

NAME: M/S INDEX NO:
CANDIDATE'S SIGN: ADM. NO:
DATE: CLASS:

231/2
BIOLOGY
Paper 2
(THEORY)
SEPTEMBER 2022
Time: 2 hours

MARANDA HIGH SCHOOL MOCK-2022
Kenya Certificate of Secondary Education
231/2
Paper 2
BIOLOGY

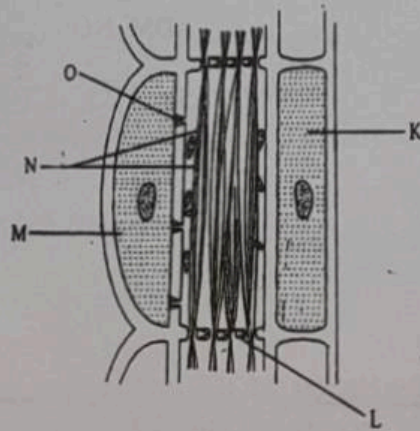
Instructions to candidates

- (a) Write all your details in the spaces provided above.
(b) This paper consists of **two** sections; **A** and **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 **8**.

For Examiner's Use only

Section	Question	Maximum Score	Candidate's Score
A	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
B	6	20	
	7	20	
	8	20	
Total score		80	

1 The diagram below represents a plant tissue



a) Name the structures L and O. (2mks)

L. Sieve plate;

O. Plasmodesma; i.e. plural - plasmodesmata

b) State the function of structure N and cell labelled M. (2mks)

N. Allows for continuous movement of manufactured food substances along them;

M. Provide energy for translocation;

Regulate activities of the sieve tube cells;

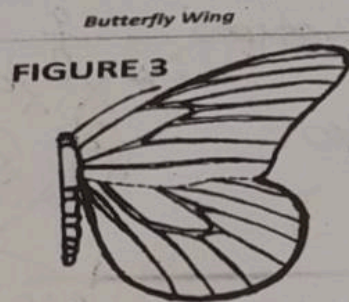
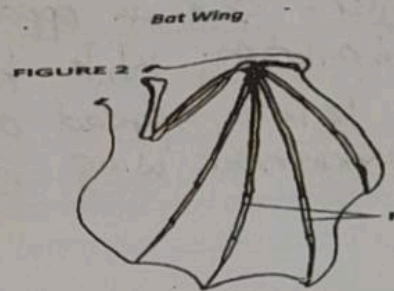
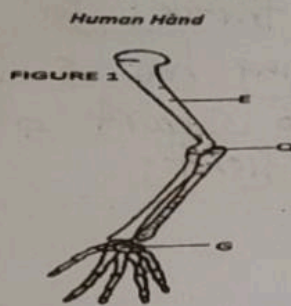
c) Give two structural differences between phloem tissue and xylem tissue. (2mks)

Phloem	Xylem
1. Made of living cells	Made of dead cells;
2. Has cross walls that form sieve plates	Lack cross walls;

d) Distinguish between active and passive immunity. (2mks)

Passive immunity is a type of immunity that results from transfer of antibodies from one animal to the other while active immunity is ~~transfer~~ type of immunity where the animal's body produces its own antibodies;

2 The following figures represent the forelimb of a certain animal species. Study them and answer the questions that follow



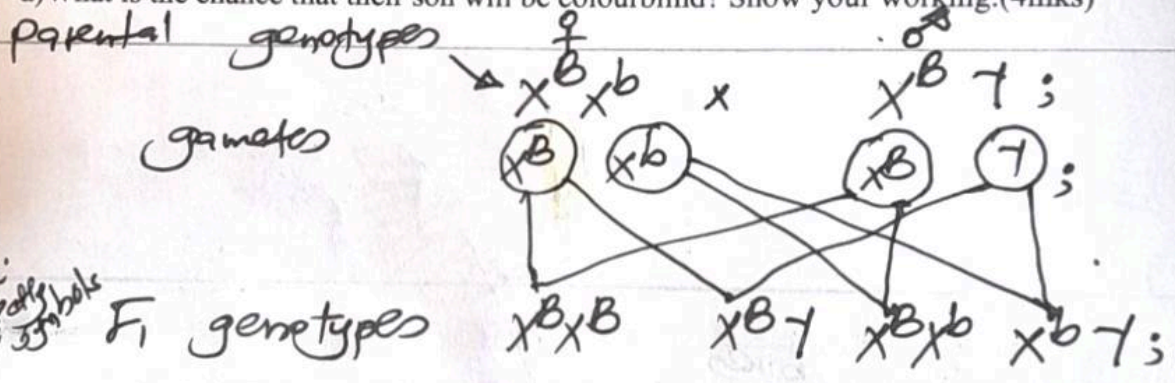
- a) Name the ^{bones} parts labelled E and G. (2mks)
- E. Humerus;
- G. Carpal; 1st phalanx
- b) State the type of skeleton represented by figure 1. (1mk)
- Endoskeleton;
- c) Name the type of joint at point Q. (1mk)
- Hinge;
- d) Which two figures represent analogous structures? (1mk)
- Fig 2 and Fig 3;

