

553/1  
BIOLOGY  
(Theory)  
Paper 1  
Oct. / Nov. 2012  
2 ½ hours

**UGANDA NATIONAL EXAMINATIONS BOARD**

**Uganda Certificate of Education**

**BIOLOGY**

**(THEORY)**

**Paper 1**

**2 hours 30 minutes**

**INSTRUCTIONS TO CANDIDATES**

*This paper consists of sections A, B and C.*

*Answer all questions in sections A and B, plus two questions in Section C.*

*Write the answers to section A in the boxes provided, answers to section B in the spaces provided, and answers to section C in the answer booklets provided.*

<b>FOR EXAMINERS' USE ONLY</b>		
<b>Section</b>	<b>Marks</b>	<b>Examiner's Signature &amp; No.</b>
A:		
B: No. 31		
No. 32		
No. 33		
C: No.		
No.		
<b>Total</b>		

**SECTION A: (30 MARKS)**

*Answer all questions in this section. Write the letter representing the most correct answer to each question in the box provided.*

1. Which one of the following pairs of parts of the human eye refracts light?
  - A. Cornea and choroid
  - B. Aqueous and vitreous humours
  - C. Cornea and Iris
  - D. Iris and Ciliary body
  
2. An advantage that a lizard has over a cat is that it
  - A. Has a constant metabolic rate
  - B. Has a lower food consumption per unit body mass
  - C. Can live in any environment
  - D. Is active throughout the day
  
3. Which one of the following methods of controlling malaria does not harm the environment?
  - A. Draining ponds
  - B. Use of insecticide such as DDT
  - C. Spraying oil on top of water ponds.
  - D. Introducing fish into ponds
  
4. Part of a section of a leaf showed irregularly shaped cells which were loosely packed and had few chloroplasts. The part of the leaf is most likely to be that of the
  - A. Spongy mesophyll layer
  - B. Palisade mesophyll layer
  - C. Upper epidermis
  - D. Lower epidermis
  
5. A soil sample characterized by good aeration, high drainage, low capillarity and loose particles is
  - A. Clay
  - B. Loam
  - C. Sand
  - D. Laterite
  
6. The following is a dichotomous key of invertebrates:
  - (1) (a) Has 8 legs ..... W
  - (b) Has 6 legs ..... 2
  
  - (2) (a) Has long antennae ..... X
  - (b) Has short antennae ..... 3
  
  - (3) (a) Has proboscis ..... Y
  - (b) Has mandibles ..... Z

Which one of the organisms is a fly?

- A. W
- B. X
- C. Y
- D. Z

7. Which of the following are likely blood groups of children from parents of blood groups A and B?

- A. O only
- B. AB only
- C. O and AB only
- D. O, A, B and AB

8. Which one of the following is difference between nervous and endocrine coordination?

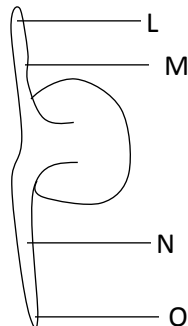
**Nervous**

- A. Messages are transmitted slowly
- B. Effects are localized
- C. Produce long lasting effects
- D. Message is chemical

**Endocrine**

- Messages are rapidly transmitted
- Effects are widespread
- Produce short lived effects
- Message is electrical

9. Figure 1 is a diagram of a seedling.



The region that elongates most rapidly during epigeal germination is indicated by letter

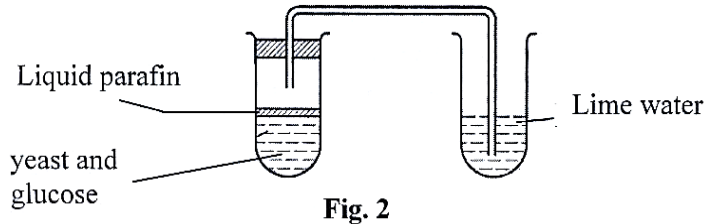
- A. L
- B. M
- C. N
- D. O

10. Four test tubes, each with contents as indicated in the following table, were incubated at a temperature of 37°C for some time.

Test tube	Contents
1	Albumen + Pepsin
2	Albumen + dilute hydrochloric acid
3	Albumen + pepsin + dilute hydrochloric acid
4	Albumen + boiled pepsin + dilute hydrochloric acid

In which test tube did the contents become clear?

- A. 4
  - B. 3
  - C. 2
  - D. 1
11. Which one of the following occurs during the stage of anaphase of mitosis?
- A. Chromatids separate and move to opposite poles
  - B. Chromosomes uncoil
  - C. Chromosomes line at the equator
  - D. Chromatids collect together at the opposite ends.
12. Which of the following organisms reproduce by budding?
- A. Bacteria
  - B. Spirogyra
  - C. Amoeba
  - D. Fungi
13. The hormones that stimulate the growth of pubic hair in humans are
- A. Oestrogen and testosterone
  - B. Progesterone and luteinizing hormone
  - C. Luteinizing hormone and thyroxine
  - D. Follicle stimulating hormone and progesterone
14. Which one of the following constituents of blood is not found in the glomerular filtrate?
- A. Urea
  - B. Proteins
  - C. Water
  - D. Glucose
15. Figure 2 is an experimental set up to demonstrate anaerobic respiration in yeast.



The importance of liquid paraffin in the experiment is to

- A. React with yeast and glucose
  - B. Speed up the reaction between yeast and glucose
  - C. Exclude atmospheric oxygen from the yeast – glucose mixture
  - D. Expel all the oxygen in the solution
16. Which one of the following describes the change from plant protein to ammonium compounds?
- A. Fermentation
  - B. Denitrification
  - C. Putrefaction
  - D. Nitrification
17. A gene which does not express itself unless in a homozygous state is
- A. Dominant
  - B. Sex linked
  - C. Codominant
  - D. Recessive
18. Which one of the following groups of organisms in a food chain contains the least amount of energy?
- A. Tertiary consumers
  - B. Secondary consumers
  - C. Primary consumers
  - D. Producers
19. A characteristic feature of a thoracic vertebra is the presence of
- A. Short transverse processes
  - B. Vertebrarterial canals
  - C. A large centrum
  - D. A long neural spine
20. In a mammalian heart, the left ventricle is more muscular than the right because it
- A. Pumps a lot of blood to the lungs
  - B. Pumps blood to all parts of the body
  - C. Receives blood from all parts of the body
  - D. Receives more blood

21. Which one the following organisms does not transport oxygen by the blood?
- Cockroach
  - Frog
  - Bird
  - Fish
22. Figure 3 shows the results of an experiment to determine the amount of water lost by a potential plant due to transpiration under different environmental conditions

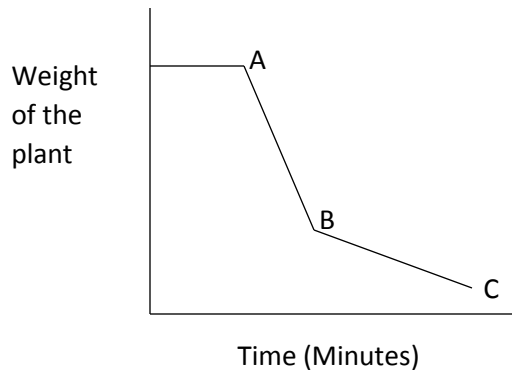
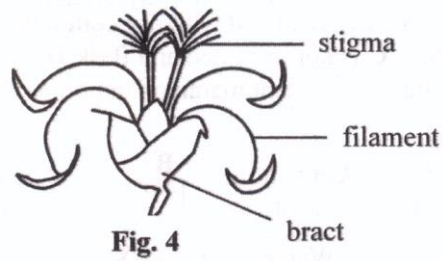


Fig. 3

The most likely conditions under which the experiment was conducted between points A and B were in

- A darkroom and the plant covered with a wet polythene bag
  - An open place, in bright sunlight
  - A cold and humid place
  - A humid and shady place
23. An athlete breathes  $500\text{cm}^3$  of air at each breath. His breathing rate is 40 breaths per minute. If the atmospheric air contains 15% oxygen by volume, what is his oxygen intake per minute?
- $3000\text{ cm}^3$
  - $2000\text{ cm}^3$
  - $600\text{ cm}^3$
  - $300\text{ cm}^3$
24. Bile salts help in the digestion of fats by
- Neutralizing excess stomach acids
  - Converting fats into simpler substances
  - Breaking fats into smaller particles
  - Separating fatty acids from glycerol
25. The growth of a plant shoot towards light is induced by
- Lack of auxins on the dark side
  - A higher distribution of auxins on the light side
  - A high concentration of auxins at the tip of the shoot
  - A higher distribution of auxins on the dark side

26. The type of pollination that the flower in figure 4 is adapted for is

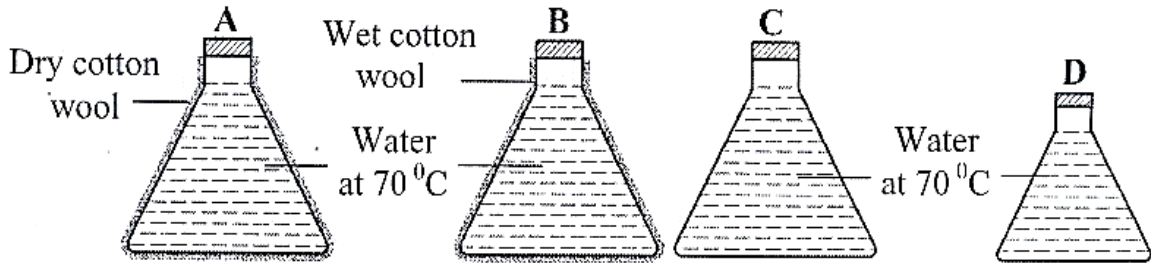


- A. Cross pollination
  - B. Self-pollination
  - C. Wind pollination
  - D. Insect pollination
27. Removal of a ring of bark from a tree trunk interferes with the movement of
- A. Water to the leaves
  - B. Mineral salts to the leaves
  - C. Food to the leaves
  - D. Food to the roots
28. Some plants produce large quantities of pollen grains because
- A. Some of the pollen grains do not mature
  - B. Much of the pollen grains never reach the stigma
  - C. The pollen is needed by bees
  - D. The pollen gives a nice scent to the plant
29. Vasodilation is likely to occur together with
- A. Vasoconstriction
  - B. Shivering
  - C. Sweating
  - D. Increased metabolism
30. The most likely habitat of a plant with many stomata on the upper surface of its leaves is
- A. Water
  - B. Salty marsh
  - C. High altitude
  - D. Desert

**SECTION B: (40 MARKS)**

Answer all questions in this section. Answers must be written in the spaces provided.

31. Figure 5 shows four flasks A, B, C, D each filled with hot water at 70°C and left to cool. Flask A is insulated with dry cotton wool, flask B with wet cotton wool, flask C is not insulated and flask D is smaller in size and not insulated. The flasks represent mammalian bodies.



**Fig. 5**

The table below shows the temperature in each flask in figure 5, recorded at 10 minute intervals for 30 minutes.

	<b>(Temperature (°C) at 10 minute intervals)</b>			
	0(min)	10(min)	20(min)	30(min)
A	70	66	62	60
B	70	50	38	30
C	70	60	53	48
D	70	53	40	38

Study the information and answer the questions that follow:

- (a) For each flask draw a graph to show the changes in temperature with time in the space on next page. Use the same X and Y axes for all the graphs.

(06 marks)



(c) Explain the rate of cooling in

(i) Flask A

(02 marks)

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(ii) Flask B

(03 marks)

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(iii) Flask C

(02 marks)

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(iv) Flask D

(02 marks)

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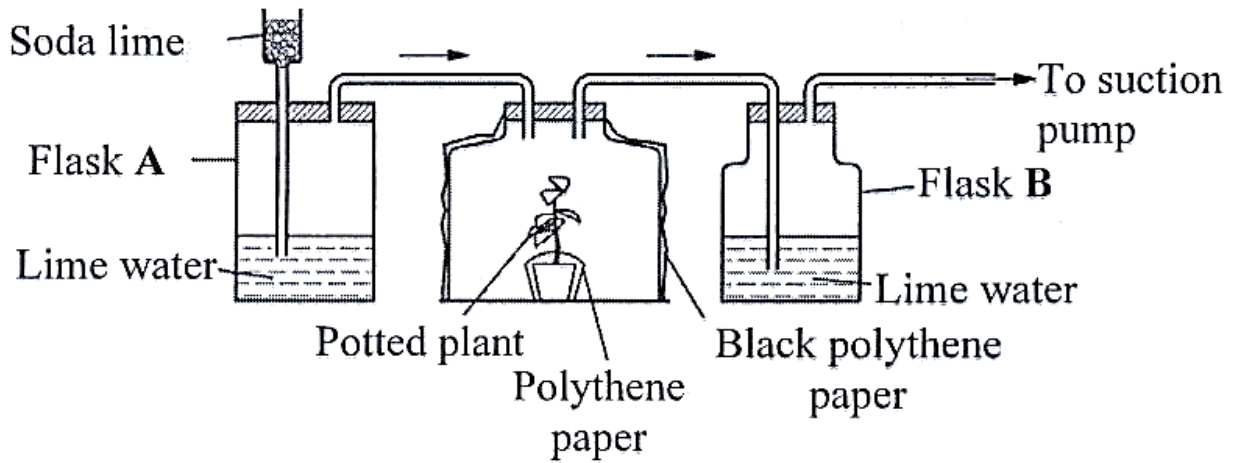
(d) From the information, state two factors that affect the rate of cooling from a body.

(01 mark)

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32. Figure 6 is an experimental set up to investigate a process in plants.



**Fig. 6**

(a) Name the process being investigated.

(01 mark)

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(b) Explain why

(i) The bell jar was covered with black polythene paper.

(01 mark)

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(ii) Part of the plant was covered with polythene paper.

(01 mark)

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(iii) Soda lime was used in the experiment.

(01 mark)

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(c) State what would be observed in flasks A and B at the end of the investigation.

(02 marks)

(i) Flask A

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(ii) Flask B

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(iii) Explain the results stated in c (i) and (ii).

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(d) (i) State what would be observed in flasks A and B if the set-up was placed in a dark room.

(01 mark)

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(ii) Explain your answer in d (i).

(01 mark)

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33. (a) State the organ in the human body that secretes insulin hormone.

(01 mark)

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(b) Explain why a person suffering from diabetes

(i) has to be given regular doses of insulin

(03 marks)



### SECTION C: (30 MARKS)

Answer any two questions from this section. Additional questions answered will not be marked. Answers to this section are to be written in the answer booklets provided.

34. (a) With the help of diagrams, describe sexual reproduction in a Rhizopus (10 marks)
- (b) Outline different ways in which fungi are important. (05 marks)
35. (a) Describe the structure of the different types of skeleton in mammals, giving an example in each case. (09 marks)
- (b) Explain how the vertebral column in mammals is adapted to its functions. (06 marks)
36. (a) Explain how the action of muscles causes carbon dioxide to pass from the lungs into the atmosphere. (05 marks)
- (b) How does oxygen move from the air in the alveoli into body tissues? (07 marks)
- (c) How are respiratory surfaces adapted to their functions? (03 marks)
37. (a) Describe two ways in which the white blood cells defend the body. (02 marks)
- (b) Explain how red blood cells are adapted to their function. (10 marks)
- (c) Describe the changes that occur in an individual's blood if the person moves from a lowland and goes to live on a highland. Explain your answer. (03 marks)

### 2011

Answer all questions in this section.

- In plants, efficient gaseous exchange due to large surface to volume ratio is achieved by
  - Many stomata on leaves
  - Flatness of leaves
  - Large sized lenticels
  - Numerous root hairs
- Which of the following would happen if a torch was shown directly into a person's eye?
  - Iris muscles would contract, narrowing the pupil
  - Lens would bulge, allowing less light to enter
  - Iris muscles would relax, narrowing the pupil
  - Lens would flatten, diverging light rays.
- The following are results of an experiment to determine percentage of water within a sample of soil.

Mass of crucible = 15 g  
Mass of crucible + soil = 30 g  
Mass of crucible + soil after drying = 25 g

The percentage of water in the soil is

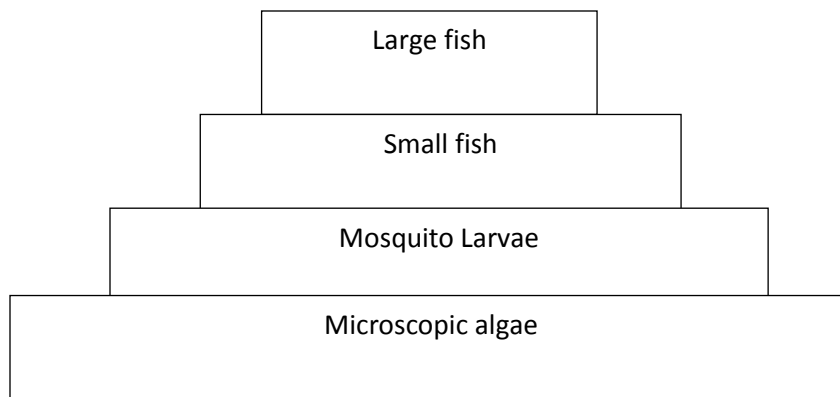
- A. 18.7
  - B. 20.0
  - C. 33.3
  - D. 66.7
4. In peas, yellow seed colour is dominant over green seed color. What would be the phenotype of the offspring if a true breeding yellow-seeded plant is crossed with a green-seeded plant?
- A. 2 yellow : 2 green
  - B. 3 yellow : 1 green
  - C. 3 green : 1 yellow
  - D. All yellow
5. The relationship between fungi and algae in lichen is best described as
- A. Mutualistic
  - B. Parasitic
  - C. Predatory
  - D. Symbolic
6. Which one of the following contains a set of characteristics which are all for wind – dispersed fruits and seeds?
- A. Parachute-like, hooked and light
  - B. Dry, curled inwards and spiked
  - C. Parachute-like, winged and light
  - D. Succulent, buoyant and light
7. Which one of the following contains a set of cells which are all haploid?
- A. Pollen grains, ovules and root hair cells
  - B. Sperms, pollen grains and ova
  - C. Sperms, ovules and brain cells
  - D. Cells of the epididymis, ovules and ova
8. Which one of the following sets, consists of bones of the fore limb?
- A. Femur, tibia, humerus
  - B. Radius, ulna, femur
  - C. Tibia, fibula, ulna
  - D. Humerus, radius, ulna
9. Which one of the following organs is supplied and drained by a vein?
- A. Stomach
  - B. Liver
  - C. Kidney
  - D. Pancreas

10. In the Biuret test, the colour which indicates a positive result is
- A. Purple
  - B. Blue
  - C. Pink
  - D. Red brown
11. Which one of the following is not a correct statement about flower parts?
- A. Sepals and petals together form perianth
  - B. Sepals form calyx
  - C. Carpels form androecium
  - D. Petals form corolla.
12. Which one of the following occurs to urine as it leaves the kidney to the bladder?
- A. Glucose is removed
  - B. Urea is added
  - C. Its composition remains unchanged
  - D. Water is removed
13. Under which one of the following conditions will air enter the mammalian lungs? When the
- A. Pressure of the thorax is increased
  - B. Ribs are lowered
  - C. Diaphragm is raised
  - D. Volume of the thorax is increased
14. Which one of the following is a modified tap root?
- A. Onion bulb
  - B. Carrot tuber
  - C. Cassava tuber
  - D. Irish potato
15. Which one of the following activities generates heat in the human body?
- A. Shivering of the body
  - B. Constriction of peripheral blood vessels
  - C. Contraction of the erector pili muscle
  - D. Dilation of the peripheral blood vessels.
16. Plants lack special excretory organs because
- A. Their waste products are less toxic and are sometimes reused.
  - B. They do not produce waste products
  - C. They lack vessels to transport the products
  - D. Waste products produced are gaseous
17. Which one of the following groups of bacteria converts soil nitrates to free nitrogen?
- A. Nitrifying bacteria
  - B. Nitrogen fixing bacteria
  - C. Denitrifying bacteria
  - D. Putrefying bacteria

18. An albino offspring is likely to result from a cross between
- A. An albino father and a normal mother
  - B. Both parents who are carriers for albinism
  - C. A carrier mother for albinism and a normal father
  - D. Both parents who are normal

19. Asexual reproduction in a *Rhizopus* results into
- A. Zygosporangia
  - B. Buds
  - C. Fragments
  - D. Spores

20. Figure 1 is a pyramid of numbers in an ecosystem.



Which one of the following changes would reduce the number of mosquito larvae?

- A. Increase in number of large fish
  - B. Increase in number of small fish
  - C. Decrease the number of small fish
  - D. Increase in number of microscopic algae
21. Which one of the following is the route a red blood cell takes from the liver to the lungs?
- A. Hepatic portal vein, vena cava, pulmonary artery
  - B. Hepatic vein, pulmonary vein, pulmonary artery
  - C. Hepatic artery, aorta, pulmonary artery
  - D. Hepatic vein, vena cava, pulmonary artery
22. In a photometer, the rate of movement of an air bubble corresponds to the rate of
- A. Water uptake
  - B. Osmosis
  - C. Air movement around the plant
  - D. Water loss from the reservoir
23. To estimate the population of *Tilapia* using a capture-recapture method, 60 fish were captured, marked and released. In the second capture, out of 72 fish, 10 had been marked. The estimated population of *Tilapia* was

- A. 672
- B. 780
- C. 432
- D. 4310

24. To which one of the following groups of plants do mosses belong?
- A. Pteridophytes
  - B. Bryophytes
  - C. Angiosperms
  - D. Conifers
25. Which one of the following human activities is likely to increase the level of carbon dioxide in the atmosphere?
- A. Cutting down trees
  - B. Using artificial fertilizers
  - C. Discharging waste in water bodies
  - D. Using pesticides
26. A radical of a seedling grows downwards because the concentration of auxin is
- A. Higher on its lower side, promoting growth on that side
  - B. Lower on its lower side, promoting growth on that side
  - C. Higher on its upper side, promoting growth on that side
  - D. Lower on its upper side, promoting growth on that side
27. Which one of the following activities results into upstroke during flight in birds?
- A. Movement of the humerus downwards
  - B. Contraction of large flight muscles and relaxation of small flight muscles
  - C. Contraction of small flight muscles and relaxation of large flight muscles
  - D. Faster air movement on upper surface than lower surface
28. Which of the following are characteristics of wind-pollinated flowers?
- A. Feathery stigmas and smooth pollen grains
  - B. Stigmas growing much higher than stamens.
  - C. Free stamens growing higher than the stigma
  - D. Large pollen grains on firm anthers.
29. Identical twins result from
- A. One ovum being fertilized by one sperm
  - B. An ovum splitting into two before fertilization
  - C. Two ova being fertilized by one sperm
  - D. Two ova being fertilized by two sperms
30. Which one of the following statements describes hypogeal germination?
- A. Hypocotyl elongates, leaving cotyledons below the ground.
  - B. Epicotyl elongates, leaving cotyledons below the ground
  - C. Hypocotyl elongates, bringing cotyledons above the ground
  - D. Epicotyl elongates, bringing cotyledons above the ground.

**SECTION B (40 MARKS)**

Answer all questions to this section. Write the answers in the spaces provided.

31. Figure 2 (i), (ii) and (iii) show the rate of photosynthesis under different conditions.

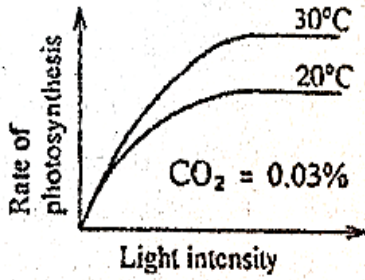


Fig. 2 (i)

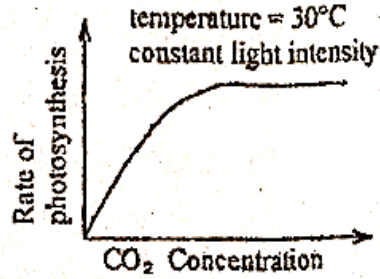


Fig. 2 (ii)

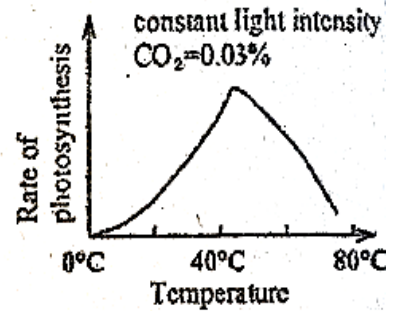


Fig. 2 (iii)

(a) State what each figure shows.

Figure 2(i)

(02 marks)

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Figure 2(ii)

(02 marks)

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Figure 2(iii)

(02 marks)

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(b) Describe what happens in each figure

Figure 2(i)

(03 marks)

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Figure 2(ii)

(03 marks)

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Figure 2(iii)

(03 marks)

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(c) Explain the shape of figure 2 (iii).

(02 marks)

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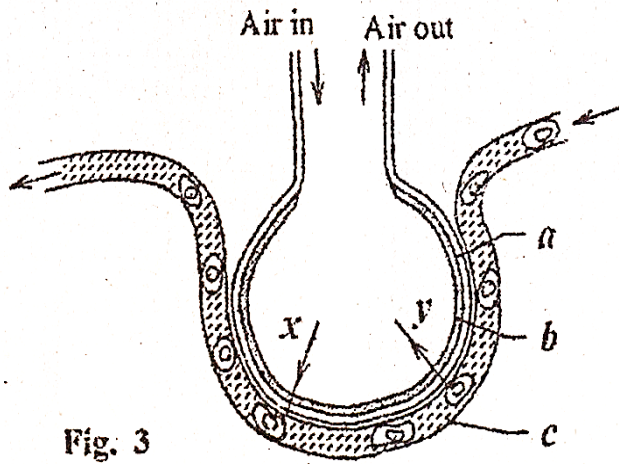
(d) From figures 2(i), 2(ii) and 2(iii), state the factors that affect the rate of photosynthesis.

(03 marks)

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32. Figure 3 shows a structure in the mammalian lung, study the figure and answer the questions that follow:



(a) Name the  
(i) Parts labelled a, b, c (1 ½ marks)

a. ....  
b. ....  
c. ....

(ii) Gases indicated by arrows x and y. (01 mark)

x. ....  
y. ....

(b) Explain how the features shown in the figure, enable the structure to function efficiently. (5 ½ marks)

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(c) State four differences between the air that goes into the structure and that which goes out of the structure. (02 marks)

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33. Rats are herbivores that usually live in human dwellings which are filthy. Bacteria of the species *Pasteurella pestis*, live in and feed on the blood of the them to humans when the fleas bite humans. The bacteria feed on human blood too; and this sometimes results into humans developing bubonic plague.

(a) In the space below, draw a food web to show the feeding relationships described. (02 marks)

(b) Which organisms are

(i) Parasites

(01 mark)

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(ii) Vectors

(01 mark)

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(c) Suggest the name of the producer for the food web and explain how it would enter the food web. (02 marks)

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(d) From the information given,

(i) State the trophic levels in the food web and give one organism in each level.

(02 marks)

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(ii) Describe what would happen if rats were removed from the food web.

(02 marks)

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## SECTION C (30 MARKS)

Answer two questions from this section. Answers are to be written in the answer booklets provided.

34. (a) Explain how a plant benefits from transpiration. (04 marks)  
(b) Describe how plants in arid areas control excessive loss of water. (11 marks)
35. Describe the processes that occur after pollination in a flowering plant leading to the formation of a fruit. (15 marks)
36. (a) Explain the advantages of ectothermy and endothermy. (09 marks)  
(b) A shrew is the smallest mammal in Africa. It eats a lot of food which is mainly insects, rich in fats. Explain why the shrew eats  
(i) a lot of food (03 marks)  
(ii) mainly insects rich in fats (03 marks)
37. (a) What is accommodation? (02 marks)  
(b) Suppose a boy was sitting in a dimly lit room reading a book, then he suddenly stepped out of the room into bright sunshine to look at an aeroplane in the sky. Describe the sequence of events which would occur in his eyes to enable him see the aeroplane clearly. (09 marks)  
(c) Explain why many old people use glasses to read. (04 marks)

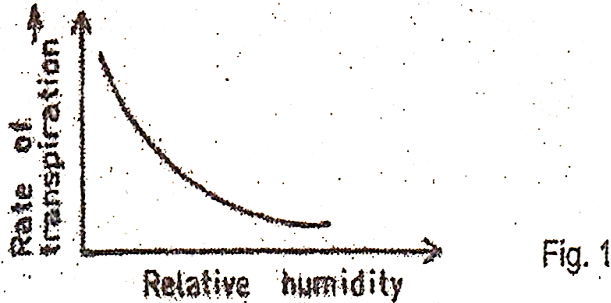
**2010**

**2009**

## SECTION A

- Which one of the following control measures against mosquitoes is least harmful to the environment?  
A. Draining of swamps  
B. Spraying with insecticide.  
C. Covering surfaces of stagnant water with oil  
D. Introducing fish in ponds
- The magnitude of a biological drawing is given as  $\times 0.5$ . This means that the drawing is  
A. Five times larger than the specimen  
B. Half the natural size of the specimen  
C. Twice the natural size of the specimen  
D. Five times smaller than the specimen
- A diet most suitable for strengthening of teeth and bones should be rich in  
A. Iodine and vitamin K  
B. Calcium and vitamin D

- C. Magnesium and vitamin C
  - D. Iron and vitamin B
4. Which one of the following digestive processes is catalyzed by salivary amylase?
- A. Maltose to glucose
  - B. Sucrose to glucose and fructose
  - C. Starch to maltose
  - D. Lactose to galactose and glucose
5. Figure 1 shows the effect of relative humidity on transpiration rate.



- From the figure, transpiration rate
- A. Increases with decreased relative humidity
  - B. Increase with increased relative humidity
  - C. Decreases with decreased relative humidity
  - D. Remains constant with increased relative humidity
6. Which one of the following classes has the highest number of species?
- A. Crustacea
  - B. Arachnida
  - C. Insect
  - D. Myriapoda
7. Which of the following substances is not contained in the glomerular filtrate in the mammalian kidney?
- A. Urea
  - B. Plasma proteins
  - C. Glucose
  - D. Mineral salts
8. Which one of the following is an adaptation of the leaf for transportation of manufactured food?
- A. Numerous chloroplasts
  - B. Numerous stomata
  - C. Branching network of veins
  - D. Large airspaces in the spongy mesophyll
9. Slow rate of repair of the uterine wall after menstruation in a mammal may be due to a deficiency in

- A. Oestrogen
  - B. Luteinizing hormone
  - C. Progesterone
  - D. Follicle stimulating hormone
10. Which of the following vertebrae provide points of attachment to the ribs?
- A. Cervical
  - B. Thoracic
  - C. Lumbar
  - D. Sacral
11. Which of the following allow smooth movement of bones at a joint?
- A. Synovial fluid
  - B. Tendons
  - C. Ligaments
  - D. Synovial membrane
12. Clay soil has a high water retention capacity because it
- A. Has small air spaces
  - B. Contains little amount of humus
  - C. Is sticky when wet
  - D. Has good capillary attraction
13. Which of the following is the correct order of cell organization?
- A. Cell → organ → tissue → system
  - B. Tissue → cell → organ → system
  - C. Organ → cell → tissue → system
  - D. Cell → tissue → organ → system
14. Figure 2 shows changes in the body temperature with environmental temperature in an animal.

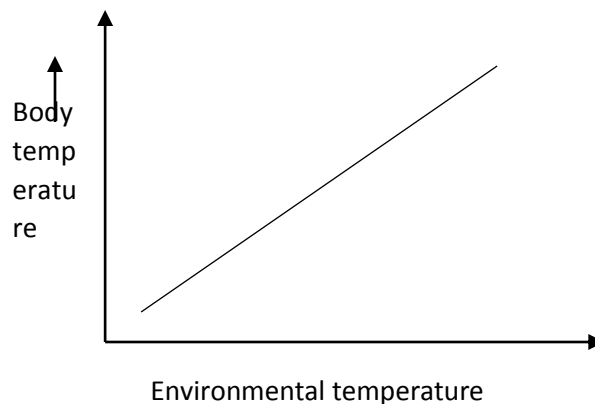


Fig. 2

Which one of the following could be the animal represented?

- A. Bird

- B. Dog
- C. Human
- D. Frog

15. Which of the following groups of organisms usually colonise bare rock first?

- A. Herbs
- B. Mosses
- C. Lichens
- D. Grasses

16. Which of the following features differentiate a housefly from a spider?

- A. Segmented body
- B. Jointed limbs
- C. Number of body parts
- D. Possession of exoskeleton

17. Which one of the following relationships is an example of mutualism?

- A. Tapeworm living in a human gut
- B. Bacteria living in the gut of a cow
- C. Ticks living on the skin of a dog
- D. Plasmodium living in human blood

18. Which one of the following plant organs can be used in vegetative reproduction?

- A. Stem tuber of Irish potato
- B. Root tuber of cassava
- C. Tap root of a carrot
- D. Leaves in metabolic rate

19. The following are responses to cold conditions in mammals:

- (1) Vasoconstriction
- (2) Hair standing up
- (3) Shivering
- (4) Increase in metabolic rate

Which of these, both reduce heat loss?

