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**BIOLOGY** **0610/43**

Paper 4 Theory (Extended) **October/November 2025**

**1 hour 15 minutes**

You must answer on the question paper.

No additional materials are needed.

**INSTRUCTIONS**

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

**INFORMATION**

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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**1** Scientists use classification systems to study relationships between different groups of organisms.

**(a)** State the **two** parts of a scientific name used in the binomial system.

View solution

.....  [1]

**(b)** Scientists discover a new species. It is multicellular, and has cell walls that are **not** made of cellulose. This new species feeds by releasing digestive enzymes into its surroundings and then absorbing the digested nutrients.

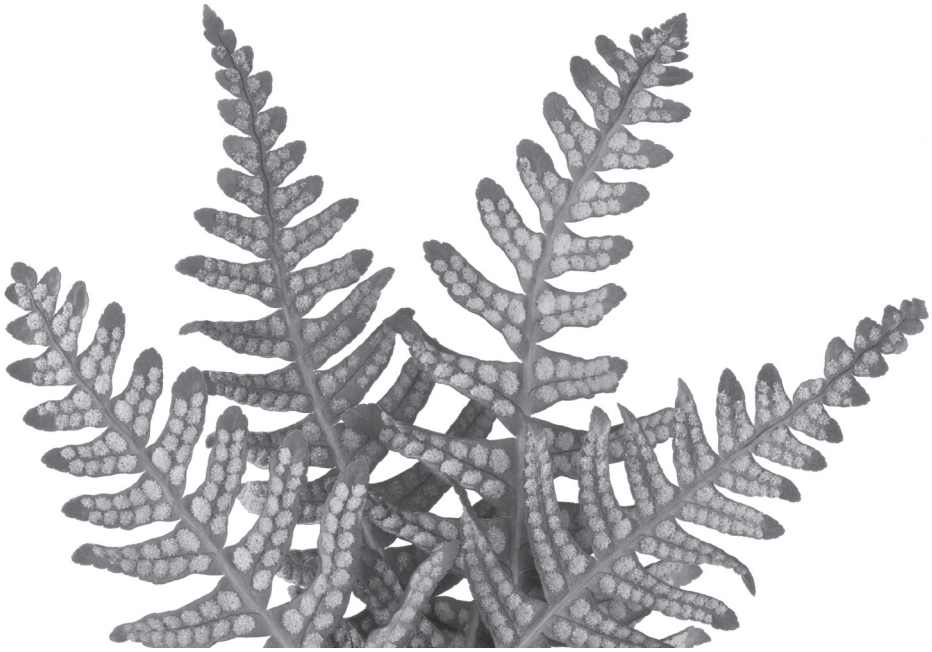
Identify the kingdom that the new species belongs to.

View solution

.....  [1]

**(c)** Fig. 1.1 shows photographs of two different species, **X** and **Y**.

View solution



species **X**



species **Y**

**Fig. 1.1**

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**(i)** Species **X** and **Y** belong to the plant kingdom.

State **two** structures found in cells from species **X** and **Y** that are **not** found in animal cells.

1 .....

2 .....

[2]

**(ii)** Using features visible in Fig. 1.1, identify the group in the plant kingdom that species **X** and **Y** belong to.

View solution

Explain your answer.

species **X** .....

.....

.....

.....

species **Y**.....

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[4]

**(iii)** Understanding evolutionary relationships between crop plants can help scientists and farmers improve agriculture.

Explain how a scientist could determine if different crop plant species share a recent ancestor (are closely related).

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..... [2]

[Total: 10]

View solution

**2** Chickens are birds that are bred by farmers to produce eggs and meat. Modern farmed chickens are very different from the red junglefowl that is their wild ancestor.

Table 2.1 describes some of the characteristics of red junglefowl and farmed chickens.

**Table 2.1**

| type of bird | mean body mass / g | mean number of eggs per year | mean mass of pectoral muscle / g | mean age at maturity / days |
|---|---|---|---|---|
| red junglefowl | 775 | 12 | 91 | 142 |
| chicken | 4090 | 160 | 437 | 59 |

**(a) (i)** Using Table 2.1, calculate the percentage change in the mean body mass from the red junglefowl to the chicken.




Give your answer to **three** significant figures.

Space for working.

..... % [3]

**(ii)** Suggest reasons why farmers have selectively bred chickens to reach maturity faster than red junglefowl.

.....

