NESA No.: .....

SCIENCE

2023

Year 12 Assessment Task 4

Trial Examination – Question Booklet

Earth and Environmental Science

General Instructions

- Write using black pen.
- Write your NESA student number at the top of this page.

Section 1 – 20 marks
Attempt questions 1-20
Use the multiple-choice sheet in the Answer Booklet for this section.
Allow 30 minutes for this section.

1 The margins of some tectonic plates are destroyed by the process called subduction. The major evidence indicating that plates sink back into Earth's interior as rigid slabs is the occurrence of:

(A) Deep focus earthquakes.
(B) Transform faults.
(C) Rifting at mid-oceans ridges.
(D) Hot-spot volcanoes.

2 The hypothesis that organic molecules originated on Earth via extra-terrestrial meteors is:

(A) Panspermia
(B) Dendrochronology
(C) Abiogenesis
(D) Black Smokers

3 How can the reliability of first-hand data be improved?

(A) Take measures to control all variables properly
(B) Ensure results align with current scientific literature
(C) Scientists replicate field data under similar conditions
(D) Research peer-reviewed scientific journals before collecting data

4 Ice cores can provide access to samples of the gases, pollen and other particles that were present in the atmosphere at different times in the past.
Which one of the following methods is most likely to be able to determine the age of a sample collected from a core drilled from an ice sheet?

(A) Freshwater fossils preserved in the ice
(B) The presence of distinctive volcanic ash layers within the ice
(C) Counting of the annual layers preserved in the ice
(D) Measurement of the salt content in the water

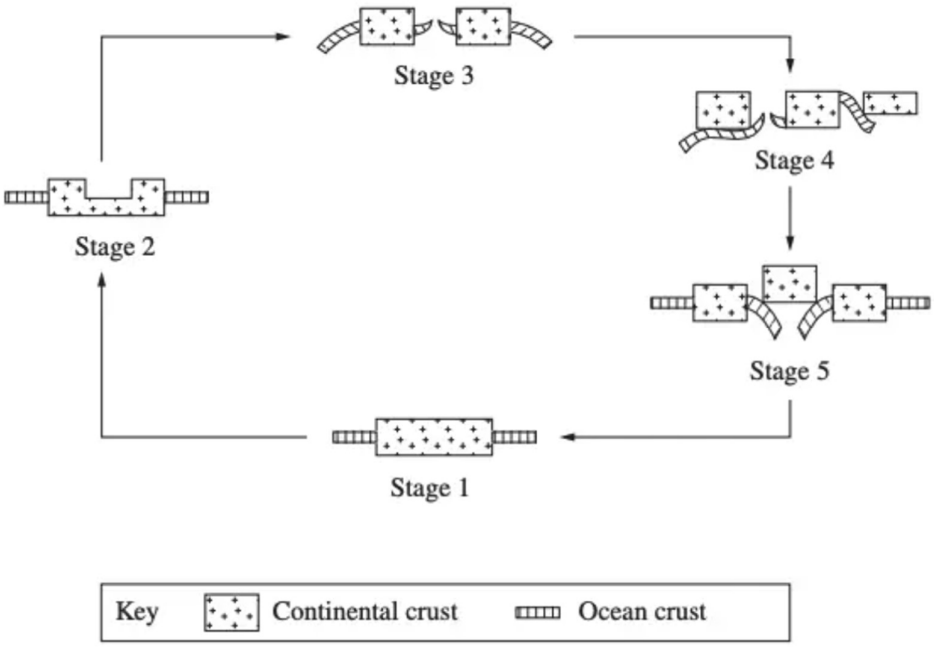
5 *Cooksonia* (below) is thought to be one of the first vascular plants to dominate terrestrial ecosystems.



What advantages did a terrestrial environment give to the first plants to leave the ocean for land?

(A) Pollinating animals, such as birds and insects, allowed new and more effective forms of reproduction.
(B) The ocean floor is too deep for photosynthesis to occur.
(C) Reduced predation by carnivorous fish.
(D) Reduced competition for space and sunlight.

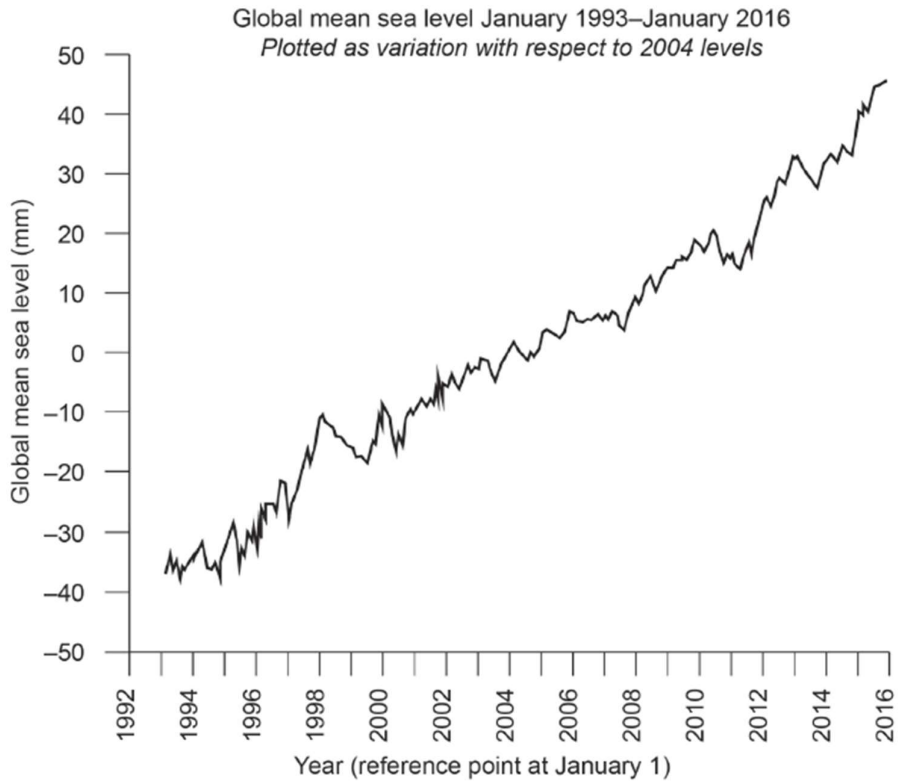
6 The diagram below shows a model of the plate tectonic supercycle:



Which stage of the model best represents the formation of a rift valley?

(A) Stage 2
(B) Stage 3
(C) Stage 4
(D) Stage 5

7 The graph below shows global mean sea level measured by satellite observation between 1993 and 2016.



Which of the following statements can be shown to be most correct using only the data displayed in the graph?

(A) Sea level has risen and fallen over the observed period, but has remained unchanged overall.
(B) Global mean sea level is at the highest point it has ever been in Earth's history.
(C) Sea level has risen every year since 2010.
(D) Sea level in January 1999 was lower than it had been in January 1998.

8 Which of the following best explains why there are few high-magnitude earthquakes in Australia?

(A) Its tectonic setting leads to volcanic activity but not to seismic activity.
(B) Earthquakes occur only at depth and are not felt at the surface.
(C) The continent is in an intra-plate environment.
(D) The continent is only subjected to subduction.

