

Student Number



Pymble Ladies' College

2006

**Trial Higher School Certificate
Examination**

Earth and Environmental Science

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black or blue pen
- Draw diagrams using pencil
- Board-approved calculators may be used
- A Geological Time Scale is provided at the back of this paper on page 23
- Write your Student Number at the top of pages 2, 9 and your writing paper for Section II

Total marks – 100

Section 1 Pages 2–19

75 marks

This section has two parts, Part A and Part B

Part A – 15 marks

- Attempt Questions 1–15
- Allow about 30 minutes for this part

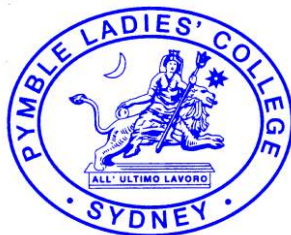
Part B – 60 marks

- Attempt Questions 16–26
- Allow about 1 hour and 45 minutes for this part

Section II Pages 20–22

25 marks

- Attempt ONE question from Questions 27–30
- Allow about 45 minutes for this section



YEAR 12

EARTH AND ENVIRONMENTAL SCIENCE

Select the alternative A, B, C or D that best answers the question.

Fill in the response space completely. If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word *correct* and drawing an arrow.

- Start Here**
1. A B C D
 2. A B C D
 3. A B C D
 4. A B C D
 5. A B C D
 6. A B C D
 7. A B C D
 8. A B C D
 9. A B C D
 10. A B C D
 11. A B C D
 12. A B C D
 13. A B C D
 14. A B C D
 15. A B C D

Earth and Environmental Science

Section I

75 marks

Part A – 15 marks

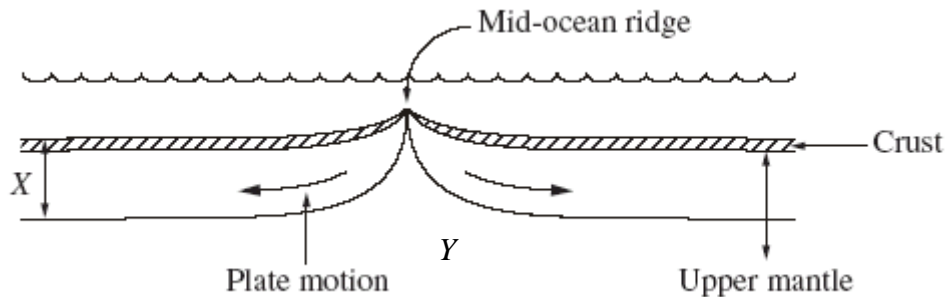
Attempt Questions 1–15

Allow about 30 minutes for this part

Use the multiple-choice answer sheet.

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

1 The diagram shows a cross-section through a mid-ocean ridge. Features of the ridge system are labelled.



What is represented by the letter Y?

- (A) Lithosphere.
- (B) Ocean trench.
- (C) Asthenosphere.
- (D) Subduction zone.

2 A plate boundary has a deep ocean trench, a chain of active volcanoes and extensive fold mountains.

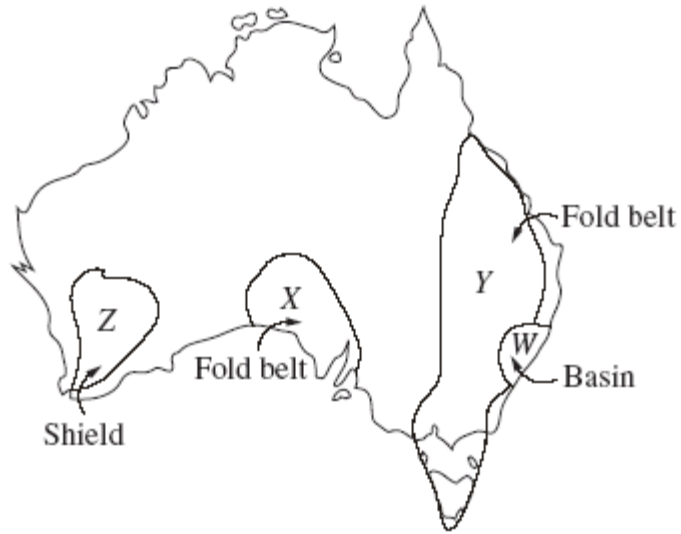
Which combination of plate boundary and igneous rock accounts for these features?