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..... [2]

**(iii)** Describe how a farmer could breed chickens with a larger body mass.

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..... [3]

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**(b)** Chicken faeces can be used as a fertiliser.

Chicken faeces spread on agricultural land near lakes can act as a pollutant, and cause the destruction of the freshwater habitat.

Explain how the use of chicken faeces near freshwater lakes can lead to habitat destruction.

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..... [6]

**(c)** Chicken waste contains a substance that is similar to urea.

View solution

Explain how urea is made in humans.

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.....

.....

.....

.....

.....

..... [3]

[Total: 17]

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**3** **(a)** Describe the pathway a water molecule takes from the soil to reach the xylem.

.....

.....

.....

.....

..... [2]

View solution

**(b)** A student investigated the effect of temperature on transpiration.

The student collected four small plants and placed them in beakers filled with water.

Fig. 3.1 shows the apparatus used.

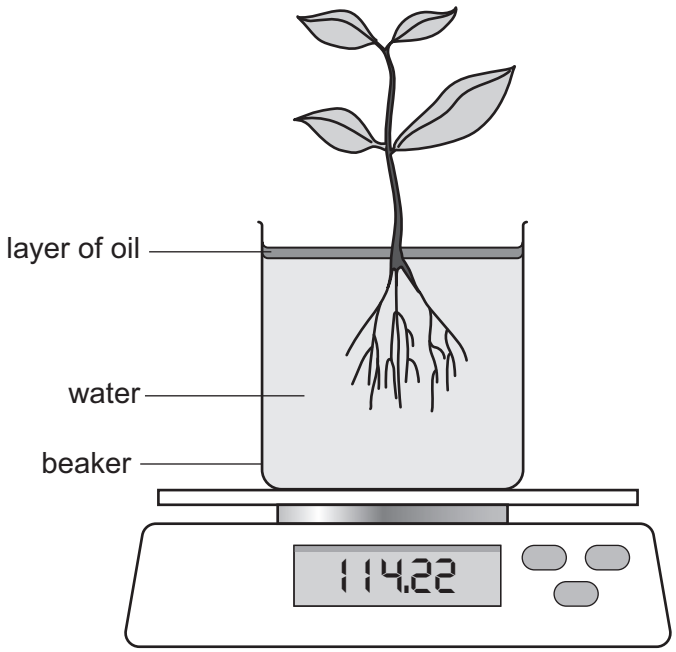


**Fig. 3.1**

For each plant, the student measured the initial masses of the equipment, water and plant.

Each plant was placed in a different temperature-controlled room for three hours.

After three hours, the student measured the final masses of the equipment, water and plants.

The results are shown in Table 3.1.

**Table 3.1**

| temperature / °C | initial mass / g | final mass / g | transpiration rate / g per hour |
|---|---|---|---|
| 15 | 138.2 | 135.5 | 0.9 |
| 20 | 136.1 | 132.5 | 1.2 |
| 25 | 137.8 | 128.5 | 3.1 |
| 30 | 135.7 | 118.3 | |

**(i)** Using the information in Table 3.1, calculate the transpiration rate in the plant kept at 30 °C.

..... g per hour [1]

**(ii)** Describe **and** explain the difference in the results for the plants kept at 15 °C and 25 °C.

.....

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..... [4]

View solution

**(iii)** The investigation was repeated with a plant kept at 25 °C in a lower humidity environment.

Predict the effect of these conditions on the transpiration rate.

View solution

Explain your prediction.

.....

.....

.....

.....

..... [2]

**(iv)** Complete the sentences about water movement through the xylem.

View solution

The xylem transports water and ..... .

Xylem cells form a long continuous ..... with thick walls

containing cellulose and ..... .

Water moves upwards in the xylem because of transpiration ..... .

This draws up a ..... of water molecules, held together by

..... between water molecules.

[6]

**(c) (i)** Explain why wilting occurs.

View solution

.....

.....

.....

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.....

.....

..... [3]

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**(ii)** Marram grass, *Ammophila arenaria*, is a xerophyte.

View solution

Fig. 3.2 is a photomicrograph of a cross-section of a marram grass leaf.

