Diploma Programme
Programme du diplôme
Programa del Diploma

Biology
Standard level
Paper 2

29 October 2025

Zone A morning | **Zone B** morning | **Zone C** morning

Candidate session number

1 hour 30 minutes

Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer one question.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[50 marks]**.

8825–6012

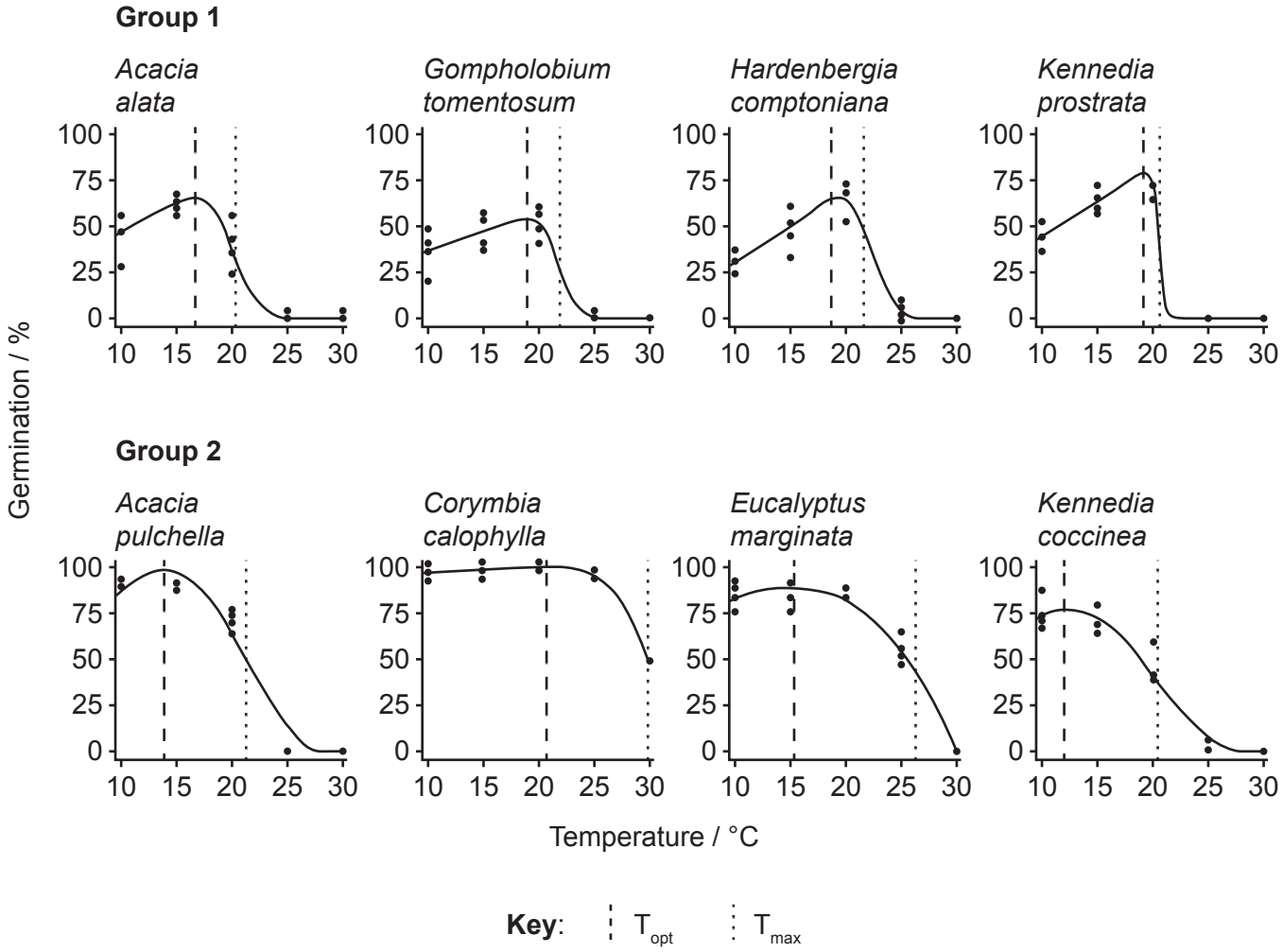
17 pages

Section A

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

1. Fires are a natural phenomenon in some forest ecosystems, so plants evolve to become fire-adapted. The Northern Jarrah Forest in southwest Australia is an example. The seeds of many species germinate after forest fires, when there is less competition for resources from existing plants.

