

**LEAVING CERTIFICATE 2002 BIOLOGY – ORDINARY LEVEL
MARKING SCHEME
PART 1 (ANY SIX QUESTIONS / THE BEST SIX / 20 MARKS EACH)**

- Q.1. any four **4(5)**
 (a) 23
 (b) Water
 (c) Ecology
 (d) Tendons
 (e) Insects / Crustacea any one
- Q.2. 5 points **5(4)**
 (a) Testis (gonad)/Interstitial cells any one
 Development of sex organs (secondary sexual characteristics) (Individual function)
 (b) Menstrual (monthly) (allow “menstruation”, “ovarian”, “ovulation”)
 (c) Oviduct (Fallopian tube)
 (d) Placenta(Umbilical cord)
- Q.3. 5 points **5(4)**
 (a) 10 g
 (b) 10 %
 (c) 20 g (d) 20 %
 (e) Constant mass /weight
- Q.4. 5 points **2(7) + 3(2)**
 (a) a notochord [3]
 (b) penta-radial symmetry [3]
 (c) a flat body [3]
 (d) a muscular foot [3]
 (e) a contractile vacuole [2]
- Q.5. 5 points **2(7) + 3 (2)**
 (a) Salivary gland/mouth any one
 (b) Maltose/glucose/reducing sugar any one
 (c) Protein/polypeptide any one
 (d) Fat/Lipid/Oil any one
 (e) Biuret/Millon's (or details) any one
- Q.6. 7 points **6(3) + 2**
- | | | | | |
|----|---|----|---|------------------|
| a. | F | g. | T | False, False |
| b. | F | h. | T | True, False |
| c. | T | i. | T | True, False |
| d. | F | j. | F | True, True, True |
| e. | T | | | False |
| f. | F | | | |
- Q.7. 7 points **6(3) + 2 [This mark for consistency and front loading instead of 4(2) + 3(4)]**
 A. Petal/Corolla any one
 B. Anther/Stamen/Androecium any one
 C. Sepal /Calyx any one
 D. Style /Carpel/Gynoecium any one
 Function 'A' = Attracts insects/protection any one
 Function 'B' = Produces pollen/produces male gametes any one
 Function 'C' = Protection/Photosynthesis any one



PART II (ANY FOUR QUESTIONS / THE BEST FOUR / 70 MARKS EACH)

- 8 (a) (i) Diagram (typical animal cell) 0, 4, 7
 [no cell wall and four structures named in question for 7 marks]
 Labels – as listed.
(nucleus, mitochondrion, cell membrane, endoplasmic reticulum.) 4 (2)
- (ii) (Mitochondrion function) – respiration (oxidation)(allow “powerhouse”) 3
 (Cell membrane function) -control of movement of substances
(selectively permeable barrier) OR Protection OR Support,
OR Shape OR Production of antigen OR Rejection 3
- (iii) (Name three features of a typical plant cell, which you would not expect to find in a typical animal cell.)
plastid /chloroplast (chlorophyll)/leucoplast /chromoplast /cell wall/
middle lamella /vacuole any three 3(3)
- (iv) (Where is food stored in a plant cell?)-
Leucoplast/starch grains in chloroplast/ pyrenoid/vacuole/e.r.
any one 4

(34)

- (b) (i) (respiration) – release of energy OR gaseous exchange 3
 (nutrition) - taking in (food) materials from the environment 3
 (excretion) – getting rid of waste (products of metabolism)
or named waste product 3
 (responsiveness) – reacting (responding to change) 3
 (growth) – increasing in size (or complexity)/developing/maturing
any one 3
 (reproduction)– making more of the same species (organism) 3
- (ii) (In the case of nutrition, excretion and reproduction, explain how each of these occurs in *Amoeba*.)
 (nutrition) - forms pseudopodia around prey(food)/food vacuole/secretes
enzyme/digests/absorbs any two 2(3)
 (excretion) –CO₂ (waste)/ diffuses out OR H₂O (waste)/ removed by con. vacuole
 2(3)
 (reproduction) – Binary fission 6
OR
[nucleus divides by mitosis/cytoplasm separates 2(3)]
OR
 [asexual reproduction – 3 marks]

(36)