9 Which of the following examples is a cast fossil?

(A)



(B)



(C)



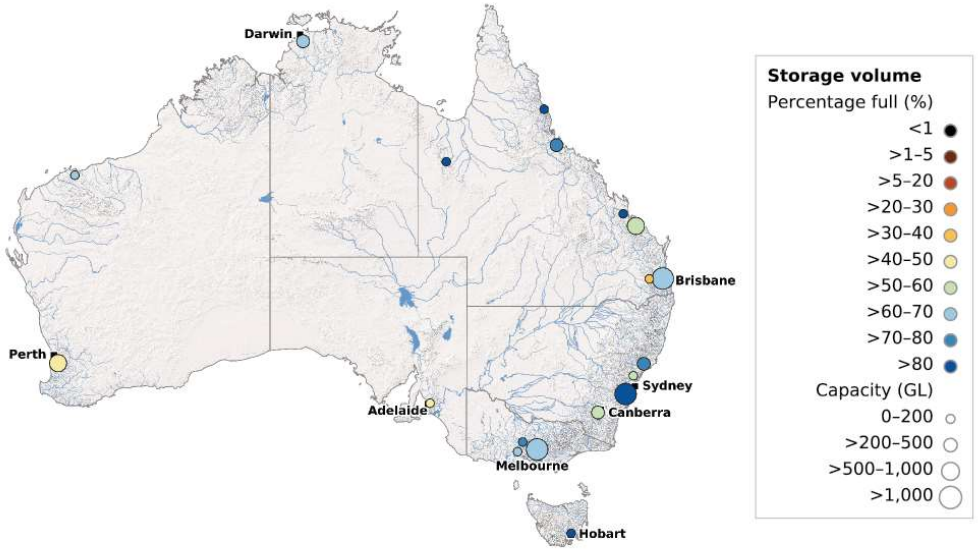
(D)



10 On what basis has the geological time scale been divided into eons?

(A) Types of rocks
(B) Thickness of rock strata
(C) Fossil evidence in rock layers
(D) Radio-isotopes in the different rock strata

11 The following map shows the status of urban water storage systems in Australia for June 2020.



The distribution and status of urban storage systems (a) On 30 June 2020

© Commonwealth of Australia 2021, Bureau of Meteorology

Which of the following statements describes the trend for urban water storage that can be determined using this map?

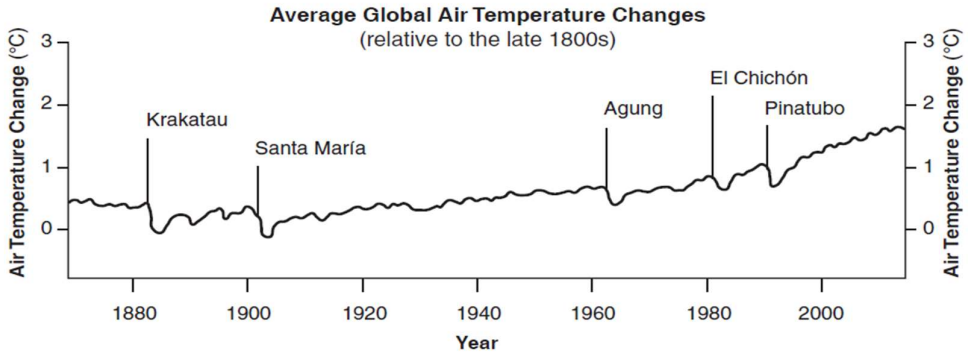
(A) The majority of Australia's urban water storage is at full capacity.
(B) The majority of Australia's urban water storage is on the East coast.
(C) Darwin has the smallest urban water storage of all the Australian capital cities.
(D) Australia's urban water storage is significantly less than its rural water storage.

12 At what point does a natural hazard become a disaster?

(A) When there is damage to property and/or life
(B) When there is damage to life only
(C) When there is damage to human life only
(D) There is no clear distinction between the two terms

Refer to the following diagrams for questions 13-14.

The graph shows the average *global air temperature changes* that have occurred since the late 1800s. Five volcanoes that experienced major eruptions during this time period are indicated.



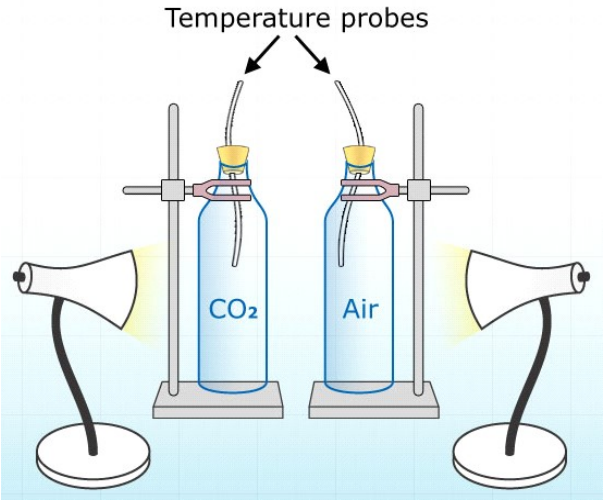
13 What is the immediate effect on the climate after these volcanic eruptions?

(A) Global temperatures decreased because volcanic gases absorb solar radiation
(B) Global temperatures decreased because ash clouds block sunlight
(C) Global temperatures increase because of greenhouse gases released by volcanic eruptions
(D) Global temperatures increased because molten rock released heat

14 Which conclusion can be made from the data shown in the graph?

(A) Volcanic eruptions occur in a cyclic and predictable pattern
(B) Volcanic eruptions have generally increased in strength since the late 1800s
(C) Global air temperatures are warmer today than they were in the late 1800s
(D) Global air temperatures have had fewer changes since 1950

15 A year 12 student set up the following investigative model to explain the cause of greenhouse gas. The temperature probes measure the change in temperature for when air and carbon dioxide (CO_2) bottles are heated using lamps.



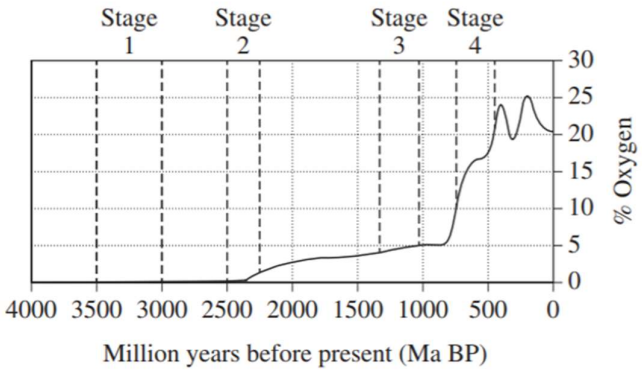
What is one misconception that might occur using this model?

(A) The CO_2 has come from a volcanic source
(B) Models cannot be used to simulate real-world phenomena
(C) CO_2 is not a Greenhouse gas
(D) There is no CO_2 in air

16 Which option best describes the time scale over which the following factors effect climate variation?

	Plate Tectonic Super Cycle	Solar activity variation	Milankovitch cycles	Ocean currents and circulation
(A)	100s of millions of years	10s of thousands of years	10s of millions of years	10s of years
(B)	10s of millions of years	100s of millions of years	10s of years	10s of thousands of years
(C)	100s of millions of years	10s of years	10s of thousands of years	10s of millions of years
(D)	10s of millions of years	10s of years	100s of millions of years	10s of thousands of years

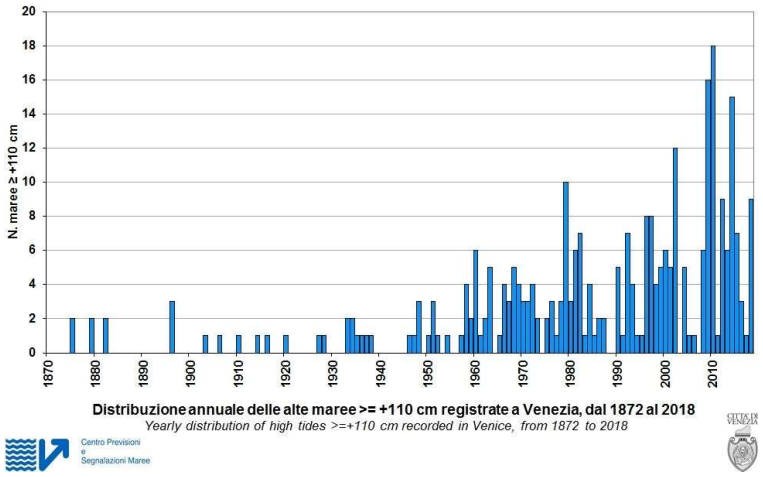
17 The graph shows an estimate of the percentage of oxygen in Earth's atmosphere over time.



During which stage were most of the Australian Banded iron Formations produced?

(A) Stage 1
(B) Stage 2
(C) Stage 3
(D) Stage 4

18 The following graph shows the measured increase in high tide level in Venice, Italy, 1872-2018.



Which of the following factors has made the largest contribution to the rise in sea level over the past 100 years?

(A) Melting land-based ice sheets and sea ice
(B) Melting land-based ice sheets, warming of ocean surface waters
(C) Warming of ocean surface waters only
(D) Increased rainfall, melting sea ice

19 The following diagrams relate seismic waves of an earthquake.

Diagram A: Difference of time of arrival of P and S was produced by an earthquake.

