

Write Your
Examination
Number here

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1989

BIOLOGY — ORDINARY LEVEL

WEDNESDAY, 14 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.

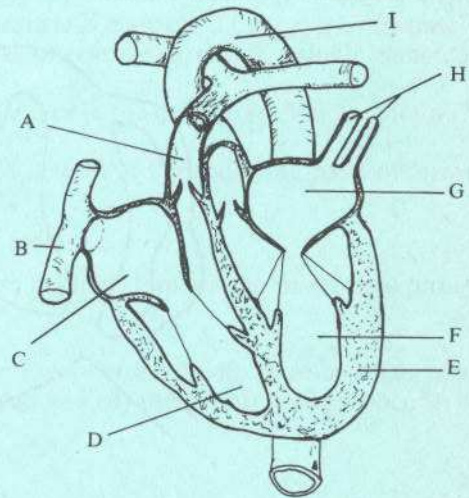
Write your examination number at top.

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) Where is bile produced in the human body?
- (b) What is the main function of sclerenchyma tissue in plants?
- (c) Name a plant that has nitrogen-fixing bacteria living in nodules (swellings) on its roots.
- (d) Name a substance which is excreted together with salts through your skin.
- (e) Name one substance transported in the phloem.

2. The diagram shows a section through the mammalian heart and some of its major blood vessels.



Give the appropriate letter to indicate the location of each of the following on the diagram.

- (i) Aorta
- (ii) Left ventricle
- (iii) The part of the heart which first receives nicotine from tobacco smoke inhaled into the lungs.
- (iv) The part which carries deoxygenated blood under high pressure.

Name the arteries through which the heart receives its own blood supply.

Are they visible in the diagram?

Blockage of these arteries can cause heart attack. State one aspect of modern life style or diet that doctors believe to be a factor in causing such blockages.

.....

3. (a) Name three mineral elements essential for plants and animals.

(i) (ii) (iii)

(b) Farmers and gardeners can improve crop growth by carrying out the following.

- A. increase the mineral nutrient content of the soil
- B. improve soil drainage
- C. raise the pH value of the soil
- D. avoid soil-borne infectious plant diseases

Indicate *one* of the above (A, B, C, D) that may be achieved by each of the following actions:

—adding lime to the soil;

—adding artificial fertilizer;

—adding farmyard manure;

—crop rotation.

(i.e. not growing the same crop on the same soil every year)

4. The diagram represents a cell as seen with the aid of an electron microscope.

Is this cell from an animal or from a plant?

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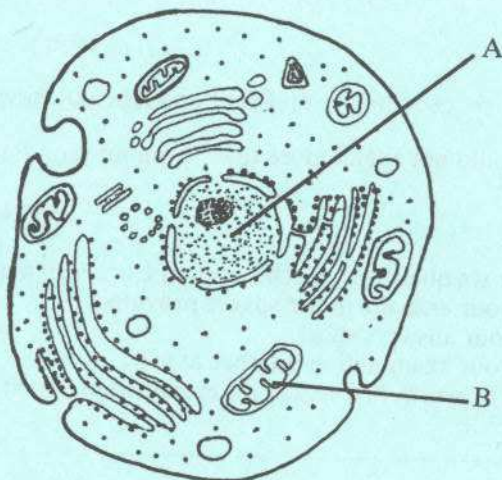
Give two reasons for your answer.

(i)

.....

(ii)

.....



Name the parts of the cell labelled and give *one* function for each part.

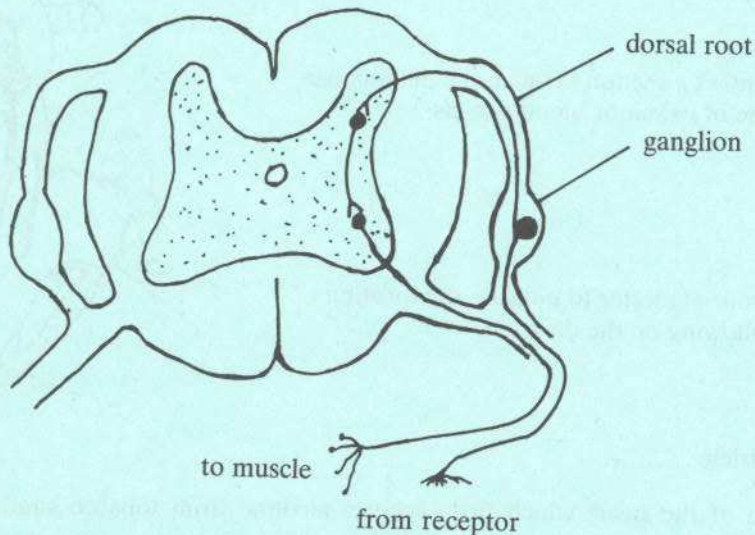
A..... Function

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B..... Function

.....

