**-Section A**

1. Answer the following:

(a) Fehling's and Benedict's solution are both used to test for reducing sugars. Name any **one** reducing sugar.

(b) Explain why respiration is classified as a catabolic reaction.

(c) What type of lipid is an important component of cell membranes?

(d) Name one disorder caused by a deficiency of a named fat-soluble vitamin in humans.

(e) To which group of biomolecules do **triglycerides** belong'.

(f) When a student added iodine to a food sample, a colour change to blue-black was observed. Suggest any **one** food the student could have used to achieve this result.

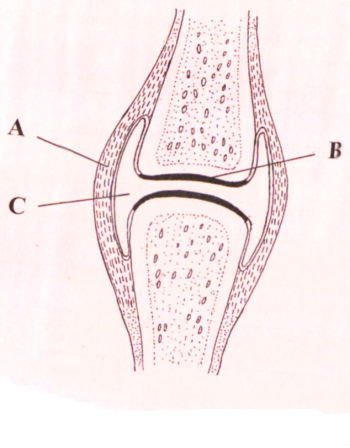
2. (a) Name any **one** organelle visible under an electron microscope that is **not** visible under the light microscope.

(b) Name **one** stain you could use to make the contents of a cell more visible when using a light microscope.

© Name **one** place in a cell where a semi-permeable membrane is located.

(d) Diffusion is a passive process. Explain the underlined term.

€ If a plant cell is placed in distilled water, it becomes turgid. Explain how this occurs. Give **one** reason why this turgidity is important to green plants.

3. The diagram shows a synovial joint.

(a) Name **one** example of a synovial joint and give **one** loeation in the body for this joint.

Example:\_-……………………………………………………………………………….

Location:\_ -………………………………………………………………………………

(b) Give **one** location in the body where an immoveable joint may be found.

(c) Explain the function of the part labelled C.

(d) Which of the labelled parts A or B represent the cartilage?

(e) Bones are held in place within joints by ligaments. What is the function of ligaments?

(f) Name the structures that connect muscles to bones in a joint.

4. Answer the following questions which relate to photosynthesis.

(i) What happens to the electrons in the chlorophyll molecule when light is absorbed?

(b) Name the two end-products of stage 1 which are required by stage 2.

(i) \_

(ii) \_

(c) Name the structures through which CO, enters the leaf.

(d) In which stage does the splitting of water occur?

(e) Give any one role for the glucose produced in photosynthesis.

(0 Suggest one reason why plants in greenhouses may be exposed to levels of CO, higher than those levels normally found in the atmosphere.

5. (a) Explain why *homeostasis* is important in animals.

(b) Give **one** way in which an alveolus is adapted to its function.

(c) Name the gas responsible for an increase in breathing rate as a result of an increase in activity levels.

(d) Under what condition is the hormone ADH released by the pituitary gland?

(e) To hat part of the kidney does this hormone travel?

(f) State the effect of the presence of ADH on the **concentration** of urine excreted,

(g) In which part of the nephron is glucose reabsorbed?

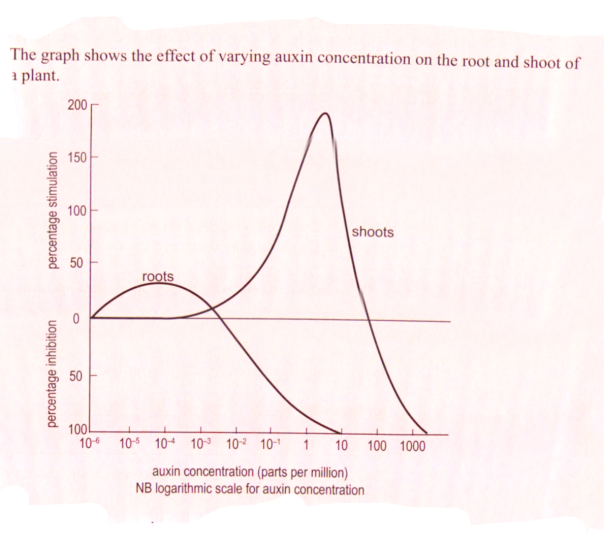
6. (a) (i) Auxins are growth regulators found in plants State any one site of auxin secrction.

(ii) Give one example of

1. An auxin that promotes growth.

2. An auxin that inhibits growth. \_

(iii) Give any one example of the use of synthetic (man-made auxins).

(b) The graph shows the effect of varying auxin concentration on the root and shoot, of a plant.

(i) The root receives maximum stimulation at a concentration of 104 parts p. million. State what effect, if any, this has on the shoot.

(ii) At what concentration should auxin be administered so the shoot receives maximum stimulation ?

(iii) Under what circumstances might it be useful to administer an auxin concentration of greater than 10 -2 parts per million to the roots of the plant?

