

Student Name



Pymble Ladies' College

2006

**Preliminary Course
Yearly Examination**

Earth and Environmental Science

General Instructions

- Working time – 2 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 **17**
- Write your Student Number at the top of pages **3** and **8**

Total marks – 75

This paper 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 16–28
- Allow about 1 hour and 30 minutes for this part



Preliminary Course

Earth and Environmental Science

Remove this page to complete your answers.

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
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| 15. | A <input type="radio"/> | B <input type="radio"/> | C <input type="radio"/> | D <input type="radio"/> |

Student Name:

Part A – 15 marks

Attempt Questions 1–15

Allow about 30 minutes for this part

Use the multiple-choice answer sheet.

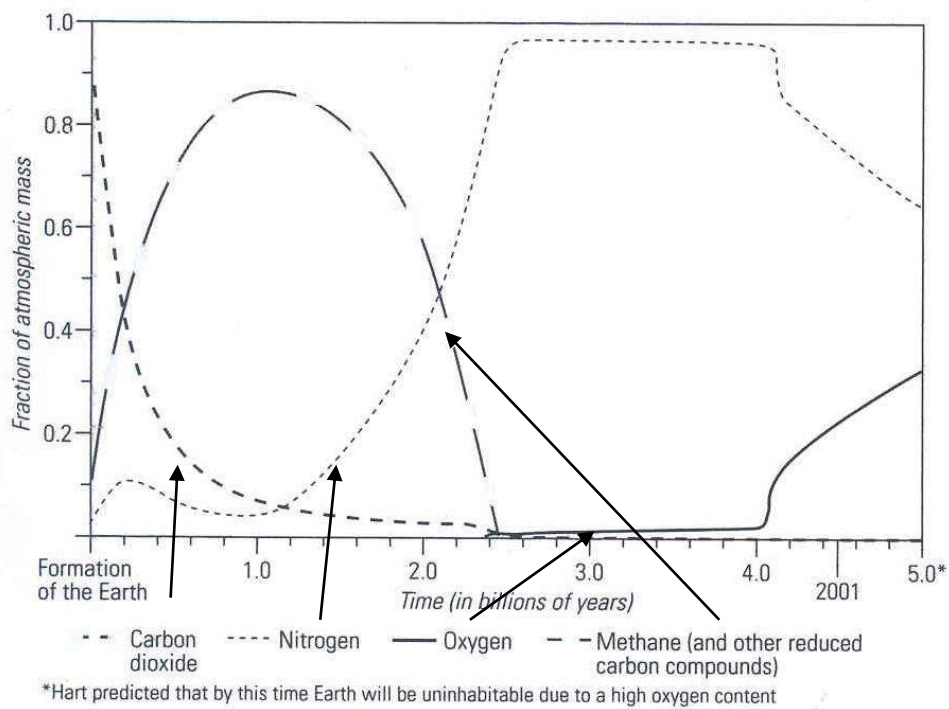
Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

1 The Big Bang is one of the accepted theories to explain the origin of the universe.

What is one piece of evidence which supports this theory?

- (A) age of the Earth
- (B) red shift of distant stars
- (C) continual creation of new matter
- (D) the presence of meteorites on the earth

2. The diagram below shows changes to the composition of the Earth's atmosphere.



Which of the following statements describes the atmosphere when the Earth formed compared to its present atmosphere?

- (A) higher in both nitrogen and methane
- (B) lower in both carbon dioxide and oxygen
- (C) higher in oxygen and lower in carbon dioxide
- (D) lower in oxygen and higher in carbon dioxide

3. Which of the following lists the correct order of events in the formation of a rocky planet?
- (A) differentiation, solar nebula, accretion, cooling
 - (B) accretion, cooling, differentiation, solar nebula
 - (C) solar nebula, accretion, differentiation, cooling
 - (D) cooling, solar nebula, accretion, differentiation

