

Candidate Name**Candidate Number****Centre Name****Centre Number**

Paper 2 (2 hour)

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser, and a dark blue or black pen.

INSTRUCTIONS:

- You must write your name, candidate number, centre name, and centre number on the answer sheets in the designated spaces.
- The objective section consists of 25 questions, and you must attempt all of them.
- Each question has four options labelled A, B, C, and D. Select the option that you think is correct. Mark it on the multiple-choice answer sheet using a soft pencil.
- Attempt all the questions from the subjective section using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.
- You are allowed to use a calculator if needed.

INFORMATION:

- This paper has a total of 100 marks.
- In the objective section, there are 25 questions, each carrying one mark.

There is no negative marking for incorrect responses.

- Subjective section comprises 75 marks
- The number of marks assigned for every question or its parts is indicated within brackets ().
- Rough work must be completed on this question paper.

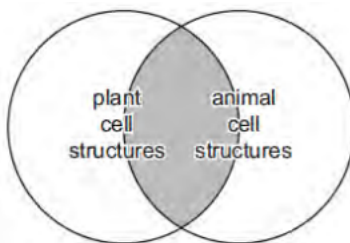
Objective Section

Marks: 25

1. Which enzyme is responsible for breaking down starch?

- A. Carbohydrase
- B. Lipase
- C. Protease
- D. Cellulase

2. Which structure represents presence in both plant and animal cells as in shaded areas?



- A. cell membrane
- B. chloroplast
- C. large vacuole
- D. cell wall

3. How do viruses induce the symptoms of the disease?

- A. Viruses engulf white blood cells, destroying them.
- B. Viruses produce antibodies that damage tissues.
- C. Viruses reproduce inside cells, damaging them.
- D. None of the above.

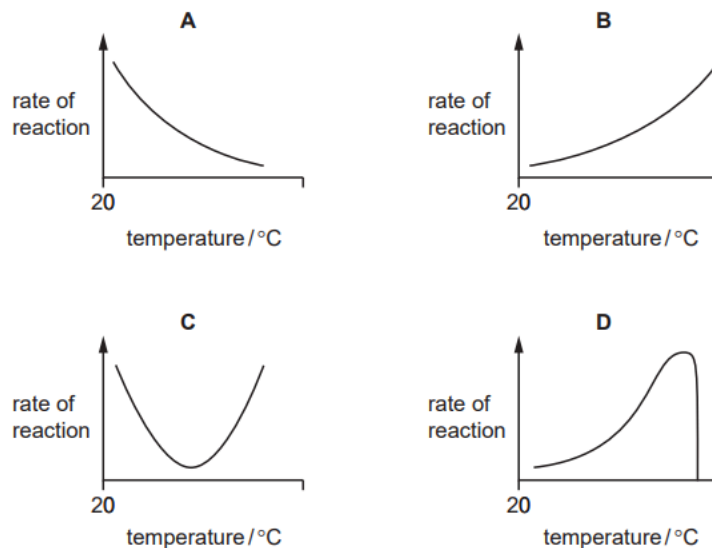
4. What mass of DNA is found in a human sperm cell?

- A. 6×10^{-6} grams
- B. 6×10^{-12} grams
- C. 3×10^{-6} grams
- D. 3×10^{-12} grams

5. Which of these characteristics of living organisms is this equation associated with
chemical reaction represented by the equation; glucose + oxygen \rightarrow carbon dioxide + water

	respiration	nutrition
A	✓	✓
B	✓	x
C	x	✓
D	x	x

6. Which graph illustrates the effect of temperature ranging from 20°C and 35°C on the activity of a human digestive enzyme?



7. What is the first product formed in a leaf due to photosynthesis?

- | | |
|----------------|------------|
| A. chlorophyll | C. glucose |
| B. starch | D. water |

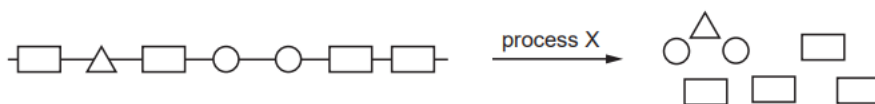
8. Four metabolic processes are listed below:

- carbon dioxide + water \rightarrow glucose + oxygen
- glucose \rightarrow alcohol + carbon dioxide
- glucose \rightarrow lactic acid
- glucose + oxygen \rightarrow carbon dioxide + water.

