

WARNING

This Question Paper **MUST** be returned with your answer book(s) at the end of the Examination:
otherwise marks will be lost.

M. 43

Write your Examination Number here 

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LEAVING CERTIFICATE EXAMINATION 2002

BIOLOGY - ORDINARY LEVEL

WEDNESDAY, 12 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.

PART II (280 marks)

Questions 8 – 15

Write your answers to this part in your answer book.
Answer **four** questions.
Each question carries 70 marks.

PART I (120 marks)

Answer **six** questions. Each question carries 20 marks.
Write your answers in the spaces provided.
Keep your answers short.

1. Answer **four** of the following.

- (a) The number of chromosomes in a human gamete is
- (b) The substance given off during transpiration is
- (c) The study of relationships between organisms and their environment is called
- (d) Muscles are attached to bones by
- (e) The name of a group of organisms that has compound eyes is

- 2.
- (a) The male hormone testosterone is produced in and its function is
 - (b) In the human female an egg is released during the cycle.
 - (c) Fertilisation in the human female normally occurs in the
 - (d) In the uterus the embryo is nourished from the

3. An experiment was carried out to determine the percentage mass of water and the percentage mass of humus in a sample of fresh soil. The soil sample was heated in an oven at 100 °C and then weighed. This procedure was repeated. It was later heated strongly in a crucible over a Bunsen burner. The following masses (weights) were obtained:

Mass of fresh soil	100 g
Mass of dry soil	90 g
Mass of burned soil	70 g

- (a) What was the mass of water in the soil?
- (b) What was the % mass of water in the soil?
- (c) What was the mass of humus in the soil?
- (d) What was the % mass of humus in the soil?
- (e) In carrying out this experiment how would you know when all the water had evaporated?
.....

4. Answer the following by placing a tick (✓) in one correct box in each case.

(a) As a member of the phylum Chordata man has

- penta-radial symmetry
- an exoskeleton
- a notochord
- a spiny skin

(b) As a member of the phylum Echinodermata the starfish has

- jointed legs
- a flat body
- penta-radial symmetry
- setae

(c) As a member of the phylum Platyhelminthes the flatworm has

- a coelom
- an exoskeleton
- a flat body
- a segmented body

(d) As a member of the phylum Mollusca the snail has

- a segmented body
- jointed legs
- a muscular foot
- an endoskeleton

(e) As a member of the phylum Protozoa (Sarcodina) *Amoeba* has

- tentacles
- a contractile vacuole
- a cell wall
- setae

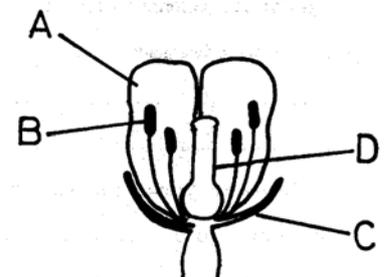
5. (a) Saliva is produced in the
- (b) An enzyme in saliva breaks down starch to
- (c) Pepsin is an enzyme found in the stomach and it starts the digestion of
- (d) Lipase is an enzyme that digests
- (e) Name a test to detect protein

6. In the case of **any seven** of the following indicate whether each is true (T) or false (F) by putting a circle around the appropriate letter.

Example:	Plant cells normally have a cell wall	<input type="radio"/>	F
(a)	Meiosis is a division of a nucleus into two identical nuclei	T	F
(b)	Glucose turns blue-black in the presence of iodine	T	F
(c)	Chlorophyll is essential for photosynthesis	T	F
(d)	Hydrotropism is the growth response of plants to light	T	F
(e)	Oxygen can combine with haemoglobin in red blood cells	T	F
(f)	Scurvy is caused by a lack of vitamin A	T	F
(g)	Xylem vessels are found in the leaf of a plant	T	F
(h)	An earthworm has a gizzard	T	F
(i)	The mushroom is a saprophyte	T	F
(j)	Sebaceous glands produce bile	T	F

7. The diagram shows a section through a typical flower. Name the parts labelled A, B, C, D.

- A
- B
- C
- D



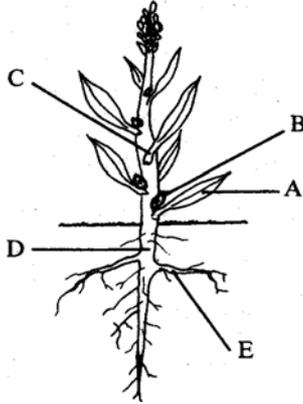
- State a function of the part labelled A
- State a function of the part labelled B
- State a function of the part labelled C

PART II (280 marks)

Write your answers to this part in your answer book.