- A. 1 and 2
- B. 1 and 4
- C. 2 and 3
- D. 3 and 4

20. Which of the following are not respiratory surfaces in animals?

- A. Spiracles
- B. Tracheoles
- C. Gill filaments
- D. Alveoli

21. A man of blood group AB marries a woman of blood group O. What would be the possible blood groups of their children?
- O and AB
  - A only
  - AB
  - A and B
22. Which one of the following types of fruits is a pineapple?
- Drupe
  - Multiple fruit
  - Indehiscent fruit
  - Berry
23. Strips W, X, Y and Z of same size and shape were cut from a raw pawpaw, whose sap had a sugar concentration of 28%. The strips were then placed in sugar solution of different concentrations as shown in table 1.

Table 1

Strip	Sugar concentration Of solution (%)
W	15
X	25
Y	28.5
Z	48

Which strip would be longest after 4 hours?

- X
  - W
  - Y
  - Z
24. What is likely to happen if a maize coleoptile whose tip has been removed, is illuminated from only one side? The coleoptile would
- Curve towards the direction of light
  - Curve away from the direction of light
  - Not show any further growth
  - Grow upright
25. Which of the following sets of joints consists of only the hinge type?
- Hip, wrist and elbow
  - Neck, shoulder and elbow
  - Elbow, knee and finger joints
  - Knee, wrist and ankle
26. Which one of the following is the least important reason why plants need to ensure efficient dispersal of seeds in nature?

- A. Increasing chances of finding a better habitat for multiplication
- B. Escape being eaten by animals in its original habitat
- C. Reducing competition for food
- D. Ensuring better colonization of different places.

27. Under which of the following sets of conditions indicated in table 2 will bean seeds germinate?

Table 2

	Temperature	Light	Water	Oxygen
A	20 <sup>0</sup> C	Absent	Present	Present
B	20 <sup>0</sup> C	Present	Absent	Present
C	0 <sup>0</sup> C	Present	Present	Present
D	20 <sup>0</sup> C	Present	Present	Absent

28. In plants, large surface area to volume ratio for gaseous exchange is achieved by

- A. Presence of numerous stomata on leaves
- B. Flatness of leaves
- C. Presence of air spaces in the mesophyll
- D. Presence of lenticels

29. In the mammalian heart, the thick muscular walls of the left ventricle are vital for

- A. Resisting pressure of the blood coming into the ventricles.
- B. Maintaining the shape of the heart
- C. Producing enough pressure to pump blood to all parts of the body
- D. Resisting back flow of blood from the aorta

30.

**SECTION B (40 MARKS)**

*Answer all questions in this section.*

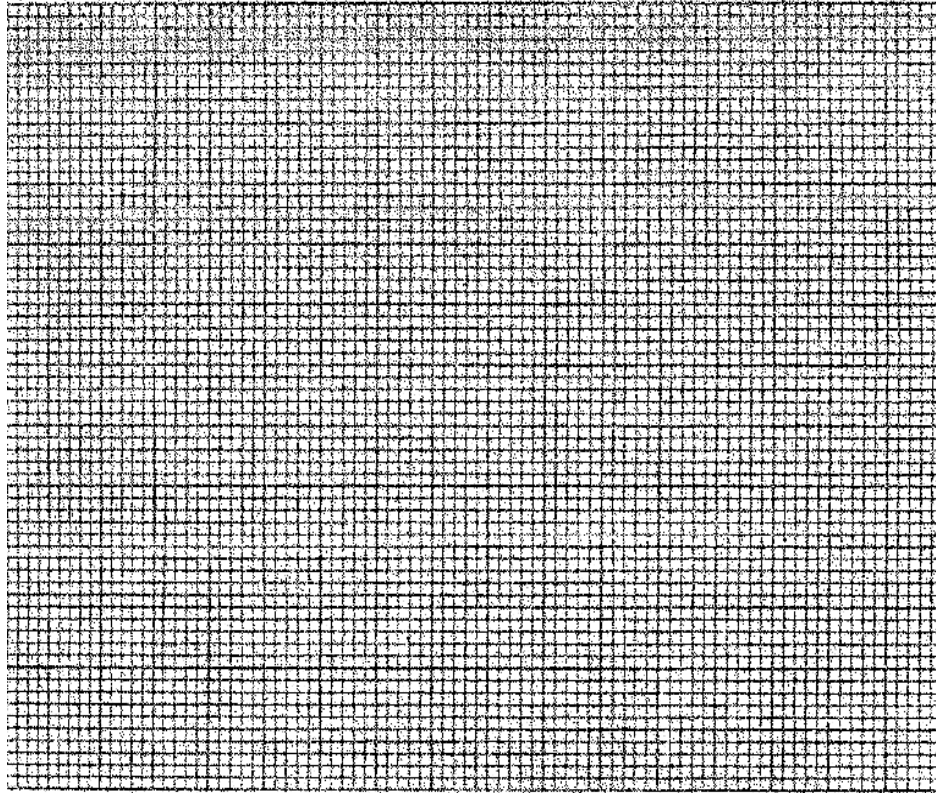
31. Table 3 shows the change in mass of starch and protein in a typical pea seed during the first 20 days of germination.

Table 3

Food Substances in the seed	Days of germination					
	0	4	8	12	16	20
Starch (mg)	60	56	32	8	5	4
Protein (mg)	28	21	11	5	3	2

(a) Using the same axes, draw two graphs to show the change in mass of starch and protein during the first 20 days of germination of the seed in the space provided.

(08 marks)



(b) How are the changes in mass of starch and protein

(i) Similar?

(02 marks)

.....

.....

.....

.....

(ii) Different?

(02 marks)

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.....

.....

(c) Explain why the mass of starch and proteins change in the germinating seed, in each case state the reactions that result into the changes. (04 marks)

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(d) Suggest two ways in which the products from each starch and proteins may be used in the germinating seed.

(i) Starch (02 marks)

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.....

.....

(ii) Proteins (02 marks)

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32. In a food chain, when energy is transferred from one trophic level to another some of it is lost. Figure 3 shows such a transfer of energy in an out of a cow in a year.

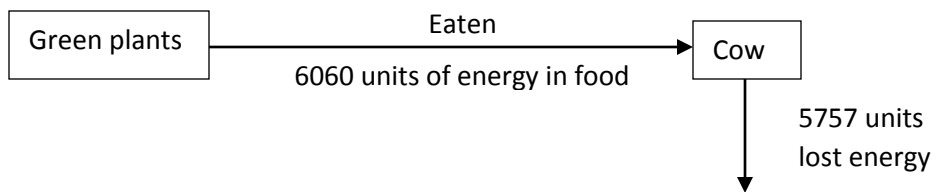


Figure 3

(a) Name the trophic levels shown in the figure. (02 marks)

.....

.....

(b) State two ways in which energy is lost from the cow.

(01 mark)

.....  
.....

(c) Calculate the percentage of energy taken in during the year, which is retained by the cow.

(02 marks)

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.....  
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(d) In proportion to its body, a calf uses more energy to maintain its body temperature than a cow. Explain why this is so.

(03 marks)

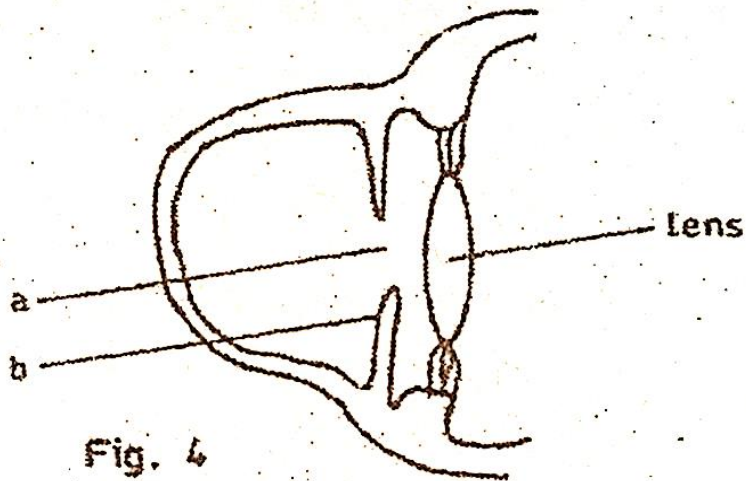
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(e) In the recycling of materials, how can the energy within the cow be made available to plants?

(02 marks)

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.....  
.....

33. Figure 4 shows part of a section of a human eye.



(a) Name the parts labelled a and b. (01 mark)

- a. ....
- b. ....

(b) What is the function of structure b in the eye? (02 marks)

.....

.....

.....

.....

(c) If a person entered a room with bright light, state the changes that would occur in each of parts a and b of the eye.

(i) a ..... (01 mark)

(ii) b .....  
.....  
.....

(02 marks)

(d) In the space below, draw the shape of the lens only, when the eye is focusing on a near and distant object respectively. (02 marks)

When focusing on a near object

when focusing on a distant object

- (e) Describe how the shape of the lens is brought about when the eye is focusing on a near object. (02 marks)

**SECTION C (30 MARKS)**

*Answer any two questions.*

34. (a) Describe the breathing mechanism in a bony fish. (11 marks)  
(b) How are gills in a bony fish adapted to their functions? (04 marks)
35. (a) Outline the internal structural differences between monocotyledonous and dicotyledonous plants in the following parts:  
(i) Stems (03 marks)  
(ii) Roots (02 marks)  
(b) Describe how leaves of green plants are suited for photosynthesis. (10 marks)
36. (a) Explain how the small size of soil particles in a soil type affect the soil's suitability for plant growth. (08 marks)  
(b) Describe an experiment to compare the rate of drainage of two soil samples. (07 marks)
37. (a) What is meant by pollution? (02 marks)  
(b) Explain how the continued use of polythene paper may harm the environment. (10 marks)  
(c) Suggest ways of preventing the effects suggested in (b). (03 marks)

2008

Answer all questions in this section.

1. Which one of the following sets of events occurs in a person when feeling cold?
  - A. Blood capillaries constrict, hair rises and metabolic rate increases
  - B. Hair lowers, blood capillaries dilate and metabolic rate decreases.
  - C. metabolic rate increases, blood capillaries dilate and hair lowers
  - D. Metabolic rate decreases, blood capillaries constrict and hair rises.
2. Which one of the following word equations summarizes the process of fermentation?
  - A. Glucose  $\rightarrow$  Ethanol + carbon dioxide + water
  - B. Glucose  $\rightarrow$  Lactic acid + energy + water
  - C. Glucose  $\rightarrow$  Ethanol + carbon dioxide + energy
  - D. Glucose  $\rightarrow$  Lactic acid + water + carbon dioxide

3. The type of roots labeled Y in figure 1 are called

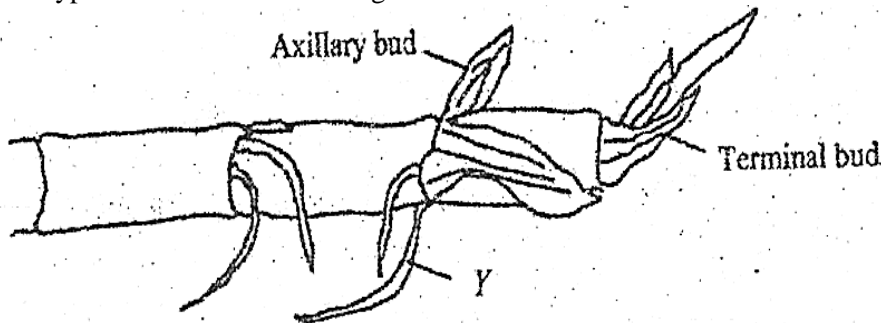


Fig. 1

- A. prop roots
  - B. lateral roots
  - C. clasping roots
  - D. adventitious roots
4. What are the chances of parents who are carriers of a gene for albinism, producing an albino child?
    - A. 25%
    - B. 50%
    - C. 75%
    - D. 100%
  5. Which one of the following is the correct route taken by an impulse after it has left a relay neurone?
    - A. synapse  $\rightarrow$  sensory neurone  $\rightarrow$  effector
    - B. sensory neurone  $\rightarrow$  synapse  $\rightarrow$  effector
    - C. synapse  $\rightarrow$  motor neurone  $\rightarrow$  effector
    - D. sensory neurone  $\rightarrow$  motor neurone  $\rightarrow$  effector

6. Which one of the following is the mode of feeding of a mould?
- Holozoic
  - Saprophytic
  - Autotrophic
  - Parasitic
7. Which one of the following is a characteristic of sandy soils?
- High retention
  - High capillarity
  - Low drainage
  - High porosity
8. Which one of the following plant organs has a scattered arrangement of vascular bundles?
- Root of a monocotyledonous plant
  - Stem of a monocotyledonous plant
  - Stem of a dicotyledonous plant
  - Root of a dicotyledonous plant
9. In the colonization of a bare rock, the next most likely group of plants after lichens are the
- grasses
  - mosses
  - shrubs
  - trees
10. Which one of the following includes all the possible blood groups that can be possessed by the children from a marriage between a mother heterozygous for blood group A and a father heterozygous for blood group B?
- A and B
  - AB and O
  - A, B and O
  - A, B, AB and O
11. Which one of the following is a correct route taken by carbon dioxide from the body cells of an insect to the atmosphere?
- Trachea – Tracheoles – spiracles
  - Spiracles – trachea – Tracheoles
  - Tracheoles – trachea – spiracles
  - Spiracles – Tracheoles – trachea
12. In an experiment to find the proportion of air in soil, the following results were obtained.
- |  |                      |
|--|----------------------|
| Volume of soil                           | = $x \text{ cm}^3$   |
| Volume of water added to soil            | = $200 \text{ cm}^3$ |
| Volume of soil plus water after stirring | = $y \text{ cm}^3$   |

Which one of the following expressions gives the volume of air in the soil samples?

- $y - x \text{ cm}^3$
- $(x + 200) - y \text{ cm}^3$

- C.  $y - 200 \text{ cm}^3$
- D.  $y - (x + 200) \text{ cm}^3$

13. Which one of the following enzymes acts best at low pH?

- A. Pepsin
- B. Peptidase
- C. Trypsin
- D. Lipase

14. Figure 2 shows the changes in the lactic acid concentration in the blood during and after exercise.

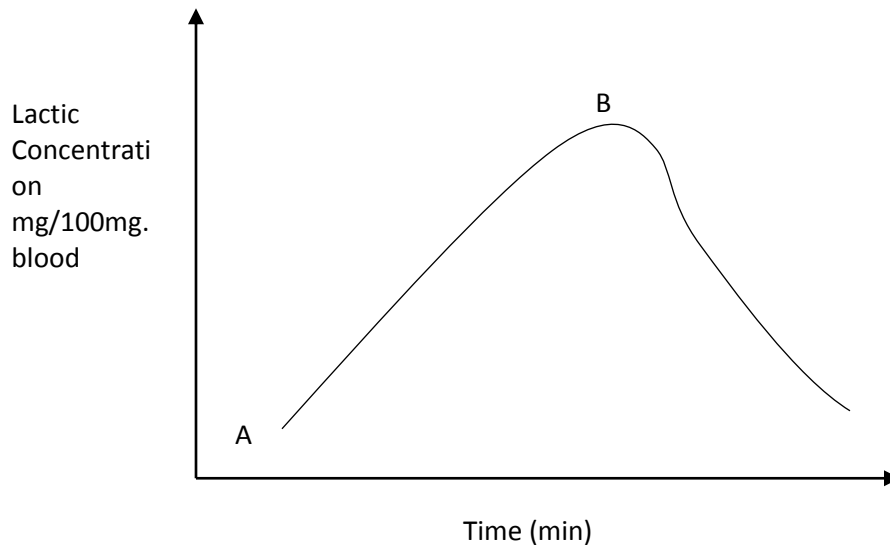


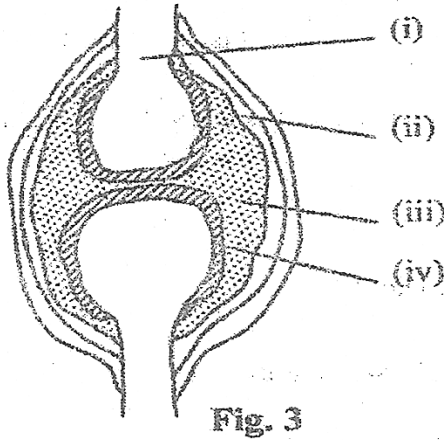
Fig. 2

The correct explanation for what is occurring between points A and B is that

- A. breathing rate has increased
  - B. blood flow to the muscles has increased
  - C. oxygen supply to the muscles is less than the demand
  - D. oxygen supply to the muscles is in excess
15. Which of the following are characteristics of insect pollinated flowers?
- A. feathery stigmas, light pollen grains
  - B. sticky stigmas, heavy pollen grains
  - C. light pollen grain, dull coloured
  - D. long filaments, much pollen
16. The part of the microscope used to make the image clear is the
- A. objective lens
  - B. eye piece
  - C. coarse adjustment
  - D. fine adjustment
17. Which one of the following glands become most active when a person is frightened?
- A. Thyroid gland

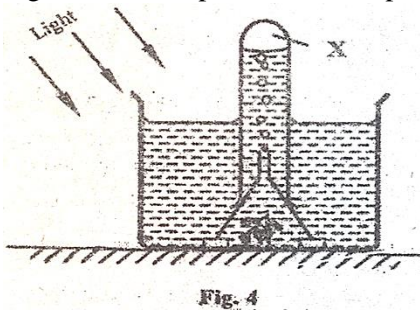
- B. Adrenal gland
- C. gonads
- D. Pancreas

18. Figure 3 shows a joint in a mammalian skeleton.



Which one of the following pairs consists of parts which reduce friction during movement in the joint?

- A. I and II
  - B. I and III
  - C. II and III
  - D. III and IV
19. Which one of the following correctly describes population density? The number of organisms
- A. in a specified area
  - B. of a particular species in a specified area.
  - C. living either on land or water
  - D. one which can interbreed and produce viable offspring
20. Which one of the following is a form of sexual reproduction?
- A. binary, fission
  - B. fragmentation
  - C. conjugation
  - D. spore formation
21. Figure 4 is an experimental set up to demonstrate photosynthesis.



- Gas X produced in the experiment is tested by the use of
- A. lighted splint
  - B. lime water
  - C. litmus paper
  - D. sodium bicarbonate
22. The main function of buttress roots is to
- A. provide additional support
  - B. store food for the plant
  - C. enable the plant clasp firmly onto others
  - D. store water for the plant
23. The bacteria which convert ammonia into nitrates are called
- A. putrefying bacteria
  - B. nitrifying bacteria
  - C. denitrifying bacteria
  - D. nitrogen fixing bacteria
24. Which one of the following is likely to occur if the osmotic pressure of the cell sap of the root hair is lower than that of the surrounding?
- A. plant wilts
  - B. cells of root hairs become turgid
  - C. rate of transpiration
  - D. more water is absorbed
25. Which one of the following foods is rich in iron?
- A. Milk
  - B. Cheese
  - C. Liver
  - D. Butter
26. Which one of the following features of arthropods would be least important when constructing an identification key?
- A. presence or absence of antennae
  - B. Number of body divisions
  - C. Body colour
27. Which one of the following conditions would lead to the highest transpiration rate?
- A. high light intensity and low temperature
  - B. low light intensity and high temperatures
  - C. low humidity and high temperatures
  - D. high humidity and low temperatures
28. Which one of the following parts of the kidney carries out the excretory function?
- A. Cortex
  - B. Pelvis
  - C. Medulla

D. Nephron

29. Which of the following events result into the formation of identical twins?
- A. One egg released, fertilized and splits into two
  - B. Two eggs released and each fertilized by a separate sperm
  - C. One egg released and fertilized by two sperms
  - D. One egg released, splits and fertilized by separate sperms
30. Which one of the following diseases is not prevented by washing of hands and covering of food?
- A. Cholera
  - B. Typhoid
  - C. Tapeworm infection
  - D. Dysentery

**SECTION B (40 MARKS)**

*Answer all questions in this section. Answers must be written in spaces provided.*

31. A student carried out an experiment using the set up in figure 5. In set R, bean seeds soaked in water were used. In S, boiled bean seeds sprinkled with a preservative were used, while in T, boiled bean seeds without the preservative were used.

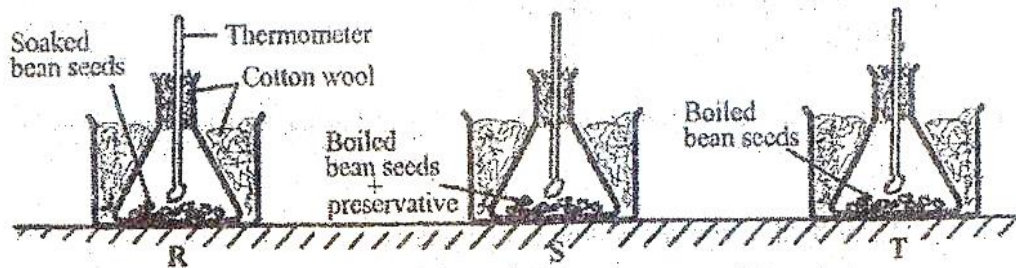
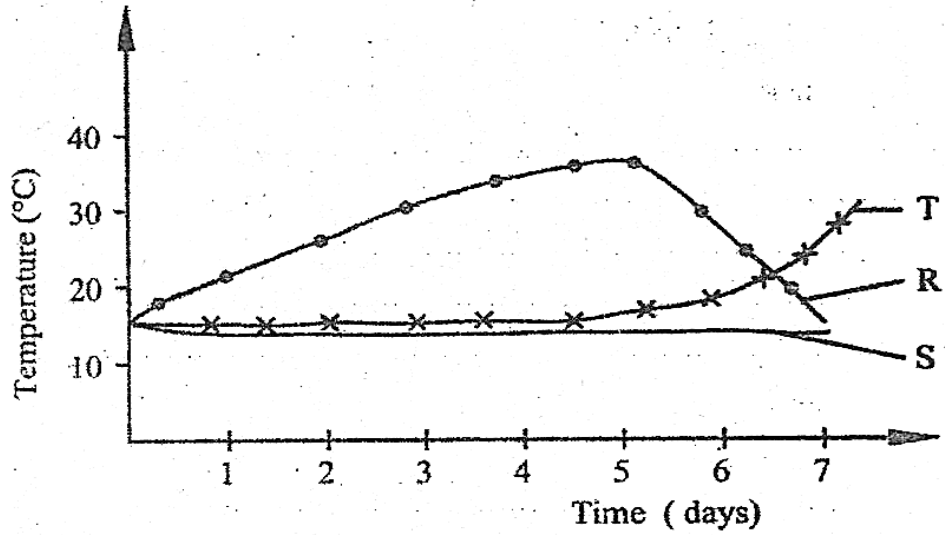


Fig. 5

The temperature in each set was recorded for a week. The results obtained are shown in figure 6.



**Fig. 6**

(a) State the aim of the experiment? (02 marks)

.....

.....

(b) Using the information provided, explain the changes in temperature in set R and T,  
 (i) From day 0 to day 5.

In R

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In T

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(ii) After day 5

In R

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In T

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(c) Explain why there was no significant change in temperature in S for the whole week. (02 marks)

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(d) Suggest one way the above set-up could be improved for better results. Give a reason for the suggested improvement. (02 marks)

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.....

(e) What other changes would occur in the composition of air in set up R and T during the experiment? (04 marks)

In R

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.....  
.....

In T

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32. In a breeding experiment, when plants with red flowers were crossed, a total of 898 plants were produced out of which 325 had white flowers.

(a) What was the recessive character? Give two reasons. (03 marks)

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(b) What was the genotype of the parents? (01 mark)

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(c) Using suitable symbols show the expected phenotype and genotype ratios in the experiment. (04 marks)

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(d) Were the observed results in agreement with the laws of monohybrid inheritance? Show your working. (02 marks)

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33. The following organisms live in a national part in Uganda: Bush rat, guinea fowl, hawk, grasshopper, Uganda kob and grass.

(a) Show the feeding relationship that exists between these organisms. (03 marks)

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.....  
.....  
.....

(b) What name is given to the feeding relationship in (a)? (01 mark)

.....  
.....

(c) Which organisms in the relationship are (i) Primary producers? (01 mark)

.....  
(ii) Primary consumers? (01 mark)

.....  
(iii) Secondary consumers? (01 mark)

.....

(d) Suggest what would happen in the relationship if Uganda kobs were removed from the park. (03 marks)

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**SECTION C: (30 MARKS)**

*Answer any two questions.*

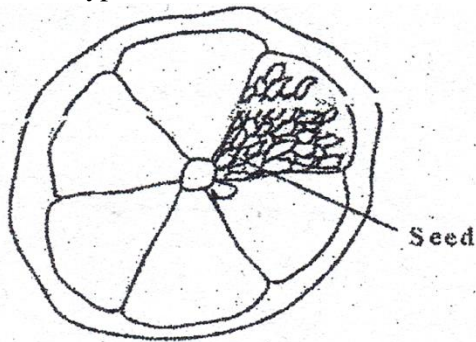
34. (a) What is a balanced diet? (01 mark)  
(b) In which way is the ileum adapted for its function? (08 marks)  
(c) Outline the fate of food after absorption. (06 marks)
35. (a) In what ways is nitrogen added and removed from the soil? (10 marks)  
(b) Give the importance of organic matter in the soil. (05 marks)
36. (a) Describe how light, humidity and air movement affect the rate of transpiration in plants. (09 marks)  
(b) Describe an experiment to show that more transpiration occurs in the lower epidermis than the upper epidermis of a plant leaf. (06 marks)
37. (a) Describe how the human body controls temperature. (12 marks)  
(b) What is the importance of having a constant body temperature? (03 marks)

2007

**SECTION A (30 MARKS)**

*Answer all questions in this section.*

1. Which type of fruit is shown in the cross section of figure 1?



- A. Berry  
B. Drupe  
C. Caryopsis  
D. Achene
2. Which one of the following sets of bones make the axial skeleton?  
A. Ribs, femur, sternum  
B. Sternum, ribs, vertebrae  
C. Hind limbs, skull, limb girdle  
D. Skull, vertebrae, humerus
3. Which one of the following pairs of insects undergoes incomplete metamorphosis?  
A. housefly and mosquito  
B. butterfly and cockroach  
C. honey bee and moth  
D. cockroach and grasshopper
4. Which one of the following occurs in a flower after fertilization?  
A. petals, stigma and style persist  
B. ovary, petals and sepals dry and fall off  
C. ovary, develops into seed coat.  
D. ovules develop into seeds.
5. Figure 2 shows the concentration of lactic acid in the blood of an athlete during and after a race. During which period on the graph does the athlete not experience both aerobic and anaerobic respiration?

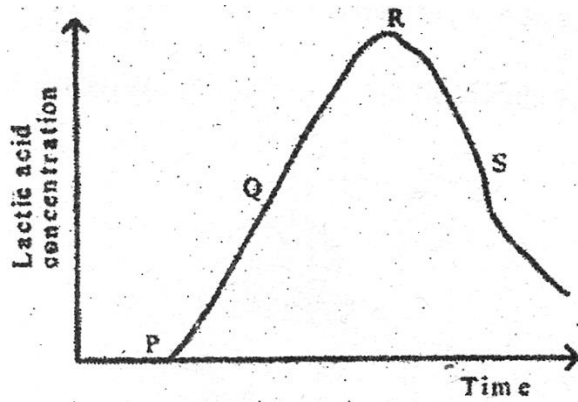


Fig. 2

- A. P – Q
  - B. Q – R
  - C. R – S
  - D. P – R
6. Which one of the following is not a reproductive and storage organ of a plant?
- A. Yam tuber
  - B. Ginger rhizome
  - C. Cassava tuber
  - D. Irish potato tuber
7. Which one of the following secretions does not play a digestive role in the alimentary canal?
- A. Pepsin
  - B. Rennin
  - C. Trypsin
  - D. Lipase
8. Which of the following are not social insects?
- A. Ants
  - B. Bees
  - C. Termites
  - D. Butterflies
9. Which one of the following does not contribute to the efficiency of a housefly as a vector?
- A. Ability to fly
  - B. feeding on liquid food
  - C. feeding in dirty places
  - D. possession of hairs on the body
10. Figure 3 is a transverse section through a dicotyledonous stem.

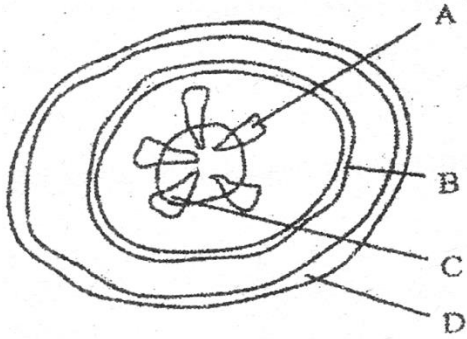


Fig. 3

Which one of the parts labelled is used to transport food substances?

11. Which one of the following is the correct order in the level of organization of an organism?

- A. cells → organs → tissues → systems
- B. tissue → organs → systems → cells
- C. cells → tissues → organs → systems
- D. organs → tissues → systems → cells

12. Which one of the following modes of reproduction is sexual?

- A. spore formation
- B. budding
- C. fragmentation
- D. conjugation

13. Which one of the following blood vessels has the highest level of nutrients?

- A. Mesenteric artery
- B. Hepatic portal vein
- C. Renal Artery
- D. Hepatic vein

14. Which one of the following farming practices does not promote soil fertility?

- A. strip cropping
- B. crop rotation
- C. monoculture
- D. Mulching

15. The following are characteristics of animals.

- (i) Jointed appendages
- (ii) Possession of exoskeleton
- (iii) Three body parts
- (iv) Three pairs of limbs

Which set of characteristics is possessed by all arthropods?

- A. (i) and (ii)
- B. (ii) and (iii)
- C. (iii) and (iv)

D. (ii) and (iv)

16. A health worker advised people to do the following

- wash hands before eating
- cover all food
- burn or bury rubbish
- use toilets

Which one of the following disease out breaks was the health worker mainly preventing?

- A. Tapeworm
- B. Cholera
- C. Trachoma
- D. Tuberculosis

17. Which one of the following organisms has the largest surface area to volume ratio?

- A. Dog
- B. Frog
- C. Cockroach
- D. Amoeba

18. In a certain, offspring of crosses between round – seeded and long – seeded plants were found always to be oval – seeded.

Which one of the following results would be most likely to occur if oval – seeded plants were self-pollinated?

- A. 100% oval – seeded
- B. 25% oval – seeded, 50% long – seeded, 25% round – seeded
- C. 67% oval – seeded, 33% long – seeded
- D. 25% long – seeded, 50% oval – seeded, 25% round – seeded

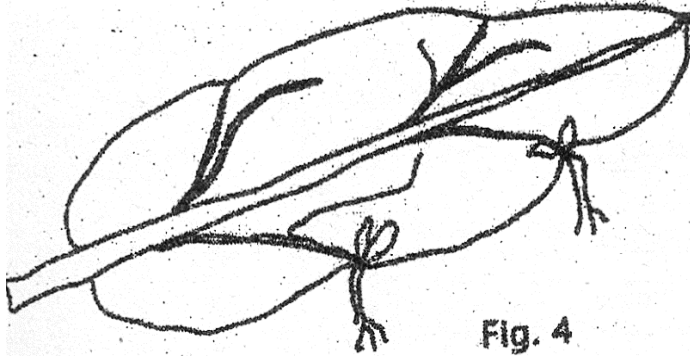
19. Which one of the following parts of the ear, regulates air pressure?

- A. Ear drum
- B. Oval window
- C. Round window
- D. Eustachian tube

20. Which one of the following structures of a dicotyledonous seed is correctly matched with its function?

<b>Structure</b>	<b>Function</b>
A. Micropyle	protection
B. Radicle	develops into shoot
C. Testa	allows in air
D. Cotyledons	store food

21. The lead in figure 4 is modified for



- A. absorption of nutrients
- B. reproduction
- C. photosynthesis
- D. water storage

22. Which of the following parts are essential for fertilization?

- A. Filament, style and petal
- B. Petal, receptacle and sepals
- C. Ovary, anther and stigma
- D. Filament, sepal and receptacle

23. Which one of the following enzymes acts in the duodenum and ileum?

- A. Lipase
- B. Maltase
- C. Peptidase
- D. Sucrose

24. Which one of the following is a nastic response?

- A. Bending of a plant shoot towards light
- B. Folding of plant leaflets when touched
- C. Growing of plant roots towards water
- D. Bending of plant root towards gravity

25. Under activity of the thyroid gland in a child may result into

- A. Overweight and sluggishness
- B. Thinness and over-activity
- C. Stunted growth and mental retardation
- D. Increased metabolic rate and restlessness

26. Which one of the following organs excretes urea?

- A. Bladder
- B. Skin
- C. Liver
- D. Lungs

27. Which one of the following is not an adaptation of a leaf for absorption of carbon dioxide?
- Its exposure in the air
  - Presence of airspaces in the mesophyll layer
  - Its being thin
  - Presence of chloroplasts
28. The hormone which causes ovulation is called
- Follicle stimulating hormone
  - Progesterone
  - Luteinizing hormone
  - Oestrogen
29. Which one of the following would not contribute to the accuracy of the capture-recapture method of estimating population size?
- Using a stable population
  - Capturing animals selectively
  - Use of very small marks
  - Allowing time before the recapture
30. Which one of the following stores carbon dioxide for a long term, in the carbon cycle?
- Living animals
  - Dead plants
  - Fossils
  - Living plants

**SECTION B (40 MARKS)**

*Answer all questions in this section.*

31. Table 1 shows the body surface area to volume of two land mammals A and B. Table 2 shows the rate of metabolism in arbitrary units, of the two animals at varying environmental temperatures.