Which of these processes takes place within muscles?

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

9. The transformation of a large food molecule into smaller molecules is illustrated in the diagram.



Which process is denoted by X?

- | | |
|---------------|--------------|
| A. absorption | C. secretion |
| B. digestion | D. chewing |

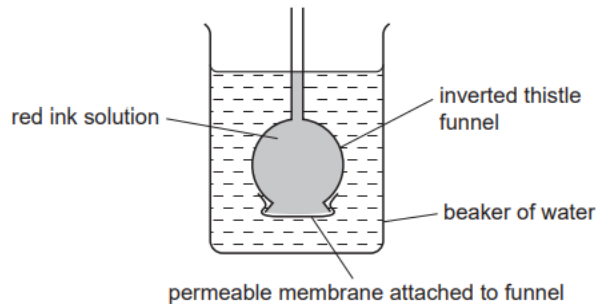
10. Which component of the human eye possesses sensitivity to light?

- | | |
|----------------|-----------|
| A. Lens | C. retina |
| B. optic nerve | D. iris |

11. Description of a root hair cell is:

	allows water to pass into the plant	increases the surface area of the root	loses water by transpiration
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

12. The diagram depicts an experiment showing the movement of molecules.



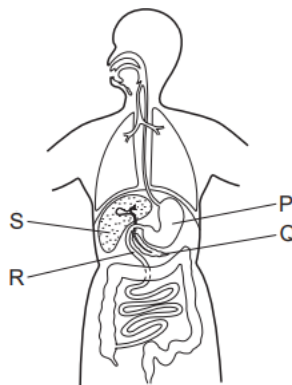
What is the probable reason for the color change of water into the red after one hour?

- A. Molecules of red ink move through the membrane by diffusion.
- B. Molecules of red ink move through the membrane by osmosis.
- C. Molecules of water move through the membrane by diffusion.
- D. Molecules of water move through the membrane by osmosis.

13. Which process yields the highest amount of energy from one glucose molecule?

- A. anaerobic respiration in muscle
- B. anaerobic respiration in yeast
- C. photosynthesis
- D. aerobic respiration

14. In which organs of the human body does the breakdown of proteins occur, in the diagram below?



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

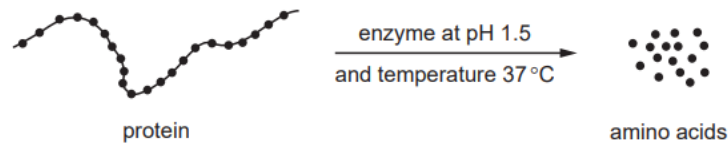
15. Which blood vessel exhibits a high concentration of carbon dioxide, a low concentration of oxygen, and a high blood pressure?

- A. pulmonary artery
- B. pulmonary vein
- C. vena cava
- D. aorta

16. Which food-testing reagent demonstrates a positive result by changing from blue to purple?

- A. biuret reagent
- B. ethanol
- C. iodine solution
- D. Benedict's solution

17. What factor in the figure would decrease the rate of amino acid production, working in the human digestive system?



- A. removing the amino acids as they are formed
- B. raising the temperature to 40 °C
- C. raising the pH to 7.5
- D. increasing the amount of protein

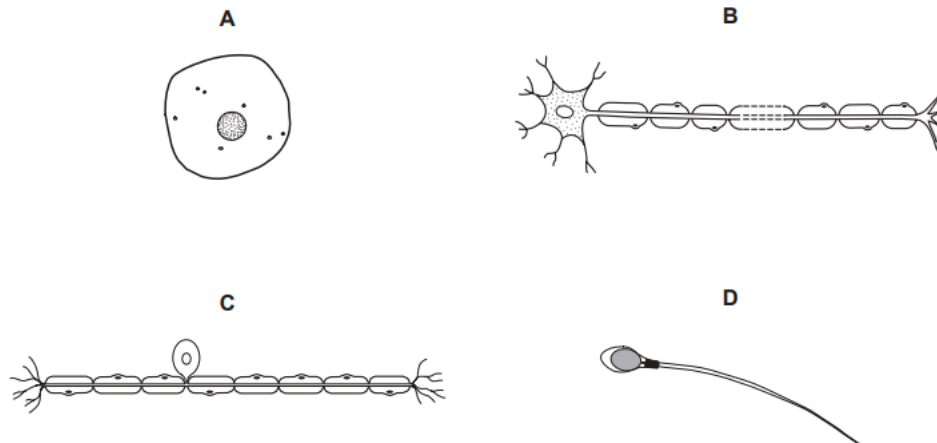
18. Which part of a leaf experiences high water evaporation during transpiration?