Answer **four** questions

Each question carries 70 marks.

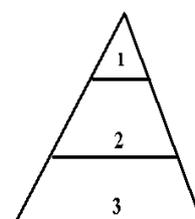
8. (a) (i) Draw a large diagram of a typical animal cell as seen with the aid of an electron microscope and label the following parts; nucleus, mitochondrion, cell membrane, endoplasmic reticulum.
- (ii) State **one** function each for the mitochondrion and the cell membrane.
- (iii) Name **three** features of a typical plant cell, which you would not expect to find in a typical animal cell.
- (iv) Where is food stored in a plant cell? (34)
- (b) Living things are distinguished from non-living things by a number of characteristics. These include the following - respiration, nutrition, excretion, responsiveness, growth and reproduction.
- (i) Explain each underlined word.
- (ii) In the case of nutrition, excretion and reproduction, explain how each of these occurs in *Amoeba*. (36)
- 9 (a) The diagram shown is that of a flowering plant.
Name the parts labelled A, B, C, D, E.
- Give **one** function of each of the parts labelled A, B, D. (33)
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- The diagram shows a flowering plant with the following parts labeled: A is a leaf, B is a stem, C is a flower, D is the main root system, and E is a lateral root.
- (b) Draw and label a vertical section through a typical leaf and label the following parts; upper epidermis, palisade cell, stoma, spongy mesophyll cell, air space, cuticle.
State **one** function each for the stoma and the cuticle. (37)
10. (a) Name **three** shapes of bacterial cell.
Draw and label a diagram of a typical bacterial cell.
State **three** ways in which bacteria are useful in industry or medicine. (31)
- (b) Describe an experiment to demonstrate the presence of bacteria in the air. (24)
- (c) A virus is an obligate parasite. What does this mean?
Name **three** diseases caused by viruses. (15)

11. (a) A square garden, measuring 50 metres on each side, was surveyed using a quadrat. The quadrat measured 1 metre on each side. The aim of the survey was to estimate the number of earthworms in the garden. In order to extract the earthworms, the vegetation inside the quadrat was removed using a shears and a solution of washing-up liquid was applied over the area. The quadrat was thrown randomly a total of ten times. The results of the survey are shown in the table below.

Quadrat number	1	2	3	4	5	6	7	8	9	10
Number of worms	25	20	19	31	27	25	15	11	19	28

- (i) Calculate the average number of worms per quadrat.
- (ii) Estimate the total number of worms in the garden (the area of the garden is important here).
- (iii) State **three** ways in which earthworms are of benefit to a garden soil. **(21)**
- (b) Distinguish between primary consumers and secondary consumers.
If all the secondary consumers were removed from a habitat suggest an effect on each of the following:
- (i) the numbers of primary consumers
- (ii) the numbers of producers **(18)**
- (c) Name a habitat that you have studied and describe **one** method used to collect animals in the named habitat. State **one** environmental factor measured during the study of the habitat and explain how it was measured.

The diagram opposite shows a typical pyramid of numbers.



- (i) What does a pyramid of numbers tell us?
- (ii) Name **three** organisms from the habitat you have studied and state the level of the pyramid at which each is found (use the numbers in the diagram).
- (iii) Why is a pyramid of numbers usually limited to a small number of levels? **(31)**
12. (a) The insect belongs to the phylum Arthropoda. Give **two** reasons for placing it this phylum. Draw a large labelled diagram of an insect and label the following parts; antenna, thorax, abdomen, spiracle.
State **one** function each for the antenna and the spiracle. **(27)**
- (b) Describe the life cycle of a **named** insect. In your answer refer to ecdysis and metamorphosis. **(25)**
- (c) State **three** ways in which insects are beneficial and **three** ways in which they are harmful. **(18)**

13. (a) Explain the following terms as they apply in genetics;

(i) locus (ii) haploid (iii) homozygous (18)

(b) In guinea pigs coat colour is controlled by a gene that has a dominant allele for black (**B**) and a recessive allele for white (**b**). A black guinea pig that is homozygous (**BB**) is crossed with a white guinea pig (**bb**) (cross 1). The offspring that result are then crossed with each other to produce the F2 generation (cross 2).

Copy the following into your answer book and give your answers in the spaces provided (genotype in brackets, phenotype on line).

Cross 1

(i) The genotypes of the original parents: (BB) x (bb)

(ii) The gametes produced by each parent: () x ()

(iii) The genotype of the offspring: (F1) ()

(iv) The phenotype of the offspring: (F1) _____

Cross 2

(i) The genotypes of the parents: () x ()
(Remember the offspring of cross 1 become the parents of cross 2)

(ii) The gametes produced by these parents: () () x () ()

(iii) The genotypes of the offspring (F2)
(To solve this use the Punnet square as shown)

(iv) The phenotypes of the offspring (F2) _____ (32)

(c) Mitosis is the division of a nucleus into two identical nuclei and this involves the stages named prophase, metaphase, anaphase and telophase.

