Marking scheme. 4

NAME.....ADM NO.....CLASS.....

SUNSHINE SECONDARY SCHOOL

PRE-MOCK 1 2015
BIOLOGY
PAPER 1
(THEORY)
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

Write your **Name, Class** and **Adm no** in the spaces provided above.
Answer **all** the questions in this paper in the spaces provided.

FOR EXAMINER'S USE ONLY:

Question	Maximum Score	Candidate's Score
1 - 25	80	

Lagat 9 $ 10
Bore 3 $ 5
Rotich 7 $ 12
Ndolo 2 $ 6
Kwamboka 4 $ 11

1. (a) Define the term 'parthenocarpy'. (1mk)

Fruit formation without fertilization having taken place.

(b) Name **two** plant growth hormones that promote parthenocarpy. (2mks)

Auxins
Gibberellins.

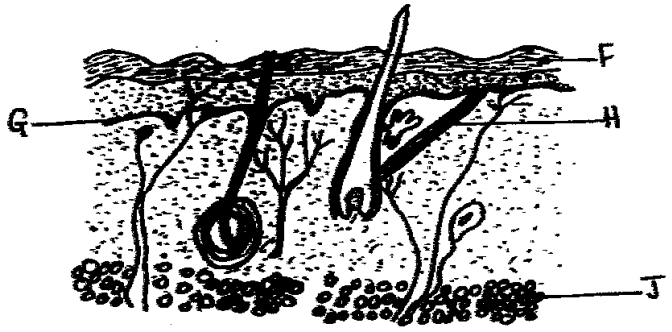
2. Name the organelle that performs each of the following functions in a cell
(i) Protein synthesis. (1mk)

Ribosomes.

(ii) Transport of cell secretions. (1mk)

Golgi apparatus / Golgi bodies.

3. The diagram below shows a longitudinal section of mammalian skin.



a) Name the parts labelled **F** and **G.** (2mrks)

F Cornified layer
G Malpighian layer

b) State **one** function of each of the parts labelled **H** and **J** (2mrks)

H Contracts and relaxes to raise and lower hair.
J Storage of fats; and insulation against heat loss.

4. Other than carbon (IV) oxide, name other products of anaerobic respiration, in plants. (2mks)

Ethanol

Energy

5. (a) Name the fluid that is produced by sebaceous glands. (1mk)

Sebum

(b) State **two** functions of sweat on the human body. (2mks)

Cools the body.

Has antiseptic qualities hence kills micro-organisms.

6. (a) State **two** characteristics that are used to divide the phylum arthropoda into classes. (2mks)

Number of body parts.

Number of legs

Presence and number of Antenae.

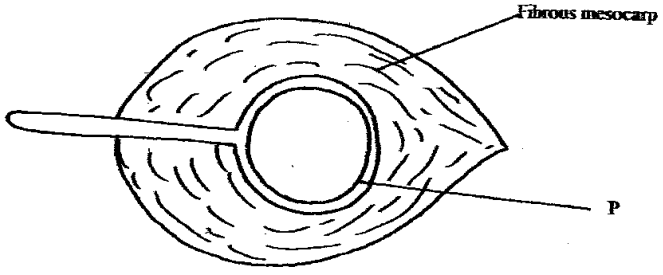
(b)Name the class with the largest number of individuals in the phylum Arthropoda. (1mk)

Insecta.

7. Why are people with blood group O referred to as universal donors? (1mk)

They lack antigens, hence can give blood to all blood groups.

8. The diagram below represents a longitudinal section of a fruit



(a) Name structures labeled P (1mk)

(b) Describe two adaptations of the fruit for its mode of dispersal (3mks)

(i) Mode of dispersal
Water.

(ii) Adaptation
Has fibrous Mesocarp which stores air; to enable it to float.
Has a tough seed coat which is impermeable to water.

9. (a) What causes the following diseases?
(i) Diabetes mellitus. (1mk)
Hyposecretion of Insulin.

(ii) Diabetes insipidus. (1mk)
Hyposecretion of Antidiuretic Hormone

b) An individual shows the symptoms for diabetes mellitus, how would you determine in the school laboratory whether they are positive for the condition? (3mks)
Take a urine ~~test~~ sample from the patient, put it in a test tube and add ~~to~~ Benedicts solution; boil the mixture and note the colour changes.

