No. of copies: 20

Miss K. Gillies
Mr P. Hare

2004
Higher School Certificate
Trial Paper

Earth and Environmental Science

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Board approved calculators may be used
- Write using blue and black pen
- Draw diagrams using pencil
- A geological time scale is provided at the back of this paper
- Write your number at the top of Page 2 and 9, as well as on your Option Booklet.

Section I Pages 3 to 20
Total marks (**75**)
This section has two parts, Part A and Part B.

Part A
Total marks (**15**)
- Attempt Questions 1-15
- Allow about 30 minutes for this part

Part B
Total marks (**60**)
- Attempt Questions 16-29

Section II Pages 21 to 24
Total marks (**25**)
- Attempt all of question Questions 30
- Allow about 45 minutes for this section.

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Section I

Part A
Total Marks (15)
Attempt Questions 1-15
Allow about 30 minutes for this part
Answer the questions on the attached answer sheet

Question 1.

Which hazard is most likely associated with explosive volcanic activity?

(A) fast flowing lahars
(B) intense heating of ocean waters
(C) massive faulting and folding of rocks
(D) fluid lava travelling great distances and lava engulfing houses

Question 2.

Where are shallow focus earthquakes commonly found?

(A) at divergent plate boundaries only
(B) at convergent plate boundaries only
(C) at conservative or transform fault boundaries only
(D) at divergent, conservative and convergent boundaries.

Question 3.

Explosive volcanic activity can affect local and global climate. What is most likely to cause a decrease in global temperature?

(A) the release of greenhouse gases such as carbon dioxide
(B) the updraft from the volcano causing severe thunderstorms
(C) the huge quantities of ash carried into the upper atmosphere
(D) the sudden release groundwater triggering volcanic mudflows

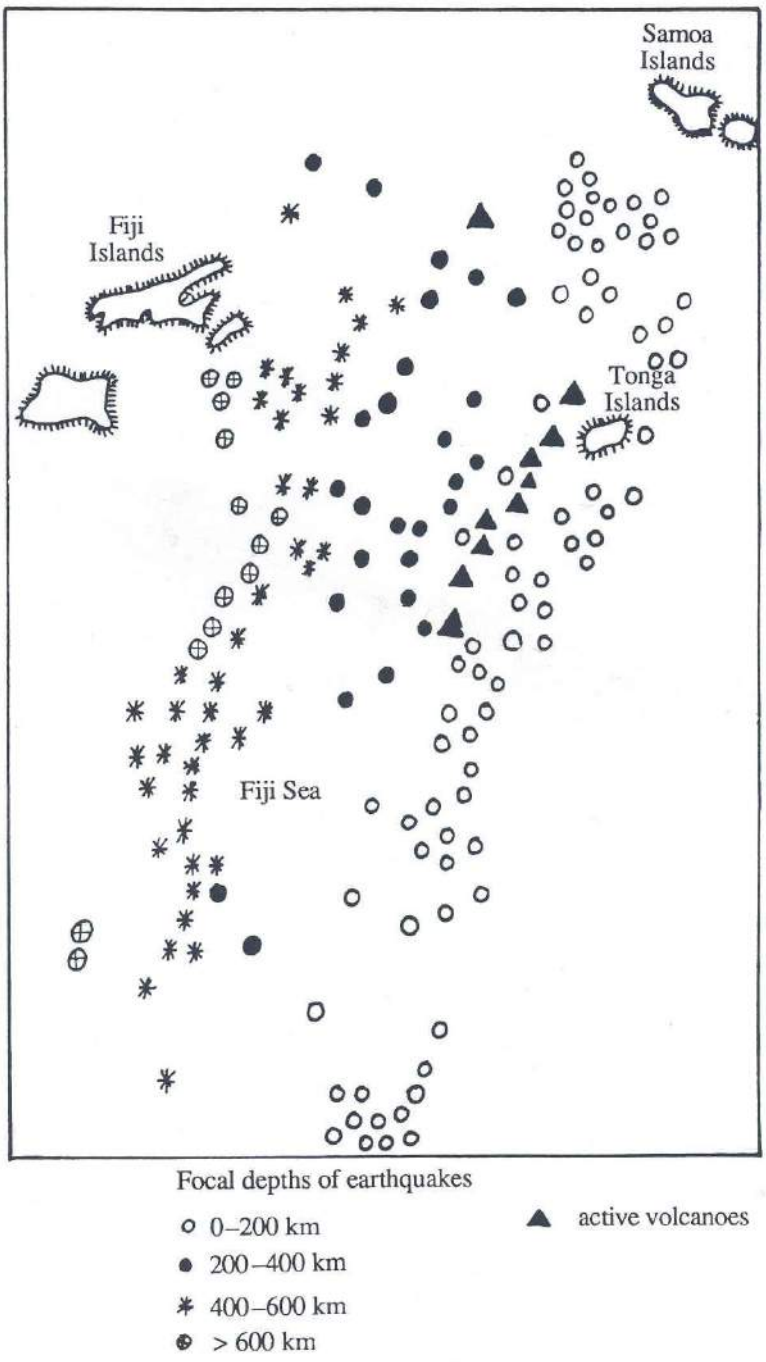
Question 4.