- (A) Oceanic divergent boundary and basalt.
- (B) Continental divergent boundary and andesite.
- (C) Ocean–ocean convergent boundary and rhyolite.
- (D) Ocean–continent convergent boundary and andesite.

3 Which of the following volcanic cones is produced by lava with very low viscosity?

- (A) cinder cone
- (B) shield volcano
- (C) composite volcano
- (D) stratiform volcano

4 The map shows some geological regions in Australia.



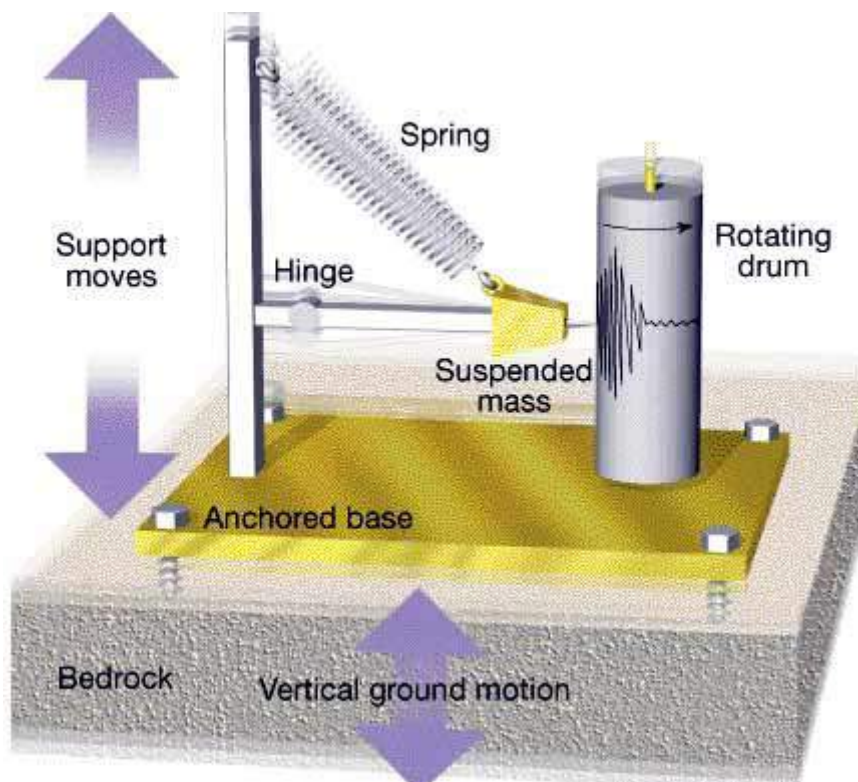
What is the order of formation, from oldest to youngest, of these regions?

- (A) Z, X, Y, W.
- (B) X, Y, W, Z.
- (C) W, X, Y, Z.
- (D) X, Y, Z, W.

5 Which of the following best describes the plate tectonic supercycle?

- (A) Movement of lithospheric plates around the Pacific Ocean rim.
- (B) Erosion and uplift of continental material through geological time.
- (C) Formation and breaking apart of continents through geological time.
- (D) Formation of new crust at oceanic ridges and its destruction in oceanic trenches.

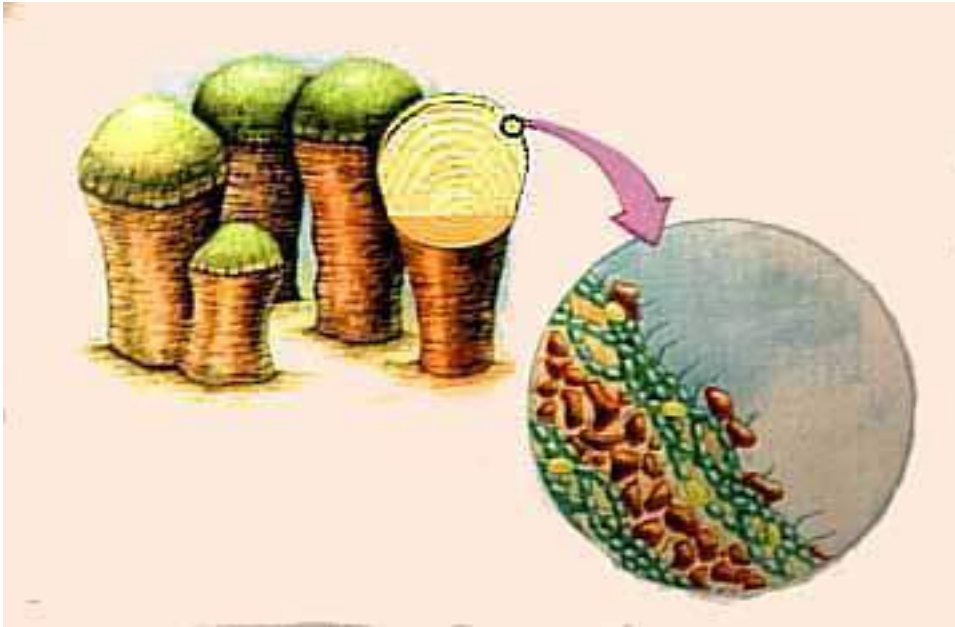
6 The scientific apparatus illustrated is used by earth scientists.