10. In an attempt to estimate the number of weaver birds in a small woodland 435 were captured , marked and released. Three days later, 620 were captured 75 of which were marked.
a) What is the name of the sampling method described above? (1mk)
- Capture recapture / Capture, Mark, Release recapture.

b) Calculate the approximate size of the weaver bird population in the woodland. (2mks)

$P = \frac{FM \times SC}{MR}$

$P = \frac{435 \times 620}{75}$

c) Give one disadvantage of this method. (1mk)

Is based on many assumptions which may not hold true.

11. Identify the nucleic acid whose base sequence is shown below.

G-A-C-U-A-G-A-C-G

i) Identify the type of nucleic shown above (1mk)

RNA.

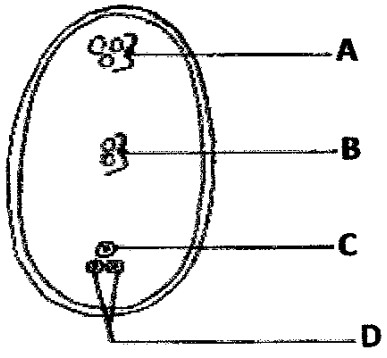
ii) Give reason for your answer in (i) above. (1mk)

Has the base Uracil.

iii) Write the base sequence of a DNA strand for the nucleic acid shown above (1mk)

C-T-G-A-T-C-T-G-C.

12. The diagram **below** shows a mature embryo sac of a flowering plant.



(a) Name the parts labeled **A** and **B** (2mks)

A Antipodal Cells

B Polar nuclei.

(b) What is the function of the structure labeled B? (1mk)

Fuses with ~~egg cell~~ one male gamete nucleus to form Triploid primary endosperm.

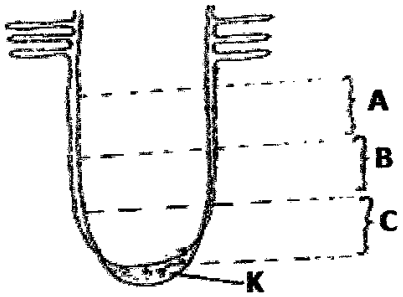
13. (a) Name the tissues that transport water in plants. (1mk)

Xylem.

(b) State why the tissue above is said to be dead. (1mk)

Lacks Cytoplasm and organelles.

14. The diagram **below** shows regions of growth in a root. Study it and answer the questions that follow.



(a) Name the zone labeled **B**

Zone of Cell elongation. (1mk)

(b) State the function of part **K** (1mk)

Protect the delicate ~~appli~~ apical meristem.

(c) State three characteristics of the cells found in zone **C** (3 mks)

- Lack vacuoles.
- Have thin cell walls
- Are small
- Are actively dividing.

15. The enzymes pepsin and trypsin are secreted in their inactive forms. Explain why they are secreted in these inactive forms. (1mk)

To prevent digestion of the cells that secrete them.

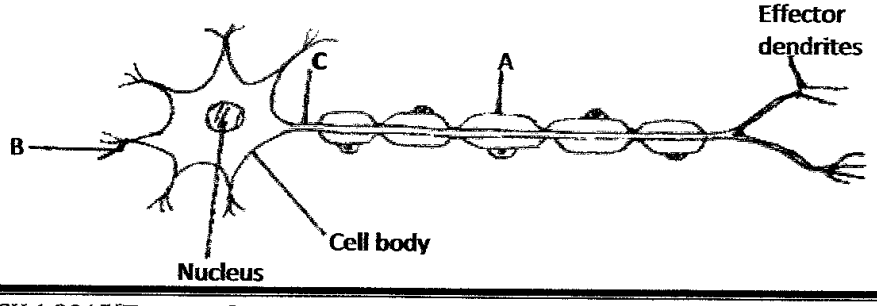
16. (a) Give two examples of natural selection in action. (2mk)

- Resistance of ~~insecticides~~ insects & bacteria to insecticides and antibiotics.
- Industrial melanism.

b) List three features that make man the most dominant species on earth. (3mks)

- Ability to communicate through speech.
- Upright posture.
- A ~~hand~~ than modified forelimb to form hand with an opposable thumb

17. Study the diagram **below** of a neurone in human being.



(a) Identify the neurone. (1mk)

Motor

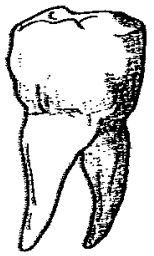
(b) Name the parts labeled.