On a recent excursion a group of students examined a sequence of rocks exposed in a road cutting. The sequence included chert, basalt pillow lava, basalt dykes, gabbro and peridotite. What is a possible plate tectonic location for the origin of this rock sequence?

(A) an island arc
(B) a submarine trench
(C) an ocean ridge system
(D) a continental shield area

Question 5.

The map below shows the distribution of active volcanoes and earthquakes in a region of the Pacific Ocean.



Which of the following statements best describes the type of plate tectonic boundary?

(A) A divergent boundary forming a basaltic mid-ocean ridge mountain range
(B) An ocean-ocean convergent boundary producing an andesitic volcanic island arc
(C) An ocean–continent convergent boundary producing a basaltic fold mountain range
(D) A continent-continent collision forming a fold mountain range with granite batholiths

Question 6.

Which of the following is the correct sequence for the appearance of life on the Earth?
(A) archaea, algae, arthropods, angiosperms.
(B) algae, sponges, birds, gymnosperms.
(C) crocodiles, tree ferns, fish, humans.
(D) insects, trilobites, molluscs, brachiopods.

Question 7.

Which is the best description of the order of events in fossil formation?

(A) rapid burial, death of organism, lack of decomposition, lack of disturbance.
(B) lack of disturbance, death of organism, lack of decomposition, rapid burial.
(C) lack of decomposition, rapid burial, lack of disturbance, death of organism.
(D) death of organism, lack of decomposition, rapid burial, lack of disturbance.

Question 8.

The history of the Earth has been divided into four eons. Which eon contains the biggest variety of fossils?

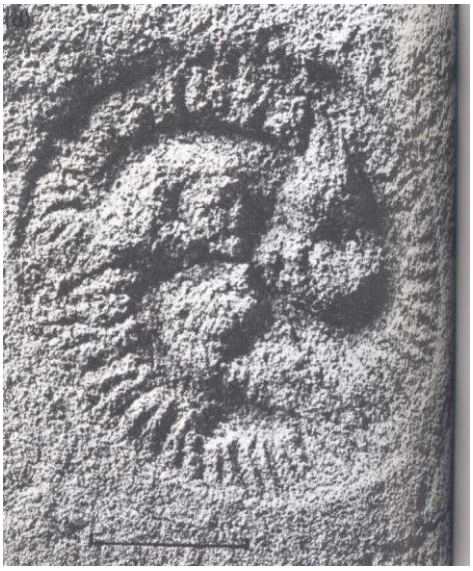
A) Phanerozoic
B) Archaean
C) Hadean
D) Proterozoic

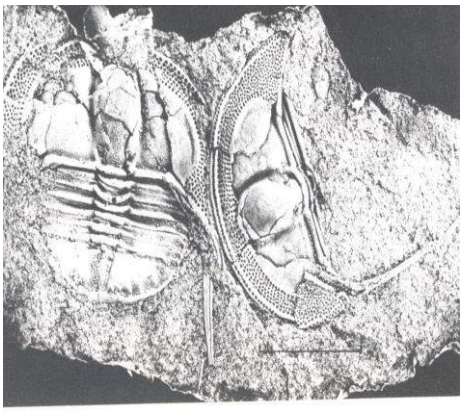
Question 9.

