

Candidate's Name:

Index Number: Signature:

545/1

BIOLOGY

(Theory)

Paper 1

2 ½ Hours

UGANDA PRIVATE AND INTEGRATED SCHOOLS ASSOCIATION

UGANDA CERTIFICATE OF EDUCATION

FINAL ASSESSMENT EXAMINATIONS YEAR 2023

BIOLOGY

(THEORY)

PAPER 1

2 HOURS 30 MINUTES

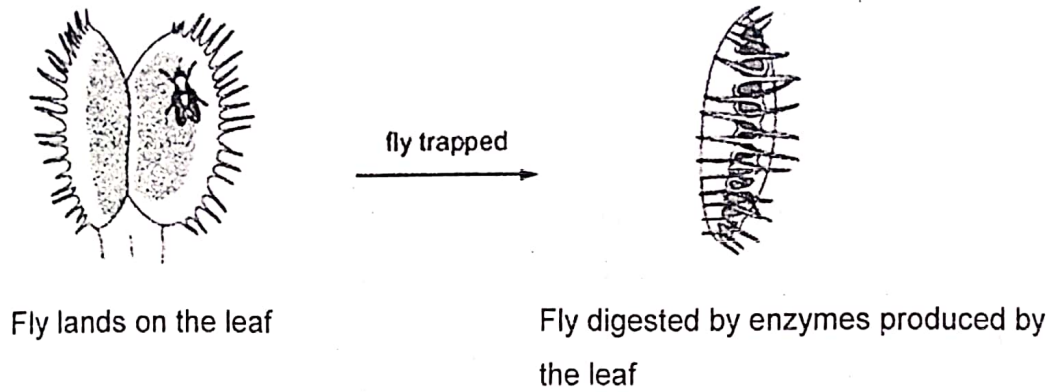
INSTRUCTIONS TO CANDIDATES

- This paper consists of **three** sections; A, B and C
- Answer **all** questions in sections A and B plus any **two** questions in section C.
- Write answers to section A in the boxes provided; and answers to section B in the spaces provided.
- Answers to section C must be written on answer booklets provided

FOR EXAMINERS USE ONLY		
Section	Marks	Comment & initials
A		
B		
C		
Total		

SECTIONS A (30 MARKS)

1. The diagram below shows how a plant, called a Venus fly-trap behaves upon a fly landing on the leaf



Which life processes are being demonstrated by the Venus fly-trap in the diagram above?

- A. Eating, Growth and Turgidity
- B. Movement, Excretion and irritability
- C. Nutrition, Movement and Irritability
- D. Feeding, Sensitivity and Locomotion

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2. The table below shows some of the characteristic features of four different vertebrates. Given that ✓ means present and x means absent; which of the four vertebrates is a mammal?

	Feature				
	Scales	Lay Eggs	Feathers	Wings	Hair
A.	✓	✓	x	x	x
B.	x	✓	x	x	x
C.	x	✓	✓	✓	x
D.	x	x	x	✓	✓

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3. Which of the following groups does NOT contain animals that are Arthropods?

- A. Annelida B. Arachnida
- C. Crustacea D. Insecta

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4. A student observed a vertebrate swimming in a pond. The animal's surface was smooth and hairless. It used its four legs to swim and at intervals, the animal came to the surface to take mouthfuls of air.

To which class does this animal belong?

- A. Mammalia
B. Pisces
C. Amphibia
D. Reptilia

☐

5. What is the correct order of arthropod groups, from those with most legs to those with fewest legs?

- A. Arachnids → Crustaceans → Insects → Myriapods
B. Crustaceans → myriapods → Insects → arachnids
C. Insects → Arachnids → Myriapods → Crustaceans
D. Myriapods → Crustaceans → arachnids → insects

