LEAVING CERTIFICATE BIOLOGY
HIGHER LEVEL EXAM PAPER SOLUTIONS

Sample Paper 3

Section A

Question 1

a) A-Lag Phase, B-Log Phase, C- Stationary Phase, D- Decline Phase,
E- Survival Phase. 5(2)

b) Rapid Growth due to an abundance of resources such as oxygen, food, moisture or lack of competion. (2)

c) In the stationary phase there is no increase in numbers, as the number of deaths = number of new bacteria produced. (2)

d) Batch – a fixed amount of reactants added to the bioreactor. (2)
continuous – reactants are continuously added to the bioreactor. (2)

e) Batch (1)

f) Log (1)

Question 2

a) A Hormone is a chemical messenger / produced by an endocrine gland / which is released into the blood stream / where it is carried to another part / of the body where it has effect. 5(1)

b) Below the hypothalamus. (2)

c) DNA and Protein. (2)

d) Proteins / Enzymes / Restriction Enzymes. (2)

e) Restriction enzymes only cut the DNA at certain sites / the cut ends from both sources will be complimentary / and will stick easily. 3(2)

f) Nutrients and Oxygen (growth medium). (3)

Question 3

a) Mitochondrion. (2)

b) (i)Muscle or sperm;
(ii) large amount of energy required for movement or reproduction. 2(3)

c) Glycolysis – A, Krebs Cycle – C, Stage 1 – A,
Formation of Acetyl Co Enzyme A – C. 4(2)

d) (i) DNA, (ii) Chloroplasts. 2(2)

Question 4

a) Conservation is the wise management of our existing resources. (4)

(i) Fisheries: use mesh size in fishing nets which allow young fish to past through; Agriculture: using crop rotation; Forestry: allow fallen leaves and branches to rot naturally on the forest floor to provide nutrients. (2)

(ii) Fisheries: prevents future generations from developing; Agriculture: prevents mineral leaching by plants; Forestry: keeps a constant supply of nutrients available to the trees. (2)

(iii) Fisheries: Keep population of species constant; Agriculture: keeps a constant and varied supply of crops; Forestry: allows nutrients to be recycled. (2)

b) (i) Fisheries: Bilge Oils; Agriculture: excess fertilizers; Forestry: Burning waste cuttings. (2)

(ii) Bilge oils: harm sea birds; Fertilizers: can be washed into rivers causing eutrophication; Burning cuttings: releases large amounts of Carbon Dioxide into the atmosphere. (2)

(iii) Bilge oils: can be recycled; Fertilizers: use more organic and less man made fertilizers; Burning cuttings: allow the leaves to rot or compost them. (2)

c) Recycling, reduce use of items, e.g. Plastic bags. 2(2)

Question 5

a) Alveolus: Permeable, one cell thick, large surface area, moist, large blood supply. 2(2)

b) Insect-pollinated plant: Coloured petals, stamens inside nectary, scented. 2(2)

c) Leaf reducing water loss: Thick cuticle, stomata on undersurface of leaves, small surface area. 2(2)

d) Skin affecting body temperature: hairs, sweat glands, blood vessels, adipose tissue. 2(2)

e) Nephron for readsorption: good capillary supply, long, thin walled, large surface area for reabsorption. 2(2)

Question 6

a) (i) water is a good solvent – carries nutrients and waste materials, (ii) good absorber of heat, helps keep the body temperature constant, (iii) highly cohesive: aids the transpiration stream. 3(2)

b) monosaccharide: glucose/fructose (2); polysaccharide: starch/glycogen (2); vitamin-B/C (2); metabolic waste product: Carbon Dioxide/urea (2); Product of fermentation: Ethanol (alcohol)/Carbon Dioxide (3); Product of protein digestion: amino acids or peptides. (3)

Section B

Question 7

a) Reducing sugars or named monosaccharide/starch/protein. 3(3)

b) – To show that exercise affects the rate of breathing/rate of heart beat

– Breathing rate-number of breaths per minute/rate of heart beat-number of beats per 10 seconds x 6

– to establish a control

– take 3 readings and find average rate

– a person taking their own rate or counting errors. 5(4) + 1

Question 8

a) To show the activity of digestive enzymes in seeds

Visking tubing acts as a semi permeable membrane to demonstrate osmosis

b) *Elodea* – is used to show the rate of photosynthesis

A line transect – is used to find % cover of a plant or to find the frequency of animals or plants along the line

Sodium Hydrogen Carbonate – used as source of Carbon Dioxide to show rates of photosynthesis using *Elodea* (Canadian pondweed)