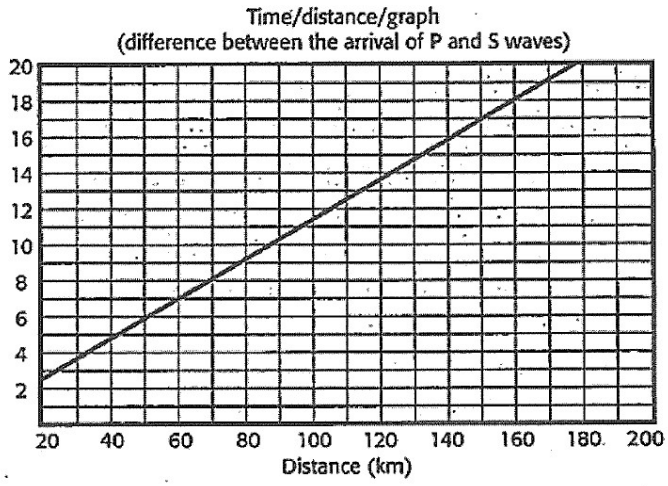
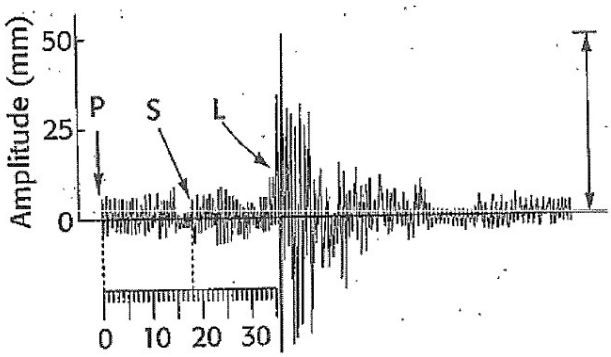


Diagram B: A siesmogram produced during an earthquake.

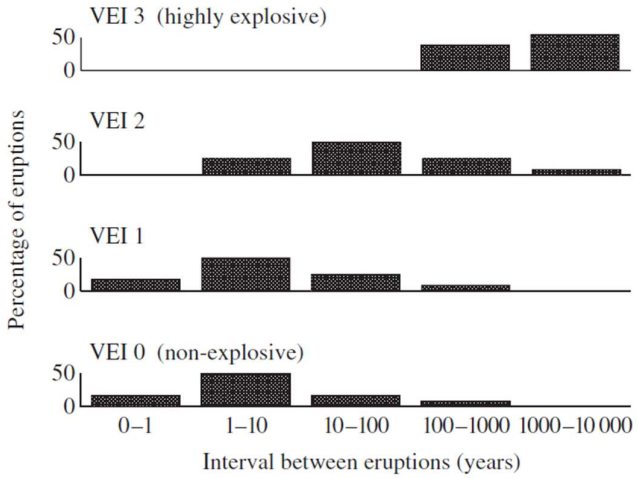


Analyse the information to determine which statement is correct.

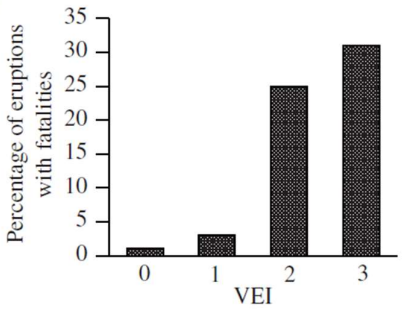
(A) As the distance from an earthquake increases the time between P and S waves arriving decreases
(B) As the distance from an Earthquake increases the time between P and S waves arriving increases
(C) S waves arrive before P waves
(D) S waves arrive with P waves

20 Graph 1 shows the percentage of eruptions at different time intervals for volcanoes with a volcanic explosivity index (VEI) between 0 and 3.
Graph 2 shows the relationship between VEI and the percentage of eruptions that had known fatalities.

Graph 1



Graph 2



Using the graphs, determine which of these statements is correct.

(A) Volcanoes with a VEI of 3 erupt only every 100 –10 000 years but are most likely to lead to fatalities.
(B) 50% of eruptions with a VEI of 0 occur every 10–100 years and lead to fatalities in 1% of cases.
(C) As the VEI increases, the interval between eruptions decreases.
(D) 32% of the population living near a volcano with a VEI of 3 will die in an eruption every 100–10 000 years.

End of Section I

Questions for Section II are found in the Answer Booklet.

NESA No.: .....

Fort Street High School

SCIENCE

2023

Year 12 Assessment Task 4

Trial Examination – Answer Booklet

Earth and Environmental Science

General Instructions

- Reading time – 5 minutes
- Working time – 180 minutes
- NESA approved calculators may be used.
- Write using black pen.
- Draw diagrams using pencil.
- Write your NESA student number at the top of this page.
- A Geological Time Scale is provided at the back of this paper

Weighting – 30%

Total marks – 100

Section 1:

- Question 1-20
- Multiple choice (20 marks)

Section 2:

- Questions 21-34
- Extended response (80 marks)

Attempt All Questions (1-34)

Multiple-choice answer sheet

Place a cross in the circle that corresponds to the most correct answer.

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 ○
16.	A ○	B ○	C ○	D ○
17.	A ○	B ○	C ○	D ○
18.	A ○	B ○	C ○	D ○
19.	A ○	B ○	C ○	D ○
20.	A ○	B ○	C ○	D ○

Attempt questions 21 - 34
Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
Allow 150 minutes for this section.

Question 21 (5 marks)

Explain how earthquake events can produce tsunami events. Use a labelled diagram to support your answer.

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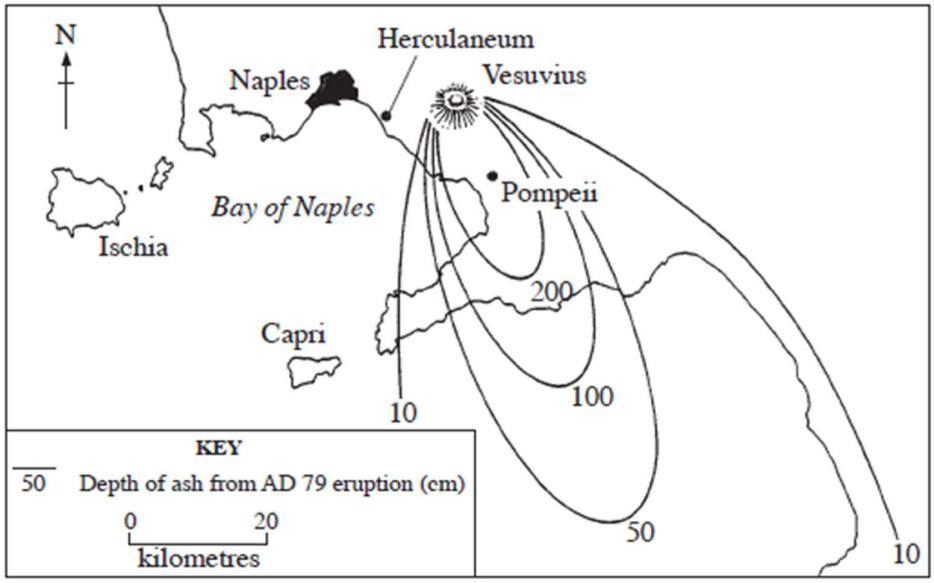
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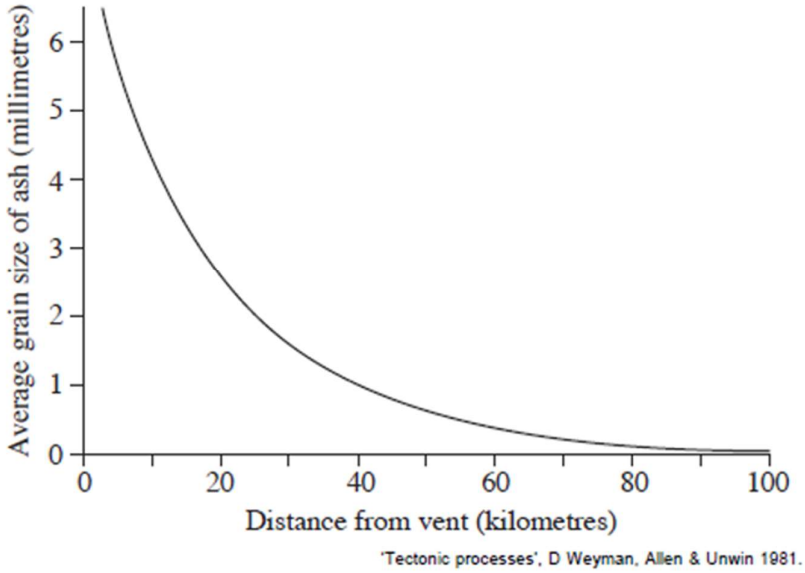
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Question 22 (4 marks)

The map shows the thickness of the ash deposit following the AD 79 eruption of Mt Vesuvius. The graph shows the relationship between grain size of the ash and the distance from the vent for the same eruption.