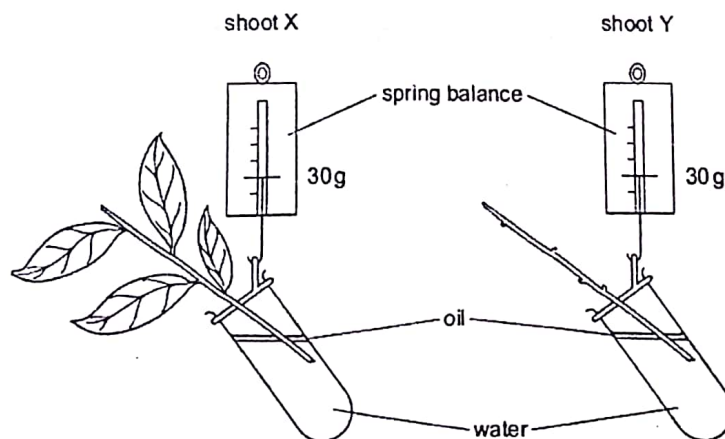
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6. Which of the following substances are found dissolved in human blood plasma

- A. Carbon dioxide, haemoglobin and glucose
B. Carbon dioxide, oxygen and haemoglobin
C. Glucose, hormones and Urea
D. Oxygen, Urea and Starch

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7. The diagram below shows two shoots at the start of an experiment on transpiration.



What are the likely readings on each of the spring balances after three days?

	Shoot X	Shoot Y
A.	30 g	30 g
B.	30 g	25 g
C.	25 g	30 g
D.	25 g	25 g
E.		

8. What happens during osmosis?

- A. Movement of solute molecules against their concentration gradient
- B. Movement of solvent molecules down their concentration gradient
- C. Movement of solvent molecules from regions of high to low concentration
- D. Movement of solute molecules down their concentration gradient

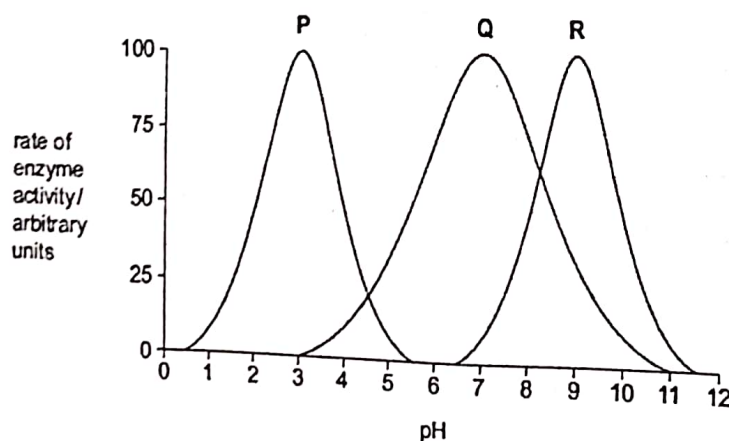
9. What type of cells do all sense organs contain?

- A. Ciliated B. Receptor C. Effector D. Rods and Cones

10. Which form of energy is stored within Glucose molecules made during photosynthesis?

- A. Light energy
- B. Heat energy
- C. Chemical energy
- D. Starch

11. The graph below shows the effect of pH on the rate of reaction of three different enzymes

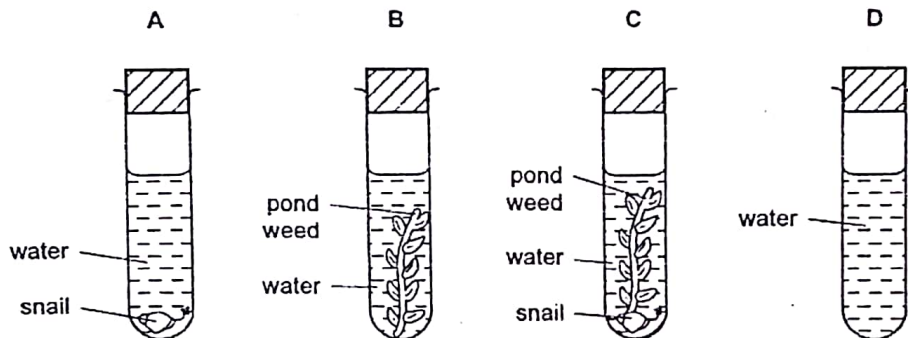


What conclusion can be drawn from the graph?