Which of the following statements describes the best use for this apparatus?

- (A) Measuring the energy of shockwaves produced by crustal movements.
- (B) Measuring radon gas emissions produced by crustal movements.
- (C) Measuring the impact of shockwaves on the built environment.
- (D) Measuring changes in global temperature.

7 The following diagram is of an organism from the Proterozoic.



Which of the following statements is correct?

- (A) It is the oldest fossilised animal known.
- (B) It was responsible for the formation of the oxygen in the atmosphere.
- (C) It removed toxins and iron from the ocean.
- (D) It is only found as a fossil in Australia.

8 All significant Banded Iron Formations (BIFs) were formed prior to 1800 Ma BP.

What does this indicate about conditions on Earth prior to 1800 Ma BP?

- (A) Deep ocean basins had not formed.
- (B) Weathering of iron-rich rocks had not commenced.
- (C) Photosynthetic organisms were rare.
- (D) There was very little free oxygen in the atmosphere.

9 What is the chemical formula for ozone?

- (A) O
- (B) O₂
- (C) O₃
- (D) O₄

- 10** With reference to the geological time scale provided, which of the following eons represents the longest period of time?
- (A) Phanerozoic
 - (B) Proterozoic
 - (C) Archaean
 - (D) Hadean
- 11** Which of the following has resulted in the majority of Australian soils being relatively low in fertility?
- (A) The age of the parent rocks.
 - (B) The lack of frequent and recent volcanism.
 - (C) The long period of leaching that has occurred.
 - (D) All of the above.
- 12** When selecting an area for waste dumps, scientists must compare various geological features. Which is the least important reason when selecting the site for a suitable waste dump?
- (A) The porosity of rocks.
 - (B) The age of the rocks.
 - (C) The proximity to the water table.
 - (D) The tectonic stability.
- 13** Soil erosion is a global problem. It is predicted that 30% of the Earth's fertile top soil has been removed in the past 30 years. Which of the following best explains why soils with a high degree of compaction suffer from erosion?
- (A) Wind erosion can easily remove the compacted soil particles creating huge dust storms.
 - (B) Water is less able to penetrate the compacted soil and so increases the amount and velocity of surface flow.
 - (C) Soil that is under cultivation is less permeable to water and thus greatly eroded.
 - (D) The use of fertilisers greatly decreases soil permeability and so increases erosion.

14 Which of the following is the most common method of treating storm water runoff in the Sydney area?

- (A) Run it through sewerage systems.
- (B) Use booms to stop wastes entering streams.
- (C) Let it flow through wetlands.
- (D) Use metal grills and sediment traps to remove solids on their way to the local stream.

15 The effect of the excessive use of some pesticides can result in the problems of bioaccumulation and biomagnification.

Which statement correctly describes ONE affect on organisms?

- (a) biomagnification only occurs in plants.
- (b) biomagnification occurs at higher levels in the food chain.
- (c) bioaccumulation only affects non target species.
- (d) bioaccumulation affects only producer organisms.

Earth and Environmental Science

Section I (continued)

Part B – 60 marks

Attempt Questions 16–26

Allow about 1 hour and 45 minutes for this part

Answer the questions in the spaces provided.

Question 16 (6 marks)

- (a) Name the supercontinent that was largely made up of North America, Europe and Asia. (1)

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- (b) Describe one piece of evidence which indicates that the Australian continent has grown over time. (2)

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- (c) Explain how the force of gravity contributes to the mechanisms that drive plate motion. (3)

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Question 17 (4 marks)

Below is a photo of Mount Mayon in the Philippines and the lush agricultural region surrounding it. The most recent eruption of Mount Mayon was in 1993.



