

Write your  
Examination Number  
here

**AN ROINN OIDEACHAIS**

**LEAVING CERTIFICATE EXAMINATION, 1974**

**BIOLOGY — HIGHER LEVEL**

**FRIDAY, 21 JUNE—AFTERNOON, 2 to 4.45**

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 120 minutes for Part II.

**PART I (120 marks)**

Answer any **six** of the questions (1-7). Each question carries 20 marks.

Write your answers in the spaces provided below. 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. (a) Name an organism having heterotrophic nutrition. ....
- (b) Name a place in the human body that has a ciliated epithelium. ....
- (c) In *Fucus*, production of gametes takes place in structures called .....  
.....
- (d) Schwann cells are found on .....  
.....
- (e) Intercostal muscles function in the process of .....  
.....
- (f) Insulin is a hormone and is secreted by special groups of cells called .....  
.....  
They are situated in an organ called the .....

2. Each of the terms in column 3 is related to one of the terms in column 1. Write in column 2 in each case the term from column 3 that most appropriately matches the term from column 1. Use each term once only. The first one is completed as an example for you.

Column 1	Column 2	Column 3
Brain cortex	..... Neuron.....	Spermatozoon
Meiosis	..... <i>hap</i> .....	DNA
<i>Phytophthora infestans</i>	..... <i>potatoes</i> .....	Gut lining
Crick and Watson	..... <i>DNA</i> .....	Blood clotting
Symbiosis	..... <i>L.L.</i> .....	Rickets
Adrenalin	..... <i>Ad</i> .....	Potato plant
Y-Chromosome	..... <i>SPX</i> .....	Haploid
Thrombin	..... <i>thb</i> .....	Neuron
Vitamin D	..... <i>vit</i> .....	Lichen
Embryonic endoderm	.....	Fast pulse rate
Krebs' cycle	..... <i>Krebs</i> .....	Respiration

3. Three test tubes A, B, C, are set up in a water bath at 37°C in an experiment to demonstrate the effect of human saliva on starch.

Tube A: 1% starch solution.

Tube B: 1% starch solution mixed with a sample of saliva.

Tube C: 1% starch solution mixed with a sample of saliva, the saliva having been boiled for 5 minutes and allowed to cool.

How would you test whether or not starch breakdown was occurring? .....

.....

What result would you expect on testing each of the solutions?

A .....

B .....

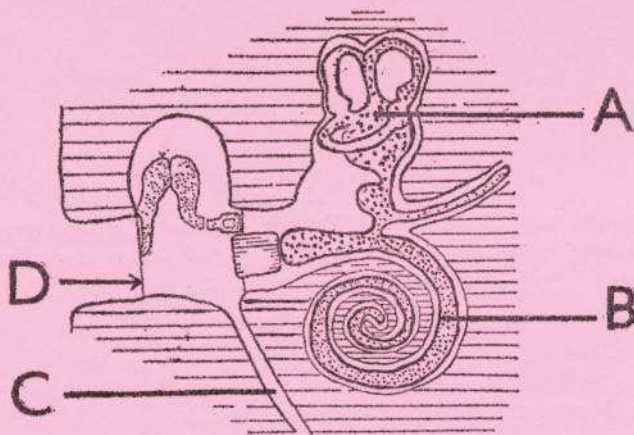
C .....

Explain the result obtained for the test on solution C.

.....

.....

4. Name the structures marked A, B, C, D in the diagram of the ear.



A .....

B .....

C .....

D .....

Mark in on the diagram the course of the auditory nerve.

