

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, center name, and center 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 Portion**

**Total: 25**

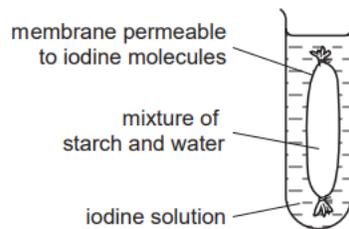
**1. The classification of four vertebrate animals is provided in the table.**

	animal 1	animal 2	animal 3	animal 4
phylum	Chordata	Chordata	Chordata	Chordata
class	Mammalia	Mammalia	Mammalia	Mammalia
order	Dermoptera	Dermoptera	Dermoptera	Dermoptera
family	Lemuridae	Indridae	Lemuridae	Indridae
genus	<i>Eulemur</i>	<i>Propithecus</i>	<i>Eulemur</i>	<i>Avahi</i>
species	<i>fulvus</i>	<i>diadema</i>	<i>coronatus</i>	<i>laniger</i>

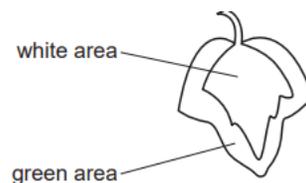
**Which two organisms share the closest relationship?**

- A. 1 and 2
  - B. 2 and 3
  - C. 1 and 3
  - D. 2 and 4
- 2. Which of the following structures is not an organ?**
- A. flower
  - B. xylem
  - C. spinal cord
  - D. artery

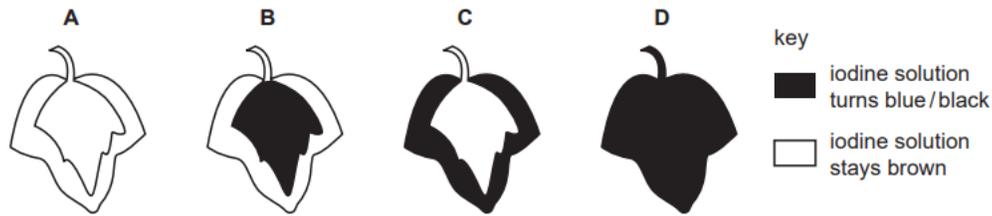
**3. What is the color of the starch and water mixture after 30 minutes in the experiment as shown?**



- A. orange
  - B. yellow-brown
  - C. white
  - D. blue-black
- 4. Which pair of substances are transported in the phloem?**
- A. amino acids and sucrose
  - B. protein and starch
  - C. amino acids and protein
  - D. starch and sucrose
- 5. Which effect occurs on the action of amylase by decreasing pH from 13 to 1?**
- A. slows it down only
  - B. speeds it up only
  - C. speeds it up then slows it down
  - D. slows it down then speeds it up
- 6. For several hours, a plant is left to stand in bright sunlight. A leaf is then separated and tested for starch, using an iodine solution, as shown in the diagram.**



Which diagram illustrates the result of the photosynthesis experiment?



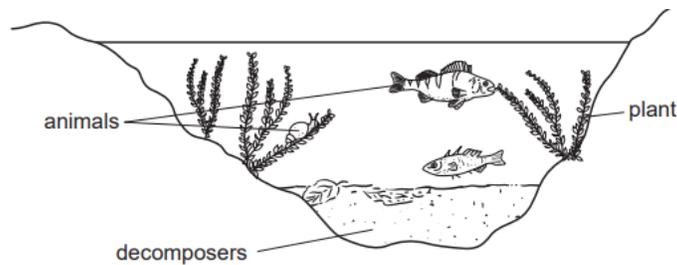
7. In case of severe food poisoning due to *Salmonella enterica*, the lining of the alimentary canal may be damaged, hindering the absorption of digested food products. Which region of the alimentary canal is impacted?

- A. ileum
- B. stomach
- C. esophagus
- D. colon

8. A root hair cell adapted for:

- A. support of stem
- B. transport of oxygen
- C. translocation of sucrose
- D. absorption of mineral ions

9. Which function is common to all the living organisms shown in the diagram?



- A. pollination
- B. transpiration
- C. respiration
- D. photosynthesis

10. What happens when a red blood cell is introduced into a concentrated sugar solution?

Why does this change occur?

- A. The cell bursts because the concentrated sugar solution enters it.
- B. The cell shrinks because water leaves it.
- C. The cell shrinks because sugar molecules leave it.
- D. The cell bursts as sugar molecules diffuse into it.

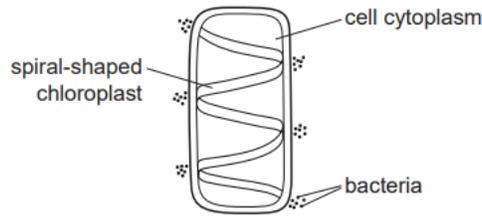
11. How to determine if amylase has digested all the starch including starch, water, and amylase?