(a) Name the type of volcanic cone represented by Mount Mayon. (1)

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(b) Name the type of plate boundary associated with this type of volcanic cone. (1)

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(b) Name and describe ONE type of hazard associated with this type of volcano. (2)

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Question 18 (7 marks)

(a) Name and describe in detail ONE technology associated with the prediction of volcanic eruptions. (3)

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(b) Describe the short term and long term effects of large volcanic eruptions on local and global temperature. (4)

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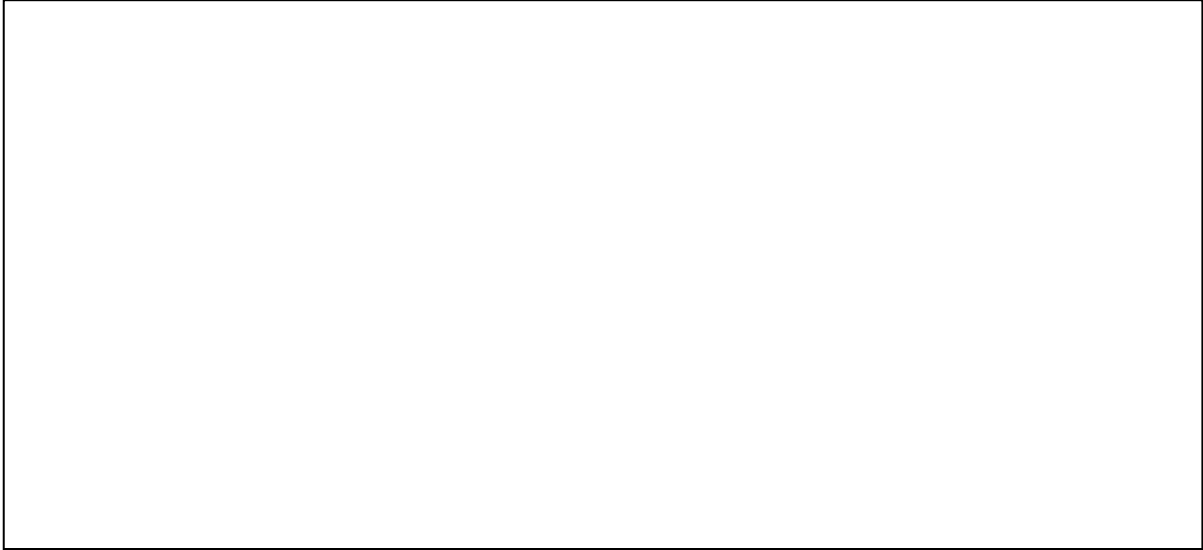
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Question 19 (8 marks)

- a) In the space below draw a labelled diagram of an ocean-ocean convergent boundary. (4)



- b) Describe the features of a mountain range formed at this type of plate boundary. (4)

