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Environmental systems and societies
Higher level
Paper 2

4 May 2026

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

Session number

2 hours 30 minutes

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Instructions to students

- 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 two questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[80 marks]**.



Section A

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

Figure 1(a): The demographic transition model (DTM) showing changing levels of birth rate and death rate in a human population through different stages of development over time

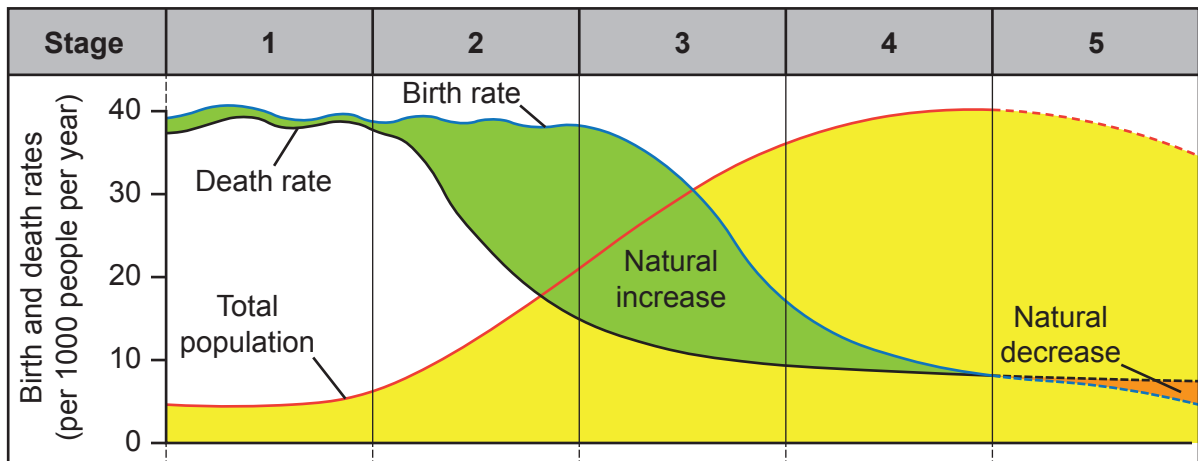
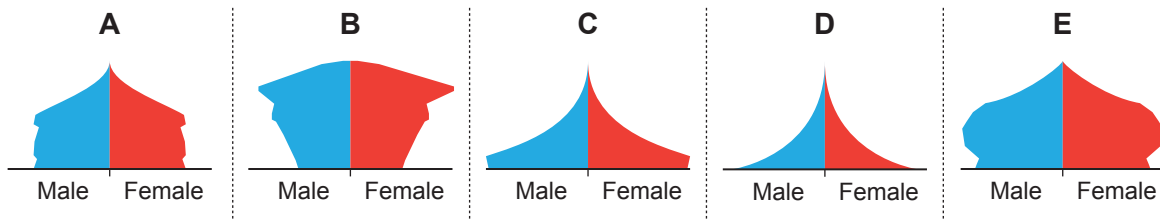


Figure 1(b): Population pyramids



1. (a) Identify the population pyramids with the correct stage of the DTM by completing the table.

[2]

Stage of the DTM	Population pyramid
1	
2	
3	
4	
5	

(This question continues on the following page)



(Question 1 continued)

Table 1: Demographic data for three countries in 2022

Country	Crude birth rate / 1000 year ⁻¹	Crude death rate / 1000 year ⁻¹	Natural increase rate (NIR) / 1000
Venezuela	15.03	7.35	7.68
Nigeria	33.19	11.95	21.24
Afghanistan	36.05	5.99	30.06

(b) Calculate the doubling time for Nigeria.

[1]

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.....

(c) Describe the impacts of Nigeria's doubling time on its population and environment.

[3]

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(d) Suggest how Afghanistan could reduce its crude birth rate.