'Tectonic processes', D Weyman, Allen & Unwin 1981.

Prior to the eruption, Pompeii was a busy seaport. Following the eruption, Pompeii was buried until 1763, when it was rediscovered and excavated by archaeologists.

Question 22 continued

(a) What was the average grain size of the ash that fell on Pompeii? **1**

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(b) If Mt Vesuvius were to erupt in the near future, the city of Naples could be seriously threatened. Explain ONE volcanic hazard apart from ash fall that could affect the citizens of Naples. **3**

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Question 23 (7 marks)

Analyse a flow-on effect of anthropogenic climate change to assess the effectiveness of one named strategy to mitigate and/or adapt to this effect.

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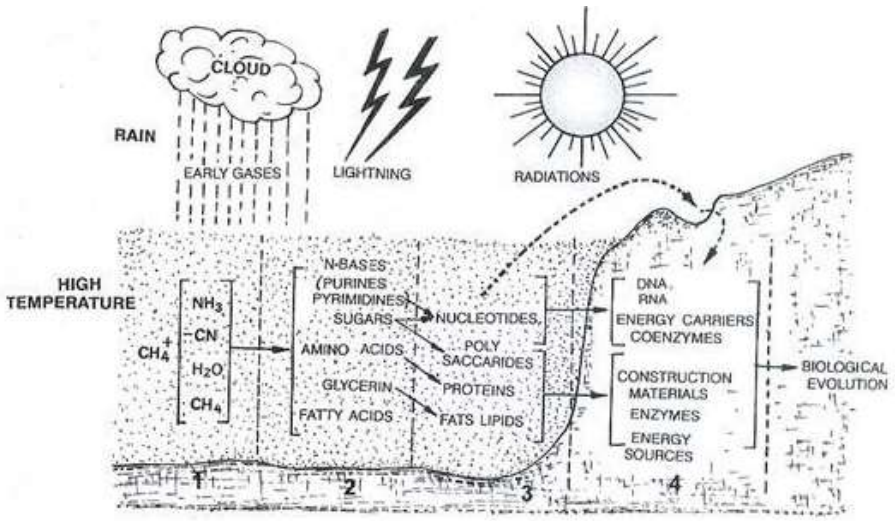
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Question 24 (5 marks)

In the 1920's, Russian scientist Alexander Oparin and British scientist John Haldane suggested that the early atmosphere contained all basic chemical and physical components for the formation of complex organic molecules. They produced a theoretical model of their hypothesis shown below.



Chemical evolution on early earth.

Analyse how experimental data is able to confirm predictions made by models regarding the origin of complex organic molecules on the Earth. Provide a named example in your answer. **5**

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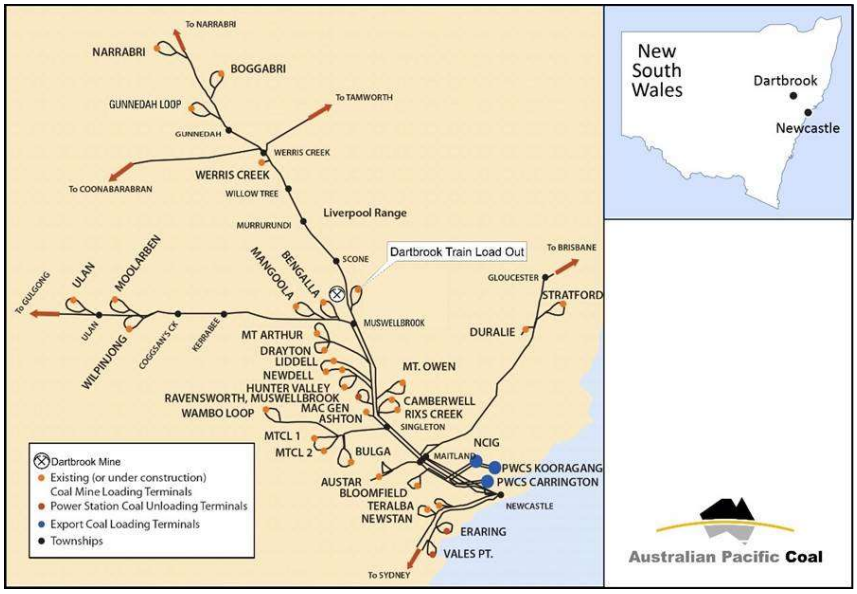
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Question 25 (6 marks)

Dartbrook mine is an open pit mine near Aberdeen, NSW, located on Geawegal Country. In 2022, this mine was granted an extra 5-year mining extension, despite concerns about its impacts on the local environment.



Analyse the processes involved in environmental reclamation to which Dartbrook mine would have to adhere, including involvement with the local Geawegal people to protect important cultural sites.

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Question 25 continued.

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Question 26 (6 marks)

(a) Explain how land use and land cover change can cause an enhanced greenhouse effect. **3**

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(b) Explain how human activities can influence the acidity of ocean waters. **3**

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Question 27 (5 marks)

In the Archean Eon, stromatelites, like those found in Shark Bay, WA, were highly abundant and widely distributed in the shallow oceans of the world.



(a) Identify the organism responsible for the formation of stromatolites in Australia from 3.4 billion years ago. **1**

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(b) Explain the effects of these organisms on the atmosphere and the later effect on the development of the biosphere. **4**

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Question 28 (6 marks)

In your studies of Earth and Environmental Science, you completed a case study of an important Australian renewable or non-renewable resource.

Name of resource: .....

(a) Identify the resource as renewable or non-renewable and justify your response. **1**

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(b) Outline an example of how the resource is used. **2**

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(c) Assess the future importance of the resource. **3**

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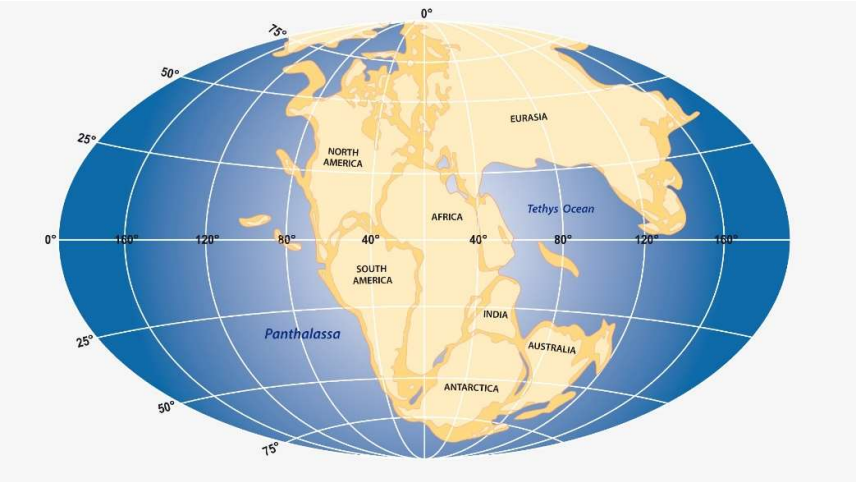
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Question 29 (4 marks)

The image shows Pangea, an ancient supercontinent that has since fragmented as part of the plate tectonic supercycle.



Use a flow diagram to explain the effect that ONE feature of the plate tectonic supercycle can have on evolution.