e) Give the adaptational difference between structures in figure 1 and figure 3 (3mks)
 Human hand has 5 digits separated into four fingers and an opposable thumb; for grasping or manipulation; while bat wing has 5 digits which are long & spread out; to support a large membranous wing for flight;

3 Colourblindness is a disorder caused by gene mutation and it is controlled by a recessive gene. A man with normal colour vision marries a carrier woman:

* let B rep gene for colour vision

a) What is the chance that their son will be colourblind? Show your working. (4mks)



NB - Accept w/ illustrated parent sq. - Accept carrier used letter symbols

chance of son being colourblind - $\frac{1}{2}$;

(b) Name another trait in humans inherited in the same way as colour blindness.

Haemophilia; Duchenne muscular dystrophy (1mk)

c) Briefly describe inversion in gene mutation.

portion of DNA strand breaks at two points, rotates through 180° and then rejoins in an inverted manner; (1mk)

d) Distinguish between back cross and testcross.

(2mks)

Back cross is a cross between an offspring with unknown parental genotype while test cross is a cross between an individual of unknown genotype with a homozygous recessive individual;

4 a) Nitrogen in the atmosphere cannot be directly utilized by plants. State two ways by which this nitrogen is made available for plant use.

(2mks)

- Fixation by lightning;
- Fixation by microorganisms e.g. nitrogen fixing bacteria; algae

b) State the importance of saprophytic bacteria in the environment.

(1mk)

Decomposition of dead organic matter releasing nutrients in the soil;

* c) Briefly explain the how excessive use of agrochemicals affects the large water bodies.

(3mks)

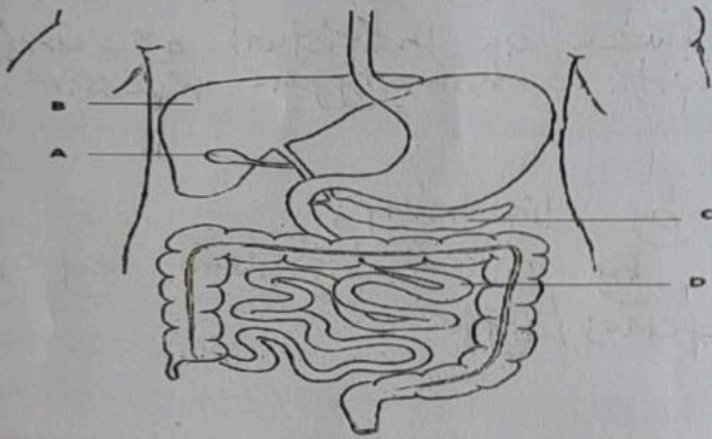
Causes rapid growth of phytoplankton/small water plants; leading to low light intensity in water hence decreasing primary productivity;

d) Explain how competition regulates the animal population in a habitat.

(2mks)

Organisms with advantageous variations survive & continue with the generation; while those with disadvantageous variations migrate or die;

5 the figure below shows the parts of the human digestive system. Study it and answer the questions that follow.



a) Name the organs labelled A, B and D. (3mks)

A. Gall bladder;

B. Liver

D. Small intestine ileum;

* b) State the ~~major~~ role of part labelled C. (1mk)

1. secretion of hormones insulin & glucagon;

- secretion of pancreatic juice / digestive enzymes e.g. trypsin / pancreatic lipase / amylase;

c) Name the two salivary glands in human beings. (2mks)

- Sublingual;

- Submandibular;

- parotid;

d) Give two adaptations of part labelled D to its function.

