

3 November 2000 A.M.

Instructions

Sections A and C carry 20 marks each. The mark allocation for section B is indicated at 7.

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Except for diagrams, which must be drawn in pencil, all writing should be in blue/black ink.

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Read each question carefully before you start answering it.

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SECTION A
Answer ALL questions in this section
This section carries 20 marks.

- I. Items (i) - (x) consist of questions or incomplete statements followed by four suggested answers. Select the correct answer in each case and write down its letter beside the item number as shown in the worked example.

Example: (i) Which of the following is the most important basic difference between plants and animals?

- A. Growth
- B. Movement
- C. Nutrition
- D. Irritability.

Answer (i) C

- (i) Kano, a form three student, wants to prepare microscope slides showing the different stages of mitosis. Which of the following would be most suitable to use?

- A. Ovary
- B. Anther
- C. Leaf
- D. Root tip.

- (ii) Fertilization in mammals usually occurs in the

- A. urethra
- B. vagina
- C. oviduct
- D. uterus.

- (iii) Which one of the following is not characteristic of the animal shown in the diagram below?



Fig. 1

- A. Hard exoskeleton
- B. Two body divisions
- C. Metamorphosis
- D. One pair of simple eyes.

- (iv) The following contribute to the availability of nitrogen compounds in the soil except

- A. thunderstorms
- B. decay of animal remains
- C. addition of ammonium sulphate
- D. addition of lime.

- (v) The parts which are likely to show a positive geotropic response in groundnuts are
- stem and roots
 - flowers and roots
 - leaves and roots
 - roots only.
- (vi) The correct order by which water travels from the root hair to the xylem is
- cortex, epidermis, endodermis, pericycle, xylem
 - epidermis, cortex, pericycle, endodermis, xylem
 - epidermis, cortex, endodermis, pericycle, xylem
 - epidermis, endodermis, cortex, pericycle, xylem.
- (vii) If you go to a market and buy some potatoes and onions, you will actually be buying
- stem tubers and fleshy leaves
 - root tubers and fleshy leaves
 - root tubers and stem tubers
 - underground stems.
- (viii) A healthy person's blood pressure in millimetres of mercury should be around $120/70$. This means that his
- diastolic pressure is 50
 - systolic pressure is 70
 - diastolic pressure is 120
 - systolic pressure is 120.
- (ix) Two gray cats are crossed. The female gives birth to 5 gray and 3 black kittens. Which of the following is most probably true?
- Gray colour is dominant to black
 - Black colour is dominant to gray
 - Black and gray colours are codominant
 - Colour trait in cats is sex linked.
- (x) Refer to the diagram below, Figure 2, of a pyramid of numbers.

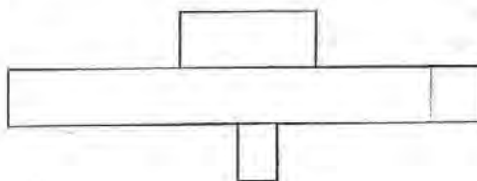


Fig.2

Which of the following food chains does the above diagram represent?

- Grass → grasshoppers → hens
- Willow tree → catapillars → birds
- Leaves → slugs → grass snakes
- Water weeds → tadpoles → water beetles.

2. The following are matching items. Match the terms or statements in list A with those in list B by writing the correct letter of the term, phrase or statement in list B against the corresponding number of term or statement in list A as shown in the worked example.

Example:

List A	List B
(i) Under activity of the thyroid gland	(x) cretinism (y) giantism

Answer (i) (x)

List A	List B
(i) Corrects short sight	A. adipose tissue
(ii) Enables muscles to work in a coordinated manner	B. epidermis
(iii) Long, narrow pointed and slightly curved beaks	C. mesophytes
(iv) Bacteria and root nodules of legumes	D. xerophytes
(v) Acts as an insulator	E. virus
(vi) Adapted to dry habitats	F. fungus
(vii) Athlete's foot	G. air
(viii) Propels the bacterium when in liquid medium	H. light
(ix) Two eggs fertilized at the same time	I. cilium
(x) Have least effect on germination of seeds	J. flagellum
	K. fraternal twins
	L. siamese twins
	M. diverging lens
	N. converging lens
	O. commensalism
	P. mutualism
	Q. cerebrum
	R. cerebellum
	S. nectar eaters
	T. flesh eater

SECTION B

Answer ALL questions in this section. This section carries 60 marks. The mark allocation is indicated at the end of each question.

3. (a) (i) What is a light microscope?
- (ii) Name any three parts of a light microscope and state their functions.
- (b) State any four precautions which should be taken when handling a light microscope. (8 marks)
4. The photograph below shows some cells of a unicellular organism which lacks chlorophyll.