- A. Each enzyme works best at a different pH
- B. Each enzyme works best over a narrow temperature range
- C. Enzymes work best in acidic conditions
- D. Enzymes work best in alkaline conditions

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12. Four Test-tubes were set up as shown in the figure below and left to stand under sunlight. After several hours, which of the four test-tubes would contain the highest amount of dissolved carbon dioxide


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13. Six test-tubes were set up at different temperatures. Each contained identical mixtures of starch and amylase solutions. The table below shows the time taken for complete reactions in each of the test-tubes

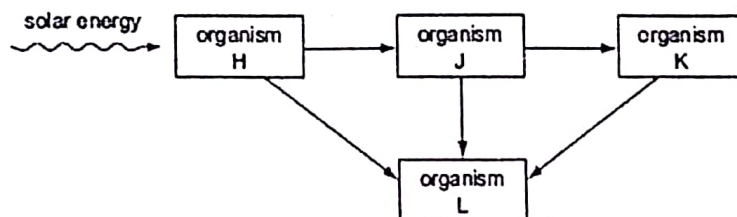
Temperature/ $^{\circ}\text{C}$	15	25	35	45	55	65
Time/Seconds	35	22	13	5	35	66

At which temperature does Amylase work best?

- A. 15°C
- B. 35°C
- C. 45°C
- D. 65°C

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14. The diagram below shows a simple food web.



What is the best description for organism L?

- A. omnivore
- B. Herbivore
- C. Predator
- D. Saprophyte

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15. At each stage in a food chain, energy is lost. What is the result of this?

- A. Rarely do food chains be longer than five organisms
- B. Plants are called producers and animals are called consumers
- C. Food chains always begin with green plants
- D. All living things respire and excrete

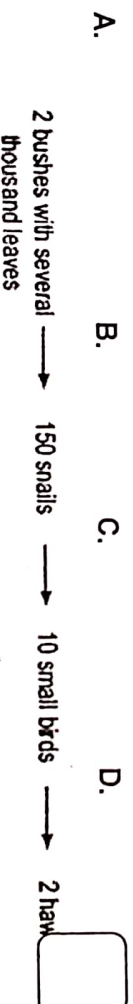
16. In a given species of animal, the allele for straight fur is dominant over the allele for curly fur. A pair of these animals mate and had three offspring with curly fur and nine offspring with straight fur. If F represents the allele for straight fur and f represents the allele for curly fur. What are the most likely genotypes of the parents?

- A. F and f
- B. FF and Ff
- C. FF and ff
- D. Ff and Ff

17. What defines a diploid nucleus?

- A. A nucleus containing two pairs of homologous chromosomes
- B. A nucleus containing two sets of chromosomes
- C. A nucleus containing two unpaired chromosomes
- D. A nucleus containing two alternative forms of a gene

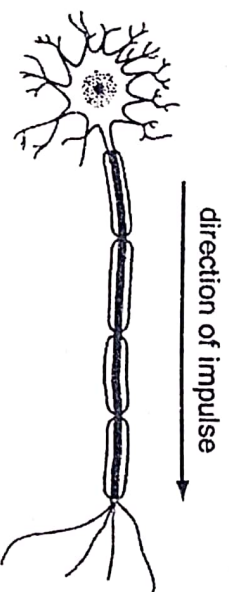
18. The food chain below shows a number of animals relying on two bushes for their survival. At what step of this food chain do the organisms have the greatest amount of energy?



19. What effect does deforestation have on the levels of Carbon dioxide, Oxygen and Water vapour in the atmosphere?

	Carbon dioxide	Oxygen	Water Vapour
A.	Less	Less	More
B.	Less	More	More
C.	More	Less	Less
D.	More	More	Less

20. The diagram below shows a neuron carrying an impulse



What is the best description for the type of neuron and direction of impulse?

	Type of neuron	Direction of impulse
A.	Motor	Towards the spinal cord
B.	Motor	Away from the spinal cord
C.	Sensory	Towards the spinal cord
D.	Sensory	Away from the spinal cord

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21. A man injures his arm in an accident. Afterwards, he could feel the objects touching his hand, but he could not move his hand away from these objects. What could be the cause?