4. Archaeobacteria are thought to have been the very first cellular organisms on the Earth.

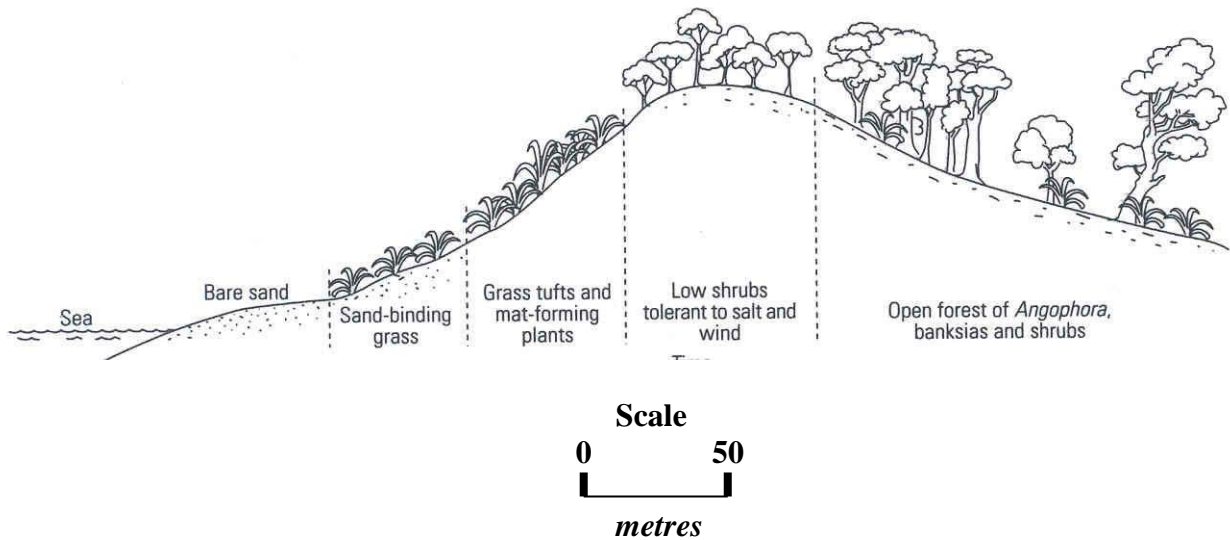
What is the most likely process by which these primitive bacteria obtained their energy?

- (A) photosynthesis
 - (B) fermentation
 - (C) precipitation
 - (D) oxidation
5. Which of the following pairs of rocks in the table correctly lists an igneous and a sedimentary rock?

	Igneous	Sedimentary
(A)	slate	shale
(B)	granite	mica
(C)	gneiss	sandstone
(D)	basalt	limestone

6. Why do governments design and enact laws to protect the biotic and abiotic environment?
- (A) to spend the taxes they collect
 - (B) to ensure that they are re-elected
 - (C) to maintain a level of sustainable development
 - (D) to force people to live in cities and towns in rural areas

7. The diagram below shows the changes in vegetation across a sand dune.



What factor could result in the succession of plants across the dune?

- (A) altitude
 - (B) fencing the area
 - (C) increased rainfall away from the coast
 - (D) increased soil nutrients and carbon content away from the sea
8. A student described a soil in her field report as being heavily leached.
- What effect would leaching have on a soil?
- (A) soluble minerals would be removed from the A horizon to the B horizon
 - (B) insoluble material would be moved out of the soil into rivers and lakes
 - (C) groundwater rising upwards would carry salt to the surface of the soil
 - (D) clay particles would become more concentrated in the A horizon
9. What is a possible effect on a healthy waterway of an oversupply of nutrients due to using too much fertiliser on adjoining land?
- (A) the water becomes acidic
 - (B) the water becomes toxic, turbid and stagnant
 - (C) algal blooms occur which starve other species of oxygen
 - (D) the fertiliser precipitates causing an increase in weed growth