5. The diagram represents a transverse section through the spinal cord of a mammal to show a reflex arc.

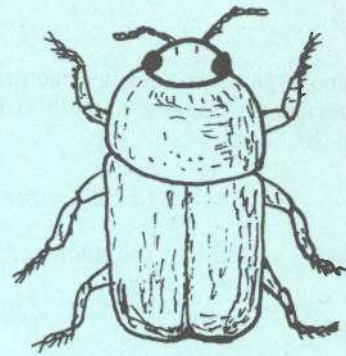
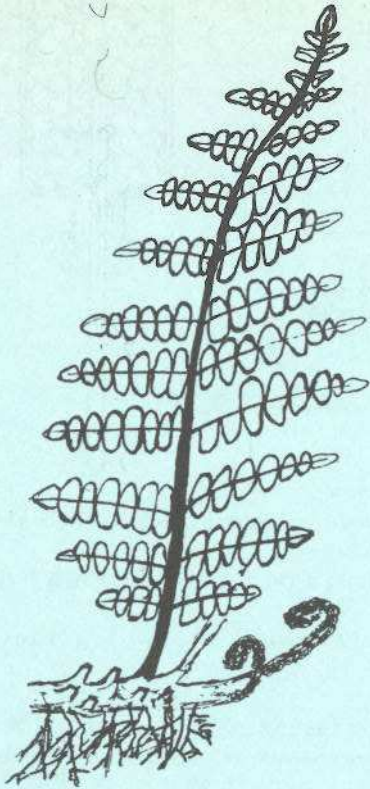


Label the following on the diagram: sensory neuron, motor neuron, an axon, spinal cord.

State briefly the sequence of events if you were accidentally to touch a very hot plate with your finger.

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6. (a) Identify each of the organisms below as indicated in each case. (Drawings not on the same scale.)

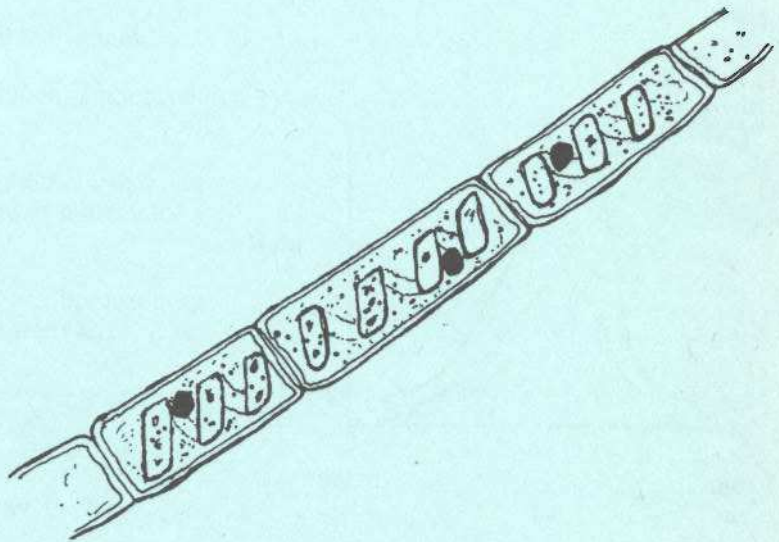
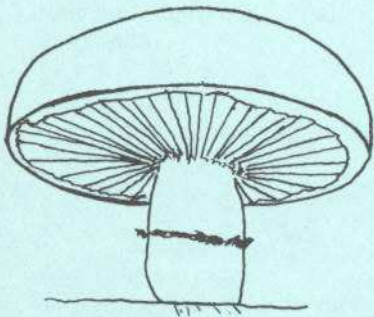


A. Plant group

B. Animal phylum

.....

.....



C. Plant group

D. Plant group

.....

.....

(b) For organism C state

(i) its mode of nutrition

(ii) its mode of dispersal.....

7. The diagram shows a vacuum flask containing germinating pea seeds, a moist cotton wool plug and a thermometer, set up for an experiment.

Suggest an experiment which might be carried out with the apparatus set up as shown.

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Why is a vacuum flask used in the experiment?

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Micro-organisms such as bacteria are likely to affect the result of the experiment. Suggest a method by which you could sterilize the flasks and the seeds.

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In what way might the micro-organisms affect the experiment?