[2]

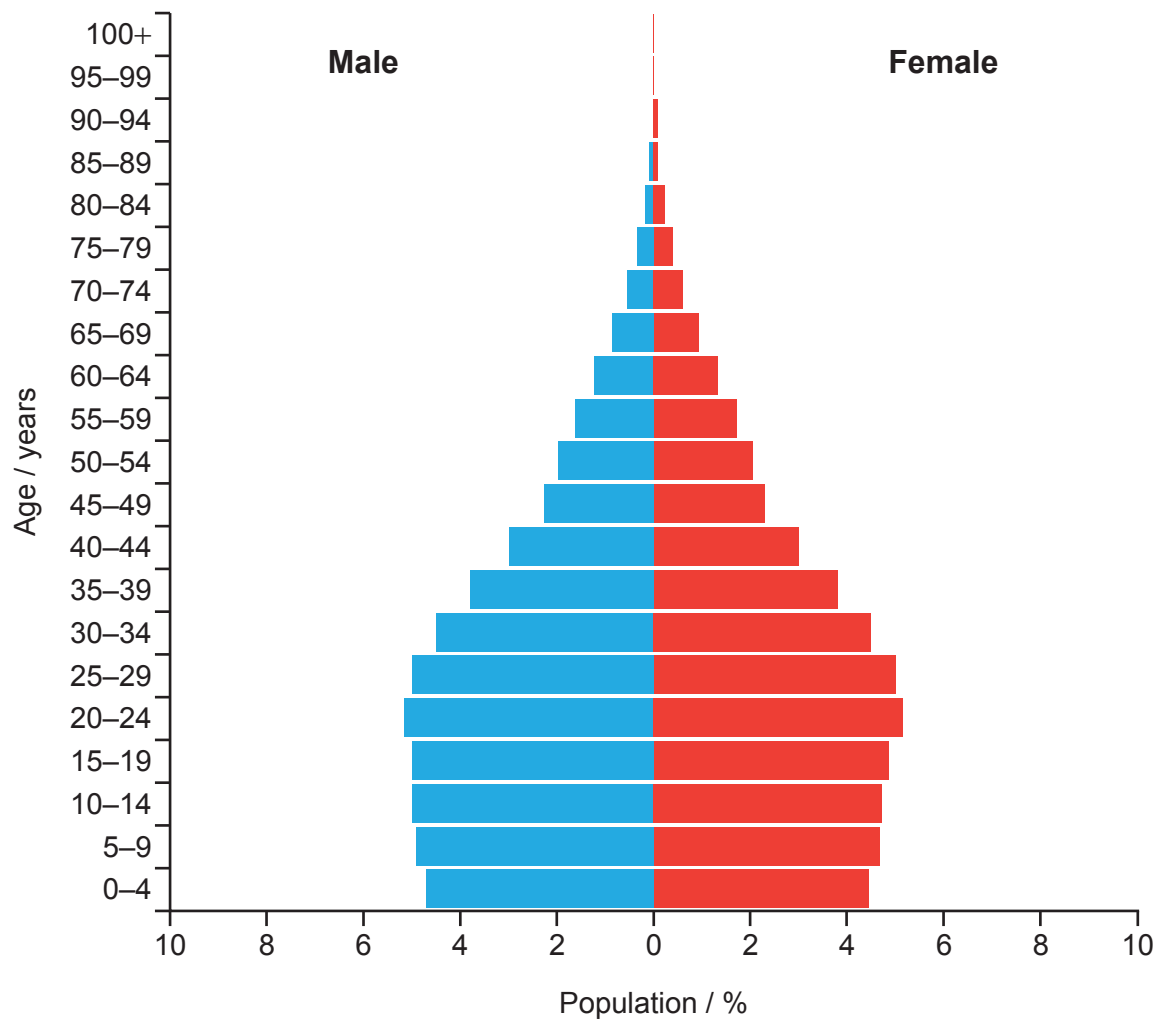
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(Question 1 continued)

Figure 1(c): Population pyramid for Thailand in 1992



(e) Explain the role that population momentum plays in population growth.

[3]

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32EP05

Turn over

Figure 2: Images of two fields of wildflowers

Barlow Field



Colour of plant species	Number of individuals
Red	26
White	100
Blue	10
Total number of individuals	136

Mountain View



Colour of plant species	Number of individuals
Red	5
Yellow	13
Purple	21
Total number of individuals	39



2. (a) Mountain View has a species diversity index of 2.48. Using Simpson's reciprocal index, calculate the species diversity index for Barlow Field. [2]

$$D = \frac{N(N-1)}{\sum n(n-1)}$$

where

N is the total number of individuals in the population;

n is the number of individuals of a single species.

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- (b) (i) Distinguish between species richness and species evenness. [1]

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- (ii) Explain why species richness and species evenness are significant when considering biodiversity. [3]

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(This question continues on the following page)



(Question 2 continued)

- (c) Speciation is the process by which new species form. Explain using examples the mechanism by which speciation may occur.