Which of the following is NOT an example of Ediacaran fauna

A) 

B) 

C) 

D) 

Question 10.

The ozone layer in the upper atmosphere was important in the evolution of life for which of the following reasons?

(A) It filtered UV radiation allowing land plants to occur in Proterozoic.
(B) It supplied oxygen for rapid evolution of the metazoans.
(C) It combined with soluble iron in the oceans to precipitate as BIF's.
(D) It absorbed UV radiation allowing life to develop on land in the Phanerozoic.

Question 11.

The following table shows the predicted salt loads in rivers in four regions in New South Wales.

YEAR	PREDICTED SALT LOADS (tonnes/year)			
	Narromine	**Gunnedah**	**Forbes**	**Wagga Wagga**
2000	234 000	161 000	228 000	402 000
2020	508 000	234 000	294 000	482 000
2050	677 000	283 000	433 000	529 000
2100	819 000	340 000	553 000	607 000

The district with the salt load that is expected to increase by the greatest percentage between 2000 and 2100 is:

(A) Narromine
(B) Gunnedah
(C) Forbes
(D) Wagga Wagga

Question 12.

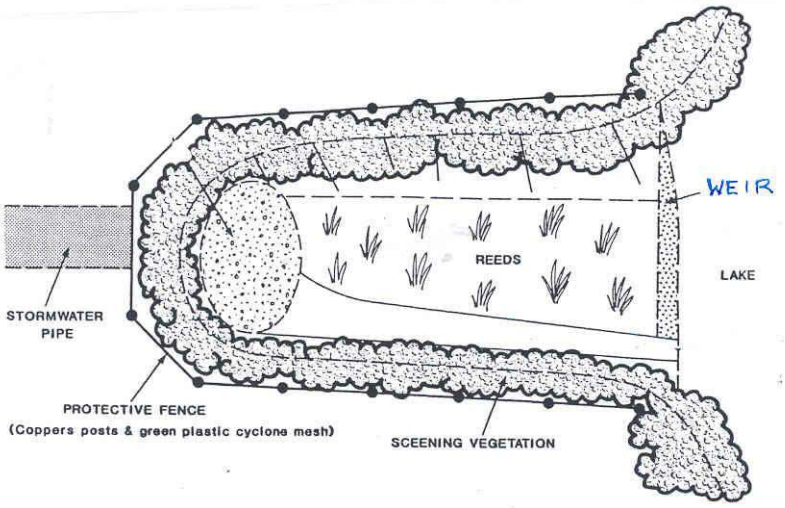
Which of the following equations represents a reaction that contributes to enhanced Greenhouse Effect?
(A) sulfur trioxide + water → sulfuric acid
(B) hydrocarbon + oxygen → carbon dioxide + water
(C) chlorine + ozone → chlorine monoxide + oxygen
(D) nitrates + water → nitric acid

Question 13.

Which of the following processes results in soils low in nutrients?
(A) Glaciation
(B) Tectonic uplift
(C) Volcanism
(D) Leaching

Question 14.

What is the purpose of the weir shown in the diagram below?



(A) To slow the water flow.
(B) To dam the water for irrigation.
(C) To stop fish in the lagoon moving upstream.
(D) To limit the amount of water entering the lagoon.