A Myelin Sheath. (1mk)

B Dendrite. (1mk)

(c) Using an arrow indicate the direction of movement of a nerve impulse along the neuron (1mk)

18. Study the diagram of the mammalian tooth **below** and answer the questions that follow.



(a) Identify the tooth. (1mk)

~~Molar~~ / Pre-molar

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

- Has two roots
- Has Cusps.

(c) State **one** adaptation of the tooth to its function. (1mk)

Has a wide top surface to increase surface area for grinding/chewing food.
Has Cusps to increase surface area for chewing.

19.a) Name the part of the brain that regulates breathing (1mk)

Medulla oblongata.

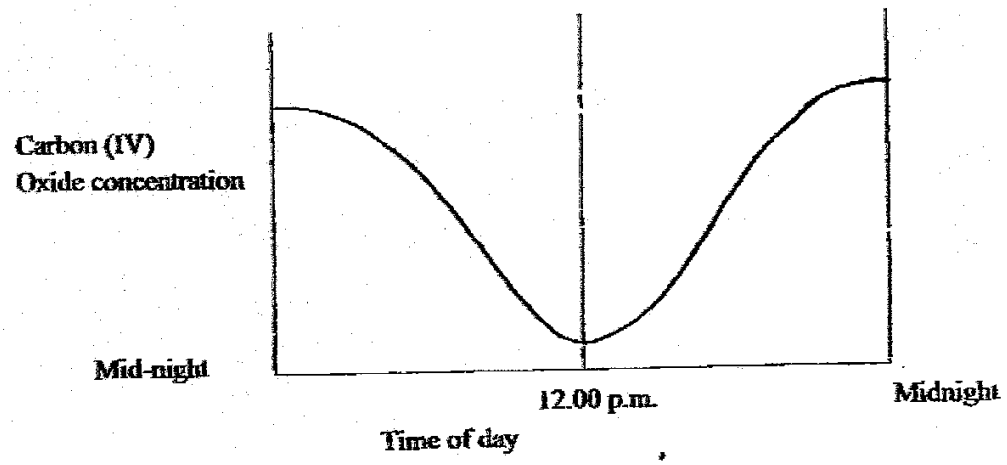
b) Give two ways through which the body responds to increased concentration of carbon (IV) oxide in the blood (2mks)

Increased rate of breathing;
Increased rate of heart beat;

c) Name the structures in pneumatophores through which gaseous exchange occurs. (1mk)

Lenticels.

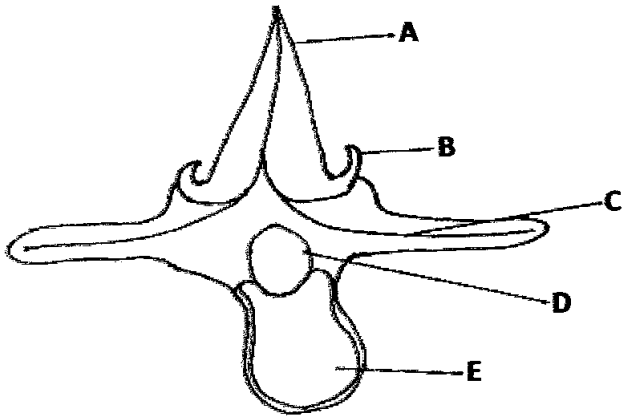
20. The concentration of carbon (IV) oxide in a tropical forest was measured during the course of 24 hours period from mid-night to mid-night.



Account for the results obtained at mid day. (2mks)

Carbon (IV) Oxide concentration is lowest; due to high light intensities; hence high rates of photosynthesis which reduces CO_2 concentration.

21. The diagram **below** represents the anterior view of a certain vertebra.



(a) With a reason, identify the type of vertebra shown **above**. (2mks)

Lumbar.
Reason:- Has large / broad transverse processes;
Has Large neural Spine;
Broad Centrum; Has metapophyses.

(b) Name the parts labeled.

(i) **A** Neural Spine. (1mk)

(ii) **D** Neural Canal. (1mk)

(c) State the function of part **E**. (1mk)

Supports the trunk.

