

**Biology
Higher level
Paper 1B**

11 May 2026

Zone A afternoon | Zone B afternoon | Zone C afternoon

Session number

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2 hours [Paper 1A and Paper 1B]

Instructions

- Write
- Do not
- Answer
- Answer
- A calculator
- The maximum mark for paper 1B is **[35 marks]**.
- The maximum mark for paper 1A and paper 1B is **[75 marks]**.

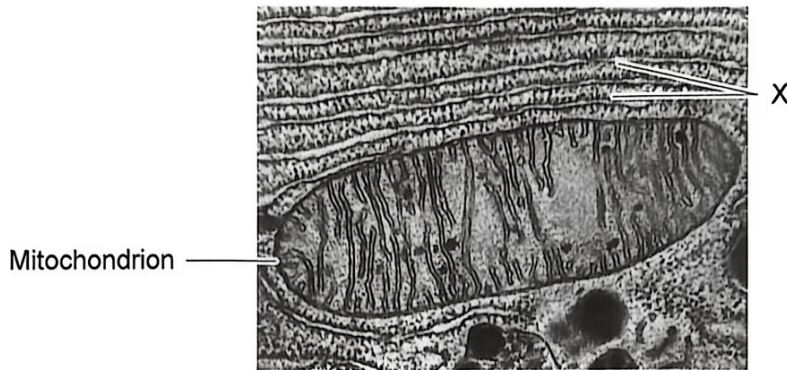
IBDP 生物

HL P1B

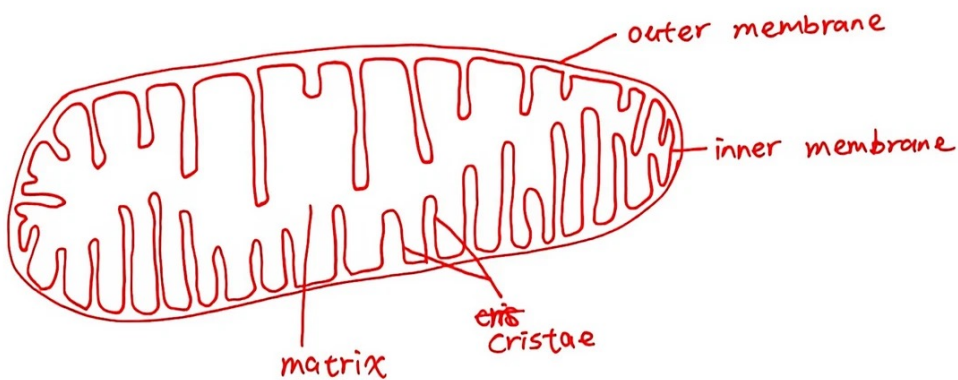


Answer all questions. Answers must be written within the answer boxes provided.

1. The electron micrograph shows part of a cell.



- (a) (i) Draw a labelled diagram of the structures of the mitochondrion that are visible in the micrograph. [3]



- (ii) The organelles labelled X are also contained inside the mitochondria. Distinguish between X and these organelles inside the mitochondria. [1]

..... X is 80S ribosome, 70S ribosome is inside the mitochondria.

- (iii) Structure X synthesizes proteins for secretion out of the cell. State another organelle required for this process. [1]

..... Golgi body

(This question continues on the following page)



12EP02

(Question 1 continued)

- (b) Explain how to prepare and view a temporary mount of a tissue such as onion (*Allium cepa*) epidermis.

[3]

Peel a thin, transparent layer of epidermis tissue from the inner surface of Allium cepa scale using forceps. Place the tissue flat on a clean slide, add a drop of water, add a coverslip gently. View the slide under a light microscope, starting with lower power and then using high power for detail.

Stain .

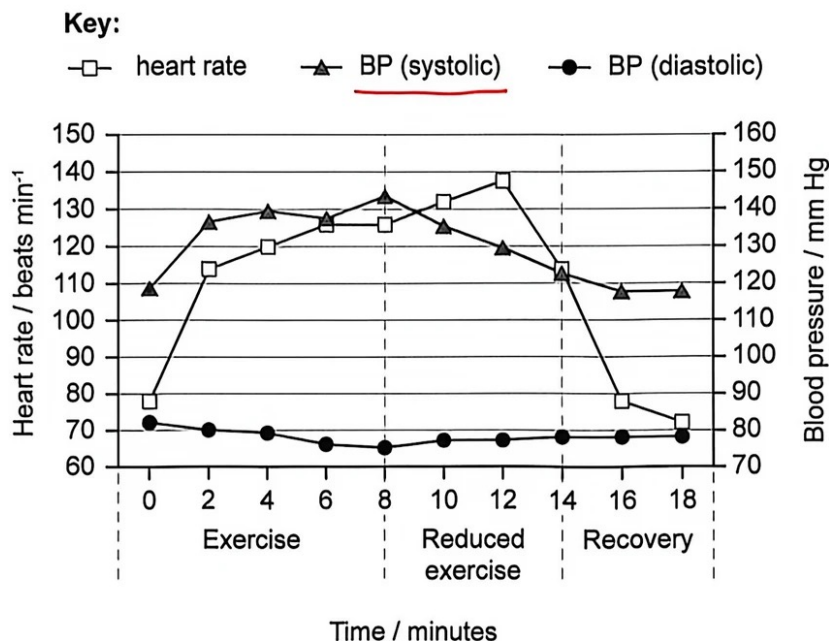
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12EP03

