

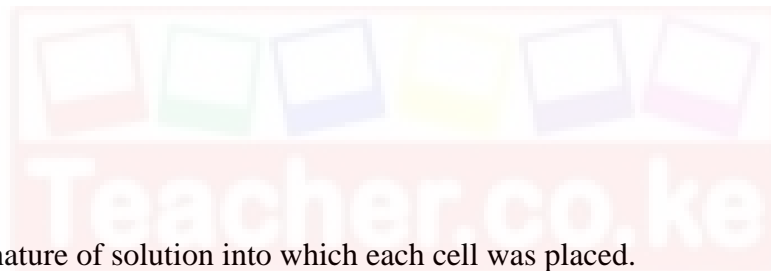
BIOLOGY
PAPER 2
FORM THREE
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

- a) This paper consists of two sections A and B.
- b) Answer All the questions in Section A in the spaces provided
- c) In section B answer question 6. (compulsory) and either question 7 or 8 in the spaces provided after question 6.
- d) Candidates should answer the questions in English.

SECTION A (40 MARKS)

1. The diagrams below represents two plants cell A and B placed in two different solutions. Study the diagrams and answer questions that follow.



- a) Identify the nature of solution into which each cell was placed. (2mks)
A- Hypotonic/highly concentrated solution
B- Hypertonic/ lowly concentrated solution
- b) Name the physiological process responsible for the observed results. (1mk)
Osmosis
- c) Give the correct biological term used to describe cell A. (1mk)
Plasmolysis; rej plasmolysed
- d) Describe what would happen if a red blood cell was placed in the solution in which cell B was placed. (2mks)
It will gain water by osmosis, swell and eventually burst.

e) Explain why freshwater amoeba do not burst when placed in distilled water.

(2mks)

Form contractile vacuoles; which get rid of excess water.

f) Explain the fate of glucose after assimilation.

(2mks)

Oxidized to produce energy or converted to glycogen for storage.

2. (a) Distinguish between the terms homodont and heterodont.

(2mks)

Homodont- a situation where an organism has teeth of same sizes and shapes

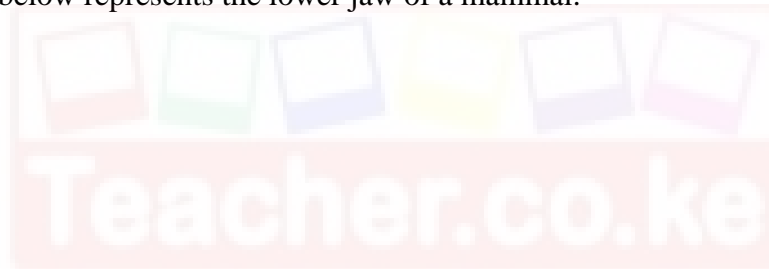
Heterodont- a situation where an organism has teeth of different sizes and shapes

(b) What is the function of carnassial teeth?

(1mk)

- **To slice through flesh and crush bones**

(c) The diagram below represents the lower jaw of a mammal.



(i) Name the mode of nutrition of the mammal whose jaw is shown above.

(1mk)

Herbivore (or herbivorous)

(ii) State one structural and one functional difference between the teeth labeled J and L.

(2mks)

J- flat, chisel shaped

L broad, ridged surfaces

Functional J; cutting and biting food

L crushing and grinding food

(iii) Name the toothless gap labeled K. (1mk)
diastemo

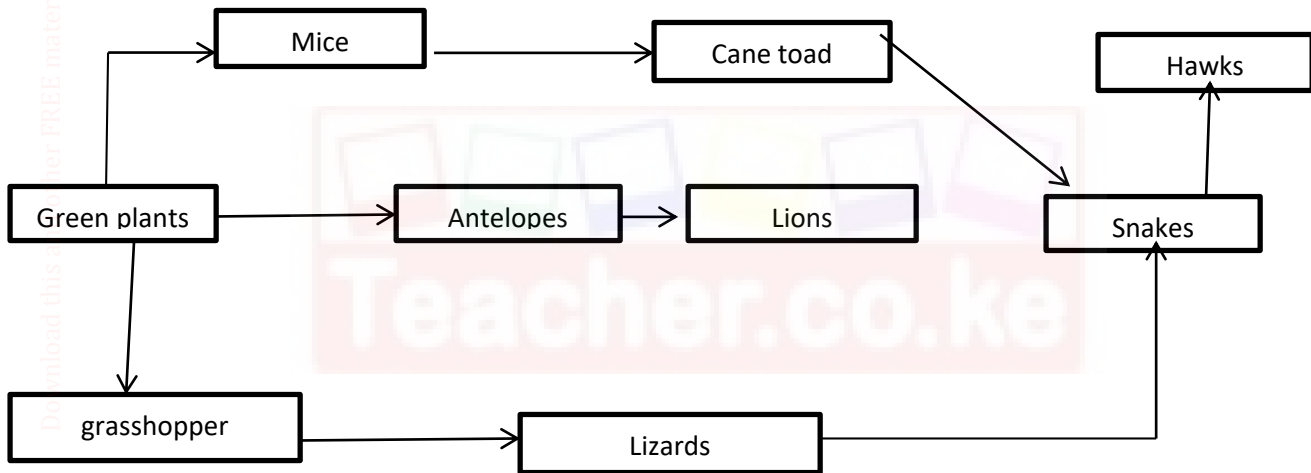
(iv) State the function of the gap. (1mk)
Assist in turning of food during grinding