[3]

Type of isolation	Explanation
Geographical	
Temporal	
Behavioural	

- (d) Using a **named** species, define what is meant by an endemic species.

[1]

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- (e) Explain why high rates of endemism occur on isolated islands.

[3]

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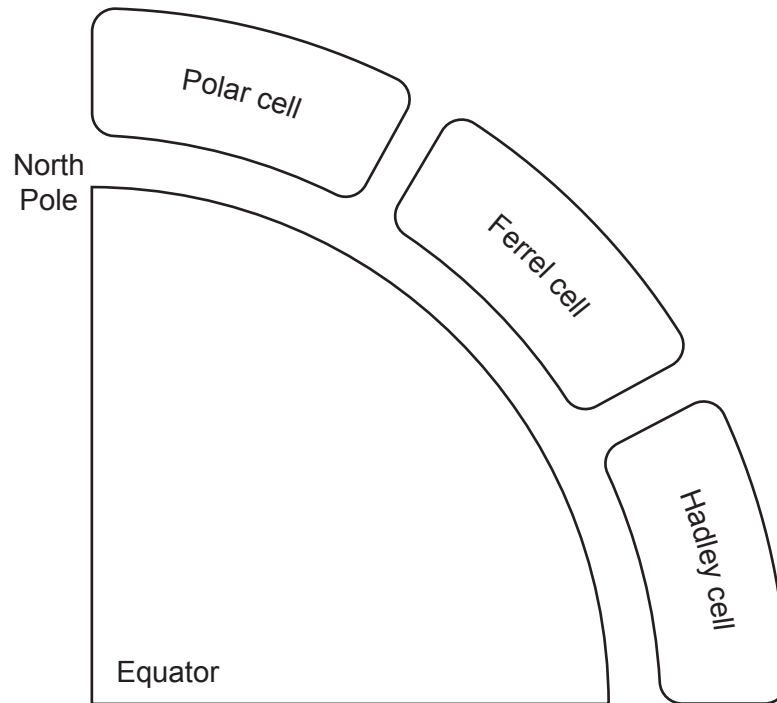
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3. (a) Annotate the diagram to show the direction of air movement.

[2]

Figure 3: Simplified diagram of the tricellular model



- (b) Explain how the tricellular model accounts for the rainfall patterns of the tropical rainforest and the desert around the globe.

[3]

