

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

Write Your Examination Number here

AN ROINN OIDEACHAIS
LEAVING CERTIFICATE EXAMINATION 1994
BIOLOGY — ORDINARY LEVEL

19235

WEDNESDAY, 15 JUNE — MORNING, 9.30 to 12.30

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)

Answer six questions. Each question carries 20 marks.
Write your answers in the spaces provided.
Keep your answers short.
Write your examination number at top.

Be sure to return this part of the examination paper; enclose it in the answer book you use for answering Part II.

1. Answer four of the following:

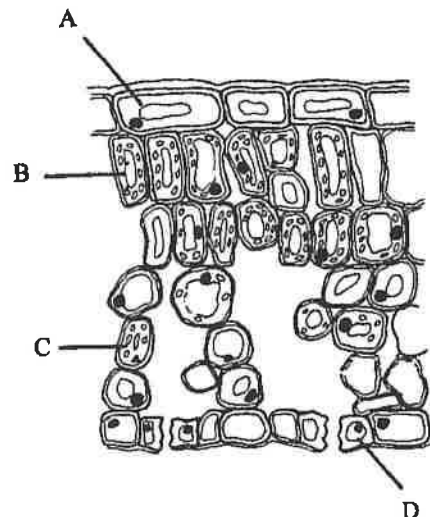
- (a) An animal which feeds on plant material is called a
- (b) Photosynthesis takes place in a structure within a plant cell called a
- (c) Cell membranes are composed of proteins and
- (d) The process by which an insect sheds its exoskeleton is called
- (e) Name the organ which regulates the water and salt balance in the human body

2. Name the cells labelled A, B, C, D in the diagram of a section through a leaf.

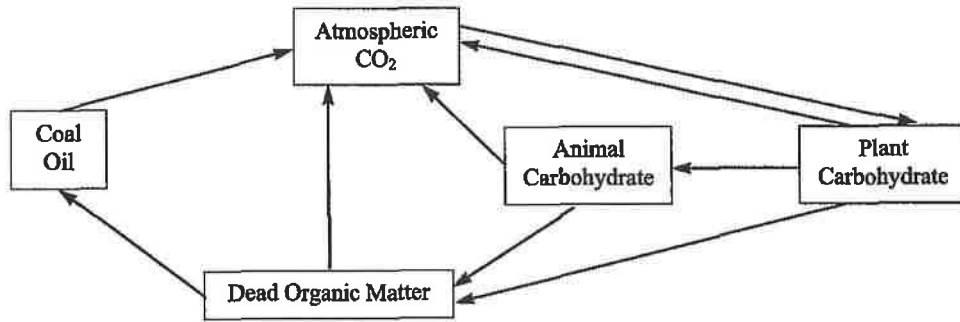
- A
- B
- C
- D

What is the function of cell B?

What is the function of cell D?



3. (i) The diagram represents the main elements of the carbon cycle in nature.



Let the letter X represent respiration, Y represent burning and Z represent photosynthesis. Place the letters X, Y, Z on the correct arrows on the diagram.

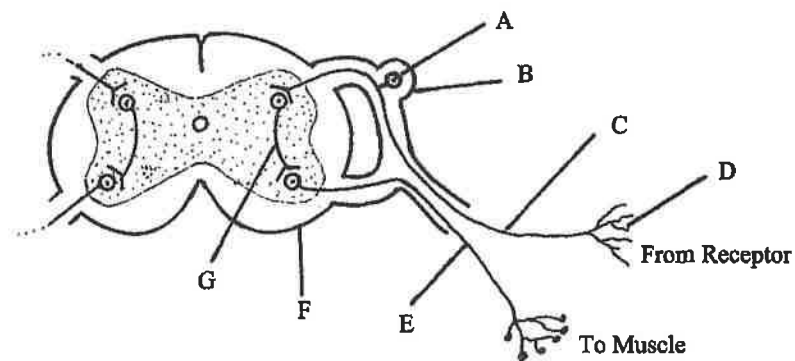
- (ii) Name a carbohydrate and describe a laboratory test to show its presence in a sample of food.

Name of carbohydrate

Description of test

.....

4. (i) The diagram represents a transverse section through the spinal cord of a mammal to show a reflex arc.



Complete the following box by placing the correct letter from the diagram opposite the appropriate word in the box.

Part	Letter from Diagram
Sensory Neuron	
Motor Neuron	
Dendrite	
Ganglion	

The spinal cord is a soft tissue needing protection. How is the spinal cord protected in the human body?

.....

- (ii) Name a hormone produced by the human body

State one function of this hormone

.....