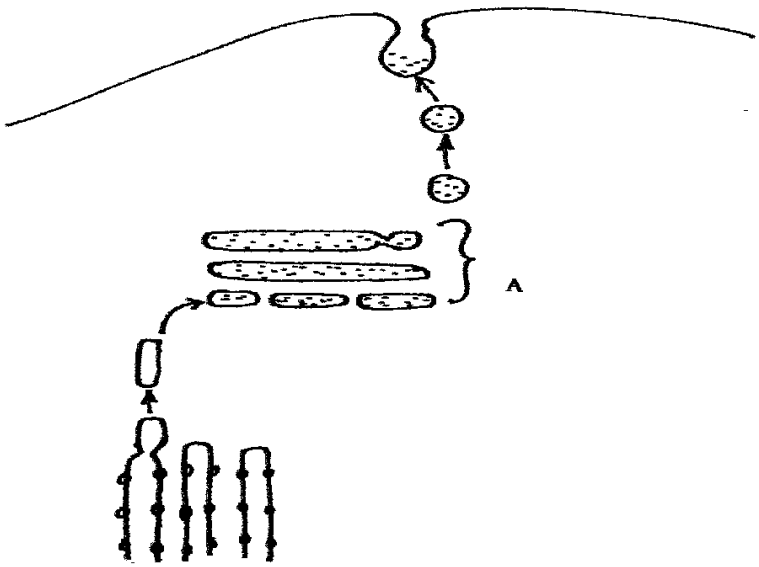
22. (a) State one similarity between diffusion and osmosis (1mk)

Molecules move passively from region of high Concentration to region of low Concentration.

(b) State two factors that can reduce the rate of active transport (2mks)

- Presence of metabolic poisons
- ~~High~~ Low oxygen concentrations in the cell
- Low glucose concentration in the cell

23. Study the diagram below and use it to answer the questions.



a) Identify the organelle marked A. (1mk)

Golgi apparatus.

b) Give three functions of the organelle named in (a) above (3mks)

- Synthesis and packaging of secretions.
- Transport of glycoproteins.
- Formation of lysosomes.
- Formation of materials that form new cell walls.

24. It was found that during germination of pea seeds $9.3cm^3$ of carbon (iv) oxide was produced while $9.1cm^3$ of oxygen was used up.

a) Calculate the respiratory quotient (RQ) of the reaction taking place. (2mks)

Carbon (IV) Oxide Concentration produced
Oxygen Consumed.
$= \frac{9.3}{9.1} = 1.02$

b) Identify the type of food substance being metabolized. (1mk)

Carbohydrates.

25. What is the biological importance of the larval stage during metamorphosis (2mks)

- Feeding and growth.
- Reduces Competition within the species.

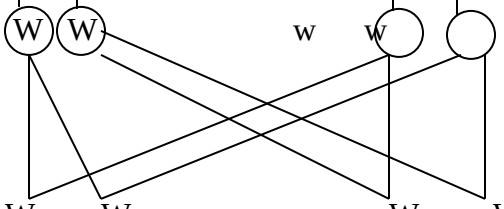
Q. 1 (a) Gene for windows peak is dominant over the gene for frontal hairlined

Parents ♂ ♀

Phenotype window peak frontal hairlined

Genotype W W x w w

Gamete W W w w



Ww W w Ww Ww F1 generation

All windows peak (4mks)

(b) Mutations
- Gene formation/independent assortment of homologous chromosomes and crossing over ;
- Fertilization; (1mk)

(c) Haemophilia
Colour blindeness (2mks)

(d) It is the entire genotype of a cell individual; (1mk)

Q. 2

(a) Kingdom protoctista ✔ (1mk)

(b) B – Vacuole ✔ (1 mk)
Y – Pyrenoid ✔ (1 mk)

(c) A – for movement ✔ (1mk)
X – for photosynthesis ✔ (1mk)
Z –protection (1mk)

(d) Because the nucleus is surrounded by a nuclear membrane ✔ (2mk)

3(a) (a) Ball and socket joint; (1mk)

(b) J – Cartilage; (2mk)

L – Synovial fluid; (2mks)

(c) Absorption of mechanical shock;
Reduce friction / lubricate the joint; (1mks)

(d) Allows movement (rotate upto 360^{o}) in all direction / planes; (1mk)

4 (a) To show that soaked seeds produce heat when they respire; (1mk)

