PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

F4 - MOCK EXAMINATIONS MAY 2024

MARKING SCHEME

BIOLOGY 1

CODE: 033/1

SECTION A: (16 MARKS).

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
E	C	D	C	B	A	D	B	A	E

@ 01 = 10 Marks.

NB: (iii) Sperm cell is haploid - either X or Y chromosome.

2.

LIST A	i	ii	iii	iv	v	vi
LIST B	D	I	K	J	F	B

06 points @ 01 = 06 Marks.

SECTION B (54 Marks).

3 (a) Name of that help is First Aid. (01 Mark)

(b) Aim of administering First Aid:-

(i) To protect further injuries or bleeding.

(ii) To reduce pain

(iii) To save life or to sustain life

(iv) To promote recovery

(v) To reduce chance of disability

(vi) To bring hope and encouragement

Any four points @ 01 = 04 Marks.

CamScanner

3 (c) Precautions to be taken when administering first aid to an accident victim:-

(i) Wearing of protective gears like gloves to avoid direct contact with one's blood since the victim have severe bleeding.

(ii) To handle broken legs or arms or other body parts with great care to avoid further worsening of the situation.

01 point = (01 Mark.)

4. (a)

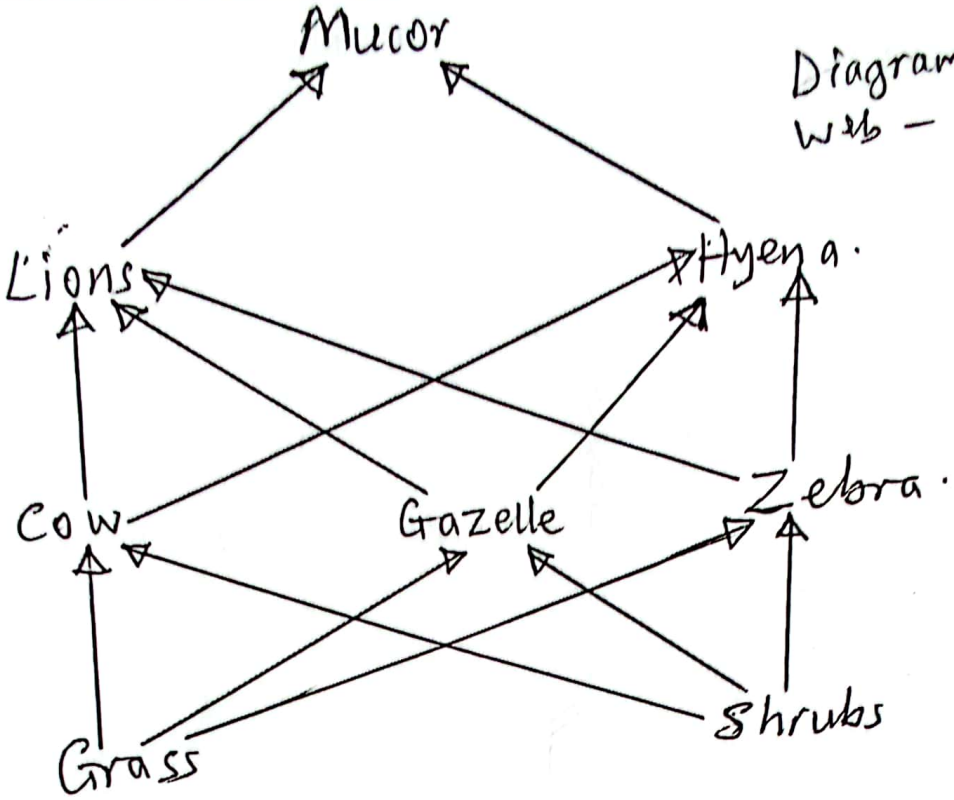


Diagram food web – 4 marks

(b) Food chains from the above food web. 3pts @01 = (03 mks)

(i) Grass → Gazelle → Hyena → Mucor
(ii) Grass → Cow → Lions → Mucor
(iii) Shrubs → Zebra → Hyena → Mucor
(iv) Shrubs → Gazelle → Hyena → Mucor
(v) Shrubs → Gazelle → Lions → Mucor
(vi) Shrubs → Cow → Lions → Mucor
(vii) Grass → Gazelle → Lions → Mucor
(viii) Grass → Zebra → Hyena → Mucor
(ix) Grass → Zebra → Lions → Mucor.
(x) Grass → Cow → Hyena → Mucor.
(xi) Shrubs → Zebra → Lions → Mucor
(xii) Shrubs → Cow → Hyena → Mucor.