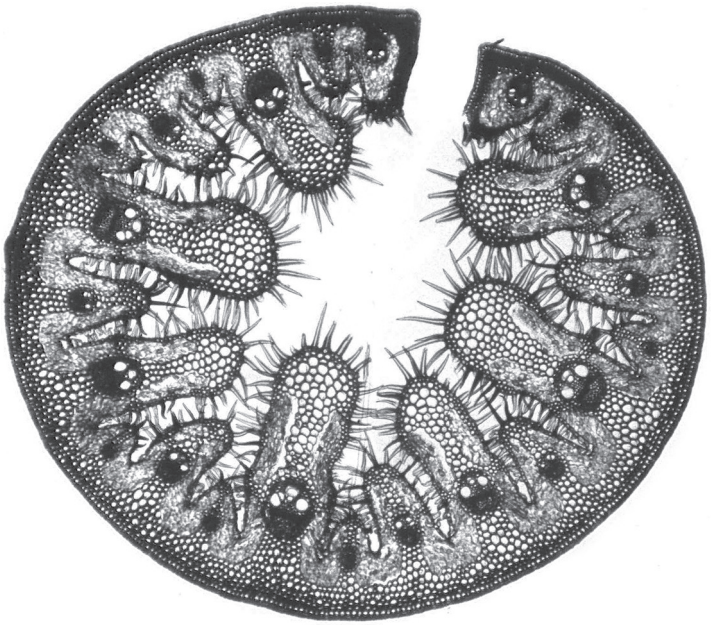

**Fig. 3.2**

Explain **one** way that the marram grass leaf shown in Fig. 3.2 is adapted to reduce transpiration.

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..... [2]

[Total: 20]

**4** Fig. 4.1 shows a section through a human heart and the main blood vessels.

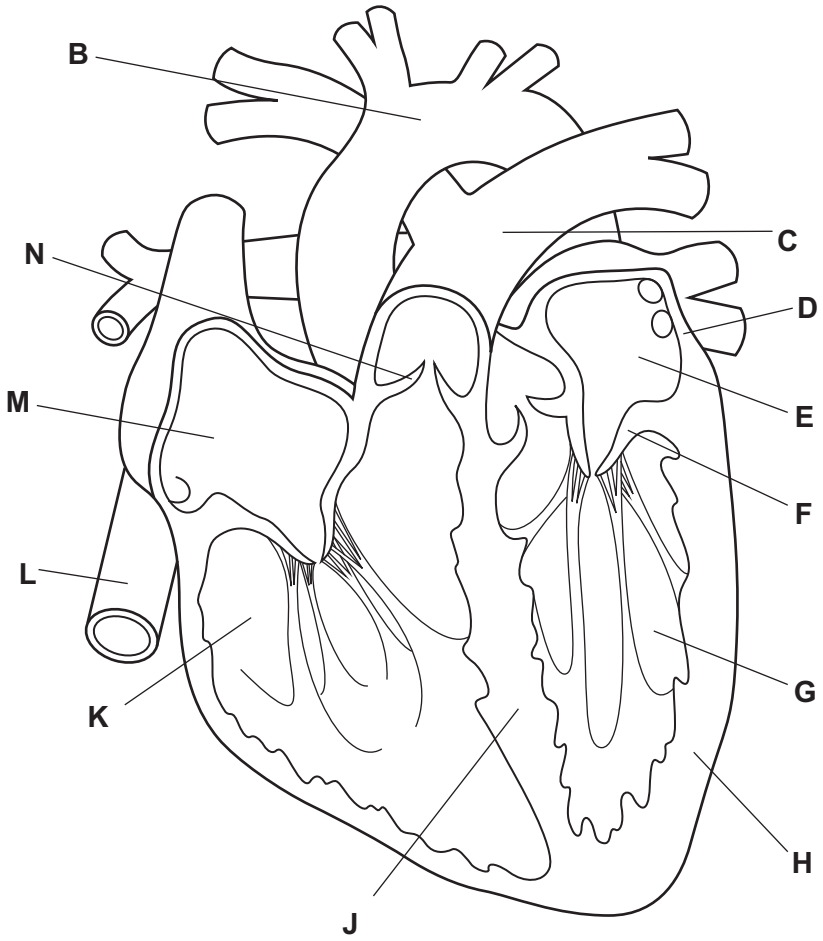


**Fig. 4.1**

View solution

**(a) (i)** State the letter in Fig. 4.1 that identifies:

the structure that separates oxygenated and deoxygenated blood .....

an atrioventricular valve. .....

[2]

View solution

**(ii)** Explain why the heart wall at **H** is thicker than the heart wall at **D** in Fig. 4.1.

.....

.....

.....

.....

