

WARNING: You must return this section with your answer book otherwise marks will be lost.

Write Your
Examination
Number Here

AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA

LEAVING CERTIFICATE EXAMINATION, 2000

BIOLOGY — ORDINARY LEVEL

WEDNESDAY, 14 JUNE — AFTERNOON 2.00 to 5.00

Answer **six** questions from Part I and **four** questions from Part II.
You should not spend more than 45 minutes on Part I, leaving about 135 minutes for Part II.

PART I (120 marks)

Questions 1 – 7

Answer **six** questions. Each question carries 20 marks.

Write your answers in the spaces provided.

Keep your answers short.

Write your examination number at the top of this page.

Be sure to return this part of the examination paper; enclose it (by folding it) inside the answer book you use for Part II.

PART I (120 marks)

1. Answer *four* of the following:

- (a) Photosynthesis occurs in a cell structure called a
- (b) The thyroid gland secretes a hormone called
- (c) Energy is released during respiration in a cell organelle called a
- (d) *Spirogyra* and *Fucus* belong to a group of plants called
- (e) A common laboratory test for oxygen is the use of a

2. (a) Arrange the following terms in a correct sequence:

class phylum genus order species

.....

(b) Name the phylum to which each of the following belongs:

spider frog snail

(c) To which of the following phyla does man belong?

Arthropoda Annelida Chordata Protozoa Mollusca

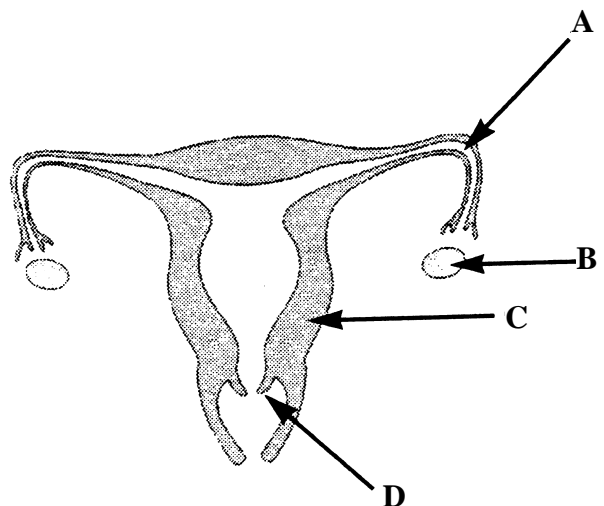
(d) State one reason why man is placed in the phylum you have named.

.....

(e) The scientific (binomial) name for man is

3. Name the parts labelled A, B, C, D on the diagram of the female reproductive system.

- A
- B
- C
- D



In which part are eggs (ova) produced?

.....

Where is the egg usually fertilised?

.....

Tissues of the mother and the embryo form a structure through which the embryo is nourished.

Name this structure

4. A sample of fresh soil was taken to the laboratory where it was found to weigh 60 g. It was then heated to 100 °C for 30 minutes and weighed. It was heated again for a further 30 minutes and weighed again. The weight in each case was found to be 50 g.

How was the soil sample heated?

.....

How do you know that all the water had been removed?

.....

What was the percentage of water in the soil?

.....

What is humus?

.....

How would you remove all of the humus from the dry soil sample obtained above?

.....

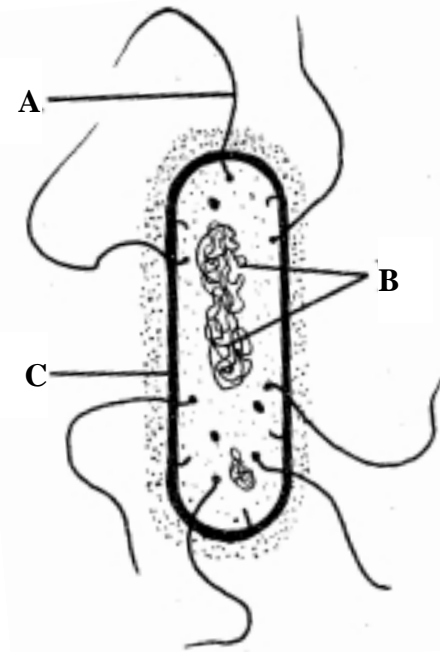
5. The diagram shows a generalised bacterial cell.

Name the parts labelled A, B, C.

A

B

C



How do bacteria normally reproduce?

.....

Name a disease of man caused by bacteria.

.....

Name the three groups of bacteria.