Turn o

2. A student monitored their heart rate and blood pressure (BP) before, during and after (recovery period) exercise. The graph shows the data they collected.



- (a) (i) Calculate the maximum increase in systolic blood pressure from the beginning of the investigation.

[1]

$$143 - 118 = 25 \text{ mm Hg}$$

..... 25 mmHg

- (ii) Compare and contrast the change in heart rate and systolic blood pressure during the investigation.

[2]

S:
 ... Both heart rate and systolic BP increase significantly at the ...
 ... start of exercise
 D: Systolic BP start to drop earlier than heart rate

(This question continues on the following page)



(Question 2 continued)

- (iii) Suggest a reason for the changes seen in diastolic blood pressure over the course of the investigation. [1]

During exercise, the blood vessels in the skeletal muscles dilate to increase blood flow, which reduces peripheral resistance, so diastolic BP stay relatively stable.

- (b) (i) State the adaptation in the capillaries of some tissues for extremely rapid exchange. [1]

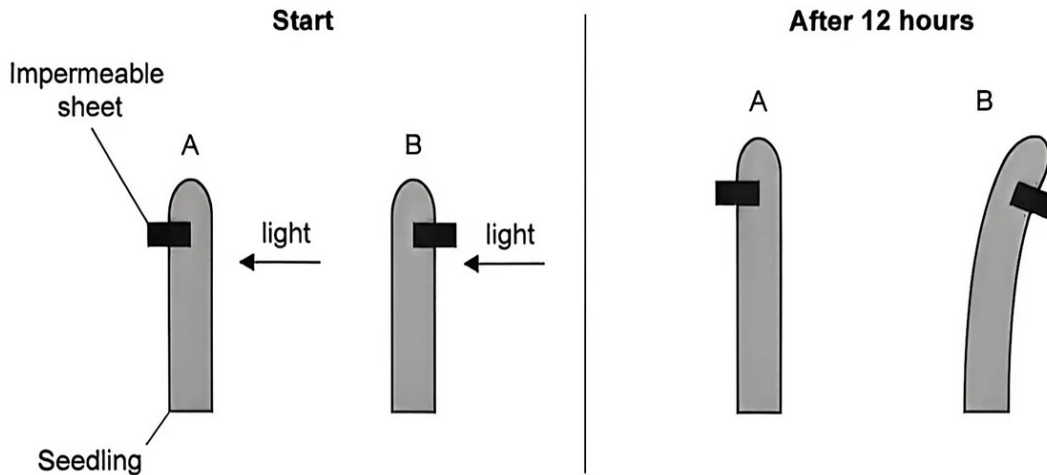
Capillaries have a very thin wall consisting of a single layer of cells.

- (ii) Distinguish between the structure of arteries and veins. [3]

	Arteries	veins
Wall thickness	thick, muscular and elastic	thinner, less muscular, less elastic
lumen	narrow	wide
Valves	Without	Have



3. Researchers inserted small pieces of impermeable plastic sheet into opposite sides of two seedlings, A and B, that were growing vertically. They exposed the seedlings to unilateral light (light from one direction) for 12 hours. The diagram shows the results.



- (a) (i) Identify the response shown by seedling B.

[1]

..... Positive phototropism

- (ii) Suggest a control for this investigation.

[1]

..... A vertically growing seedling without impermeable sheet, exposed to unilateral light for 12h

- (iii) Explain the difference in the appearance of seedlings A and B after 12 hours.

[3]