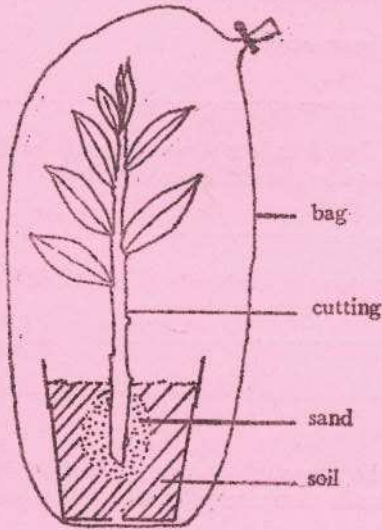
What would be the effect if A was damaged or surgically removed? .....

.....

What would be the effect if B was damaged?

.....

5. The diagram represents a recently potted "cutting" of a plant which has been placed in a transparent bag and then left in good natural light.



(i) What is the purpose of the bag?

.....  
.....

(ii) Good drainage is essential for fast root growth and a healthy plant. Why?

.....  
.....

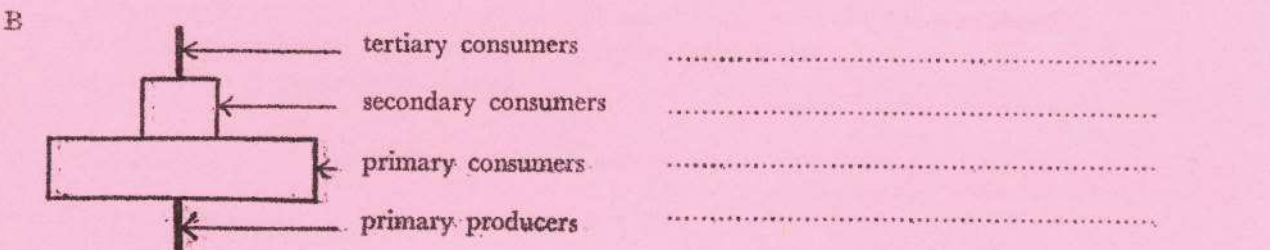
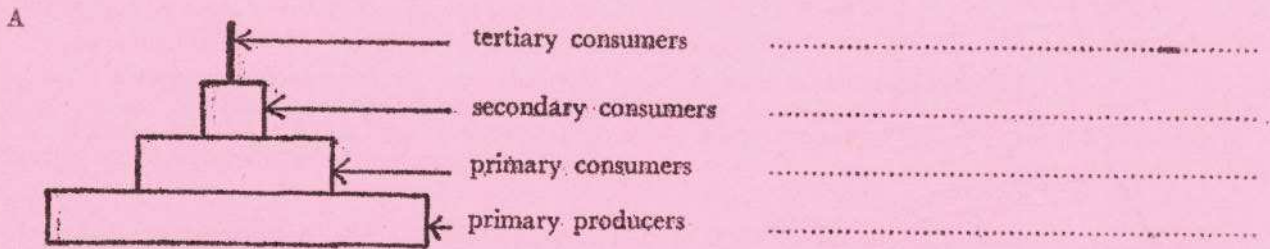
(iii) Plants propagated by this method are identical to the parent plant. Why is this?

.....  
.....

(iv) Explain the relationship between the respiration of soil microorganisms and the rate of photosynthesis in the cutting.

.....  
.....

6. The diagrams A and B represent two pyramids of numbers. Give examples from simple food chains or webs to illustrate each pyramid.



What units would you use to express standing crop biomass?.....

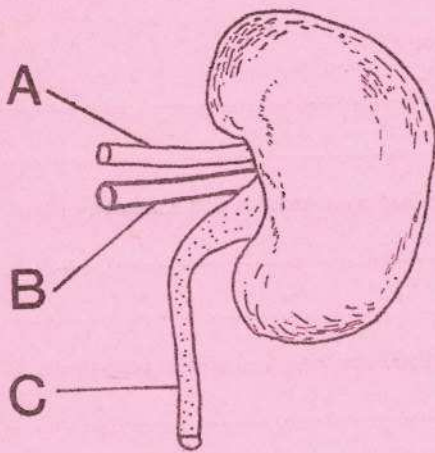
Why are there usually less than six steps in a pyramid of energy?