(v) Name the substance that is responsible for hardening of teeth. (1mk)
Calcium phosphate and crbonate

(v) What do you understand by the term 'dental formula'. (1mk)

It's the description of the number, type and position of teeth in the jaws of mammals.

3. The diagram below represents a food web in a terrestrial ecosystem.



a) Which organism has the highest number of preys? (1mk)
Hawks

b) Construct food chains with snakes as tertiary consumers. (2mks)

Green plants → grasshoppers → lizards → snakes → hawks

Green plants → mice → cane toads → snakes → hawks

c) State the trophic level occupied by hawks in the food chains constructed in (b) above (1mk)
Quaternary consumers

- d) Describe how capture-recapture method can be used in estimating the population of fishes in a lake. (4mks)

Capture some fish, mark and release them. Record as first marked (FM), after 24 hours, collect as many organisms as possible in the same area. Record the number collected as second capture. (SC). Record the number of those previously marked as marked recaptured (MR)

$$\frac{P}{MR} = \frac{fm \times sc}{MR}$$

- e) Name the process through which:

(i) Producers convert chemical energy into heat energy lost to the environment. (1mk)

Photosynthesis

(ii) Living organisms convert chemical energy into heat energy lost to the environments. (1mk)

Respiration

4. The figure below shows the embryo sac before fertilization.



- a) Identify the structures labeled A and B (2MKS)

A pollen tube

B Synergids

- b) Identify the structures labeled in the diagram that will develop into the following after fertilization.

(i) **Embryo zygote** (1mks)

(ii) **Endosperm - Primary endosperm** (1mk)

- c) State the ploidy of each of the following nuclei after fertilization

i) **C Diploid** (1mk)

ii) **D - Triploid** (1mk)

- d) Briefly outline the process of 'double fertilization' in flowering plants. (2mks)
Is the process by which one male nucleus fuses with the egg cell to form a zygote; and another nucleus fuses with the polar nuclei to form primary endosperm
- e) Name two substances which are found in the intercellular air spaces in a green leaf during a hot sunny day. (2mks)
- Oxygen
 - Water vapour (rej water alone)

5. (a) Metaphase of meiosis1;

(b) A = Cell membrane;

B – Spindle fibre;

C – Centriole;

(c)

