a neurotransmitter substance is secreted.
- (f) What is the role of the motor neuron?

5. (a) Write a balanced equation on the line below to represent aerobic respiration.

- (b) The first stage of respiration takes place in the cytosol. What is the cytosol?

- (c) Does the first stage of respiration release a small or large amount of energy?
- (d) What is fermentation?
- (e) Where in the cell does the second stage of aerobic respiration take place?.....
- (f) Is oxygen required for the second stage of aerobic respiration?
- (g) Suggest a situation in which some cells in the human body may not be able to engage in the second stage of aerobic respiration.....

6. The diagram shows the female reproductive system.



- (a) Identify parts A, B and C.
 A
 B
 C
- (b) Using the letters X, Y and Z and arrows, identify each of the following on the diagram: endometrium (X), where fertilization normally occurs (Y), where meiosis occurs (Z).
- (c) Which part of the system is influenced by both FSH and LH?
- (d) Give **two** biological advantages of breastfeeding.
 1.....
 2.....

Section B

Answer any two questions.

Write your answers in the spaces provided.

Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

- 7. (a) (i) What is a habitat?
- (ii) What is an ecosystem?.....

(b) Answer the following questions by reference to a named ecosystem that you have investigated.

Name of ecosystem.....

(i) List **three** abiotic factors that you investigated.

1. 2. 3.

(ii) For each of the three abiotic factors that you have listed describe how you carried out the investigation.

Factor 1

.....

.....

.....

Factor 2

.....

.....

.....

Factor 3.....

.....

.....

.....

(iii) In the case of a named organism give an adaptation feature that you noted.

Name of organism

Adaptation feature

.....

.....

(iv) Briefly explain how the adaptation feature that you have given in (iii) is of benefit to the

organism.

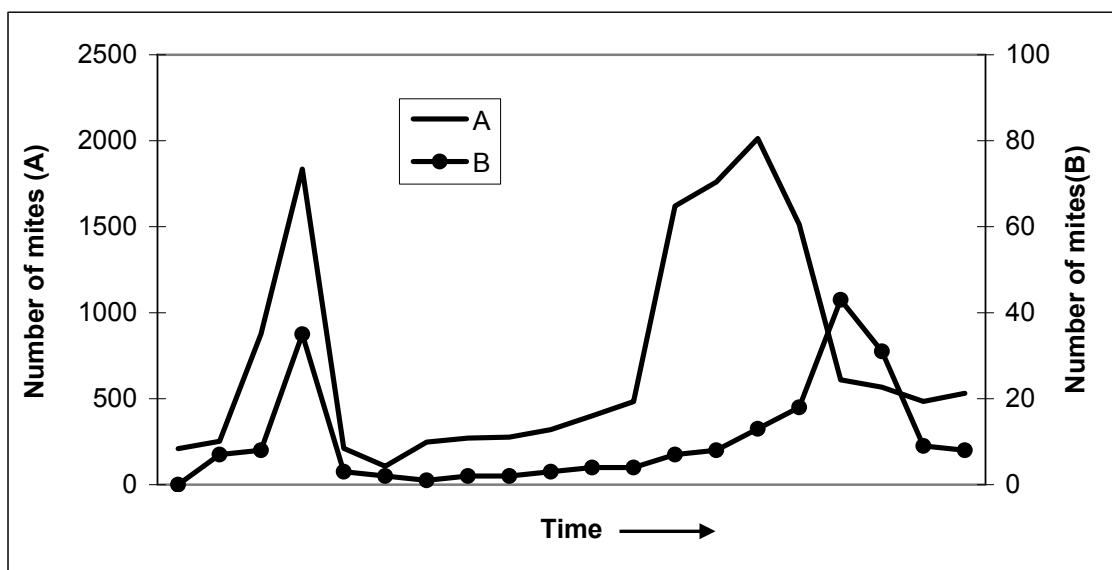
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Section C
Answer four questions.
Write your answers in the answer book.