(c) From the above ecosystem; the primary consumers are;
(i) Cow (ii) Gazelle and (iii) Zebra 3pts @01 = (03 marks)

(c) Mucor is a decomposer... (01 Marks)

5. (a) Names of the types of animals from their temperature regulation. – 2 pts @ 01 = (02 marks)

(i) X – is Homoiothermic (Endotherms)

(ii) Y – is Poikilothermic (Ectotherms)

(b) Examples of organisms in each group.

(i) Homoiothermic – Examples are: mammals (such as man, cow, birds, ...) 2 pts @ 0½ = (01 Mark)

(ii) Poikilothermic – Examples are: Reptiles (such as snake, Lizard, ...), Fish and Amphibians (eg. Frog, Toad, ...) 2 pts @ 0½ = (01 Mark)

(c) Adaptations of animal X – to hot condition

During hot weather conditions homoiothermis take measures that promote heat loss and cut out heat production. This is achieved ∴ through: 2 pts @ 01 = (02 marks)

(i) Sweating ÷ this has cooling effect to an organism's body.

(ii) Panting ÷ this is evaporative cooling

(iii) Relaxation of hair erector muscles ÷ allows heat to escape.

(iv) Vasodilation of arterioles ÷ This allows los of more heat

(v) Decreased metabolic activities ÷ This decrease generation of heat.

(d) Organ	Nitrogenous waste (Excretory products)	
(i) Kidney.	Urea, Uric acid, Ammonia.	3 organs @ 0½ = 01½ ~~03~~ marks. Any 3 waste @ 0½ = (01½ marks)
(ii) Skin	Ammonia, traces of Urea.	
(iii) Liver	Urea	

(e) The situation will be rectified by ÷ Pancreas will secrete insulin into the bloodstream which will cause liver cells to convert the excess glucose into glycogen for storage. (01 mark)

6. (a) Types of pollination of the mentioned groups of flowers. 2 pts @ 01 = (02 marks)

(i) Group A flowers:- ..... (Insected pollinated)

(ii) Group B flowers:- ..... (wind pollinated)

(b) Features of flowers in group A + B Any 3 pts @ 01 = (03 marks)

Features of group A flowers	Features of group B flowers
(i) They have petals which are large, brightly coloured + sometimes scented, mostly with nectaries	- Usually do not have petals and when petals present are very small and dull coloured.
(ii) They produce stick: sticky large pollen grains → They produce small quantities of pollen.	- They produce numerous pollen grains or large quantity of pollen. * Pollen grains are usually small + light.
(iii) The stigma are sticky and are situated in such a way that they brush against the bodies of the visiting insects.	- Stigmas are large and feathery. This is for easy traping of the pollen grain floating in the air.
(iv) The anthers are usually small and are situated inside the flowers	- Anthers are large and often have long filaments which hang them well outside the flowers.

(c) Insects which can pollinate flowers in group A.
(i) Bees (ii) Butterflies. Any 2 pts @ 0½ = (01 marks)

(d) Possible agents of pollination in flowers of group B are:
(i) Wind (ii) Animal (eg. man). Any 2 pts @ 0½ = (01 Marks)

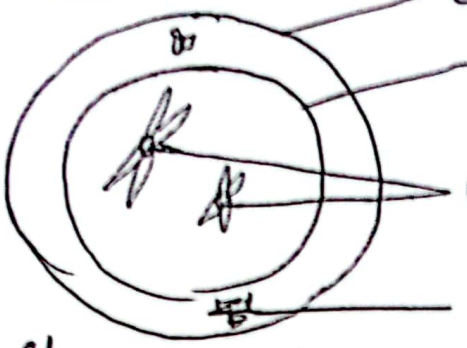
7. (a) Name + meaning of type of cell division (02 marks)

Mitosis:- Is a type of cell division that results into two daughter cells each having a nucleus containing the same number and kind of chromosomes as the mother (parent) cell.