- A. the cuticle
- B. the spongy mesophyll cells
- C. the xylem vessels
- D. the guard cells

19. Which of the following is an example of gravitropism?

- A. a painful sensation in response to a stimulus
- B. the growth of a plant root towards the centre of the Earth
- C. the growth of a plant shoots toward light
- D. a chemical messenger produced by a plant

20. Which diagram illustrates a sensory neuron?



21. Which of the listed processes rely on enzyme action?

- 1. digestion
- 2. osmosis
- 3. respiration
- A. 1 and 2
- B. 1 only
- C. 2 and 3
- D. 1 and 3

22. Why does carbon dioxide move from capillaries to ALVEOLI?

- A. Carbon dioxide moves more freely in the air than in blood.
- B. Carbon dioxide must replace oxygen.
- C. Diffusion of carbon dioxide can only be out of the blood.
- D. Air has a lower concentration of carbon dioxide than blood.

23. Role of kidneys in a healthy person?

- | | |
|-------------------------|----------------------|
| A. eliminate all salts | C. retain all water |
| B. reabsorb all glucose | D. break down toxins |

24. Which substance is carried by haemoglobin?

- | | |
|-----------|-------------|
| A. oxygen | C. water |
| B. urea | D. nitrogen |

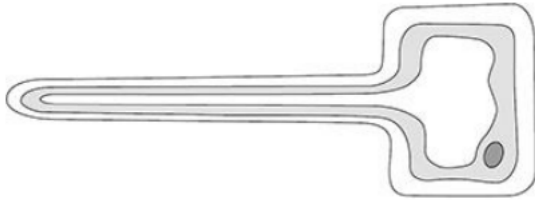
25. What causes the change in the plant's appearance after 24 hours?

- A. Water moves from the leaves to the stem.
- B. Water uptake is equal to water loss.
- C. Water loss is greater than water uptake.
- D. Water uptake is greater than water loss.

Theoretical Portion

Marks: 45

1. The figure illustrates a specialized cell responsible for absorbing substances from the soil.



- (i) Identify the type of specialized cell in Figure.
_____ [1]

- (ii) What benefit does the cactus of having a green stem?

_____ [2]

- (iii) Explain the adaptation of the cell in Figure that increases the substance absorption from the soil.

_____ [4]

- (iv) What is responsible for the green color in the stem of the cactus?

_____ [3]

[Total: 10]

2. (i) Explain the mechanism by which a high level of TMV (Tobacco Mosaic Virus) infection reduces growth in a plant.

[3]

(ii) Complete the diagram to show the possible genotypes of the offspring produced.

		Male gametes	
		R	r
Female gametes	R	RR	
	r		

[3]

(iii) DNA can encode the amino acids found within the active site of an enzyme. Clarify the function of an enzyme's active site.

[4]

(iv) Tissue typing is conducted before kidney transplantation to ensure a close permeability between the donated kidney and the recipient—however, corneal transplantation can be done without blood typing or tissue typing.

Suggest why successful corneal transplants without conducting tissue typing or blood typing.

[4]

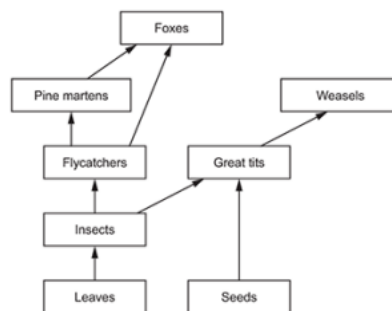
[Total: 14]

3. (i) Fetus blood does not blend with that of its mother, but substances can be exchanged through the placenta. The table depicts five substances that can pass through the placenta, their direction, and the cause of movement. The second row has been completed for you. Complete the remaining Table.

substance	direction of movement	reason
amino acids		
carbon dioxide	from fetus	waste gas from respiration
glucose		
oxygen		
urea		

[4]

(ii) Explain the classification of great tits are described as both primary consumers and secondary consumers, shown in the woodland food web.