.....  
.....

If an insecticide like DDT, which accumulates in the tissues of organisms, had been used in an ecosystem containing pyramid A or B, which trophic level would eventually have the highest concentration?

.....

7. (a) The diagram represents a kidney and its major attachments.



(i) Name the structure C.

.....

(ii) To what organ is C directly connected?

.....

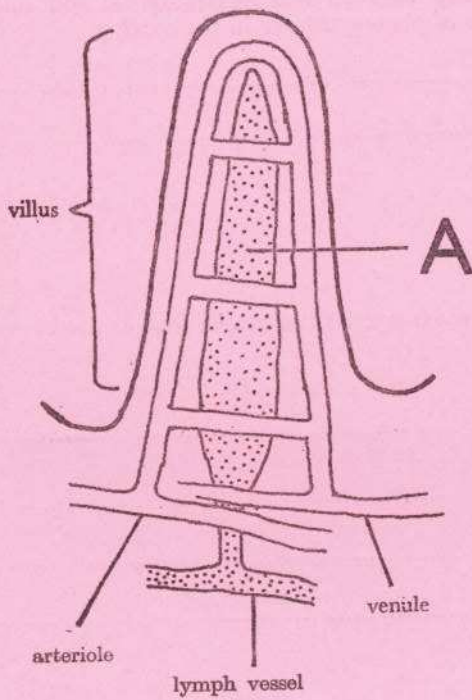
(iii) Name a soluble substance found in the fluid present in A and B but not normally found in the fluid present in C.

.....

(iv) Name a soluble substance present in the fluids in A, B and C.

.....

(b)



(i) Where would you find the structure shown in section in the diagram in the mammal's alimentary tract?

.....

(ii) Draw an arrow on each vessel to show the direction of fluid flow in the villus.

(iii) Name the structure A.

.....

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Answer **six** questions from Part I and **four** questions from Part II.

**PART I**

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

8. Explain, with the aid of diagrams, where and why a build up of parasite numbers occurs in the life cycle of the liver fluke (or tape worm).

Name two effective measures used in controlling the parasite. Mention the stage of the life cycle involved in each case.

Describe briefly the effects of the adult parasite on its host.

9. Outline the methods by which you would carry out

(i) a qualitative survey of the animals in a named habitat,

(ii) a quantitative survey of the frequency and cover of plants in the same habitat.

Use sketches where possible in support of your answer.

Mention one way in which each of the above types of survey would be of value to deep-sea fishermen if carried out in a previously unfished area.

10. Explain the term evolution. Write notes to show how study of the following provide evidence for the theory of evolution:

(i) fossils and the relationships between fossils and present groups of plants and animals,

(ii) the relationships between present groups of plants *or* of animals,

(iii) adaptation in plants and in animals.

11. In a study of the size variation in relation to age in a single species of snail five hundred snails were collected from a habitat in June and were grouped according to size of the shell. Another collection (same number) was made in the following January from the same habitat.

The results were as follows:

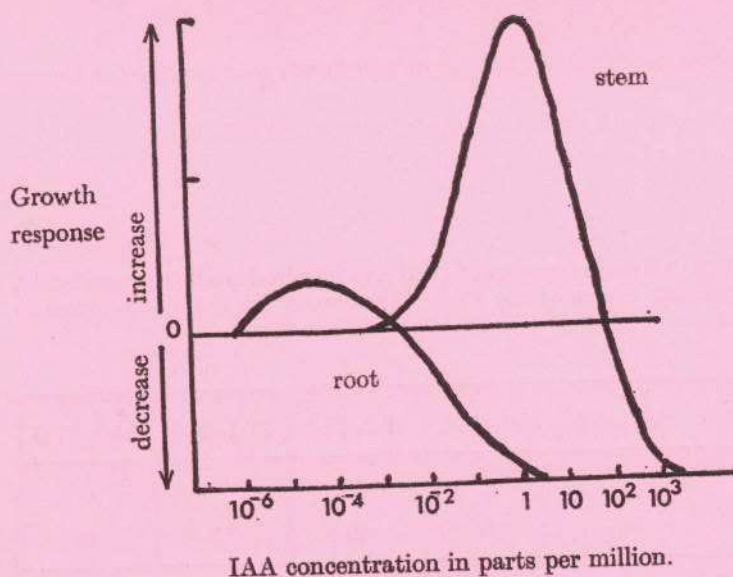
Shell length (mm)	0-3.0	3.1-6.0	6.1-9.0	9.1-12.0	12.1-15.0	15.1-18.0	18.1-21.0	21.1-24.0	24.1-27.0
Number of snails (June)	0	40	115	175	105	10	40	15	0
Number of snails (January)	0	0	0	0	25	120	190	125	40