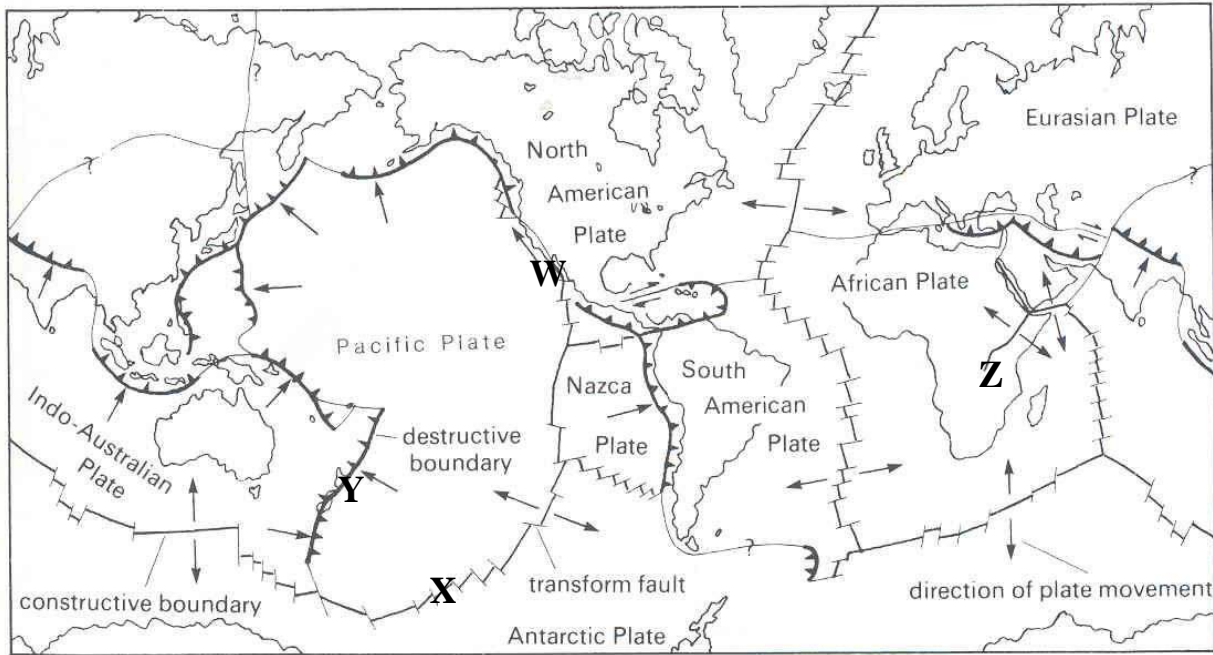
10. The table below shows where the Earth's supply of water is stored.

Volume of water stored in the water cycles reservoirs	
Reservoir	Percent of total
Oceans	97.25
Ice caps and glaciers	2.1
Ground water	0.68
Lakes	0.01
Soil moisture	0.005
Atmosphere	0.001
Streams and rivers	0.0001
Biosphere	0.00004

What approximate percentage of the Earth's total water supply is available for human consumption as a liquid?

- (A) 2.7
 (B) 0.7
 (C) 0.02
 (D) 0.00004
11. What is a natural cause of fresh water salinity?
- (A) addition of salt from plants along rivers
 (B) melting of glaciers adding salt water to river systems
 (C) addition of dissolved minerals derived from weathering of rock
 (D) adding salt from the atmosphere which has evaporated from the sea
12. What could cause the water table to be deeper?
- (A) increasing the area covered by impermeable surfaces
 (B) over irrigation of gardens and parks
 (C) increased precipitation
 (D) removing more trees

13. Refer to the map below which shows crustal plates.



Which letter W, X, Y or Z represents a conservative (transform fault) boundary?

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

14. Scientists have determined that the crust under continents and oceans is different.

Which following statement correctly describes the ocean crust when compared with continental crust?

- (A) thicker, more dense and intermediate to felsic in composition
- (B) thinner, less dense and intermediate in composition
- (C) thinner, more dense and mafic in composition
- (D) thicker, less dense and felsic in composition

15. How is the age of the sea floor determined?

- (A) calculating the speed of convection currents in the asthenosphere
- (B) comparing magnetic anomaly patterns with a magnetic time scale
- (C) recording the amount of magnetite present in the lithosphere
- (D) using fossils in the igneous rocks of the ocean crust

Student Name

Part B – 60 marks

Attempt Questions 16–28

Allow about 1 hour and 30 minutes for this part

Answer the questions in the spaces provided.

16. Banded Iron Formations (BIFs) are composed of alternating layers of iron rich material and silica which accumulated in the sea. Banded iron formations only exist in rocks dating from 1.8 to 2.5 million years ago.