..... [2]

**(iii)** Table 4.1 contains eight descriptions of parts of the pathway a red blood cell takes as it moves from the vena cava to the aorta.

Using Fig. 4.1, complete Table 4.1 by numbering the descriptions to show the correct sequence.

Two have been done for you.

View solution

**Table 4.1**

| description | sequence |
|---|---|
| blood enters **C** | |
| blood enters **E** and then **E** contracts | |
| blood enters **M** and then **M** contracts | 1 |
| blood travels to lungs | |
| blood moves into **G** | |
| blood moves into **B** | 8 |
| **N** opens | |
| blood moves into **K** | |

[2]

**(b)** Fig. 4.2 shows the effect of exercise on heart rate.

View solution

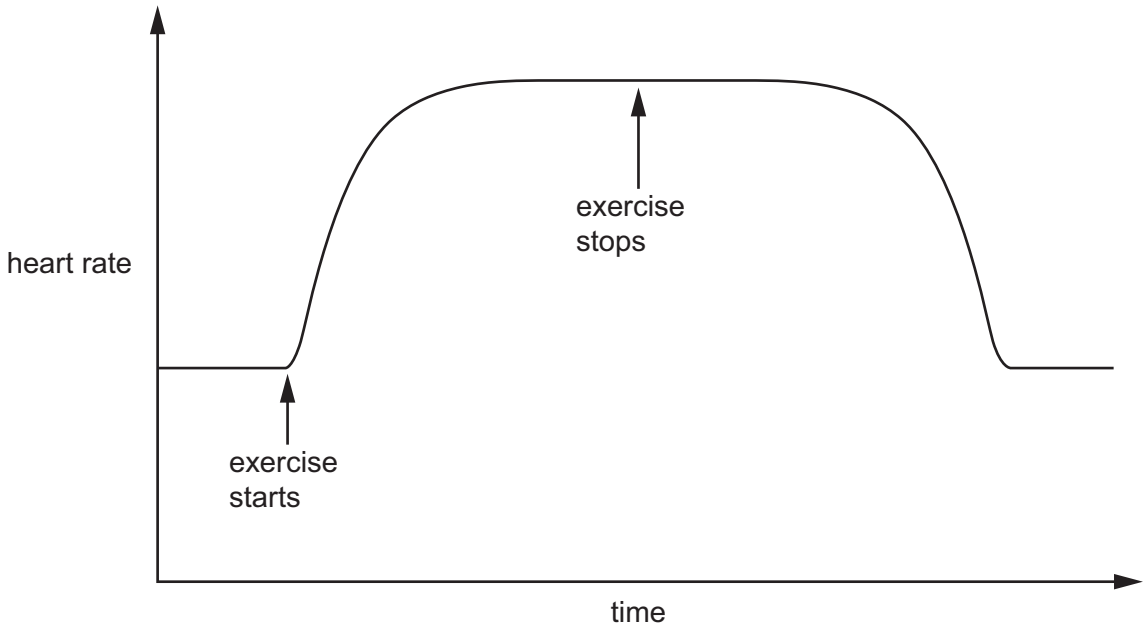


**Fig. 4.2**

**(i)** Explain the effect of exercise on heart rate shown in Fig. 4.2.

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..... [5]

**(ii)** A lack of exercise can increase the risk of coronary heart disease.

View solution

State **three** other factors that can increase the risk of coronary heart disease.

1 .....

2 .....

3 .....

[3]

[Total: 14]

**5** **(a)** **(i)** State the balanced chemical equation for photosynthesis.

View solution

.....  [2]

**(ii)** Chlorophyll is needed for photosynthesis.

State the name of the mineral ion needed to make chlorophyll.

View solution

.....  [1]

**(iii)** State the name of the carbohydrate used for energy storage in a plant.

View solution

.....  [1]

**(b)** A plant shoot was placed in a light-proof box. A hole was cut in one side of the box and a light was shone into the box.

View solution

Fig. 5.1 shows the plant shoot at the start of the investigation and after one week.

