

LEAVING CERTIFICATE BIOLOGY HIGHER LEVEL EXAM PAPER SOLUTIONS

Sample Paper 2

Section A

- Q1** (a) A = Radicle
B = Hypocotyl (Hook)
C = Testa
D = Cotyledon
E = (True) Leaf
- (b) Cotyledon and endosperm
(c) Starch (or fat or oil)
(d) Digestion
(e) To allow enzyme action
- 10 (2 marks)**

Q2 (a)

	Bacteria	Yeast
Cell wall	Present	Present
Pro-Eukaryotic	Prokaryotic	Eukaryotic
Reproduction	Binary	Fission Budding
Auto/Heterotrophic	May be either	Heterotrophic
Size	Smaller	Bigger

10 (1 mark)

- (b) Round, Rod, Spiral **3 (1 mark)**

(c)

Bacteria	Virus
Have nuclear membrane	No nuclear membrane
Have cell wall	No cell wall
Have cell organelles	No organelles

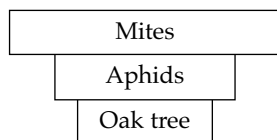
any 2 (1 mark)

- (d) Food, water, pH, temperature, oxygen (present/ absent),
external solute concentration **any 3 (1 mark)**

- (e) Spores (or endospores) **(2 marks)**

- Q3** (a) (i) Food chain (3 marks)
 (ii) Spider or Thrush (3 marks)
 (iii) Snails and greenflies or greenfly and apple moth (3 marks)
 State what they compete for (e.g. lettuce or apples) (1 mark)
 (iv) Producer = lettuce or apples (1 mark)
 Primary consumer = snail, greenfly or apple moth (1 mark)
 Secondary consumer = Robin, Spider or Thrush (1 mark)
 (v) Any correct example (3 marks)

e.g.



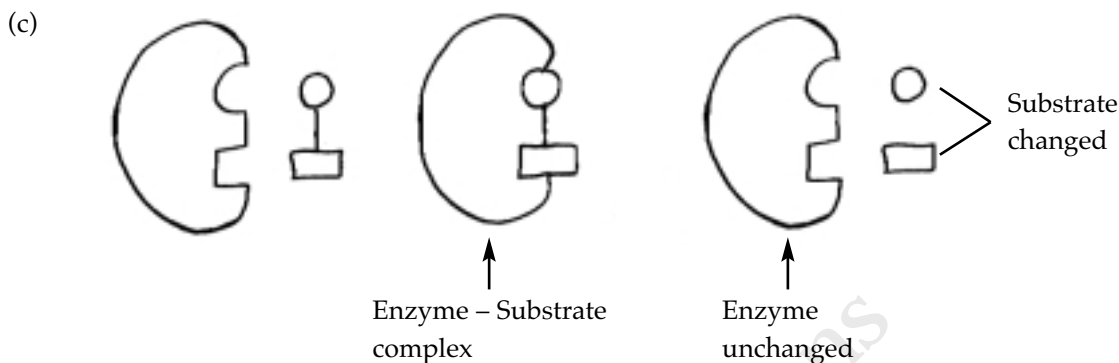
- (b) The statement is true (1 mark)
 It is true because of the huge loss of energy between each trophic level (3 marks)

- Q4** (a) Restriction enzymes cut DNA at particular sites (or where a certain sequence of bases occur) (3 marks)
 (b) 3 (3 marks)
 (c) 10910 (3 marks)
 (d) Ligation or splicing (3 marks)
 (e) It combines DNA from different species (3 marks)
 (f) Named animal e.g. sheep (2 marks)
 Product e.g. makes human clotting protein (3 marks)

- Q5** (a) Herbs speed recovery from colds (2 marks)
 (b) As above (2 marks)
 (c) (i) Too small or too few (2 marks)
 (ii) Selection was not random/all 5 had colds/all 5 were female any 2 (2 marks)
 (d) Another group should not get herbs/but give them a non-active substance instead (placebo) 2(2 marks)
 (e) The experimenter does not know who gets herb or placebo (2 marks)
 The people being investigated do not know who gets herb or placebo (2 marks)
 (f) Law (2 marks)

Q6 (a) Metabolism = all chemical reactions in an organism.
 Anabolic = where simpler substances form more complex ones.
 Catabolic = where complex substances are broken down to simpler forms. **3 (2 marks)**

(b) Anabolic enzyme = DNA ligase etc
 Catabolic enzyme = Any digestive enzyme e.g. amylase **2 (2 marks)**



Diagrams **2 (2 marks)**
 Labels **any 2 (1 mark)**

- (d) (i) Rate of molecular movement increases/
 Enzymes and substrate meet more often **any (1 mark)**
 (ii) Enzyme changes shape **(1 mark)**
 (iii) Denatured **(1 mark)**
 (iv) pH **(1 mark)**