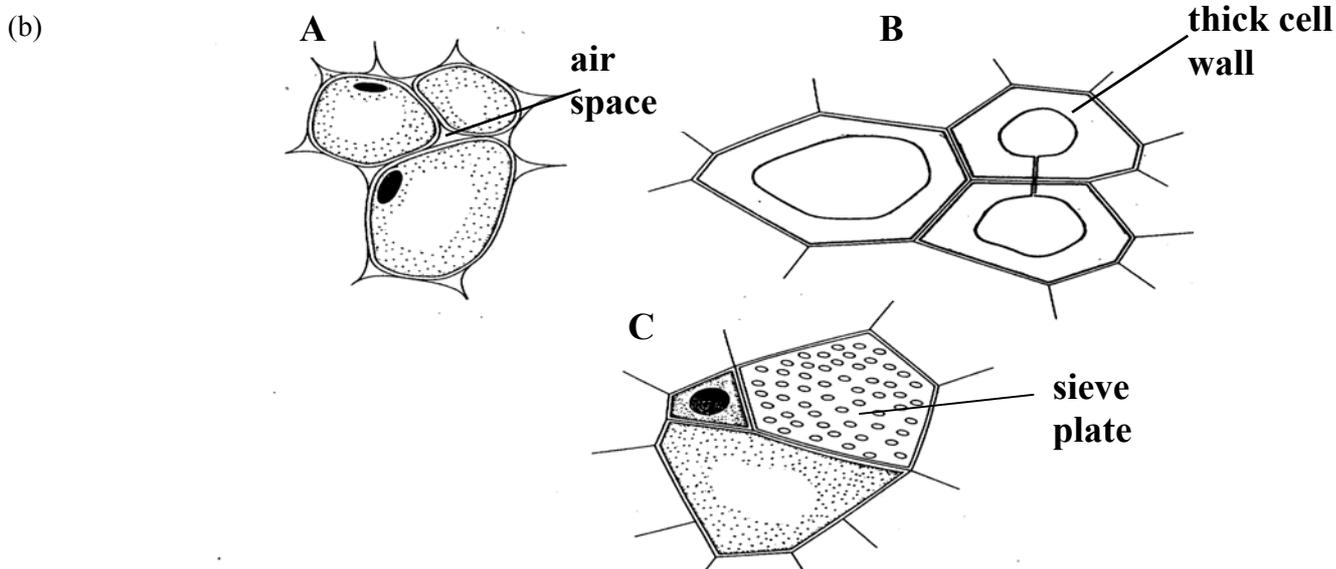
If a nucleus has four chromosomes, draw and label

(i) a diagram of metaphase

(ii) a diagram of anaphase.

(20)

14. (a) (i) Name **two** parts of the human skeleton that have a protective function, and in each case, state what is protected.
- (ii) State **three** functions of the human skeleton other than protection.
- (iii) A bone that had been immersed for some time in a dilute solution of hydrochloric acid solution was found to be flexible and rubbery. Suggest a reason for this. (33)



Adapted from The Associated Examining Board, Guildford, Surrey, England. 1994

- (i) Name any **two** of the plant tissues labelled A, B, C in the diagram above. State a function for each of the tissues you have named. Name a substance found in cell walls.
- (ii) Cambium is a meristem. What is a meristem? State **one** location of cambium. Name **two** tissues that result from the activity of cambium. (37)

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

- (a) (i) State **three** factors, other than temperature, that affect the rate of enzyme action.
- (ii) Describe an experiment to show that the rate of enzyme action is affected by temperature.
- (b) (i) *Rhizopus* (the bread mould fungus) is a saprophyte and *Phytophthora* (the potato blight fungus) is a parasite. Explain the underlined terms.
- (ii) Describe, with the aid of labelled diagrams, asexual reproduction in the bread mould fungus.
- (iii) Explain how the bread mould fungus obtains its food.
- (c) (i) Draw a diagram to show the structure of a motor neuron and label **five** parts. State **one** function for each of any **three** of the parts you have labelled.
- (ii) What is meant by a reflex action?
- (d) (i) Write a word equation to show the substances used and the products formed during photosynthesis.
- (ii) Where does the energy needed for photosynthesis come from?
- (iii) Where in a cell does photosynthesis take place?
- (iv) Describe an experiment to show that carbon dioxide is necessary for photosynthesis.