Table 1

Mammal	Surface area (m <sup>2</sup> )	Volume (m <sup>3</sup> )
A	1.2	0.92
B	0.6	0.18

Table 2

	Metabolic rate (arbitrary units)	
	Mammal A	Mammal B
16	10.5	12.9
18	8.9	10.9
20	7.5	9.2
22	6.4	7.8
24	5.6	6.7
26	5.0	5.8

(a) From table 1

(i) Work out the surface area: volume ratio of each mammal.

(02 marks)

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(ii) State the structural difference between mammal A and B.

(02 marks)

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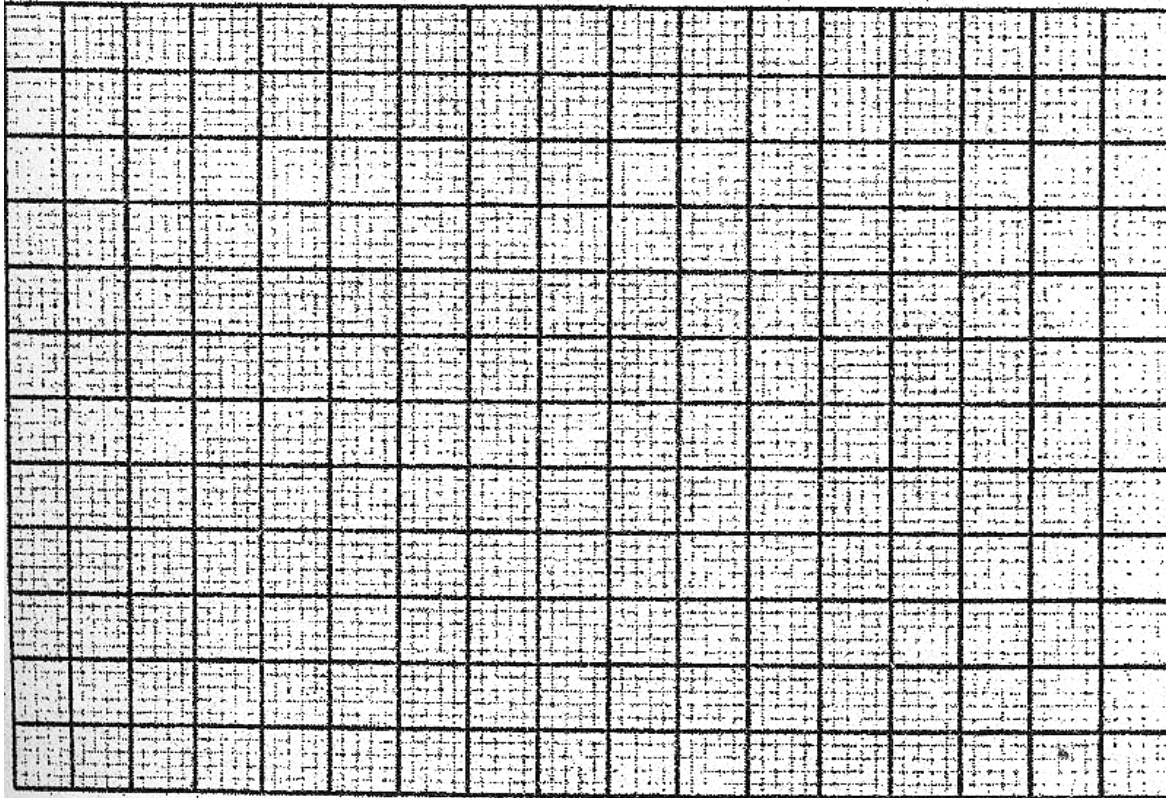
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(b) Using the space provided, plot on the same graph the metabolic rate of the two animals against environmental temperature.

(07 marks)



(c) From your graph, determine the metabolic rate of each mammal at environmental temperature of 25°C. (02 marks)

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(d) (i) How does environmental temperature affect the metabolic rate of the mammals? (02 marks)

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(e) From the information provided explain why at any environmental temperature, the metabolic rate of mammal B is higher than that of mammal A. (03 marks)

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32. Withdraw of a hand from a hot object and bending of a plant shoot towards light are examples of sensitivity of living organisms.

(a) What is the importance of sensitivity to living organisms? (03 marks)

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(b) State three ways in which the two actions described above differ. (03 marks)

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(c) Suggest the cause of the following defects in humans. (01 mark)

(i) Production of large amounts of dilute urine.

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(ii) Overweight and sluggishness in an adult individual. (01 mark)

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- (d) Explain why water-logged soils are usually deficient in nitrates. (02 marks)

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**SECTION C (30 MARKS)**

*Answer any two questions*

34. (a) What is meant by **tropism**? (02 marks)  
(b) Describe the importance of the difference types of tropisms in plants. (13 marks)
35. (a) Outline the causes of water pollution. (05 marks)  
(b) What are the effects of water pollution? (06 marks)  
(c) Suggest ways of controlling water pollution. (04 marks)
36. Describe how sound produced externally is heard by the human ear. (15 marks)
37. (a) Outline the importance of wild life conservation. (08 marks)  
(b) What are the likely problems to be faced in wildlife conservation? (07 marks)

**2006**

**SECTION A (30 MARKS)**

*Attempt all questions in this section.*

- Muscles are attached to bones by
  - Cartilages
  - Tendons
  - Muscle fibres
  - Ligaments
- Which one of the following blood vessels contains blood with the highest amount of oxygen?
  - Venacava
  - Hepatic vein
  - Pulmonary vein
  - Hepatic portal vein
- A distinguishing feature on the thoracic vertebrae is a
  - Long neural spine

- B. Big centrum
  - C. Small neural canal
  - D. Pair of large transverse processes
4. When testing for starch in a leaf, it is boiled in alcohol in order to
- A. Kill the protoplasm
  - B. Make it permeable to iodine
  - C. Remove the chlorophyll
  - D. Make it soft
5. An insect's respiratory system consists of
- A. Trachea, Tracheoles and bronchioles
  - B. Spiracles, trachea and Tracheoles
  - C. Spiracles, trachea and bronchioles
  - D. Trachea, bronchioles and Tracheoles
6. Which one of the following cell structures is possessed by both animal and plant cells?
- A. Chloroplast
  - B. Cell wall
  - C. Flagellum
  - D. Cell membrane
7. Beans are usually included in crop rotation cycle because they
- A. Act as cover crops
  - B. Improve water retention of the soil
  - C. Increase humus content in the soil
  - D. Restore nitrogen in the soil
8. In a parasitic association between two organisms,
- A. Both members benefit
  - B. Only one member benefits
  - C. Both members suffer harm
  - D. Neither member is harmed
9. Which one of the following pairs of activities consists of correct responses to cold in a mammal?
- A. Vasoconstriction, hairs standing
  - B. Increased metabolism, hairs lying flat
  - C. Increased sweating, hairs standing
  - D. Increased blood flow to the skin surface, hairs lying flat.
10. Which one of the following is true of vegetative reproduction?
- A. Involves spores
  - B. Maintains varieties
  - C. Gametes are transported by water
  - D. Does not lead to overcrowding

11. Which of the following are end products from digestion of cane sugar?
- A. Sucrose and maltose
  - B. Glucose and fructose
  - C. Maltose and galactose
  - D. Fructose and galactose
12. Which one of the following is a characteristic of the class insecta?
- A. Cutaneous outer skeleton
  - B. Jointed limbs
  - C. Two pairs of wings
  - D. Three body parts
13. A pure breeding red-flowered plant was crossed with a pure breeding white flowered plant and all the resulting  $F_1$  generation had pink flowers.  
What percentage of the  $F_2$  plants would have red flowers if the  $F_1$  plants were self-pollinated?
- A. 100%
  - B. 50%
  - C. 33%
  - D. 25%
14. In grasses, the anthers hang out below the flower and the stigma is held out above the anthers.  
The importance of this arrangement is to
- A. Improve the chances of pollination
  - B. Encourage cross pollination
  - C. Minimize waste of pollen grains
  - D. Encourage self-pollination
15. Which one of the following is correct about nutrition in a *Rhizopus*?
- A. Digestion of food occurs outside the organism
  - B. It makes its own food
  - C. Digestion of food is intracellular
  - D. It does not produce enzymes
16. Which one of the following tissues brings about an increase in width of a stem in a flowering plant?
- A. Xylem
  - B. Phloem
  - C. Cambium
  - D. Cortex
17. Figure 1 represents a setup of experiments to show the effect of unilateral lighting on plant shoots.

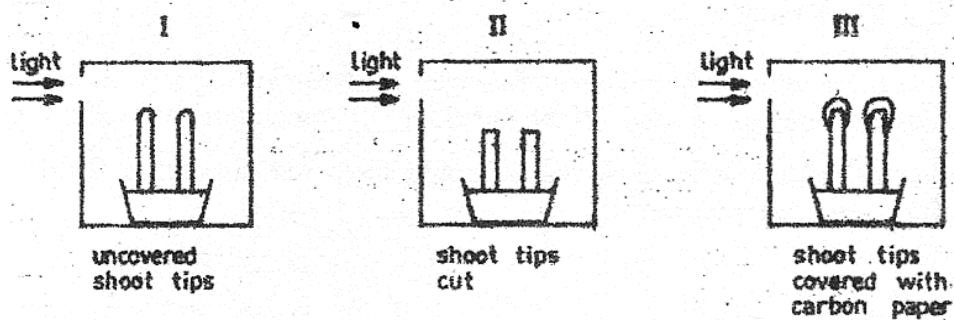


Fig. 1

In which experiment(s) would the shoots grow straight?

- A. I and II
- B. I and III
- C. II and III
- D. III only

18. The best way to ensure that yeast added to sugar produces ethanol is by

- A. Supplying a lot of oxygen to the mixture
- B. Placing the mixture in warm conditions
- C. Excluding air from the mixture
- D. Using a lot of sugar in the mixture

19. Which of the following diseases are all transmitted by mosquitoes?

- A. Elephantiasis, river blindness and yellow fever
- B. Malaria, elephantiasis and river blindness
- C. Yellow fever, river blindness and malaria
- D. Yellow fever, malaria and elephantiasis

20. Which one of the following organisms can reproduce both sexually and asexually?

- A. Amoeba
- B. Spirogyra
- C. Bacteria
- D. Yeast

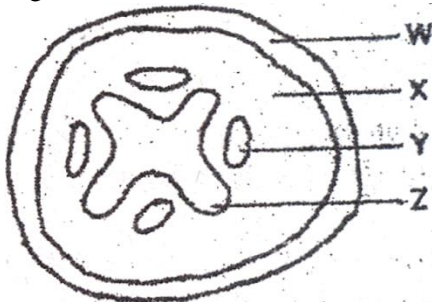
21. Which of the following is affected when the cerebrum is damaged?

- A. Breathing and heart beat
- B. Memory and voluntary actions
- C. Body balance and osmoregulation
- D. Osmoregulation and temperature control

22. Which one of the following characteristics of an organism is most important in constructing a dichotomous key?

- A. Body structure
- B. Body colour

- C. Body size
  - D. Age of organism
23. When  $80 \text{ cm}^3$  of water was added to  $100 \text{ cm}^3$  of soil, the volume of the mixture was  $140 \text{ cm}^3$ . What was the percentage of air in the soil sample?
- A. 20%
  - B. 40%
  - C. 60%
  - D. 80%
24. Cutting of fallopian tubes in a woman prevents conception because
- A. Ovaries stop producing eggs
  - B. Implantation does not occur
  - C. Sperms do no reach the egg
  - D. Sperms are destroyed
25. Which one of the following sets of characteristics of leaves enables them to absorb maximum light?
- A. Broad lamina, tightly packed palisade cells
  - B. Being thin, possession of numerous stomata
  - C. Possession of numerous stomata, waxy cuticle
  - D. Being thin, large intercellular spaces
26. Figure 2 is a transverse section of a dicotyledonous root.



**Fig. 2**

- Which one of the parts labelled, is responsible for the conduction of mineral salts and water?
- A. W
  - B. X
  - C. Y
  - D. Z
27. Which one of the following characteristics of insects enable them to live in dry habitats?
- A. Spiracles
  - B. Hairy bodies
  - C. Waxy cuticle
  - D. Wings

28. Controlled feeding on food rich vitamin A may improve
- A. Calcium deposition
  - B. Number of red blood cells
  - C. Night vision
  - D. Healing of wounds
29. Which one of the following sets consists of hormones produced by mammalian reproductive organs?
- A. Follicle stimulating hormone and testosterone
  - B. Progesterone and testosterone
  - C. Oestrogen and testosterone
  - D. Follicle stimulating hormone and Oestrogen
30. Lichens are usually the first plants to colonise a rocky surface because they
- A. Possess strong roots
  - B. Require little water
  - C. Are resistant to desiccation
  - D. Are able to photosynthesis

**SECTION B (40 MARKS)**

*Answer all questions in this section. Answers must be written in the spaces provided.*

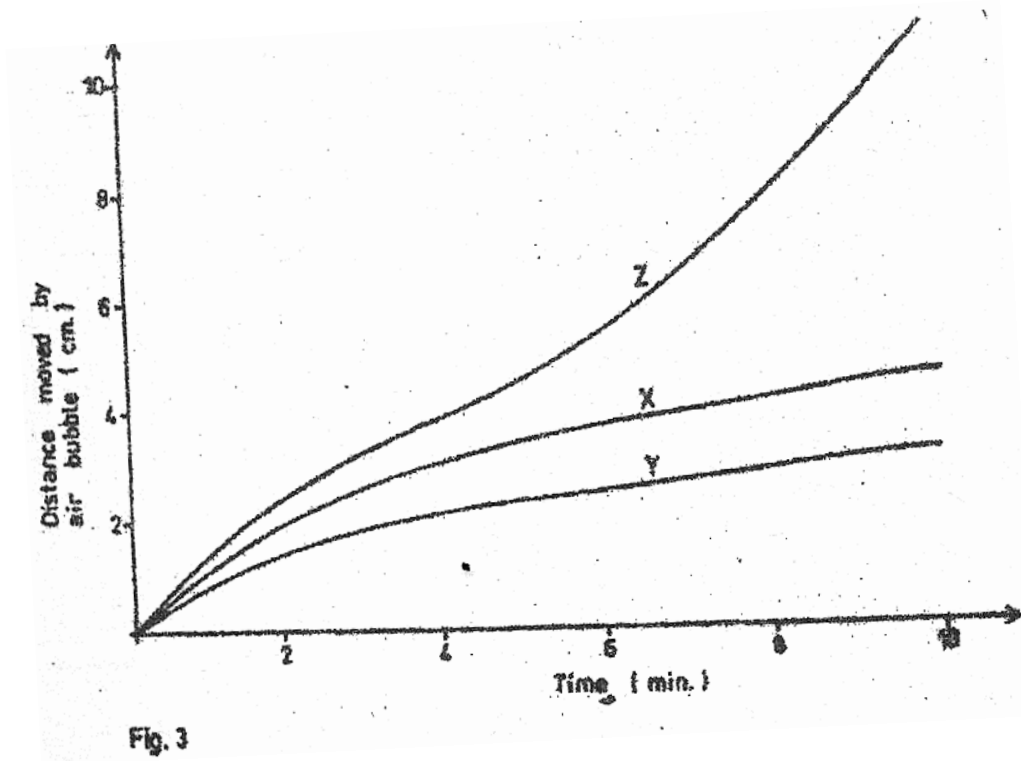
31. Three equal sized shoots X, Y and Z bearing the same number of leaves from similar herbaceous plants were treated as follows:

X – had the upper epidermis of all its leaves covered with petroleum jelly

Y – had the lower epidermis of all its leaves covered with petroleum jelly

Z – all its leaves were left uncovered

The three shoots were cut under water and each placed in one of the three identical photometers. All the photometers were then left under a shade. After 5 minutes, the photometer bearing shoot Z was transferred to a sunny place. The movement of the air bubble in each photometer was recorded every time for 10 minutes. The results are shown in figure 3.



(a) Describe the pattern of movement of the air bubble in each of the three photometers during the time of the experiment.

(i) X (02 marks)

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(ii) Y (02 marks)

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(iii) Z (04 marks)

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(b) Explain the pattern of movement of the air bubble in each photometer.

(i) X (02 marks)

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(ii) Y (02 marks)

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(iii) Z (05 marks)

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(c) Why were similar shoots and photometers used and all the three photometers placed under a shade? (01 mark)

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(d) The movement of the air bubble in the photometer is a measure of water uptake rather than water loss. Why is this so? (02 marks)

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32. Figure 4 represents the carbon cycle.

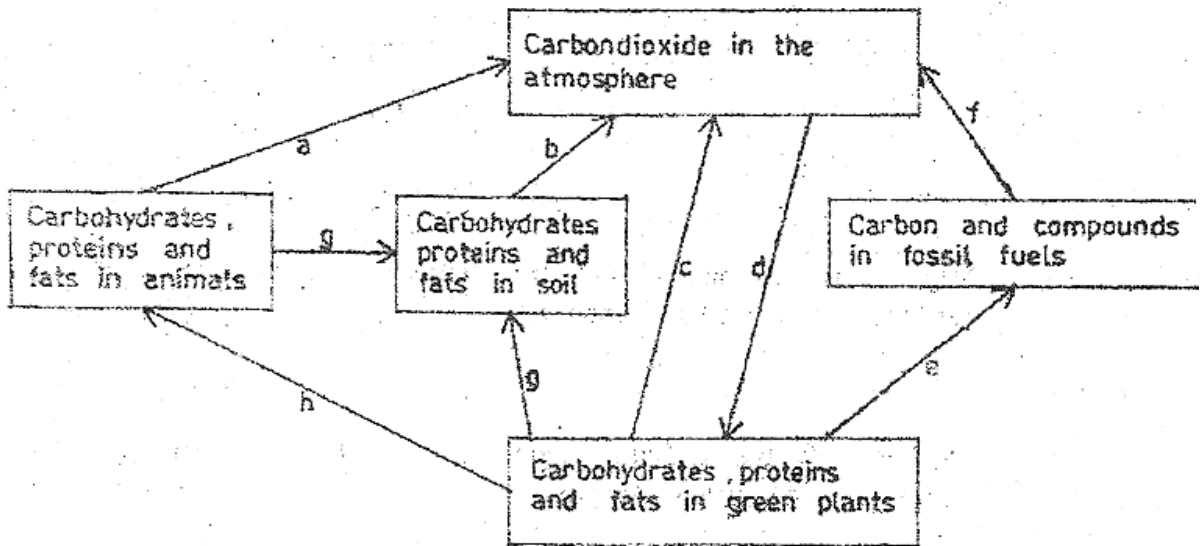


Fig. 4

(a) Name the processes labeled a, c, f and g (02 marks)

- a. ....
- c. ....
- f. ....
- g. ....

(b) State one physical factor that promotes process b. (01 mark)

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(c) Give two uses of process d to animals. (02 marks)

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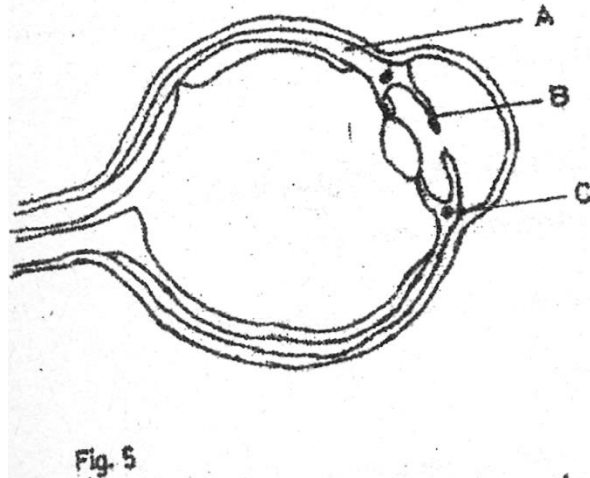
(d) Describe one way in which process e may be harmful. (02 marks)

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(e) (i) Suggest one human activity that tends to lower the level of carbon dioxide in the atmosphere. (01 mark)

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(ii) Explain how the activity suggested in (e)(i) lowers the level of carbon dioxide in the atmosphere. (02 marks)

33. Figure 5 represents a section through a mammalian eye.



(a) Give two functions of structure A to the eye. (02 marks)

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(b) (i) What stimulus does structure B respond to? (01 mark)



2005

**SECTION A (30 MARKS)**

1. Which one of the following organisms improves secretion and drainage of soil?
  - A. Fungi
  - B. Snails
  - C. Bacteria
  - D. Termites
  
2. Which one of the following groups contains the largest number of organisms?
  - A. Order
  - B. Species
  - C. Class
  - D. Phylum
  
3. People living at high altitudes have more red blood cells than those at lower altitudes in order to
  - A. Breathe more quickly
  - B. Keep the body warm
  - C. Pump more blood
  - D. Absorb enough oxygen
  
4. Which one of the following best describes the effect of one – sided illumination on the distribution of auxins in a shoot tip?
  - A. The auxins are evenly distributed around tip
  - B. The light inhibits movement of auxins down the tip
  - C. There is a reduction of auxins on the illuminated side of the tip
  - D. The auxins increase on the illuminated side of the tip
  
5. The group of organs performing excretory functions is
  - A. Kidneys, lungs and skin
  - B. Liver, kidneys and pancreas
  - C. Skin, kidneys and pancreas
  - D. Lungs, spleen and gall bladder
  
6. A cuticle may be regarded as a disadvantage to insects mainly because
  - A. It does not allow rapid locomotion
  - B. It limits the size of insects
  - C. Does not prevent water loss
  - D. Does not allow gaseous exchange
  
7. The best description of the leaf in fig. 1 is

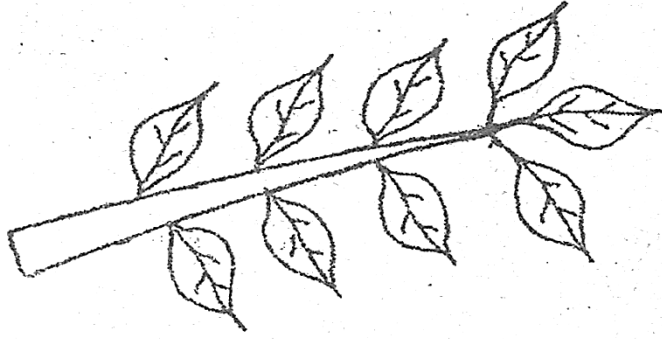


Fig. 1

- A. Pinnate and parallel veined
  - B. Palmate and net veined
  - C. Pinnate and net – veined
  - D. Bi pinnate and parallel veined
8. Which one of the following structures of the ear equalizes pressure on both sides of the ear drum?
- A. Oral window
  - B. Eustachian tube
  - C. Semi – circular canal
  - D. Round window
9. Which one of the following shows the correct path followed by the sperms when ejaculated?
- A. Seminiferous tubules → epididymis → sperm ducts → uretha
  - B. Epididymis → seminiferous tubules → urethra → sperm ducts
  - C. Sperm ducts → seminiferous tubules → epididymis → uretha
  - D. Seminiferous tubules → urethra → sperm ducts → epididymis
10. Stunted growth and mental retardation in children may be due to
- A. Under production of pituitary hormone
  - B. Under production of insulin
  - C. Deficiency of thyroxine hormone
  - D. Deficiency in adrenaline hormone
11. Which of the following monosacharides make up sucrose?
- A. Galactose and fructose
  - B. Galactose and glucose
  - C. Fructose and glucose
  - D. Two glucose molecules
12. Which of the following parts of a microscope are adjusted in order to bring the specimen into focus?
- A. Eyepiece and coarse adjustment
  - B. Coarse and fine adjustment
  - C. Eyepiece and fine adjustment
  - D. Mirror and fine adjustment

13. P, Q, R and S are characteristics of insects

P – undergo complete metamorphosis

Q – possess wings

R – have three pairs of legs

S – divided into three body parts

Which of them are common to all insects?

A. P and Q

B. R and S

C. Q and S

D. P and R

14. Which of the following is not a characteristic of a respiratory surface?

A. Thin walls

B. Moist surface

C. Densely supplied with capillaries

D. Smooth surface

15. Green plants give less carbon dioxide during day than at night because during day

A. The rate of photosynthesis is low

B. Transpiration interferes with escape of carbon dioxide

C. Most stomata close

D. Some of the carbon dioxide produced is used for photosynthesis

16. In comparison with the blood flowing through the vena cava, the blood flowing through the aorta has

A. Less carbon dioxide, more oxygen and higher pressure

B. More oxygen, more carbon dioxide and lower pressure

C. Less carbon dioxide, less oxygen and lower pressure

D. More carbon dioxide, less oxygen and higher pressure

17. Which of the following organs contain glands which are part of the endocrine system?

A. Liver, pancreas, heart

B. Brain, pancreas, ovary

C. Brain, testes, heart

D. Kidney, heart, liver

18. Oxygen debt occurs during active physical exercise in mammals because

A. Alcohol accumulates in the body

B. Of anaerobic respiration that occurs

C. Of high rate of breathing during exercise

D. Carbon dioxide produced accumulates during the exercise

19. Which one of the following explains why a rat loses heat more rapid to the surroundings than an elephant?

A. A rat has smaller ears than an elephant

B. A rat has a higher metabolic rate than an elephant

- C. Surface area : volume ratio of a rat is higher than that of an elephant  
D. A rat has fewer hairs than an elephant
20. Which one of the following is responsible for a decrease in dry weight of a seed during germination?  
A. The seed loses more water than it absorbs  
B. Soluble food materials are converted to starch  
C. Stored food is used up  
D. Soluble food materials are lost into the soil
21. Which one the following is not affected by environmental factors?  
A. Height  
B. Skin colour  
C. Albinism  
D. Intelligence
22. Which one of the following would occur if the number of predatory bugs was increased in the food chain below?  
Plants → caterpillars → Predatory bugs → birds  
A. Decrease in number of birds  
B. Increase in number of plants  
C. Increase in number of plants  
D. Decrease in number of plants
23. Which one of the following structures of a flower develops into a seed coat after fertilization?  
A. Embryo sac  
B. Integuments  
C. Receptacle  
D. Ovary
24. Which one of the following would happen to plasmolysed cells of a plant tissue that has been placed in water for some time?  
A. Their cell vacuoles would shrink  
B. They would not experience any change in size  
C. They would increase in volume  
D. They would become shorter
25. Which one of the following is part of the axial skeleton?  
A. Humerus  
B. Femur  
C. Thoracic vertebra  
D. Ulna
26. When homozygous red-flowered plants were crossed with homozygous white-flowered plants, all the plants produced had pink flowers. What would be the phenotype ratio of plants resulting from a cross of pink-flowered plants?

- A. 3 red-flowered: 1 white-flowered
  - B. 1 red-flowered: 3 white-flowered
  - C. 1 red-flowered: 2 pink-flowered plant, 1 white-flowered
  - D. 2 red-flowered: 1 pink-flowered, 1 white-flowered
27. When milk is the main food in the diet of a child, it should be supplemented with food rich in
- A. Iron
  - B. Calcium
  - C. Sugar
  - D. Vitamin D
28. In which of the following are the largest amounts of nitrogenous wastes excreted?
- A. Urine
  - B. Sweat
  - C. Breath
  - D. Feaces
29. Which of the following describes internal respiration?
- A. Breathing in and releasing of oxygen into the tissues.
  - B. Getting rid of carbon dioxide accumulated in the tissue
  - C. Building up of complex substances
  - D. Oxidation of food substances to release energy
30. Which one of the following is the least important function of humus in the soil?
- A. Improving soil aeration
  - B. Prevention of soil erosion
  - C. Water retention
  - D. Increasing soil fertility

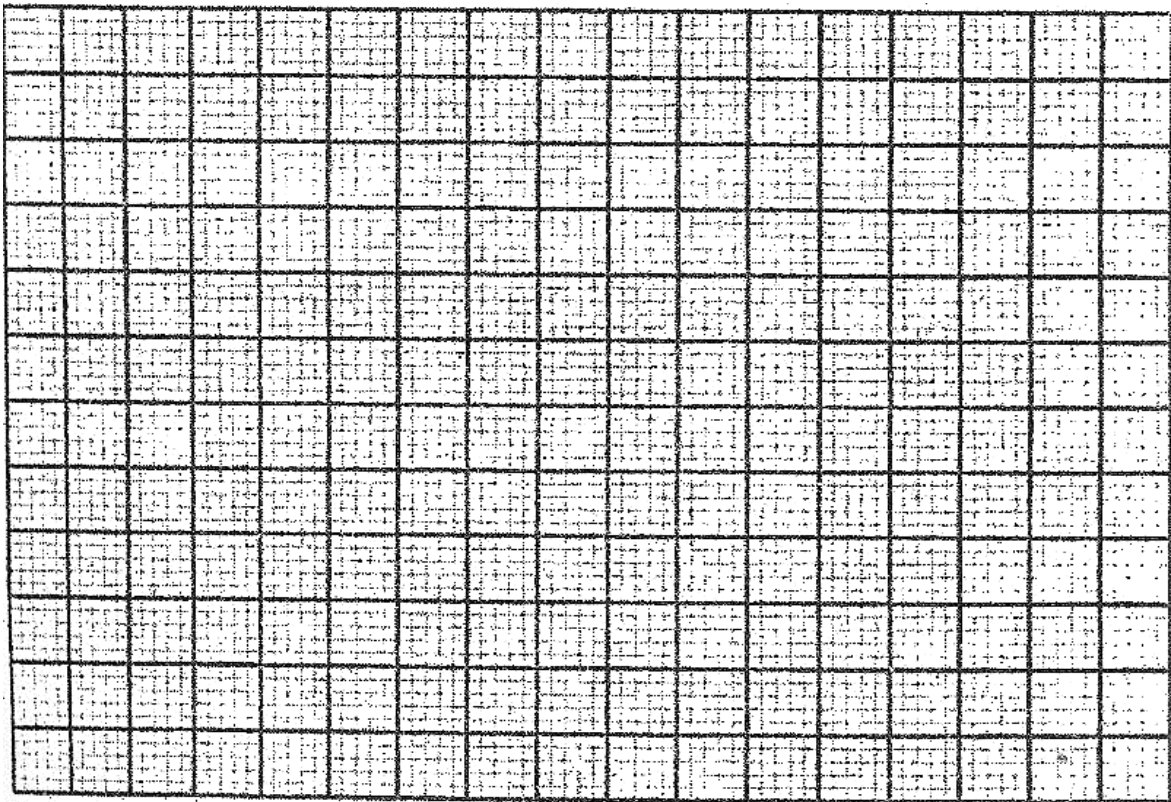
**SECTION B: (40 MAKRS)**

*Answer all questions in this section. Answers must be written in the spaces provided.*

31. Six identical potato cylinders measuring 2.0 cm in length were each placed in a different concentration of sugar solution. After two hours, the potato cylinders were removed from the solutions and re measured. The table below shows the results.

Concentrations of sugar Solutions mol $l^{-1}$	Length of potato cylinders After 2 hours (cm)	Difference in length Of potato cylinders After 2 hrs (cm)
0.1	2.40	
0.2	2.25	
0.3	2.15	
0.4	2.05	
0.5	1.98	
0.6	1.02	

- (a) Complete the table by filling in the difference in length of each potato cylinder after two hours (i.e length after 2 hours subtract initial length) (03 marks)
- (b) In the space provided plot a graph of the difference in length after 2 hours against concentration of sugar solutions. (05 marks)



- (c) (i) What was the effect of the concentration of the sugar solutions on the length of the potato cylinders? (04 marks)

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(ii) Explain why the concentration of the sugar solutions affected the length of the potato cylinders as stated in (c)(i). (03 marks)

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(d) (i) From your graph, determine the concentration of the sugar solution that would give no difference in length of a potato cylinder. (01 mark)

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(ii) Explain what happens in a potato cylinder when no change in length occurs. (02 marks)

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(e) Suggest one other observation other than change in size that would be made on the potato cylinders.

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32. Fig. 2 shows the relationship between blood supply of the embryo, placenta and uterus.