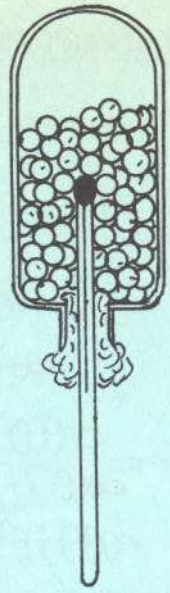
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What control would you set up when carrying out the experiment?

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Indicate what you would expect to observe in the experiment.

.....



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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. Describe, with the aid of a diagram, how a named flower is adapted for pollination by insects. State, with the aid of a diagram, how a wind-pollinated flower differs from the insect-pollinated flower. Bee-hives are often placed in orchards. How does the beekeeper and the orchard-owner benefit from this practice? (42)
- Pollination results in seed production by the plant. Name three other methods by which plants may be propagated *and* describe briefly *one* of those methods. (28)
9. In 1865 Mendel published results of experiments carried out with garden pea plants. In one of these experiments pure-breeding pea plants, which had grown from smooth-coated seeds, were crossed with pure-breeding plants from seeds with wrinkled seed coats. All of the seeds produced had smooth coats. These seeds and the plants that grew from them were then called the first filial generation or the F_1 generation. When Mendel grew plants from these seeds and allowed them to self-pollinate he found that in the second generation (F_2) of pea seeds there were 890 seeds with smooth coats and 298 seeds with wrinkled coats.
- Mendel's explanation of these results was that each characteristic is controlled by a pair of factors which segregate at gamete formation. Only one of a pair of such factors can be carried in a single gamete.
- (i) What is the modern word for Mendel's term 'factor'? Where in the cell are such factors found?
- By reference to Mendel's experiments above define each term in the following pairs of terms and give an example in each case:
- (a) homozygous and heterozygous, (b) dominant and recessive.
- The parent plants have diploid cells and the gametes are haploid. Explain the underlined terms. (42)
- (ii) If some of the F_1 generation from Mendel's experiment were crossed with pure-breeding smooth-seeded plants show (a) the type of the gametes produced and (b) the genotypes and phenotypes of the resulting offspring. (28)
10. (a) Draw a large labelled diagram to show the following parts of the breathing system of the human: ribs, intercostal muscles, diaphragm muscle, trachea, lungs. (24)
- Inhalation is active whereas exhalation is passive. Explain what is meant by this statement and outline the mechanism of inhalation (breathing in).
- The trachea wall contains U-shaped rings of cartilage. Suggest a reason for this. (21)
- (b) Why does oxygen pass from the air sacs into the blood stream? What part of the blood carries this oxygen?
- What is the source of carbon dioxide produced in the cells of the body?
- Describe an experiment to show that exhaled air contains more carbon dioxide than inhaled air. (25)

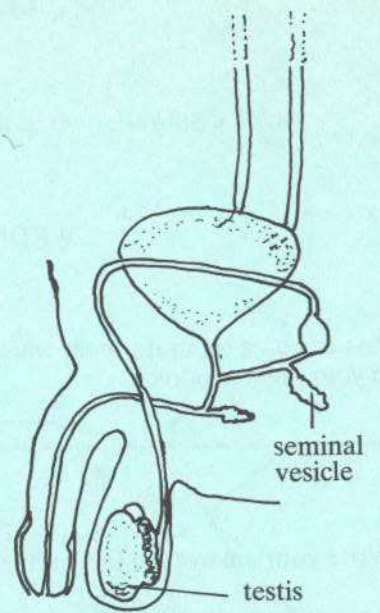
11. (i) Draw a large labelled diagram of the human female reproductive system.
Mark on the diagram where each of the following occurs: sperm released from male, fertilization, ovulation, implantation.
How does the womb provide for possible implantation during each menstrual cycle? (42)

- (ii) The diagram shows the human male reproductive system.

Suggest a reason why the testes are in external scrotal sacs rather than located inside the body cavity.

Give the function of the seminal vesicles.

The testes, besides producing the male gametes, are also endocrine glands. Explain the term endocrine gland and outline the endocrine function of the testes. (28)

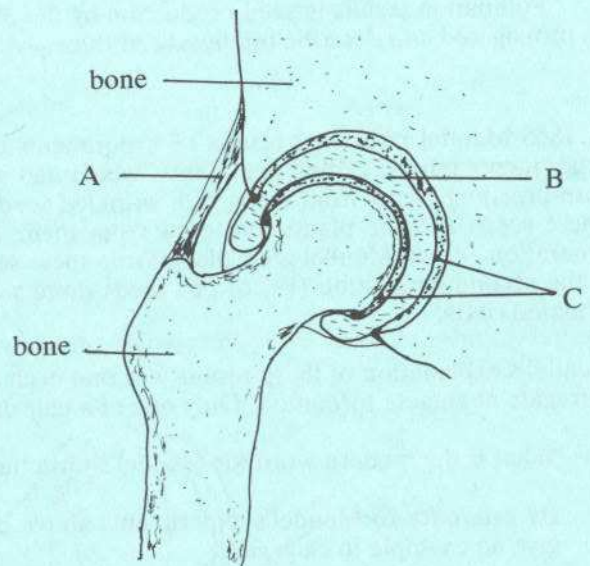


12. The diagram is of a ball and socket joint as seen in section. Name the parts labelled A, B, C and state the functions of each of these parts.

