Coimisiún na Scrúduithe Stáit
State Examinations Commission

Scéimeanna Marcála *Scrúduithe Ardteistiméireachta, 2003*

Bitheolaíocht *Gnáthleibhéal*

Marking Scheme *Leaving Certificate Examination, 2003*

Biology *Ordinary Level*

Leaving Certificate 2003 Biology
Ordinary Level Marking Scheme

Part I - Answer **six** questions. Each question carries **20** marks

1. **any four** **2(8) + 2(2)**

(a) ear
(b) kidney
(c) movement /grip
(d) water (allow CO_2 / O_2)
(e) D

2. **ANY EIGHT 2(7) + 6(1)**

(a) **K** = (terminal) bud or scales
L = (leaf) scar
M = (lateral) bud
N = (scale / girdle / ring) scar
O = lenticels
(b) Gas (air) exchange
(c) 2 years or 1 year
(d) (Bud) scales fall off
(e) Deciduous

3. **Biological use of** **2(7) + 3(2)**

(a) Capturing insects or invertebrates or small animals.
(b) (measuring) transpiration / water uptake
(c) (testing for) carbon dioxide or showing respiration
(d) (testing for) water
(e) dissection

4. **Terms etc.** **2(7) + 6(1)**

(a) A = muscle or tendon
B = knee cap or patella
C = synovial fluid or synovial cavity
D = cartilage
(b) Shock absorber or protection or to reduce friction or to prevent wear.
(c) Hinge or synovial or articulating
(d) **any two** Ball and socket / pivot / gliding /fused / rotating / fixed / slightly moveable

5. **Location of** **2(5) + 5(2)**

(a) head or (under) brain
(b) eye
(c) ovary
(d) (under, near) liver
(e) intestine/alimentary canal / gut - any one
(f) pancreas
(g) ear

6. **Answer each 2(7) + 3(2)**

(a) Use oxygen or part of air /or produce carbon dioxide or respire.
(b) to absorb carbon dioxide
(c) Rise
(d) Part of air or oxygen is used by animal / carbon dioxide absorbed by soda lime.
(e) nothing / rise

7. (a) Diagram – <u>any two of</u> nucleus/wall/vacuole = 5 <u>but any one</u> = 3 **5, 3, 0**
Ignore wrong labels when assigning diagram mark
Labels - Cytoplasm, Cell wall, Cell membrane, Nucleus, Vacuole, Chloroplast and nucleoli
4(3)

(b) Name – must refer to labelled or clearly identifiable organelle - + Function (must match named organelle) **1+ 1**
Allow any organelle from the drawn diagram including vacuole for food storage.

(c) Iodine or aniline sulphate or methylene blue, Feulgen, fuchsin, acetic orcein.

<u>any one</u> **1**

Leaving Certificate 2003 Biology
Ordinary Level Marking Scheme

Part II

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

8. (a) Definitions **2(9) + 2(3)**

gene – unit of heredity or section of chromosome or section of DNA
locus – position of gene (on chromosome)
homozygous – (pair of) same or similar alleles or example e.g. (TT)
genotype – genes present in an organism or trait. **[24]**

(b)

Cross 1. – **Any Five** **5(2)**

Phenotypes of parents	Purple	White
Genotypes of parents	(PP)	(pp)
Genotypes of gametes	(P)	(p)
Genotype of progeny	(Pp)	
Phenotype of progeny	Purple	

Cross 2. – **Any Eight** **8(2)**

Phenotypes of parents	Purple		White
Genotypes of parents	(Pp)		(pp)
Genotypes of gametes	(P)	(p)	(p)
Genotypes of progeny	(Pp)		(pp)
Phenotypes of progeny	Purple		White

[26]

(c) (i) Centrioles move apart / centromere splits / spindles contract / chromatids or chromosomes separate.
any one **4**

Chromosomes become thinner /disappear from view /nuclear membrane forms /nucleoli re-appear /divides in two
any one **4**

(ii) Number of chromosomes halved in meiosis / meiosis produces haploid chromosomes / number of chromosomes the same in mitosis / genetic variation in meiosis / meiosis produces 4 nuclei / mitosis produces 2 nuclei / mitosis produces identical nuclei
any two **2(4)**

(iii) root tip/shoot tip/(apical or lateral) meristem/cambium/pollen grain /embryo sac / anther / ovary / carpel.
any one **4** **[20]**

9. (a) diagram – diffuse DNA + Wall = 7 but either one only = 4 **7, 4, 0**
labels **4(2)**
cell wall / capsule / flagellum(cilium) / plasmid <u>any one</u> **3** **[18]**

(b) <u>any four</u> **4(5) + 4(1)**
4(5) marks awarded for the methods.
Salting or Sugaring – Plasmolysis / dehydration / kills
Pickling – kills
Drying – dehydration / inhibition
Refrigeration – activity slowed
Freezing – slowed or killed
Pasteurisation – kills
Smoking – kills or prevented from entering food
Food additives or specific example – inhibits / kills
Canning or Bottling– kills
Sulphur dioxide – kills
Sodium nitrate – kills
Antibiotics – kill
Vacuum packing – inhibits
Irradiation – kills
Cooking or a form of it - kills