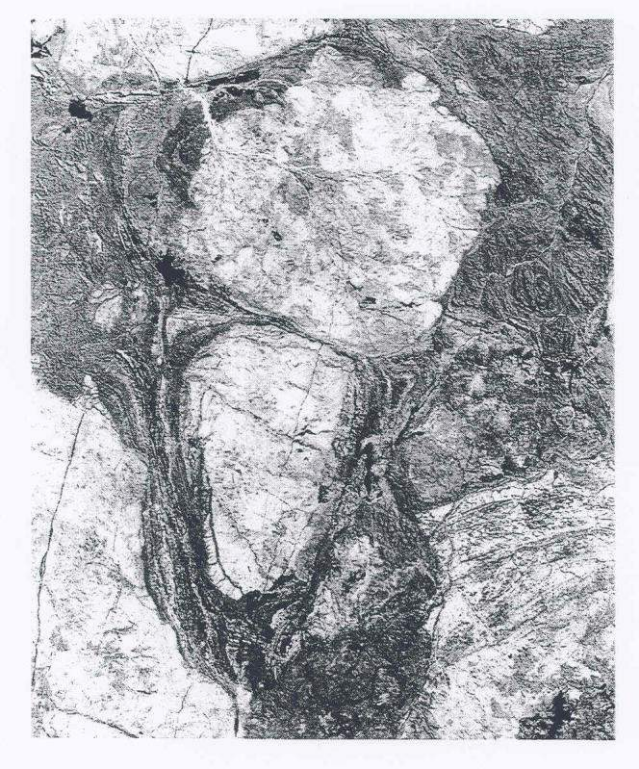
Question 15.

Which of the following features is desirable for a waste dump?
(A) An extensive water table to carry away leachates and prevent them building up in one place.
(B) An active fault line to allow rubbish to penetrate deeper into the ground.
(C) An impermeable clay layer to trap leachates and restrict them to one area.
(D) A hill top location to allow good run off and transportation of leachate.

Section II **Number:_____**
Total marks (60)
Attempt questions 16 – 29
Allow about 1 hour and 45 minutes for this part

Answer the questions in the spaces provided

Question 16. (6 marks)
The diagram below shows the Marble Bar area in Western Australia. This area is part of Australia's Precambrian shield.



(a) Identify **two (2)** distinctive features of a shield area. **2**

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(b) Briefly describe how a shield area forms. **4**

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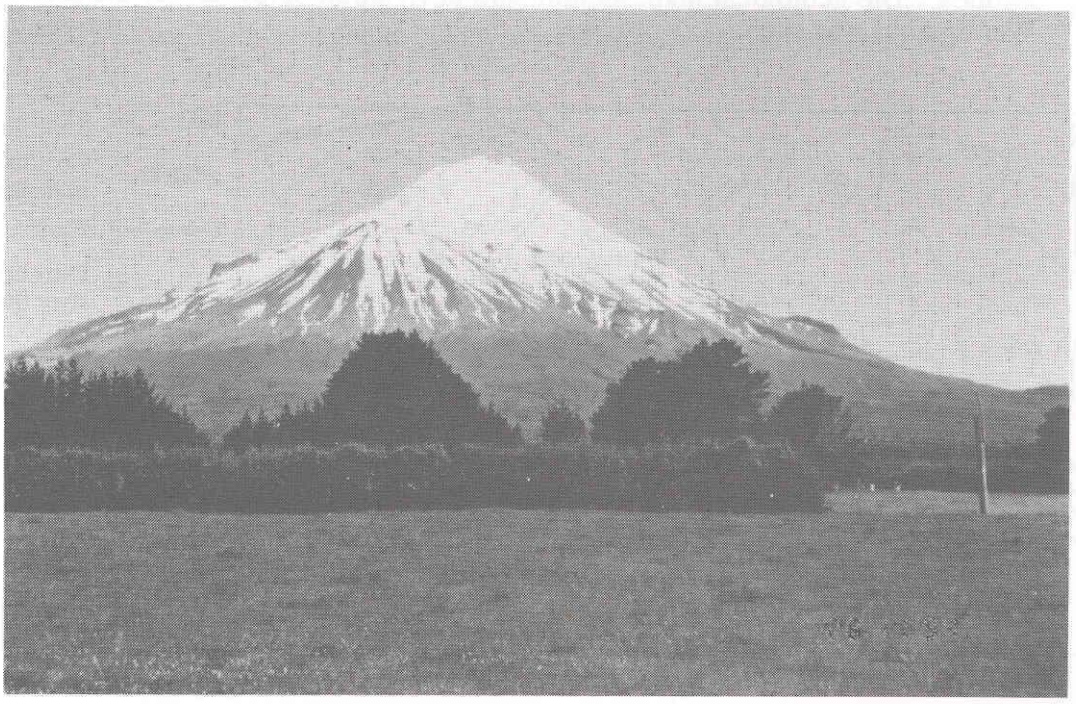
Question 17. (4 marks)
This question refers to the volcano in the photograph below.



