QUESTION – BIOLOGY

FORM -1

INTRODUCTION TO BIOLOGY.

1. Write three major differences between plants and animals.

2. List the use of the energy obtained from the process of respiration.

3. State three characteristic similar in plants and animals.

(Section A)

4. Motor vehicles move, use energy and produce carbon dioxide and water. Similar characteristics occur in living organisms yet motor vehicles are not classified as living. List other characteristics of living things that do NOT occur in motor vehicles.

CLASSIFICATION 1 - QUESTIONS

1.

a) What is meant by the term binomial nomenclature? (1mk)

b) Give two reasons why classification is important (2mks)

2. Explain the following terms; (3mks)

a) Classification

b) Taxonomy

c) Binomial nomenclature

3.

a) State three characteristics of Monera that are not found in other kingdoms (3mks)

b) Name the class to which a termite belongs (1mk)

4. Ascaris lumbricoides is an example of an endoparasite. The name Ascaris refer to

5. Blackjack (Bidens pilosa) belongs to the family compositae. What does pilosa stand for?

(1mk)

6. Define the term species. (1mk)

7. Distinguish between Taxonomy and taxon. (1mk)

CELL

1. Which organelle would be abundant in?

   Skeletal muscle cell _____

   Palisade cell _____

2. State the functions of the following organelles.

   Lysosomes _____

   Golgi apparatus _____

3. State the functions of the following organelles;

   Goigi apparatus _____

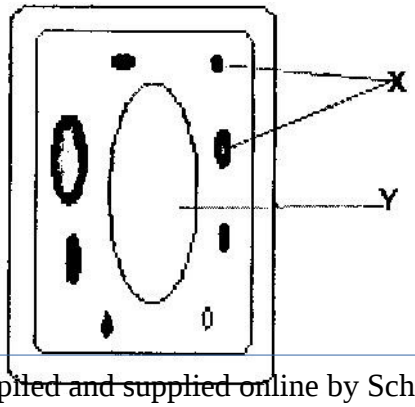
   Ribosomes cell _____

4. Name the organelles that perform each of the following functions in a cell.

   Protein synthesis _____

   Transport cell secretions _____

5. The diagram below represents a cell.



a) Name the parts labeled x and y

X _____

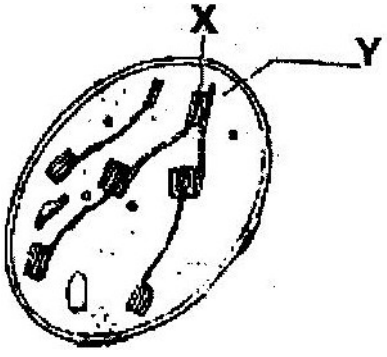
Y _____

b) Suggest why the structures labeled x would be more on one side than the other side.

6.

a) State the function of cristae in mitochondria (1mk)

b) The diagram below represents a cell organelle



(i) Name the part labeled Y (1mk)

(ii) State the function of the part labeled X (2 mks)

7.

a) What is the formula for calculating linear magnification of a specimen when using a hand lens? (1mk)

b) Give a reason why staining is necessary when preparing specimens for observation under the microscope. (1mk)

8.

State three functions of Golgi apparatus. (3mks)

9. Name two structures found in plant cell but are absent in animals cell.

10. Write the role of the following parts of a microscope

    i) Nerve cell

    ii) Palisade cell

    iii) Root hair cell

    iv) Red blood cell

11. The diameter field of view of a light microscopic is 3.5mm. Plant cells lying of the diameter are 10. Determine the size of one cell microns (1mm = 1000µm)

12. Define the following

    i) Tissue

    ii) Organ

    iii) Organ system

CELL PHYSIOLOGY QUESTIONS

1. The table below shows the concentration of some ions in pond water and in the cells sap of an aquatic plant growing in the pond.

Ions	Concentration in pond water (parts per million)	Concentration in cell sap (parts per million)
Sodium	50	30
Potassium	2	150
Calcium	1.5	1
Chloride	180	200

a) Name the processes by which the following ions could have been taken up by this plant.