5. You are asked by your teacher to set up an experiment to investigate the activities of earthworms using a wormery.

Name two materials, apart from food, that you would place inside the wormery.

(i) (ii)

Suggest a suitable food for the earthworms in the wormery.

.....

The lid of the wormery is perforated with a series of small holes.
What is the function of these holes?

.....

Why should the glass sides of the wormery be covered by black paper?

.....

State two changes you would expect to see in the material you have placed inside the wormery at the end of a week.

(i)

.....

(ii)

.....

6. Name the parts labelled A, B, C, D on the diagram of the dissected heart.

A.....

B.....

C.....

D.....

State precisely where the blood in A and E will flow to next.

A.....

E.....

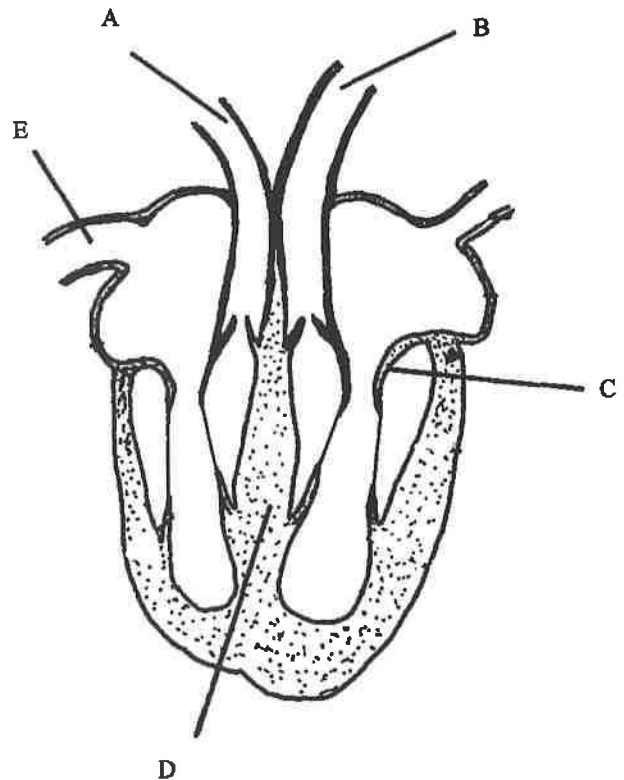
Why is there more muscle in the wall of the left ventricle than in the wall of the right ventricle?

.....

.....

Right Side

Left Side



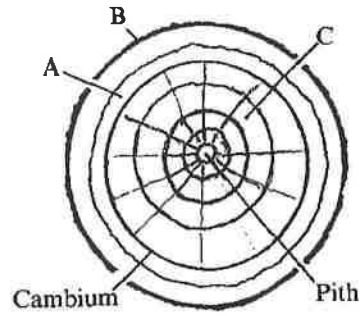
7. (i) The diagram shows the arrangement of tissues in a transverse section of a woody stem.

Name the parts labelled A, B, C.

A

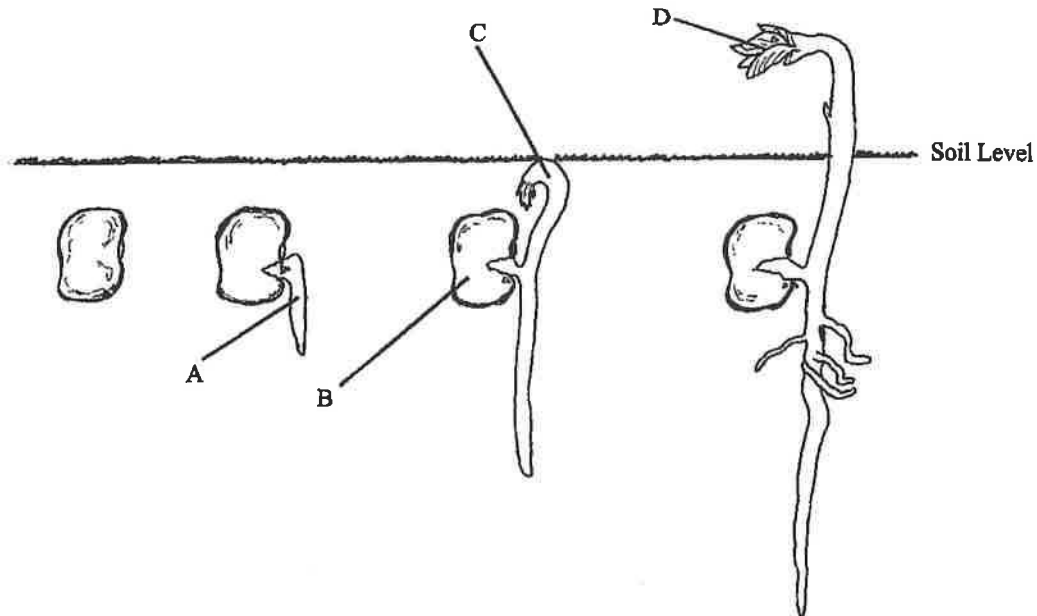
B

C



How many years growth are shown in the section?years.