Include in your description –

Rock types present

Types of geological structures present

The nature of plate tectonic processes forming the mountains

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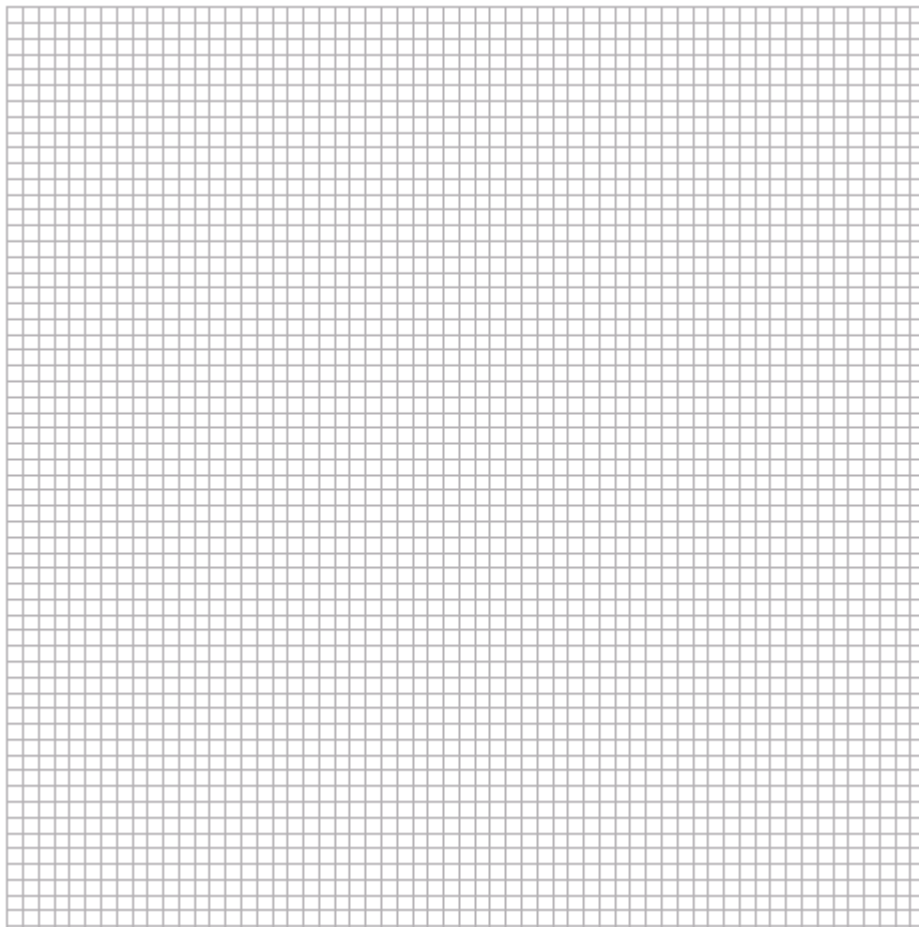
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Question 20 (8 marks)

The table shows the oxygen content of the atmosphere through geological time.

<i>Time</i> (Ma BP)	1000	900	800	700	600	500	400	300	200	100	0
<i>Oxygen content of atmosphere</i> (%)	0.8	1.3	2.1	4.6	11.4	19.6	17.3	35.6	18.9	24.5	21.0

(a) Using the grid provided, draw a graph of oxygen content of the atmosphere through time. (3)



Question 20 continues next page.

(b) Describe the graph. (3)

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(c) Explain the relationship between oxygen and ozone concentrations in the atmosphere through geological time. (2)

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Question 21 (6 marks)

Fossils can give us information about the environments of the past.

(a) Describe the conditions necessary for fossil formation. (2)

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(b) Describe the stable isotopic evidence for the first presence of life in 3.8 billion year old rocks. (4)

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Question 22 (4 marks)

Draw a flowchart to summarise the major processes and products involved in the treatment of sewage. (4)

Question 23 (7 marks)

In your Earth and Environmental Science course you gathered information about a pesticide, the use of which is now banned.

Name the pesticide you studied

(a) Name one pest for which this pesticide was used. (1)

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(b) Discuss why this pesticide is now banned. (2)

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(c) Assess TWO management practices which provide alternatives to pesticides. (4)

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Question 24 (3 Marks)

During your Earth and Environmental Science course you performed an investigation to determine the effect of compaction or tracking on soil.

(a) Outline the investigation you performed. (3)

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Question 25 (3 marks)

Evaluate a strategy used in NSW to treat soil erosion. (3)

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Question 26 (4 marks)

Analyse different scientific views on the causes of global warming. (4)

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Earth and Environmental Science

Section II

25 marks

Attempt ONE question from Questions 27–30

Allow about 45 minutes for this section

Answer the question on the paper provided.

Question 27 Introduced Species and the Australian Environment

Question 28 Organic Geology – A Non-renewable Resource

Question 29 Mining and the Australian Environment

Question 30 Oceanography 21–22

Question 30 — Oceanography (25 marks)