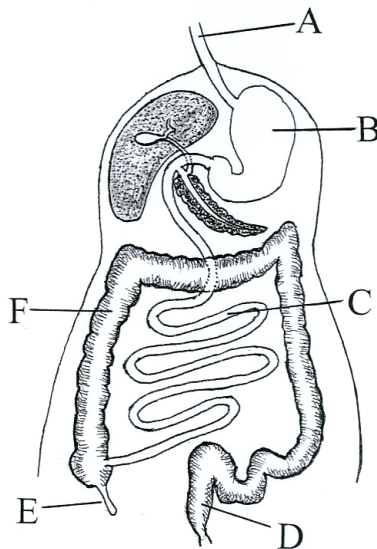
10. (a) (i) What does an ecologist mean by competition?
(ii) Distinguish clearly between contest competition and scramble competition. (9)

- (b) Read the following extract, study the graph below and answer the questions that follow.
“The application of pesticides to strawberry plants in an attempt to destroy cyclamen mites that were damaging the strawberries killed both the cyclamen mites and the carnivorous mites that preyed on them. But the cyclamen mites quickly re-invaded the strawberry fields while the mites that preyed on them returned much more slowly. The result was that the cyclamen mites rapidly increased in density and did more damage to the strawberries than if the pesticide had never been applied.”
(Adapted from W.T. Keeton and J. L. Gould. *Biological Science*. New York: W.W. Norton & Co., 1993)



- (i) Which graph, A or B represents the carnivorous mites? Explain your answer.
(ii) What term is used to describe the relationship between the cyclamen mites and the carnivorous mites?
(iii) Suggest **two** reasons why the cyclamen mite managed to quickly re-invade the strawberry fields.
(iv) Suggest an alternative to the use of pesticides for controlling the cyclamen mite population.
(v) Draw a pyramid of numbers to include each of the organisms mentioned in the extract above.
(vi) Apart from competition and the factor illustrated in the above example, state another factor that limits population growth. (27)
- (c) (i) Waste management is a matter of growing concern in Ireland as the population expands. Outline **three** problems associated with waste disposal.
(ii) Give an example of waste produced in agriculture or fisheries or forestry and describe how it is managed.
(iii) Suggest **two** methods of waste minimisation.
(iv) Give one example of the use of micro-organisms in waste management. (24)

11. (a) Explain the following terms which are used in genetics: homozygous, recessive, phenotype. (9)
- (b) In the fruit fly, *Drosophila*, the allele for grey body (G) is dominant to the allele for ebony body (g) and the allele for long wings (L) is dominant to the allele for vestigial wings (l). These two pairs of alleles are located on different chromosome pairs.
- (i) Determine all the possible genotypes and phenotypes of the progeny of the following cross: grey body, long wings (heterozygous for both) X ebony body, vestigial wings.
- (ii) What is the significance of the fact that the two allele pairs are located on different chromosome pairs? (27)
- (c) Haemophilia in humans is governed by a sex-linked allele. The allele for normal blood clotting (N) is dominant to the allele for haemophilia (n).
- (i) What is meant by sex-linked?
- (ii) Determine the possible genotypes and phenotypes of the progeny of the following cross: haemophilic male X heterozygous normal female. (24)
12. (a) (i) Distinguish between mechanical and chemical digestion.
- (ii) Name a structure in the human digestive system, other than teeth, which is involved in mechanical digestion. (9)
- (b) The diagram shows the human digestive system.

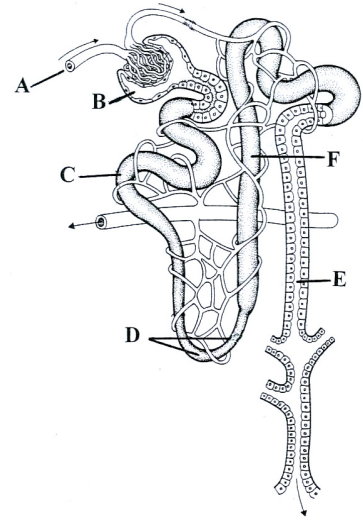


- (i) Name the parts A, B, C, D, E and F.
- (ii) Describe **two** functions of bile in relation to digestion.
- (iii) Answer the following in relation to a lipase:
1. Where is it secreted?
 2. Where does it act?
 3. What is the approximate pH at its site of action? (27)
- (c) (i) What are symbiotic bacteria?
- (ii) Give **two** activities of symbiotic bacteria in the human digestive system.
- (iii) Name the part(s) of the digestive system in which the following are absorbed into the blood.
1. the products of digestion,
 2. water.
- (iv) Name a process involved in the passage of the products of digestion into the blood.
- (v) Explain how the structure that you have named in (iii) 1. is adapted for the absorption of the products of digestion. (24)

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13. (a) (i) What is meant by excretion?
(ii) Urea and carbon dioxide are excretory products of the human body. In the case of each product name a substance from which it is derived. (9)
- (b) The diagram shows the structure of a nephron and its associated blood supply.