Cont:...

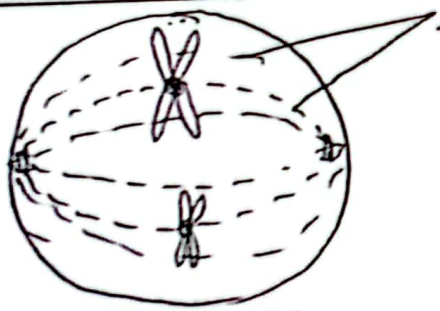
7. (b) Stages of Mitosis. 4pts [@ Diagram of = (4 marks)
@ Explanation of = (04 marks)

(i) Prophase



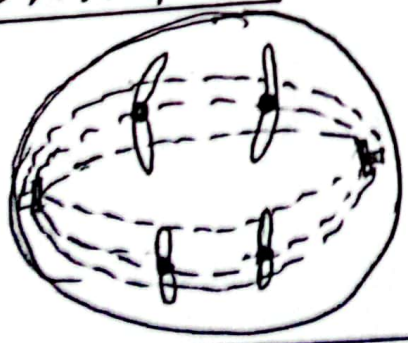
→ Chromosomes become short & thick thus visible under light microscope.
→ Each chromosome forms two sister chromatids attached at a centromere.
→ At the end of prophase the nuclear membrane disappear and spindle fibres start to form.

(ii) Metaphase



→ The spindle fibres are fully formed.
→ The Centromere are lined up on the equator
→ The Chromosomes are arranged at the equator of the spindle fibres.

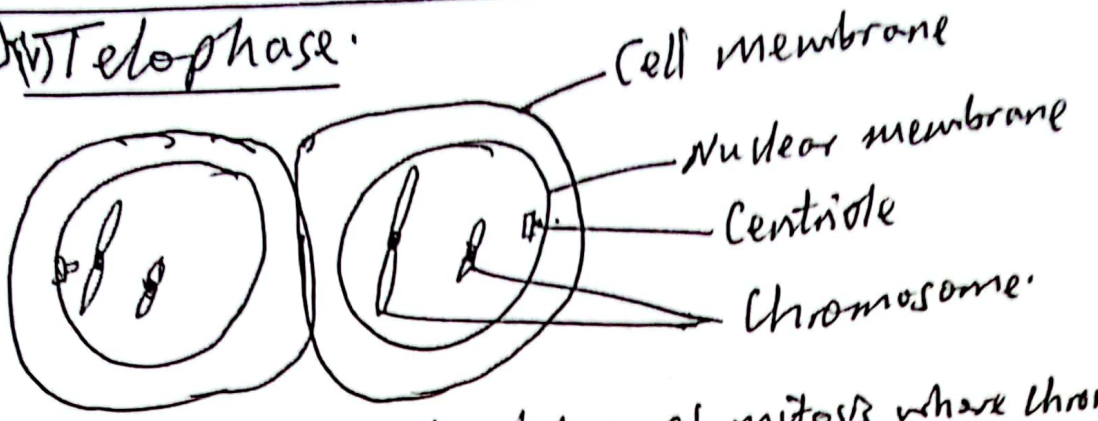
(iii) Anaphase.



→ During this phase, the centromere separates.
→ Spindle fibres shorten, pulling apart the sister chromatids towards opposite poles of the cell.
→ By the end of anaphase, the chromatids arrive at the poles.

cont...

7. (b) (v) Telophase.



→ This is the last stage/phase of mitosis where chromatids become chromosomes.
→ The spindle fibres disappears/break apart.
→ The nucleolus reappears and the new nuclear membrane is formed.
* Daughter (Two daughter cells) are formed each having the same number of chromosomes as the parent cell.