(b) In flask A there was increase in thermometer reading; in flask B there was no noticeable increase in thermometer reading/ thermometer reading remained constant;
(c) In flask (A) soaked seeds respire aerobically to produce heat energy which raised the temperature in the flask; in flask B no respiration; no heat was produced hence no increase in temperature /thermometer reading;
(d) Vacuum flasks do not allow heat to enter or leave;
(e) Flasks should be filled with seeds to ensure that the bulb is covered;
(f) To kill bacteria/micro-organisms which would otherwise respire, giving wrong results

Q. 5a
i) Vascular cambium ;
Found between the xylem and phloem of woody plants; cells decide to give rise to secondary xylem and phloem; resulting to increase in birth / Diametre ; secondary parenchyma ; is formed between adjacent vascular bundles resulting to secondary growth ;

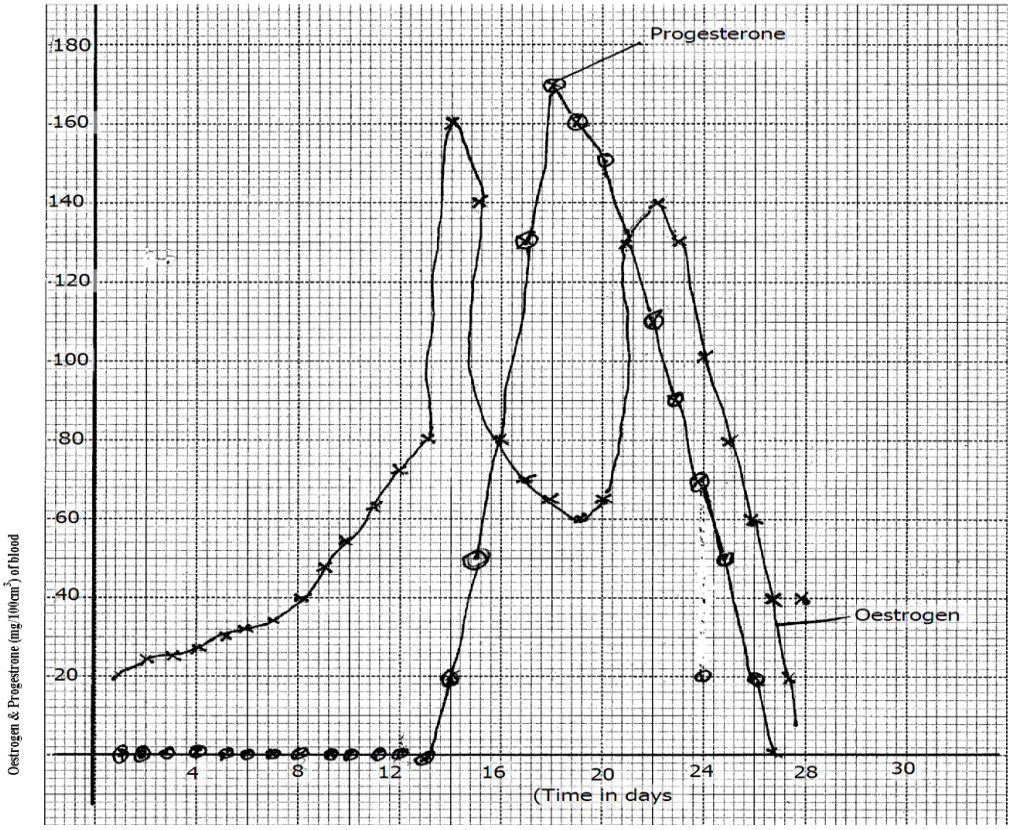
iii) Cork Cambium ;
Located beneath the Epidermis; Divides to form secondary cortex ; and corky cells ; (to the inside and outside respectively Preventing rapturing of the stem and root when vascular cambium increase in firth

a) (i) Juvenile hormone ✔ (1mk)

(ii) Ecdysone / moulting hormone ✔ (1mk)

b) Prothoracic gland ✔ (1mk)
c) Instar (1mk)

6. a)



(a)Graph (NB) Reject if plotting is not visible.
Plotting the 2 curves = 2 marks(p)
Labelling curves = 2 marks(c)
Labelled axes with units = 2 marks(l)
Two linear scales = 2 marks

b) Menstruation days 1 – 5

c) Healing and repair of the uterus

d) Causes/ stimulates thickening and increased blood supply to the endometrium in preparation of implantation of blastocyst in the uterus;

e) Ovulation taking place; Due to hormonal imbalance There is rise in temperature;

f) The corpus luteum disintergrates hence progesterone is produced;

g) i) Ovary – Produces ova;
- Produces female sex hormones;

ii) Progesterone – Stimulates thickening of the endometrium
- Stimulates increased blood supply to endometrium

iii) Oestrogen – Healing and repair of the endometrium
- Stimulates pituitary gland to produce LH