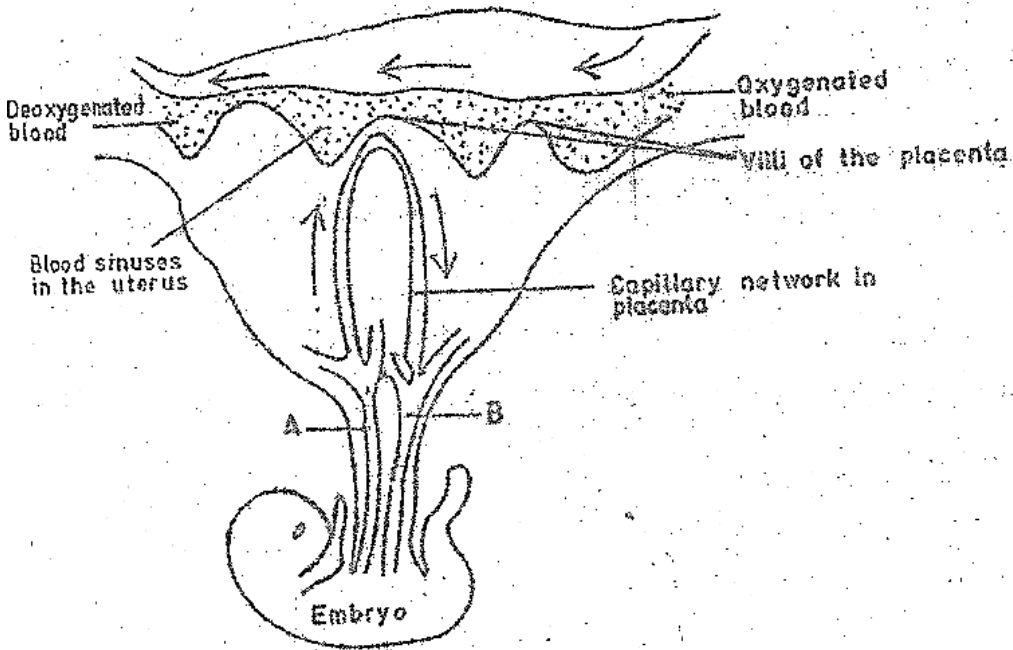


Fig. 2

(a) State the functions of the;

(i) Placenta to the embryo

(04 marks)

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(ii) Villi on the placenta

(02 marks)

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(b) Give two reasons why the mother's blood does not mix with that of the embryo.

(02 marks)

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(c) Give two differences in the composition between the blood in vessels A and B. (02 marks)

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33. (a) What is meant by genotype? (01 mark)

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(b) A man of blood group A married a woman homozygous for blood group B and they produced a son of blood group B.

(i) Work out the genotypes of the father and of the son. (04 marks)

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(ii) The son married a wife of blood group O. showing your working, give the percentages of the possible phenotypes of their offspring. (03 marks)

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(c) Blood groups in humans, show discontinuous variation. Explain what you understand by this statement. (02 marks)

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**SECTION C: (30 MARKS)**

*Answer any two questions.*

34. (a) What are the constituents of fertile soil? (03 marks)
- (b) In what ways may human activities:
- (i) improve soil? (06 marks)
  - (ii) degrade soil? (06 marks)
35. (a) Describe the structure of the different types of a bird's feathers, stating the function of each type. (06 marks)
- (b) What factors contribute to the bird's ability to fly? (09 marks)
36. (a) Draw and label a transverse section of a stem of a herbaceous dicotyledonous plant. (03 marks)
- (b) State the function of five of the parts that can be identified in the section. (05 marks)
- (c) Describe how stems are modified to perform other functions other than conducting materials within the plant. (07 marks)
37. (a) What is meant by excretion? (02 marks)
- (b) Describe how carbon dioxide is removed from the mammalian body tissue into the atmosphere. (13 marks)

**2004**

**SECTION A (30 MARKS)**

*Attempt all questions in this section.*

1. Which of the following are structural adaptations to flight in birds?
  - A. Light bones and webbed feet
  - B. Webbed feet and light feathers
  - C. Streamlined body and light bones
  - D. Smooth body and light feathers
  
2. In which of the following associations do both organisms benefit?
  - A. Malarial parasite and human
  - B. Tapeworm and human
  - C. A fungal parasite and plant
  - D. Nitrogen fixing bacteria and leguminous plant

3. Which one of the following methods would be best for estimating the population density of rats in a bush?
  - A. Direct counting
  - B. Quadrant counting
  - C. Line transect
  - D. Capture-recapture method
  
4. Addition of humus to a sandy soil would
  - A. Decrease the capillarity of the soil
  - B. Increase the aeration of the soil
  - C. Decrease mineral content of the soil
  - D. Improve the water retention capacity of the soil
  
5. At which of the following levels of classification can organisms interbreed and produce fertile offspring?
  - A. Class
  - B. Species
  - C. Phylum
  - D. Kingdom
  
6. By which one of the following processes does carbon dioxide leave the blood capillaries into the alveoli?
  - A. Osmosis
  - B. Active transport
  - C. Diffusion
  - D. Capillarity
  
7. Which one of the following parts of the mammalian ear is concerned with balance?
  - A. Cochlea
  - B. Semi – circular canal
  - C. Eustachian tube
  - D. Oval window
  
8. The main reason why birds sit on their eggs during the incubation period is to ensure that
  - A. Hatching occurs quickly
  - B. Rain does not destroy eggs
  - C. Eggs are kept at a constant temperature
  - D. All eggs develop chicks at the same time
  
9. Which one of the following would be a correct sequence of plant succession on an abandoned tarmac road?
  - A. Mosses → herbs → shrubs → trees
  - B. Herbs → mosses → shrubs → trees
  - C. Shrubs → herbs → trees → mosses
  - D. Mosses → herbs → trees → shrubs
  
10. Which one of the following is likely to cause pollution in water bodies?

- A. Over fishing
  - B. Boat racing
  - C. Use of fertilisers
  - D. Use of farmyard manure
11. When a growing shoot is placed horizontally, it bends upwards after sometime. Which of the following;
- A. High auxin concentration on the upper side inhibits growth on the upper side
  - B. High auxin concentration on the lower side makes the lower side grow faster.
  - C. Lack of auxin on the upper side inhibits growth on the upper side.
  - D. Low auxin concentration on the lower side makes the lower side grow faster
12. Which one of following is an advantage of vegetative propagation?
- A. Competition between parent and offspring is minimal
  - B. Colonization of new habitats is fast
  - C. Variation among offspring occurs
  - D. Maintenance of parental characteristics in offspring
13. Which one of the following excretory products are removed from the body by the kidney?
- A. Urea, excess water and excess salts
  - B. Urea, excess water and carbon dioxide
  - C. Carbon dioxide, excess water and excess salts
  - D. Carbon dioxide, urea and excess salts
14. Which one of the following pairs of organs is important in the digestion of fats?
- A. Stomach and liver
  - B. Pancreas and stomach
  - C. Liver and pancreas
  - D. Stomach and mouth
15. Which of the following describes the carrying capacity of a population?
- A. Maximum number of organisms that can reproduce freely in a habitat
  - B. Area occupied by organisms of different species
  - C. Maximum number of organisms that can be supported by a specific area.
  - D. Maximum number of plants that can support animals in a given area
16. Fig. 1 shows how the body temperature of animals A and B vary with environmental temperature.

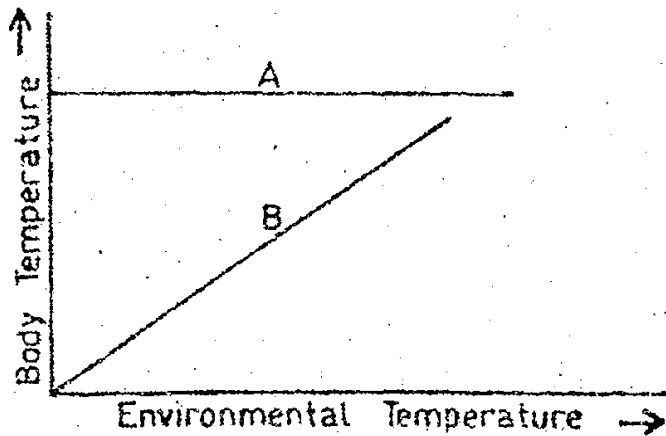


Fig. 1

Which one of the following is demonstrated in the figure?

- A. Body temperature of A is dependent on environmental temperature
- B. Body temperature of B is dependent on environmental temperature
- C. A has a higher body temperature than B
- D. B loses more heat than A

17. Which of the following features show continuous variation?

- A. A, B and O blood groups
- B. Sickle cells
- C. Hemophilia
- D. Height

18. Which of the following is a likely effect of a decrease in the number of platelets in the blood?

- A. The blood may not be able to carry enough oxygen
- B. There may be prolonged bleeding in case of an injury
- C. The body may not be able to fight disease
- D. The body may not be able to distribute heat efficiently

19. Which one of the following characteristics may be used to determine whether leaves are compound?

- A. Nature of margin
- B. Number of leaflets
- C. Type of venation
- D. Presence of leaflets

20. The following events occur during germination of a bean seed.

- (i) Development of lateral roots
- (ii) Growth of radicle out of the testa
- (iii) Hypocotyl pulls cotyledons out of soil
- (iv) Growth of root hairs

Which one of the following gives the correct sequence of the events?

- A. (i), (ii), (iii) and (iv)
- B. (ii), (iii), (iv) and (iii)
- C. (ii), (iv), (i) and (iii)
- D. (ii), (i), (iii) and (iv)

21. Which one of the following stimulates the reabsorption of water in the kidneys?

- A. Adrenalin
- B. Antidiuretic hormone
- C. Thyroxine
- D. Insulin

22. The best explanation for panting of an athlete immediately after a race is to

- A. Allow fast blood flow to the lungs
- B. Restore the used up energy
- C. Take in more oxygen
- D. Allow fast blood flow from the muscles

23. During pregnancy in humans, the substances that pass from the mother to the embryo are

- A. Oxygen, nitrogenous wastes and glucose
- B. Glucose, amino acids and oxygen
- C. Carbon dioxide, mineral salts and nitrogenous wastes
- D. Carbon dioxide, amino acids and mineral salts

24. An endosperm is formed in plants when the second male nucleus fuses with the

- A. Egg nucleus
- B. Polar nuclei
- C. Antipodal nuclei
- D. Embryo sac

25. In a pea plants, tallness is dominant over shortness. If a heterozygous tall plant is crossed with a short plant, the proportion of the offspring will be

- A. 50% tall, 50% short
- B. 100% tall
- C. 25% tall, 75% short
- D. 75% tall, 25% short

26. A farmer grew beans and noticed that the leaves turned yellow but the veins remained green. The minerals likely to be deficient in the soil are

- A. Magnesium and iron
- B. Potassium and manganese
- C. Calcium and potassium
- D. Zinc and calcium

27. Which of the following conditions increase the rate of transpiration?

- A. High temperature windy conditions and high humidity

- B. Low temperatures, windy conditions and high humidity
- C. High temperatures, low windy humidity and windy conditions
- D. Low temperatures, low humidity and still air

28. Which of the following parts of a microscope magnify the object?

- A. Eyepiece and mirror
- B. Objective lens and mirror
- C. Eyepiece and objective lens
- D. Eyepiece and fine adjustment

29. Which one of the following shows the correct order of cell organization?

- A. Organism → system → organ
- B. Tissue → organ → organism
- C. Organ → tissue → organism
- D. Tissue → organ → system

30. Which one of the following is a long term adaptation of mammals to low temperature environment?

- A. Raising of hair
- B. Increase in metabolic rate
- C. Deposition of fats under the skin
- D. Reduction of blood flow to the skin

**SECTION B (40 MARKS)**

*Answer all questions in this section.*

31. The table below shows the percentage composition of inhaled and exhaled air, in a human being at rest and also the composition of exhaled air, during exercise. Use the information in the table to answer the questions that follow.

	Water Vapour	Nitrogen	Carbon dioxide	Oxygen
Inhaled air at rest	Variable	79%	0.03%	20.96%
Exhaled air at rest	0.8%	79%	4.1%	16.2%
Exhaled air during exercise	0.92%	79%	4.5%	15.58%

(a) State the differences in composition between inhaled and exhaled air at rest.

(03 marks)

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(c) State the purpose of including each of leaves B and C in the experiment. (02 marks)

(i) Leaf B

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(ii) Leaf C

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(d) What was observed when each leaves A, B and C were tested for starch? (03 marks)

(i) Leaf A

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(ii) Leaf B

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(iii) Leaf C

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(e) Give reasons why each of the following is carried out while testing a leaf for starch.

(i) Put a leaf in boiling water. (02 marks)

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(ii) Put a leaf in hot ethanol (02 marks)

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33. (a) What do you understand by a recessive gene? (02 mark)

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(b) A man who is a carrier for albinism married a normal woman. Using suitable symbols, work out the proportions of the possible genotypes and phenotypes of their children. (06 marks)

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(c) Give two benefits of studying human genetics. (02 marks)

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**SECTION C (30 MARKS)**

*Answer any two questions*

34. (a) Explain the value of earthworm in maintaining the soil in a condition suitable for crop growth? (07 marks)  
(b) How does clay affect the fertility of soil? (08 marks)
35. (a) What are the functions of a skeleton in mammals? (04 marks)  
(b) With the aid of a labelled diagram, describe how movement is caused in a named hinge joint in a mammal. (11 marks)
36. (a) What factors are necessary for germination in seeds? (1 ½ marks)  
(b) Using labelled diagrams, describe experiments to show the necessity of each factor for germination. (13 ½ marks)
37. In humans, the blood circulatory and lymphatic systems transport body fluids.  
(a) Outline the functions of the lymphatic system. (04 marks)  
(b) Explain the changes that occur in the composition of blood as it passes through the capillaries of the following parts of the body.  
(i) Lungs (03 marks)  
(ii) Liver (05 marks)  
(iii) Kidneys (03 marks)

2003

**SECTION A (30 MARKS)**

1. The following are conditions necessary for germination except
  - A. Oxygen
  - B. Moisture
  - C. Moderate temperature
  - D. Carbon dioxide
  
2. The main value of panting in a dog is that
  - A. Excess water is removed from the body
  - B. Latent heat of vaporization of water cools the body
  - C. Excess mineral salts are removed from the body
  - D. The dog relaxes from exhaustion
  
3. Which one of the following is true about a person of blood group O?
  - A. Receives blood from people of all other blood groups
  - B. Donates blood to people of all other blood groups
  - C. Receives blood from only people of blood groups AB and O
  - D. Donates blood to only people of blood group AB
  
4. The main value of sweating in man is that during the process
  - A. Excess water is lost
  - B. Excess salts are got rid of
  - C. The body is cooled
  - D. Excess nitrogenous waste is got rid of
  
5. Sexual reproduction in spirogyra is described as
  - A. Fragmentation
  - B. Conjugation
  - C. Binary fission
  - D. Budding
  
6. Lack of a nucleus in a red blood cell is advantageous in that it
  - A. Enables the cell to pass through thin epithelium ]
  - B. Allows the cell to fight disease-causing organisms.
  - C. Allows the cell to carry a lot of oxygen
  - D. Enables the cell to carry much dissolved food
  
7. Which of the following parts of a flower is not essential for reproduction?
  - A. Corolla
  - B. Stigma
  - C. Style
  - D. Anther
  
8. Mitosis is different from malaria in that mitosis results into
  - A. Four daughter cells with equal matter

- B. Two daughter cells with equal genetic matter
  - C. Four daughter cells with half the genetic matter
  - D. Two daughter cells with half the genetic matter
9. The role of rennin in children during digestion is
- A. Breaking down milk protein into peptides
  - B. Mixing the milk protein with digestive enzyme
  - C. Activating pepsin to digest the milk protein
  - D. Coagulating milk protein
10. Which one of the following is a reaction to over – cooling by a mammalian body?
- A. Dilation of blood vessels
  - B. Sweating
  - C. Decrease in metabolic rate
  - D. Shivering
11. A good mammalian respiratory surface should be
- A. Dry with large surface area
  - B. Moist with reduced surface area
  - C. Dry with many blood vessels
  - D. Moist with many blood vessels
12. Which of the following parts of a plant cell provides shape and rigidity?
- A. Protoplasm
  - B. Nucleus
  - C. Cell wall
  - D. Cell membrane
13. Which one of the following is not a function of the liver?
- A. Regulation of blood sugar
  - B. Production of insulin
  - C. Formation of bile
  - D. Storage of iron
14. Which of the following biological processes describes a fungus growing on the leaves of a living potato plant?
- A. Predation
  - B. Parasitism
  - C. Competition
  - D. Saprophytism
15. In cattle, white bull is mated with a red cow, the offspring is roan. This indicates that the gene for white is
- A. Dominant to that for red
  - B. Recessive to that for red
  - C. Codominant with that for red
  - D. Mutated to show roan

16. What would be the ratio of the phenotypes if a roan bull and roan cow from the offspring referred to in question 15 were mated?
- A. 1 red : 2 roan : 1 white
  - B. 2 red : 1 roan : 1 white
  - C. 1 red : 1 roan : 2 white
  - D. 1 red : 1 white
17. Which one of the following is true about insect pollinated flowers?
- A. Produce small and smooth pollen
  - B. Have small greenish bracts
  - C. Stigma and pollen grains are often sticky
  - D. Filaments are flexible and anthers loosely attached.
18. While analyzing a soil sample, the following results were obtained:
- Sand =  $200 \text{ cm}^3$   
Water =  $300 \text{ cm}^3$   
Water and sand after stirring =  $450 \text{ cm}^3$
- What was the percentage of air in the sand?
- A. 10%
  - B. 20%
  - C. 25%
  - D. 30%
19. Which of the following features of an amphibian are suited for aquatic life?
- A. Possession of wings
  - B. Muscular hind limbs
  - C. Moist skin without scales
  - D. Webbed toes
20. Which part of Irish potato plant is used in its vegetative reproduction?
- A. Stem
  - B. Root
  - C. Leaf
  - D. Flower
21. In which two parts of the alimentary canal is starch digested?
- A. Small intestines and mouth
  - B. Mouth and duodenum
  - C. Duodenum and stomach
  - D. Mouth and stomach
22. Lack of iodine in the human diet causes
- A. Anaemia
  - B. Scurvy
  - C. Goiter

D. Rickets

23. Which of the following farming practices would control soil erosion?
- A. Application of artificial fertilizers
  - B. Addition of compost manure
  - C. Terracing
  - D. Mixed farming
24. Which one of the following maintains a transpiration stream in flowering plants?
- A. Capillarity
  - B. Osmosis
  - C. Diffusion
  - D. Active transport
25. Which one of the following layers of the human skin helps the body to retain water?
- A. Granular layer
  - B. Malpighian layer
  - C. Subcutaneous layer
  - D. Cornified layer
26. Which one of the following is not caused by Oestrogen?
- A. Healing of the uterine wall.
  - B. Growth of the uterine wall
  - C. Inhibiting further secretions of follicle stimulating hormone
  - D. Causing ovulation
27. Which one of the following increases the amount of nitrogen in the atmosphere?
- A. Excretion
  - B. Action of fungi on dead organic matter
  - C. Action of nitrifying bacteria
  - D. Action of denitrifying bacteria
28. The following are structures of a cell
- (i) Cell wall
  - (ii) Cell membrane
  - (iii) Nucleus
  - (iv) Chloroplast
- Which of them are found in both plant and animal cells?
- A. (i),(ii) and (iv)
  - B. (i),(iii) and (iv)
  - C. (ii) and (iii)
  - D. (ii) and (iv)
29. Which one of the following parts of a tooth contains living tissue?
- A. Cement
  - B. Pulp cavity

- C. Enamel
- D. Dentine

30. Which one of the following occurs during exhalation in a mammal?
- A. The diaphragm relaxes
  - B. The inter-costal muscles contract
  - C. The volume of the chest cavity increases
  - D. The ribs move upwards and outwards

**SECTION B (40 MARKS)**

Answer all questions in this section.

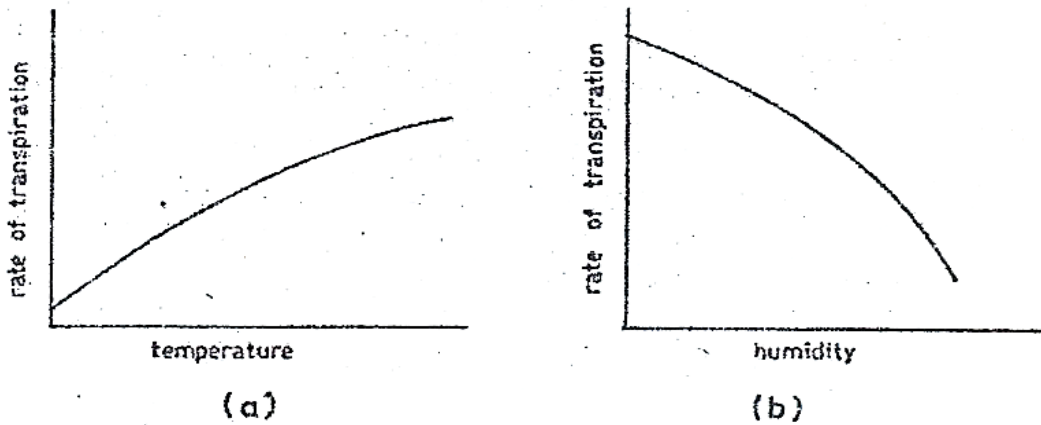
31. (a) What is transpiration? (02 marks)

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- (b) Figure 1(a) and (b) show how temperature and humidity affect the rate of transpiration.



**Fig. 1**

- (i) From fig. 1 (a), describe how the rate of transpiration changes with temperature. (01 mark)

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- (ii) From fig. 1(b), describe how the rate of transpiration changes with humidity. (01 mark)

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(c) Explain why:

(i) Temperature affects the rate of transpiration as shown in figure 1(a).

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(02 marks)

(ii) Humidity affects the rate of transpiration as shown in the figure 1(b).

(02 marks)

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(d) State the importance of transpiration in plants.

(02 marks)

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32. How does each of the following characteristics of a respiratory surface aid diffusion of gases at the surface?

(a) Thin epithelium

(02 marks)

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(b) Dense network of capillaries

(03 marks)

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(c) Moist Surface

(03 marks)

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(d) Large surface area

(02 marks)

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33. Figure 2 shows an internal structure of a leaf.

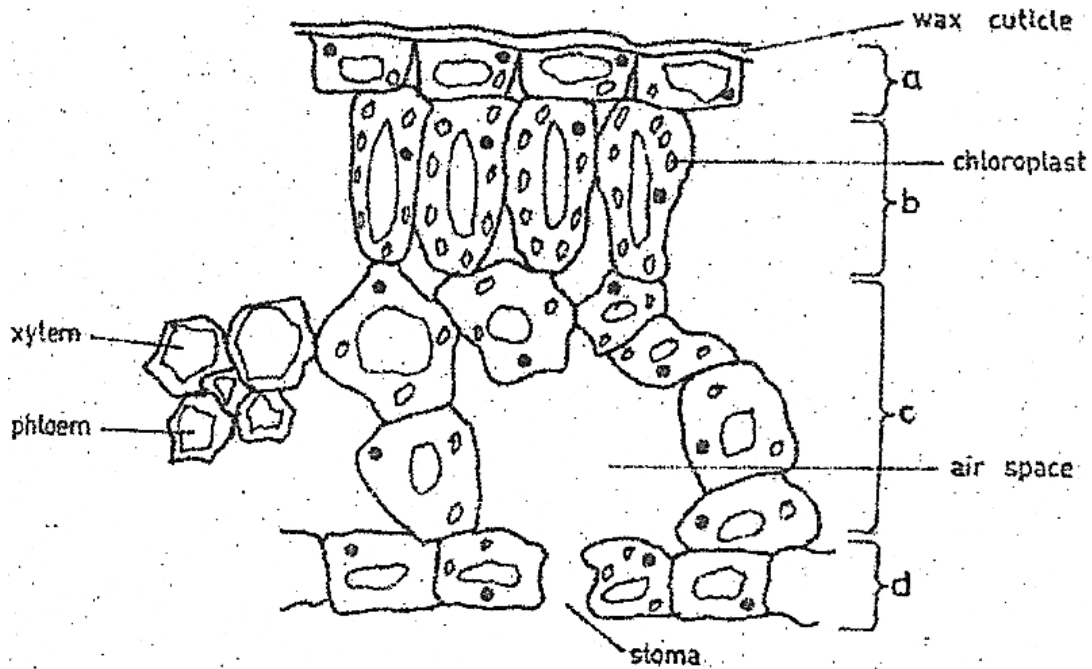


Fig. 2

(a) Label the layers marked a, b, c and d on the diagram.

(02 marks)

(b) Give three differences between layers b and c.

(03 marks)

Layer b	Layer c
(i) .....	.....
.....	.....
(ii) .....	.....
.....	.....
(iii) .....	.....
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(c) Using evidence from the diagram, describe how the structure of a leaf is suited for photosynthesis. (04 marks)

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(d) What is the importance of wax on layer (a)? (01 mark)

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34. (a) What is long-sightedness? (02 marks)

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(b) State two causes of long-sightedness. (02 marks)

(i)

.....

.....

(ii)

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.....

(c) In the space below, draw light rays from an object into the eye to show long-sightedness. (03 marks)

(d) What is the effect of each of the following movements of the different parts of the eye?

(i) Contraction of the iris (01 mark)

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(ii) Relaxation of the Ciliary muscle (01 mark)

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(iii) Shortening and thickening of the lens (01 mark)

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**SECTION C (30 MARKS)**

*Answer any two questions*

35. (a) Distinguish between dominance and codominance in genetics. (02 marks)

(b) When all pea plants were crossed with short pea plants, all the plants in F<sub>1</sub> generation were tall. When two plants of the F<sub>1</sub> generation were crossed, both tall and short plants were produced in the F<sub>2</sub> generation.

(i) Why were all plants tall in the F<sub>1</sub> generation? (02 marks)

(ii) Using suitable symbols, show the crosses to produce the F<sub>1</sub> and F<sub>2</sub> generations. (07 ½ marks)

(c) In rose plants, when a red flowered plant is crossed with a white flowered plant, all plants produced bear pink flowers. Using suitable symbols show the result of crossing a pink flowered plant and a white flowered plant. (03 ½ marks)

36. (a) What do you understand by environmental degradation? (01 mark)

(b) Describe how man's activities lead to the degradation of soil. (14 marks)

37. (a) List the substances transported by the blood circulatory system. (04 marks)

(b) Give the importance of transporting each one of the substances named in (a) above. (11 marks)

38. (a) What is excretion? (02 marks)

(b) With the aid of a labelled diagram describe the functioning of the kidney in excretion. (13 marks)

2002

**SECTION A**

*Answer all questions in this section.*

- Which of the following are characteristics of surfaces for gaseous exchange?
  - Large surface area, thinness and moistness
  - Thinness, moistness and presence of fine blood vessels.
  - Large surface area thinness and presence of arteries and veins
  - Thinness, moistness and presence of arteries and veins
- Stunted plant growth, creamy yellow leaves and poor fruit development is caused by deficiency of
  - Nitrogen and potassium
  - Nitrogen and phosphorous
  - Potassium and iron
  - Nitrogen and iron
- Which one of the following dental formulae is that of a sheep?
  - $I \frac{0}{2} \quad C \frac{0}{0} \quad Pm \frac{3}{3} \quad M \frac{3}{3}$
  - $I \frac{2}{2} \quad Pm \frac{2}{2} \quad M \frac{3}{3}$
  - $I \frac{3}{3} \quad C \frac{0}{0} \quad Pm \frac{3}{3} \quad M \frac{2}{2}$
  - $I \frac{2}{2} \quad C \frac{1}{1} \quad Pm \frac{2}{2} \quad M \frac{3}{3}$
- Enzymes differ from catalysts because enzymes
  - Are required in small amounts
  - Respond to temperature changes
  - Are protein in nature
  - Speed up reactions
- When preparing to test for starch in a leaf, the leaf is boiled in alcohol in order to
  - Burst chloroplasts
  - Remove coloured materials in the leaf
  - Quicken the reaction of starch with iodine
  - Soften the leaf
- In which of the following animals does expired air take a different route from that of inspired air?
  - Birds
  - Reptiles
  - Bony fish
  - Mammals
- Which one of the following does not aid flight in birds?

- A. Pectoral muscles
  - B. Hollow muscles
  - C. Down feathers
  - D. Quill feathers
8. Which one of the following sets of organisms belong to the same group?
- A. Butterfly, beetles and starfish
  - B. Crab, tape worm and liver fluke
  - C. Scorpion, mite and spider
  - D. Jelly fish
9. Which one of the following explains the accumulation of lactic acid in muscles during vigorous activity?
- A. Carbohydrates is completely broken down
  - B. The oxygen supply to the muscles may not be enough
  - C. Much of the stored glycogen is converted into glucose
  - D. The blood vessels leading from the muscles are constricted
10. Bacteria that often live in their hosts where both partners cannot survive without the other are called
- A. Parasites
  - B. Symbionts
  - C. Commensals
  - D. Saprophytes
11. In a plant tissue, water moved from cell A to cell B. this indicates that
- A. Cell A and cell B had the same osmotic potential
  - B. Cell A had a higher osmotic potential than cell B
  - C. Cell A had a lower osmotic potential than cell B
  - D. Cell A was older than cell B
12. Which of the following are the end products of lactose?
- A. Glucose and sucrose
  - B. Glucose and galactose
  - C. Glucose and fructose
  - D. Fructose and galactose
13. Which one of the following sets contains only characteristics of continuous variation?
- A. Tongue rolling, blood group, skin colour
  - B. Height, body weight, intelligence
  - C. Sex, Hemophilia, height
  - D. Finger prints, intelligence, albinism
14. The following are sizes of different soil particles in millimetres

P = 2.0 – 0.02

Q = 0.2 – 0.02

R = 0.02 – 0.002  
S = less than 0.002

In which of the following soil particles would you expect the rise of water by capillarity to be highest?

- A. P
- B. Q
- C. R
- D. S

15. Which one of the following methods can be used to estimate the population of butterflies in a flower garden?

- A. Direct count
- B. Quadrant
- C. Line transect
- D. Capture-recapture

16. Where in the mammalian skin is the melanin pigment found?

- A. Malpighian layer
- B. Granular layer
- C. Cornfield layer
- D. Subcutaneous layer

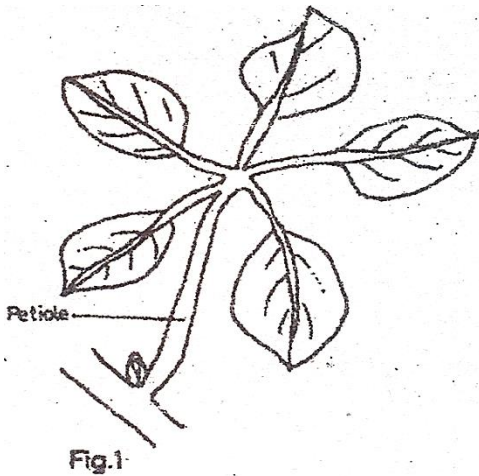
17. Which one of the following organisms reproduce by budding?

- A. Yeast
- B. Amoeba
- C. Spirogyra
- D. Mucor

18. What would happen to a plant tissue placed in a strong sugar solution? It

- A. Becomes longer and soft
- B. Maintains the original length and texture
- C. Becomes shorter and soft
- D. Becomes shorter and hard

19. Figure 1 shows a leaf type



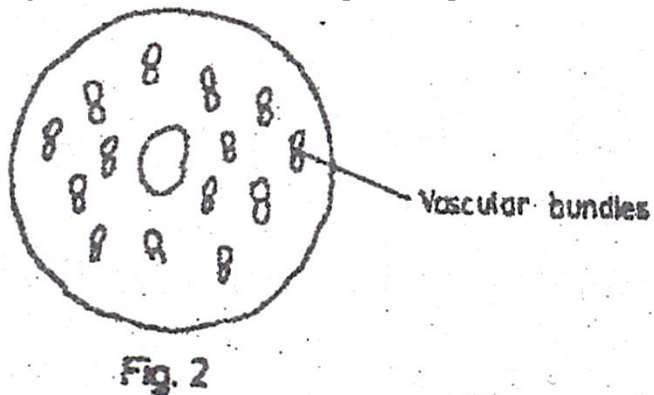
Which type of leaf is shown in the figure shown?

- A. Compound bipinnate
- B. Compound trifoliolate
- C. Compound pinnate
- D. Compound palmate

20. Which one of the following is not a function of blood?

- A. Regulation of sugar level in the body
- B. Healing of damaged parts of the body
- C. Regulation of body temperature
- D. Transportation of wastes

21. Figure 2 is a cross section of part of a plant.



From which one of the following was the section obtained?

- A. Root of dicotyledonous plant
- B. Stem of monocotyledonous plant
- C. Root of monocotyledonous plant
- D. Stem of dicotyledonous plant

22. What effect does light have on the distribution of auxins at the tip of a plant shoot?

- A. Causes equal distribution of auxins at the shoot tip
- B. Has no effect on the distribution of auxins at the shoot tip

- C. Concentration more auxins on the dark side of the shoot tip
- D. Causes auxins to concentrate more on the illuminated side of the shoot tip.