Question 30 (5 marks)

Using an example, analyse ONE process used by Aboriginal and Torres Strait Islander Peoples as sustainable resource managers. **5**

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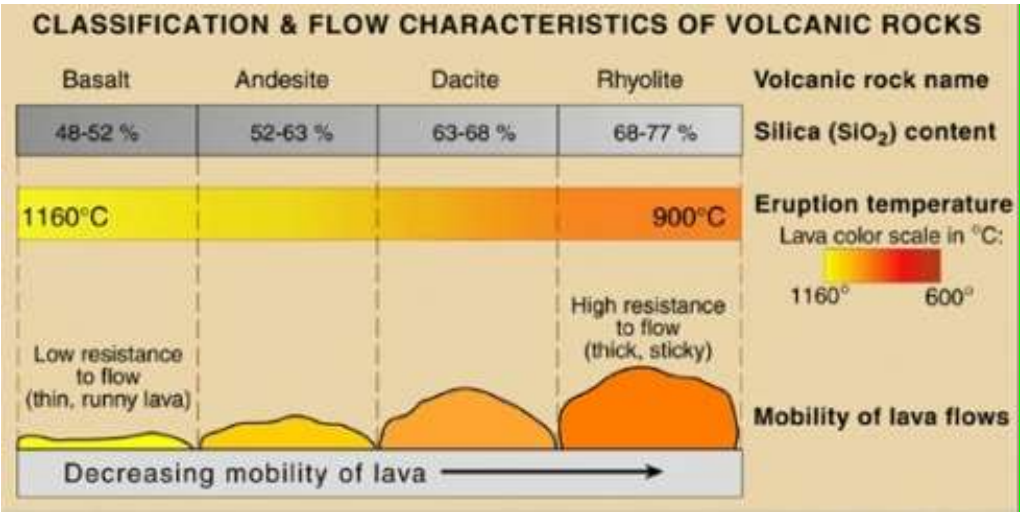
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Question 31 (5 marks)

The following information shows some properties of types of magma.



Explain how different types of magma account for the explosivity of volcanic eruptions. Refer to the data given in your response. **5**

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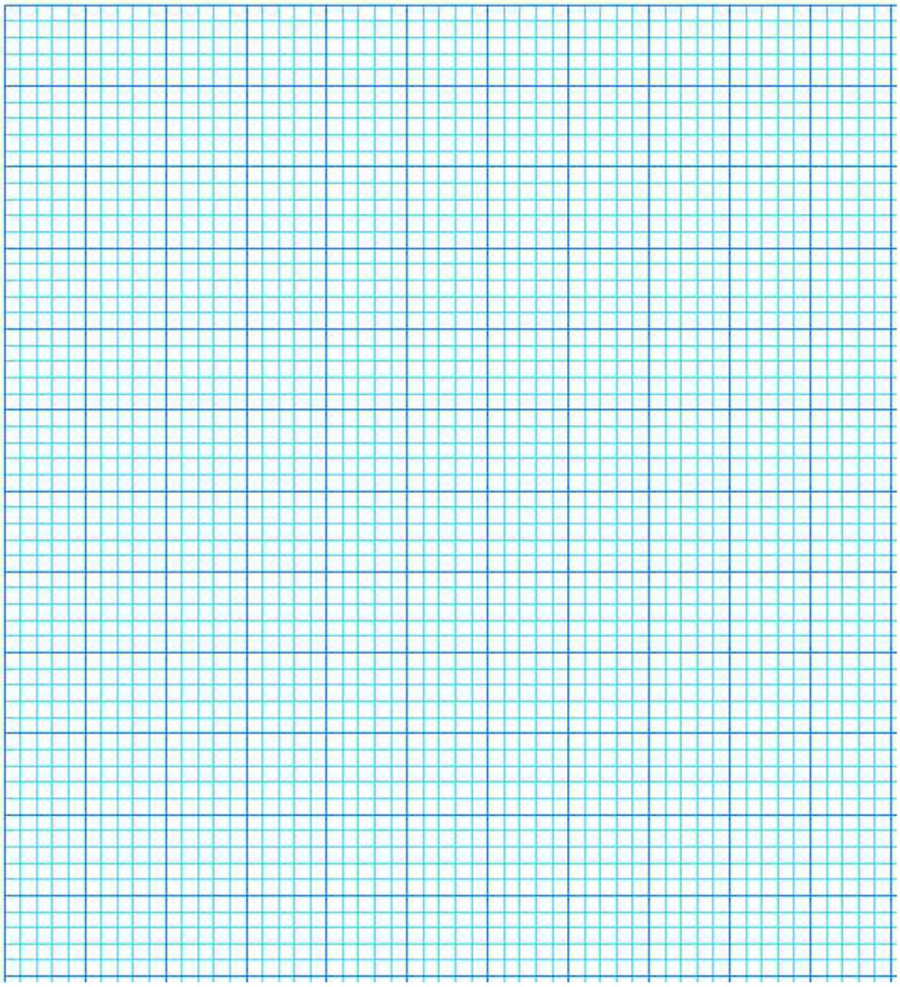
Question 32 (6 marks)

The Peruvian fishing industry is an ideal example of the changing sustainability of fishing. The data below shows the mass of anchovy fish caught in 2-year periods from 1960 – 2012.

Year	**1960**	**1962**	**1964**	**1966**	**1968**	**1970**	**1972**	**1974**	**1976**
Catch (millions of tonnes)	28	64	88	86	103	120	48	38	40
Year	**1978**	**1980**	**1982**	**1984**	**1986**	**1988**	**1990**	**1992**	**1994**
Catch (millions of tonnes)	14	8	18	1	36	30	32	52	67
Year	**1996**	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**	**2010**	**2012**
Catch (millions of tonnes)	39	11	92	71	74	60	62	78	74

Question 32 continued.

(a) Create an appropriate graph to display the information provided. **4**



(b) There were major El Nino events in 1972, 1982-83 and 1997-98. Identify the effects of an El Nino on the anchovy catch. **2**

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Question 33 (7 marks)

The following graphs provide information about sustainable water use in Sydney.

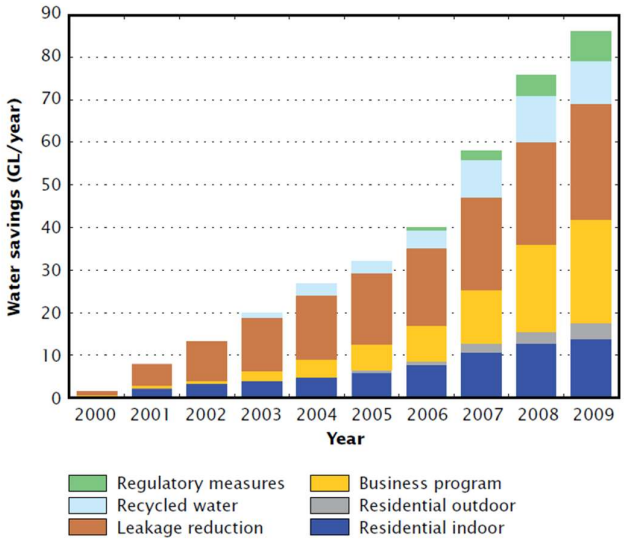


Fig. 1 Water saving measures in Sydney, which have made savings equivalent to 15% of supply.

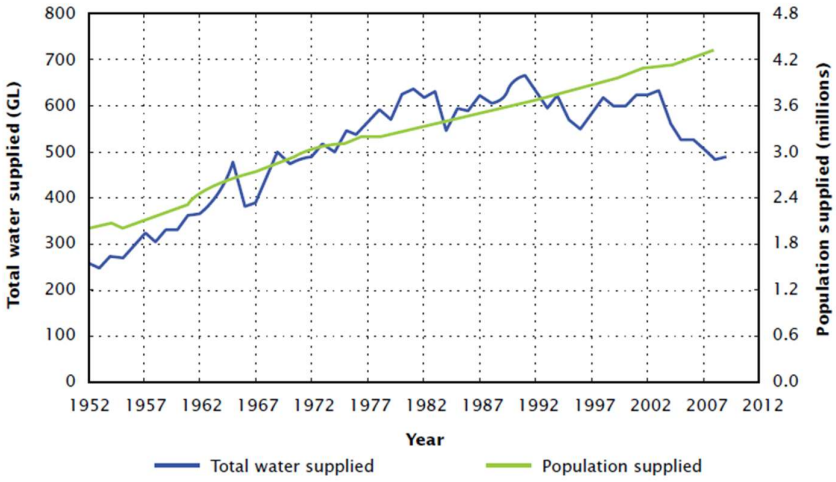


Fig. 2 Long-term trend in Sydney water supply. Water supply used to grow in line with population but reduced per capita consumption since 1992 enabled more people to be supported from the same total supply.