- A. Receptors in his hand are damaged
- B. The nerve connection is cut between his Central Nervous System and the effectors in his hand
- C. The nerve connection is cut, between his Central Nervous System and receptors in his hand
- D. Nerve connections are cut between his central Nervous System and both receptors and effectors in his hand

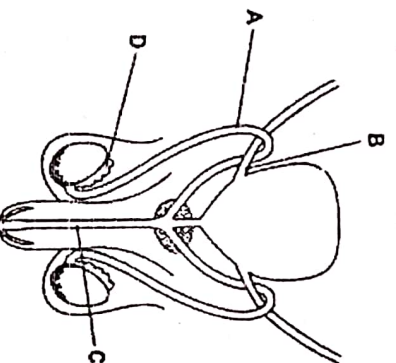
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22. During a long race, an athlete's skin temperature rises due to;

- A. Increased sweating
- B. Vasodilation of arterioles in the skin
- C. Opening of the pores in the skin
- D. Vasoconstriction of arterioles in the skin

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23. The diagram below shows the male reproductive system. Which of the indicated parts is cut during Vasectomy?

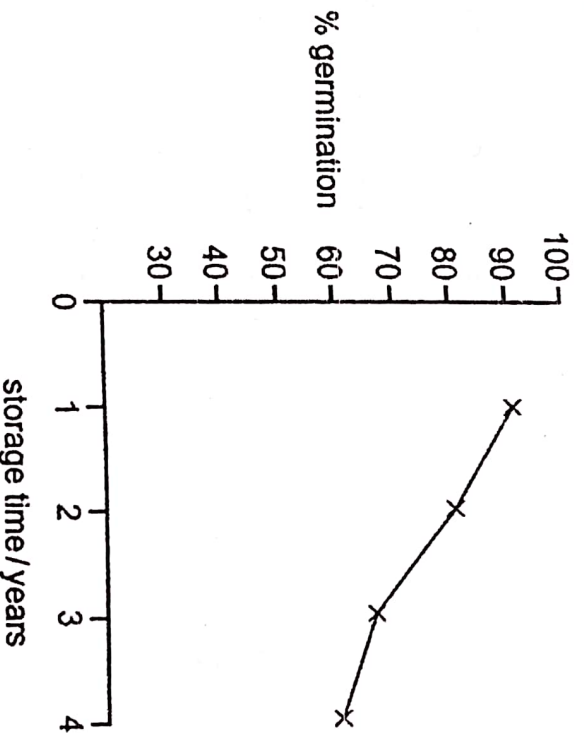

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24. Which of the following is not a form of growth of an organism?

- A. Increase in dry mass
- B. Increase in number of cells
- C. Permanent increase in size
- D. Turgidity due to water uptake

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25. The graph below shows the effect of storage time on the germination of some seeds

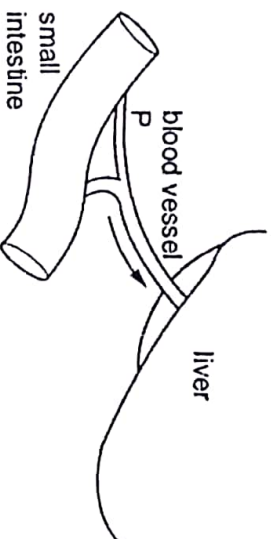


What can be concluded from this graph?

- A. Older seeds do not germinate
- B. Older seeds germinate better than younger seeds
- C. Younger seeds always germinate
- D. Younger seeds germinate better than older seeds

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26. The diagram shows blood vessel P which carries digested food from the small intestine to the liver



Which of the following best describes the level of glucose in blood vessel P and the level of glycogen in the liver, shortly after a meal containing carbohydrates?

	Glucose level in P	Glycogen in liver
A.	High	Decreasing
B.	High	Increasing
C.	Low	Decreasing
D.	Low	Increasing

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27. A True-breeding white mouse was crossed with a true-breeding black mouse; their offspring were black. Later, one of the offspring was bred with a true-breeding white mouse, 10 baby mice were produced. What are the most likely colours of these baby mice?