Section B

Q7 (a) Correct diagram **(3 marks)**

Labels (pondweed, lamp, sodium hydrogen carbonate, water bath, any one other label.) **3 (1 mark)**

(b) Factor named = no marks
 How varied = same lamp/different distances or different amounts or concentrations/of sodium hydrogen carbonate **2 (3 marks)**
 Constant = temperature/CO₂ conc. or temperature/light **(3 marks)**

How kept constant =

Temperature	Water bath / Same temperature
CO ₂ conc.	Same volume / Sodium hydrogen carbonate solution
Light	Same lamp / At same distance

Any 1 = 2 (3 marks)

Estimate photosynthesis = Count number of bubbles/min **2 (3 marks)**

Invalid result = any one reason, e.g. bubbles not counted properly or bubbles may be different sizes or plant produces less bubbles after some time **(3 marks)**

- Q8**
- (a) Glucose (3 marks)
 Diagram (3 marks)
 Labels (Glucose solution, yeast) 2 (2 marks)
- (b) Chemical = potassium dichromate (or alternative) (3 marks)
 Change = colour goes from orange to green 2 (2 marks)
 Other product = CO₂ (3 marks)
 Substance = limewater (3 marks)
 Change = colour goes from clear to milky or cloudy 2 (2 marks)
 Control = no yeast or no glucose (3 marks)
- Q9**
- (a) A = Eyepiece lens
 B = Coarse adjustment (or focus)
 C = Fine adjustment (or focus)
 D = Objective lens
 E = Platform (or stage)
 F = Condensor (or diaphragm) 6 (1 mark)
- (b) x 400 (3 marks)
- (c) How a thin section was obtained/add stain/name of stain/indicate what stain shows or highlights/blot off surplus stain/add water/add cover slip/at an angle 4 (3 marks)
- (d) Diagram (3 marks)
 Labels – Plasma membrane (1 mark)
 Any two others (cell wall/nucleus/cytoplasm) 2 (1 mark)
 Low power = to see a number of cells before examining a specific cell at HP. (3 marks)

Section C

- Q10** (a) (i) External factors = temperature/light/CO₂ concentration/water/minerals **3(1 mark)**
(ii) Two named tropisms **2(1 mark)**
Benefit = maximum growing conditions in each example **2 (2 marks)**
- (b) (i) Named promoter = auxin (or IAA) **(3 marks)**
Example = cell elongation or fruit or root formation **(3 marks)**
Named inhibitor = Ethylene or abscisic acid **(3 marks)**
Example = Ethylene = leaf fall or ageing.
Abscisic acid = prevents germination **any 1 (3 marks)**
- (ii) Named promoter = IAA **(3 marks)**
Named tropism = phototropism **(2 marks)**
How works = made in tip/passes down shady side/elongates cells/bending to light **4 (1 mark)**
- (iii) Commercial growth regulator use **(3 marks)**
e.g. stimulates rooting or forms tissues or acts as weedkiller
Benefit = as appropriate, e.g. cuttings grow faster or used in micro-propagation to form plants or kills weeds (dicots) but not crop (monocot) **(3 marks)**
- (c) (i) Chemicals/made in one place/transported in organism
Act somewhere else/example of plant regulator/details of any hormone by way of example **4 (3 marks)**
- (ii) Plant protection (e.g. epidermis/cuticle/thorns/stings/heat shock proteins/stress protein)
Name methods **any 2 (3 marks)**
Explain how protect **2 (3 marks)**
- Q11** (a) Homeostasis = maintain constant internal environment
Excretion = getting rid of waste products of metabolism
Immunity = resisting infection **3 (3 marks)**
- (b) Diagram = **(6 marks)**
Labels = **6 (2 marks)**
- (i) Infection protection = barrier **(3 marks)**
(ii) Maintain temperature in cold = hair upright or blood vessels contract **(3 marks)**
(iii) Maintain temperature in cold = sweating or blood vessels dilate **(3 marks)**
- (c) (i) All (or most) of the glucose and water passed into glomerular filtrate **(3 marks)**
(ii) Glucose is re-absorbed **(3 marks)**
(iii) Amino acids are small enough to pass through/red blood cells are too big **2 (3 marks)**
(iv) ADH (or vasopressin) **(3 marks)**
(v) Production = pituitary gland
Action = distal tubules or collecting ducts **2 (3 marks)**
(vi) Plasma is too concentrated or equivalent statement **(3 marks)**

- Q12** (a) Any 1 benefit (3 marks)
 Any 1 harmful effect (3 marks)
 One other benefit or harmful effect (3 marks)

- (b) (i) Diagram (3 marks)
 Labels 5 (1 mark)
 (ii) Heterotrophic or saprophytic (3 marks)
 (iii) Spores and stolons 2 (2 marks)
 (iv) Diagram (3 marks)
 Account = 2 hyphae grow close/swellings form/nuclei (or gametes) move into swellings/cross walls form/swellings touch/end walls breakdown/fertilisation/diploid zygote/forms zygospore/zygospore dormant/zygospore grows by meiosis 9 (1 mark)