**Section B**

7. (a) Photosynthesis is a two-stage process which results in the production of glucose

(i) Name the stage which requires light.\_\_

(ii) Oxygen is an important by-product of photosynthesis. Explain why.

(b) Answer the following questions in relation to an activity that you carried out to

investigate the influence of light intensity OR carbon dioxide concentration on the rate of photosynthesis.

(i) (a) At what temperature did you carry out the experiment?

(b) Explain why you chose this temperature.

(c) How could you tell whether the rate of photosynthesis was increasing or decreasing during the course of the experiment?

(ii) As part of your course work you also investigated the production of alcohol using yeast.

(a) This investigation must be carried out under anaerobic conditions. Explain why.\_\_\_

(b) How did you ensure conditions were anaerobic during the course of the investigation?

(c) Suggest a suitable control for this experiment.

(d) How did you know fermentation was taking place?

(c) Why might limewater be used during this experiment?

8 (a) (i) What is a denatured enzyme?

(ii) At what temperature do human enzymes work best?

(b) In the course of your studies you used enzymes on a number of occasions.

(i) When investigating the effect of **temperature** on enzyme activity:

(a) Explain why it was necessary to use a buffer solution during the

experiment.\_\_\_

(b) Name the enzyme you used and indicate how you measured its» activity-----

(c) What control did you use?

(ii) Using labelled axes, sketch a graph of the results you obtained when investigating the effect of **pH** on enzyme activity

(iii) In the procedure to prepare an immobilised enzyme, explain the reason for the following steps:

(a) Adding the enzyme solution to a solution of sodium alginate.

(b) Dropping the mixture produced in (a) into a solution of calcium chloride.\_

9 (i) Name any one industrial process that makes use of yeast.

(ii) *Rhizopus* is a fungus. Name **one** substrate where it might be found.

Answer the following questions in relation to your investigation on the growth of leaf yeast

1. Describe any **one** step you took during the course of the experiment to avoid contamination.

(ii) What control did you use?

(iii) Draw a clearly labelled diagram showing the arrangement of the leaf samples on an agar plate.

(iv) At what temperature are the agar plates incubated?

(v) How did you dispose of the agar plates at the end of the experiment?

(vi) Explain why this step was necessary.

**Section C Answer any four questions.**

**Write your answers in the answer book.**

10 (i) The size of a population is controlled by a number of factors, two of which are *parasitism* and *symbiosis.* Explain the difference between these factors.

(ii) Give any **one** example of a parasite. **(9)**

(b) In the course of your ecological studies you investigated an ecosystem.

(i) Name this ecosystem.

(ii) Name any **one** organism present in this ecosystem.

(iii) Use the organism you have named in (ii) to explain the difference between the terms *habitat* and *niche.*

(iv) If you were asked to record the types of plant and animal species present in the ecosystem you named in (i), w hat type of survey would you carry out?

(v) Name any **two** abiotic factors that could influence the distribution of organisms in the ecosystem named in (i).

(vi) Construct a grazing food chain containing four trophic levels. The food chain must (a) contain organisms from the ecosystem named in (i), and (b) it must include the organism named in (ii). (27)

The Carbon Cycle and the Nitrogen Cycle both play important roles in the recycling

of nutrients in nature.

(i) Why is it important that these nutrients are recycled?

(ii) Outline the role played by (a) photosynthesis and (b) combustion in the Carbon Cycle.

(iii) Name **one** other process that plays the same role as combustion in the Carbon Cycle.

(iv) The following processes, *nitrification* and *denitrification*, both play importar roles in the Nitrogen Cycle. Explain the significance of **each** process.

(v) Name any **one** product of nitrogen fixation.

(vi) To what use do plants put the nitrogen compounds absorbed during the Nitrogen Cycle. (24)

11 (i) Name the scientist whose work with pea plants led him to propose the basic rules of genetics.

(ii) As a result of his work, he put forward the Law of Segregation. Explain the basic principle of this Law. (9)

As part of his work, the scientist crosscd plants that were tall and produced purple flowers with plants that were short and produced white flowers. He chose plants that were *pure-breeding* for each trait, and the alleles controlling the traits were *not-linked.* He discovered that all the plants produced were tall and produced purple flowers.

(i) What is meant by the term *pure-breeding'!*

(ii) If the plants thus produced were then crossed with plants that were short and produced white flowers, indicate all possible genotypes and phenotypes of this cross.

(iii) Indicate the percentage of each type of phenotype you would expect from the cross you carried out in part (ii).

(iv) Explain the significance of the fact that the alleles are *not-linked.*

(v) If the above alleles were linked, what effect would this have on the percentages you have indicated in (iii)? (27)

Individuals within a species show some degree of variation. This variation can arise as a result of a mutation. The genetic disorder cystic fibrosis is a result of a genetic mutation. The mutation is recessive.