- A. 3 Black and 1 White
B. 1 Black and 1 White
C. 5 Black and 5 White
D. All black

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28. Which of the following substances is lost from the body by the kidneys, lungs and skin?

- A. Carbon dioxide
B. Excess salts
C. Water
D. Urea

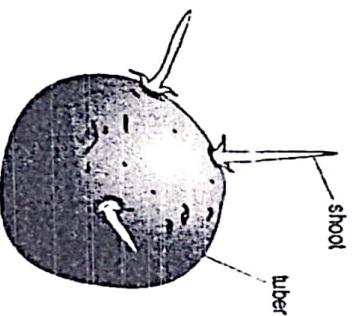
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29. How often must a blood cell in the renal artery pass through the heart before reaching the renal artery again?

- A. Once
- B. Three times
- C. Twice
- D. Four times

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30. The diagram below shows three shoots sprouting from a stem tuber of a potato plant.



How do the genotypes of the three shoots compare with the genotypes of the stem tuber and the original potato plant?

- A. They are all identical
- B. The shoots are identical to each other, but are different from the tuber and the parent plant
- C. The shoots are identical to the tuber, but are different from the parent plant
- D. They are all different

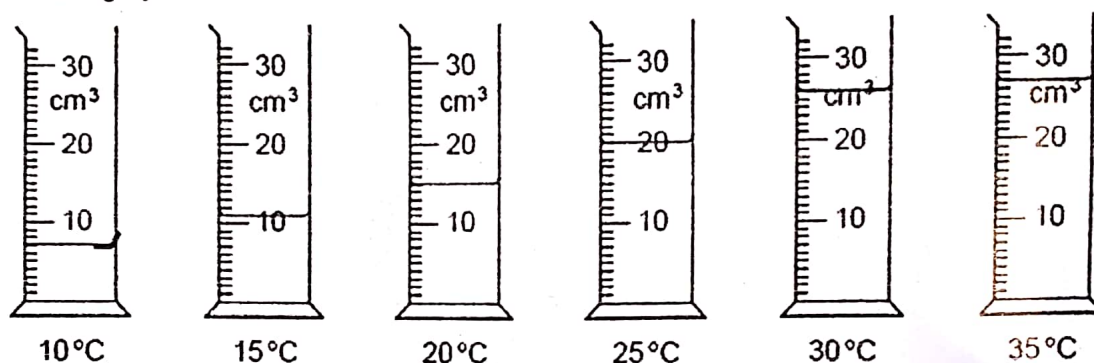
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SECTION B: (40 MARKS)

31. Enzymes are used commercially to extract juice from fruits as they tend to increase the volume of juice produced.

An investigation was carried out to determine the volume of apple juice produced from apple pulps at different temperatures. In this investigation, mixtures of apple pulps and enzyme were left to stand for 15 minutes at different temperatures.

After 15 minutes, the mixtures were filtered to collect the juice extracted from apples in measuring cylinders as shown