Image source: CSIRO

Question 33 continued.

Analyse how sustainable water saving measures in Sydney have allowed for an increase in the city's population. Refer to the data given in your response.

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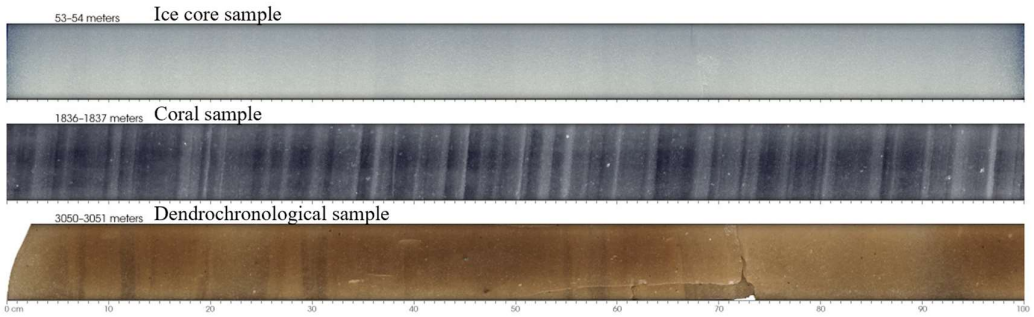
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Question 34 (9 marks)

Ice core samples, stalagmites, stalactites, corals and dendrochronology all use principles also found in palaeontology to date and determine more recent climate variations.



Analyse how palaeontological principles that are used to explain evidence for climate change can give us a highly reliable timeline of the climate variations for tens of thousands of years into the past.

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Question 34 continued.

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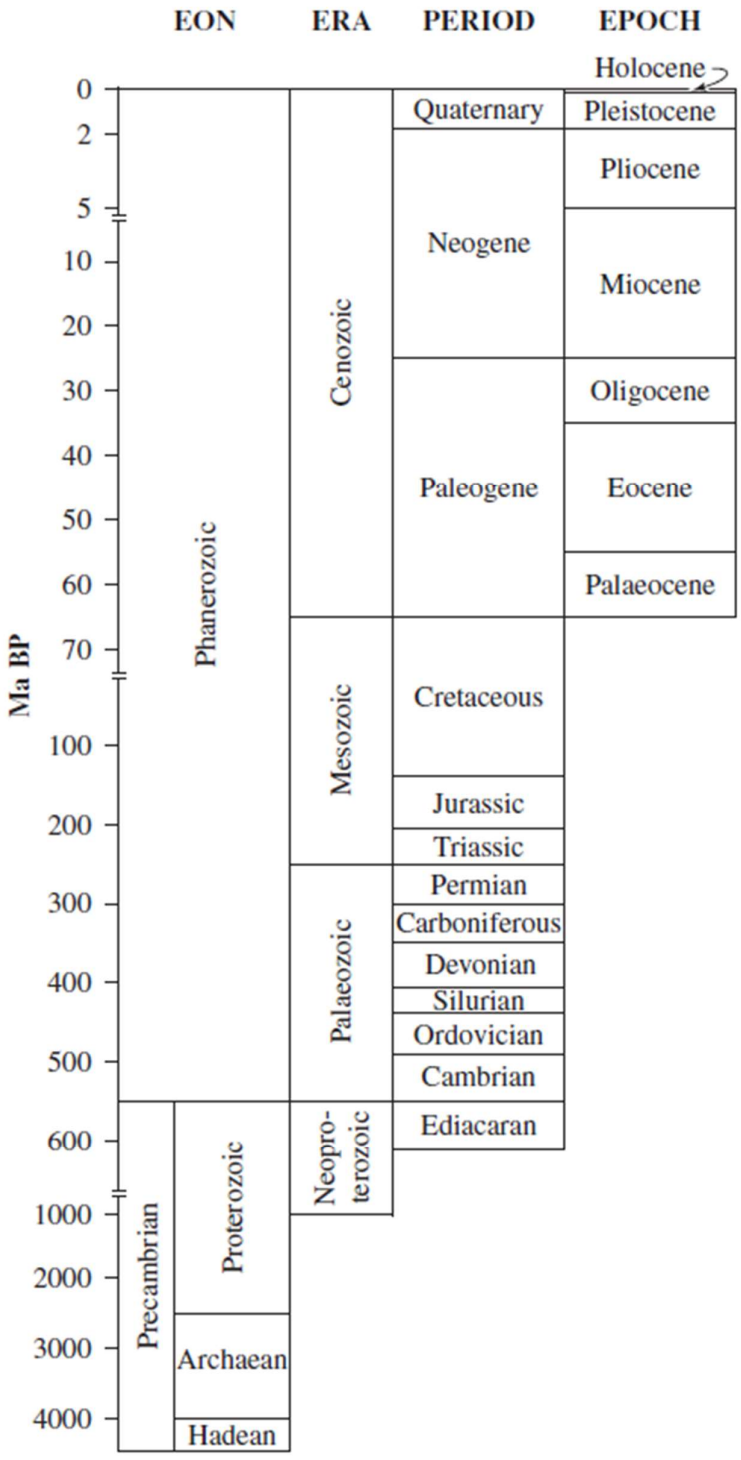
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Earth and Environmental Science