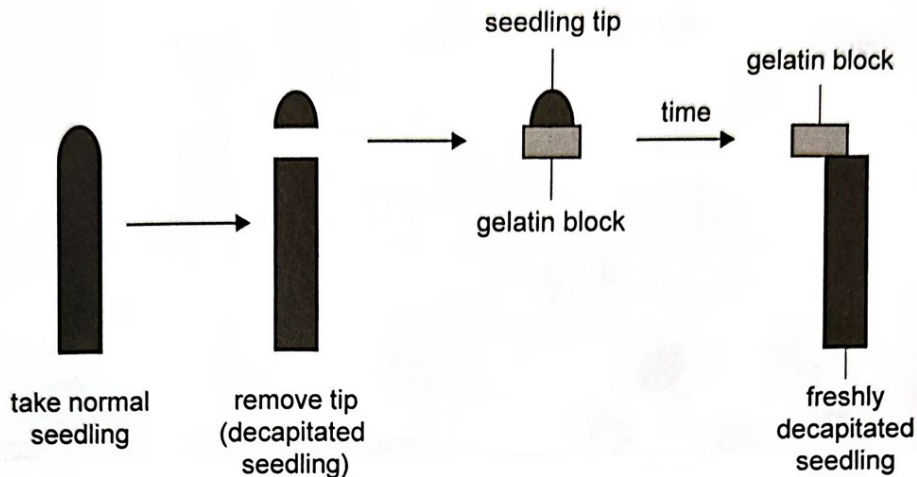
..... The tip produces the growth substance, auxin.....
 For seedling B, with unilateral light, more auxin reaches the shaded side, auxin stimulates the cells to elongate faster..... lateral.....
 For seedling A, with unilateral light, the movement of auxin is prevented by the impermeable sheet.....

(This question continues on the following page)



(Question 3 continued)

- (b) In another experiment carried out in the dark, 10 tips of seedlings were removed. Each tip was placed on a separate block of gelatin, which can absorb chemicals. Every hour, a tip was removed from one gelatin block, and the block was placed on a freshly decapitated seedling, as shown in the diagram.



- (i) Once the blocks were added to the freshly decapitated seedlings, the seedlings were left for 48 hours before the results were recorded. Predict the results of the experiment. [2]

..... All seedlings bend away from the side with the block.
 Seedlings with later blocks show greater curvature
 and taller growth.....

- (ii) Suggest a quantitative measurement for this experiment. [1]

..... The angle of curvature of the seedlings.....
 (or) The height of the seedlings.....

- (c) Outline how the phytohormone ethylene (ethene) promotes fruit ripening. [1]

..... By increasing the fruit's respiration rate, accelerating
 the conversion of starches to sugars.....

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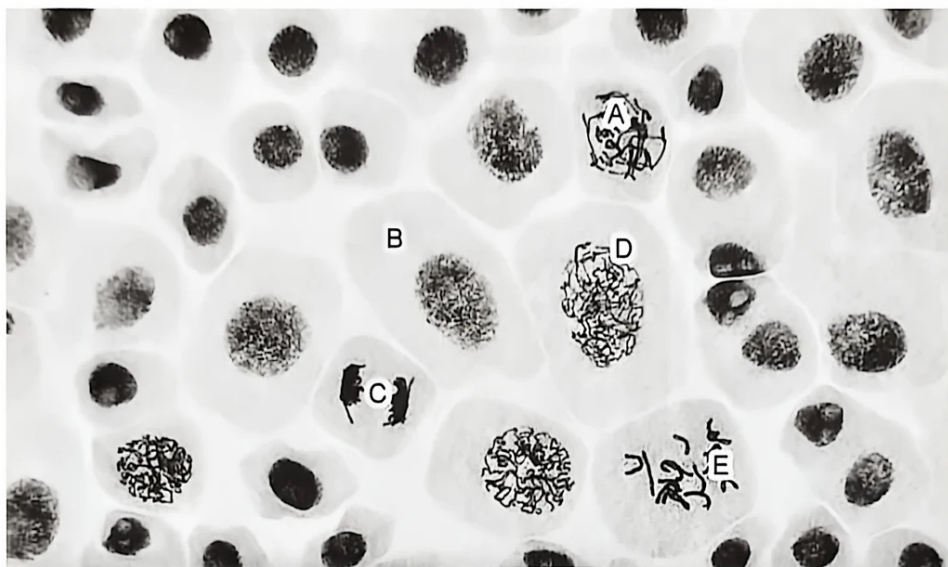
A004



12EP07

Turn over

4. Students examined cells from an onion (*Allium cepa*) root tip under the microscope. The micrograph shows a section through the tissue.



- (a) (i) List the letters of the cells in order of the phases of mitosis. [1]

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

- (ii) Identify the phase shown in cell C. [1]

....Anaphase.....

- (iii) State **one** phase that is **not** shown in the micrograph. [1]

....Metaphase.....

(This question continues on the following page)



(Question 4 continued)

- (b) The mitotic index of 160 cells in meristem tissue was 0.25. Calculate the number of cells in cell division.

[1]

$$160 \times 0.25 = 40$$

.....40.....

- (c) Distinguish between the cells produced at the end of mitosis and meiosis.

[2]

	mitosis	meiosis
number of daughter cells	2	4
type genetically	2 diploid identical	haploid different

538

- (d) Onion plants are hermaphroditic. Discuss how hermaphroditic plants increase genetic variation in offspring.

[4]

- mutation
- independent assortment
- crossing over
- random fertilisation
- cross pollination

A004



12EP09