Methylene Blue – stains cheek cells blue

Buffer Solution – used to maintain a constant pH when investigating enzyme activity

Water bath – maintains a constant temperature during an experiment

Coffee filters – remove large debris and allows smaller material through, e.g. DNA

Tullgren funnel – extracts small animals from leaf litter

Protease enzymes – break down large proteins associated with DNA. 10(3)

Question 9

a) Beads will not form properly if there is contamination. (3)

b) Tap water contains calcium salts which may affect the hardening process. (3)

c) – to form a gel to surround the yeast

– a syringe

– hold the syringe high and let the gel out drop by drop

– to allow time for the beads to harden/gel to become Calcium Alginate

– to remove any Calcium chloride or Yeast cells

– used in fermentation. 6(4)

Section C

Question 10

a) Including fibre in a diet – induces peristalsis/allows easy passage of food/prevents constipation/cleans digestive tract/prevents disorders of the bowel. 2(3)

b) Children are often sick after vaccination – vaccination contains a small amount of pathogen/as the body initially has no antibodies the child feels sick/after a short time the body produces antibodies. 2(3)

c) Stomata are usually located on the lower surface of a leaf – the upper surface is water proof due to cuticle/there would be a greater rate of evaporation from the upper surface/the lower surface has a slower rate of evaporation. 2(3)

d) People who are long sighted use convex lenses – eye ball too short/image lands behind the yellow spot/convex lens converges image onto the yellow spot. 2(3)

e) Fungi are not classified as plants – no chlorophyll/cell walls chitin not cellulose/are not autotrophic. 2(3)

f) Antibiotics are not used to treat the common cold – common cold is caused by a virus/antibiotics are used against bacteria infections. 2(3)

g) It is difficult to view colours in low light intensity – our eye uses cones to view colour/rods are only active at low intensity/these view shape not colour

h) Human sperm cells have different sex chromosomes but egg cells all contain the same sex chromosomes – in the male the sex pair is XY/When they split during meiosis half the sperm will have the X chromosome while the other half will have the Y chromosome/the female sex pair is XX/All the egg cells will have the X chromosome. 2(3)

i) A pollen/grain is not a gamete – it contains 2 nuclei, (it doesn't fuse with an egg to form a zygote), a generative and tube nucleus/it produces gametes sperm. 2(3)

j) Reflex actions are beneficial – prevents the body from immediate harm/blinking prevents the eye from damage/it helps the early removal of the hand from heat or pain. 2(3)

k) Red blood cells do not repair themselves at maturity – They have no nucleus/no DNA/no ability to reproduce. 2(3)

Question 11

a) (i) bacteria (4), (ii) symbiosis. (5)

b) (i) greater numbers of grass/greater competition. 2(3)

(ii) less grass/reduced competition. 2(3)

(iii) Field X has more Nitrogen fertilizer/causes an increase in numbers. 2(3)

(iv) Cattle remove the grass/reduce competition. 4+5

(c) For quadrat (i) throw a light object, e.g. a marker, at random/ place quadrat at the point / count number of plants/repeat a number of times, e.g. 10/ find average number of plants /m^2. 5(3); Any other correct method. 5(3)

(ii) quadrat/grided quadrat/transect. (4+5)

Question 12

a) Homozygous: 2 alleles the same/genotype: genetic make-up/recessive; gene is prevented working by the dominant gene. 3(3)

b) (i) Incomplete dominance of R the gene for red is not dominant over r the gene for white petals. (3)

Cross: RR x rr (2). Gametes R x r (2). Offspring Rr(Pink) (2)

(ii) Both flies were heterozygous. (3)

Cross Nn x Nn/Gametes N, n x N, n/Result 3 normal: 1 dwarf (342:116). 3(2)

	N	n
N	NN	Nn
n	nN	nn

(iii) Male XY, Female XX/Large portion of Y chromosome missing/Males only need one allele for the characteristic to show. 3(3)

c) (i) Organisms of the same species/have different abilities to survive/species more suited/have a greater chance to reproduce/pass on their gene to their offspring/the environment acts differently on each variation 5(2)

(ii) A Theory is an idea which is widely accepted but not proven or disproven/a Law is shown to be valid under all conditions that can be tested 2(2)

(iii) Darwin + Wallace (2)

(iv) Example the modern horse (2)/a fossils the remains or footprint of an animal or plant/fossils can be aged/older rocks show less fossils/newer rocks more complex and diverse fossils/these fossils show more general chacters of animals living today. 3(2)