(i)

(ii)

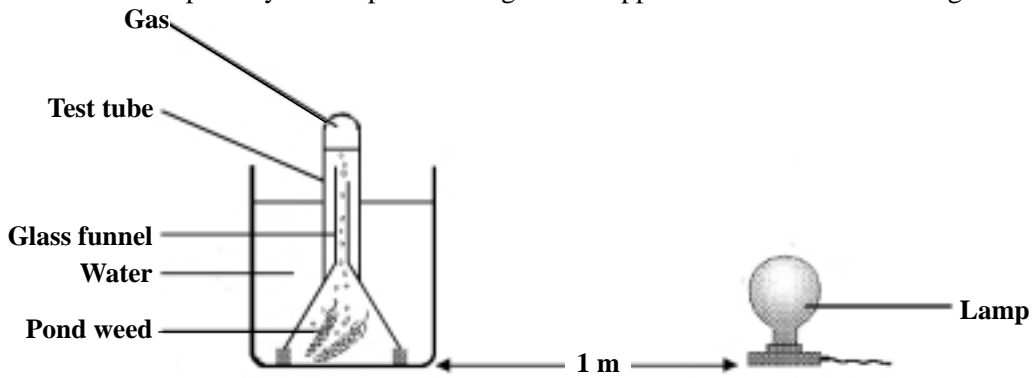
(iii)

Name two types of nutrition found in bacteria.

(i)

(ii)

6. A student is given a lamp, a large beaker, a funnel, a test tube and some pond weed and asked to carry out an experiment to show that photosynthesis produces a gas. The apparatus is shown in the diagram.



Name the gas collected in the tube.....

Name a food substance produced in photosynthesis

What gas is necessary for photosynthesis to take place?

Name another substance needed for photosynthesis

How can she measure the rate of photosynthesis?

.....

How can she determine the effect of light intensity on the rate of photosynthesis?

.....

7. The diagram shows a transverse section (T.S.) of a young dicotyledonous root.

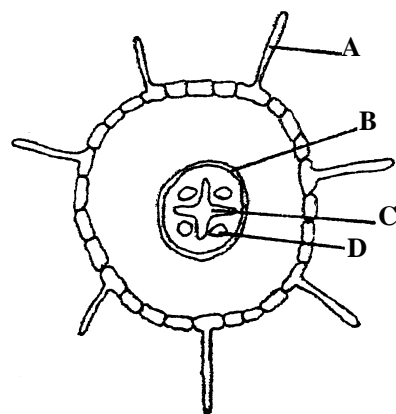
Name the parts labelled A, B, C, D.

A

B

C

D



State a function of each of A, C, D.

A.....

C.....

D.....

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Part I is on a separate sheet which provides spaces for your answers. The completed sheet should be enclosed in your answer book.

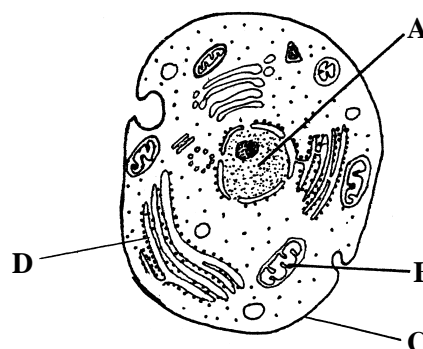
PART II (280 marks)

Write your answers to this part in your answer book.

Answer **four** questions. Each question carries 70 marks.

8. (a) The diagram shows a typical animal cell as seen with the aid of an electron microscope.

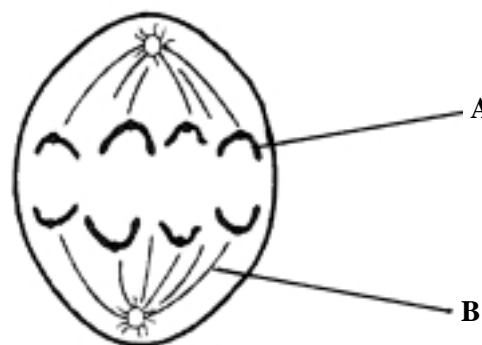
- (i) Name the parts labelled A, B, C, D.
- (ii) State *one* function for each of A, B, C.
- (iii) Name *two* additional structures, which are found in plant cells only. (27)



(b) Mitosis is the division of a nucleus into two identical nuclei. When a nucleus is not dividing it is said to be in interphase. The division of the nucleus occurs in four phases

METAPHASE TELOPHASE PROPHASE ANAPHASE

- (i) Arrange these phases in their correct sequence.
- (ii) Name the parts labelled A, B in the diagram of anaphase shown opposite.
- (iii) Nuclei divide by another process in cells in the reproductive organs of animals.
What is this other process called?
- (iv) What are produced as a result of this other process of nuclear division in the reproductive organs? (25)



(c) A tissue is described as a group of cells with a similar structure and function.

- (i) Name *one* animal tissue.
- (ii) State a function of this named tissue.
- (iii) State a location of this tissue.
- (iv) Name *one* plant tissue.
- (v) State a function of this named tissue.
- (vi) State a location of this tissue.