23. Which one of the following is a modified root?

- A. Irish potato tuber
- B. Cassava tuber
- C. Rhizome
- D. Corm

24. Which one of the following organs is responsible for removing excess amino acids from blood?

- A. Gall bladder
- B. Kidney
- C. Liver
- D. Spleen

25. Which one of the following is the most common air pollutant

- A. Dust
- B. Fungicides
- C. Herbicides
- D. Smoke

26. In which part of the kidney nephron does reabsorption of glucose occur?

- A. Proximal convoluted tubule
- B. Distal convoluted tubule
- C. Descending loop of Henle
- D. Ascending loop of Henle

**SECTION B**

*Answer all questions in this section.*

27. (a) What is an artery?

.....  
.....

(01 mark)

(b)

28. Figure 3 shows the effect of unidirectional light on the growth of plant shoots. Study the figure and answer the questions that follow.

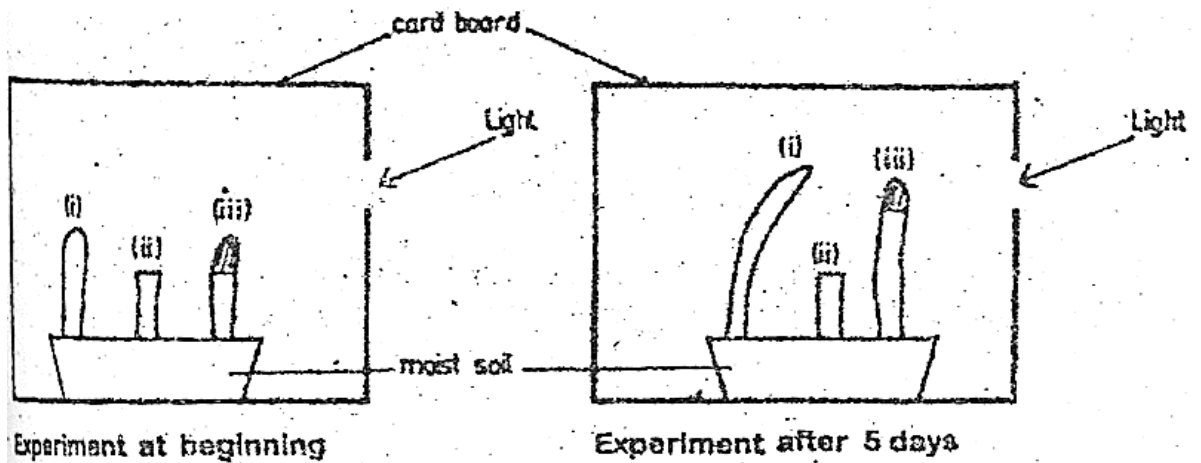


Fig. 3

**Key**

- (i) Intact coleoptile.
- (ii) Coleoptile with cut tip.
- (iii) Coleoptile with tip covered with aluminium foil.

(a) Explain why each coleoptile appears as shown after 5 days.

(i)

.....

.....

.....

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(ii)

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(iii)

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(06 marks)

30. (a) State four ways in which a leaf is suited for photosynthesis.

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(08 marks)

(b) State two ways in which food transported to growing regions is utilized by the plant.

(i)

.....  
.....

(ii)

.....  
.....

(02 marks)

**SECTION C**

*Answer any two questions.*

31. Using named examples, describe the methods of fruit and seed dispersal.

(15 marks)

32. (a) Give three characteristics of enzymes. (03marks)  
(b) Describe an experiment to show that enzyme activity is affected by temperature. (12 marks)
33. (a) Give effects of four air pollutants on living things. (04 marks)  
(b) Describe how human activities interfere with soil environment in Uganda. (11 marks)
34. Describe an experiment that you would carry out in the laboratory to test for the presence of a non-reducing (complex) sugar in a solution of a food sample. In your description, state the use of each reagent used. (15 marks)

**2001**

**SECTION A (30 MARKS)**

1. Which one of the following would occur if a potato strip was placed in distilled water?
  - A. Increase in length
  - B. Strip would soften
  - C. Decrease in length
  - D. Remain unchanged
  
2. When a seedling on a clinostat and placed in a horizontal position, the shoot continues to grow horizontally, but without the clinostat it bends upwards. Which one of the following is true about the role of the clinostat?
  - A. Enables the seedling to receive uniform light
  - B. Causes auxin to accumulate on the lower side of the seedling
  - C. Causes auxins to accumulate on the upper side of the seedling
  - D. Causes auxins to accumulate uniformly on all sides.
  
3. The following are some features of lower plants
  - (i) Reproduce by spores
  - (ii) Lack vascular tissues
  - (iii) Grow in damp places
  - (iv) Have simple stem and leaves

Which of the features belong to both mosses and ferns?

- A. (i) and (iv)
- B. (i) and (iii)

- C. (ii) and (iii)
- D. (iii) and (iv)

4. Which part of a flowering plant is represented by figure 1 below?

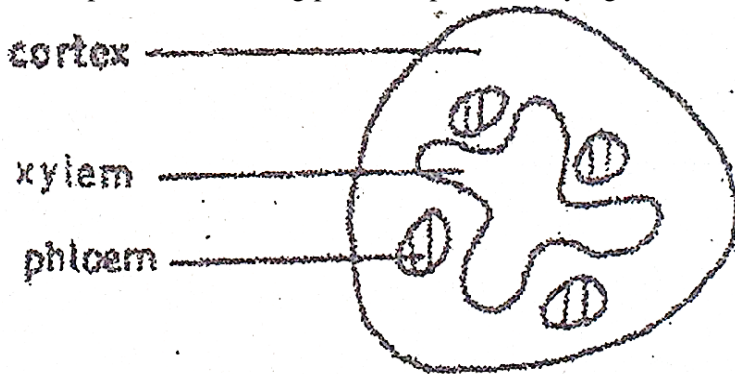


Fig. 1

- A. Monocotyledonous plant
  - B. Dicotyledonous stem
  - C. Monocotyledonous root
  - D. Dicotyledonous root
5. The following are products of tissue respiration in living organisms
- (i) Energy
  - (ii) Carbon dioxide
  - (iii) Water
  - (iv) Ethanol
  - (v) Lactic acid

Which of them are common to both aerobic and anaerobic respiration in plants?

- A. (i) and (ii)
  - B. (ii) and (iii)
  - C. (i), (ii) and (iii)
  - D. (ii), (iv) and (v)
6. A student wanted to determine the percentage of air in a soil sample. The following measurements were obtained.

Volume of dry soil	=	250 cm <sup>3</sup>
Volume of water added	=	160 cm <sup>3</sup>
Volume of mixture of soil + water	=	380 cm <sup>3</sup>

What was the percentage of air in the soil sample?

- A. 7.9
- B. 12
- C. 25
- D. 34

7. Which one of the following groups of animals uses gills, skin, buccal cavity and lungs for gaseous exchange at some stage in their life cycle?
- Fish
  - Amphibians
  - Reptiles
  - Mammals
8. A student noted the following characteristics on a vertebrae
- Long neural spine
  - Wide neural canal
  - Short transverse process
- The vertebrae was
- Cervical
  - Atlas
  - Thoracic
  - Lumbar
9. Which one of the following may result from lack of progesterone hormone in a woman?
- Implantation may not occur
  - Miscarriage may occur
  - Menstruation may not occur
  - Ovulation may not occur
10. Which one of the following fruits is an example of a drupe?
- Avocado
  - Passion
  - Tomato
  - Orange

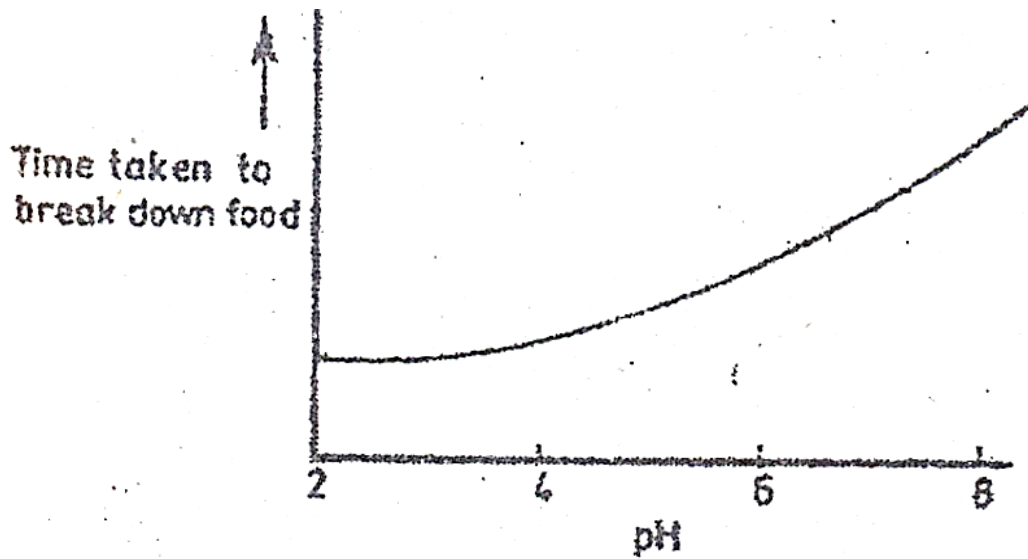
11. To identify a substance Y, a student performed the following experiment.

Test	Observation
(i) Heated Y with Benedict's Solution	Solution remained blue
(ii) Heated Y with hydro-chloric acid, cooled, added sodium hydrogen carbonate, benedict's solution, then heated again.	

From the observations, the most likely food substance in Y is

- Starch
  - Maltose
  - Sucrose
  - Glucose
12. Which one of the following is true of both photosynthesis and respiration?
- Involve enzymes

- B. Need light energy
  - C. Are exothermic
  - D. Occur in all living organisms
13. The reason why urine of a healthy person does not contain glucose is that
- A. The glomerulus is impermeable to glucose
  - B. Glucose is used for respiration before reaching the collecting duct
  - C. Glucose passes back into the blood stream
  - D. The kidney converts glucose to urea
14. Which one of the following reactions is likely to occur when a donor of blood group A gives blood to a recipient of blood group B?
- A. Antibodies **a** react with antigens **B**
  - B. Antigens **B** react with antibodies **b**
  - C. Antibodies **b** react with antigens **A**
  - D. Antigens **A** react with antigens **B**
15. When round seeded bean plants and long-seeded plants were crossed, all the offspring were oval-seeded plants. This is an example of
- A. Complete dominance
  - B. Incomplete dominance
  - C. Mutation
  - D. Recessive genes
16. Which one of the following may not be used for classifying insects?
- A. Mouth parts
  - B. Feeding habits
  - C. Structure of legs
  - D. Type of eyes
17. Which one of the following is a possible sequence of plant succession on an undeveloped piece of land?
- A. Fungi → ferns → shrubs → trees
  - B. Fungi → mosses → shrubs → trees
  - C. Mosses → trees → fungi → ferns
  - D. Mosses → herbs → shrubs → trees
18. The graph below shows the effect of varying pH on the time taken for an enzyme to break down food.



Which one of the following enzymes below could have given that response?

- A. Pepsin
  - B. Lipase
  - C. Salivary amylase
  - D. Trypsin
19. Which one of the following fins provides a major propulsion force in a fish?
- A. Caudal
  - B. Pectoral
  - C. Dorsal
  - D. Pelvic
20. Which one of the following characteristics of respiratory surfaces is true of humans but not of insects?
- A. Highly vascularized
  - B. Have large surface area
  - C. Moist
  - D. Thin walled
21. The rapid elongation of the hypocotyl during germination causes
- A. Delay in emergence of photosynthesis leaves
  - B. Cotyledons to grow above the ground
  - C. Early emergence of photosynthetic leaves
  - D. Cotyledons to remain below the ground
22. Which one of the following blood vessels contains the lowest concentration of urea?
- A. Hepatic portal vein
  - B. Renal artery
  - C. Hepatic vein
  - D. Renal vein

23. Which one of the following is the correct response increased carbon dioxide in human blood? The rate of
- Breathing is slowed
  - Heart beat is slowed down
  - Heart beat is increased
  - The pulse is slowed down
24. The tapeworm *Taenia solium* has a primary and a secondary host. Which of the following are the primary and secondary hosts in that order?
- Pig and man
  - Cow and man
  - Man and cow
  - Man and pig
25. Which one of the following statements is not correct about photosynthesis?
- Water is required
  - Oxygen is a by-product
  - Sugar is a product
  - Energy is released
26. Figure 2 below shows the cycling of oxygen between the atmosphere and living cells.

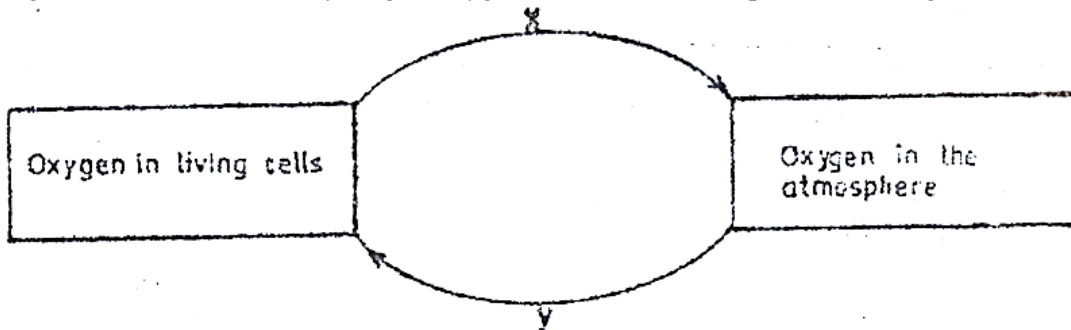


Fig.2

- Which process is represented by letter X?
- Excretion
  - Respiration
  - Decay
  - Photosynthesis
27. Which one of the following is the correct reason for the thickness of the walls of atria and ventricles?
- Atria are thicker because they have to generate higher pressure
  - Atria are thicker because they have to resist higher pressure
  - Ventricles because they have to generate higher pressure
  - Ventricles are thicker because they have to resist higher pressure
28. Which of the following controls the rate of heart beat in a mammal?

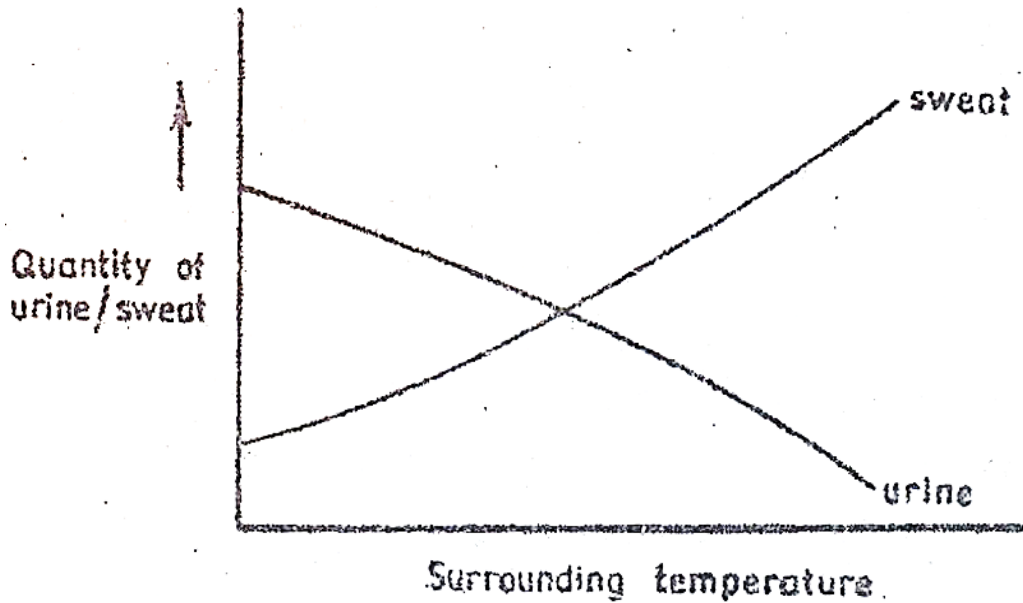
- A. Cerebrum
- B. Pituitary
- C. Medulla oblongata
- D. Cerebellum

29. Which one of the following events occurs during osmosis?
- A. Solute molecules move from more to less concentrated solution
  - B. Solvent molecules move from more to less concentrated solution
  - C. Solvent molecules move from less to more concentrated solution
  - D. Solute molecules move from less to more concentrated solution
30. Which of the following is characteristic of a soil with low capillarity?
- A. Poor water retention
  - B. Poor drainage
  - C. Poor aeration
  - D. Small particles

**SECTION B**

*Answer all questions in this section.*

31. The graph below shows the variation in the amount of sweat and urine with temperature in humans.



- (a) How does the increase in temperature affect
- (i) Urine production?

.....

.....  
.....

(ii) Sweat production?

.....  
.....  
.....

(02 marks)

(b) Explain your answers in (a)(i) and (ii) above.

(i) Explanation for (a)(i)

.....  
.....  
.....

(ii) Explanation for (a)(ii)

.....  
.....  
.....

(04 marks)

(c) State three conditions under which humans pass out concentrated urine.

(i) .....

(ii) .....

(iii) .....

(d) Apart from sweating, state three other body responses by mammals to overheating.

(i) .....

(ii) .....

(iii) .....

32. Figure 3 below is an experimental set up to investigate the conditions for photosynthesis. The Plant is in light but had previously been kept in the dark overnight.

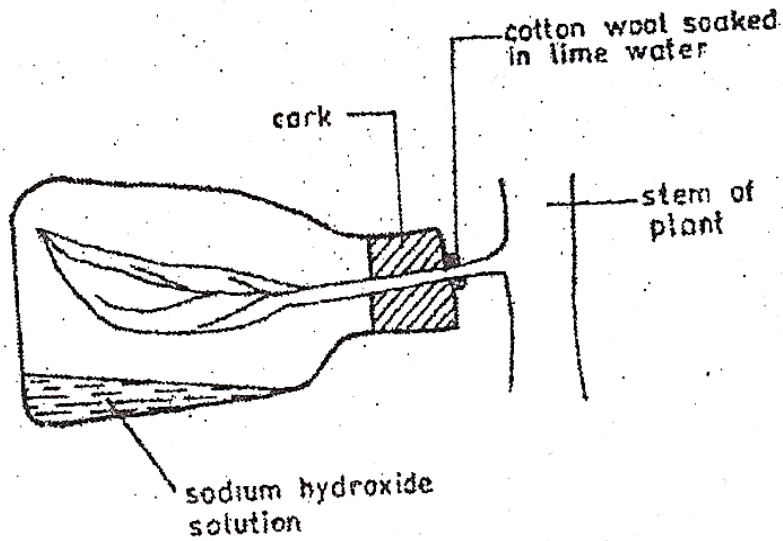


Fig-3

(a) Which condition is being investigated? (01 mark)

.....

(b) Why

(i) Was it necessary to keep the plant in the dark overnight?

.....

.....

(ii) Is the leaf left attached to the plant?

.....

.....

(02 marks)

(c) What is the purpose of sodium hydroxide in the flask? (01 mark)

.....

.....

(d) How would you test for starch in the leaf after some time?

.....

.....

.....



.....  
.....

(04 marks)

(b) How would the population of the organisms in (a) (i) above be affected if the praying mantis were removed from the ecosystem?

.....  
.....  
.....  
.....

(c) (i) State one group of important organism that have not been included in the ecosystem.

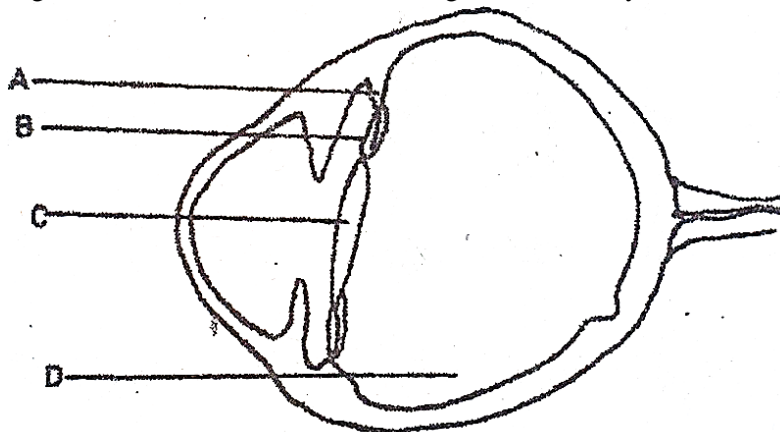
.....

(ii) Why are the organisms named in (c)(i) above important in an ecosystem?

.....  
.....  
.....

(03 marks)

34. Figure 4 below shows a section through the human eye.



**Fig 4**

(a) Name the parts labelled A, B, C and D

(02 marks)

A

.....

B

.....

C

.....

D

.....

(b) What function is performed jointly by the parts A, B, C and D?

.....  
.....

(01 mark)

(c) Other than the joint function, state two other functions of the part labelled D. (02 marks)

.....  
.....

(d) Give the state of parts A, B and C when the eye is viewing,

(i) Near objects

A.....

...

B

.....

C

.....

(ii) Distant objects

A

.....

B

.....

C

.....

(06 marks)

(e) State two eye defects and how they are corrected.

(i) Defect

.....

Corrective measure

.....

(ii) Defect

.....  
Corrective measure  
.....

### SECTION C

*Answer any two questions*

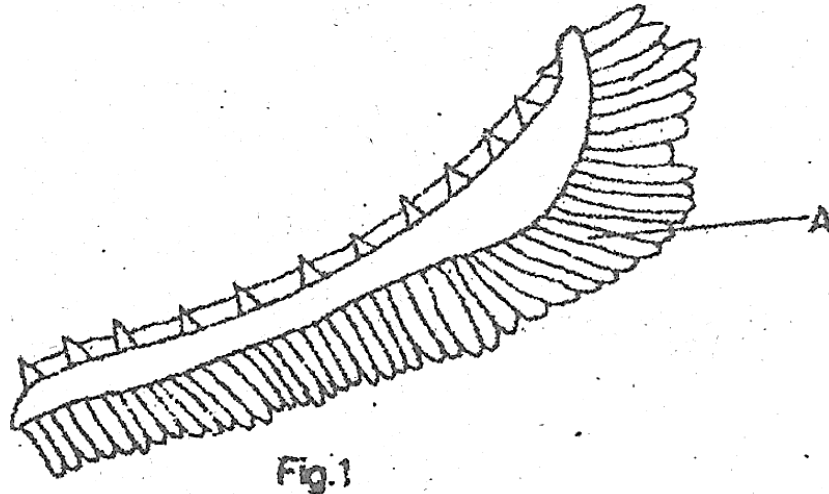
35. (a) State the dangers of a parasitic mode of life. (5 marks)  
(b) Describe how a tapeworm is adapted to its mode of life. (10 marks)
36. (a) Describe the digestion of proteins in a mammal. (6 marks)  
(b) Explain how the ileum is suited for its functions. (9 marks)
37. (a) With the aid of well labelled diagrams explain the difference between hypogeal and epigeal germination. (7 marks)  
(b) Describe an experiment you would carry out to show that heat is liberated by germinating seeds. (8 marks)
38. (a) Explain why a skeleton is necessary in a mammalian body. (10 marks)  
(b) With the aid of diagrams describe how a human arm can bend and straighten. (5 marks)

**2000**

*Answer all questions in this section.*

1. The following are characteristics of blood vessels:
- (i) Presence of valves
  - (ii) Thick walls
  - (iii) Wide lumen
  - (iv) Elastic walls
- Which of the characteristics belong to veins?
- A. (i) and (ii)
  - B. (i) and (iii)
  - C. (ii) and (iii)
  - D. (iii) and (iv)
2. *Mucor* undergoes reproduction to produce
- A. Spores
  - B. Zoospores
  - C. Zygosporangia
  - D. Sporangia
3. The fins which keep a fish stable in water are the
- A. Anal and dorsal fins
  - B. Dorsal and pelvic fins

- C. Caudal and pelvic fins
  - D. Pelvic and pectoral fins
4. Which one of the following is correct about dividing cells at the tip of plant shoots?
- A. Have large vacuoles
  - B. Are specialized
  - C. Have soft cell walls
  - D. Have rigid cell walls
5. Which one of the following would contain the highest concentration of proteins?
- A. Blood plasma
  - B. Glomerular filtrate
  - C. Urine
  - D. Serum
6. Which one of the following would be observed in a plant growing in a soil lacking magnesium?
- A. Poorly developed shoot system
  - B. Yellowing of leaves
  - C. Poorly developed root system
  - D. Yellowing of buds
7. What mode nutrition is used by *Rhizopus*?
- A. Heterotrophism
  - B. Autotrophism
  - C. Parasitism
  - D. Saprophytism
8. Which one of the following would be the first to colonise a rocky surface?
- A. Lichens
  - B. Mosses
  - C. Shrubs
  - D. Ferns
9. The blood constituents that help in the formation of blood clot at the site of an injury are
- A. Platelets and erythrocytes
  - B. Hormones and plasma
  - C. Platelets and leucocytes
  - D. Platelets and fibrinogen
10. Figure 1 shows a gill of a fish.



The name and function of part labelled A is

- A. Gill filaments for gaseous exchange
  - B. Gill rakers for filtering food
  - C. Gill bar for support
  - D. Gill arch for increasing surface area
11. Which one of the following would not be found in the glomerular filtrate?
- A. Fibrinogen
  - B. Glucose
  - C. Mineral salts
  - D. Urea
12. Which one of the following is an example of discontinuous variation?
- A. Height
  - B. Weight
  - C. Eye color in *Drosophila*
  - D. Skin color
13. Which one of the following sets consists of substances that are stored in the liver?
- A. Glucose, iron and vitamin D
  - B. Iron, glycogen and vitamin D
  - C. Glucose, glycogen and vitamin D
  - D. Iron, glycogen and amino acids
14. Albinism is caused by having a double recessive gene for skin pigmentation. What is probability of the children having normal skin color if an albino woman carries a man who is heterozygous for albinism?
- A. 100%
  - B. 75%
  - C. 50%
  - D. 25%

15. The data below shows the amount of carbon dioxide inhaled air, rate of breathing at rest and volume of air in a breath, in humans:

Percentage of carbon dioxide in inhaled air = 0.025%

Number of breaths per minute = 36

Volume of one breath taken in at rest = 500 cm<sup>3</sup>

The volume of carbon dioxide inhaled per minute while at rest is

- A. 0.9 cm<sup>3</sup>
  - B. 45 cm<sup>3</sup>
  - C. 12.5 cm<sup>3</sup>
  - D. 450 cm<sup>3</sup>
16. How is lactic acid produced in muscles got rid of? By
- A. Converting it into water
  - B. Storing it in the liver
  - C. Converting it into ethanol
  - D. Oxidation
17. Blood flows in the pulmonary artery at a lower pressure than in aorta because in the pulmonary circulation
- A. Blood travels a shorter distance
  - B. The right-ventricle has thinner walls
  - C. The vessel carrying blood is smaller
  - D. Fewer organs are supplied
18. Which one of the following is an example of a reflex action?
- A. Eating
  - B. Screaming after kicking a stone
  - C. Riding
  - D. Salivating on smelling food
19. What happens to insect wings when depressor muscles are relaxed? The wings
- A. Move downwards
  - B. Move upwards
  - C. Rotate freely
  - D. Move in three directions
20. Which one of the parasites is transmitted by *Anopheles* mosquito?
- A. Filarial worm
  - B. *Trypanosome*
  - C. *Plasmodium*
  - D. *Schistosoma*
21. The following are body secretions:
- (i) Amylase
  - (ii) Trypsin
  - (iii) Hydrochloric acid

- (iv) Pepsin
- (v) Rennin

Which of them are contained in gastric juice?

- A. (i) and (iii)
  - B. (ii) and (iv)
  - C. (iii) and (v)
  - D. (i) and (ii)
22. What is the main function of the phloem in green plants?
- A. Transporting water
  - B. Supporting the plant
  - C. Transporting mineral salts
  - D. Transporting manufactured food
23. Which of the following is an example of a modified root?
- A. Irish potato tuber
  - B. Cassava tuber
  - C. Rhizome
  - D. Corn
24. Which of the following events occur during inhalation in a mammal?
- A. Diaphragm contracts, ribs raised
  - B. Diaphragm relaxes ribs lowered
  - C. Internal intercostal muscles contract, pressure in chest cavity increases
  - D. Internal intercostal muscles relax, pressure in chest cavity increases
25. What is the main function of the choroid layer in the human eye?
- A. Focusing rays of light on the retina
  - B. Supplying nutrients to the eye
  - C. Bringing about accommodation
  - D. Controlling amount of light entering the eye
26. Which one of the following pairs of hormones is produced by reproductive organs in mammals?
- A. Follicle stimulating hormone and testosterone
  - B. Oestrogen and Luteinising hormone
  - C. Progesterone and testosterone
  - D. Insulin and Oestrogen
27. When a homozygous black mouse (BB) was mated with homozygous white mouse (WW), the offspring were all brown. What would be the colour of the mice produced?
- A. 3 brown : 1 white
  - B. 1 brown : 3 white
  - C. 1 brown : 1 white
  - D. All white

28. The scheme below shows a food chain with corresponding concentration of organic chloride in milligrams:

Green plants → Herbivorous → Predatory → Lizard  
0.01                      bug                      bug                      2.8  
                                 0.9                      2.3

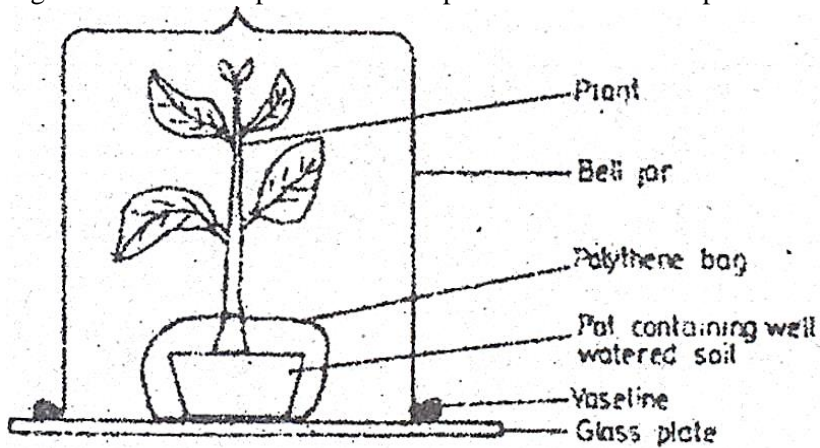
Which does the tissue of the lizard contain the highest concentration in the organic chloride?  
Because the

- A. Lizard eats all the organisms in the food chain
  - B. Organic chloride remains persistent in the food chain
  - C. Organic chloride is cumulative in the tissues of the organisms
  - D. Organic chloride is not toxic to lizard
29. Which one of the following structures is found in cervical vertebrae only?
- A. Centrum
  - B. Neural spine
  - C. Transverse process
  - D. Vertebra – arterial canal
30. The forces which mostly help water to move up a tall plant are
- A. Osmosis and diffusion
  - B. Capillarity and transpiration
  - C. Osmosis only
  - D. Capillary and osmosis

**SECTION B**

Answer all questions in this section.

31. Figure 2 shows an experimental set up to demonstrate transpiration in plants.



(a) Explain why

- (i) Vaseline is smeared between the glass plate and the bell jar

.....

.....  
(1 mark)

(ii) Polythene bag is wrapped around the pot and tied at the base of the plant.

.....  
(1 mark)

(b) (i) What will be observed in this experiment?

.....  
(1 mark)

(ii) How do you test for the identity of the substance observed in (b)(i)?

.....  
(3 marks)

(c) Describe the setup of the control for this experiment.

.....  
(2 marks)

(d) State two factors which affect the results of this experiment.

32. (a) What is an enzyme?

.....  
(1 mark)

(b) State three factors which affect enzyme action.

.....  
 .....  
 .....

(3 marks)

(c) The optimum pH for enzyme X is 2.00 and for enzyme Y is 9.00. suggest the names of the enzymes X and Y, and name the parts of the alimentary canal where you would expect to find each enzyme.

	Name of enzyme	Part of alimentary canal the enzyme is found
X	.....	.....
Y	.....	.....

(d) State two enzymes in the pancreatic juice, the food substance acted on by each enzyme and the product formed in each case.

Enzyme	Food Substance acted upon	Product formed
(i) .....	.....	.....
(ii) .....	.....	.....