(c) How does mitosis bring about growth?
⇒ It increases the number of cells in organisms.
⇒ It is used in the generation of body parts which have been cut off. 1pt – (01 mark)

8. (a) Importance of studying biology: 4pts @01 = (04 marks)
(i) Helps us to understand ourselves better.
(ii) Helps us to understand our environment better.
(iii) It is the foundation for careers in fields such as medicines, agriculture, forestry, domestic science.
(iv) Helps us to appriciate nature.
(v) Helps international cooperation through research.
(vi) Helps to acquire research skills that are useful.
(vii) Knowledge of biology helps us to improve on home management techniques eg: better methods of food preservation.
(viii) Knowledge of biology helps us in solving environmental problems such as food shortage, poor health services, etc.

cont.:

8 (b.) (i) Effects of Disposing waste in water.

→ Water contamination.
→ Diseases breakout eg. Cholera.
→ To harm acquatic animals like fish.

3 pts @01 = (3 marks)

(ii) Proper ways of Disposing waste:

→ Burying.
→ Incineration
→ Recycling.
→ Composing.

2 pts @01 = (02 marks)

SECTION C (30 marks)

9. The protozoa which cause the prescribed disease is the plasmodium sp. and the disease is malaria (01 mark)

→ The parasite can enter the human body through female anopheles mosquitoes (vector) having bitten an infected person and drawing blood from the body containing plasmodium and then biting uninfected person transfering plasmodium to the uninfected person. (02 marks)

→ Plasmodium also can be transmitted through blood transfusion — if the blood donor has malaria.

* Prevention of the disease Any 6 pts @ 02 = (12 marks)

Malaria can be prevented/controlled by the following:

→ Destroy mosquito breeding grounds.
→ Protect oneself from mosquito bites by using mosquito nets, wiregauze (wire meshes) in windows and use of mosquito repellants
→ Kill mosquito by pesticides (eg. rungu).
→ Cleaning bushes around the house.
→ Draining marshes and stagnant water
→ Use of anti-malaria.
→ Treatment of malaria patient.

10. From the concept evolution/organic evolution, Organism never remain static rather they do change. This can be justified by;

First the concept or definition of Evolution.
- It is the slow and gradual process where organisms change from the simplest form, to complex form that existing today. — Introduction 0½

Secondly justification can be made by describing Evidences of Evolution as follows 5pts@2½(12½)

⇒ Paleontology evidence (Fossil records):- This is the study of fossil (Remain of organisms). This shows that organisms existed in many years ago had less complex ~~th~~ fossil compared to recently.

⇒ Comparative Embryology:- this is the study of embryos and their development. The similarities of embryos among the complex animals such as human, chicken, frogs, reptiles and fish is evidence for evolution. It suggests that all these organisms arose from common ancestors...

⇒ Biochemistry:- This is the study of basic chemistry and processes (physiological that occur in cells). It seem that the biochemistry of all living things is incredibly similar, showing that all organisms share a common ancestry. For example; the presence & functions of DNA is the same in most organisms. Also the process of respiration is basically similar in all species.

⇒ Vestigial Organs:- These are organs/structure whose function is lost in the course of evolution. Presence of vestigial organs in different organisms indicate that all organisms arose from common ancestors but they differ due to organic evolution.
Example: The wings of flightless birds such as Ostriches and penguins.

⇒ Comparative anatomy:- This is the study of similarities and differences of anatomy of different species.

10. Comparative anatomy illustrates that, organisms have similar structures even though they live in different environment. This indicates that various organisms share a common ancestor and differ due to organic evolution.

* The structures compared can be homologous structures and analogous structures.

→ Homologous organs :- these are organs of the same origin and anatomy but they perform different functions.

eg. The fore limbs of human, horse, cat, bat, birds & Whale all of them have the same origin and same structures but perform different functions

→ Analogous Organs :- these are organs of different in origin, morphology and anatomy but they perform similar functions. eg. wings of insects & birds differ in origin, morphology and anatomy but all are for flying functions.