- A. Add dilute hydrochloric acid.
- B. Weigh the test tubes and contents before and after the experiment.
- C. Add iodine solution.
- D. Add Biuret solution.

12. What happens to enzymes when exposed to temperatures above 60°C?

- A. They are destroyed by white blood cells.
- B. They are made more active.
- C. They are digested.
- D. They are denatured.

13. The diagram depicts a cell surrounded by a group of bacteria along its edge.



Which process influences the bacteria to move to areas of high oxygen concentration in groups?

- A. photosynthesis
- B. respiration
- C. reproduction
- D. digestion

14. Which components constitute the majority of the dry mass in a balanced diet?

- A. carbohydrates, fats, and proteins
- B. proteins, vitamins, and calcium compounds
- C. fats, proteins, and vitamins
- D. calcium compounds, carbohydrates, and fats

15. The effects of smoking cigarettes are described by which two statements?

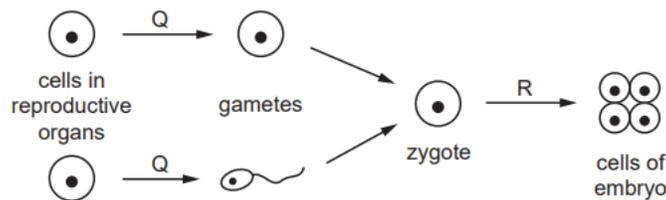
- Cilia beat more quickly.
- Cilia beat more slowly.
- Goblet cells stop producing mucus.
- Goblet cells produce more mucus.

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

16. For seed germination, which factor must always be present?

- A. light
- B. water
- C. mineral salts
- D. carbon dioxide

17. Which processes are represented by stages Q and R in the diagram showing sexual reproduction?



	Q	R
A	meiosis	meiosis
B	meiosis	mitosis
C	mitosis	meiosis
D	mitosis	mitosis

18. Which statement is not natural selection?

- A. production of many offspring
- B. variation within the population

C. selection by humans

D. competition for resources

**19. An example of a population is:**

- A. all the mahogany trees growing in a forest
- B. all the species of animals in Africa
- C. all the people born in a country for 100 years
- D. all the animals and plants living in a pond

**20. The term for the transfer of a gene from one organism to another is:**

- A. genetic engineering
- B. natural selection
- C. mutation
- D. artificial selection

**21. What factor reduces if rivers are filled with untreated sewage?**

- A. the concentration of oxygen
- B. the number of bacteria
- C. the amount of nitrate
- D. the concentration of carbon dioxide

**22. Some hormones in the human body are given below.**

- **V involves changes within the ovaries during the menstrual cycle**
- **W promotes the development of stronger muscles**
- **X causes the voice to deepen at puberty**
- **Y produced by the pancreas**

**Which statements are correct for testosterone?**

- A. V and W
- B. W and X
- C. X and Y
- D. V and Y

**23. Owners of racehorses expect that the offspring will be like their racehorse parents. How does a young racehorse inherit its characteristics?**

- A. Mainly from its father
- B. Mainly from its mother
- C. Equally from its mother and father
- D. Passed across the placenta

**24. How do fewer stomata of cacti help them to survive in desert conditions?**

- A. It increases the uptake of carbon dioxide.
- B. It reduces the loss of water.
- C. It reduces the uptake of carbon dioxide.
- D. It increases the loss of water.

**25. Some organisms feed on a dead rat and one of the organisms which, in turn, feeds on them. What additional component is required to complete the food chain?**

- A. consumer
- B. producer
- C. carnivore
- D. predator

**Theoretical Portion**

**Marks: 45**

1. (i) Explain the process of monoclonal antibody production.

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[4]

(ii) Identify two components of animal cells that are involved in respiration. Explain the function of each component.

Part 1

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Function

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Part 2

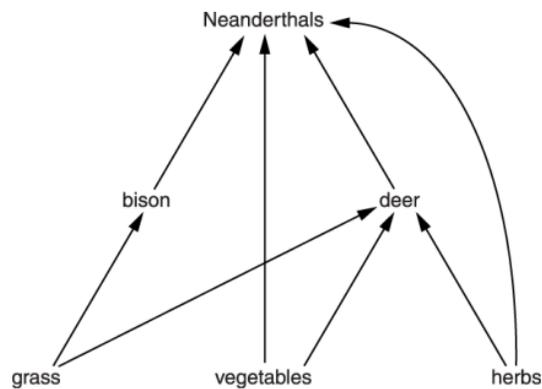
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Function

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[4]

(iii) The Neanderthal food web is illustrated below.



Examine the interdependence between the size of the bison population and the deer population.

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[4]

[Total: 12]

2. (i) The human body maintains the internal environment by responding to changes. Explain how the release of adrenaline helps the body restore its core temperature to normal when thermoreceptors in the skin and hypothalamus detect temperature changes.