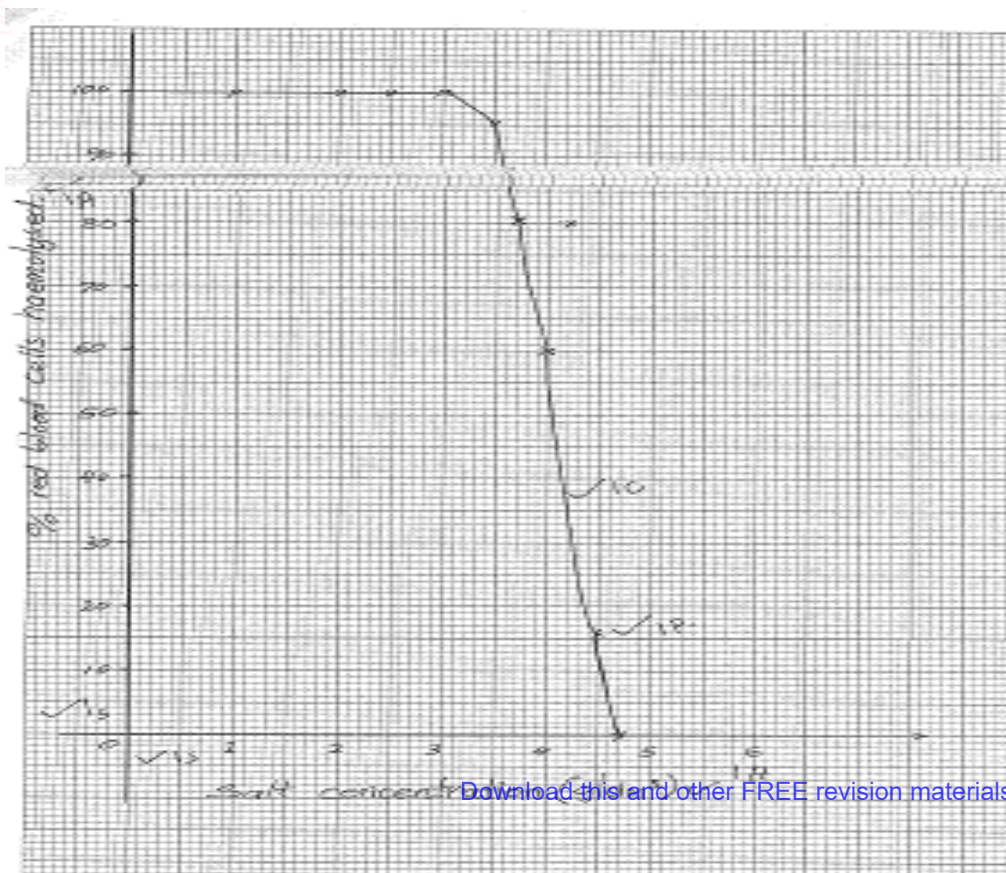
	Mitosis	Meiosis
(i)	Occurs in all somatic cells	Occurs only in reproductive cells;
(ii)	Occurs in one phase	Occurs in 2 phases;
(iii)	Daughter cells produced are diploid	Daughter cells produced are haploid;
(iv)	Homologous chromosomes do not come together/do not pair	Homologous chromosomes come together/pair;
(v)	No variation at the end	Variation occurs at the end;

(Any first 3 @ 1 Mark = 3 Marks)

(d) Crossing over;

SECTION B(40 MARKS)

Answer question 6(compulsory) and either 6 or 7 in the spaces provided.



- 6 b) Haemolysis of red blood cells occurs when they are placed in a hypotonic solution. They gain water by osmosis swell and then burst;
- c) i) 4.1g/dm^3 ;
ii) 3.0g/dm^3 ;
- d) i) 47g/dm^3 ;
ii) At 4.7g/dm^3 salt concentration, there is no haemolysis. It was at 0%;
iii) Isotonic solution;
- e) Osmoregulation;
- f) -Enable movement of water from one cell to the next;
-Helps in the opening and closing of stomata in plants;
-Leads to turgidity in cells, thus providing support in plants;
-Enables the absorption of water from the soil by the root hairs;

7. (a) Large; brightly coloured petals/ bracts; to attract insects; scented; to attract insects.

Have nector guides that direct insects into nectaries which secrete nectar;
Pollen grains rough/ sticky surface; to stick on insects body;
Special shaped corolla tube; to enable insects to land
Anthers situated inside the flowers; to ensure that they get into contact with the insect;
Sticky stigma; for pollen to stick and adhere;

- (b) Animal dispersed fruits/seeds
Presence of hooks for attachment to animals; thus carried to other places;
Fruits are brightly coloured; succulent; aromatic/scented; to attract animals; which feed on them. The seed coats/ hard seed are resistant to digestive enzymes; thus remain unaffected, the seeds are dropped away from parent plant in faeces/ droppings;
Wind dispersed fruits/ seeds
Presence of hairs/ wing like structures/ floss/ extensions; which increases surface area for buoyancy; making it easy for fruit/ seed to be blown away;
fruits/ seeds are light due to small size; therefore easily carried away by wind

8. Domestic effluent/ sewerage feaces nitrogenous wastes wine/ garbage detergents pollutes water pollution caused by domestic effluents may be controlled by treating domestic wastes / using biotechnology i.e. psendomon as spp; burning of phosphate based detergents/ using plastic pipes instead of those made from lead; recycling garbage; industrial wastes. Radioactive wastes heavy metals in industrial wastes include lead zinc / copper chromium/. Mercury; heat water pollution caused by industrial wastes/ cooling hot water, carrying out environmental impact assessment before establishing industries; spillage ;of oil; oil spillage may ;be controlled by cleaning spilled oil/ biotechnology / spendomonas spp; penalizing industries companies which cause oil spills which pollutes water; agrochemicals such as inorganic fertilizers herbicides pollution caused by agrochemicals may be controlled by using mechanical control of weeds; biological control of weeds/ pests, biodegradable organic fertilizers/ herbicides/ insecticides/ fungicides organic farming use of correct amount of agrochemicals; soil erosion, contribute to silting; may be controlled by appropriate farming practices such as contours arming/ reforestation. Building gabions/ terracing