(18)

9. (a) Explain the following terms as used in ecology; ecosystem, parasite, predator, food web. (24)

(b) A farmer wanted to find out the density of clover in one of his fields. He threw a 1 m² quadrat at random twenty times and obtained the results shown in the table below.

Throw of quadrat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
No. of clover plants	5	0	3	1	12	8	8	8	22	13	6	3	7	10	12	4	10	13	12	15

- (i) Calculate the total number of clover plants in the twenty throws of the quadrat.
- (ii) Calculate the density (average number) of clover plants per square metre.
- (iii) What evidence is there in the table above to suggest that the clover plants are not evenly distributed in the field? (19)

(c) Answer the following questions in relation to a habitat you have studied.

- (i) Name the habitat.
- (ii) Name *two* plants.
- (iii) Name *two* animals.
- (iv) Give *one* food chain which includes at least two consumers.
- (v) In the case of a named plant and a named animal, state *one* way that each is adapted to life in the habitat. (27)

10. (a) Explain the following terms used in genetics: gene, locus, phenotype. (18)

(b) The height of pea plants is controlled by a single pair of allelic genes. The allele for tallness (T) is dominant over the allele for shortness (t). A homozygous tall plant (TT) was crossed with a short plant (tt). The progeny (the first generation) were heterozygous. The progeny were then allowed to self-pollinate to produce a second generation. Copy the following into your answer book and complete the spaces (brackets, lines)

The genotypes of the parents (TT) (tt)

The genotypes of the gametes () ()

The genotype of the progeny (F1) ()

The genotypes of the gametes of the progeny () () () ()

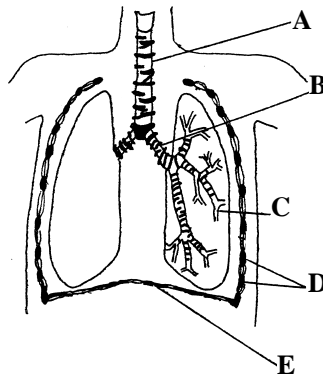
The genotypes of the second generation (F2) () () ()

The phenotypes of the second generation _____ (36)

- (c) (i) Darwin's theory of evolution may be summarised by the phrase "survival of the fittest". Explain this phrase.
- (ii) Fossil evidence supports the theory of evolution. What is a fossil? (16)

11. (a) The diagram shows the structure of the human respiratory system. Use the following list of terms to name the parts labelled A, B, C, D, E. (15)

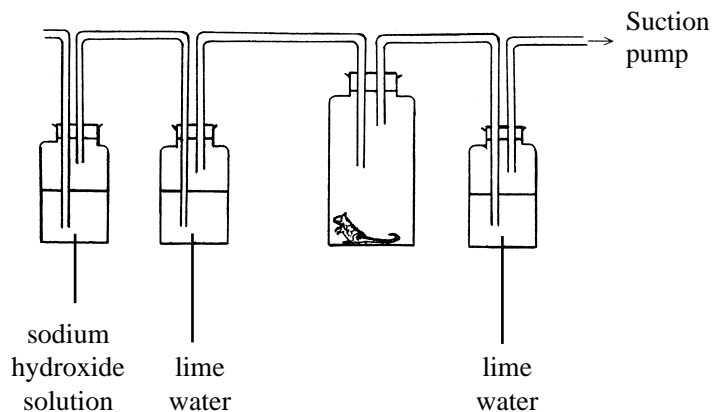
trachea, diaphragm, bronchus, alveolus (air sac), bronchiole, ribs, larynx (voice box)



- (b) Following inhalation, oxygen diffuses into the blood and is carried around the body.
- Which type of blood cell carries oxygen around the body?
 - Name the substance in this blood cell which combines with oxygen.
 - Name the substance produced by the combination of oxygen and the substance named in (ii).
 - State *one* way in which carbon dioxide is carried in the blood.
 - Glucose and oxygen are used by the body cells in respiration.

Write the equation for this process. (22)

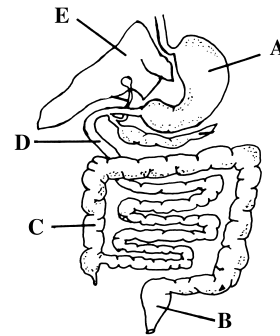
- (c) The apparatus shown in the diagram is used to show that living organisms produce carbon dioxide during respiration. Examine the diagram carefully and answer the following questions.