[24]

(c) agar plates /sterile / label / control (sterile soil) / sterilise loop / by flaming / cool / place soil in plate / open lid / streak agar / repeat with sterile soil / incubate / upside down / suitable temperature / in oven / leave for some time / examine (observe) / note any difference

OR

Take two slides / bury in soil / leave / remove gently / dry / pass through flame / place on staining rack / crystal violet stain / wash off with water / allow to dry / add immersion oil / examine under high power

OR

Agar plates / sterile / label / remove lid **(expose to water**) / control not exposed / incubate / upside down / in incubator (oven) / leave for some time / examine / note difference / suitable temperature <u>any seven</u> **7(4)**

[28]

10. (a) *Amoeba* - Protozoa / unicellular. **2(3)**

Earthworm - Annelida / segmented, clitellum, setae, triploblastic **2(3)**

Spider - Arthropoda / jointed legs, exoskeleton, spiracles **2(3)**

Rabbit – Chordata / notochord or allow backbone, or spinal cord / gill slits. **2(3)**

[24]

(b) (i) pond / water / sea water / soil <u>any one</u> **5**

(ii) cannot make its own food or it feeds on other organisms **5**

(iii) water – diffusion / contractile vacuole
carbon dioxide - diffusion.
solid or food waste – egestion <u>any one</u> **3 + 3**

[16]

(c) (i) contractile vacuole/pseudopodia/food vacuole / centriole / ectoplasm / endoplasm
<u>any two</u> **2(3)**

(ii) cell wall / chloroplast / pyrenoid / mucilage / cytoplasmic threads
<u>any two</u> **2(3)**

(iii) *Amoeba* nucleus divides / by mitosis / cytoplasm separates / binary fission / identical cells / new cells
<u>any two</u> **6 + 3**

Spirogyra piece breaks off or fragmentation / divide by mitosis / new filaments / identical <u>any two</u> **6 + 3**

[30]

11. (a) (i) Diagram **7, 4, 0**

4 chambers i.e. two above and two below + 2 vessels = 7
but wrong chambers or 1 blood vessel = 4
(Must show 4 chambers, Vena cava, Pulmonary arteries & veins and Aorta

Labels **- as listed.** **6(3)**
Bicuspid or tricuspid on either side, left ventricle, right atrium, septum, aorta, pulmonary artery)

(ii) left ventricle must pump blood around whole body OR **6**
right ventricle pumps blood to lungs only

[31]

(b) (i) (bone) marrow/named bone / liver / spleen any one **3**

(ii) (biconcave) disc or circular **3**

(iii) iron **3**

(iv) transport of oxygen or CO_2 **3**

(v) red – smaller / no nucleus / haemoglobin /carries O_2 /
has definite shape

OR

white – larger / nucleus /part of immune system / no haemoglobin

any one **3**

[15]

(c) locate pulse / in neck or wrist / using finger / use pulse monitor / on ear lobe / count for x seconds / record beats per minute or rate / repeat / average / exercise / locate pulse / count for x seconds / record beats per minute or rate / rest / repeat / count /average / compare or state results.

any six **6(4)**

[24]

12. (a) (i) Diagram – **7, 4, 0**

Any two of :
bag or bell jar / soda lime / plastic sheet on soil or pot excluded = 7
but if only one = 4

Labels any four **4(2)**
pot plant / transparent plastic bag or Bell-jar / soda lime or NaOH / light / soil in pot sealed with plastic sheet.

(ii) name of suitable plant (*Geranium* etc.) **3**

(iii) place in darkness / overnight or a minimum of 12 hours)
2(3)
[24]

(b) Place leaf in boiling water (briefly)
Place in test tube of alcohol
Place test tube in hot water
Remove leaf from tube
Place leaf in water
Spread on white tile
Add iodine
Blue or Black is positive
Brown is not positive

Any Five

4(5) + 2

[22]

(c) **This part to be marked 2(9) + 2(3)**

(i) to show photosynthesis OR
to show production of a gas or oxygen by a plant OR
to investigate effect of light intensity or temperature or CO_2 conc. on rate of photosynthesis
any one

(ii) pond weed *(Elodea)*

(iii) no light / no weed / dead plant / water with no dissolved gases etc
any one

(iv) add sodium bicarbonate (hydrogen carbonate) OR blow into it.

