



AN ROINN | DEPARTMENT OF  
OIDEACHAIS | EDUCATION  
AGUS EOLAÍOCHTA | AND SCIENCE

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*Bitheolaíocht*

*Ardleibhéal*

*Marking Scheme*

*Leaving Certificate Examination, 2001*

*Biology*

*Higher Level*

# Leaving Certificate Biology Higher Level 2001

## Marking Scheme

- Q.1**
- (a) nitrogen
  - (b) 23
  - (c) calcium
  - (d) anther
  - (e) cardiac sphincter
- 2(7) + 3(2)
- Q.2.**
- (i) (liver) fluke/tapeworm
  - (ii) *Spirogyra/Chlamydomonas*
  - (iii) *Fucus*
  - (iv) cactus/pine/marram grass/etc
  - (v) yeast/*Hydra*
  - (vi) *Phytophthora/* potato blight fungus/lichen
  - (vii) starfish/sea urchin/etc...
- 2(5) + 5(2)
- Q.3.**
- A = (sensory) receptor or named receptor  
(e.g. Meissner's corpuscle, Pacinian Corpuscle, heat or other receptor)
  - B = sebaceous gland
  - C = hair follicle
  - D = sweat gland or duct
- 4 (1)
- secretions - . sweat/sebum (oil)/water any two 2 (2)
- two functions – temperature control/insulation/protection against  
UV/protection against injury/immunity or protection against  
infection/sensory/vitamin D manufacture/ protection against water loss/fat  
storage any two 2 (2)
- germ layer – (layer) in embryo/of dividing (mitotic) cells or gives rise to  
tissues/ all three germ layers named any two 2 (2)
- which layer? – ectoderm 2
- (Vitamin) A/B(or named B)/C any one 2
- Q.4.**
- (a) (i) stem (twig)/bark/surface of tuber/root any one
  - (ii) gaseous exchange/passage of named gas any one
  - (b) (i) inner ear/utricle/saccule/macula any one
  - (ii) balance/position of head or body any one
  - (c) (i) ovary
  - (ii) (secretion of) progesterone
  - (d) (i) leaf (or correctly named part)/epidermis any one
  - (ii) regulates diameter of stoma any one
  - (e) (i) earthworm/insect or named insect any one
  - (ii) storage of partner's sperm any one
- 2(6) + 8(1)

- Q.5.** completion of diagram 4, 2, 0  
 labels – phosphate/deoxyribose/adenine or A/guanine or G 4(2)  
 Feulgen's/acetic orcein any one 2  
 making a copy 2  
 (genetic) information transmitted 2  
 interphase (accept prophase) 2
- Q.6** endocrine/ductless any one  
 (transported) in blood or lymph  
 long-lived(short-lived)/chemical(electrical)/more than one target(single target)  
 delayed response (immediate response) any two  
 oxytocin (accept oestrogen)  
 thyroxine  
 adrenaline 6 (3) + 2
- Q.7.** peptide two or more amino acids/ section of a protein any one  
 protein polypeptide/number of peptides/ large numbers of amino acids  
any one
- fibrinogen precursor of fibrin/soluble or inactive form of fibrin/substrate  
 for thrombin any one  
 fibrin (protein) forming clot or mesh or scab/product of thrombin  
 action any one
- ureter (tube) from kidney/(tube) to bladder any one  
 urethra (tube) from bladder/(tube) to outside / duct of penis  
any one
- cerebrum (part of) forebrain/ function any one  
 cerebellum part of hind brain/ function any one
- collenchyma living plant tissue/may have chlorophyll/thick-walled cells  
any one  
 sclerenchyma non-living plant tissue/ lignified cell wall/very thick wall  
any one
- [NB “plant” or “wall” must be mentioned in one case, otherwise a maximum  
 of 2 marks]
- 2(6) + 8(1)

8. (a) **heterozygous** (genotype with) two different alleles  
NB allow “gene” instead of “allele” when qualified by example e.g. Tt
- autosomes** chromosomes not concerned with sex determination or identical pair(s) of chromosomes
- locus** position of a gene on a chromosome
- haploid** one of each pair (type) of chromosome or one set of chromosomes
- mutation** change in genetic material (DNA)
- phenotype** expression of the genotype/ the result of the interaction of the genotype and the environment any one 6(3)
- (18)**