(A) Draw a labelled diagram to show a banded iron formation. (1 mark)

(B) Describe how BIFs form and explain why they no longer continued to form during the last 2.5 million years. (6 marks)

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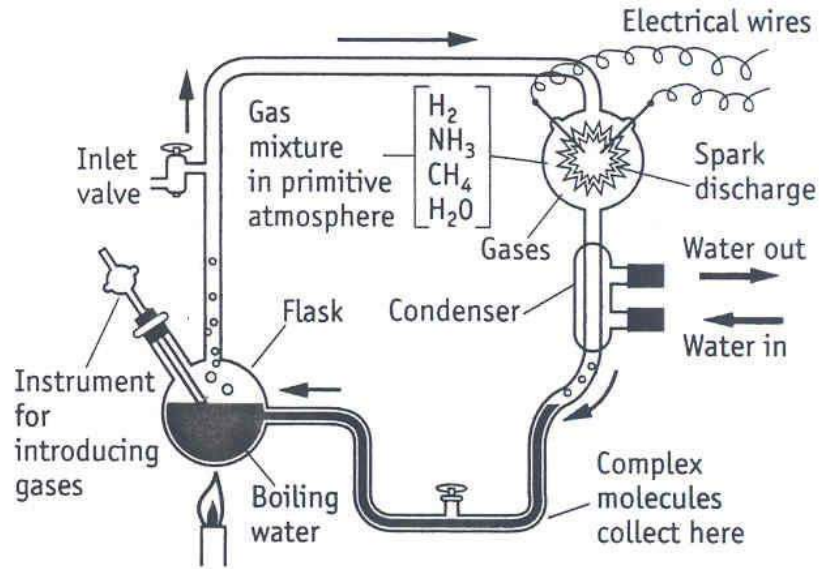
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17. The diagram below shows the apparatus used in a famous experiment.



(A) Name the scientist(s) who carried out this experiment. (2 marks)

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(B) Discuss the importance of this experiment in understanding how life may have originated on Earth. (4 marks)

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18. Describe the impact of photosynthesis on the Earth's atmosphere. (3 marks)

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19. Summarise the processes that produce soil. (3 marks)

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20. Explain what is meant by the term 'biodiversity'. (2 marks)

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22. Many Australian species have been declared endangered.

(A) Name an endangered Australian species. (1 mark)

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(B) Outline a possible reason why this species has become endangered. (2 marks)

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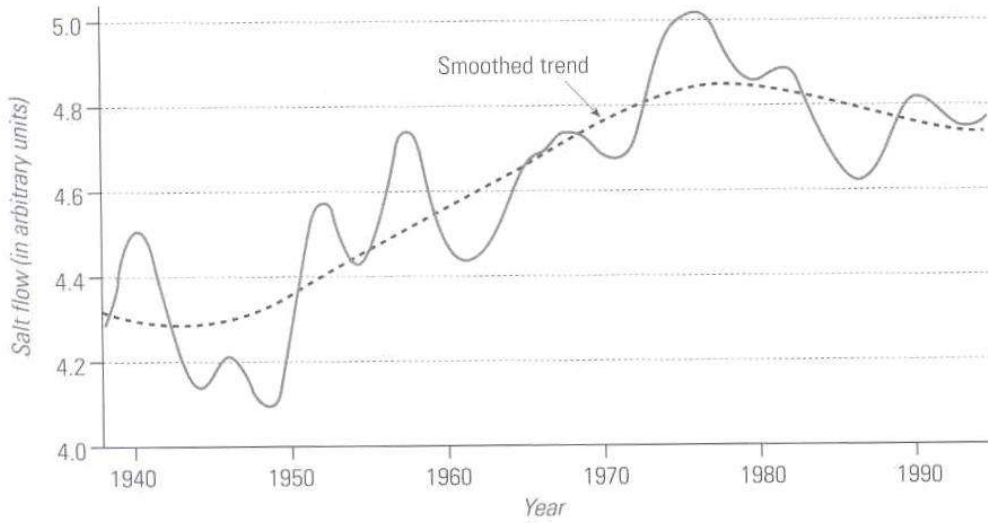
(C) Describe one possible measure that could be taken to ensure the survival of an endangered species. (2 marks)

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23. Describe how the relative solubility of oxygen and carbon dioxide gases in water changes with temperature. (2 marks)

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24. The graph below shows salinity levels at one location on the Murray River.