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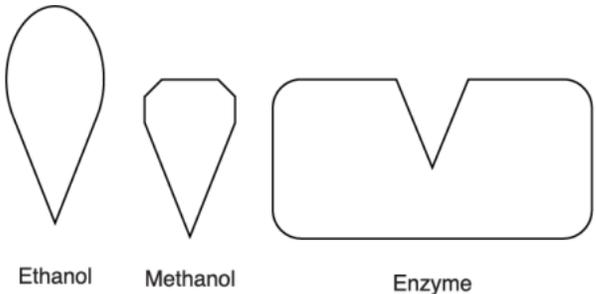
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[6]

(ii) Methanol, a type of alcohol, is broken down by an enzyme and the products are poisonous. It can be used to counteract methanol poisoning.



Shapes of enzyme, ethanol, and methanol are shown in the figure. Explain why ethanol is used to prevent methanol poisoning.

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[4]

(iii) Explain how water moves from the roots to the leaves of a tree.

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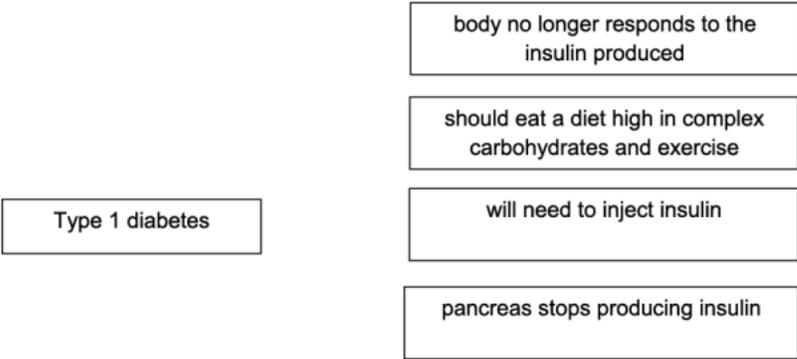
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[4]

[Total: 14]

3. (i) Connect each statement by drawing lines to Type 1 diabetes.



[2]

(ii) Explain the involvement of negative feedback in controlling body temperature.

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[4]

(iii) Kidney diseases can be treated through dialysis. Explain how blood filtration occurs by the dialysis machine.



Label the structures A and B along with their brief functions

**A:** \_\_\_\_\_

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**B:** \_\_\_\_\_

\_\_\_\_\_ [2]

[Total: 8]

**Practical Portion**

**Marks 30**

1. (i) An experiment on water movement in plant cells was conducted by a group of students. They measured the mass of five pieces of potato and placed each piece of potato into different concentrations of salt solution. After one hour they dried the potato pieces to record their mass. The results are shown in the table.

concentration of salt solution / %	mass / g			percentage change / %
	start	after 1 hour	change	
0	10.2	13.1	+2.9	+28.4
10	9.8	11.4	+1.6	+16.3
20	10.3	9.8	-0.5	
30	10.1	8.9	-1.2	-11.9
40	9.7	7.7	-2.0	-20.6

Determine the percentage change in the mass of the potato immersed in the 20% salt solution.

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[4]

- (ii) Explain why measuring a percentage change is more advantageous than that of mass change in the above experiment.

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[4]

- (iii) Investigate the impact of antiseptics and antibiotics on bacterial growth through the measurement of zones of inhibition.

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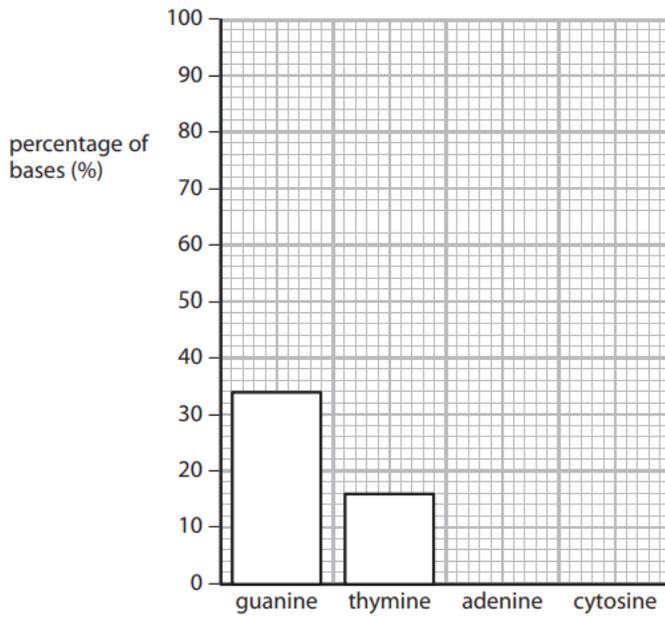
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[6]

[Total: 14]

2. (i) The percentage of guanine and thymine within a sample of DNA is shown in the table. Complete the bar chart by adding the percentage of adenine and cytosine in the DNA sample.



[4]

- (ii) Examine the effect of different variables on the rate of photosynthesis, including;

- carbon dioxide concentration
- temperature
- light intensity

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