Explain how the eruptive style of this type of volcano reflects the plate tectonic setting in which it occurs. **4**

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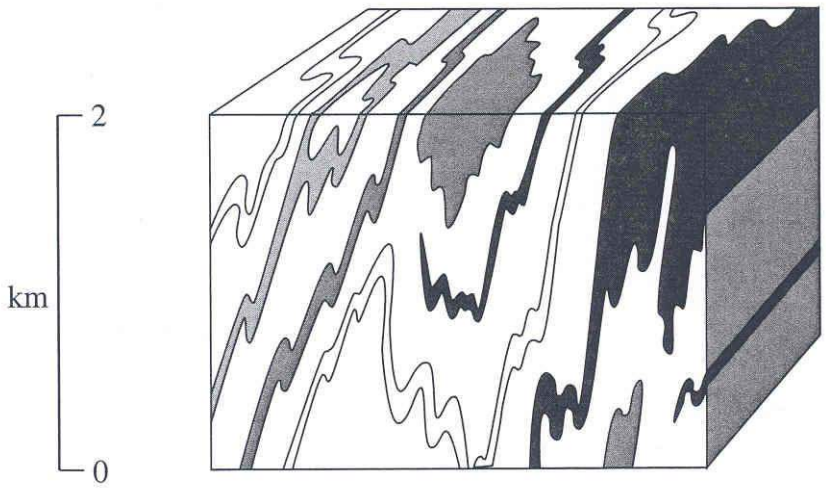
Question 18. (6 marks)
The diagram shows rock structures observed in a mountainous part of the Earth's crust.



(a) Explain how these structures could be produced in a developing mountain range. **4**

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(b) Identify and describe **ONE** hazard associated with volcanoes. **2**

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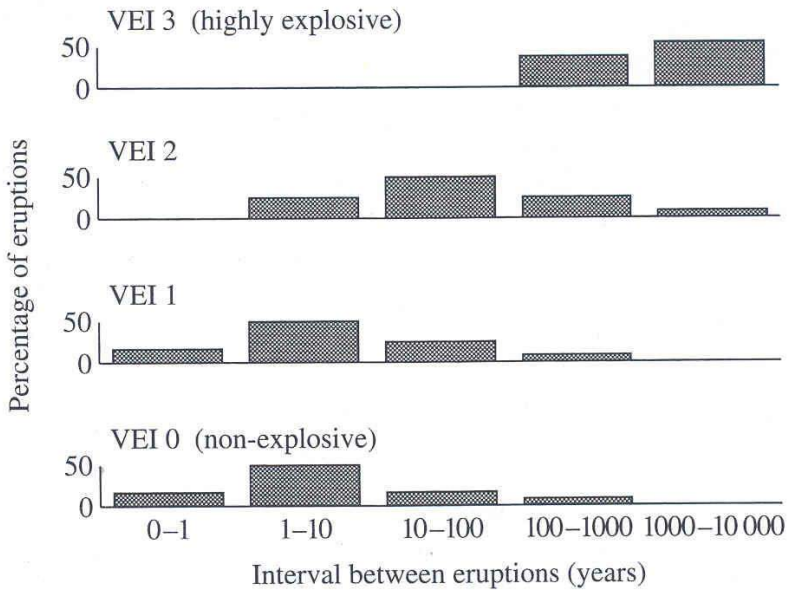
Question 19. (4 marks)
The graphs below record information about volcanic activity.