(ii) The diagrams show stages in the germination of a seed.



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

A

B

C

D

Which of the following words describes the type of germination shown above?

hypogeal

epigeal

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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.

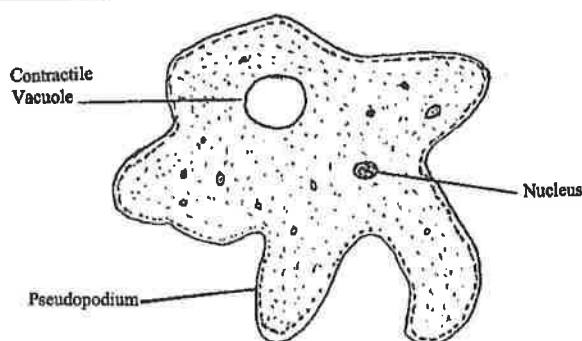
PART II (280 marks)

Write your answers to this part in your answer book.

Answer four questions. Each question carries 70 marks.

8. (a) The diagram shows *Amoeba*.

- (i) Name the phylum to which it belongs.
- (ii) Why is *Amoeba* placed in this phylum?
- (iii) Describe, with the aid of labelled diagrams, how *Amoeba* obtains its nutrition. (33)



(b) (i) Mitosis is described as a type of cell division. Describe the main features of prophase of mitosis.

(ii) A diploid cell contains two pairs of homologous chromosomes.

Draw a large labelled diagram to show the chromosomes in this cell during anaphase of mitosis.

How many chromosomes will there be in a daughter cell produced from this diploid cell by (a) mitosis, (b) meiosis?

If the homologous chromosomes are called A1A2 and B1B2, write down the possible combinations of chromosomes in the cells which are produced by meiosis.

(iii) In what organ does meiosis occur in the female mammal? (37)

9. (a) Explain the terms (i) ecosystem, (ii) biosphere, (iii) producer, as used in ecology.

Name a habitat you have studied and draw a simple outline map of that habitat. Indicate on the map at least two physical features.

Name two plants and two animals that you found in the habitat.

Give an example, from the habitat, of (i) competition between animals, (ii) competition between plants. (50)

(b) While on a field trip, your teacher asks you to take a small sample of soil back to the laboratory to see if there are any small animals in it. How would you carry out this experiment in the laboratory? (20)

10. Alternation of generations in the moss *or* in the fern is described as the alternation between a diploid asexual sporophyte phase and a haploid sexual gametophyte phase.

- Describe, with the aid of a clearly labelled diagram, the diploid asexual sporophyte phase in *either* the moss *or* the fern.
- Is the sporophyte you have drawn the dominant longer-lived phase or the less dominant shorter-lived phase of the plant's cycle?
- What does the gametophyte phase produce?
- Why is water required for fertilisation to be successful?
- What do antheridia produce?
- Give two reasons that the plant you have chosen in (i) above is *not* a member of the phylum Spermatophyta.
- Give two adaptations which enable *either* the moss *or* the fern to survive in its own environment.
- Both moss and fern are examples of plants which show a "division of labour" – that is the functions of the plant are divided out among different cells or tissues. Give three examples of this "division of labour" in *either* the moss *or* the fern. (70)

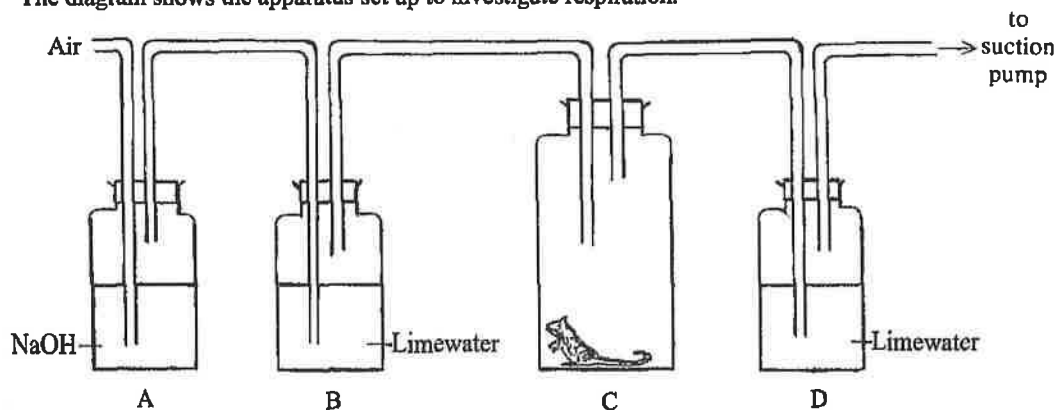
11. (a) Respiration is one of the characteristics of living organisms. What is respiration and why is it essential for all living organisms?