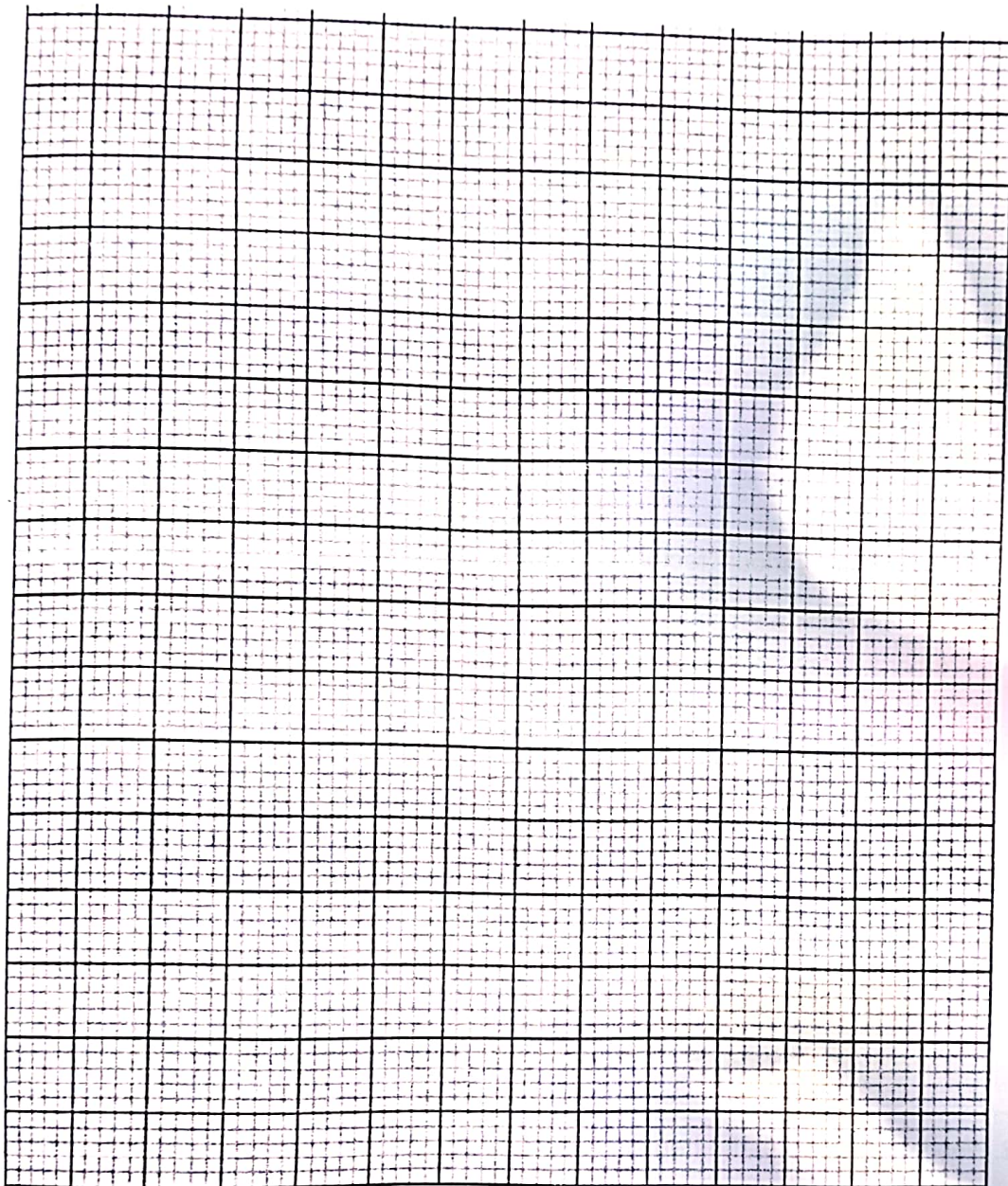


- a) Complete the table below by filling in the volume of juice extracted at each temperature by taking the reading directly from each of the measuring cylinders shown in the figure above. (03 marks)

Temperature/ °C	Volume of juice collected/ cm ³
10	
15	
20	
25	
30	
35	

- b) In the space provided below, represent the above data on a suitable graph

(06 marks)



c) Describe and explain the shape of the graph

(06 marks)

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- d) Predict what could be the expected results if the mixture of apple pulp and enzymes were left for 15minutes at a temperature of 70⁰c. Give a reason for your answer. (02marks)

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- e) There are various factors that affect enzyme activity. Apart from one of the factors indicated in the commercial extraction of fruit juice above. Describe any other two factors that affect enzyme activity. (3marks)