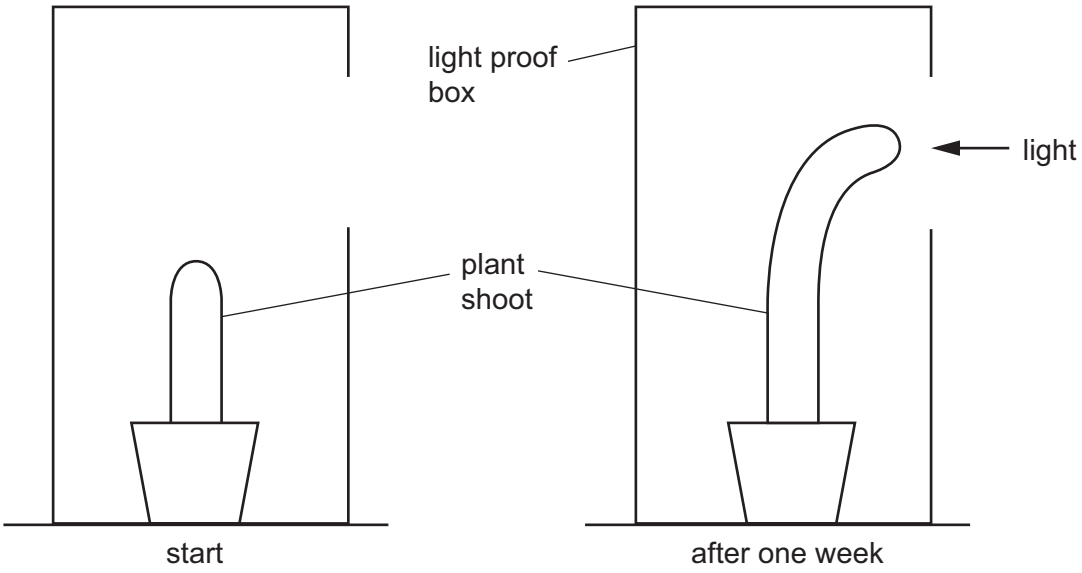


**Fig. 5.1**

**(i)** Identify the tropic response shown by the plant shoot in Fig. 5.1.

.....  [1]

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**(ii)** Explain the chemical control of the tropic response shown by the plant shoot in Fig. 5.1.

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..... [4]

**(iii)** Explain how the type of tropic response shown in Fig. 5.1 is an advantage to a plant.

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.....

..... [2]

[Total: 11]

**6** **(a)** Fig. 6.1 is a diagram of the human male reproductive system.

View solution

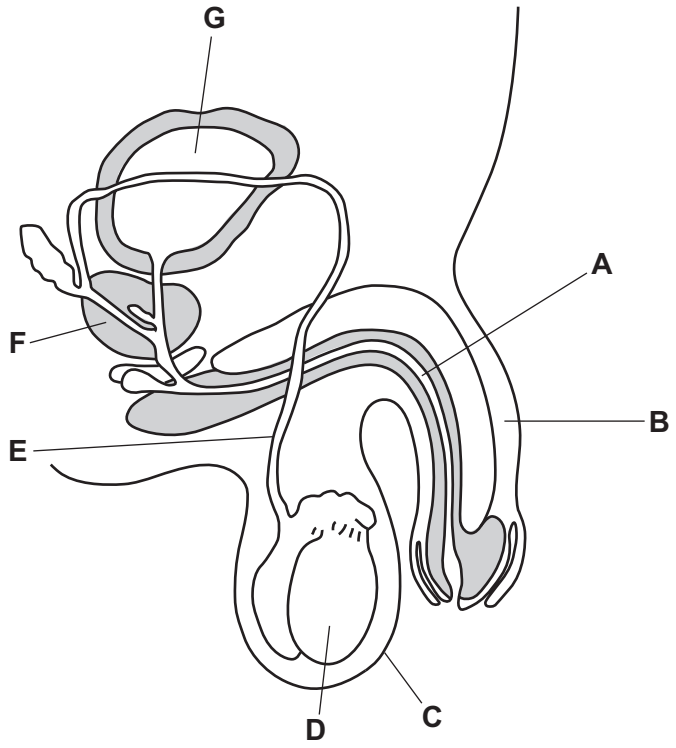


**Fig. 6.1**

Table 6.1 contains information about the male reproductive system shown in Fig. 6.1.

Complete Table 6.1.

**Table 6.1**

| letter in Fig. 6.1 | name of the structure | function |
|---|---|---|
| | scrotum | |
| | | produces seminal fluid |
| | | transports urine and sperm |
| **E** | | |

[4]

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**(b)** State the name of the hormone that causes voices to deepen at puberty.

..... [1]

**(c)** Sperm have adaptive features to carry out their function.

View solution

Explain **three** adaptive features of sperm.

1 .....

.....

2 .....

.....

3 .....

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[3]

[Total: 8]

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