- (i) What do these results suggest to you regarding the life cycle of this species of snail?
- (ii) Suggest two possible causes, other than age, for variation in size of individual snails.
- (iii) What method would you use to ensure that the snail collections were random samples of the snails in the habitat?
- (iv) The snails collected should be returned alive to the habitat. Why?
- (v) To what phylum do snails belong?

12. (a) Explain the term crossing-over. State when it occurs and briefly outline its importance in inheritance.
- (b) In cattle, the allelic genes red (R) and white (r) show an absence of dominance, the heterozygous animal having a roan coat colour; straight coat (S) is dominant over curly coat (s).
- In a cross between a curly red bull and a pure-breeding (homozygous) straight-coated white cow, what would be the offspring phenotype and genotype?
  - Show the possible genotypes and phenotypes of a cross between one of the offspring from (i) and a curly roan mate.
13. In an experiment, 30 cylinders of potato tissue of equal length and diameter were divided into six groups. The five cylinders of each group were dried by a standard technique, weighed and the weights recorded. The groups were then placed in sucrose solutions of different molar concentrations. Two hours later they were removed, dried and weighed again. The percentage change in weight was calculated. The results are shown below.

Group	Molar conc. of sucrose solution	Percentage gain or loss in wt.
1	0.1 M	+ 6.5
2	0.2 M	+ 4.0
3	0.3 M	+ 0.5
4	0.4 M	- 4.0
5	0.5 M	- 7.5
6	0.6 M	- 10.0

- Plot a graph of these results; put molarity along the horizontal axis.
  - What concentration of solution causes no loss or gain in weight? Why is there no loss or gain at this concentration?
  - Name the process involved in the gain and loss of weight by the tissues.
  - What term is used to describe the condition of potato cells left in a sucrose solution of 0.6 M concentration?
  - Draw a large labelled diagram of a plant cell showing the condition referred to in (iv) above. Explain how you would attempt to restore these cells to normal.
14. (a) State what is meant by an endocrine gland and give one example. Colour change in crabs is said to be under hormonal control. State briefly how you would test this theory.
- (b) The graph shows root and stem growth responses to the external application of a plant hormone indole-acetic acid (IAA) at various concentrations.



- Describe in words the effect of the auxin on the growth of (a) the stem, (b) the root.
- Which of the concentrations of the hormone  $10^{-4}$ ,  $10^{-2}$ , 1,  $10^2$ , if applied to the plant would probably (a) have little or no effect on plant growth, (b) cause the plant's death?
- State two uses in horticulture for plant hormones.

15. After harvesting, apples lose their sweetness and this has a wide economic importance in the transportation and storage of apples.
- If this loss of sweetness is due to tissue respiration,
- how would you show that stored apples respire?
  - what food substance in the apples is most likely to be used in tissue respiration?
  - outline a simple experiment to show that the substance was being broken down by enzymes associated with tissue respiration during the storage period.
- Using ideas gained from questions (a) to (c) above, outline what environment you would choose for good commercial apple storage and give reasons for your choice.