(2mks)

i) Sodium ions

ii) Potassium ions

b) For each processes named in (a) (i) and (ii) above, state one condition necessary for the process to take place. (2mks)

2. Explain how water in the soil enters the root hairs of a plant. (4mks)

3. Explain how drooping of leaves on a hot sunny day is advantageous to a plant.

(2mks)

4. a) What is diffusion? (2mks)

b) How do the following factors affect the rate of diffusion?

i) Diffusion gradient (1mk)

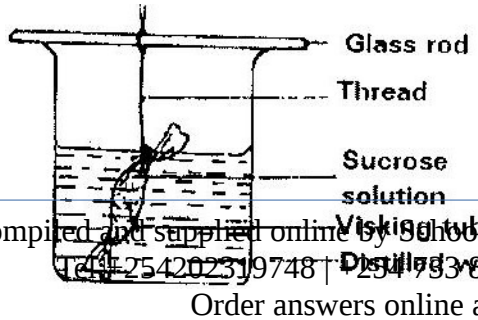
ii) Surface area to volume ratio (1mk)

iii) Temperature (1mk)

c) Outline 3 roles of active transport in the human body (2mks)

5. State the importance of osmosis in plants (3mks)

6. An experiment was set up as shown in the diagram below.



The set up was left for 30 minutes.

a) State the expected results. (1mk)

b) Explain your answer in (a) above. (3mks)

7. Explain why plant cells do not burst when immersed in distilled water. (2mks)

8. Distinguish between diffusion and osmosis. (2mks)

9. Define the following terms in relation to a cell

a) Isotonic solution

b) Hypotonic solution

c) Hypertonic solution (3mks)

10. Addition of large amounts of salt to soil in which plants are growing kills the plants. Explain

(6mks)

11. Explain why

a) Red blood cells burst when placed in distilled water while plant cells remain intact.

b) Fresh water protozoa like amoeba do not burst when placed in distilled water.

(2mks)

NUTRITION IN PLANTS

1. An experiment was carried out to investigate the rate of reaction shown below.

Sucrose → Fructose + Glucose

For the products; fructose and glucose to be formed, it was found that substance K was to be added and the temperature maintained at 37^0C. When another substance L was added, the reaction slowed down and eventually stopped.

a) Suggest the identity of substances K and L. (2mks)

K _____

L _____

b) Other than temperature state three ways by which the rate of reaction could be increased. (3mks)

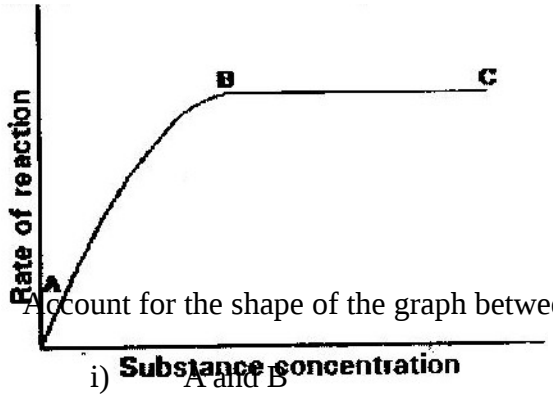
c) Explain how substance L slowed down the reaction. (1mk)

2. State the role of light in the process of photosynthesis. (2mks)

Name one product of dark reaction in Photosynthesis (1mk)

3. State one effect of magnesium deficiency in green plants.

4. The graph below shows the effect of substrate concentration on the rate of enzyme reaction.



a) Account for the shape of the graph between

i) A and B (3mks)

ii) B and C (2mks)

b) How can the rate of reaction be increased after point B? (1mk)

c) State two factors that affect the rate of enzyme reaction. (2mks)

5. a) State the function of co-factors in cell metabolism. (1 mk)

b) Give one example of a metallic co-factor. (1 mk)

6. Name two mineral elements that are necessary in the synthesis of chlorophyll.

(2mks)

7. What is the role of the vascular bundles in plants nutrition? (3mks)

8. Describe what happens during the light stage of photosynthesis. (3mks)

9. Photosynthesis takes place in two stages. Name the part of the chloroplast where

   i) Light stage occurs

   ii) Dark stage occurs (2mks)

   b) How is dark stage dependant on the light stage of photosynthesis? (2mks)

10. A solution of sugarcane was boiled with hydrochloric acid; sodium carbonate was heated with Benedict's solution. An orange precipitate was formed.

   a) Why was the solution boiled with hydrochloric acid? (1mk)

   b) To which class of carbohydrates does sugarcane belong?

   c) Name the type of reaction that takes place when:

   i) Simple sugars combine to form complex sugar. (1mk)

   ii) A complex sugar is broken into simple sugar. (1mk)

   d) State the form in which carbohydrates are stored in:

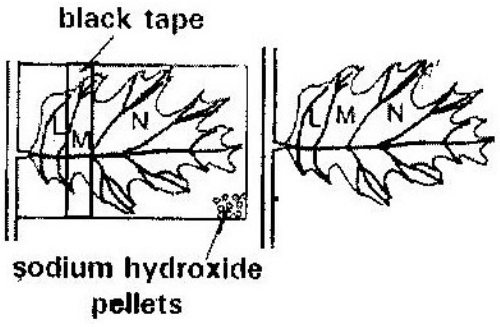
   i) Plants

   ii) Animals (2mks)

11. i) Name structural units of lipids (1mk)

   ii) State three important functions of lipids in living organisms. (3mks)

12. The diagram below shows an experiment carried out to investigate photosynthesis in a potted plant which has been kept in the dark for 48 hours.



The setup was left in the sunshine for 6 hours. The leaf was tested for starch using iodine solution at the end of the experiment.

a) What would be the colours of the regions of the leaf marked L. M and N? (3mks)

b) What is the function of the sodium hydroxide pellets? (1mk)

NUTRITION IN ANIMALS

1. a) Name the bacteria found in the root nodules of leguminous plant. (1mk)

   b) State the association of the bacteria named in a) above with the leguminous plants. (1mk)

2. a) State the function of co-factors in cell metabolism.

   b) Give one example of metallic co-factor.

3. Name the disease in humans that is cause by lack of vitamin C. (1mk)

4. Name a disease caused by lack of each of the following in human diet;

   Vitamin D (1mk)

   Iodine (1mk)

5. Explain how birds of prey are adapted to obtaining their food. (2mks)

6. Explain biological principles behind the preservation of meat by;

i) Salting

ii) Refrigeration

iii) Canning (3mks)

7. State one similarity and one difference between parasitic and predatory modes of feeding (3mks)

8. In an investigation, the pancreatic duct of a mammal was blocked. It was found that the blood sugar regulation remained normal while food digestion was impaired. Explain these observations. (3mks)

9. Give a reason why lack of roughage in diet often leads to constipation.

10. a) What does the term digestion mean? (2mks)

b) Describe how the mammalian small intestine is adapted to its function. (18mks)

11. State the role of vitamin C in humans. (2mks)

12. a) Distinguish between the terms homodont and heterodont. (1mk)

b) What is the function of carnasial teeth? (1mk)

c) A certain animal has no incisors, no canines, 6 premolars and 6 molars in its upper jaw, in the lower jaw there are 6 incisors, 2 canines, 6 premolars and 6 molars. Write its dental formula.

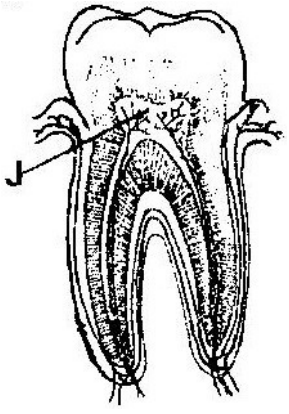
13. a) State two functions of bile juice in the digestion of food. (2mks)

b) How does substrate concentration affects the rate of enzyme action?

(1mk)

14. Name the end-products of the light stage in photosynthesis. (2mks)

15. The diagram below represents a section through a human tooth.



a) i) Name the type of tooth shown.

ii) Give a reason for your answer in (a) (i) above. (1mk)

b) State a factor that denatures enzymes. (1mk)

16. a) Name a fat soluble vitamin manufactured by the human body.

(1mk)

b) State two functions of potassium ions in the human body.

(2mks)

17. a) The action of ptyalin stops at the stomach. Explain. (1mk)

b) State a factor that denatures enzymes. (1mk)

c) Name the features that increase the surface area of small intestines.