- Long to increase SA for absorption of food; ^(2mks)

- Highly coiled to reduce the mass of digested food allowing more time for absorption;

- Inner walls have villi / microvilli to increase SA for absorption;

- Lacteals for absorption of fatty acids & glycerol;

- Thin epithelium to reduce distance for absorption;

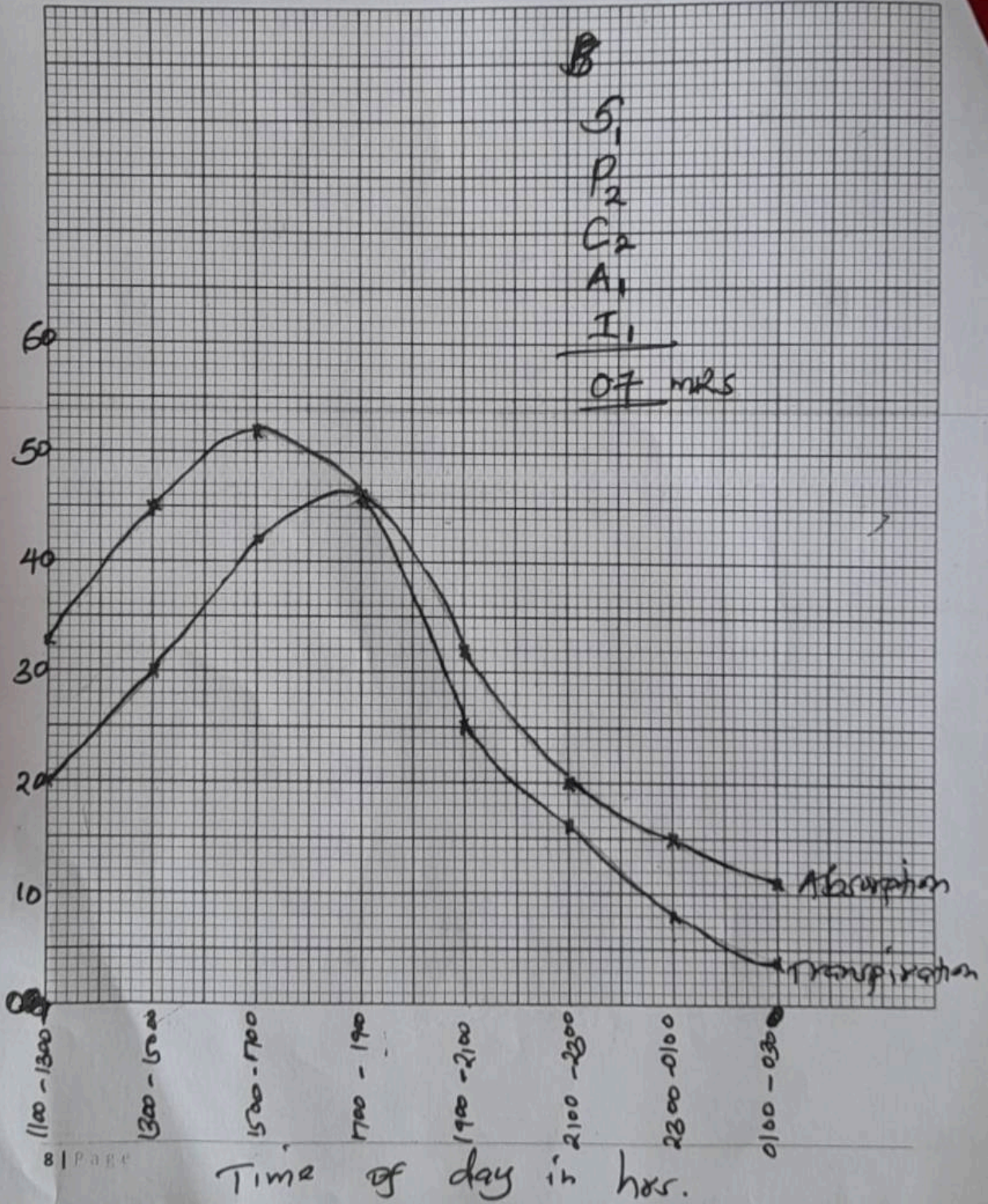
(First two)

- 6 An experiment was carried out to investigate transpiration and absorption of water in sunflower plants in their natural environment with adequate supply of water. The amount of water was determined in two hour intervals. The results are as shown in the table below.