(i) Explain the underlined terms.

(ii) Two parents, neither of whom suffer from cystic fibrosis, have a child who suffers from the disease. Indicate the genotype of **both** parents.

(iii) The parents have a second child. What is the probability that this child will **not** inherit the disease?

(iv) This child later undergoes genetic screening, and the results confirm that the child is not a carrier for the disease. Indicate the genotype of this child.

(v) Name any **one** agent responsible for causing mutations.

(vi) "Most mutations arc not passed on from one generation to the next." Explain this statement. (24)

12. (a) Human nutrition occurs in a number of stages. Two of these stages are ingestion and digestion.

(i) Explain the difference between the underlined terms.

(ii) Name **one** place in the body where both these stages occur. **(9)**

(i) The physical digestion of food starts in the mouth, when food is chewed by teeth. However the physical digestion of food docs not stop when food leaves the mouth. Explain.

(ii) Enzymes play a major role in the chemical breakdown of food. To what group of biomolecules do enzymes belong?

(iii) Name the enzyme present in the mouth.

(iv) In the case of the enzyme you have named in (iii), state:

1. where it is produced,

2. its optimum pH,

3. any **one** end-product of its action.

(v) This enzyme stops working when it enters the stomach. Explain why.

(vi) Lipase is the enzyme responsible for the breakdown of fats.

**1**. Name **one** place in the alimentary canal where it is produced,

2. Name **both** end-products of its action. **(27)**

The end-products of digestion pass into the bloodstream in the small intestine.

(i) What is this process called?

(ii) Name the part of the small intestine in which the majority of this process occurs.

(iii) State **two** ways in which the part named in part (ii) is well adapted to its function.

(iv) Name the blood vessel responsible for the transport of the end-products of digestion from the small intestine to the liver.

(v) *Bile* is produced by the liver. Explain the significance of bile in the process of digestion.

(vi) Which of the end-products of digestion undergo deamination?

(vii) Name any **one** substance stored in the liver. **(24)**

13. Plants are often produced by means of *artificial vegetative propagation.*

(i) Give any **one** disadvantage of producing plants in this way.

(ii) Name **two** methods of artificial vegetative propagation.

(b) In order for flowering plants to reproduce by means of sexual reproduction, both

pollination and fertilisation must occur.

(i) Differentiate between the underlined terms.

(ii) Explain the difference between cross-pollination and self-pollination.

(iii) Describe in detail the development of the egg cell from the megaspore mother cell. (27)

(c) Seeds consist of an embryo plant and a food store enclosed by a protective coat.

(i) What is the protective coat callcd?

(ii) Name the part of the embryo plant that will give rise to the root.

(iii) Most seeds remain dormant for a period of time after they have been dispersed. Give **two** reasons why this may be advantageous to the seed.

(iv) Germination cannot begin unless water enters the seed. Explain the role water plays in the process of germination.

(v) "Seeds cannot germinate if oxygen is absent." Comment on the validity of this statement. (24)

14. Answer any **two** of (a), (b), (c). (30, 30)

(a) For ease of classification all living organisms are divided into five kingdoms. Two of these kingdoms contain only single-celled organisms. One such group of single-celled organisms is bacteria. Bacteria can be classified as *autotrophic* or *heterotrophic* based on their mode of nutrition.

(i) Name **both** these kingdoms, and indicate to which kingdom bacteria belong.

(ii) Autotrophic bacteria are further subdivided into two groups; explain the basis for this further subdivision.

(iii) Some heterotrophic bacteria are classified as *obligate anaerobes.* Explain.

(iv) Some bacteria are classified as pathogens. Explain the underlined term and give **one** example of a bacterium that is regarded as a pathogen.

(v) *Penicillin* is an example of an *antibiotic* produced in large quantities using the *batch flow method.*

1. Explain why the abuse or misuse of antibiotics is potentially dangerous.

2. Describe the technique used in the *batch flow method.*

(b) The balanced equation shown below represents the overall sequence of reactions for the breakdown of glucose in the process of aerobic respiration.

**C6H1206 + 6O2 -► 6C02 + 6H2O + Energy**

(i) Name the two possible end-products of *anaerobic* respiration.

(ii) Which of the end-products you have named in (i) would you expect to find in a muscle which has undergone anaerobic respiration?

(iii) *Glycolysis* is common to both types of respiration.