Question 13

a) (i) Plasma/Red Blood cells/White blood cells/Platelets. (4)

(ii) non cellular – plasma, cellular – red blood corpuscles, white blood cells, platelets. 2(1)

(iii) Food materials/vitamins/minerals/gases/waste (urea, carbon dioxide)/antibodies/ hormones. 3(1)

b) (i) A: Aorta, B: Pulmonary Vein, C: Left Atrium, D: Bicuspid Valve, E: Left Atrium, F: Septum, G: Right Ventricle, H: Right Atrium, I: Vena Cava, J: Pulmonary Artery. 10(1)

(ii) Lungs. (3)

(iii) Vein/brings blood back to the heart. 2(3)

(iv) Correct flow. (4)

(v) Coronary Artery/Provides blood to the cardiac muscle. 2(2)

c) (i) General defence system – the bodies natural defence against disease causing organisms e.g. skin, digestive juices, blood clotting, white blood cells (3) specific defence system – involves the production of antibodies against particular pathogens. (3)

(ii) General defence role of white blood cells – damage or infected cells release a chemical that attracts white blood cells – macrophages/which act as phagocytes and engulf the damaged cells and bacteria 2(3)

Specific defence role of white blood cells: is triggered by the presence of an antigen/B-Lymphocytes produce antibodies/memory B-Lymphocytes remain to attack a second infection/T-Lymphocytes do not produce antibodies/T-lymphocytes – 4 types: killer – destroy bacteria, /helper – cause killer to react/memory – fight secondary infection/suppressor – end lymphocyte activity once infection has passed/Monocytes – recognise certain pathogens and kill it. 6(2)

Question 14

a) (i) Are biomolecules containing Carbon, Hydrogen and Oxygen/in the following ratios $C_X(H_2O)_Y$. 2(3)
Germination: is the growth a plant embryo(seed) into a plant (3)/Water, Oxygen, Heat 3(1)

(ii) Reserve Carbohydrates:
(i) in humans – glycogen, (ii) in plants – starch. 2(3)

stored in (i) liver, brain, muscle, (ii) cotyledons. 2(3)

(iii) A: Plumule, B: Testa 2(2), C: Cotyledon, D: Radicle. 2(1)

b) (i) Correct axes 2(2), correct points 10(1)

(ii) Day 1: 0.58g/day 8: 0.49g/change in mass due to respiration in seed 3(3)

(iii) In this graph the Endosperm carbohydrate loss in mass is matched by an increase in mass of the embryo/The carbohydrate is passing from the endosperm to the embryo. 3+2

c) (i) Lymph is extracellular fluid/formed when fluid leaks from capillaries. 2(3)

(ii) Lymph moves by contraction of lymph vessels/general body movement/a system of valves prevents backflow 2(3). What happens: 90% return to veins by osmosis/10% enters dead ending tubes called lymph nodes/small lymph vessels join to form the thoracic duct and right lymphatic duct./These empty into the blood at the subclavian vein under the shoulder. 3(3)

(iii) Lacteals are blind ending lymph vessel/found in the villi in the small intestine. 2(3)

(iv) fatty acids/glycerol/fat soluble vitamins 2(1)/ function. (1)

Question 15

a) (i) A – Nucleolus (2)/contains m-RNA which carries the genetic code for protein production. (2)

B – Mitochondrion. (2); Site of cellular aerobic respiration. (2)

C – Membrane (2) acts as a semi permeable membrane/allows materials to enter via active transport/passive transport/osmosis. (2)

D – Ribosome (2), site of protein production (2)

(ii) Animal Cell (2): no cell wall/no large vacuole/no chloroplast. 2(3)

(iii) Nucleus/Mitochondrion. 2(3)

b) (i) Water has been lost from cell B/through osmosis/as cell has been placed in a more concentrated solution. 3(3)
Cell A is more turgid (3)
It maintains the cell shape/gives support to the whole plant. 2(3)

(ii) Water or dilute solution. (3)

(iii) Salting (3), removes water from growing micro-organisms/these micro-organisms require water as a medium for enzyme activity. 2(3)

(c) (i) A Tissue is a group of cells /grouped together to perform a function. 2(3)
epidermal/blood/muscle. (3)

An Organ is a group of tissues/which perform a particular function. 2(3)
heart/lungs/kidneys. (3)

(ii) Is the growth of a tissue/in an artificial environment/outside an organism. 2(2)
example-growth of carrots. (2)

(iii) In growth media fungi and bacteria grow much faster. (3)
Milton/any disinfectants/alcohol (2+1)