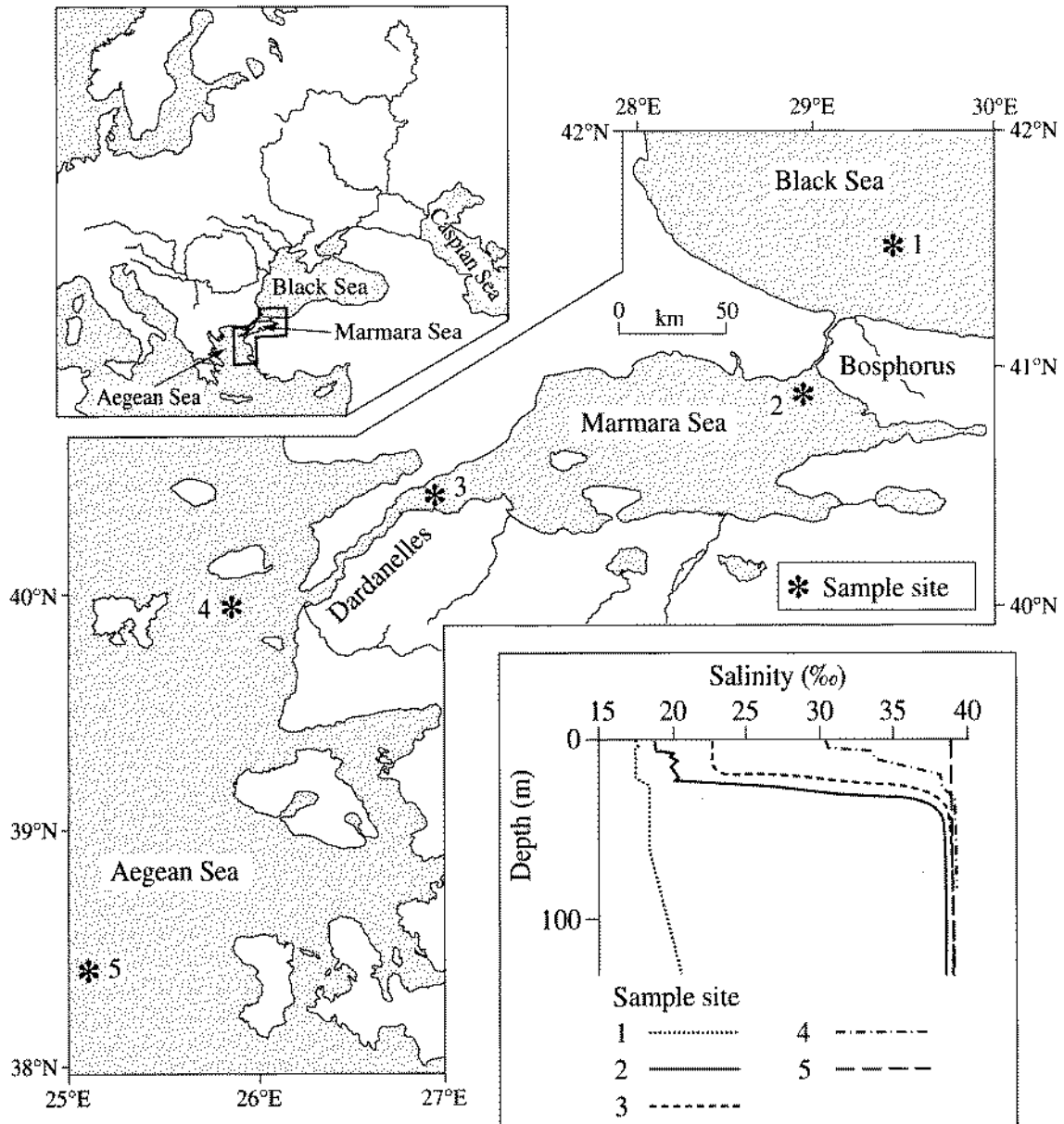
- (a) Identify one example of a pollutant that may be transported by the mass motion of sea water. (1)
- (b) Describe how long lived pollutants can be transported significant distances within an ocean basin. (2)
- (c) Describe how the physical aspects of the ocean change with depth. (4)
- (d) The photographs below show life from two different locations in the ocean.



- (i) Discuss why most ocean life occurs in the upper 30 metres of the ocean. (2)
 - (ii) Describe ONE adaptation of deep ocean organisms. (2)
 - (iii) Describe the characteristics of hydrothermal vents and their unique biotic communities. (4)
- (e) Analyse how the use of echo sounders, drilling and magnetometers has improved our understanding of the oceans. (6)

This question continues on the next page.

(f) The maps show the Marmara Sea in Turkey. Water flows from the Black Sea through the Marmara Sea to the Aegean Sea. The graphs show the salinity data taken at five sites in the Black Sea, Marmara Sea and Aegean Sea.



- (i) Describe the trend shown by the curve for data at Site 3. (1)
- (ii) Account for the trend shown by the curve for data at Site 1 and Site 3. (3)

Geological Time Scale