TIME ^{OF} IN DAY	Amount of water in grammes	
	Transpiration	Absorption
11:00-13:00	33	20
13:00-15:00	45	30
15:00-17:00	52	42
17:00-19:00	46	46
19:00-21:00	25	32
21:00-23:00	16	20
23:00-01:00	08	15
01:00-03:00	04	11

a) Using the same axes, plot graphs to show transpiration and absorption of water in grammes against the time of the day. (7mks)

Transpiration/absorption of water in grammes



b) At what ^{time} point of the day was the amount of water the same for transpiration and absorption? (1mk)

1700 - 1900 hrs

c) Account for the shape of the graph of :

i) transpiration hrs (3mks)

1100 - 1700 : Increase in rate of transpiration; due to high light intensity / high temperature;

1700 - 0300 hrs : Decrease in rate of transpiration; due to low light intensity / absence of light / low temp; (max 3)

ii) absorption (3mks)

1100 - 1900 hrs : Increase in rate of absorption of water; to replace water lost through transpiration;

1900 - 0300 hrs : Decrease in rate of absorption of water; due to decline in transpiration rate;

d) What would happen to transpiration and absorption of water if the experiment was continued till 0500 hours? (2mks)

Both transpiration and absorption; would decrease;

e) Name two factors ^{Environment} that may affect transpiration and absorption at any given time. (2mks)

Wind; Light intensity;
Humidity; Temperature;
Atmospheric pressure; (just two)

f) Explain how the factors you named in (e) above affect transpiration. (2mks)

Wind - Rate of transpiration is faster in windy conditions / lower when air is still;

Humidity - Low humidity causes high rate of

transpiration due to high saturation deficit / conc gradient / high humidity leads to low rate of transpiration due to low saturation deficit;

Atmospheric pressure - low atmospheric pressure causes high rate of transpiration / high atmospheric pressure causes low rate of transpiration;

Light intensity - High light intensity leads to high rate of transpiration & vice versa;

Temperature - High temperature leads to high rate of transpiration & vice versa; (12mks)

7a) Explain how blood sugar is regulated in the human body.

Normal blood sugar level is about $90 \text{ mg}/100 \text{ cm}^3$;

Increase in blood sugar above normal is detected by the hypothalamus; which then sends nerve impulses to the pancreatic cells/islets of Langerhans; that are stimulated to secrete Insulin hormone; Insulin stimulates liver cells; to convert excess glucose to glycogen; / fats, excess glucose is also oxidised to release energy; This reduces glucose level back to normal;

Decrease in blood sugar level below optimum is detected by the hypothalamus, that send impulses to the pancreatic cells/islets of Langerhans, which are stimulated to secrete glucagon hormone; Glucagon stimulates liver cells to convert glycogen to glucose; fats & amino acids are converted to glucose; reduced oxidation of glucose; This increases the level of glucose in blood to normal; (13 mks max 12)

b) Explain the adaptations of the mammalian skin to thermoregulation. (8mks)

- Sweat glands secrete more sweat; when temperatures are high. ~~Sweat~~ ^{Water} in sweat evaporates, absorbing latent heat of vapourisation; hence cooling the body;
- When temperatures are low, hairs stand upright; when erector pili muscles contract; trapping air to insulate/reduce heat loss; ~~hairs~~ ^{hairs} lie flat; to allow heat loss when temperatures are high;
- Vasodilation; when temperatures are high to enhance heat loss; vasoconstriction when temperatures are low to minimise heat loss;
- Subcutaneous layer; insulates the body against heat loss;

8a) Describe factors which enable the leaf of a terrestrial plant to absorb maximum light for photosynthesis. (12mks)

- Thinness; of the leaf to reduce distance; for maximum absorption of light.
- Broad lamina; to provide large surface area; for maximum light absorption.
- Numerous chloroplasts in the palisade mesophyll; with more chlorophyll pigment for maximum trapping of light;
- Leaf mosaic; to minimise overlapping and overshadowing;

- Transparent cuticle; to allow light to pass through;
- palisade mesophyll found beneath the upper epidermis; to receive maximum light for photosynthesis;

b) Describe how support is achieved in herbaceous plants and shrubs. (8mks)

- Turgidity of parenchyma cells; the cells take in water by osmosis; become turgid & closely packed; hence providing mechanical support.
- Twining around other plants; in some plants.
- Use of tendrils; in some plants.
- Use of hooks; in some plants.

- Some herbaceous plants use collenchyma cells; whose walls are thickened with cellulose; to provide mechanical support