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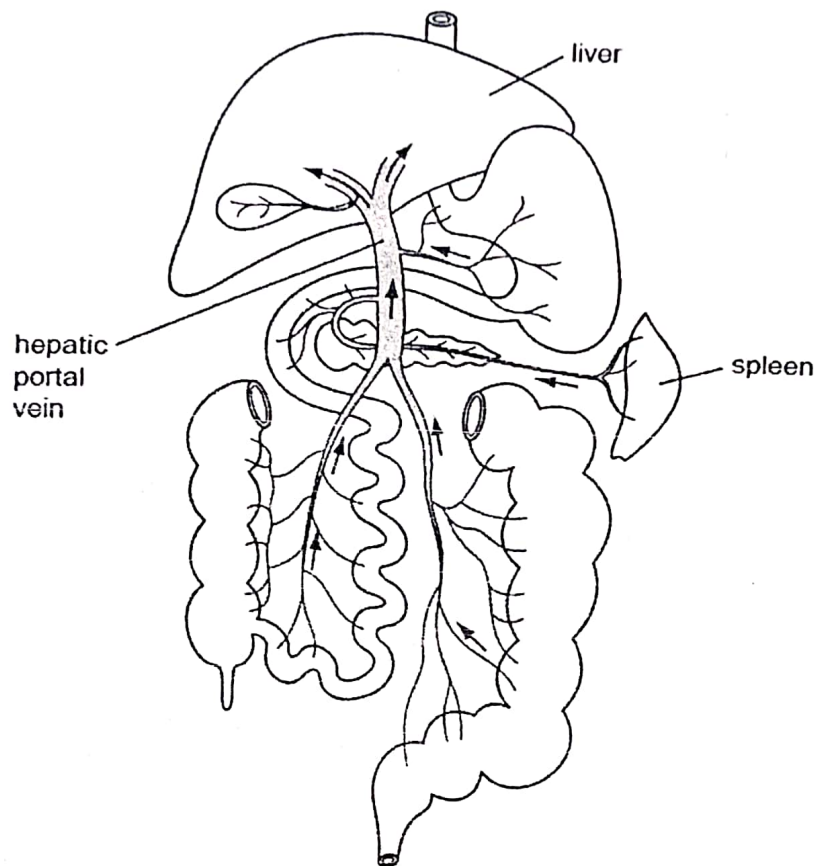
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32. Blood flows through the hepatic portal vein from some organs to the liver. The figure below shows the Hepatic portal vein and those associated organs. Study it carefully and answer the questions that follow.



- a) State if the blood flowing in the Hepatic portal vein is oxygenated or deoxygenated; Give a reason for your answer (02 marks)

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- b) Name four organs shown other than the spleen from which blood flows into the Hepatic portal vein (04 marks)

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- c) Explain why it is rather advisable to have small but frequent meals rich in proteins than a single heavy meal of proteins (03 marks)

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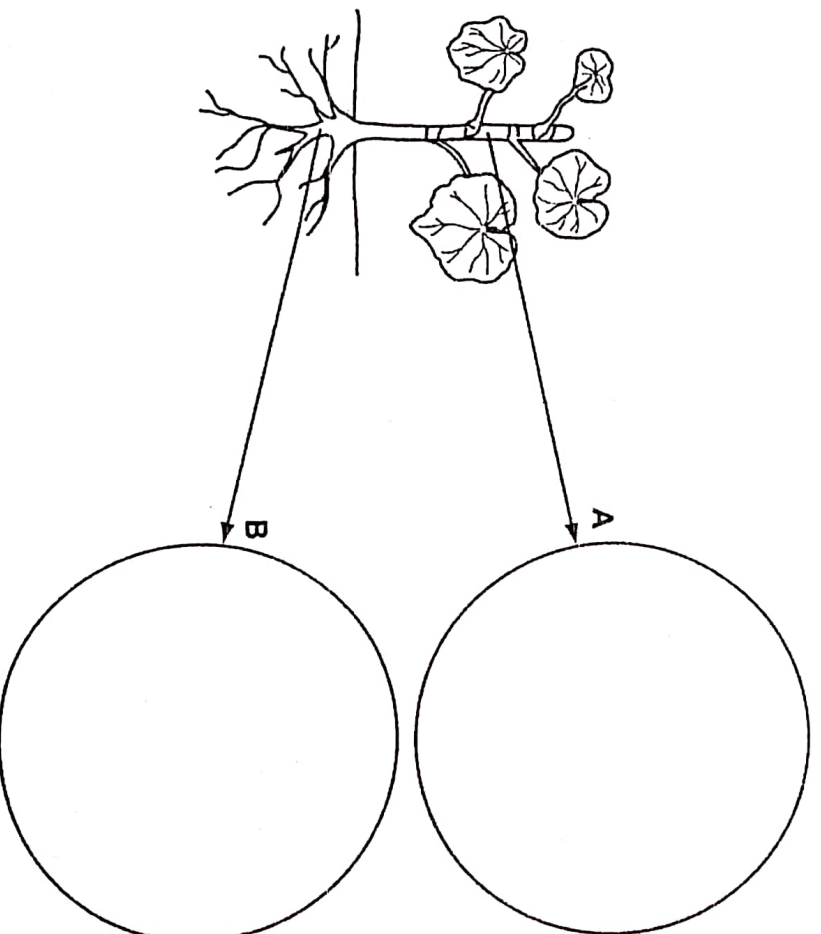
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- d) The spleen contains lymphatic tissue which is full of phagocytes and lymphocytes. State how phagocytes and lymphocytes contribute to body immunity (02 marks)