- (b) (i) on the same chromosome  
(accept correct explanation of “not linked”) 3
- (ii) the genes can assort independently (or explained)/variation any one 3
- (iii) BbSs 3
- (iv) BS Bs bS bs 4(2)
- (v) BbSs Bbss bbSs bbss 4(2)
- black brown black sooty pearl brown pearl sooty 4(2)  
[NB in (iii) to (v) a wrong answer cancels a right answer]
- (vi) BBSS BBSs BbSS any two 2(2)  
[NB wrong cancels right after first two answers]
- (37)**

- (c) palaeontology(fossil record)/comparative anatomy/comparative embryology/  
or other any one 3  
explanation four points 4 (3)

fossils – definition or types of e.g impressions, petrification/ series showing change (accept simple to complex)/change related to environmental change/e.g.evolution of horse or other example/ any detail of example/ suggestion of common descent

comparative anatomy – (homologous) structure in two or more organisms/same basic plan/adaptive radiation (or explained) or mention of vestigial structures /e.g. pentadactyl limb/any detail of example/suggestion of common descent

embryology – similarity between embryos of a group of animals / e.g.vertebrates/  
any detail of example/ similar developmental pathways/mention of vestigial structures or example (e.g. gill slits)/suggestion of common descent

**(15)**

9.

- (a) translocation - movement of (food) material through a plant or route described e.g. via phloem 3  
transpiration - loss of water vapour from a plant or correct part of plant 3  
transpiration stream – movement of water through a plant 3  
  
translocation in – phloem or sieve tubes 3  
transpiration stream in – xylem 3  
**(15)**

- (b) diagram (lamp, (viable) potometer – look for seal , plant, air bubble or scale) 6, 3, 0  
labels 2 (2)  
immerse potometer in water/cut leafy stalk under water/at an angle/place it in potometer/place end of capillary tubing in beaker of water/introduce air bubble/apply Vaseline between stalk and potometer to seal/method of varying light intensity stated/time the movement of air bubble along distance/ repeat/ equilibration/compare 6 (3)  
graph - axes correctly labelled/plot 2 (3)  
**(34)**

- (c) plasmolysis – shrinking of cell contents/ due to water loss /by osmosis 3(3)  
diagrams – cell contents in normal position in plant cell 3  
shrunken cell contents 3  
food preservation – salting or use of sugar/inhibition or death of organisms/enzyme inhibition any two 2 (3)  
**(21)**

10. (a) (i) protection/support/movement/making blood cells/shape  
any three 3(3)
- (ii) diagram (2 bones, cartilage, capsule or membrane, ligaments,  
\*7, 3, 0  
\*(any 3 for 7 marks, one missing = 3m)  
labels (ligament, membrane or capsule, synovial fluid, cartilage)  
4 (2)  
one function for each of three 3 (3)  
ligament – holds bones together  
membrane or capsule – retains fluid or secretes fluid  
fluid – lubricant or absorbs shock  
cartilage – reduces friction or absorbs shock or protects bone
- (iii) calcium/phosphorus/magnesium any one 3  
(Vitamin) D 3  
[NB wrong answer cancels right answer] (39)

- (b) (i) chitin 4
- (ii) Fungi/Annelida or earthworms 3
- (iii) five 3
- (iv) days:14 (between 12 and 16) 3
- (v) mgs:18 (between 16 and 20) or 60 (between 58 and 62) 3
- (vi) swell body/allow growth/split exoskeleton any one 3
- (vii) from larva to adult 3  
no exoskeleton 3
- (viii) **limitation** **overcome**  
movement less rigid between segments/  
jointed limbs/wings/light exoskeleton  
sensitivity stalked sense organs/antennae/palps  
gas exchange spiracles/tracheae  
any one 3 + 3

(31)