Geological Time Scale



EES Year 12 Trial 2023 Marking Criteria

Skills = 3, 7, 22a, 24, 28c, 32 KU = all others

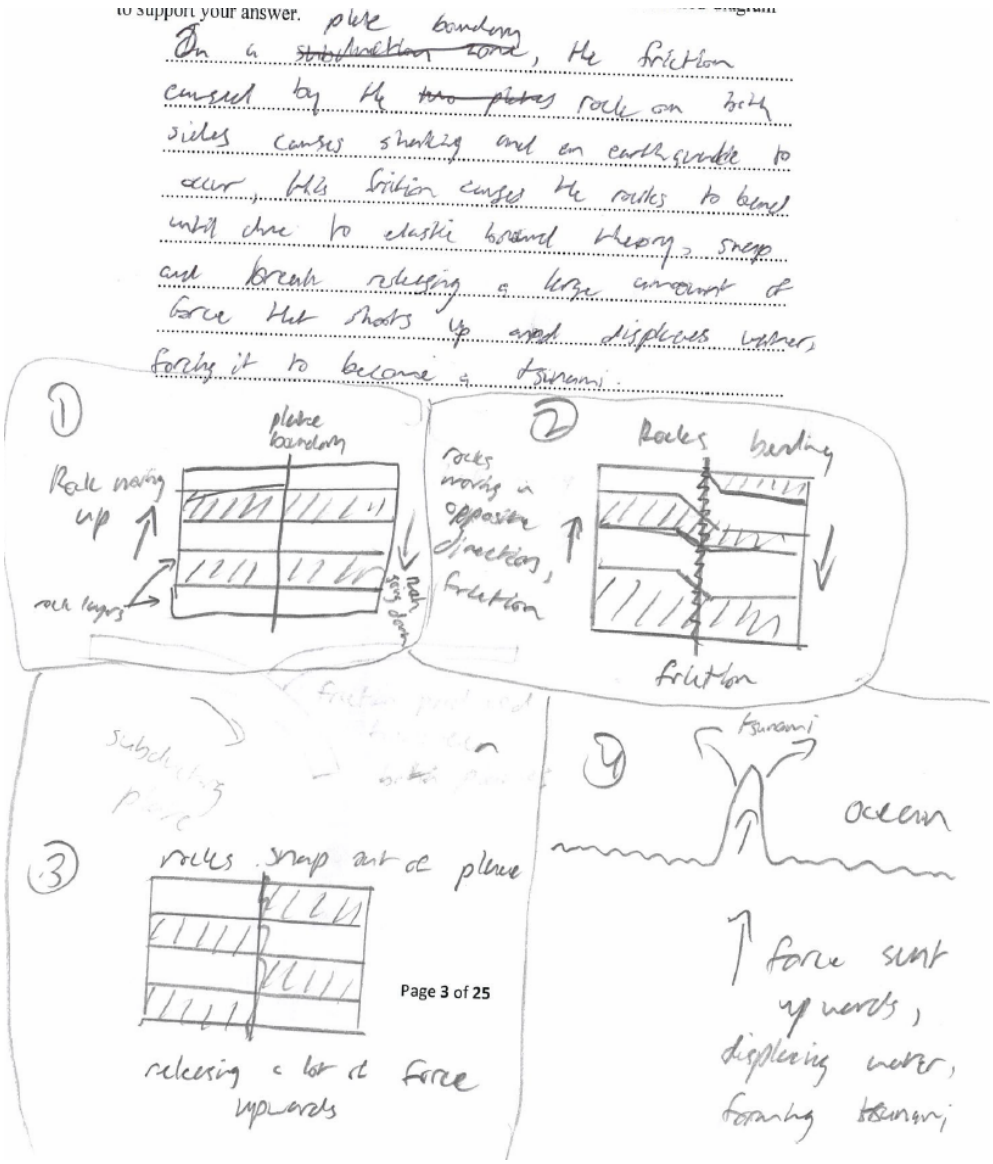
	EES12-12		EES12-13		EES12-14		EES12-15		
Options									**Outcome(s)**
1.	A	X	B	○	C	○	D	○	**EES12-13**
2.	A	X	B	○	C	○	D	○	**EES12-12**
3.	A	○	B	○	C	X	D	○	**EES11/12-3**
4.	A	○	B	○	C	X	D	○	**EES12-14**
5.	A	○	B	○	C	○	D	X	**EES12-12**
6.	A	X	B	○	C	○	D	○	**EES12-12**
7.	A	○	B	○	C	○	D	X	**EES11/12-5**
8.	A	○	B	○	C	X	D	○	**EES12-13**
9.	A	X	B	○	C	○	D	○	**EES12-12**
10.	A	○	B	○	C	X	D	○	**EES12-12**
11.	A	○	B	X	C	○	D	○	**EES12-15**
12.	A	X	B	○	C	○	D	○	**EES12-13**
13.	A	X	B	○	C	○	D	○	**EES12-13**
14.	A	○	B	○	C	X	D	○	**EES12-13**
15.	A	○	B	○	C	○	D	X	**EES12-14**
16.	A	○	B	○	C	X	D	○	**EES12-14**
17.	A	○	B	X	C	○	D	○	**EES12-12**
18.	A	○	B	X	C	○	D	○	**EES12-14**
19.	A	○	B	X	C	○	D	○	**EES12-13**
20.	A	X	B	○	C	○	D	○	**EES12-13**

Question 21 (5 marks) EES12-13

Criteria	Marks
• Clearly links earthquake events to tsunami events using cause-and-effect. • Diagram clear, labelled and includes all relevant components.	5
• Describes appropriate features of earthquakes and tsunami events. • Uses appropriate diagram.	4
• Describes features of earthquakes or tsunami events. • Provides diagram with some relevant aspects.	3
• Provides some relevant information.	1-2

NOTE: Many students discussed elastic potential energy and the causes of earthquakes. This is year 11 work. The focus of this question was on tsunamis.

Sample Answer:



Question 22 (4 marks)

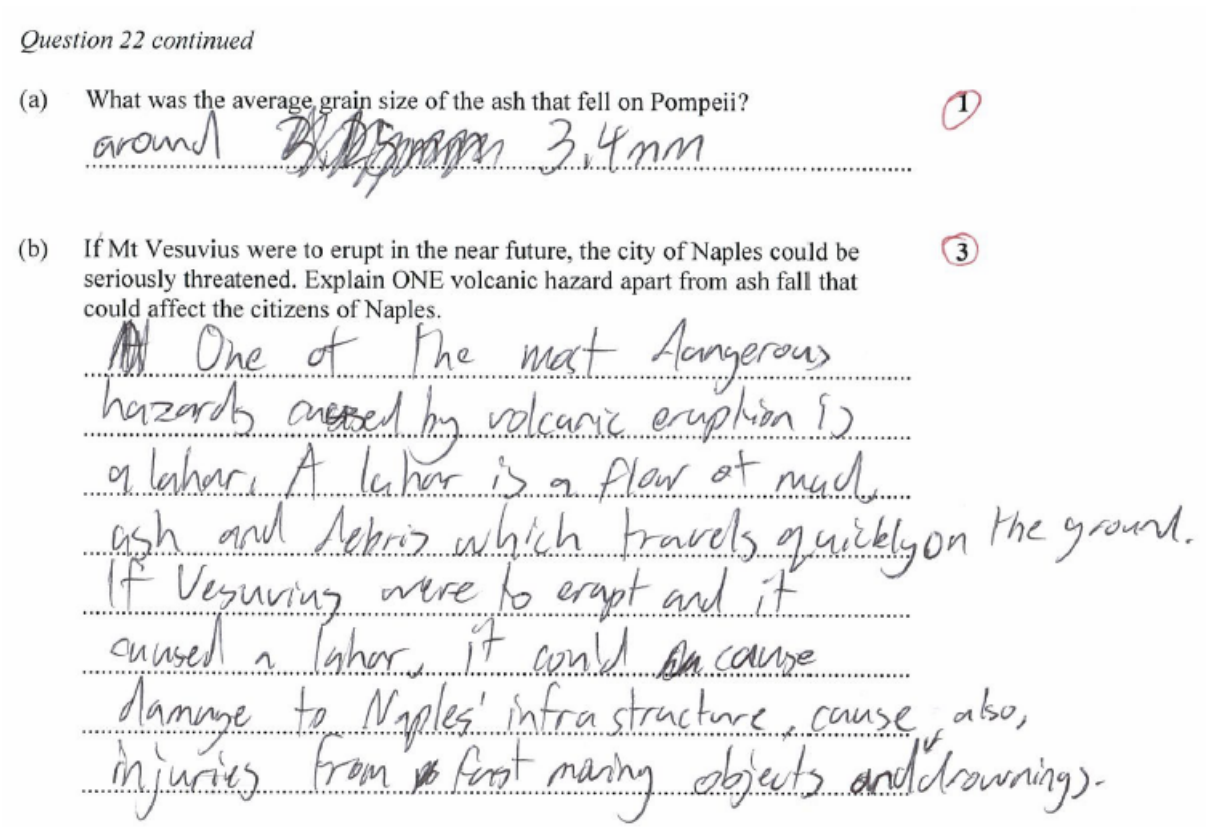
a) (1 marks) EES11/12-5

Criteria	Marks
• Identifies 4 mm (3.5-4.5 mm)	1

b) (3 marks) EES12-13

Criteria	Marks
• Clearly links one appropriate volcanic hazard to its affect on the biosphere using cause-and-effect.	3
• Describes one appropriate volcanic hazard.	2
• Provides some relevant information.	1

Sample Answer:



Question 22 continued

(a) What was the average grain size of the ash that fell on Pompeii? (1)

around 3.4mm

(b) If Mt Vesuvius were to erupt in the near future, the city of Naples could be seriously threatened. Explain ONE volcanic hazard apart from ash fall that could affect the citizens of Naples. (3)

One of the most dangerous hazards caused by volcanic eruption is a lahar. A lahar is a flow of mud, ash and debris which travels quickly on the ground. If Vesuvius were to erupt and it caused a lahar, it could cause damage to Naples' infrastructure, cause also, injuries from fast moving objects and drownings.