(A) Describe the changes in salinity for the time period shown. (2 marks)

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(B) Identify one factor which may cause an increase in salinity and one factor which may cause a decrease in salinity in river water. (2 marks)

Increase

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Decrease

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(C) For one of the factors you have named describe how it changes the salinity. (3 marks)

Factor

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25 In your Earth and Environmental Science course you have carried out a first-hand investigation to determine the effect of salinity on plant growth.

a) Describe the method you used to set up the experiment. (2 marks)

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b) Summarise your results. (2 marks)

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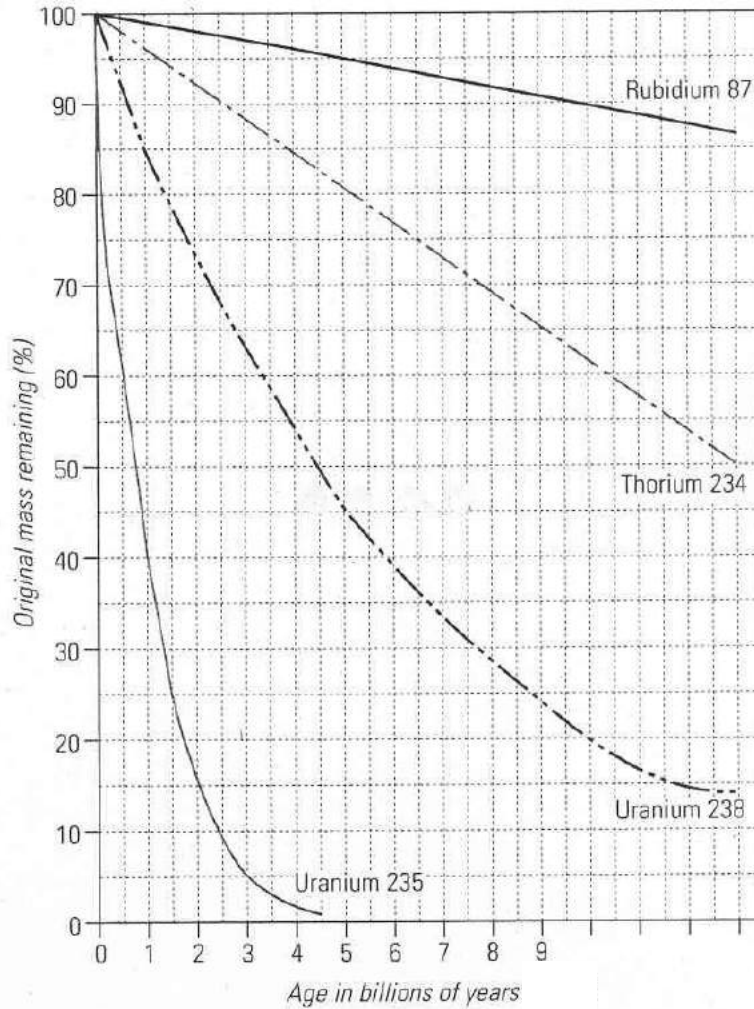
c) Assess the validity of the results you obtained. (2 marks)

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26. Describe a negative impact of water being a very effective solvent. (2 marks)

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27. The graph below shows the decay of several radioactive isotopes found on Earth.



(A) Use the graph to determine the half life of Uranium 238. (1 mark)

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(B) From the graph calculate the age of a rock sample which has 90% of its original amount of Thorium 234 remaining. (1 mark)

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(C) Evaluate a claim made by a physicist in a recent newspaper that she had found a rock sample containing 92% of its original amount of Rubidium 87 at an undisclosed location on Earth. (2 marks)

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28. Volcanic activity is associated with regions where sea-floor spreading is occurring.

(A) In the space below draw a labelled diagram to show the type of plate boundary associated with sea-floor spreading. (4 marks)

(B) Name the type of volcano associated with regions where sea-floor spreading is occurring. (1 mark)

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(C) Describe the characteristics of volcanic activity associated with sea-floor spreading. (2 marks)

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(D) Name an igneous rock produced in areas where active sea-floor spreading is occurring. (1 mark)

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End of Exam!!!!

Geological Time Scale