33. Figure 3 below shows a cross section of part of a plant.

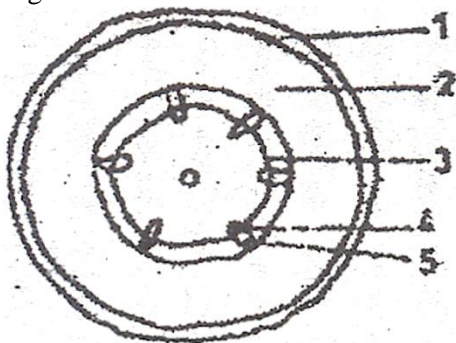


Fig. 3

(a) Name the parts labelled 1 to 5

1 .....

2 .....

- 3 .....  
4 .....  
5 .....  
(2 ½ marks)

(b) Using a reason, state the part of the plant from which the section was taken.

Part of plant  
.....  
Reason  
.....  
.....

(2 marks)

(c)(i) State the functions of the parts labelled 3 and 4.

- 3 .....  
4 .....

(2 marks)

(ii) Give two similarities between the cells in part labeled 3 and those found at the tips of growing shoots.

.....  
.....

(2 marks)

34. Figure 4 shows a longitudinal section of a human skin.

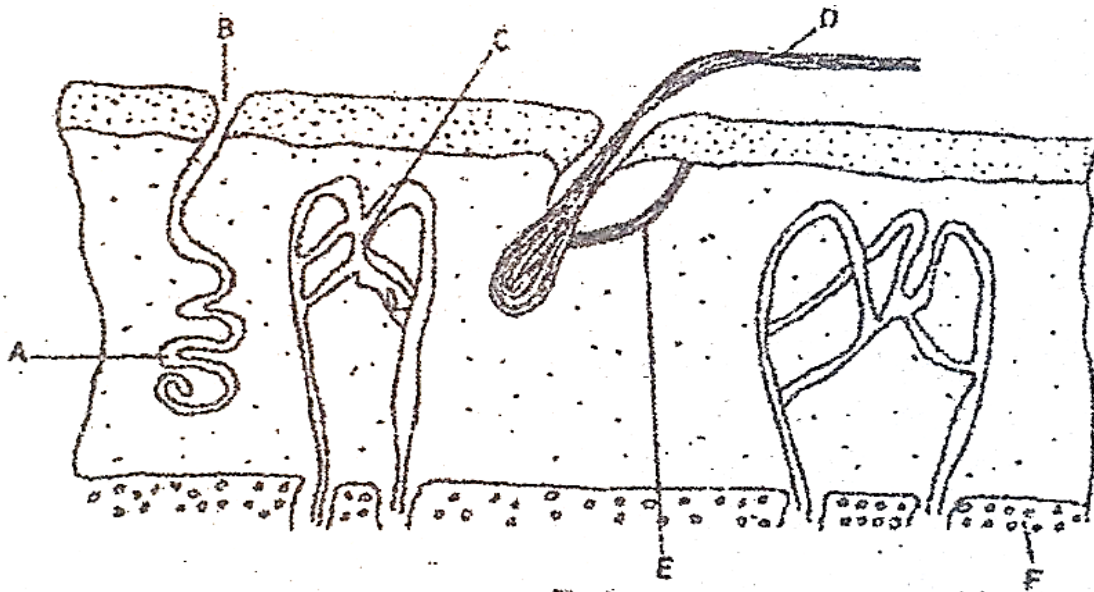


Fig. 4

(a)(i) Name the parts labeled A to F.

- A .....
- B .....
- C .....
- D .....
- E .....
- F .....

(ii) State the function of each of the parts labeled A, B, D and F.

- A .....
- B .....
- D .....
- F .....

(7 marks)

(b) Using one observable feature on the diagram, suggest the type of temperature condition the skin is responding to, state the observable feature as a reason for your answer.

Temperature condition

- .....
- .....

Observable feature

.....  
.....  
(3 marks)

**SECTION C**

*Answer any two questions*

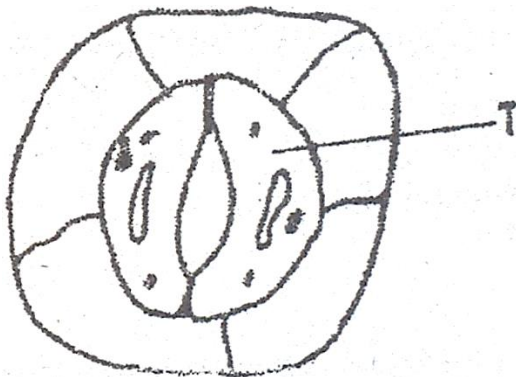
35. Describe an experiment to show that carbon dioxide is necessary for photosynthesis. (15 marks)
36. (a) What is sexual reproduction? (2 marks)  
(b) Give the advantages of sexual reproduction in plants. (6 marks)  
(c) Describe how sexual reproduction occurs in a *Mucor*. (7 marks)
37. Describe human activities which may cause environmental pollution. (15 marks)
38. (a) What is the importance of water to animals? (5 marks)  
(b) Describe how water balance in the mammalian body is maintained. (10 marks)

**1999**

**SECTION A**

*Answer all questions in this section.*

1. Figure 1 below shows the structure of a part of the lower epidermis of a leaf.



**Fig.1**

What is the structure labelled T?

- A. Stoma
- B. Vacuole
- C. Chloroplast
- D. Guard cell

2. Which of the following blood vessels transports blood most rich in nutrients?
- A. Pulmonary artery
  - B. Hepatic portal vein
  - C. Mesenteric artery
  - D. Renal vein
3. Which one of the following is an example of biological control of pests?
- A. Application of pesticides
  - B. Destruction of pests' habitats
  - C. Interruption of pests' breeding cycle
  - D. Introduction of pests' predators
4. The effect of unidirectional light on the distribution of auxins in the tip of a plant shoot is
- A. Uniform distribution of auxins around the tip
  - B. Reduction in concentration of auxins on the illuminated side of the plant
  - C. Increase in auxins on the illuminated side of the plant
  - D. Inhibition of movement of auxins down the plant
5. Which of the following is a function of thyroxine hormone?
- A. Prepares development of follicle in the ovary
  - B. Prepares the body for fright-flight action
  - C. Controls body metabolic rate
  - D. Regulates sugar content of the body
6. Which of the following is an example of a berry?
- A. Avocado
  - B. Passion
  - C. Groundnut
  - D. Cotton
7. The mode of feeding displayed by a Mucor is described as
- A. Holozoic
  - B. Filter feeding
  - C. Parasitic
  - D. Saprophytic
8. What is the function of the Eustachian tube in the human ear?
- A. Detection of body posture
  - B. Transmission of sound waves to the middle ear
  - C. Equalizing pressure in the middle ear
  - D. Transmission of sound waves to the inner ear
9. If a man of blood group A is married to a woman of blood group O, what are the possible genotypes of their children?
- A. AA, OO
  - B. AA, AO
  - C. AO, OO

D. AO only

10. What relationship exists between a groundnut plant and nitrogen fixing bacteria in its root nodules?

- A. Parasitism
- B. Saprophytism
- C. Naturalism
- D. Symbiosis

11. Which type of soil has the following characteristics?

- (i) Heavy to cultivate
  - (ii) Rich in dissolved minerals
  - (iii) High capillarity
- A. Loam
  - B. Clay
  - C. Sand
  - D. Silt loam

12. In figure 2 below, which part transports water and dissolved minerals?

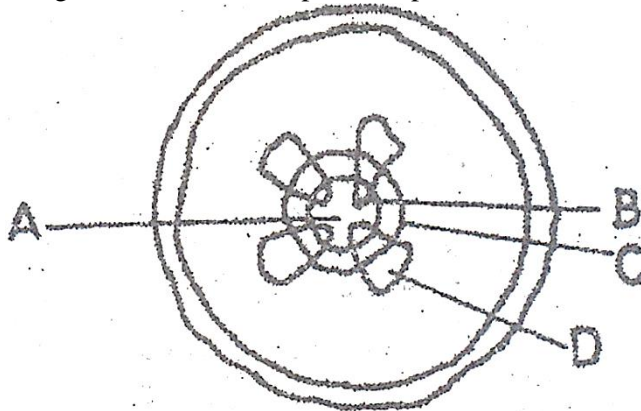


Fig.2

13. Which of the following features belong to both an arachnida and an insect?

- A. Cuticle and two pairs of wings
- B. Six legs and two pairs of wings
- C. Six legs and antennae
- D. Jointed legs and cuticle

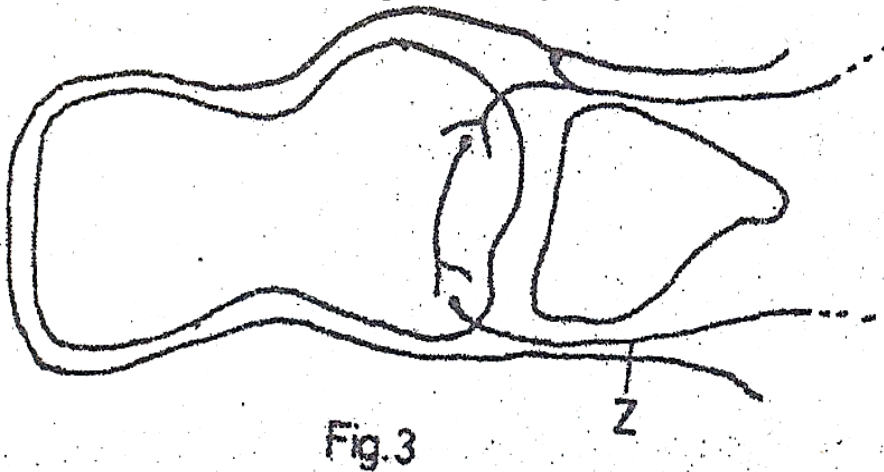
14. Which one of the following statements best explain why urine does not normally contain glucose?

- A. Glucose molecules are too large to pass through the capillaries of the glomerulus
- B. Glucose present in the renal tubule is changed to carbondioxide and water
- C. All the glucose filtered is re-absorbed back into the blood in the renal tubules
- D. The bladder re-absorbs all the glucose filtered.

15. Aerobic respiration is more efficient than anaerobic respiration because it
- A. Uses more oxygen
  - B. Yields lactic acid
  - C. Uses less oxygen
  - D. Yields more energy

16. In humans, the hormone progesterone stimulates the
- A. Formation of egg cells
  - B. Formation of sperm cells
  - C. Production of milk by a lactating mother
  - D. Thickening of the uterine wall

17. What is the destination of the impulses moving along the nerve fibre marked Z in figure 3 below?



- A. The spinal cord
  - B. The brain
  - C. The effector organ
  - D. The receptor organ
18. Which of the diseases listed below is a result of lack of the anti – Diuretic Hormone (ADH) in the body?
- A. Diabetes mellitus
  - B. Anaemia
  - C. Goiter
  - D. Diabetes
19. The following are body responses to changes in temperature of a mammal:
- (i) Shivering
  - (ii) Increased blood supply to the skin
  - (iii) Decreased sweat production
  - (iv) Relaxation of erector Pilli muscles

Which two of these are responses to a fall in body temperature?

- A. (i) and (ii)
- B. (ii) and (iii)

- C. (iii) and (iv)
  - D. (i) and (iii)
20. Which one of the following pairs of bones form a ball and socket joint?
- A. Humerus and ulna
  - B. Femur and pelvis
  - C. Humerus and radius
  - D. Femur and tibia
21. Which of the following characteristics show discontinuous variation?
- A. Body weight
  - B. Blood groups
  - C. Size of leaves
  - D. Colour of flowers
22. Which one of the following responses is a directional growth movement?
- A. Taxis
  - B. Reflex
  - C. Tropic
  - D. Nastic
23. The blood serum of a universal donor contains
- A. Antigens A
  - B. Antigens B
  - C. Neither antigens A nor B
  - D. Both antigens A and B
24. Meiosis leads to the production of
- A. Two daughter cells each with original number of chromosomes
  - B. Four daughter cells each with original number of chromosomes
  - C. Two daughter cells each with half the original number of chromosomes
  - D. Four daughter cells each with half the original number of chromosomes
25. Which one of the following organisms carries out intracellular digestion?
- A. Fungi
  - B. Algae
  - C. Amoeba
  - D. Hookworm
26. If energy from the sun was cut off from an ecosystem containing the following organisms:
- (i) Green plants
  - (ii) Herbivores
  - (iii) Saprophytes
  - (iv) Carnivores

In which order would the organisms die out?

- A. (i), (ii), (iii) and (iv)

- B. (i), (ii), (iv) and (iii)
- C. (iii), (i), (ii) and (iv)
- D. (i), (iii), (ii) and (iv)

27. A plant with poorly developed roots is likely to be growing in a soil that is deficient in

- A. Sulphur
- B. Phosphorous
- C. Magnesium
- D. Iron

28. In fish, the fins which are used in propulsion movements are

- A. Caudal
- B. Dorsal
- C. Pelvic
- D. Ventral

29. Phagocytosis is the process whereby white blood cells

- A. Ingest bacteria
- B. Cause the bacteria to stick together
- C. Dissolve the outer coats of invading bacteria
- D. Neutralize bacteria

30. The following are factors that affect the rate of transpiration:

- (i) High temperature
- (ii) High relative humidity
- (iii) Low atmosphere
- (iv) Low light energy

Which two of these would favour increased transpiration?

- A. (i) and (ii)
- B. (i) and (iii)
- C. (ii) and (iv)
- D. (iii) and (iv)

**SECTION C**

*Answer all questions in this section.*

31. (a) What is an enzyme?

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(b) Study the experimental set up in figure 4 below and answer the questions that follow:

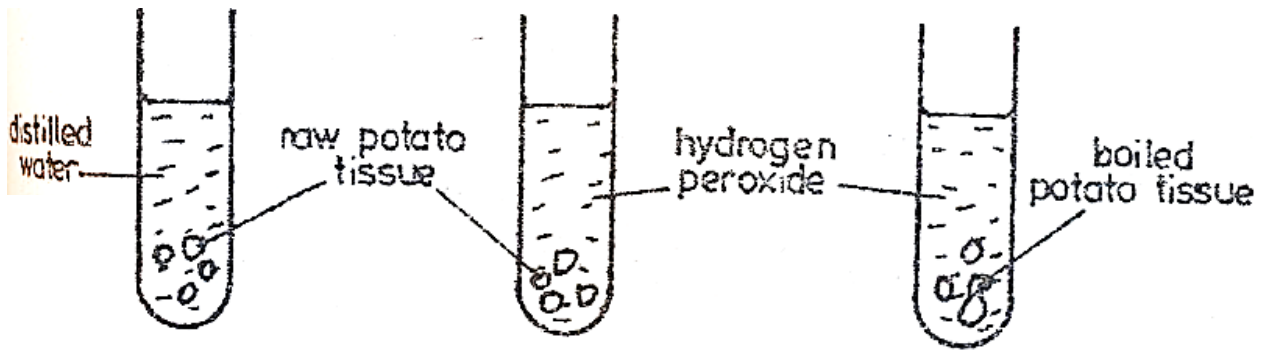


Fig. 4

(i) What is being investigated?

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(ii) Suggest what was observed in each of the test tubes.

.....  
 .....

(iii) Explain the observations suggested in (b) (ii) above.

.....  
 .....

32. (a) Distinguish between predator and prey?

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 .....

(b) Figure 5 below shows a predator/prey relationship. Study the figure out answer the questions that follow.

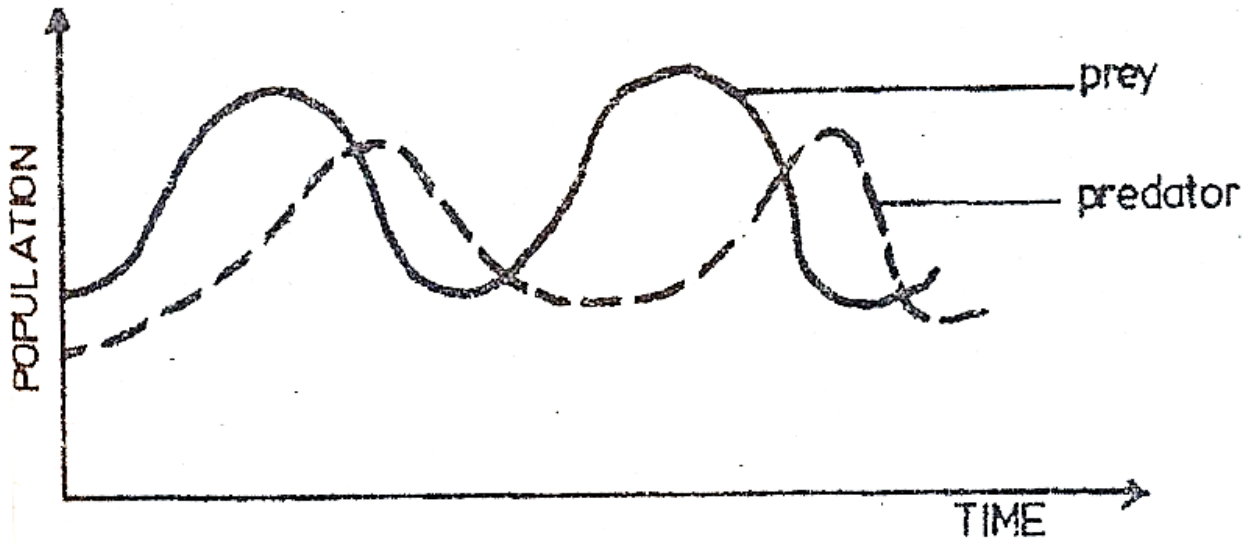


Fig 5

(i) Describe the relationship between the predator and prey

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(ii) Explain the relationship of the predator and prey described in (b) above.

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(iii) Name two other external factors that may affect the population of the prey in the habitat.

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33. (a) What is erosion?

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(b) Name four types of soil erosion.

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(c) State the causes of soil erosion.

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(d) How does mulching help the farmer in

(i) Water conservation?

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(ii) Soil conservation?

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34. (a) (i) State the difference between cross-pollination and self-pollination.

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(ii) Give three structural features of flowers that ensure cross-pollination

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(b) Give five adaptations of flowers for insect-pollination.

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**SECTION C**

*Answer any two questions*

35. Describe an experiment to show that oxygen is produced during photosynthesis.

- 36. (a) Give three secondary sexual characteristics in a human female.
- (b) Describe the main events that occur during the menstrual cycle in a mammal.

- 37. (a) Describe the life cycle of a housefly.
- (b) What is the economic importance of a housefly?
- (c) How would you minimize the spread of houseflies in a home?

- 38. (a) Define:
  - (i) Phototropism
  - (ii) Geotropism
- (b) Describe an experiment you would carry out to determine the effects of gravity on the root of a dicotyledonous plant.

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SECTION A

Answer all questions in this section.

1. What would happen to an enzyme if the temperature of its medium was increased to above 50°C?

The Enzyme would be

- A. Killed
- B. Activated
- C. Denatured
- D. Inactivated

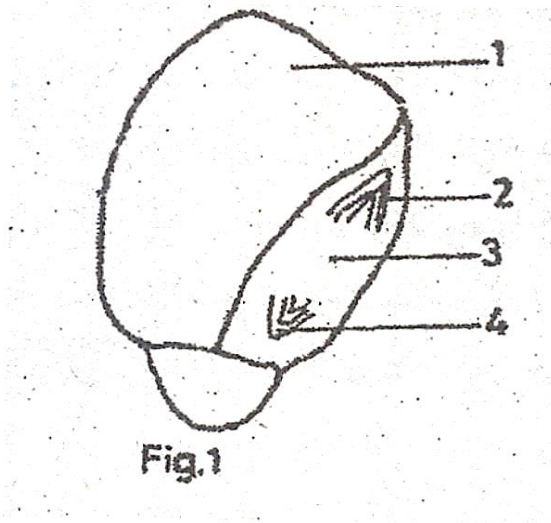
2. In which of the following does active transport not occur?

- A. Kidney tubules
- B. Phloem sieve tubes
- C. Xylem vessels
- D. Ileum villi

3. Which one of the following is an adaptation of reptiles for terrestrial environment?

- A. Limbs
- B. Lungs
- C. Scales
- D. Elongated body

4. Figure 1 below shows a longitudinal section through a maize grain.



Which of the parts 1 – 4 of the grain would you expect to decrease in weight during germination?

- A. 1
- B. 2
- C. 3
- D. 4

5. Which one of the following parts of the ear, transmits sound waves from the middle ear to the inner ear?

- A. Tympanic membrane
  - B. Ossicles
  - C. Auditory nerve
  - D. Oval window membrane
6. Which one of the following would you use to estimate the frequency of a plant species in an area?
- A. Quadrant method
  - B. Belt transect
  - C. Line insect
  - D. Random sampling
7. An unknown sample of blood was found to agglutinate with blood of group AB, but not with blood of O. what was the blood group of the unknown sample?
- A. O
  - B. AB
  - C. A
  - D. B
8. A rabbit is able to utilize cellulose because it
- A. Has symbiotic bacteria in the stomach
  - B. Has symbiotic bacteria in the caecum
  - C. Has a very long alimentary canal
  - D. Secretes the enzyme cellulose
9. Which one of the following factors is not important in as far as nutrition of the common mould is concerned?
- A. It produces large quantities of spores
  - B. It can respire anaerobically
  - C. It has a highly branched mycelium
  - D. It secretes enzymes
10. In the human heart, the mixing of oxygenated and de-oxygenated blood is prevented by the
- A. Septum
  - B. Bicuspid valve
  - C. Tricuspid valve
  - D. Semilunar valve
11. Removal of the thyroid gland in a young child may lead to
- A. Stunted growth and mental retardation
  - B. Failure to develop secondary sexual characteristics
  - C. Development of diabetes
  - D. Increased metabolic rate and restlessness
12. The following are physiological processes that occur in the body of a mammal:
- (i) Elimination of urea
  - (ii) Regulation of salts in the body
  - (iii) Regulation of water in the body

(iv) Deamination of excess amino acids

Which of them are carried out by the kidney?

- A. (i), (ii) and (iv)
- B. (ii), (iii) and (iv)
- C. (i), (ii) and (iii)
- D. (ii), and (iii) only

13. Which one of the following is a respiratory organ in an insect?

- A. Malpighian tubule
- B. Spiracle
- C. Trachea
- D. Zygote

14. Which one of the following is a diploid cell?

- A. Pollen grain
- B. Ovum
- C. Spermatoon
- D. Alveolus

15. What gas is likely to be evolved from a submerged aquatic plant placed in bright sunlight?

- A. Carbon dioxide
- B. Oxygen
- C. Hydrogen
- D. Nitrogen

16. Which of the following is a characteristic of cervical vertebra?

- A. Broad neural spine
- B. Long transverse processes
- C. Presence of Vertebrarterial canals
- D. Presence of facets

17. Which one of the following has the least energy content in a food chain?

- A. Producer
- B. Secondary consumer
- C. Tertiary consumer
- D. Primary consumer

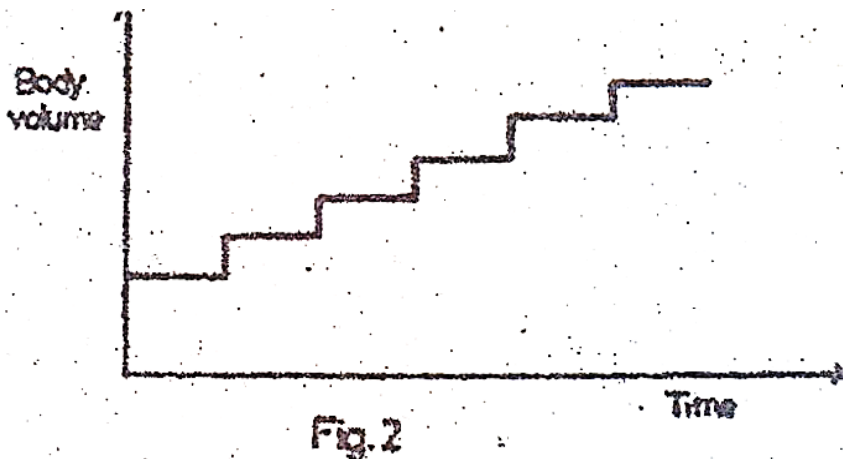
18. A certain plant had the following characteristics

Leaves reduced to spikes  
Stomata shrunken in pits  
Leaves covered with thick cuticle

Which one of the following would be the likely habitat for the plant?

- A. Open grass land
- B. Arid land

- C. Wet land
  - D. Tropic rainforest
19. Yellowing of leaves in growing maize plants indicates a deficiency of
- A. Calcium
  - B. Sulphur
  - C. Nitrogen
  - D. Magnesium
20. What are the products of digestion of lactose sugar?
- A. Glucose only
  - B. Glucose and galactose
  - C. Fructose and galactose
  - D. Fructose and glucose
21. Which one of the following is a characteristic of insects only?
- A. Exoskeleton
  - B. Jointed legs
  - C. Two pairs of wings
  - D. Three body divisions
22. Which of the following vegetative plants would appear earliest in a rocky habitat?
- A. Moss
  - B. Lichens
  - C. Algae
  - D. Ferns
23. Which one of the organisms below has a growth curve represented by the graph in figure 2?



- A. A bacterium
- B. An insect
- C. A human being
- D. A bony fish

24. Which one of the following is a modified root?

- A. Sweet potato tuber
- B. Rhizome
- C. Irish potato tuber
- D. Corm

25. Which one of the following hormone is responsible for ovulation in mammals?

- A. Oestrogen
- B. Progesterone
- C. Follicle stimulating hormone
- D. Luteinsing hormone

26. Which of the following are characteristics of sandy soil?

- A. Poor aeration and poor drainage
- B. Good water retention and poor drainage
- C. Sticky when wet and poor drainage
- D. Good aeration and good drainage

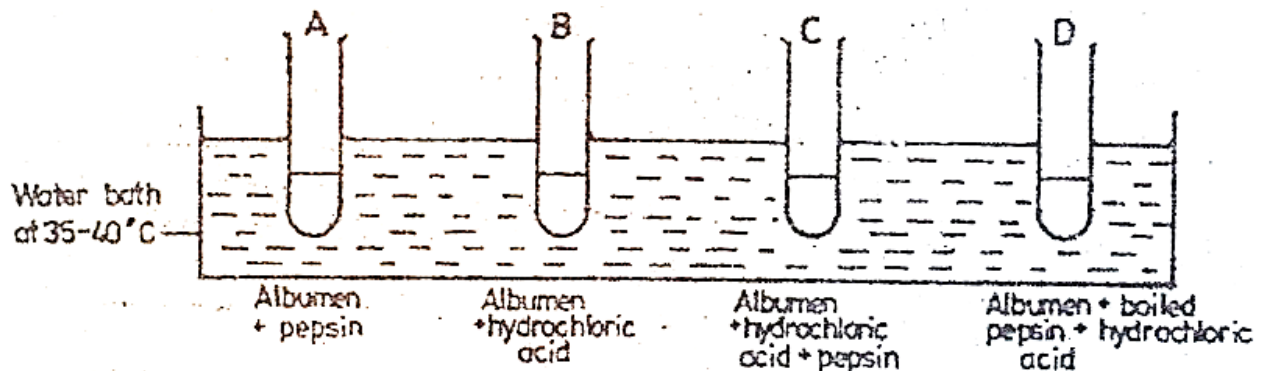
27. Which of the following is not true about mutation?

- A. Mutation may affect single genes or chromosomes
- B. All mutations produce harmful effects
- C. A mutant gene can be passed onto the offspring during fertilization
- D. Mutations are the raw materials for evolution

28. A maize grain is both a seed and a fruit because it

- A. Shows hypogeal germination
- B. Has a fused pericarp and testa
- C. Shows two attachments or scars
- D. Has both endosperm and cotyledon

29. Figure 3 below is an experiment set up to investigate the action of enzyme pepsin on egg albumen.



In which tube will the contents clear after sometime?

30. Which one of the following substances does not contain nitrogen?
- A. Glycerol
  - B. Amino acids
  - C. Amylase
  - D. Urea

**SECTION B**

Answer all questions in this section.

31. Figure 4 below, shows a mammalian system.

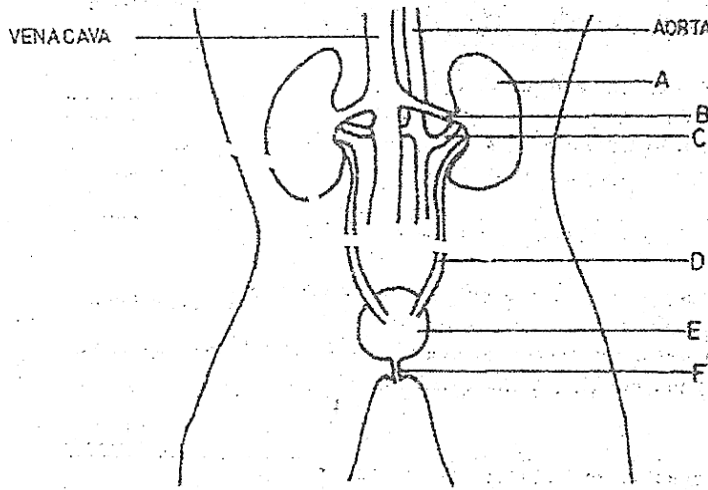


Fig.4

(a) Name the parts A – F

- A .....
- B .....
- C .....
- D .....
- E .....
- F .....

(b) Briefly explain why the concentration of urea in B is less than that in C.

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(c) What is the function of E?

.....  
.....  
(d) A sample of urine was found to contain sugar.

(i) Suggest the type of sugar likely to be contained in the urine sample

.....  
(ii) What hormone is likely to be deficient in the person from whom the urine sample was taken?

.....  
(iii) Name the disease that the person is likely to be suffering from.

.....  
(e) Another individual was found to be passing out a lot of urine but without sugar and complaining if thirst most of the time.

(i) Suggest a hormone that is deficient in this individual.

.....  
(ii) Name the organ which produces the hormone referred to in (e) (i) above.

.....  
32. (a) Give five differences between respiration and photosynthesis.

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(b) Give three ways in which respiration is important to living organisms.

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(c) Name two commercial uses of anaerobic respiration.

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33. (a) What is germination?

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(b) State the external factors that affect germination.

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(c) Figure 5 below shows a growth curve of a bean seedling.

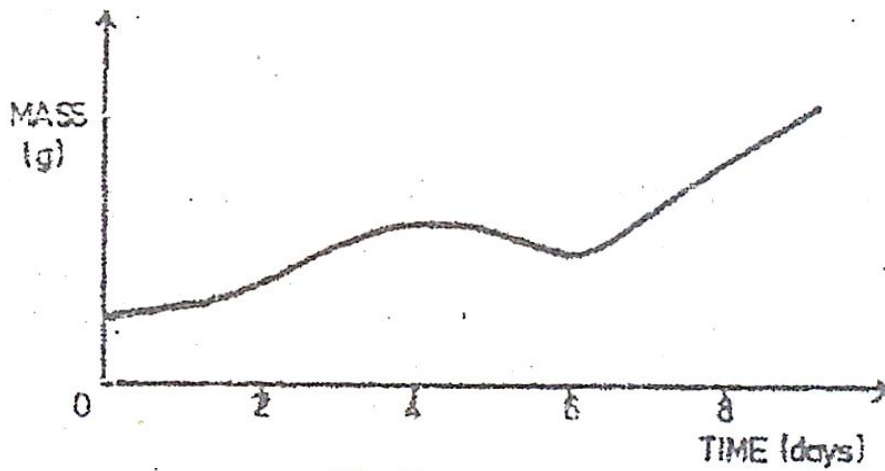


Fig.5

(i) Why does the mass of the seedling increase between day 0 and day 4?

.....  
.....

(ii) What has caused a drop in the mass between day 4 and day 6?

.....

(iii) Give reasons for the steady increase in mass after day 6.

34. Figure 6 below shows the nitrogen cycle.

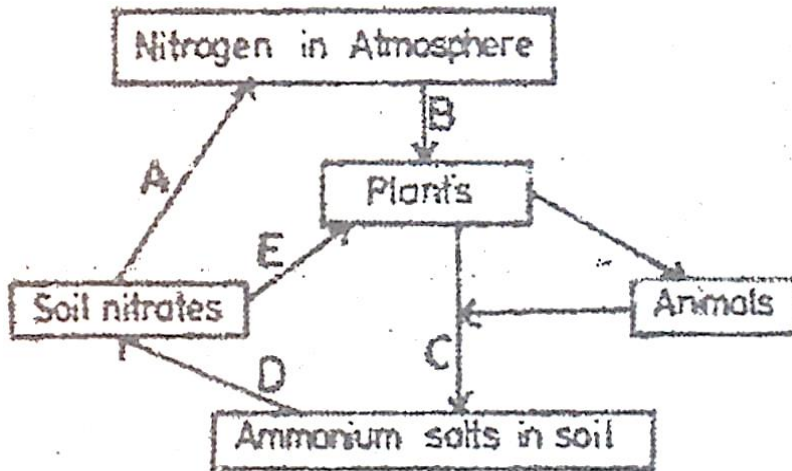


Fig.6

(a) Name the processes taking place at A, B, C, D and E.

A .....

B .....

C .....

D .....

E .....

(b) (i) How is the process at B useful to plants?