- Why is sodium hydroxide solution placed in the first flask?
- What happens to the lime water in the second flask when the air passes through it?
- What happens to the lime water in the fourth flask when the air passes through it?
- Suggest a control for this experiment.
- How would you modify this experiment to show that a plant respire? Explain your answer. (33)

12. (a) The following experiment was carried out by a group of students to show the effect of temperature on the rate of enzyme activity. They placed an equal amount of starch solution in three test tubes. They then placed the test tubes in water baths as follows: test tube A at 20 °C, test tube B at 37 °C, test tube C at 80 °C. After several minutes they put an equal amount of enzyme (amylase) into each tube. At one minute intervals they put a drop from each test tube on a white dish and added a drop of iodine solution to each.
- What is an enzyme?
 - Why did they add equal amounts of enzyme to each tube?
 - How did they keep the temperatures in the water baths constant?
 - Why did they add the iodine solution?
 - At which temperature would the starch be digested most quickly?
 - What results would you expect to find in the sample from test tube C? (21)

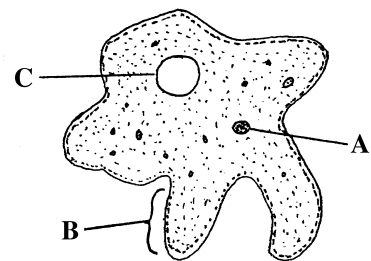
- (b) (i) Use the following list of terms to name the parts labelled A, B, C, D, E on the diagram of the human digestive system: oesophagus, duodenum, liver, spleen, stomach, colon, rectum, bile duct, gall bladder, pancreas.



- State *one* function for each of A, B, C. (24)
- (c) A balanced diet includes protein, fat, carbohydrate, vitamins, minerals, water, fibre.
- Name *three* elements common to carbohydrates, fats and proteins.
 - Name *one* essential mineral and state its function.
 - Name *one* vitamin and state its function **or** a symptom which results from its deficiency.
 - Why is fibre important in the diet? (25)

13. (a) The diagram shows an *Amoeba*.

- Name the parts labelled A, B, C,
- State one function of B.
- Describe, with the aid of diagrams, how *Amoeba* obtains its food.
- Name the phylum to which *Amoeba* belongs and state one of its characteristics. (27)



- (b) (i) The earthworm has the following characteristics: it is a segmented, triploblastic coelomate with pseudohearts, a clitellum, setae, crop and gizzard. Explain briefly each underlined term.
- State *two* ways in which the activities of earthworms are beneficial to gardeners and farmers.

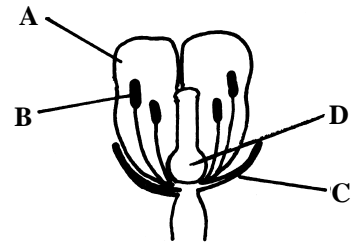
Outline briefly a laboratory experiment to show *one* of the beneficial activities of earthworms. Use the following headings as a guide:

— apparatus used

— materials to be added to the apparatus

— the result of earthworm activity (43)

14. (a) The diagram shows the structure of a typical flower as seen in vertical section.



(36)

- (i) Name the parts labelled A, B, C, D.
- (ii) State *one* function for each A and B.
- (iii) Explain the term pollination and state *two* common methods of pollination.
- (iv) Explain the term fertilisation

(b) Before growth can begin a seed may have to go through a period of inactivity.

- (i) What term is used to describe this period of inactivity?
- (ii) State *one* reason for this period of inactivity.
- (iii) What term is used to describe the process by which a seed begins to grow?
- (iv) What are the environmental conditions necessary for a seed to begin to grow?

(18)

(c) Vegetative propagation occurs in many plants.

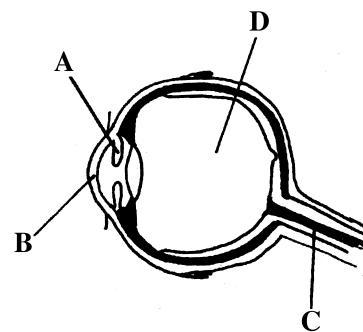
- (i) What is meant by vegetative propagation?
- (ii) Name any *two* methods of vegetative propagation.
- (iii) Give *one* advantage and *one* disadvantage of vegetative propagation.

(16)

15. Answer *two* of the following:

(35,35)

- (a) (i) Name the parts labelled A, B, C, D, on the diagram of the human eye.
- (ii) State a function for each of A and C.
- (iii) Explain briefly how the eye focuses for near vision.
- (iv) There are two types of light-sensitive cells in the retina. Name the two cell types and state which is involved with colour vision.



(b) Excretion means getting rid of metabolic waste from the body.

- (i) Name *three* waste materials of metabolism.
- (ii) Draw a labelled diagram of a vertical section of the human kidney.
- (iii) Name *two* excretory organs, other than the kidney, in the human body.

(c) What is meant by the term tropism? Name *two* types of tropism.

State *two* uses of auxins in horticulture or agriculture.

Describe an experiment to investigate the effects of gravity on the radicle of a seedling.

(d) What is an antibiotic? Describe an experiment to determine which antibiotic is the most effective one to use against a particular bacterium.

Suggest a problem that may arise from the excessive use of antibiotics in agriculture.