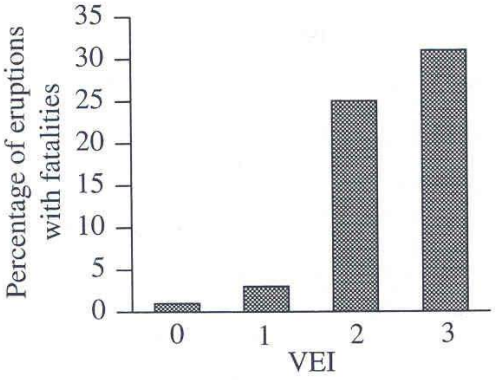
Graph 1 shows the percentage of eruptions at different time intervals for volcanoes with an explosion index (VEI) between 0 and 3.

Graph 2 shows the relationship between VEI and the percentage of eruptions that had known fatalities (deaths).

Graph 1



Graph 2



Analyse the information shown in the graphs. **4**

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Question 20. (6 marks)

(a) Summarise the changes in life forms from the Ediacaran metazoans to the life forms that characterised the Cambrian. **3**

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(b) Outline the benefits of each of these changes. **3**

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Question 21. (5 marks)

(a) Briefly describe the processes and conditions involved in the deposition of Banded Iron Formations. **3**

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(b) Discuss the statement that Banded Iron Formations are indirect evidence of life. **2**

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Question 22. (5 marks)

Evaluate the role of ozone in the evolution of terrestrial organisms. **5**

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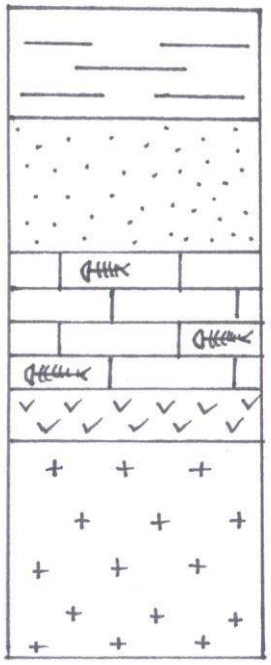
Question 23. (4 marks)
Study the diagram below.



Carbonaceous shale

Sandstone

Fossiliferous Limestone

Basalt

Gabbro

(a) Identify one rock in the sequence you would choose to date using relative methods and give reasons to support your choice. **2**

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(b) Identify one rock in the sequence you would choose to date using absolute methods and give reasons to support your choice. **2**

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Question 24. (4 marks)

a) List one management strategy employed to reduce the problem of soil erosion as a result of compaction. **1**

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b) Assess the effectiveness of this strategy. **3**

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Question 25. (2 marks)

Acid rain is a problem that has increased significantly in the last 200 years.

(a) Outline one reason for the increase mentioned above. **1**

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(b) Recall a word equation for the formation of acid rain. **1**

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Question 26. (6 marks)

You have carried out a case study on a successful rehabilitation program of salt affected area.

(a) Name the area and recall the origins of the problem. **2**

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(b) Evaluate the rehabilitation strategy used. **4**

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Question 27. (2 marks)

(a) Describe briefly how primary treatment of sewage waste is carried out at Orange Sewage Plant and what is separated? **2**

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Question 28. (3 marks)

Motor vehicle emissions are known to effect the environment detrimentally. From your studies of the composition of emissions from motor vehicle exhausts name two likely gases that would be given out from car exhausts and for each discuss how the gas would adversely affect our environment. **3**

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Question 29. (3 marks)

(a) Recall the name of the global treaty that covers the repairing of the ozone layer. **1**

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(b) Outline the way in which ozone is depleted in the stratosphere. **2**

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Section II

Total marks (25)

Attempt ONE question from Questions

Allow about 45 minutes for this section

Answer the question on writing paper. Extra writing paper is available.