Main body 5 pts @ Pt. 1 — 05 marks
@ Explanation 1½ → 07½ marks

Conclusion (Any related). — 01

~~Total — 15 marks~~

11 (a) From the expression;
gene for smooth seed coat is W then
gene for wrinkled seed coat is w

→ To get F1 generation;

Parental phenotype - - Smooth seed coat × Wrinkle seed coat (01 mark)

Parental genotype - WW — ww (01 mark)

Meiosis:

Gametes W W w w (01 mark)

Fertilization.

Offsprings (F_1 – genotype) -- Ww Ww Ww Ww (01 mark)

F1 (phenotype) – All are Smooth seed coats.

~~F1 genotypes are – 9~~ ALL heterozygous Smooth seeds

Cont...

11 (b) To get genotype and phenotype ratio of F_2

→ This is done by selfing F_1.

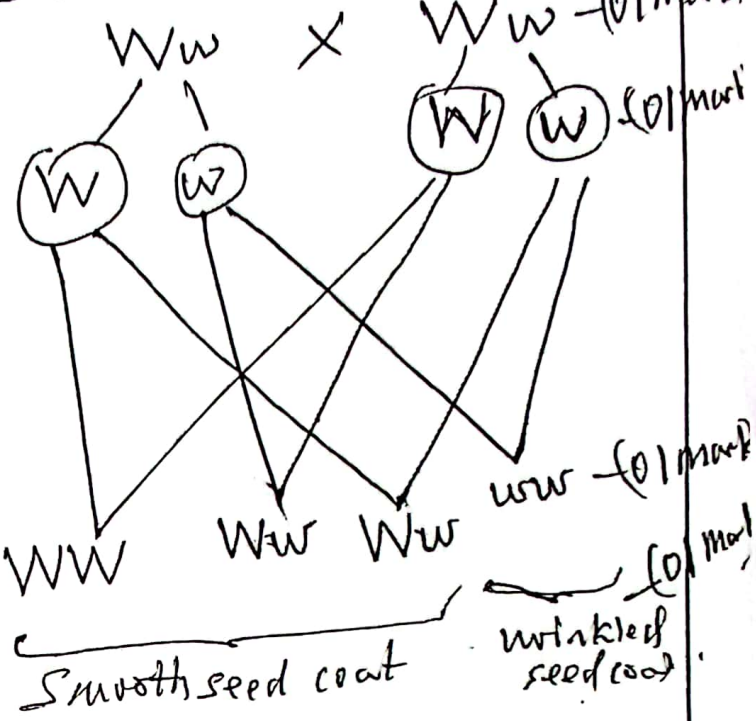
Parental phenotype — Smooth seed coat × Smooth seed coat. (01 mark)

Parental genotype — Ww × Ww — (01 mark)

Meiosis — W W W W (01 mark)

Gametes

Fertilization.



F_2 - genotypes --- WW Ww Ww ww — (01 mark)

F_2 - phenotypy — Smooth seed coat — wrinkled seed coat. (01 mark)

Therefore:

(i) Ratio of genotype of F_2 is

⇒ Homozygous Smooth (WW) : Heterozygous Smooth (Ww) : Homozygous wrinkled.

[Genotypic ratio]. 1 : 2 : 1 — (01 mark)

(ii) Ratio of phenotype of F_2 is

⇒ Smooth seed coat : wrinkled seed coat

[phenotypic ratio] 3 : 1 — (01 mark)

(c) Calculation of number of seeds in F_2.

(i) Wrinkled seed in F_2

→ Since the total number of offspring in F_2 is 8328 and the ratio is 3 (Smooth) : 1 (wrinkled)

Cont:-

11 (C) (i) Number of wrinkled seeds in F2 (02 marks)

$= \frac{1}{4} \times 8328 = \underline{2082 \text{ seeds.}}$

(ii) Number of seeds (Smooth seeds) in F2.

$\Rightarrow \frac{3}{4} \times 8328 = \underline{6246 \text{ Seeds.}}$ (02 Marks)