Give a balanced chemical equation for the process of respiration.

Some organisms respire aerobically and others respire anaerobically.

Distinguish between the underlined terms by giving three differences between the two forms of respiration. (31)

(b) The diagram shows the apparatus set up to investigate respiration.



- What is the purpose of the suction pump in this experiment?
- Why is NaOH (Sodium Hydroxide) used in flask A?
- Why is limewater used in both flasks B and D?
- Why is one of the tubes in each of the flasks A, B, D under the surface of the liquid?
- If the animal in flask C were replaced with a plant, what effect would this have on the limewater in flask D (a) in daylight, (b) in darkness? (39)

12. (a) List the principal stages of animal nutrition.

Name two vitamins and two essential minerals in the human diet. Give a source for each of the vitamins and minerals named and state also the function *or* deficiency symptom of each. (44)

- (b) An enzyme is defined as an organic catalyst. Explain the underlined term.

It is known that the rate of enzyme action increases as the temperature increases up to a certain point. As the temperature increases beyond that point the rate of activity slows down and eventually the enzyme ceases to react. Describe an experiment which would suggest these statements to be true. In your experiment use three temperature settings: (i) 20°C, (ii) 37°C, (iii) 60°C. (26)

13. (a) When a pure breeding black male guinea pig was crossed with a pure breeding white female guinea pig, all of the offspring in the first generation were found to be black. When a black male guinea pig and a black female guinea pig from the first generation were crossed, the ratio of the colours of the second generation was three black animals to one white animal. Coat colour is controlled by a single gene which has two alleles – one for black coat colour and one for white coat colour. The diagram illustrates the results of the crosses.

PARENTS	BLACK MALE GUINEA PIG	x	WHITE FEMALE GUINEA PIG
FIRST GENERATION	BLACK MALE GUINEA PIG	x	BLACK FEMALE GUINEA PIG
SECOND GENERATION	3 BLACK GUINEA PIGS		1 WHITE GUINEA PIG

- (i) What letter would you choose to represent the gene for (a) black coat colour, (b) white coat colour?
- (ii) Write down (a) the genotype, (b) the phenotype of the guinea pigs in the first generation.
- (iii) How many of the animals above are *definitely* homozygous for the gene for coat colour?
- (iv) How many of the animals above are *definitely* heterozygous for the gene for coat colour?
- (v) What proportion of the animals in the second generation *would you expect* to be heterozygous for the gene for coat colour? (30)
- (b) Blood group in humans is an example of a trait controlled by more than two forms of a gene. There are three forms or alleles of the gene which controls blood group, and only two can occupy the loci on a pair of homologous chromosomes. Alleles "A" and "B" are equally dominant and "o" is recessive.
- (i) What are the six possible blood group genotypes that can be found in humans?
- (ii) How many blood group phenotypes exist? Write down their names.
- (iii) Which blood group is commonly referred to as (a) the universal donor, (b) the universal recipient? (40)

14. (a) Explain the following terms and give an example in each case of their use in medicine or industry:

(i) vaccine, (ii) antibiotic.

Describe an experiment to demonstrate the presence of bacteria in the air.

(36)

(b) Fungi may be either parasitic or saprophytic. Explain each of the underlined terms.

Give an example of each type of fungus.

In the case of the saprophytic fungus you have named, describe its asexual method of reproduction.

(34)

15. Answer *two* of the following:

(35, 35)

(a) Explain the terms perennation and vegetative propagation.

Outline with the aid of diagrams two methods of vegetative propagation in plants.

Which structures in the flower develop into (i) the seed coat, (ii) the fruit?

(b) Draw a diagram of the human female reproductive system and label the following parts: ovary, oviduct, vagina, uterus, cervix.

Indicate, by placing the letter X on the diagram, where fertilisation usually occurs.

State two functions of the placenta.

(c) List the components of a fertile soil.

Explain how two of the components are important to plant life.

Describe an experiment to measure the organic content of a dried sample of soil.

(d) Draw a large labelled diagram of the human eye and label the following parts: lens, cornea, retina, iris, fovea, blind spot.

State the function of each of the underlined structures.