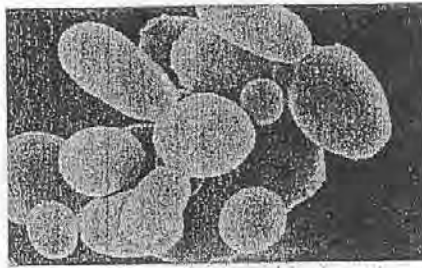


Fig. 3

- (a) (i) Give the name of the organism shown in the photograph.
- (ii) To which kingdom and phylum does the organism belong?
- (b) (i) Suggest the mode of reproduction in the organism and briefly describe how new individuals are formed.
- (ii) State two ways in which the organism in Fig. 3 is of economic importance to humans. (6 marks)
5. (a) Distinguish between excretion and osmoregulation.
- (b) Briefly describe how mammals are able to keep each of the following at constant levels in their body fluids.
- (i) Glucose
- (ii) Water. (8 marks)

6. (a) (i) During a blood transfusion, a person receiving blood can only accept blood of the correct type. Copy the table below (Table 1) and put in the box space a tick (✓) if the donor's blood is compatible with the recipient's blood and a cross (X) if the donor's blood is incompatible with the recipient's blood.

Table 1

		Donors blood type			
		A Rh ⁺	A Rh ⁻	B Rh ⁺	B Rh ⁻
Recipient's blood type	A Rh ⁺				
	A Rh ⁻				
	B Rh ⁺				
	B Rh ⁻				

- (ii) Why is cardiac muscle of the left ventricle thicker than that of the right ventricle?
- (b) Explain the changes which take place in the breathing of people who
- take exercise
 - climb high altitudes such as Mt-Kilimanjaro. (7 marks)
7. (a) (i) State the four factors required for the formation of carbohydrates in plants.
- (ii) Describe an experiment in which you will show that any one of the four factors stated in (a) above is necessary for carbohydrate formation.
- (b) Name two enzymes found in the human gut which break down carbohydrates and in each case state the site of production, the substrate and product. (9 marks)
8. (a) (i) What is the main agent used in the pollination of maize flowers?
- (ii) Describe the adaptations of the maize flowers to the agent of pollination you have stated.
- (b) Explain how the human embryo is protected from physical injury and supplied with food. (6 marks)
9. (a) Sickle-cell anaemia is an inherited disease of humans. The disease is controlled by a single pair of alleles. People homozygous for the recessive allele develop the disease, while heterozygotes do not suffer from it.
- Using the symbol "A" for the dominant allele and "a" for the recessive allele, write down the possible genotypes of the following:
 - people who suffer from the disease
 - people who do not suffer from the disease.
 - If a homozygous normal male marries a woman suffering from the disease; write down the ratio of children suffering: children not suffering in the F₂ generation.
- (b) Distinguish between test-cross and back-cross. (6 marks)

10. The diagrams in Figures 4 and 5 show two set ups of the apparatus which were used in an investigation on growth responses in plants. Study the diagrams carefully and then answer the questions which follow.

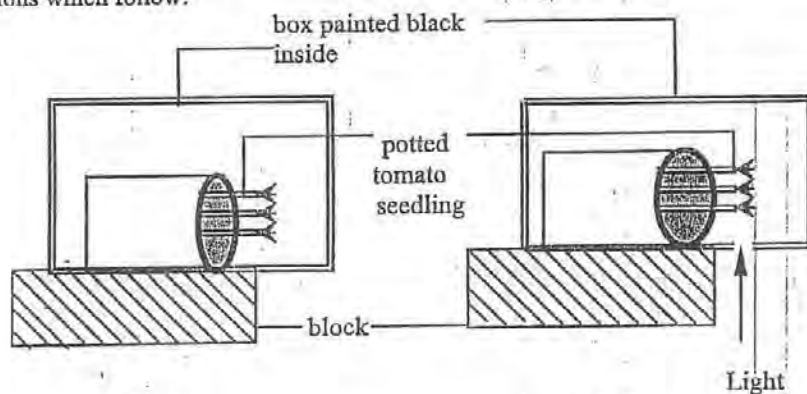


Fig. 4

Fig. 5

- (a) (i) Suggest two types of tropisms which were being investigated by the apparatus set-ups in figs. 4 and 5.
- (ii) Name the stimulus for the tropism investigated in Fig. 4.
- (b) (i) Draw diagrams to show how the seedlings changed four days after setting the experiments in Figs. 4 and 5.
- (ii) Give a biological explanation for the changes shown in your diagrams in (b)(i).
- (iii) What conclusions can you draw from the results of the experiment as shown by your diagrams in (b) (i)?
- (c) Give one advantage to farmers of the tropisms investigated in Figs. 4 and 5. (10 marks)

SECTION C

Answer only ONE question from this section. Each question carries 20 marks.

11. Citing an example in each case, write an essay on the ways in which insects are both beneficial and harmful to humans.
12. (a) Why are Tanzanians advised to practise birth control and child spacing?
- (b) Giving at least five methods, discuss how unwanted pregnancies can be prevented. For each method discussed explain.
 - (i) how it works
 - (ii) the extent to which it is reliable
 - (iii) its disadvantage(s) if any.
13. Surfaces where useful materials enter the body of an organism are usually modified to allow maximum surface area for entry of materials. Citing one example in plants, and two examples in mammals, explain how an increased surface area may be realised.