The effect of temperature on germination was measured in species that occur commonly in the Northern Jarrah Forest. The graphs show results for eight species across the range of soil temperatures expected in this ecosystem. Four replicates of 25 seeds were sown at each temperature. Statistical modelling was used to predict the overall relationship between temperature and germination, and to estimate the optimum temperature (T_{opt}) and maximum temperature (T_{max}) at which germination commonly occurs. The eight species were then divided into two groups according to the effects of temperature on germination.



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(Question 1 continued)

(a) Identify the species in which T_{opt} is lowest. [1]

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(b) Calculate the range for T_{max} among the eight species. [1]

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(c) Analyse the graphs to find the key difference between species in Group 1 and Group 2. [1]

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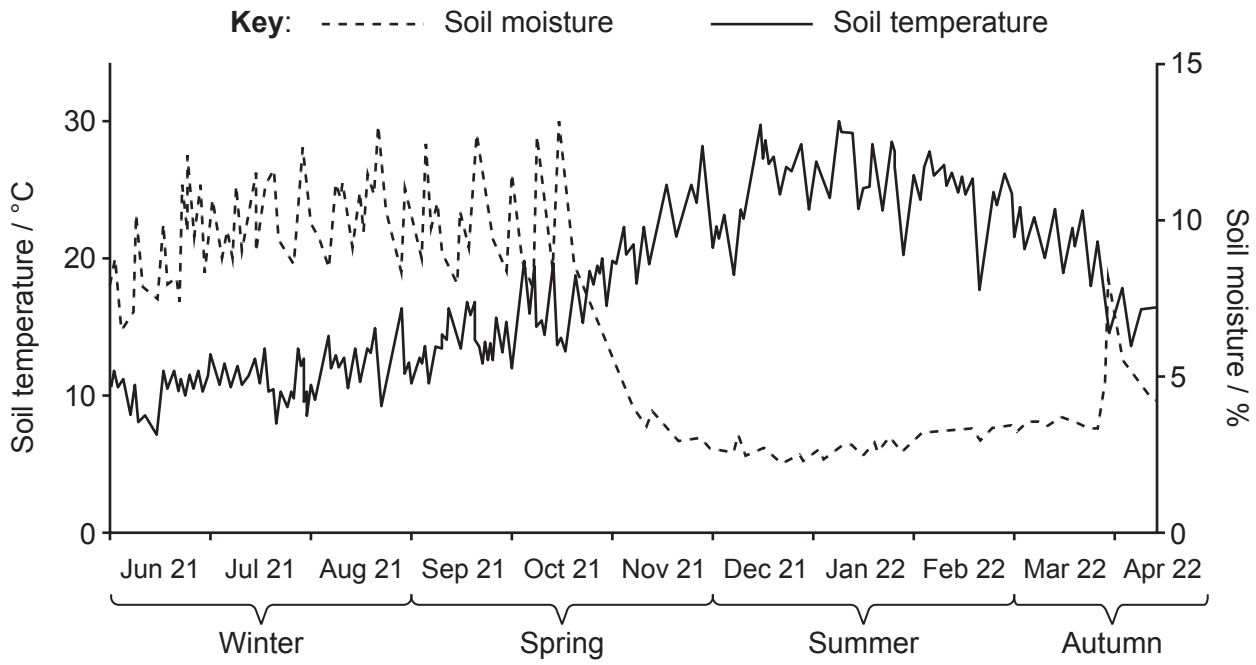
(Question 1 continued)

To investigate the seasonality of germination, soil temperature and soil moisture were monitored at sites in Korung National Park, which is part of the Northern Jarrah Forest. The graph shows the results.



(d) (i) Distinguish between soil moisture in winter and in summer. [2]

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(ii) Suggest reasons for the differences. [2]

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(Question 1 continued)

(e) Predict, giving reasons, when germination would start in *Kennedia prostrata*, following a forest fire at the start of summer. [3]

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(f) Using the data in the graphs, discuss whether species in Group 1 or Group 2 are more likely to be adversely affected by increases in soil temperature due to global warming. [2]

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will not be marked.