Pages

Section II

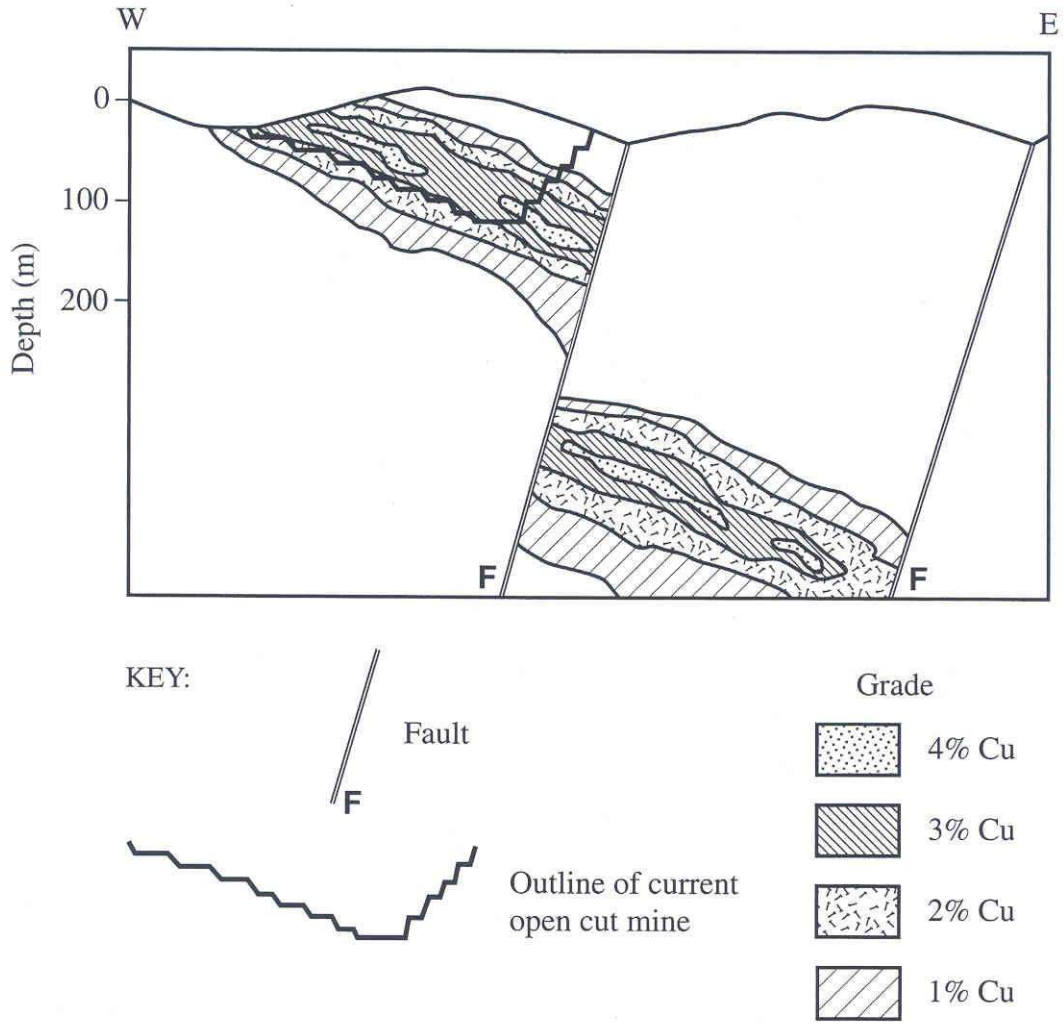
Total marks (25)

Allow about 45 minutes for this section

Answer the question on writing paper.

Question 30 – Mining and the Australian Environment (25 Marks)

The diagram shows a faulted ore body which is being mined by open pit methods.



QUESTION CONTINUED OVER PAGE

(a) The cut-off grade of the ore body is currently 3% copper. Explain what is likely to happen to future mining operations if the price of copper changes. **4**

(b) This existing open cut mine has caused a number of environmental problems. Identify **TWO** possible problems and assess the impact of the problems. **4**

(c) Identify the main geological features of an Australian mineral province in an iron ore producing locality. **2**

(d) In this Earth and Environmental Science option you have conducted first hand investigations which have helped you to understand aspects of your case study. Describe ONE such investigation and explain how it relates to your case study. **4**

(e) Discuss the effect of one landmark decision on the exploitation of the deposit you have studied. **2**

(f) Outline the methods and technologies used in the concentration of ore from the deposit you have studied. **6**

(g) Evaluate the relationship between mining methods and mine site rehabilitation for the deposit you have studied. **3**

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Earth and Environmental Science Data Sheet

Geological Time Scale