(2mks)

18 Define the following terms (5mks)

a) Ingestion

b) Digestion

c) Absorption

d) Assimilation

e) Egestion

19 Explain the role of the following organs in the digestion of food in a mammal.

a) Salivary glands

b) Pancrease

c) Liver (3mks)

20 State any three functions of the mucus, which is secreted along the wall of the alimentary canal.

(3mks)

21. Explain why the digestion of starch stops after food enters the stomach. (3mks)

22. Give an account of the adaptation of a named herbivore to its mode of feeding.

(3mks)

23. What are the contents of gastric juice and what is their role in digestion. (6mks)

24. Liver damage leads to impaired digestion of fats . Explain the statement. (3mks)

25. For each of the following nutrients give one example of a good source and one example of its role in the body.

Nutrient	Food source	Role in the body
Vitamin A		
Iron		
Iodine		
Vitamin D		
Protein		

(10mks)

The chemicals of living cells

1 Apart from food, what other substances do cells need to take in?

2 Water has a high capacity for heat (thermal capacity). This is an advantage in living cells because …. (Select one of the following statements)
(a) any rise in temperature is small in comparison with the amount of heat absorbed by a cell
(b) any rise in temperature is large in comparison with the amount of heat absorbed by a cell
(c) the 75% water in a cell does not retain a lot of heat
(d) any change in temperature will cause a cell to heat up or cool down quickly.

3 (a) Give three examples of cell structures which contain structural proteins.
(b) What is the other type of protein in a cell?

4 Name the chemical elements present in a protein.

5 What name is given to the sub-units which make up all proteins?

6 A protein molecule which is denatured, has
(a) split into smaller molecules
(b) changed its shape
(c) combined with another molecule
(d) been diluted..

7 What kind of substance is a lipid?

8 In a cell, where are lipids found?

9 (a) What are the two types of chemical compound which combine to form a lipid?
(b) What elements are present in a lipid?

10 (a) Name four examples of compounds which are classed as carbohydrate.
(b) What elements are present in carbohydrates?

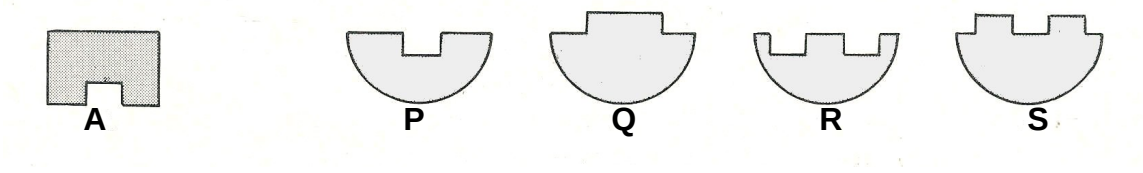
11 Write the formula for glucose.

12 If  represents a glucose molecule draw (a) a maltose molecule, (b) part of a starch molecule.

13 Select the most appropriate words from the list below to complete the following paragraph All cells contain ……. which are ……. and act as …..…. which …..…. chemical reactions. The reactions do not ……the ……. which can take part in further reactions.

substances, proteins, enzymes, catalysts, speed up, use up, slow down

14 Enzymes will usually react with only one substance. This can be explained by the 'lock and key' theory. If this theory is correct, which of the following substances, represented by P, Q, R and S would be acted on by enzyme A?

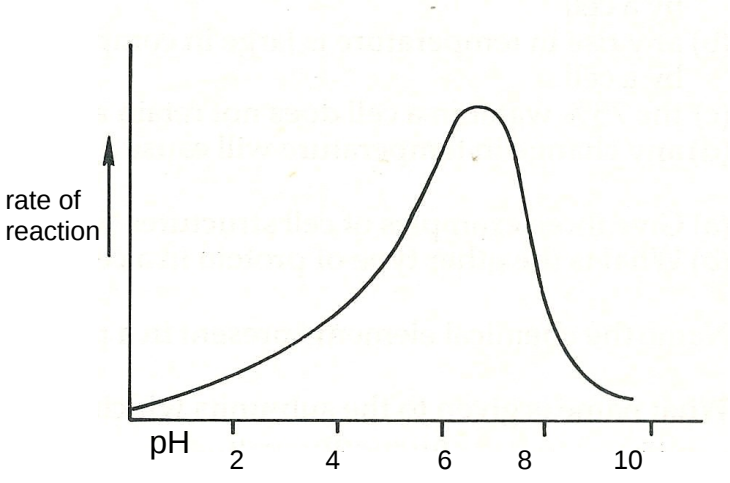


15 If an enzyme-controlled reaction normally takes place at 10ºC, in general terms how will the reaction be affected by (a) a fall in temperature to 2°C , (b) a rise in temperature to 20°C. (c) a rise in temperature to 65°C?

16 If an enzyme is denatured, why does it no longer work?

17 The graph shows the rate of an enzyme reaction at different levels of acidity or alkalinity (pH). From the graph, what is the optimum pH for this enzyme?