[5]

(iii) Explain the reason why foxes are both predators and competitors of pine martens.

[4]

(iv) Rats act as major pests in many areas of the world, reducing food security and spreading diseases. Warfarin is a chemical used as a rat poison, and functions by inhibiting the activity of platelets in the blood. Detail the roles of platelets in the blood.

[4]

[Total: 17]

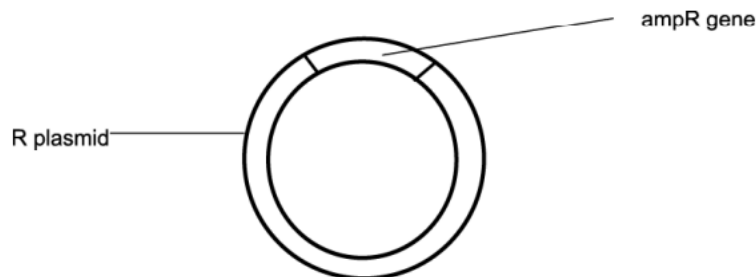
4. (i) The diagram depicts the left eye of a girl walking from a sunny beach into a dark café.



Diagram A: on the beach. **Diagram B:** after she enters the café. Explain the change and its occurrence mechanism.

[4]

(ii) What features of the R plasmid make it appropriate for use as a vector in genetic engineering? Use the details shown in the diagram to support your response.



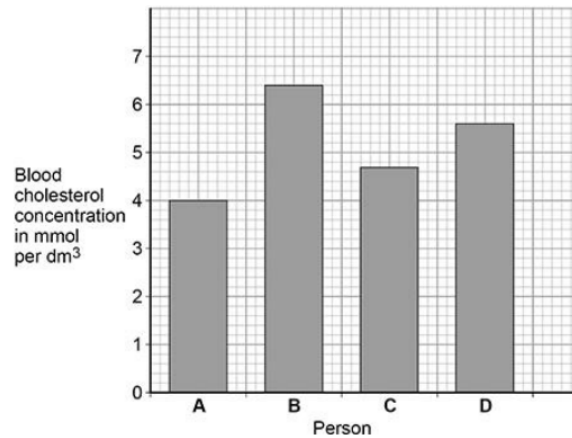
[4]

[Total: 8]

Practical Portion

Marks: 30

1. Doctors can access the cholesterol levels in the bloodstream.



(i) Who among the individuals falls in the medium cholesterol category?

_____ [1]

(ii) Who is at great risk of having a heart attack?

_____ [1]

(iii) Provide reasons for answering the part (ii).

_____ [2]

(iv) Calculate how many times the blood cholesterol concentration of person D is greater than that of person A.

_____ [2]

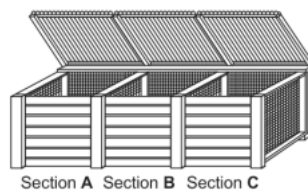
[Total: 6]

2. (i) How to use the quadrat method to estimate the percentage cover of buttercup plants in the field?

(ii) Identify three environmental factors that could influence the growth of buttercup plants in a field.

[Total: 12]

3. (i) A gardener purchases a composter with three sections, for the decomposition of plant material.

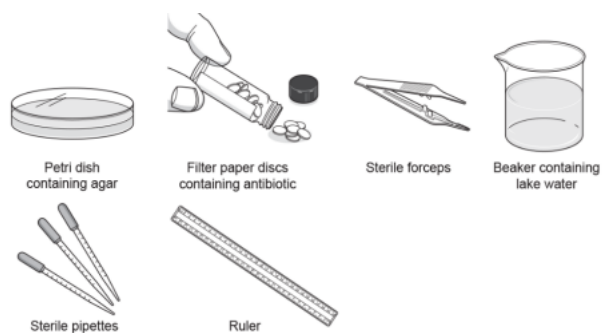


She designs an experiment to investigate if watering accelerates the decay process of plant material. She waters:

- Section A once a month
- Section B once a week
- Section C is not watered.

The gardener wants to obtain reliable results. Explain the factors that the gardener should keep constant throughout the experiment.

(ii) Researchers examine antibiotic pollution in two distinct lakes. They collect water samples from the two lakes and use aseptic techniques to assess the antibiotic resistance of bacteria present in the water samples.



Describe how the scientists utilize the shown apparatus to measure the antibiotic resistance of bacteria.

[Total: 12]