11. (a) (i) virus – borderline living organism/description of structure e.g. non-cellular or DNA(RNA) and protein 3  
**virus** **bacterium**  
non-cellular or description of structure cellular or mention of any organelle  
all parasites not all parasites or saprophytic or autotrophic  
obligate parasites not all obligate parasites  
(one side of argument sufficient) 2 (3)
- (ii) agar is not a living tissue/viruses need cells or host to reproduce or obligate parasites any one 3
- (iii) chicken pox/smallpox/foot and mouth/distemper/leaf mosaic /polio/measles/AIDS/shingles/rabies/myxomatosis etc. [NB – after the first 3 answers a wrong cancels a right] any three 3 (1)
- (iv) exchange of body fluid or named fluid/contact/ droplets/vector or explained [NB not “in air”] any two 2 (3)
- (v) introduction of antigen/any example of a vaccine/ weakened pathogen/antibody formation/by lymphocytes/without getting disease/future protection any three 3 (3)
- (vi) antibiotic – substance produced by a micro-organism (bacterium or fungus)/ that inhibits (kills) bacteria or fungi/ does not kill viruses does not harm human any two 2(3)
- (36)**

- (b) nitrogen gas - nitrate or plant  
nitrate – plant (protein)  
plant – animal  
animal/plant – dead organic matter (humus) (allow ammonium or waste or urea)  
dead organic matter - ammonium  
ammonium – nitrite (or allow nitrate)  
nitrite – nitrate  
nitrate – nitrogen gas  
**processes to be linked to above**  
(fixation) by symbiotic bacteria (or named)  
(fixation) by free-living bacteria (or named)  
(fixation) by lightning  
(nitrification) by bacteria (or named)  
(denitrication) by bacteria (or named)  
decay by bacteria and fungi (or named) any ten 10 (3)
- (ii) *Rhizobium/Azotobacter* nitrogen fixation  
*Nitrosomonas/Nitrobacter* nitrification  
*Thiobacillus* denitrification  
*Pseudomonas* decay any one 2 + 2
- [NB can get these points by referring back to cycle but must refer]
- (34)**

12. (a) terminal bud auxin (or similar term)inhibits lateral buds/inhibition lifted when terminal bud removed [NB apical dominance only = 4 marks]
- (b) arterioles (blood vessels not capillaries) dilate / blood nearer surface or blood entering capillaries
- (c) infected tubers in soil/produce infected plants  
OR  
sexually produced spores/in soil or infect plants  
[NB allow: infected tubers or sexual spores in soil/are source of infection]
- (d) high humidity(air is saturated)/guttation (water lost in liquid form)
- (e) zygospore /germinates when conditions favourable (when water present)
- (f) water snails or cercaria or miracidia/ need water or won't survive  
OR  
eggs/will not hatch
- (g) oxygen deficiencyor oxygen debt or more oxygen needed or lactic acid build up or increased carbon dioxide or low pH/oxygen needed to remove lactic acid or response to high carbon dioxide or response to low pH
- (h) (light stimulates) photosynthesis/causing utilisation of carbon dioxide
- (i) reduced ability to change curvature of lens or explained or longsight /convex lens increases curvature or corrects this
- (j) caused by a (recessive) gene on X-chromosome or sex linkage/ male with this allele will express phenotype or female has two alleles (genes)  
[NB allow 4 marks for first point given] 10 (4 + 3)



13. (a) (i) predator – an animal (accept organism) that kills (hunts) another animal for food 3  
 prey – the animal eaten (by a predator) 3
- (ii) abundant food supply/lack of competition/ lack of parasites/ further immigration any one 3
- (iii) competition for territory or food/diminishing food supply or habitat/disease or build up of parasites / adverse weather/human activity or named activity any one 3
- (iv) the numbers increased slightly/declined/population (slowly) increased/population stabilised any three 3 (3)
- (v) yes 3  
 little or no immunity initially or some die/gradual increase in immune individuals or fewer parasites/ balance eventually achieved any two 2 (3)
- or**
- no 3  
 virulent parasite/ eliminates population or population fluctuates/extension point 2(3)
- (vi) name of recognised habitat 3  
 example of predator/prey 6  
 (must match each other and the habitat)
- (39)**
- (b) (i) pH too low/% water too high/air too low any two 4 + 3  
 (ii) add lime 3
- (ii) mass of dish /mass of dish and soil/mass of soil/put in oven at 100°C (+or – 5<sup>0</sup>)/ until mass constant/ mass of water/formula [mass of water/mass of fresh soil X 100] 4(3)
- (iv) minerals or named mineral/humus/soil particles or named particle/ macro-organisms or named/micro-organism or named 3 (3)
- (31)**