.....  
.....

(ii) What organisms are responsible for the process at C?

.....

(c) State the importance of the process at A in the cycle.

.....

.....

**SECTION C**

*Answer any two questions.*

- 35. (a) Outline the mechanism of
  - (i) Inspiration
  - (ii) Expiration
- (b) How are gills adapted for gaseous exchange in a bony fish?
  
- 36. (a) What is self-pollination?
- (b) How is self-pollination naturally prevented in plants?
- (c) Describe the features of a flower that favour pollination by insects.
  
- 37. (a) Giving two examples in each case, explain the following:
  - (i) Parasitism
  - (ii) Commensalism
  - (iii) Symbiosis
- (b) How is the tape worm adapted to its parasitic mode of life?
  
- 38. (a) What is transpiration?
- (b) Describe an experiment to show that transpiration occurs in plants.
- (c) State the factors that affect transpiration in plants.

**1997**

**SECTION A**

*Answer all questions in this section.*

- 1. Which of the following processes need energy?
  - A. Osmosis
  - B. Diffusion
  - C. Plasmolysis
  - D. Active transport
  
- 2. What is the normal blood sugar level in an adult person?
  - A. 140 mg/100 cm<sup>3</sup>
  - B. 100 mg/100 cm<sup>3</sup>
  - C. 90 mg/100 cm<sup>3</sup>
  - D. 80 mg/100 cm<sup>3</sup>

3. The diagram in figure 1 is of a transverse section of a plant part.

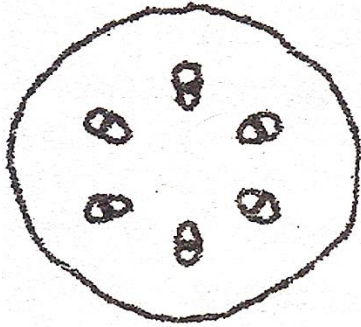


Fig.1

From which one of the following was the section taken? A

- A. Monocotyledonous stem
- B. Monocotyledonous root
- C. Dicotyledonous stem
- D. Dicotyledonous stem

4. Which one of the following represents a reflex arc?

- A. Receptor → motor neurone → effector → central nervous system → sensory neurone → effector
- B. Receptor → sensory neurone → effector → central nervous system → motor neurone
- C. Receptor → central nervous system → motor neurone → sensory neurone → effector
- D. Receptor → sensory neurone → central nervous system → motor neurone → effector

5. The following are characteristics of insecta:

- (i) They undergo complete metamorphosis
- (ii) They have 1 or 2 pairs of wings
- (iii) They have 3 pairs of jointed legs
- (iv) Their bodies are divided into 3 main parts
- (v) They possess exoskeletons

Which of them are common to all insects?

- A. (iii), (iv) and (v)
- B. (i), (ii) and (iii)
- C. (i), (iii) and (v)
- D. (iii), (ii) and (v)

6. Which one of the following combination of words about amoeba are related?

- A. Pseudopodia, reproduction
- B. Nucleus, movement
- C. Contractile vacuole, water
- D. Ectoplasm, digestion

7. The results of an experiment to determine percentage of water in a sample of soil are shown below:

Mass of crucible	=	15g
Mass of crucible plus soil	=	30g
Mass of crucible plus soil after drying	=	25g

What is the percentage of water?

- A. 33.3%
- B. 18.7%
- C. 66.7%
- D. 20.0%

8. Which of the following reasons supports natural feeding of baby on mother's milk? Mother's milk is

- (i) Easy to digest
- (ii) Made up mainly of carbohydrates
- (iii) Contains correct antibodies
- (iv) Fosters relationship between mother and baby

- A. (i) and (ii)
- B. (ii) and (iii)
- C. (ii), (iii) and (iv)
- D. (i), (iii) and (iv)

9. The milk teeth in humans consist of

- A. Incisors only
- B. Incisors and canines
- C. Incisors, canines and premolars
- D. Incisors and premolars

10. Which one of the following is not transported in blood?

- A. Amylase
- B. Urea
- C. Insulin
- D. Sodium chloride

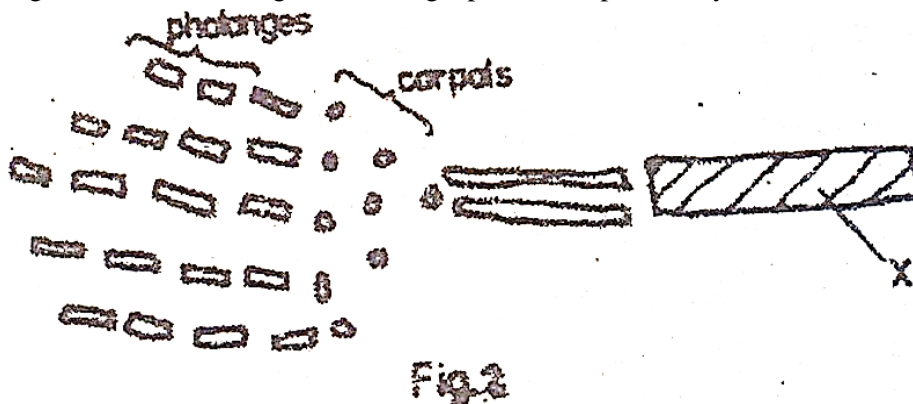
11. Which one of the following is not a primary function of roots?

- A. Conduct water and mineral salts
- B. Anchor the plant into the soil
- C. Store food and water
- D. Absorb water and mineral salts

12. Within an ecosystem, the total number of secondary consumers must be

- A. Less than the total number of herbivores
- B. Greater than the total number of herbivores
- C. Equal to the total number of producers.
- D. Constant year after year

13. Which one of the following hormones is not secreted from the pituitary gland?
- Gonadotrophic hormone
  - Luteinizing hormone
  - Progesterone hormone
  - Follicle stimulating hormone
14. Why is it necessary to keep both eyes open when you are using a monocular microscope?
- Straining one eye is avoided
  - One eye is set on the drawing paper
  - It enables one to see the object clearly
  - It eases the control of the adjustment knobs
15. Which one of the following food substances are not changed by the gut enzymes?
- Lipids and vitamins
  - Minerals and vitamins
  - Minerals and disaccharides
  - Lipids and lactose
16. The structure in insects that serve as respiratory surfaces for gaseous exchange are
- Trachea
  - Bronchioles
  - Tracheoles
  - Spiracles
17. A man's urine gave a positive test with Benedict's solution. What is the best deduction about this man?
- He had been eating a lot of sugar
  - There was too much insulin in his blood
  - There was too much glycogen in his blood
  - He was suffering from diabetes
18. Figure 2 below is a diagram showing a plan of the pentadactyl limb.



What part is represented by letter X?

- Femur
- Humerus
- Radius

- D. Ulna
19. What do the rhizobium bacteria gain in their association with leguminous plant?
- A. Air
  - B. Heat
  - C. Shelter
  - D. Nitrates
20. Which of the following is the best advantage of crop rotation?
- A. It helps reduce soil erosion
  - B. The growth of weeds is brought under control
  - C. It prevents exhaustion of particular mineral salts from the soil
  - D. It helps improve soil conditions
21. Which one of the following events does not occur following the contraction of the ventricles in mammalian heart?
- A. Blood flows from ventricles into arteries
  - B. The blood pressure increases in the aorta
  - C. Atrio-ventricular valves open
  - D. Arterial valves open
22. Which of the following mineral elements are for home formation?
- A. Iodine, sodium and calcium
  - B. Iron, fluorine and calcium
  - C. Phosphorous, sodium and fluorine
  - D. Calcium, fluorine and phosphorous
23. What is the function of albumen in an egg? It
- A. Is a source of fat and protein for the embryo
  - B. Is a source of protein and water for the embryo
  - C. Suspends the embryo
  - D. Stores embryo's excretory products
24. A heterozygous red flowered plant (Rr) is crossed with a homozygous white flowered plant (rr). If R is dominant over r, what will be the phenotypes of the offsprings?
- A. All red
  - B. All white
  - C. Pink and white
  - D. Red and white
25. The dry fruit which splits open along both sutures is
- A. A follicle
  - B. A capsule
  - C. An achene
  - D. A legume

26. Which one of the following structures is not essential in the life of a tadpole?

- A. Lungs
- B. Horny jaws
- C. Gills
- D. Tail

27. The diagram in figure 3 below represents the frequency of occurrence of a character in human population.

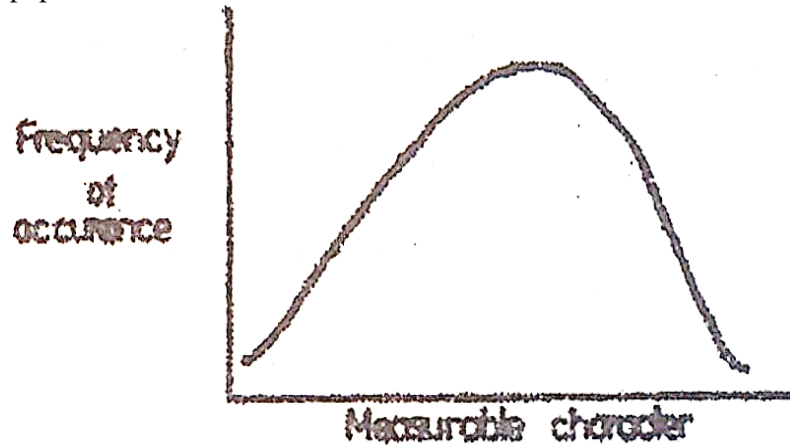


Fig.3

Which one of the following characters in the population does not conform to this pattern?

- A. Height
- B. Weight
- C. Length of feet
- D. Eye colour

28. Which of the following is not a function of the liver?

- A. Storage of vitamins
- B. Manufacture of plasma proteins
- C. Storage of proteins
- D. Formation of bile

29. Which of the following cells in the leaf contain the least number of chloroplasts?

- A. Palisade cells
- B. Guard cells
- C. Epidermal cells
- D. Spongy mesophyll cells

30. Which one of the following organisms is not a heterotroph?

- A. Mushroom
- B. Alga
- C. Tick
- D. Grass hopper

**SECTION B**

*Answer all questions in this section.*

31. (a) What do you understand by the following terms?

(i) Habitat

.....  
.....  
.....

(ii) Ecosystem

.....  
.....  
.....

(b) There are four possible trophic levels that can exist in a food chain. State them below.

(i)

.....

(ii)

.....

(iii)

.....

(iv)

.....

(c) Give an example of a food chain consisting of four levels of organisms found in a grassland.

.....  
.....

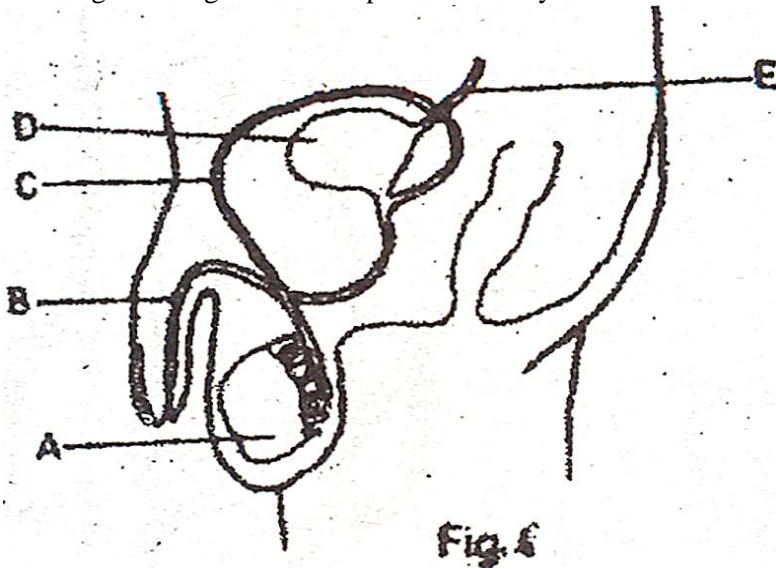
(d) Construct a diagram of a food web which may exist in a freshwater lake in Uganda, comprising of the following organisms.

Tadpole, Green alga, Heron, Saprophytic bacteria, small fish, big fish and mosquito larvae.

32. In an experiment, a long winged male drosophila was crossed with a short winged female drosophila. All the offspring in the F<sub>1</sub> generation were long winged. When two members of the



33. The diagram is figure 4 shows part of the body of a man.



(a) Name the parts labelled A to E.

- A .....
- B .....
- C .....
- D .....
- E .....

(b) (i) Name the hormone made in the male which brings about the secondary sexual characteristics.

.....

(ii) On the diagram, write H where the hormone is made.

(iii) Name two secondary sexual characteristics in the human male.

.....  
.....

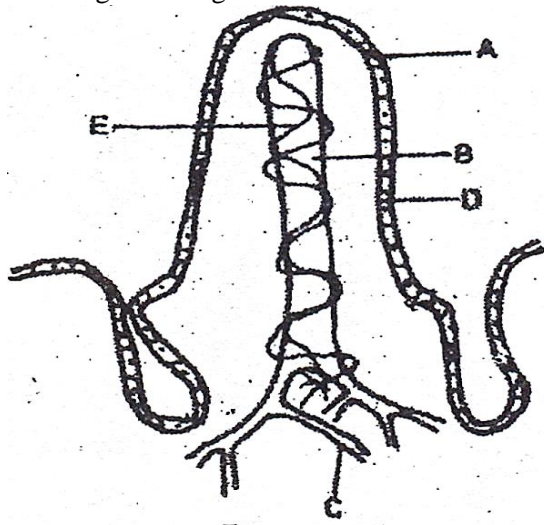
(c) What is the function of part D?

.....

(d) From which organ would fluid in the tube E come from?

.....

34. The diagram in figure 5 shows the structure of a villus.



**Fig 5**

(a) Label parts marked A, B, C and D.

A .....

B .....

C .....

D .....

(b) What food substance enters

(i) A  
.....

(ii) B  
.....

(c) State two factors which make a villus an effective absorbing structure.

(i) .....

(ii) .....

(d) How does the absorbed food in B reach the general circulation?

.....

(e) State two nutrients which are absorbed in the gut before reaching the villus.

(i)  
.....

(ii)

.....

### SECTION C

*Answer any two questions.*

35. (a) What is soil erosion?  
(b) State the various types of soil erosion.  
(c) Explain how man's activities may lead to soil erosion.
36. (a) Describe how plants loss water through their leaves.  
(b) Describe two features of plants and two features of animals which help them reduce water loss in dry conditions.
37. (a) What is meant by the word metamorphosis?  
(b) Using a written description and labelled diagrams, describe the life cycle of a grass hopper.
38. (a) What is respiration?  
(b) State three differences between aerobic and anaerobic respiration.  
(c) Describe gaseous exchange in a frog.

**1996**

### SECTION A

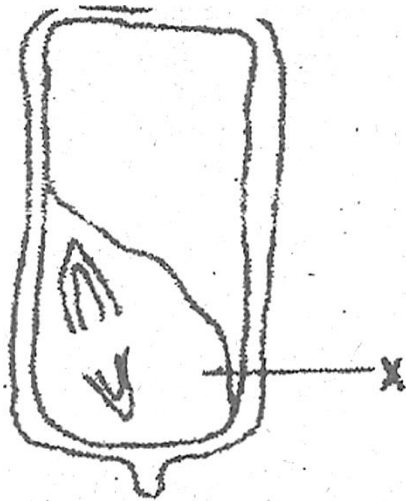
*Answer all question in this section.*

1. Individuals with blood group AB are said to be universal recipients because they have
- A. No antigens
  - B. No antibodies
  - C. Both antigens and antibodies
  - D. Antibodies a and b
2. Which one of the following is true about the nervous system of a mammal?
- A. Cell bodies of the sensory neurons are found in the ganglia
  - B. Cell bodies of the sensory neurones are found in the grey matter
  - C. Sensory neurones transmit impulses from the central nervous system
  - D. Cell bodies of sensory neurones are found in the receptors.
3. The last segment of a caterpillar bears a pair of structures called
- A. Prolegs
  - B. Ovipositors
  - C. Claspers
  - D. True legs

4. In cattle the gene for red coat colour, R, is co-dominant to that for white coat colour, W. if a red cow was mated to a white bull, what would be the phenotype of the F<sub>1</sub> generation?
- All red
  - All white
  - 3 red : 1 white
  - Intermediate coat colour (roan)
5. What are the products of the hydrolysis of lactose?
- Galactose and fructose
  - Glucose and galactose
  - Glucose only
  - Glucose and fructose
6. Photosynthesis is said to have a pair of raw materials, a pair of conditions, and a pair of products. Which of these is the correct set?
- Carbon dioxide and light; water and chlorophyll; oxygen and sugars
  - Water and light; carbon dioxide and chlorophyll; oxygen and sugars
  - Light and chlorophyll; carbon dioxide and sugar; water and oxygen
  - Carbon dioxide and water; light and chlorophyll; oxygen and sugars
7. Which one of the following controls the activities of other ductless glands?
- Thyroid
  - Adrenal
  - Pituitary
  - Islets of Langerhans
8. A runner is a
- Stem which bends over and roots in the soil
  - Horizontal stem above the ground which gives roots and aerial shoots at the nodes
  - Horizontal stem beneath the ground which gives rise to roots and aerial shoots at the nodes
  - Short vertical stem which buds beneath the soil
9. What would result if secretion of gastric juice were inhibited in an individual who has just had a meal of posho and beans?
- The person would suffer from heartburn
  - The person would suffer from constipation
  - Digestion would not take place
  - Digestion of certain food types would be delayed
10. Which of the following is true about arteries? They
- Carry blood away from the heart
  - Carry deoxygenated blood
  - Carry oxygenated blood
  - Possess valves along their length
11. Which of the following is true nastic response?
- Depends on the direction of the stimulus
  - Does not involve hormones
  - It is relatively slow
  - Does not involve only growth

12. Urine is formed by
- A. Ultrafiltration and selective reabsorption
  - B. Selective reabsorption in the proximal tubule
  - C. Selective reabsorption at the loop of Henle
  - D. Ultrafiltration in the Bowman's capsule
13. Which one of the following substances accumulates in muscles during vigorous exercise?
- A. Water
  - B. Lactic acid
  - C. Carbon dioxide
  - D. Oxygen
14. The best method of measuring the growth rate of a seedling is by
- A. Taking records of dry weight
  - B. Measuring the fresh weight
  - C. Observing the increase in volume
  - D. Observing the increase in the size of the leaves
15. Which one of these methods is not important in the maintenance of soil fertility on a given piece of land?
- A. Practising crop rotation
  - B. Addition of organic manure
  - C. Maintaining of vegetation cover
  - D. Burning of the grass in the plot regularly
16. Short sightedness is caused by the
- A. Lens becoming thicker
  - B. Suspensory ligament becoming shorter
  - C. Contraction of the Ciliary muscles
  - D. Expansion of iris muscles
17. Which one of the following soil types has the highest capillarity?
- A. Silt
  - B. Loam
  - C. Clay
  - D. Sand
18. When blood passes from the lungs to the kidney it has to go through the
- A. Pulmonary artery, tricuspid valve and aorta
  - B. Pulmonary vein, bicuspid valve and aorta
  - C. Anterior Venacava, tricuspid valve and aorta
  - D. Posterior Venacava, bicuspid valve and aorta

19.



In a germinating grain, the function of X is to

- A. Absorb food from the endosperm
- B. Provide the first leaves
- C. Hydrolyze the food in the endosperm
- D. Protects the plumule

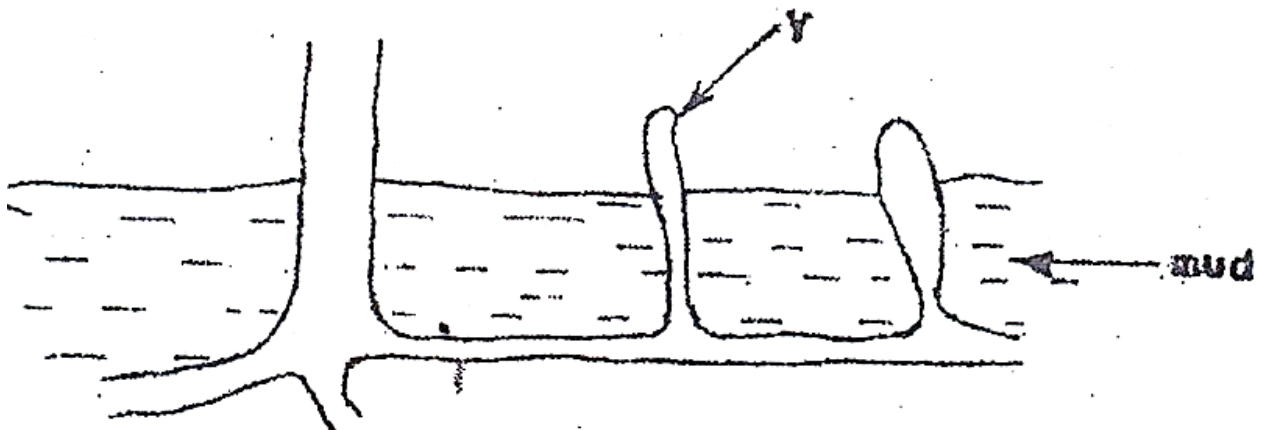
20. A mammalian embryo exchanges materials with its mother by

- A. Osmosis
- B. Secretion
- C. Circulation
- D. Diffusion

21. Which one of the following statements is the most appropriate definition of respiration?

- A. The oxidation of sugar to produce energy and water
- B. Breathing in oxygen, oxidation of food and release of water, carbon dioxide and energy
- C. The exchange of oxygen and carbon dioxide in the lungs
- D. The oxidation of sugar to produce carbon dioxide and energy

22.



The root modification shown by Y above is for

- A. Storage
- B. Excretion
- C. Breathing
- D. Extra support

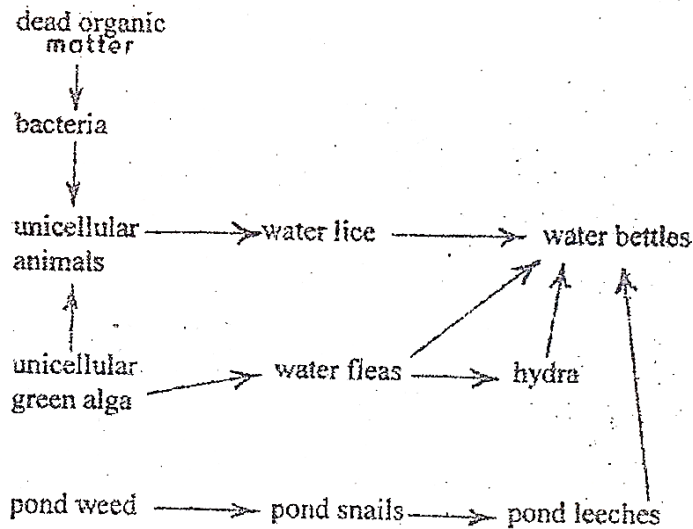
23. In what part of the green flowering plant does meiosis occur?

- A. Seed
- B. Flower
- C. Fruit
- D. Short apex

24. A bat is classified as a mammal because

- A. It does not possess feathers
- B. It has specialized teeth
- C. It has four limbs
- D. Its digits have claws

Study the food web below and use it to answer questions 25 and 26.



25. In this food web, which of the following groups of organisms are primary consumers?

- A. Pond leeches and water fleas
- B. Pond snails and unicellular animals
- C. Hydra and water beetles
- D. Bacterial and water fleas

26. In this food web which one of the following groups of organisms are decomposers?

- A. Unicellular green algae
- B. Water beetles
- C. Water lice

D. Bacteria

27. Which one of the following features is typical of the class insecta?

- A. Jointed legs
- B. Three body parts
- C. Complete metamorphosis
- D. Exoskeleton

28. Which one of the following types of feathers is most widespread?

- A. Covert feather
- B. Filoplumes
- C. Quill feathers
- D. Down feathers

29. Which of the following pairs of cells does not have nuclei when mature?

- A. Sieve tube cells and companion cells
- B. Erythrocytes and leucocytes
- C. Sieve tube cells and erythrocytes
- D. Companion cells and leucocytes

30. Which one of the following processes need energy?

- A. Absorption of water by root hairs
- B. Gaseous exchange in the alveoli
- C. Loss of turgidity by a plant cell
- D. Absorption of mineral salts by root hairs

**SECTION B**

*Answer all questions in this section.*

31. (a) (i) What is meant by the term mutation?

.....

.....

(b) The gene for normal production of haemoglobin is dominant to the mutant gene which causes sickle cell anaemia. If a female heterozygous for the sickle cell anaemia marries a normal man, illustrate, using suitable symbols, the possible genotypes and phenotypes of the offspring.

.....

.....

.....

.....

.....

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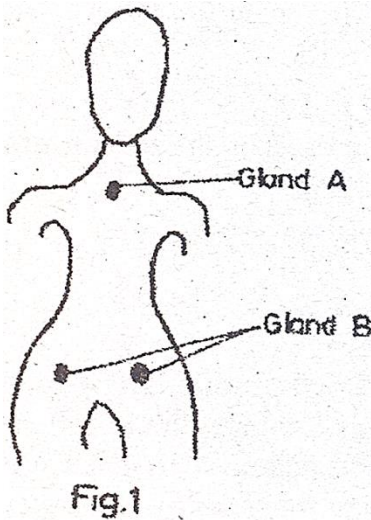
32. (a) Distinguish between endocrine and exocrine glands.

.....

.....

.....

(b) Below is a diagram of a human female showing the location of two endocrine glands.



Name the glands A and B and one hormone produced by each.

.....

.....

.....

(c) Give three effects of adrenaline in the body

.....

.....

33. Figure 2 (a) shows a vertical section of the end region of a growing root and figure 2 (b) shows an enlargement of a cell from the root.

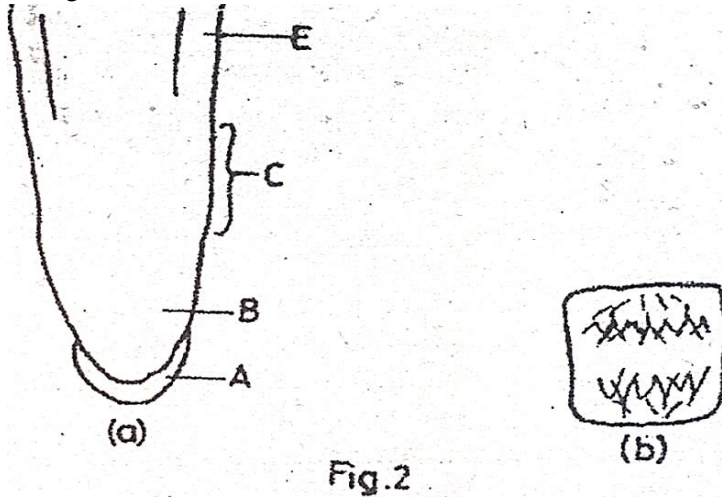


Fig.2

(a) (i) Name the region labelled A.

.....

(ii) How does growth occur in the region labelled B?

.....

(iii) Describe briefly what happens to the cells in the region labelled C.

.....

(iv) What structures might be expected to grow at the region marked D?

.....

(b) State the function of region marked A.

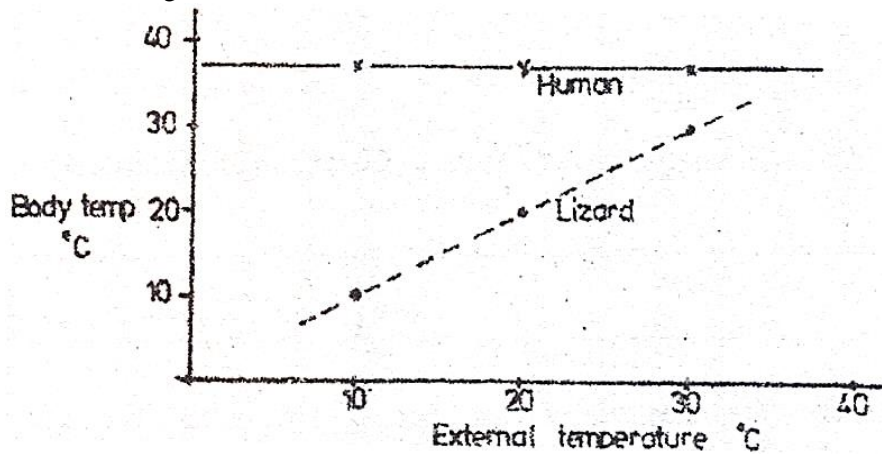
.....

(c) Figure 2 (b) shows a cell from region B.

(i) Name the process taking place in this cell.

.....  
(ii) Briefly describe what is happening at this particular stage of the process.  
.....  
.....  
.....

34. The graph below shows the relationships between body temperatures and external temperatures in a human being and a lizard.



(a) What happens to the temperature of each organism as the external temperature increases?

Human

Lizard

.....  
.....  
.....  
(b) Humans are sometimes described as warm-blooded (homoiotheric). State the advantage of this condition.

.....  
.....  
.....  
(c) Suggest how a lizard living in hot desert, conditions might avoid overheating if external temperatures rose above 40°C.

## SECTION C

Answer any two questions from this section.

35. (a) How does gaseous exchange take place in an insect?  
(b) How does gaseous exchange in insects differ from that in mammals?
36. Describe an experiment you would carry out to test for the presence of starch in a leaf.
37. (a) Draw a well labelled diagram of a human female reproductive system.  
(b) Outline the events that lead to the fertilization of the ovum in the human female.
38. (a) Describe the structure of a motor neurone  
(b) (i) What is meant by reflex action?  
(ii) By means of a diagram, show the path followed by a nerve impulse during a reflex action.

**1995**

## SECTION A

*Answer all questions in this section.*

- Enzymes are said to be specific in nature because they
  - Are proteins
  - Act in a particular pH medium
  - Act on one kind of substrate
  - Remain unchanged at the end of the reaction.
- A sample of urine from a man was boiled with Benedict's solution and the mixture turned orange in colour. Which of the following is the best deduction about the condition of this man?
  - There was a lot of glycogen in his blood
  - He has a deficiency of insulin in his blood
  - His diet has a lot of sugar
  - His kidneys were damaged
- Which of the following will not cause an evolutionary change in an animal species?
  - Having more males than females in the population
  - Abundant food supply
  - Presence of many predators
  - Severe change in environmental conditions
- Which of these are characteristic of all insects?
  - Complete metamorphosis and possession of three pairs of jointed legs
  - Possession of three pairs of jointed legs and body divided into three main parts
  - Possession of one or two pairs of wings and having three pairs of jointed legs
  - Complete metamorphosis and body divided into three main parts

5. In body temperature regulation, vasoconstriction
  - A. Allows less blood to enter the skin capillary network
  - B. Allows less urine to be secreted into the bladder
  - C. Allows more sweat to be secreted by the sweat glands
  - D. Increases heat loss by radiation
  
6. Which type of soil has the following properties?
  - (i) Heavy to cultivate
  - (ii) High water retention
  - (iii) High capillarity
  - A. Sandy loam
  - B. Loam
  - C. Sand
  - D. Clay
  
7. The main function of the Eustachian tube in the mammalian ear is to
  - A. Concentrate the sound waves into the middle ear
  - B. Transmit sound waves to the brain
  - C. Transmit sound waves to the middle ear
  - D. Regulate pressure in the middle ear
  
8. Which one of the following results of seed dispersal may not be an advantage to a plant?
  - A. Reduces overcrowding
  - B. Minimizes spread of disease
  - C. Stops competition for light and air
  - D. Results in colonization of new areas
  
9. A heterozygous red flowered plant is crossed with a homozygous white flower. If red is dominant over white, what will be the phenotypes of the offspring?
  - A.  $\frac{1}{2}$  red and  $\frac{1}{2}$  white
  - B. All white
  - C. All red
  - D.  $\frac{3}{4}$  red and  $\frac{1}{4}$  white
  
10. Which of the following is the best description of the term double circulation in a mammal?
  - A. Blood flows into the two lungs and then into the body
  - B. Blood passes through two chambers of the heart
  - C. Blood passes through the heart twice in one circulation
  - D. Blood first flows through arteries and then through veins
  
11. Which one of the following is an example of a tactic response?
  - A. Rolling up of leaves on a sunny day
  - B. Withdrawal by blowfly larvae from light
  - C. Withdrawal of the hand from a hot object
  - D. Bending of a plant shoot towards light

12. The best method that prevents the start of gully erosion on a cultivated hill is
- Contour cultivation
  - Strip cropping
  - Tree belts
  - Mulching
13. An adult person who constantly feeds on an iodine – deficient diet may show one of the following conditions:
- Anaemia
  - Goiter
  - Cretinism
  - Dry scaly skin
14. In the flowering plants translocation of photosynthetic products is by the
- Xylem vessels
  - Sclerenchyma
  - Sieve tubes
  - Companion cells
15. In which part of the gut does mucus (mucin) have a protective function?
- Oesophagus
  - Stomach
  - Small intestine
  - Rectum
16. The main function of Luteinising hormone in the reproductive cycle of a mammal is that it
- Causes ovulation
  - Causes thickening of the uterine walls
  - Initiates the growth of a Graafian follicle
  - Maintains pregnancy for the first 3 months
17. During seed germination, the dry weight initially decreases because
- Stored food is used up for growth and respiration
  - Soluble food materials diffuse out of the seedlings
  - Rate of water absorption is low
  - Rate of cell division is low
18. A sample of blood from the hepatic portal vein contains
- Fats
  - Proteins
  - High concentration of urea
  - High concentration of products of digestion
19. Which of the following does not affect the rate of diffusion?
- Density of the diffusion medium
  - Size of diffusing particles
  - Distance through which particles diffuse

- D. Temperature of the diffusion medium
20. The function of amniotic fluid in foetal development is
- A. Protection of the foetus from shock
  - B. Transfer of nutrients from mother to foetus
  - C. Allowing gaseous exchange between mother and foetus
  - D. Prevention of dangerous substances from reaching the foetus
21. Which of the following is not a component of joints in the endoskeleton?
- A. Cartilage
  - B. Tendon
  - C. Ligament
  - D. Synovial fluid
22. Which one of the following structures represents the respiratory surface of a fish?
- A. Gill bars
  - B. Gill rakers
  - C. Gill chamber
  - D. Gill filaments
23. Meiosis normally results in
- A. Halving the number of chromosomes
  - B. Production of identical cells
  - C. Maintaining the number of chromosomes
  - D. Propagation of new organisms
24. Which of these statements is not true of an ecosystem?
- A. Consumers use less food compared to what producers make
  - B. One of the ways constructing a food chain is by observing the animals feeding
  - C. The numbers of organisms decrease from the bottom to the top of the pyramid of numbers
  - D. Because of mains feeding habits, he can be placed in any of the feeding levels.
25. In humans, the male sex chromosomes are X and Y (XY) and the female sex chromosomes are X and X (XX). When a male gamete fuses with female gamete the sex ratio is
- A. 1 : 2
  - B. 1 : 3
  - C. 1 : 1
  - D. 1 : 4
26. Artificial immunity to a disease is developed by
- A. Catching the disease and recovering from it
  - B. Inoculation with a mild strain of the pathogen
  - C. Receiving antibiotic injections against the disease
  - D. Taking drugs that prevent the disease
27. Which one of the following is an example of discontinuous variation in humans?
- A. Skin color

- B. Intelligence
- C. Height
- D. Blood groups

28. What are final products of anaerobic respiration?

- A. Carbon dioxide, water and energy
- B. Carbon dioxide, water and alcohol
- C. Carbon dioxide, alcohol and energy
- D. Carbon dioxide and alcohol

29. Which one of the following is characteristic of monocotyledons?

- A. Leaf sheath
- B. Net venation
- C. Prominent tap root
- D. Cork layer

30. What is the functional unit in a nervous system called?

- A. Dendrite
- B. Neurone
- C. Axon
- D. Synapse

**SECTION B**

*Answer all questions in this section.*

31. The table below shows the effect of temperature on the activity of amylase on starch, six test tubes, each containing a mixture of starch and amylase, were placed in water baths maintained at 0°C, 10°C, 20°C, 30°C, 40°C and 50°C and allowed to stand. Study the table and answer the questions that follow.