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33. Angiosperms take up water from the soil through their roots. Water passes to all parts of the plant through the xylem. The leaves carry out photosynthesis forming sugars which are transported through phloem to other organs where it may be utilized or stored.

The figure below shows an herbaceous dicotyledonous plant.



- a) Using circle A as a cross-sectional view through the stem, draw to show the distribution of vascular tissues in the stem; label the Xylem and phloem (03 marks)
- b) Using circle B as a cross-sectional view through the root, draw to show the distribution of vascular tissues in the root; label xylem and phloem (03 marks)

c) Name the major form of sugar that is transported through phloem (01 marks)

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d) Give any three (3) ways in which angiosperms are adapted for self-pollination

(03 marks)

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SECTION C (30 MARKS)

34. Soil is a layer of finely divided material that covers the earth's surface.

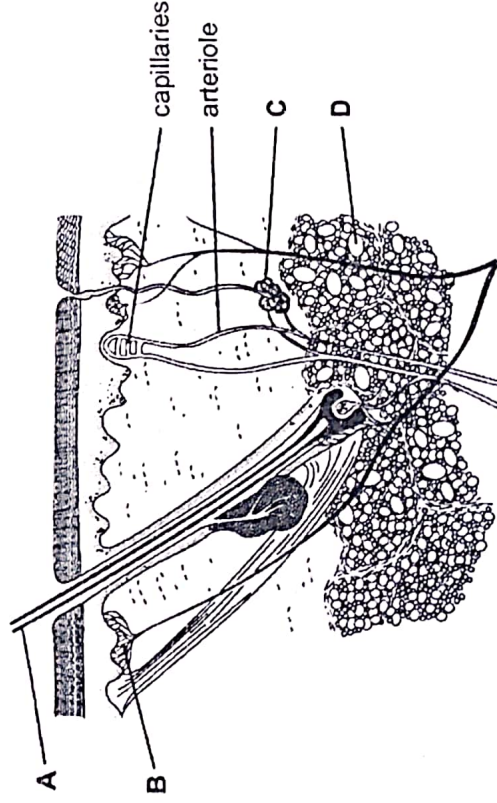
a) State how soil is generally important in nature (04 marks)

b) Describe an experiment to determine the amount of humus in a fresh sample of soil (07 marks)

c) Explain the effect of extensive deforestation on soil fertility. (04 marks)

35. According to the cell theory, all cells are known to come from pre-existing cells by cell division. Use annotated diagrams to show the sequence of events that occur in a newly formed cell until it divides into two daughter cells. (15 marks).

36. The figure below shows some of the external and internal parts of the human skin



- (a) Using parts A, B, C and D describe clearly how each of these parts are involved in thermo regulation. (12 marks)
- (b) What is the importance of having a constant body temperature. (3 marks)
37. The common bread mould (*Rhizopus stolonifer*) is known to belong to a Kingdom Fungi. These organisms usually reproduce asexually, but may reproduce sexually especially when environmental conditions are not favourable
- a) Describe the sexual mode of reproduction in moulds (09 marks)
- b) Discuss the general roles of Fungi in ecosystems (06 marks)

END