- (c) (i) 5 kingdoms
 5 correct features 10 (1 mark)

(ii)

Organism	Kingdom
Insect	Animal
Fern	Plant
Amoeba	Protoctista (or protist)
Bacterium	Monera
Yeast	Fungus
Brown alga	Protoctista (or protist)
Daffodil	Plant

7 (1 mark)

- (iii) Viruses are not living (or they are borderline) (7 marks)

- Q13** (a) Red petals and large leaves (5 + 4 marks)

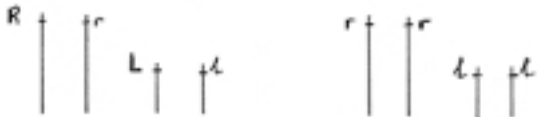
- (b) (i) **Cross A** **Cross B**
 R = Red petals L = large leaves
 r = White petals l = small leaves 4 (2 marks)

- (ii) Parents = RR and rr 2 (2 marks)
 Gametes = R and r 2 (1 mark)
 Offspring = Rr (2 marks)

(iii) RrLl × rrl

RL	RrLi
RI	Rrll
rL	rrL
rl	rrll

11 (1 mark)

- (c) (i)  2 (6 marks)

- (ii) Red petals and large leaves / white petals and small leaves 2 (3 marks)
 Ratio = equal numbers or 1:1 or 50%:50% (6 marks)

- Q14** (a) (i) Name of plant (2 marks)
 Gradient named or indicated (2 marks)
 Belt transect/ % cover/ in each quadrat/ shown as a table or list or chart or graph or histogram/ frequency calculated **any 4 (3 marks)**
- (ii) Plant named/ % cover stated/ in at least 5 quadrats **any 2 (3 marks)**
 Explanation = relate results to gradient (2 marks)
- (iii) Frequency calculation explained (3 marks)
 % cover estimation explained (3 marks)
- (b) (i) Competition = organisms struggle/ for scarce resource **2(3 marks)**
- (ii) Any relevant example (3 marks)
 State resource competed for (3 marks)
 State ecosystem investigated (3 marks)
- (iii) Contest competition = physical struggle / between 2 (or more) organisms / one wins and rest lose **any 2 (3 marks)**
 Example (3 marks)
 Scramble competition = all organisms get some of the resource (3 marks)
 Example (3 marks)
- (c) (i) Any 2 methods of disease control, e.g. vaccination, antibiotics, improved sanitation, improved surgical methods. Or more food available/ less deaths due to war **(8 + 7 marks)**
- (ii) Contraception/ smaller family size (due to social/ education reasons) **(8 + 7 marks)**
 (In parts (i) and (ii) the reasons must be explained)

- Q15** (a) (i) Enzyme = A biological (or protein) catalyst (3 marks)
 Name of enzyme (3 marks)
 Name of substrate (these must match) (3 marks)
 Activity of enzyme = Time taken for colour change (3 marks)
 (or height of foam/ in a given time) (3 marks)
- (ii) pH = A measure of the acidity or basicity of a substance (3 marks)
 Scale = 0 to 14 (3 marks)
 Range in this experiment = 2 to 10 (3 marks)
- (iii) Optimum pH = 7 (3 marks)
 Activity reduces = Shape of enzyme (or active site) alters (3 marks)
 Other factor = temperature (3 marks)
- (b) (i) Immobilized enzyme = enzymes attached to each other (or to an inert material) (3 marks)
 Two methods described = Attached to a support or enclosed in a gel or membrane or attached to each other 2 (3 marks)
 Two diagrams 2 (3 marks)
- (ii) Bioreactor = a vessel in which a biological reaction is carried out (3 marks)
 Two advantages = efficiency of enzyme not affected/ enzymes may be reused/ product formed is free of enzymes/ enzyme activity may be improved any 2 (3 marks)
- (iii) Name one immobilised enzyme = glucose isomerase or penicillin acylase or lactase (3 marks)
 Describe its use = as appropriate (3 marks)
- (c) (i) Mechanical digestion = Physical breakdown of food 2 (3 marks)
 Chemical digestion = Breakdown of food using enzymes (4 marks)

(ii)

Substance	Role	Mechanical or chemical
An amylase	<u>Starch</u> to <u>Maltose</u>	Chemical
Bile salts	<u>Emulsify</u> (breakdown) <u>fats</u>	Mechanical
Stomach contractions	<u>Churn</u> food	Mechanical
A lipase	<u>Fat</u> to <u>fatty acids</u> and <u>glycerol</u>	Chemical
A protease	<u>Protein</u> to <u>peptide</u> or amino acids	Chemical

10 (1 mark)

5 (2 marks)