Test tube	Temperature (°C)	Time taken for starch Digestion (minutes)
1	0	Starch still present after 60 minutes
2	10	22
3	20	11
4	30	5
5	40	3.5
6	50	Starch still present after 60 minutes

(a) How does temperature affect the action of amylase?

.....

.....

.....

(b) Give one reason in each case for the results obtained in the tubes kept at

(i) 0°C

.....

(ii) 50°C

.....

Section C

37. (a) Giving two examples in each case explain what you understand by the terms

(i) Parasitism

(ii) Symbiosis

(b) How are parasites adapted to their mode of life?

38. (a) Why do flowering plants possess simpler excretory organs than those found in mammals?

(b) Describe how the mammalian kidney forms urine

(c) What part is played by the mammalian skin in excretion?

1994

SECTION A

Answer all questions in this section.

1. The following results were obtained from an experiment done to determine the percentage of air in a sample of soil.

Volume of water used	=	10 cm <sup>3</sup>
Volume of soil + water	=	40 cm <sup>3</sup>
Volume of soil + water after stirring	=	37 cm <sup>3</sup>

From the results, the percentage of air in the soil is

- A. 7.5  
B. 8.1  
C. 10  
D. 23.3
2. Which one of the following flower parts is most important in promoting insect pollination?  
A. Calyx  
B. Corolla  
C. Stamens  
D. Pistil
3. Figure 1 shows an experiment which was set up and left to be observed the following day.

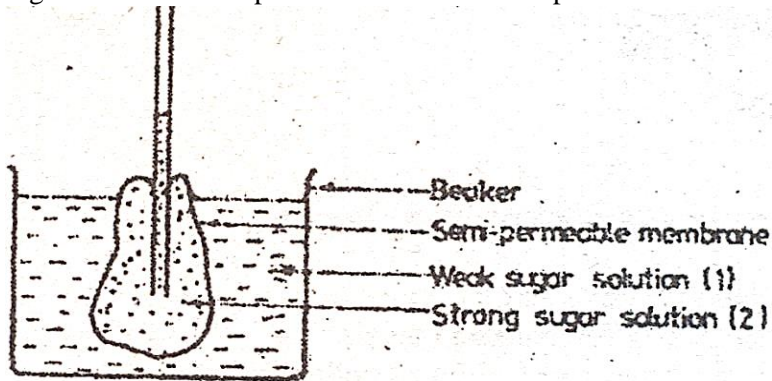


Fig.1

Which of the following events will have taken place?

- (i) Solution 2 will have risen higher in the capillary tube  
(ii) The level of solution 1 will have fallen  
(iii) The level of solution 2 in the capillary tube will have fallen  
(iv) Concentration of solution 1 in the beaker will not have changed at all
- A. (i) and (iii)  
B. (ii) and (iv)  
C. (i) and (ii)  
D. (iii) and (iv)

4. 2 g of a food substance was burnt, and the heat produced raised the temperature of 50 cm<sup>3</sup> of water from 25°C to 37°C. What is the energy content of the food substance in joules per gram? (specific heat capacity of water = 4.2 j per gram)
- A. 1260 joules
  - B. 2520 joules
  - C. 300 joules
  - D. 105 joules
5. Which one of the following activities takes place during the pupal stage in the life cycle of an insect?
- A. Hibernation
  - B. Organ formation
  - C. Feeding
  - D. Resting
6. A couple produced four children who were at different blood groups with the following genotypes: AO, BO, AB and OO. What were the genotypes of their parents?
- A. AA and OB
  - B. AO and OB
  - C. BB and OB
  - D. AB and OO
7. Which one of the following can be applied so as to reduce the acidity of a soil?
- A. Ammonium compound
  - B. Nitrate
  - C. Phosphate
  - D. Lime
8. The following are some characteristics of flowers
- (i) Large feathery stigma
  - (ii) Large brightly coloured petals
  - (iii) Produce large quantities of pollen grains
  - (iv) Flowers are often scented

Which of the characteristics belong to wind pollinated flowers?

- A. (i) and (ii)
  - B. (iii) and (iv)
  - C. (i) and (iii)
  - D. (ii) and (iv)
9. The living together of a fungus and an alga as a lichen is called
- A. Symbiosis
  - B. Parasitism
  - C. Saprophytism
  - D. Commensalism

10. Which one of the following seed parts plays both roles of protection and nutrition during germination?
- A. Endosperm
  - B. Testa
  - C. Coleorhiza
  - D. Cotyledons
11. Why is a shoot being prepared for transpiration experiments normally cut under water? To
- A. Avoid water loss which may cause wilting
  - B. Prevent loss of sap
  - C. Prevent air from entering the xylem vessel
  - D. Remove damaged tissue
12. Meiotic cell division is important because it ensures that
- A. There is variation in the number of chromosomes
  - B. The number of chromosomes of a species is not double at fertilization
  - C. The chromosomes of the daughter cells are identical
  - D. Bad traits are not passed on from parents to offspring
13. The following are features found in birds
- (i) Light bones
  - (ii) Webbed feet
  - (iii) Presence of feathers
  - (iv) Streamlined body
- Which of the features are adaptations for flight?
- A. (i) and (ii)
  - B. (ii) and (iii)
  - C. (iii) and (iv)
  - D. (i) and (iv)
14. Which of the following substances are secreted in mammalian sweat?
- A. Urea, ammonia, water
  - B. Urea, carbon dioxide, sodium chloride
  - C. Urea, water, sodium chloride
  - D. Urea, carbon dioxide, water

15.

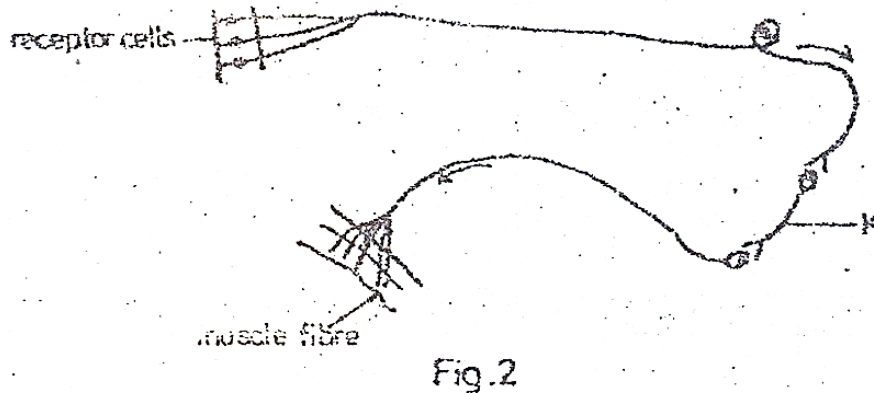


Figure 2 is a simplified reflex arc. The part labelled K is

- A. The relay neurone
  - B. A ganglion
  - C. The sensory neurone
  - D. The motor neurone
16. Nerves, the spinal cord and the brain make up
- A. A tissue
  - B. A system
  - C. An organ
  - D. An organism
17. Which one of the following shows the correct path followed by light rays to produce an image at the retina?
- A. Cornea, aqueous humour, lens, pupil, vitreous humour, retina
  - B. Cornea, vitreous humour, pupil, lens, aqueous humour, retina
  - C. Cornea, pupil, vitreous humour, lens, aqueous humour, retina
  - D. Cornea, aqueous humour, pupil, lens, vitreous humour, retina
18. Decrease the number of mammalian red blood cells could reduce the ability of the blood to
- A. Clot
  - B. Transport oxygen
  - C. Destroy harmful bacteria
  - D. Distribute heat
19. Which one of the following characters shows discontinuous variation?
- A. Blood groups
  - B. Height
  - C. Intelligence
  - D. Skin colour in people
20. The similarity in feeding between an amoeba and the fungus *Mucor* is that both
- A. Feed on dead organic matter only
  - B. Ingest undigested food materials
  - C. Digest their food materials
  - D. Secrete enzymes onto food materials from their cytoplasm

21. Which of the following make the skin of a toad an effective respiratory surface?
- (i) Moist surface
  - (ii) Rough skin
  - (iii) Rich blood supply to the skin
  - (iv) Large numbers of secretory glands on the skin
- A. (i) and (iii)
  - B. (i) and (ii)
  - C. (ii) and (iv)
  - D. (iii) and (iv)
22. Below are some food chains: which one of them is correct?
- A. Dead wood → termite → chicken
  - B. Chameleon → mantid → grass hopper
  - C. Termite → hawk → snake
  - D. Carnivore → plant → herbivore
23. Which one of the following types of cells is unspecialized?
- A. Companion cell in plants
  - B. Red blood cell
  - C. Meristematic cell
  - D. Nerve cell
24. During inspiration the
- A. Pressure in the thoracic cavity is reduced
  - B. External intercostal muscles relax
  - C. Diaphragm becomes dome shaped
  - D. The thoracic cavity becomes smaller
25. A heterozygous flowered plant (Rr) is crossed with a homozygous white plant (rr): If R is dominant over r, what will be the phenotypes of the offspring?
- A. All red
  - B. All white
  - C. Pink and white
  - D. Red and white
26. Which one of the following is a characteristic of animal cells?
- A. Presence of cell walls
  - B. Cells consist entirely of cytoplasm
  - C. Have regular shape
  - D. Have large centrally placed vacuoles
27. Which one of the following dental formulae represents that of a ruminant e.g sheep?
- A.  $\frac{2}{2} : \frac{1}{1} : \frac{2}{2} : \frac{3}{3}$
  - B.  $\frac{2}{2} : \frac{1}{1} : \frac{2}{2} : \frac{0}{3}$

- C.  $\frac{0}{2} : \frac{1}{1} : \frac{2}{2} : \frac{3}{3}$   
 D.  $\frac{0}{3} : \frac{1}{1} : \frac{3}{3} : \frac{3}{3}$

28. In plants, anaerobic respiration is less efficient than aerobic respiration because during anaerobic respiration
- Not all the carbohydrates are broken down
  - The amount of carbon dioxide released is less than in aerobic respiration
  - There is less energy released per unit weight of carbohydrate broken down
  - Less water is produced in anaerobic respiration
29. Which one of the following characteristics is common to birds, fish and reptiles?
- Regulation of body temperature
  - Bodies are covered with scales
  - Use of nostrils
  - Internal fertilization
30. Which of the following vitamins is deficient in a person whose gums bleed?
- Vitamin C
  - Vitamin E
  - Vitamin B<sub>2</sub>
  - Vitamin K

**SECTION B**

*Answer all questions in this section.*

31. The table below shows the effect of wind, still air and stomatal opening on the rate of transpiration of a plant in milligrams of water lost per hour per dm<sup>2</sup>. Study the table and answer the questions following.

Stomatal Opening ( $\mu\text{m}$ )	1	2	3	4	5	6	7
Wind	40	63	74	86	94	110	124
Still air	0	6	12	19	23	27	30

- (a) (i) Compare the rates of transpiration in windy and still air conditions.

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- (ii) Explain your observation.

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(b) How does stomatal opening affect transpiration rate?

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(c) Name three other factors that affect the rate of transpiration.

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(d) State two functions of transpiration to plants.

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32. Two different-sized cubes of colourless jelly A and B were used to represent models of living organisms. They were submerged in a coloured dye for a period of time and then removed and cut into half.

The diagrams below show the penetration of the dye.

33.

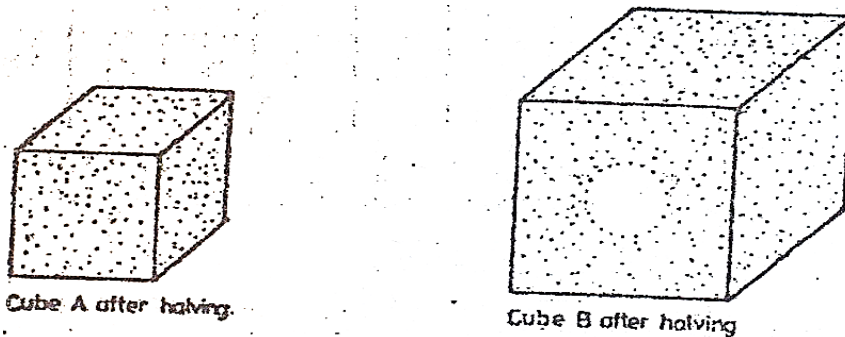


Fig. 3

(a) (i) Explain the different between the penetration of the coloured dye in the two cubes.

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(ii) Suppose that dye represents an essential substance being absorbed by a living organism. Explain how the problem in B could be overcome by a living organism without altering its shape.

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(b) Explain how the shape of a red blood cell helps it to function efficiently.

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33. (a) In cattle, the gene for hornless condition is dominant over the one for horned condition. A hornless cow was mated to a horned bull. Using genetic symbols, show the possible genotypes and phenotypes of the F<sub>1</sub> offspring.

Genotypes of F<sub>1</sub> offspring

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Phenotype(s) of F<sub>1</sub> offspring

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(b) (i) A bull whose horns were removed was mated to a horned cow. Show the possible genotypes and phenotypes of the F<sub>1</sub> offspring.

Genotypes of F<sub>1</sub> offspring

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.....

Phenotypes of F<sub>1</sub> offspring

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(ii) Give a reason for your answer in (b) (i) above.

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34. (a) (i) Give the main difference between cold-blooded (ectothermic) and warm-blooded (endothermic) animals.

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(ii) Give one advantage that an endothermic animal has over an ectothermic animal.

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(iii) Why are ectothermic animals said to be cold-blooded?

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(b) Give four ways in which an ectotherm reacts to the lowering of external temperature.

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**SECTION C**

*Answer any two questions from this section.*

- 35. (a) (i) What are the similarity(ies) and differences between asexual and sexual reproduction in the spirogyra?  
(ii) What is the advantage of asexual reproduction to such a plant?
- (b) Describe sexual reproduction in the spirogyra.
- 36. (a) Describe the digestion of proteins in the human alimentary canal.  
(b) What may happen to the products of digestion of proteins?
- 37. Explain how a dicotyledonous leaf is adapted for the process of photosynthesis.
- 38. (a) Give six features which are common to adult insects.  
(b) (i) What is understood by the term *metamorphosis*?  
(ii) With the aid of labelled diagrams, give an account of the life cycle of a house-fly.

**1993**

**SECTION A**

*Answer all questions in this section.*

1. Which one of these processes helps to lower mammalian body temperature to normal?
  - A. Vasodilation
  - B. Vasoconstriction
  - C. Shivering
  - D. Raising of hair on the skin
  
2. Six fingers in man is controlled by a sex-linked recessive gene. If a normal woman marries a six fingered man. Which of the children will have six fingers?
  - A. All the sons
  - B. All the daughters
  - C. All will be normal
  - D. Half the number of girls and boys will be normal
  
3. Which one of the following tissues has a protective function in plants?
  - A. Xylem
  - B. Phloem
  - C. Cambium
  - D. Epidermis
  
4. What disease would you be controlling by pouring molluscicides in water?
  - A. Schistosomiasis
  - B. Guinea worm infestation
  - C. Typhoid
  - D. Cholera
  
5. Which one of the following takes place by the process of active transport in plants?
  - A. Uptake of water
  - B. Intake of carbon dioxide
  - C. Transpiration
  - D. Uptake of mineral salts
  
6. In an ecosystem the survival of all living things depend on
  - A. Decomposers
  - B. Primary producers
  - C. Primary consumers
  - D. Secondary consumers
  
7. If a gecko on a wall is seen eating mosquitoes, flies, moths and grasshoppers, this animal is said to be a
  - A. Parasite
  - B. Symbiont
  - C. Predator

- D. Saprophyte
8. Which one of the following structural adaptations of leaves is important for light absorption during photosynthesis?
- Dense network of veins
  - Large numbers of stomata on leaf surfaces
  - Large intercellular air spaces in the spongy layer
  - Broad and flat shapes of leaves
9. Which of the following is a function of progesterone?
- Prepares the uterine walls for implantation
  - Initiates the process of birth
  - Initiates ovulation
  - Initiates formation of corpus luteum
10. The part of the brain that controls breathing is the
- Cerebellum
  - Medulla oblongata
  - Cerebrum
  - Hypothalamus
11. Which of the following are respiratory surfaces in toads and frogs?
- The mouth, webbed toes and skin
  - Nostrils, mouth and skin
  - Webbed toes, lungs and mouth
  - The mouth, lungs and skin

12.

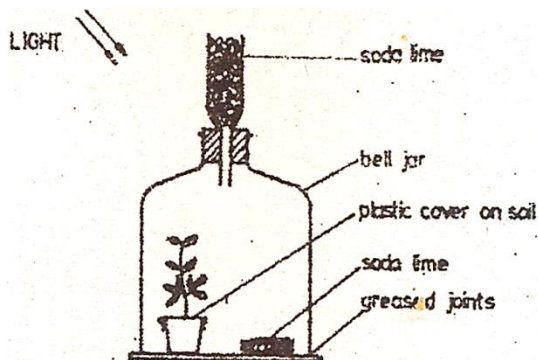


Fig. 1

Figure 1 above shows an experiment on photosynthesis set up by a student. The soda lime was used to absorb

- Any oxygen off by the plant
- Any carbon dioxide from the air
- Moisture from the air

D. Carbon dioxide give off by the plant

13. Which one of the following glands produces a hormone whose normal effect is to influence the rate of heartbeat?

- A. Pituitary gland
- B. Islets of Langerhans
- C. Adrenal gland
- D. Thyroid gland

14. The condition known as 'oxygen debt' occurs during active physical exercise in animals because of the

- A. Accumulation of carbon dioxide during physical exercise
- B. The high rate of breathing during physical exercise
- C. Accumulation of lactic acid in the body
- D. Accumulation of alcohol in the body

15. The stem root which grows from near the base of the trunk of some woody plants is called

- A. Lateral root
- B. Prop root
- C. Aerial root
- D. Adventitious root

16. Which one of the following farming methods would cause pollution in an aquatic habitat?

- A. Mulching
- B. Crop rotation
- C. Use of fertilisers
- D. Application of farm yard manure

17. The graph below shows changes in dry weight of a seedling of a non – woody plant.

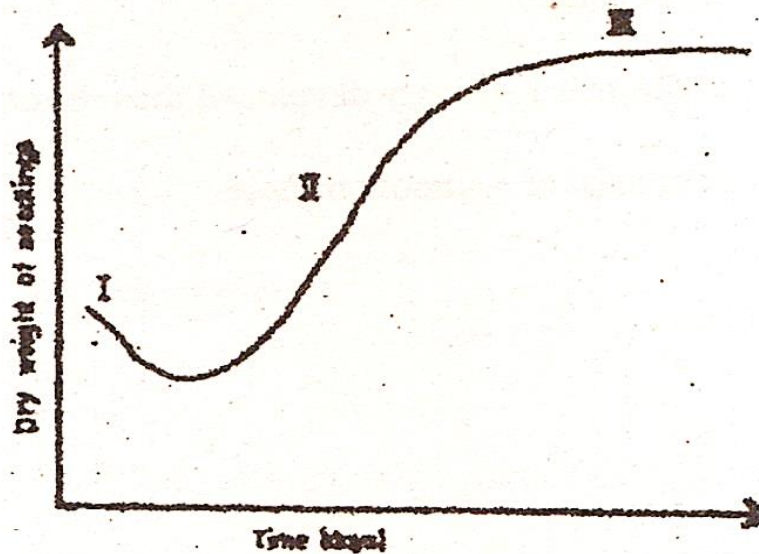


Fig. 2

What is the possible explanation for the shape of the curve in phase III? Rate of

- A. Respiration is constant
- B. Respiration is greater than that of photosynthesis
- C. Growth is highest
- D. Assimilation is equal to respiration

18. Which one of the blood groups will not agglutinate with any blood serum when mixed?

- A. O
- B. A
- C. AB
- D. B

19. A male cockroach is different from the female cockroach by having

- A. Styles
- B. Cercus
- C. Longer antennae
- D. Larger abdomen

20. Which of the following conditions are necessary for producing movement in vertebrates?

- (i) Muscles must be attached to the end of bones
- (ii) Muscular bundles must occur in pairs
- (iii) One of a pair of muscles must be more strongly developed than the other
- (iv) One of a pair of muscles must consist of a smooth muscle

- A. (i), (iii), (iv)
- B. (i), (ii), (iii)
- C. (i), (ii), (iv)
- D. (iii), (iv)

21. Which one of the following compounds is a constituent of enzymes?

- A. Lipids
- B. Polysaccharides
- C. Protein
- D. Vitamins

22. One of the two identical twins brought up differently was fatter and more healthy than the other. What kind of variation do these show?

- A. Discontinuous variation
- B. Genetic variation
- C. Social variation
- D. Habitat variation

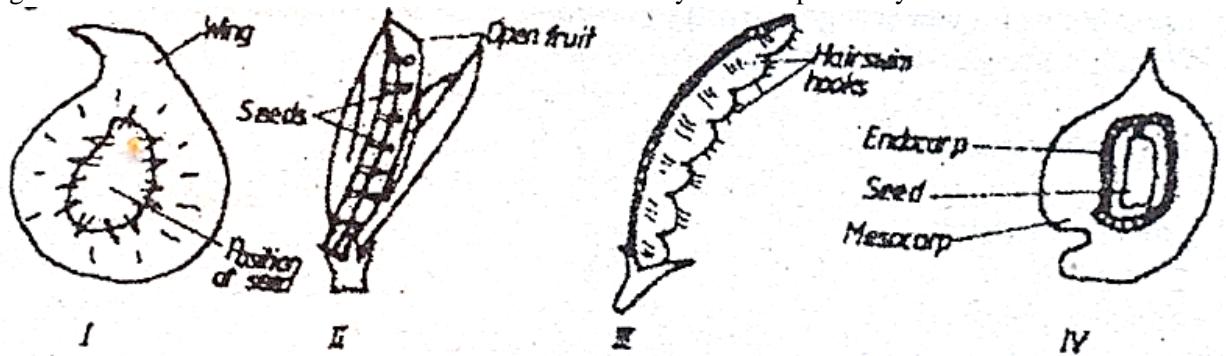
23. Which one of the following structures in the mammalian ear is concerned with balance? The

- A. Cochlea
- B. Semicircular canals
- C. Eustachian tube
- D. Oval window

24. The type of soil with minute air spaces and high water retention capacity is
- Sand
  - Clay
  - Silt
  - Loam

25. Which one of the following cannot be used in the classification of plants?
- Structure of the flowers
  - Leaf structure
  - Type of seeds
  - Leaf colour

26. Figure 3 below shows some fruits. Which of them are likely to be dispersed by animals?



- I and II
  - II and III
  - III and IV
  - I and IV
27. Which one of the following is not a property of a fully turgid plant cell?
- The vacuole has maximum volume
  - There is no more absorption of water by the cell
  - The cell wall resists further expansion of the vacuole
  - The cytoplasm is only slightly separated from the cell wall
28. Which one of the following diets would be recommended for an overweight person?
- Low carbohydrate, high protein, low fat
  - High carbohydrate, low protein, low fat
  - High carbohydrate, high protein, low fat
  - Low carbohydrate, low protein, high fat
29. Intestinal parasites are not digested by the host's enzymes because of
- Possession of attachment devices
  - Secretion of large quantities of mucus
  - Having a high rate of reproduction
  - Lack of their own digestive system
30. Which one of these is the correct order in which the following organisms occur in a food chain?

- A. Vulture, antelope, lion
- B. Lion, vulture, antelope
- C. Antelope, lion, vulture
- D. Lion, antelope, vulture

**SECTION B**

*Answer all questions in this section.*

31. The table below shows the concentrations of different substances in the glomerular filtrate and urine. Study the table and answer the questions that follow.

SUBSTANCE	CONCENTRATIONS (%)	
	GLOMERULAR FILTRATE	URINE
Water	93	95
Proteins	0	0
Glucose	0.1	0
Sodium	0.3	0.35
Urea	0.003	2.0

(a) Give any one reason for the difference in the concentration of water in the glomerular filtrate and in urine.

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.....

(b) Explain the absence of proteins from both the glomerular filtrate and urine.

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(c) (i) Which substance is reabsorbed with

- The highest efficiency .....
- The lowest efficiency .....

(ii) Which substance is not reabsorbed at all?

.....

(d) By what factor is urea more concentrated in urine than in glomerular filtrate?

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(e) Under what condition does glucose appear in urine?

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32. Figure 4 below shows a longitudinal section through the female reproductive system of a mammal.

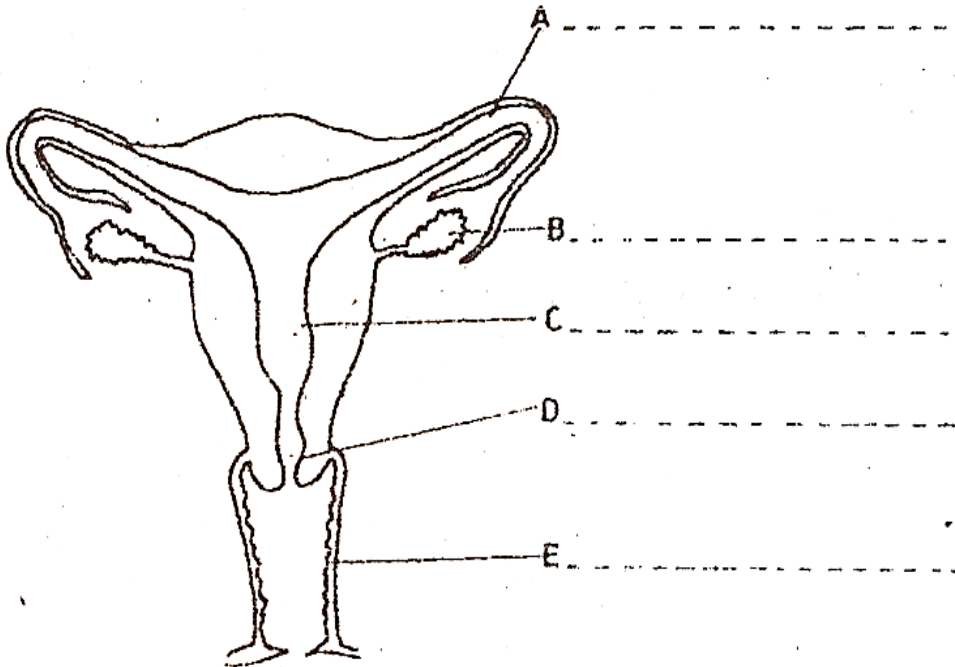


Fig. 4

(a) Name the parts labelled A, B, C, D and E on the diagram.

(b) State any two functions of B

- (i) .....
- (ii) .....

(c) In what two ways are parts A and C adapted to their functions?

A

.....  
.....

C

.....  
.....

(d) State two advantages the mammalian embryo has over that of a frog during their development.

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33. (a) What do you understand by the following terms:

(i) A habitat,

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(ii) An ecosystem?

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.....

(b) Use the following organisms to construct a food web showing their feeding relationship: Chameleon, moth, grasshopper, herbaceous bug, praying mantis, predatory bug and plants.

(c) What is the role of each of the following organisms in the food web:

(i) The plants

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(ii) The grasshopper

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(iii) The predatory bug?

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(d) Which one of the organisms listed above will have the least energy for any single food chain considered? Why?

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34. The graphs below show the effects of temperature and pH on the activity of an enzyme in the human digestive system.

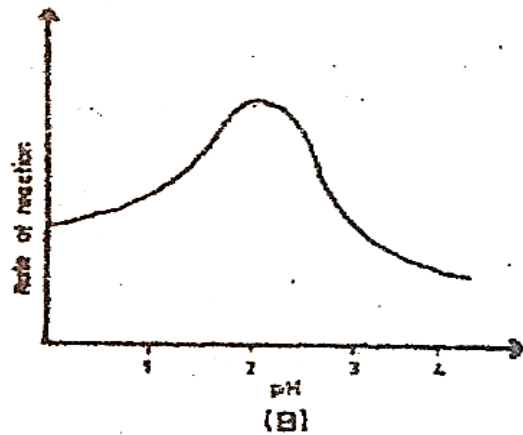
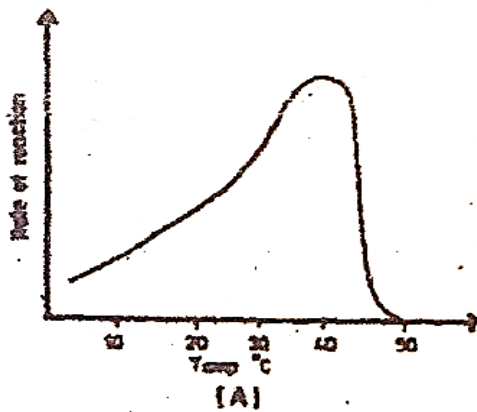


Fig. 5

(a) At what temperature and pH does the enzyme show optimal activity?

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(b) Suggest one reason for the sharp fall in the rate of reaction of the enzyme as shown in graph A.

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(c) (i) Suggest the identity and location of this enzyme.

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(ii) Give a reason for your answer to c(i) above.

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(d) For the enzyme in e(i) above, suggest the food it acts on and the end products.

Food acted on

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End products

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### SECTION C

*Answer any two questions from this section.*

35. (a) What is growth?  
(b) Name the main parts responsible for producing growth in a shoot.  
(c) Describe an experiment you would perform to determine the region of most rapid elongation in the root of a bean seedling.
36. (a) What do you understand by the term 'irritability' as applied to plants and animals?  
(b) Explain how plants respond to light as a factor of irritability.  
(c) Name any three other trophic responses in plants.
37. (a) Explain how the action of muscles causes air to pass from the atmosphere into the lungs?  
(b) How does oxygen move from the air in the lungs into the cells of the blood?  
(c) Give three characteristics of an efficient respiratory organ.
38. (a) What is pollution?  
(b) Give an outline of the human activities, in Uganda, which may result in environmental pollution.