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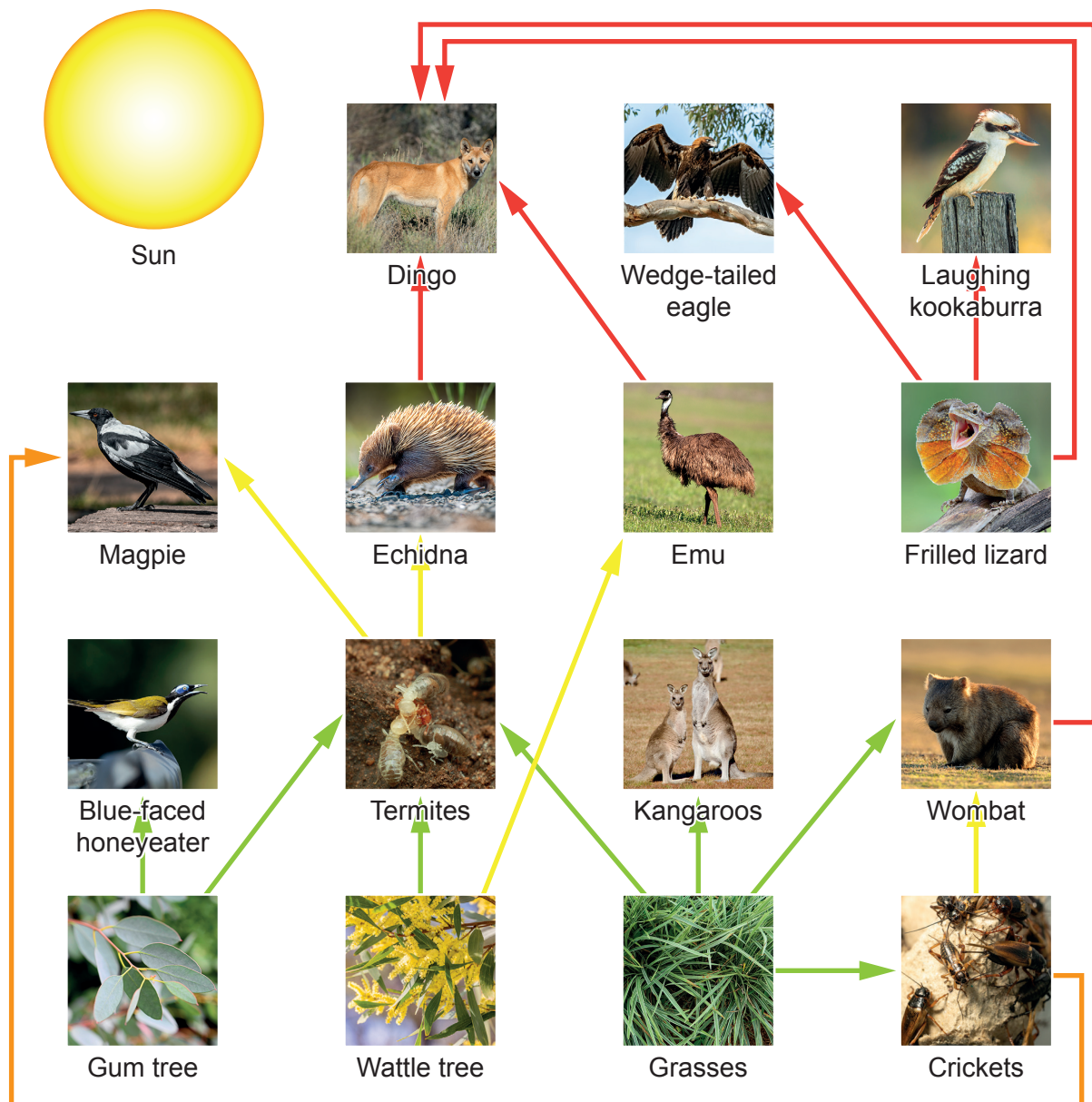
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Figure 4: Food web in the Australian tropical savanna



4. (a) Using **Figure 4**, draw a food chain with **four** trophic levels. [2]

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- (b) State **one** impact of the removal of the echidna from this food web. [1]

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- (c) Explain how the second law of thermodynamics applies to food chains. [2]

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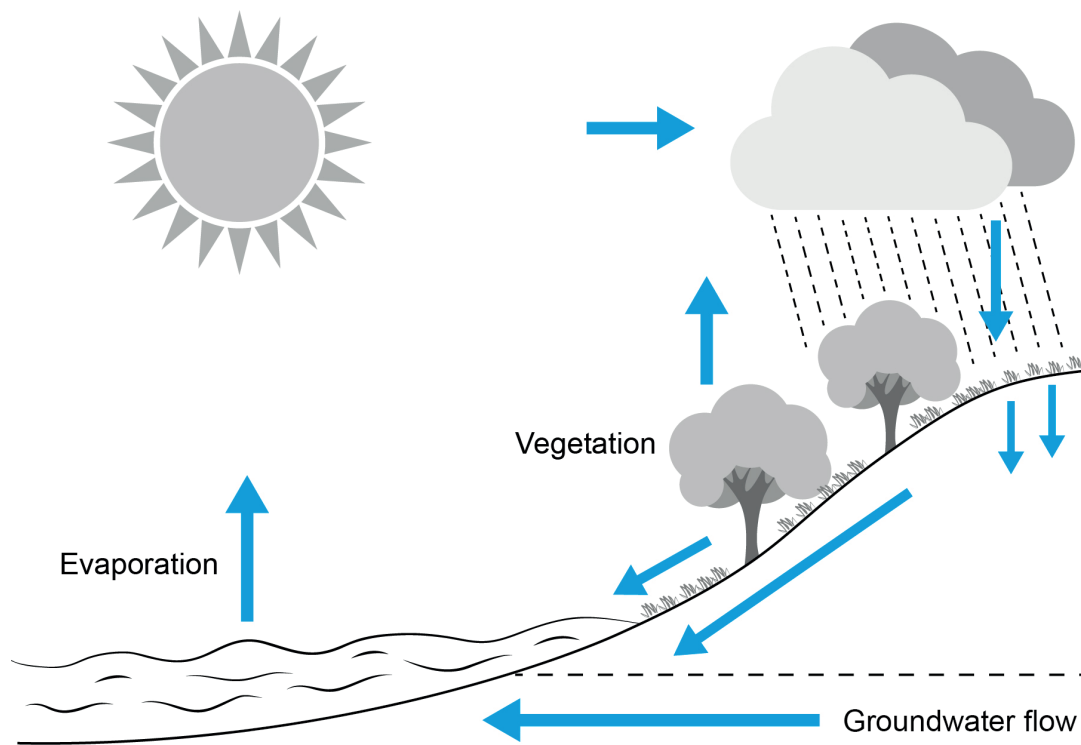
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Figure 5: The hydrological cycle