14. (a) (i) elimination of metabolic waste 3  
egestion is the elimination of undigested material or egested materials not formed in the body 3
- (ii) urea/uric acid/ ammonia any one 3  
*Amoeba* – from surface/by diffusion  
or  
Earthworm - from coelom or via nephrostome /through nephridia/out by (nephridio)pores 2(3)
- (iii) liver 3  
**(18)**
- (b) diagram of nephron (for 6m – Bowman’s capsule, proximal tubule, loop of Henle, distal tubule, collecting duct) 6, 3, 0  
[1 missing or incorrect connection, 3 marks only]  
labels as above any four 4 (2)
- diagram of vascular supply (for 6m – afferent arteriole, glomerulus, efferent arteriole, capillaries) 6, 3, 0  
[1 missing or incorrect connection, 3 marks only]  
vascular supply labels: (branch of) renal artery/renal vein/afferent arteriole/efferent arteriole/glomerulus/capillaries  
any four 4 (2)  
**(28)**
- (c) (i) Bowman’s capsule (accept glomerulus) 3
- (ii) pressure from heart or from aorta or from renal artery/arterioles at both ends of glomerulus/ wide bore to narrow bore  
any two 2 (3)
- (iii) does not contain: (plasma) proteins/ enzymes/ hormones/ antibodies/cells/ platelets  
must mention two at least 3
- (iv) proximal tubule (wrong cancels right) 3
- (v) active transport (accept diffusion) 3
- (vi) amino acid/vitamin/water/uric acid/urea/mineral or ion e.g.  $\text{HCO}_3^-$ ,  $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{Cl}^-$ , /salt  
any one 3
- (vii) osmoregulation (or explained)/pH balance  
any one 3

**24**

15. (a) (i) dormant period – metabolic rate is very low/inactive period  
any one 3  
germination – (resumption of) growth of seed (or embryo or spore or other dormant structure) 3
- (ii) germination will occur only when conditions are favourable/ survival during adverse conditions/time for maturation/time for dispersal  
any one 3
- (iii) diagrams (for 6m minimum of two – plumule and radicle shown, cotyledons left behind – one missing =3m  
6, 3, 0  
labels or points – radicle/epicotyl/plumule/testa/ cotyledons 4(2)
- (iv) (experiment) with seeds + water + warmth + no oxygen/ (control) with seeds + water + warmth + oxygen/ (alkaline) pyrogallol or boiled water covered in oil/ results stated i.e. no germination without oxygen 4 (3)  
{NB mention of warmth or water once is sufficient]
- (b) (i) mechanical – physical breakdown of food material (or described, e.g. crushing, grinding, etc.) 3  
chemical – breakage of chemical bonds/ by enzymes/breakdown to soluble form (or simpler molecules) any one 3
- (ii) **stomach:** pepsin digests protein/HCl provides optimal pH/ HCl releases pepsin/ HCl hydrolyses starch/food acquires optimum temperature/food is crushed or churned /absorption  
any two 2(3)  
**liver:** secretes bile/bile emulsifies fats/bile activates pancreatic amylase/bile neutralises acid /stores food or named food/assimilation  
any two 2(3)  
**ileum:** name of enzyme and its substrate e.g. amylase/maltase/sucrase/lactase /lipase /enterokinase/erepsin /absorption/peristalsis  
any two 2(3)  
**pancreas:** amylase breaks down starch/lipase breaks down lipids/proteinase (trypsin) breaks down protein/neutralises acid  
any two 2 (3)
- (iii) produces insulin /in Islets of Langerhans or controls blood sugar levels  
any two 3 + 2  
[NB not “prevention of diabetes”]