(a) pH 2 (c) pH 10
(b) pH 7 (d) none of these.



18 A protein-digesting enzyme when mixed with starch solution would

(a) have no action (c) produce glucose
(b) produce amino acids (d) digest the starch?

19 Select the most appropriate words from the list below to complete the following paragraph.

All enzymes are produced inside ……. Enzymes which do their work outside cells are called ……. Enzymes which do their work inside cells are called …….. Most of our digestive enzymes are examples of ……. enzymes.

animals, extra-cellular, intra-cellular, cells, digestive, nuclei, catalysts.

20 Give two examples of chemical reactions which are catalysed by enzymes in the course of brewing.

21 What does the enzyme catalase do?

22 Substance A is being investigated to see if it is an enzyme. When substance A is mixed with substance B a reaction takes place. A control experiment is conducted using a sample of A which has been boiled.

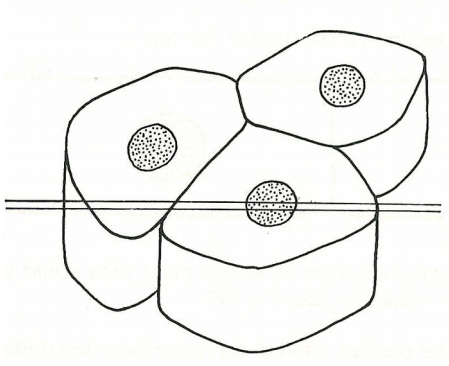
(a) Why is boiling used as a control?
(b) If the reaction still worked after A had been boiled, what might be your interpretation?

23 In an investigation to compare the rates at which starch is being broken down by an enzyme

(a) what test is used
(b) how do you know when the reaction is completed?

Cells and tissues

1 The drawing shows a group of three cells. Make an outline drawing to show how the cells would appear under the microscope if a thin section A-A was cut and mounted on a slide.

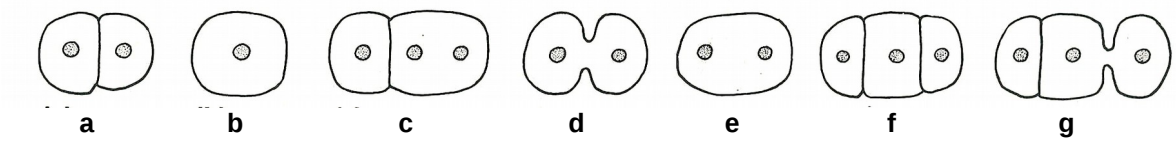
A  A

2 Which one of the following is most likely to be true: To see plant cells with a microscope you usually need a magnification of about
(a) x5, (b) xl0, (c) xl00, (d) xl000?

3 Which one of the following best describes the function of a cell membrane?
(a) It keeps the cell in shape.
(b) It controls the substances entering and leaving the cell.
(c) It controls the substances entering the cell.
(d) It supports the cell structures.

4 Which of the following structures are (a) in plant and animal cells, (b) in plant cells but not in animal cells?
cell wall, cytoplasm, cell membrane, mitochondria, nucleus, central vacuole, chromosomes, cell sap

5 The drawings below show stages in cell division but in the wrong order. What is the most likely sequence of events?



6 Select the most appropriate words from the list below to complete the following paragraph:
If a cell develops in such a way that it does one particular job very efficiently, it is said to be …….. . Such a cell is also said to be …… to its function. A nerve cell is ….. for conducting impulses. It can do this efficiently because of its ……and the chemical reactions in its …..

shape, vacuole, adapted, cytoplasm, size, specialised, mature, mitochondria

7 Classify the following under the headings 'Cell structure', 'Tissue', 'Organ' or 'System'.

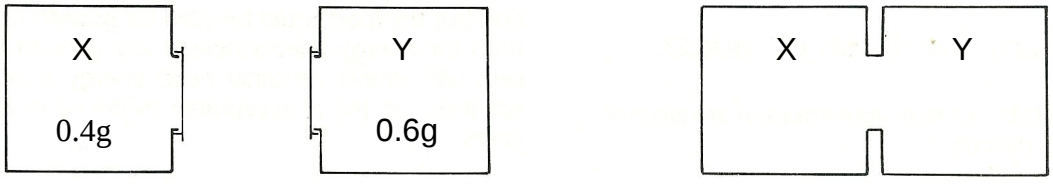
bone, nucleus, skeleton, brain, nerve, mitochondrion, muscle, cytoplasm, epithelium, heart and blood vessels, stomach, alimentary canal, lung, lungs and windpipe

How substances get in and out of cells

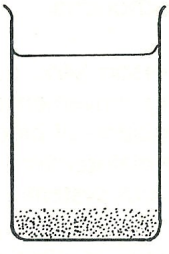
1 Containers X and Y each hold one litre of air. X also contains 0.4g of a gas and Y contains 0.6 g of the same gas. The two containers are connected together as shown in the diagram.