- (i) Name the parts A, B, C, D, E and F.
(ii) From which blood vessel is A derived?
(iii) Where in the kidney is B located?
(iv) Give the part of the nephron in which each of the following takes place:
1. filtration, 2. reabsorption of amino acids.
(v) Give **two** features of the nephron that aid filtration.
(vi) Name a group of biomolecules in the blood which are too large to pass through the filtration system of the nephron. (27)



- (c) (i) Suggest **two** situations which may result in a drop in the water content of the blood.
(ii) When the water content of the blood drops a hormone is released. Name this hormone and the endocrine gland from which it is secreted.
(iii) Give a precise target area for this hormone. How does the hormone reach the target area?
(iv) Explain the role of the hormone at its target area, when the water content of the blood is low. (24)

14. Answer any **two** of (a), (b) and (c). (30, 30)

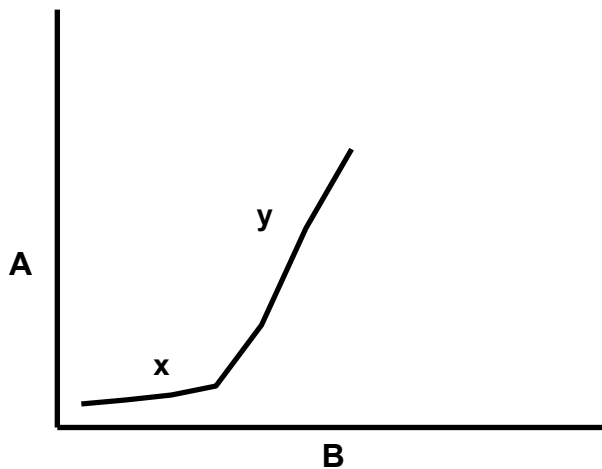
- (a) (i) Name the openings in the leaf which allow the entry of carbon dioxide for photosynthesis. State a factor which influences the diameter of these openings.
(ii) During photosynthesis oxygen is produced.
1. From what substance is oxygen produced?
2. In which stage of photosynthesis is oxygen produced?
3. Give **two** possible fates of oxygen following its production.
(iii) Give an account of the role of each of the following in photosynthesis:
1. ATP, 2. NADP.
- (b) (i) DNA is made of units called nucleotides. Draw a labelled diagram of a nucleotide to show its three constituent parts.
(ii) Which of the labelled parts in your diagram in (i) may vary from nucleotide to nucleotide?
(iii) The genetic code is contained within the DNA of chromosomes. Briefly describe the nature of this code.
(iv) What is meant by non-coding DNA?
(v) Give **one** structural difference between DNA and RNA.
(vi) Name a cell organelle, apart from the nucleus, in which DNA is found.
- (c) (i) Draw a large labelled diagram of a transverse section through a young root.
(ii) Water enters the outermost cells of the root by osmosis. What does this tell you about the cell sap of these outermost cells?
(iii) Osmosis has been described as a special case of diffusion. Explain why.
(iv) Describe an investigation that you carried out to demonstrate osmosis.
(v) Describe how minerals such as nitrates enter the root of a plant from the soil.

15. Answer any **two** of (a), (b) and (c).

(30, 30)

- (a) Answer the following questions in relation to the human musculoskeletal system.
- Give **three** roles of the skeleton.
 - Explain what is meant by the axial skeleton.
 - Give a function for each of the following:
1. Red marrow, 2. Cartilage, 3. Tendon.
 - Explain what is meant by an antagonistic muscle pair and give an example in the human body.
 - Suggest a treatment for a named disorder of the musculoskeletal system.
- (b) Just over fifty years ago the myxoma virus was brought to Ireland. The disease for which it is responsible in rabbits, myxomatosis, quickly decimated the wild population. Now, however, the disease is much less common and is responsible for far fewer deaths.
- Why do you think that the rabbit population was decimated when the myxoma virus was first brought to Ireland?
 - Suggest a reason why myxomatosis is no longer a major threat to the Irish rabbit population.
 - The use of one species to control the population of another species is called biological control. Suggest **one** advantage and **one** disadvantage of biological control.
 - The human immunodeficiency virus (HIV) is responsible for AIDS in the human population. Would you expect a similar trend to that shown by myxomatosis as time passes? Explain your answer.
 - Outline briefly how a virus replicates (reproduces).

(c) The diagram shows a bacterial growth curve.



- A** and **B** represent the labels on the axes. What does each of them stand for?
- What term is applied to the part of the curve labelled **x**? What is happening during **x**?
- What term is applied to the part of the curve labelled **y**? What is happening during **y**?
- Copy the diagram into your answer book and continue the curve to show the next phase. Explain why you have continued the curve in this way.
- Distinguish between batch and continuous flow food processing using micro-organisms in the food industry.