Give the names and the exact location of each of three other types of joint found in the human skeleton. (24)

Describe an experiment you would carry out in the laboratory to remove the mineral content of a bone. Describe what the bone feels like after the experiment and explain briefly why it becomes like this.

Name the mineral that helps to strengthen bones thus enabling them to function in support of the body. (24)



State two functions of the skeleton other than support and explain briefly how it carries out *one* of these functions.

State briefly how each of the following organisms achieves body support: insect; horse chestnut tree. (22)

13. (i) The diagram shows part of a food web of a woodland habitat. It shows the interdependence of the organisms for food requirements.

Explain the term interdependence and give an example from the habitat you have studied of interdependence other than for food.

Give two food chains from the food web in the diagram. State why the food chains are limited to four or five steps.

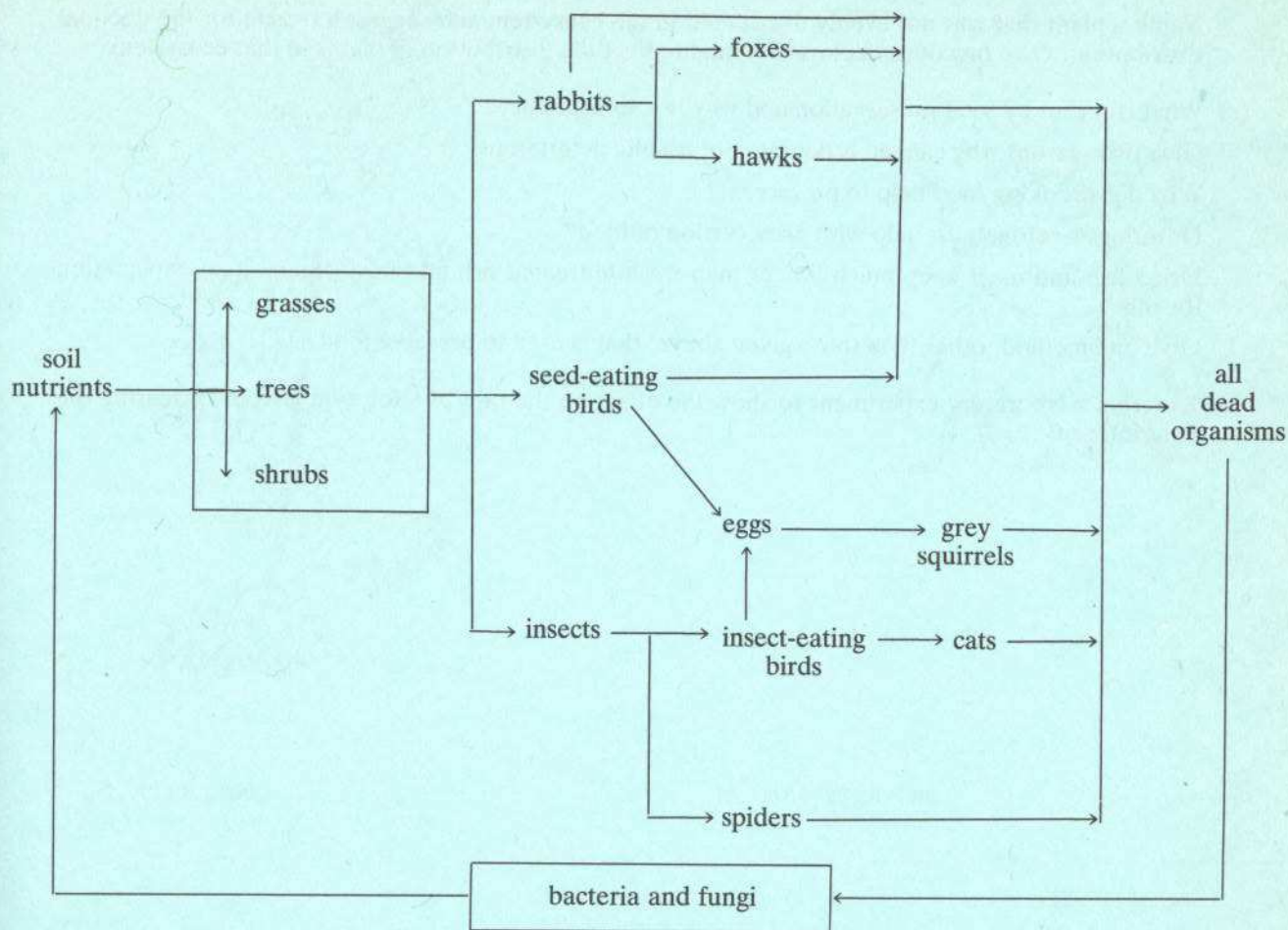
State the point in the food web at which energy enters the ecosystem and name the process by which it enters. (36)