(a) Which way will the gas diffuse?

(b) After a long period of time, what will be the concentration of the gas (in grams per litre) in each container?



2 The diagram represents (not to scale) molecules of a salt dissolved in the bottom layer of water in a beaker. Make two similar diagrams to show the distribution of salt molecules (a) after a few minutes, (b) after several hours.



3 When a cell is respiring aerobically, which two gases are likely to be diffusing in and out of the cell, and in which direction will they be diffusing?

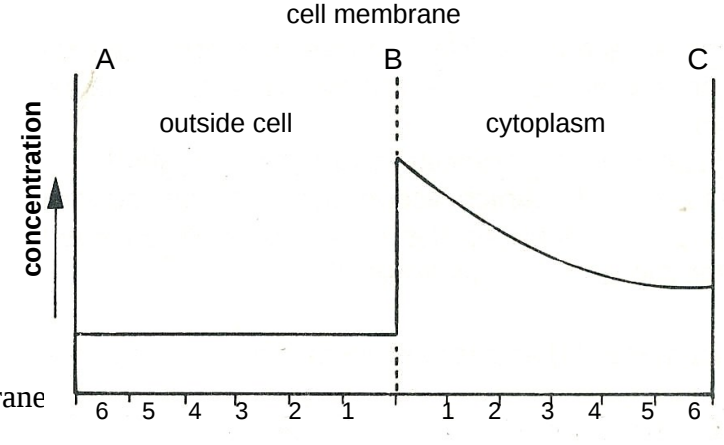
4 The graph shows the concentration of a substance inside and outside a cell.

(a) If the substance is free to move by diffusion, which way will it move

(i) inside the cell

(ii) between the cell and the medium outside the cell?

(b) If, after some hours, the concentration has not changed, what assumption would you make about the movement of the substance across the cell membrane



5 (a) Which one of the following is the best definition of osmosis?

(i) The movement of water from a concentrated solution to a dilute solution across a partially permeable membrane. .

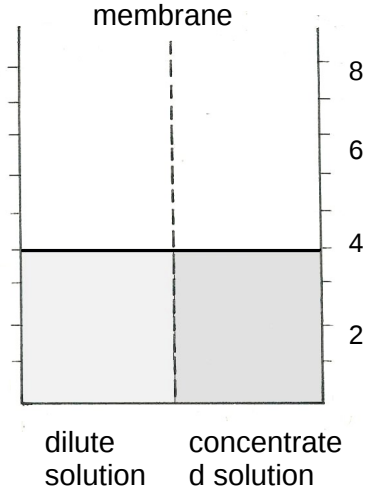
(ii) The movement of a dissolved substance from a concentrated solution to a dilute solution across a partially permeable membrane.

(iii) The movement of water from a dilute solution to a concentrated solution across a partially permeable membrane.

(iv) The uptake of water by a living cell.

(b) Which of the statements is an acceptable description of diffusion?

6 The diagram shows a vessel which contains a concentrated and a dilute solution separated by a partially permeable membrane. Draw a similar diagram to show the liquid levels after an hour or two.



7 Which statement is correct?

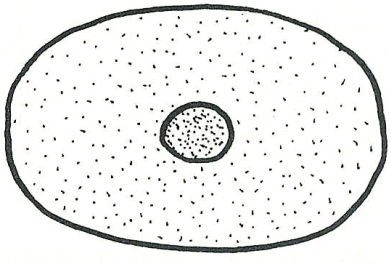
(a) A concentrated solution has a high osmotic potential (water potential).

(b) A concentrated solution has a low osmotic potential (water potential).

8 The drawing shows the outline of a human cell.
Copy the drawing and make two further drawings to show how the cell would appear if it were to be immersed for a few minutes in a solution with

(a) a lower osmotic potential (water potential) than its own cytoplasm

(b) a higher osmotic potential (water potential) than its own cytoplasm.