9. (a) (The diagram shown is that of a flowering plant. Name the parts labelled A, B, C, D, E)
A = leaf (lamina/blade)/midrib B = bud C = petiole (leaf stalk)
D = root E = lateral root (root branch or side root) 5(3)
 [if D is not labelled or labelled incorrectly, then allow "root" for E]
- functions
- A = photosynthesis/transpiration/gas exchange/transport any one 6
- B = produces branch/produces flower/lateral growth/new growth
 any one 6
- D = support/absorbs water/absorbs minerals/
food storage anchor / transports water / transports minerals
perennation/propagation any one 6
- (33)
- (b) (Draw and label a vertical section through a typical leaf and label the following parts:
 Upper epidermis, Palisade cells, Stoma, Spongy mesophyll cells, Air spaces and Cuticle.)
- Diagram 0, 4, 7
 [diagram must show epidermis, palisade, mesophyll and stoma for 7 marks]
 Labels (as listed in question only) 6 (3)
- (State one function each for the stoma and the cuticle)
 (function of stoma) – Gaseous exchange/transpiration 6
 (function of cuticle) – prevents water loss/prevents water entry/protection 6
- (37)
10. (a) (Name **three** shapes of bacteria cells)
 sphere or round (coccus) / rod or cylinder (bacillus) / helix or spiral (spirillum) /
 curved rod (vibrio) any three 3(3)
 (Draw and label a diagram of a typical bacteria cell).
 Diagram 0,3,5
 [must show cell wall, cell membrane, nuclear material for 5 marks]
 Labels any four 4 (2)
- (State **three** ways in which bacteria are useful in industry or medicine.)
 Bioreactors /fermentation /brewing /antibiotics /cheese /yoghurt/*dairy products /
 vinegar /genetic engineering /pickling /pharmaceuticals /etc any three 3(3)
 [note: "cheese and dairy products" or "yoghurt and dairy products" is one point]
 (31)
- (b) (Describe an experiment to demonstrate the presence of bacteria in the air.)
Sterile agar (prepared plate) /Petri dishes /expose dish /control /incubate / close/ upside
down/ suitable temperature/leave for period /observe /compare /repeat
 any six 6(4)
- (24)
- (c) (A virus is an obligate parasite. What does this mean?)
 It needs/ a living cell (host) 2(3)
- (Name **three** diseases caused by viruses.)
AIDS (HIV)/smallpox /polio /flu /measles /shingles /cold /rabies/cold sores (herpes)
/foot and mouth /distemper /leaf mosaic, etc. any three 3(3)
- (15)

11. (a) (i) (calculate the average number of worms per quadrat)
22 6
- [correct formula - total no. of worms/divided by 10 3]
- (ii) (Estimate the total number of worms in the garden -the area of the garden is important here).
55,000 6
Area of garden = $50 \times 50 = 2,500$
Number of worms = $2,500 \times 22 = 55,000$
[allow 3 marks for correct area]
[If candidate has wrong answer for (i) and correct calculation for (ii) then allow 6 marks]
- (iii) (State three ways in which earthworms are of benefit to a garden soil.)
Increase aeration /improve drainage /mix soil layers /change pH
bring down surface vegetation / add nitrogen /increase humus
any three 3(3) (21)
- (b) (Distinguish between primary & secondary consumers)
(primary consumers) – feed on producers/are herbivores any one 6
(secondary consumers) – feed on primary consumers (herbivores) /are carnivores
any one 6
(Remove all sec. consumers – effect on the following):
(i) Primary consumer numbers would increase 3
(ii) Producer numbers would decrease 3 (18)
- (c) Name of habitat 3
One method used to collect animals (must match habitat) 3
One factor measured (any relevant abiotic or biotic factor) 3
How measured 3
(i) (What does Pyramid of numbers tell us?)
Shows the numbers (or biomass or energy)
at each feeding (trophic) level 3
(ii) (Three organisms from studied habitat)
Three organisms (must match habitat) 3(2)
appropriate level(s) 3(2)
(iii) (Why are pyramids limited to a small number of levels?)
Loss of energy 4 (31)



12. (a) (two reasons for placing the insect in the phylum Arthropoda).
jointed limbs / exoskeleton (OR one of those with one other e.g. triploblastic, coelomate, segmented, bilateral symmetry) 2(3)
 (Diagram of insect and label:-antenna, thorax, abdomen, spiracle)
 Diagram 0,4,7
 [must show head, thorax and abdomen for 7 marks]
 Labels (from list) 4 (2)
 Function of antenna – sense organ (or smell, touch, feel) 3
 Function of spiracle – gas exchange (or respiration, to get O₂ etc.) 3 (27)
- (b) (Describe the life cycle of a named insect. In your answer refer to ecdysis and metamorphosis)
Life cycle
Insect name 1
adults mate /female lays eggs /egg hatches into larva or nymph / larva or nymph feeds /grows / moults (ecdysis) / further larval or nymphal stages /changes into pupa or imago / adult structurally different from pupa or imago (metamorphosis) (Must include reference to ecdysis and metamorphosis)
any six 6(4)
 [mention of four stages of life cycle – e.g. egg, larva, pupa, adult – gains 4(4)marks] (25)
- (b) State three ways in which insects are beneficial and three ways in which they are harmful.
 (Three benefits) – pollination /honey /silk /pest control /wax /scavengers /etc.
any three 3(3)
 (Three harmful effects) – crop destruction /disease vectors /parasites / woodworm /etc..
any three 3(3) (18)

13. (a) (Explain the terms)
- (i) (locus) – position of gene (on chromosome) 6
 - (ii) (haploid) – containing one of each pair of chromosomes(allow “n”)6
 - (iii) (homozygous) – containing two identical alleles of a gene (TT, tt) 6
- (18)**