[24]

13. (a) Definitions **2(9) + 2(3)**

Omnivore	(an animal that) eats plants and animals
Decomposer	(an organism that) feeds on dead material OR breaks down dead organisms
Predator	(an animal that) kills for its food or prey or hunts
Parasite	(an organism that) feeds or lives on or off / at the expense of another living organism or host

[24]

(b) Name of habitat **3**

Three plants (must be related to habitat) **3 (2)**

Three animals (must be related to habitat) **3 (2)**

Quadrat - frame / indication of area enclosed or length of side / throw / many times or number of throws / at random / count organisms within or measure cover i.e. % cover/ relate to total area.

any three

OR

Capture-recapture – capture animals / method of capture / count/ tag / release / recapture / count the number tagged / apply a formula

OR

If full formula given then full marks

any three **3(4)**

[27]

(c) Soil sample taken by filling inverted can / volume of can OR volume of soil sample = A / crumble soil / add to fixed volume of water = B / note new volume of water + soil = C / note difference = A + B – C.

OR

Weigh an evaporating dish / weigh dish + sample of soil / mass of soil / dry the soil / place dish in oven / at 100 ^{o}C / for a period of time / remove and cool / weigh / repeat until no change in weight or to constant mass / loss in weight = weight of water.

any four **3(5) + 4**

[19]

14. (a) germination – seed / absorbs water / uses food store / begins to grow / hypogeal (or describe) / epigeal (or describe) / radicle / plumule

any two **4 + 3**

pollination – pollen on anther or on male / attaches to insect / carried by wind / transferred to carpel or to female / on another or same plant

any two **4 + 3**

dormancy – seed does not germinate immediately or seed needs time before germination or resting stage/ even though all conditions are there / reduced water content / low metabolism or low activity / seed coat needs to soften / needs period of cold / chemical inhibitors need to be leached / survival / perennation / reference to other plant organs e.g. bud

any two **4 + 3**

[21]

(b) oxygen / water / suitable temperature – do not allow light **3(3)**

seeds / state missing factor / method of removal of factor / other factors present / control / explain control / leave / observe / result of experiment / result of control.

any five **5(3)**

[24]

(c) (i) reduces competition / for space / for minerals / for light / for water / colonises new areas / increases population / improves survival of species

any one **7**

(ii) Animal, e.g. burdock, goose grass

Swallowed / eaten / egested, e.g. berries

Pecked / discarded, e.g. soft fruits

Wind, e.g. sycamore, ash

Water, e.g. water lily, alder

Explosive or self, e.g. furze, pea, bean, lupin, geranium

Three methods + Three examples **3(5+ 1)**

[25]

15. (a) (i) Diagram **7, 4, 0**

Iris, lens and optic nerve in correct position = 7
But any one missing or in wrong position = 4

Labels **6(3)**

(ii) Lens changes from thin to thick **2**

(iii) Functions e.g.

- ciliary muscle contracts to change shape of lens
- iris contracts to control amount of light entering eye etc.

any two **6 + 2**

(b) (i) **name** (must match diagram and description) **1**

Diagram **7, 4, 0**

[side view - antenna, three pairs of jointed legs and three body regions] = 7
[Ventral view – antenna, 3 pairs of legs, abdomen] = 7
[But any one missing] = 4

Labels only any five **5(3)**

Three body regions / head, thorax, abdomen, / exoskeleton or chitin / mouth parts / antennae / (compound) eye / segments / legs / wings / spiracles / etc.

(ii) life cycle – female lays eggs / eggs hatch / larva or caterpillar feeds / ecdysis or moults / pupa or cocoon / metamorphosis / adult or chrysalis / mates

Deduct 3 marks (once) for wrong sequence

any four **4(3)**

(c) (i) Digestion – breakdown of food / into smaller substances or into a form that can be absorbed **2(3)**

Physical digestion – tooth action or e.g. cutting / chewing /grinding / peristalsis.

any one **3**

Chemical digestion – enzyme / substrate / product

any two **2(3)**

(ii) **(mouth)** - saliva or amylase / starch / broken down to maltose
(small intestine) - pancreatic juice / amylase /intestinal juice / amylase or maltase or sucrase or lactase / starch or maltose or sucrose or lactose / or glucose or fructose or galactose or monosaccharides

any five **5(4)**

(d) **ANY FOUR** **3(4 + 4 + 1)** + **1(4 + 4)**

(i) Viruses - sub microscopic or smaller than bacteria / not cellular / DNA and/or RNA / and protein / parasite / sphere / rod / bacteriophage /replicate by injecting DNA into host / causes disease or name of disease / not affected by antibiotics / provoke immune response

any three

(ii) Thyroid gland – in neck / endocrine gland or produces hormone / thyroxine / contains iodine / controls metabolism / regulates metamorphosis / deficiency leads to cretinism or myxoedema / too much causes goitre **any three**

(iii) Binomial system – Linnaeus / Latin / genus / species / all species have a specific binomial/ first name with capital letter / second name with small letter / example / universal **any three**

(iv) Yeast – fungus / single cell / saprophyte / anaerobic respiration / produces CO_2 / produces alcohol / used in brewing / baking / cause disease or name of disease / budding **any three**

(v) Xerophyte – plant / adapted to dry conditions / reduced leaf / sunken stomata / rolled leaf / leaf spines / thick cuticle / named example

any three

(vi) Earthworms in agriculture – burrow in soil / improve aeration / improve drainage/ mix layers / improve soil / improve fertility / add humus

any three