9 Why is it important that a cell membrane does not allow all dissolved substances to diffuse freely through it?

10 The concentration of the tissue fluid, which bathes all cells in the body, is kept more or less constant. Why is this important?

11 When meat is salted, bacteria cannot grow on it. Suggest a reason for this.

Photosynthesis and nutrition in plants

1 Select the most appropriate words from the list below to complete the...following paragraph:
A green plant can make all the substances it needs. It builds up carbohydrates by the process of …….. In this process, it combines …….. from the …….. with ……. from the ……. to form ……. The …… needed for this process comes from ……., which is absorbed by the ……. in the ……. of leaf cells. The waste product of the process is……

soil, energy, oxygen, glucose, chloroplasts, mineral salts, cells, photosynthesis, air, respiration, sunlight, water, nitrogen, chlorophyll, carbon dioxide.

2 Complete the following equation which summarises the process of photosynthesis

…..CO… + 6 …… ⟶ C…… + 6 ….

3 What gases will be taken in and given out by a green plant (a) in darkness, (b) in bright sunlight?

4 Is it possible for a plant to be photosynthesisng and respiring at the same time?

5 (a) What carbohydrates does a plant make from glucose?
(b) Which of these carbohydrates is transported round the plant?
(c) Which carbohydrate is the main storage substance?

6 (a) What additional substances does a plant need to make amino acids and proteins from glucose?
(b) Where do these substances come from?

7 What ions must a plant obtain from the soil in order to make (a) ATP, (b) chlorophyll?

8 Name an artificial fertiliser or fertilisers which farmers can use to increase the supply of nitrate, phosphate and potassium to their crops.

9 (a) How would you destarch the leaves of a potted plant?
(b) How would you check that the destarching had been effective?

l0 In a school laboratory, what is usually regarded as evidence that photosynthesis has occurred in a plant?

11 In designing an experiment to find out whether light is needed for photosynthesis
(a) what is the principle of the design
(b) what control would you use?

12 A leaf is detached from a tree and tested with iodine. The leaf turns dark blue.
(a) What does this result tell you?
(b) Why is this result not sufficient evidence to confirm that photosynthesis had taken place in *the leaf?*

Energy from respiration

1 Select the most appropriate word from the list below to complete the following paragraph:

Respiration is the release of …… from ……and takes place in all …….. of the body…… In the course of respiration, …… is broken down to ……and …… .
If oxygen is used for this process, the respiration is called …… . If oxygen is not used in the process, the respiration is called ……...
Each stage of respiration is speeded up by a particular ……...

cells, food, carbon dioxide, enzyme, muscles, aerobic, oxygen, water, vitamin, protein, energy, anaerobic.

2 Complete the following equation which summarises aerobic respiration of glucose:

C ……. + …O… $\longrightarrow$ …CO… + ….H_2O + 2830 ……

3 What are the products of alcoholic fermentation?

4 In which cell structures does respiration mainly occur?

5 If a person is lying quite still, what does he or she need energy for?

6 Which of the two forms of respiration (aerobic and anaerobic) provides more energy from a given quantity of food?

7 (a) What are the intermediate products of anaerobic respiration in an active muscle?
(b) Which of them is associated with oxygen debt?
(c) In what way is this product associated with the 'oxygen debt?

8 Which two of the following statements are **incorrect**?
(a) Anaerobic respiration uses oxygen to release energy from food.
(b) Aerobic respiration releases oxygen from food during oxidation.
(c) Aerobic respiration converts food to carbon dioxide and water.
(d) Anaerobic respiration releases energy from food without using oxygen.

9 (a) Which one of the following would be acceptable evidence that some form of respiration was taking place in a living tissue
(i) oxygen being taken up
(ii) oxygen being given out
(iii) water vapour being produced
(iv) food being used up
(b) Why are the others unacceptable?

10 If a tissue was heated to 65ºC for 10 minutes, respiration would cease even if oxygen and food were supplied. Why is this?

11 What name is given to the whole range of chemical changes which are needed just to keep an organism alive ?
(a) basal metabolism (c) catabolism
(b) anabolism (d) metabolism

12 (a) What chemical is normally used to test for the presence of carbon dioxide?

(b) What is the result of the test if carbon dioxide is present?

13 Blood from a donor is sterile and stored in a sealed bag, but it is still kept at 4°C. What is the advantage of keeping it at this low temperature?