7 a) Evidence of Evolution

<u>Fossil records//Palaeontology;</u>

These are remains of organisms preserved in some naturally occurring materials e.g. sedimentary rocks for many years; They give direct evidence of the type of organisms

that existed at a certain geological time//show a gradual increase in complexity/morphological changes of organisms over a long period of time e.g. skull of man

Geographical distribution;

present continents are thought to have been a large land mass joined together; continental drift led to isolation that lead to different patterns of evolution; e.g. camels of Africa resemble the Ilamas of S. America// tiger of Asia resemble jaguars of S. America // unique Marsupials of Australia;
(accept any valid example)

Comparative anatomy/taxonomy;

- Members of a phylum show similarities indicating common ancestry; These organisms have similar functions e.g. presence of digestive, urinary, nervous systems e.t.c;
- Homologous structures like pentadactyl limbs in different animals like monkey and rats have similar borne arrangement hence same origin but modified to perform different functions// adaptive radiation//divergent evolution; vestigial organs//coccyx Appendix;
- Analogous structures like wings of birds and wings of insects with different embryonic origin but perform same function//convergent evolution;
(maximum 10mks)

N/B- Mention of each evidence 1mk each

b) Phototropism

This is a growth curvature in response to direction and intensity of light Shoots are positively phototropic while roots are negatively phototropic

Chemotropism

This is a growth curvature in response to a gradient of chemical concentration; developing pollen tubes grow towards chemicals secreted by the embryo sac;

Geotropism

This is a growth curvature in response to gravity; Shoots are negative geotropic while roots are positively geotropic;

Hydrotropism

This is a growth curvature in response to water/moisture; Roots are positively hydrotropic;

Thigmotropism

This is a growth curvature in response to contact with solid objects; shown by tendrils/climbing stems which twine around objects;

Survival values of tropic responses

- Phototropism exposes the leaves in position to maximum light absorption thereby enhancing photosynthesis;
- Chemotropism enables pollen tubes to grow towards the embryo sac to facilitates fertilization;
- Geotropism enables plant roots to grow deep into the soil thus offering firm anchorage to the plant;

- Hydrotropism enables the roots of the plant to seek water;
- Thigmotropism enables the plants to obtain mechanical support, especially plants lacking woody stems;

8a)

- It is muscular//Has cardiac muscles which are myogenic;//capapble of contracting and relaxing without nervous stimulation to ensure the heart beat without stopping;
- Supplied by vagus and sympathetic nerves; which control the rate of heart beat depending on body's physiological requirement;
- Has tricuspid and bicuspid valves//arteria ventricular valves; to prevent back flow of blood into wrong directions;
- Has semi lunar valves at the base of pulmonary artery and aorta; to prevent back flow of blood into right and left ventricles respectively;
- Presence of valve tendons attached to the walls //arteria ventricular walls; prevent arteria ventricular valves // tricuspid and bicuspid valves from turning inside out;
- Supplied by coronary artery; to supply food and oxygen t the cardiac muscles for their pumping action;
- Coronary vein; draws away metabolic wastes;
- Heart is enclosed by pericardial membrane; which secrete fluids which lubricates//reduces friction on the walls as it pumps;
- Pericardial membrane is lined with a layer of fat to act as shock absorber; hold the heart in position; checks over dilation of the heart;
- The heart is divided into two by (artria ventricular) septum; which prevents mixing of oxygenated and deoxygenated blood;
- The sino-artria node// pace maker; initiates a wave of excitation leading to contraction and relaxation of cardiac muscles;
- The artria–ventricular node; in the heart spread out waves of excitation through out the heart

The structure tied to function wrong function cancel the mark of the structure. Correct structure minus function do not qualify for a mark

b) Role of osmosis in organisms
Absorption of water from the soil;
Root hair cells of plants absorb water from the soil by osmosis; it also helps in water distribution from cell to cell in the body.