(ii) Give two examples of competition from your own habitat studies.

For the food web shown name the animals whose food supply would be reduced (directly and indirectly) if the area was to be sprayed with insecticide.

State briefly the part played by bacteria and fungi in maintaining the food web.

(34)



14. A dicotyledonous plant was set up as shown in the diagram and left in a bright airy place for a period of time.

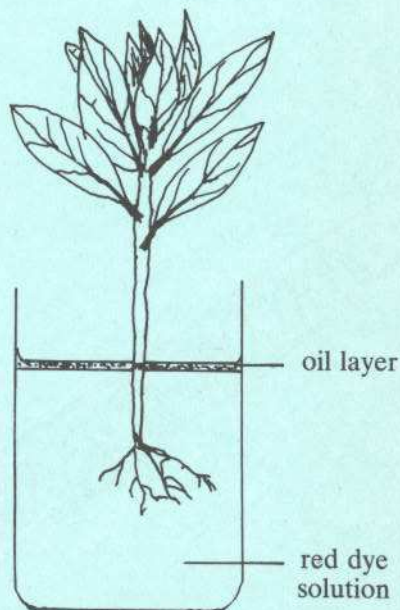
(i) Explain the terms (a) root pressure (b) transpiration.

What change would you expect to occur in the amount of red dye solution during the experiment? Explain your answer.

What was the purpose of the oil layer? (28)

(ii) Give an outline labelled diagram of a transverse section of the stem. Indicate on your diagram where you would expect to find the red dye located. (24)

(iii) Seedlings for use in this experiment should be lifted carefully from the soil and not roughly pulled out. Suggest a reason for this.



If the plant had been left in a dark humid room during the experiment how would the results of the experiment differ? Explain your answer. (18)

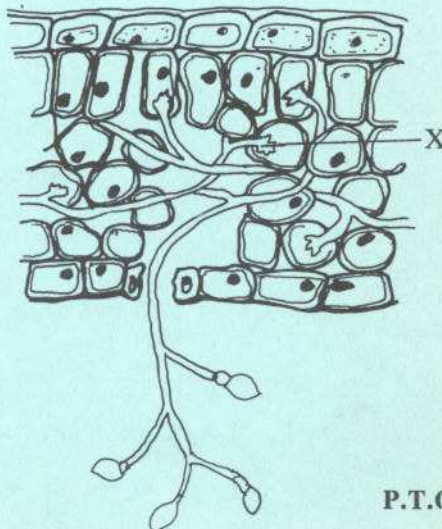
15. Answer two of the following. (35, 35)

(a) The diagram shows the potato blight fungus (*Phytophthora infestans*) as seen in a section through a leaf of a potato plant.

Name the structure labelled X and state its function.

Sporangia emerge from the stomata of the leaf and form spores. Outline the rest of the life cycle of the fungus from the spore formation stage to the infection of new potato plants the following year. Mention how the fungus survives the winter season.

List two methods of controlling this parasite (pathogen) and give the reason why each method is successful.



P.T.O.

- (b) The plant species in an ecosystem are not always evenly distributed throughout the ecosystem — they can be found in abundance in one part and be scarce or absent altogether from another part.

Outline how you would use a transect line to investigate the distribution of a named plant species in the ecosystem you have studied.

Name a plant that was not evenly distributed in the ecosystem and suggest a reason for the unequal distribution. Give *two* other factors that might affect the distribution of plants in that ecosystem.

- (c) What is meant by food preservation and why is it so necessary?

Give two reasons why canned food does not usually deteriorate.

Why does cooking food help to preserve it?

How does a refrigerator help with preservation of food?

Dried fish and meat keep much longer than fresh untreated fish and meat. Suggest an explanation for this.

Give one method, other than those given above, that is used to preserve food.

- (d) Describe a laboratory experiment to show the effect on the rate of photosynthesis of increasing the light intensity.