5. (a) State **one** storage and **one** flow that are **not** labelled on **Figure 5**. [1]

Storage:	
Flow:	

- (b) State **two** sources of energy that drive the hydrological cycle. [1]

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- (c) Water has unique physical and chemical properties that support and sustain life.
Explain how specific heat capacity is important to life. [2]

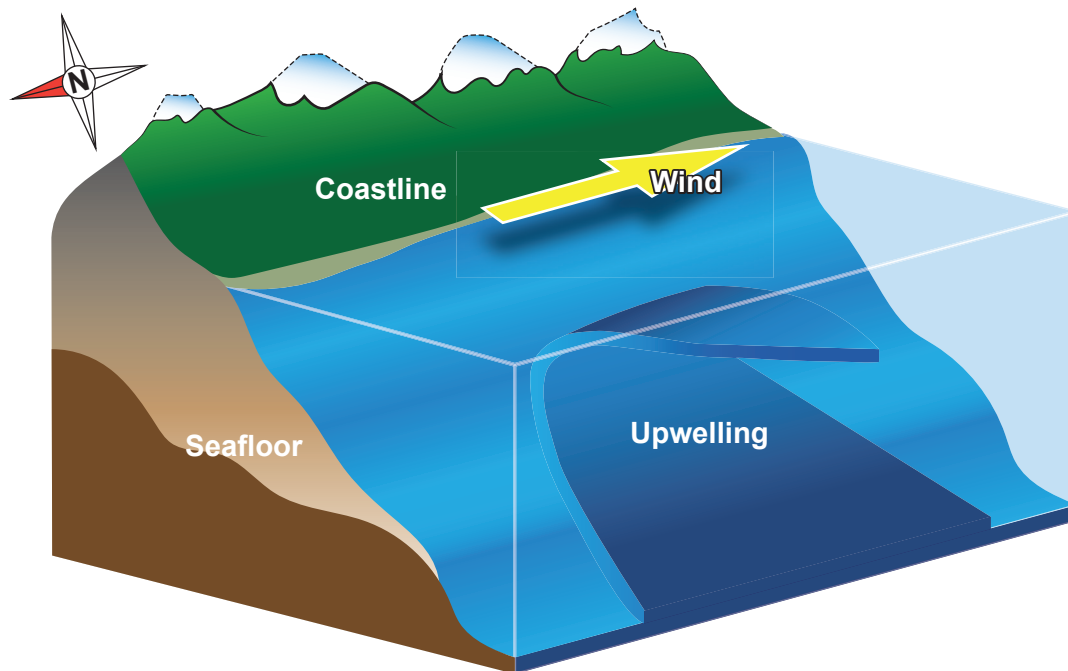
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(Question 5 continued)

Figure 6: Oceanic upwelling



- (d) Explain why the phenomenon in **Figure 6** leads to an increase in the rates of productivity in coastal waters.

[2]

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Section B

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

6. (a) Identify **four** processes included in the planetary boundaries model for sustainability. [4]
(b) Evaluate the role of rare earth elements in the production of renewable energy. [7]
(c) To what extent can economic strategies and models be useful in increasing the sustainability of human communities? [9]
7. (a) Outline **two** transfers and **two** transformations that occur as part of the nitrogen cycle. [4]
(b) Explain how data can be collected and manipulated to produce a kite diagram of distribution for a plant species along an environmental gradient. [7]
(c) To what extent are terrestrial agricultural strategies effective in increasing ecosystem productivity to generate a sustainable food supply? [9]
8. (a) Identify **four** ways to reduce the environmental impact caused by rural–urban migration. [4]
(b) Explain the causes and impacts of photochemical smog. [7]
(c) To what extent have international agreements helped to maintain the steady state of the atmospheric system? [9]



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