Support;
Water taken into the cells increase cell turgor hence cells become firm /rigid/turgid; and therefore turgidity in the cells provide support to plant organs;

Opening and closing of stomata;
Guard cells become turgid; when they take in water by osmosis; Turgid guard cells cause the stomata to open; when the guard cells lose water by osmosis they become flaccid leading to the closure of the stomata;

Feeding of insectivorous plants;

The plants trap insects using special structures that suddenly change there turgor pressures when disturbed; the change in turgor pressure enables the special structures/ leaves to close trapping the insect which are then digested to provide amino acids;

Osmoregulation;
In kidney tubules of animals; water is withdrawn from the tubules through the tubular walls through osmosis; the water then enter the surrounding blood capillaries, this helps the animal to regulate its body osmotic pressure;

MARKING SCHEME
P3 PREMOCK
BIOLOGY PAPER 3

1.

LIQUID	PROCEDURE	OBSERVATION	CONCLUSION
Q1	Add iodine solution to solution Q1;	No colour changes/iodine colour remained /brown colour is retained;	No starch / starch absent;
	Add equal amount of benedict's Solution to Q1 and then heat.;	No colour change / benedicts solution remained unchanged /Blue colour of benedicts solution remains;	No reducing sugar/reducing sugar absent.;
Q2.	Add iodine solution to Q2;	Black/blue/black/ Blakishblue/bluish/black colour forms;	Starch present;
	Add equal amounts of Benedict's solution to Q2 then heat;	Green → yellow → orange colours observed;	Reducing sugars present;

½ mk each Total

6mks (b)

LIQUID	OBSERVATION	CONCLUSION
Q1	Iodine colour retained /brown colour of iodine retained / No colour change;	No starch/starch absent;
	Green → yellow → orange; (correct sequence)	Reducing sugar present;

½ mk each Total: 2 mks

(c) i) Diffusion;
(ii) Ileum / small intestine; placenta /lungs/ proximal convoluted tubule;

(d) The visking tubing is semi-permeable and has small pores; reducing sugar molecules are small and hence move from region of high concentration to region of low concentration into visking tubing; starch molecules are large and did not diffuse through the small pores of the visking tube;

2. (a) C -Hypocotyl

Importance —protects the plumule /shoot tip/first foliage leaves /opens path through the soil for the cotyledon to pass/pulls the cotyledon out of the soil.

D Cotyledons/seed leaves
Importance: Photosynthesis
Food storage /food reserves
Provide food for germinating seedlings /young plants.

E Coleoptile/plumule sheath Rej: cover/coat
Importance-protects the delicate tip/first leaves/foliage leaves

(b)
(i) nodules/root nodules
(ii) Rhizobium/Rhizobia/Rhizobium bacteria rej. Bacteria alone.
(iii) Symbiotic relatioship in which bacteria gets protection and nutrients while the plant gets nitrogen in form of nitrates fixed by bacteria.

(c) (i) Epigeal
(ii) Cotyledons are brought out of the ground.
(d) Water
Oxygen;
Optimum temperature

3. (i) 4.5 cm, 1 mk
(ii) Magnified size=4. 5 cm
mg = x 6
real size = $\frac{4.5;}{6}$
= 0.75 cm 2 mks
(i) Dentine ; 1 mk
(ii) Has cusps/ ridges; to enable it grind / chew food; (into smaller pieces)
(iii) Blood vessels;✓ 2 mks
Nerve fibres; ✓ 1 mk

Biology confidential

Each candidate will require the following:

50ml distilled water labelled Q1.

One ripe tomato labelled specimen J.
2 pieces of sewing machine cotton thread 9 15cm long each)

Benedict's solution

One mature pod from leguminous plant labelled specimen K.

Iodine solution,

One mature (dry) fruit of Bidens pilosa (Black jack)

Labelled specimen L.

10cm long piece of visking tubing (wet) and preferably of 3cm width.

100 ml solution (made of 2% starch and 20% glucose) labelled Q2.

Means of heating /Flame (candle or Bunsen burner)

100ml beaker

A measuring cylinder – upto 10ml

Distilled water.

6 test tubes

Tap water / water in a wash bottle

Test tube rank

Test tube holder

A sharp razor blade / scalped

'Note'

Guide lines for the preparation of solution Q2

To prepare 1 litre of solution Q2, dissolve 20g starch in about 500ml distilled water, dissolve 200g glucose in the solution.

Make up the total volume of the mixture 1 litre by adding distilled water.