2. (a) Some of the twenty amino acids that are linked together to make polypeptides in human cells are essential in the diet and others are not. Distinguish between essential and non-essential amino acids. [2]

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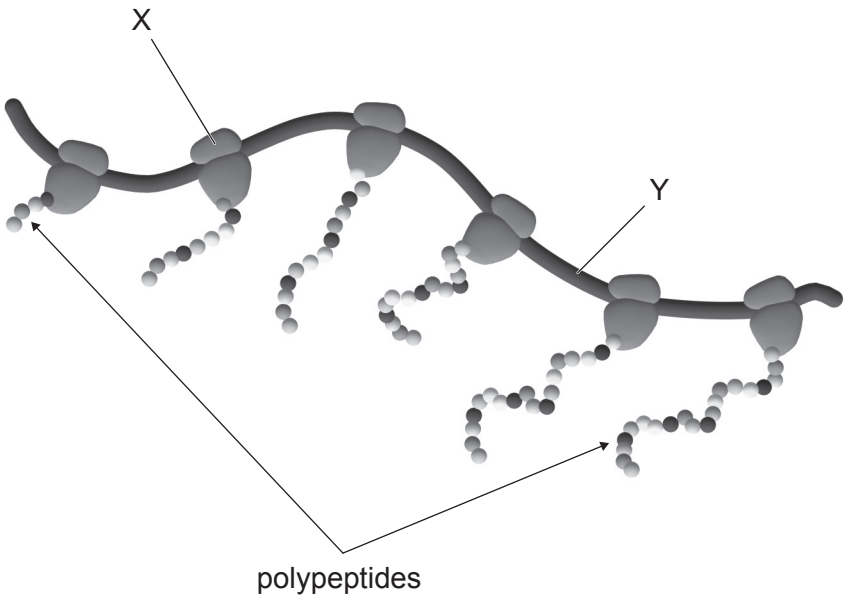
The diagram represents the synthesis of proteins in the cytoplasm of a cell.



(b) Identify X and Y. [2]

X: . . . . . .

Y: . . . . . .

(c) Six polypeptides are shown in the diagram. Explain the different lengths of these polypeptides. [2]

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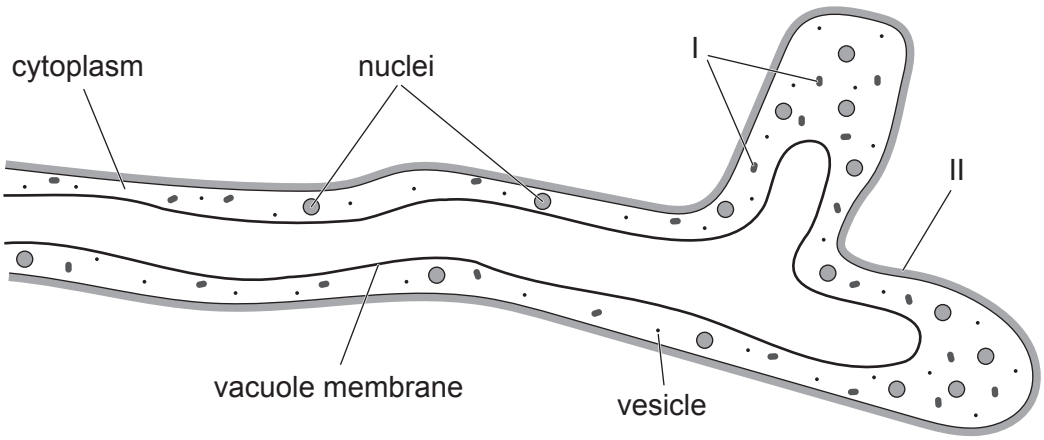
3. The diagram shows the structure of part of a fungus.



(a) The structures labelled I are membrane-bound organelles. Deduce, giving a reason, what these organelles could be. [2]

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(b) State with a reason whether the fungus is prokaryotic or eukaryotic. [1]

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(c) The structure labelled II is the outer part of the fungus. State the main component of this structure. [1]

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(Question 3 continued)

(d) Identify **one** feature of the fungus that is atypical of cell structure. [1]

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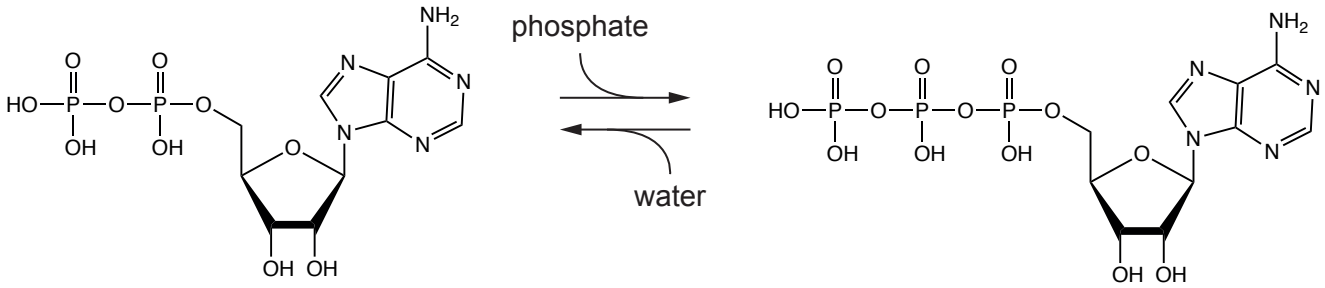
(e) Water is the main component of vacuoles and cytoplasm in fungi. Draw a diagram to show the structure of a water molecule. [2]