1. Where in the cell does glycolysis occur?

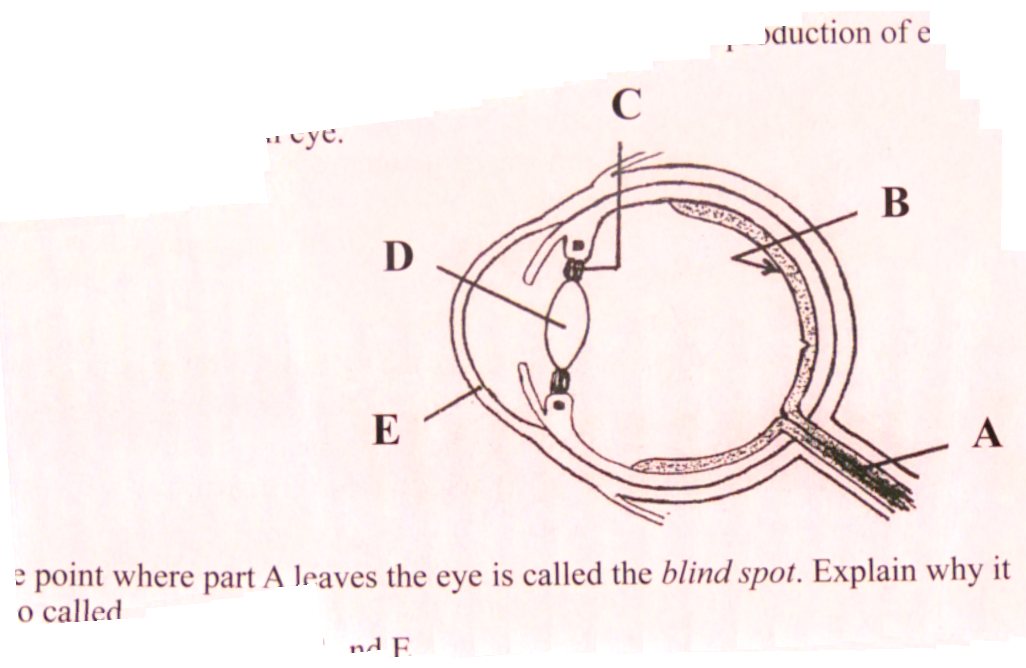
2. For every **one** glucose molecule that undergoes glycolysis, how many pyruvate molecules are formed?

(iv) In aerobic respiration the pyruvate molecule is then converted to an acetyl group.

1. Name the molecule lost during this conversion.

2. The acetyl group is picked up by a carrier molecule which passes it into Krebs Cycle. Name this carrier molecule.

(v) Explain how the electron transport system results in the production of energy in the form of ATP.

 (c) The diagram shows the human eye.

(i) The point where part A leaves the eye is called the *blind spot.* Explain why it is so called.

(ii) Name the parts labelled C and E.

(iii) Damage to the part labelled B could result in blindness. Explain why.

(iv) Name the type of light receptor cell responsible for colour vision.

(v) Name the part of the eye:

1. that allows light enter the eye,

2. that controls the amount of light entering the eye.

(vi) The choroid layer is found behind the part labelled B. Give **one** function for this layer.

vii) What is the function of the part labelled D?

viii) Explain why the eyeball doesn't lose its shape.

Answer any **two** of (a), (b), (c).

(a) Hormones are produced by endocrine glands.

(i) Explain what is meant by an *endocrine gland.*

(ii) The menstrual cycle is controlled by a number of hormones, including *follicle stimulating hormone (FSH)* and *luteinizing hormone (LH).*

1. What event in the menstrual cycle results in the release of FSH?

2. Name the hormone produced by the ovary as a result of the action of FSH.

(iii) FSH and LH are also produced in males. State the role of **each** of these hormones in the male.

(iv) Describe what happens during the menstrual cycle **after** ovulation has occurred, and providing fertilisation of the egg **does not** occur.

(b) (i) Explain the importance *of transpiration* in flowering plants.

(ii) By what process does water enter the root hairs?

(iii) Explain the role played by *root pressure* in transpiration.

(iv) Give **two** reasons why an *unbroken* column of water is able to reach the top of tall trees.

(v) With the aid of a labelled diagram, indicate the precise location of xylem and phloem in the *root* of a flowering plant.

(vi) Explain the role of the following structures found in phloem tissue:

1. Companion cells

2. Sieve plates

(vii) The movement of nutrients in the phloem is a two-way process. Is the same true of the movement of water in the xylem?

(c) Nerves arc made up of bundles of tiny nerve cells called *neurones.*

(i) In what part of the neurone is the nucleus found?

(ii) Many neurones contain a *myelin sheath.*

1. Name the structure responsible for the production of the myelin sheath.

2. Give any **one** function of the myelin sheath.

(iii) Where are *interneurons (association neurones)* located? What is their function?

(iv) Nerve impulses cross the synapse with the aid of chemicals.

1. What causes these chemicals to be produced?

2. Where are these chemicals produced?

3. What happens to these chemicals after the impulse has crossed the synapse?

(v) In the case of a named disorder of the nervous system, state:

1. A possible cause,

2. A means of prevention **or** a treatment.

(30,