(b) Cross 1

| | | | | | |
|--------------|---------------------------|-------------|----------|-------------|--|
| (i) | Parental genotypes | (BB) | x | (bb) | |
| (ii) | Parental gametes | B | x | b | |
| (iii) | Genotype of Offspring | | | Bb | |
| (iv) | Phenotype of Offspring | | | Black | |

Cross 2.

| | | | | | |
|---------------------------------|---------------------------|------------------|--------------|------------------|-------------------|
| (i) | Parental genotypes | <u>Bb</u> | x | <u>Bb</u> | |
| (ii) | Gametes | <u>B</u> | <u>b</u> | <u>B</u> | <u>b</u> |
| (may be shown in Punnet square) | | | | | |
| (iii) | Genotypes of Offspring | <u>BB</u> | <u>Bb</u> | <u>Bb</u> | <u>bb</u> |
| (iv) | Phenotypes of Offspring | <u>Black</u> | <u>&</u> | <u>White</u> | 16(2) (32) |

- (c)
- (i) (If a nucleus has four chromosomes, draw and label) 0,2,4
 Diagram of metaphase of mitosis (must show 4 chromosomes on equator of cell for 4 marks)
 Labels – chromatids /chromosomes /spindle(fibres) /equator/pole
centromere /centriole/metaphase any three 3(2)
 - (ii) Diagram of anaphase of mitosis 0,2,4
 (must show 4 pairs of chromosomes separated for 4 marks)
 Labels – chromosomes /spindle(fibres) /centromere/centriole/pole
/anaphase any three 3(2)
(20)

- 14** (a) (i) (Name two parts of the human skeleton with protective function)
Rib cage /skull /vertebral column (vertebrae) any two 6 + 3
 (Name organs protected)
Heart /lungs /brain /nerve cord any matching two 6 + 3
- (ii) (Three functions of human skeleton other than protection)
Movement /support (strength)/blood formation /shape (structure)
/muscle attachment any three 3(3)
- (iii) (Bone flexible and rubbery having been immersed in acid, why?)
Mineral (calcium) content removed (dissolved/reacted with acid)
OR organic material only remains 6
- (33)**
- (b) (i) (Name any two tissues)
 A = parenchyma
 B = sclerenchyma
 C = phloem any two 6 + 3
- (State a function for each tissue named)
 A = storage/ photosynthesis/meristematic/packing
 B = support
 C = transport/translocation any two 6 + 3
- (Substance found in cell wall)
Cellulose/lignin /suberin any one 6
- (ii) (What is a meristem)
actively dividing cells or shows mitotic activity
 or a growth tissue any one 6
- (State one location of cambium)
vascular bundle /between phloem and xylem /between vascular bundles /
inside epidermis/below bark any one 3
- (Name two tissues that result from the activity of cambium)
Xylem /phloem / parenchyma /cork(phellem) /
secondary cortex (phelloderm). any two 2(2)

(37)



15. Any two parts or best two 35 + 35

- (a) (i) (Three factors, excluding temp., affecting rate of enzyme actions)
pH / enzyme concentration / substrate concentration /
product concentration / inhibitors any three 3(3)
- (ii) (Expt. To show affect of temp. on rate of enzyme action)
named enzyme / named substrate / different temperature conditions /
constant pH / fixed substrate concentration at start /
fixed enzyme concentration at start / control / named product formed /
product formation recognised / rate measured (time)/repeat
 any five 6 + 4(5)
(35)
- (b) (i) (Explain the terms)
 (saprophyte) – (a plant/ micro-organism) that feeds on dead (decaying,
organic)matter 3
 (parasite) – (an organism/plant/animal/micro-organism) that feeds (lives) on or in
(lives at the expense of) another organism (plant/ animal) 3
- (ii) (Asexual reproduction of bread mould)
Diagram(s) 0,3,5
 [must show sporangium and sporangiophore for 5 marks]
 Labels / description - sporangium / bursts / in dry conditions / spores released /
germinate any four 4(3)
- (iii) (How bread mould obtains its food)
hyphae (rhizoids /grow into substrate (bread) /secrete (release) enzymes/ digest /
absorb nutrients any four 4(3)
(35)
- (c) (i) (Structure of motor neuron)
 Diagram 0, 3, 5
 [must show cell body, axon, terminal buds for 7 marks]
 Labels (any five) 5(3)
 any three functions 3(3)
- (ii) (reflex action) –
automatic response OR example of 6
OR
[Response to stimulus (or example of) /without involving brain 2 (3)]
(35)

- (d) (i) (Word equation for photosynthesis)
carbon dioxide + water = glucose + oxygen 4 (3)
[allow formulae or symbols, allow "sugar" or "carbohydrate" for glucose]
- (ii) (Where does photosynthetic energy come from?)
Sun (light) 3
- (iii) (Where does photosynthesis occur in cell?)
Chloroplast 3
- (iv) (Expt. To show that CO₂ is necessary for photosynthesis)
Two destarched plants (or parts of) or leave in darkness/
Isolate plants from air or isolate soil from shoot
Soda lime in one /
Control /
Leave in light /
Test leaves for starch
Result any six 5 (3) + 2
(35)