4. The equation shows a reversible reaction that happens in all living cells.



ADP (adenosine diphosphate)

ATP (adenosine triphosphate)

(a) State **two** processes in cells that are supplied with energy by converting ATP to ADP. [2]

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(b) Outline how ATP is produced in cells. [3]

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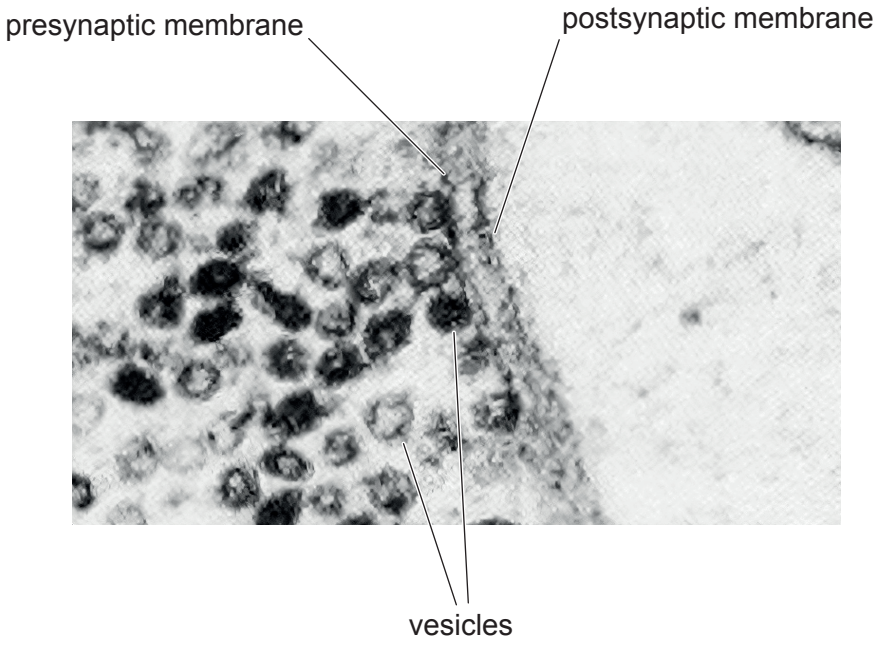
5. The electron micrograph shows part of a synapse between two neurons.



(a) Deduce what type of substance the vesicles contain. [1]

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(b) Distinguish between the presynaptic and postsynaptic membranes by giving **two** differences. [2]

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(c) The gap between the presynaptic and postsynaptic membranes is very narrow. Suggest an advantage of this. [1]

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Section B

Answer **one** question. One additional mark is available for the construction of your answer. Answers must be written within the answer boxes provided.

6. Feedback control is used to regulate the levels of variables in the blood system.

(a) Discuss the use of positive and negative feedback to control levels of variables. [4]

(b) Describe the mechanisms used to keep blood glucose levels within narrow limits in humans. [7]

(c) Explain the changes that would occur in the body if blood pH decreased below the optimum level. [4]

7. Convergent evolution increases similarities, despite differences in origins.

(a) Explain how analogous structures can evolve. [4]

(b) Describe adaptations that are typical of plants growing in hot deserts throughout the world. [7]

(c) Suggest examples of adaptations in herbivores for feeding on plants. [4]

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References:

1.a and d Ryan, C., Callow, J.N., Lewandrowski, W. and Tangney, R., 2023. *Conserv Physiol* 11(1): coad093. https://doi.org/10.1093/conphys/coad093. Reference redacted. Source adapted.

2. Christinelmiller. https://en.wikipedia.org/wiki/File:Multiple_Ribosomes_Translation_Protein_Synthesis.png. CC BY-SA 4.0. https://creativecommons.org/licenses/by-sa/4.0, image adapted.

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