Question 23 (7 marks) EES12-14

Criteria	Marks
• Demonstrates a depth or breadth and comprehension of knowledge and understanding of the effects of anthropogenic climate change and mitigation/adaptation strategies. • Draws-out and relates implications of a flow-on effect of anthropogenic climate change. • Makes clear link between flow-on effect and adaptation/mitigation strategy. • Makes a judgement supported by arguments regarding mitigation or adaptation of a named flow-on effect of climate change. • Uses specific and appropriate terminology and progression of thought.	7
• Demonstrates detailed knowledge and understanding of the effects of anthropogenic climate change and mitigation/adaptation strategies. • Describes features of a flow-on effect of anthropogenic climate change. • Attempts link between flow-on effect and adaptation/mitigation strategy. • Makes a judgement regarding mitigation or adaptation of a named flow-on effect of climate change. • Uses appropriate terminology and progression of thought.	5-6
• Demonstrates an understanding of the effects of anthropogenic climate change and/or mitigation/adaptation strategies.	3-4
• Provides some relevant information.	2-1

Sample Answer:

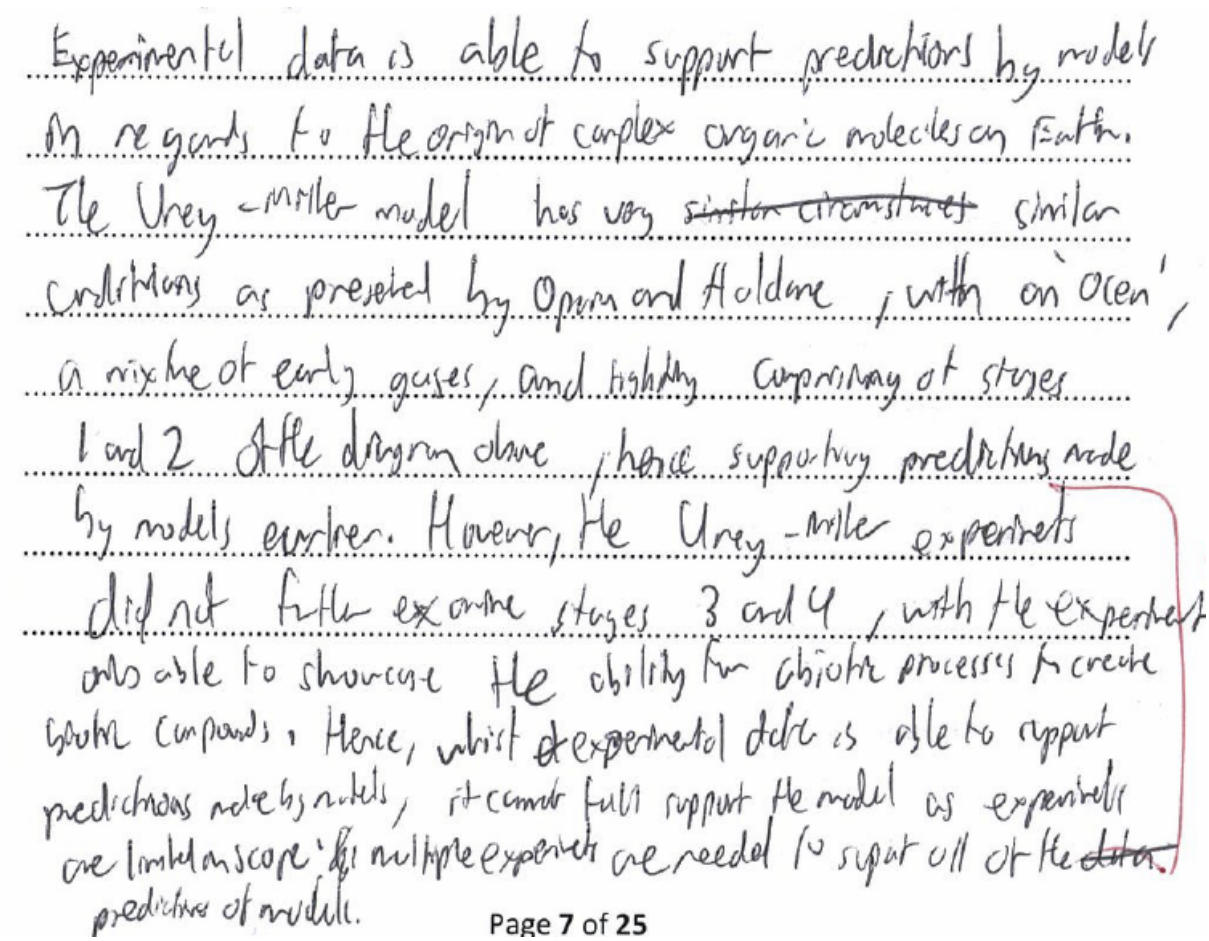
Due to the increase of Earth's average global temperature, storms and subsequently floods have been more severe and more frequent, with flood plains harbouring once considered "100 year" events occurring at greater frequencies, damaging communities and now creating a serious hazard for human habitation. To adapt to this changing environment, governments have started 'buy-back' schemes, to purchase flood~~prone~~prone land from home and business owners ~~as land~~ as a natural flood ~~defence bank~~ barrier in the form of ~~the~~ riverside parks. These schemes, as well as similar town relocation strategies have ~~mitigated~~ ~~the adapting to the~~ effects of floods by ensuring small towns are not located on flood plains, instead occupying higher elevations not expected to flood. These schemes also help reduce costs on governments to rescue individuals or communities in the event of flooding, given the lessened number of affected people. Hence, flood buyback and town relocation schemes are ~~quite~~ effective in adapting to the increased risk of flooding of communities caused by anthropogenic climate change.

Question 24 (5 marks) EES11/12-6

Criteria	Marks
• Draws-out and relates experimental procedures to features of models. • Clearly to the origin of organic molecules on Earth. • Links to an explicit aspect of an appropriate example (Urey & Miller experiment).	5
• Describes features of experimental procedures and models. • Links to the origin of organic molecules on Earth. • Links to appropriate example.	4
• Describes features of experimental procedures OR models. • Attempts to link to the origin of organic molecules on Earth OR appropriate example.	3
• Provides some relevant information.	1-2

NOTE: Students needed to elaborate on predictions made by scientific models in general. Overall, all students showed a good understanding of the Urey/Miller experiment.

Sample Answer:

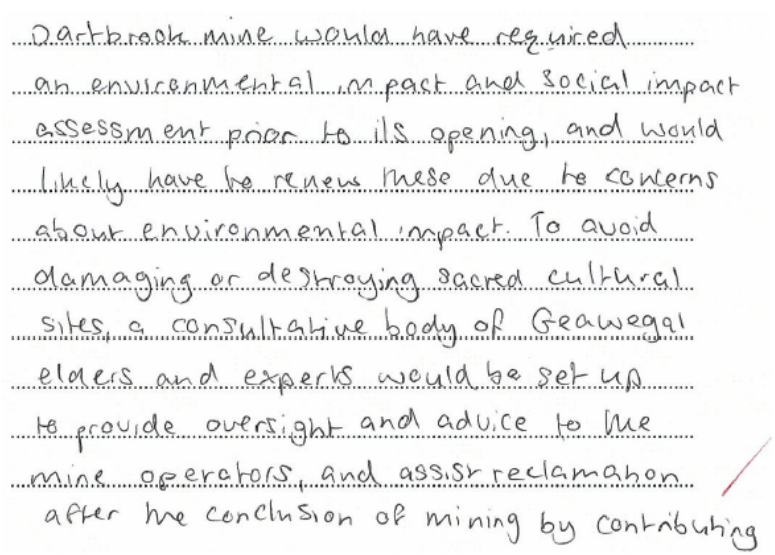

Experimental data is able to support predictions by models in regards to the origin of complex organic molecules on Earth. The Urey-Miller model has very ~~similar circumstances~~ similar conditions as presented by Oparin and Haldane, with an 'ocean', a mixture of early gases, and lightning corresponding at stages 1 and 2 of the diagram above, hence supporting predictions made by models earlier. However, the Urey-Miller experiments did not further examine stages 3 and 4, with the experiment only able to showcase the ability for abiotic processes to create biotic compounds. Hence, whilst ~~the~~ experimental data is able to support predictions made by models, it cannot fully support the model as experiments are limited in scope & multiple experiments are needed to support all of the ~~data~~ predictions of models.

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Question 25 (6 marks) EES12-15

Criteria	Marks
• Demonstrates a depth or breadth and comprehension of knowledge and understanding of processes involved in environmental reclamation of mines. • Draws-out and relates processes of mining to reclamation of land (1 environmental, 1 ATSI).	6
• Demonstrates detailed knowledge and understanding of processes involved in environmental reclamation of mines. • Draws-out and relates a process of mining to land reclamation.	5
• Demonstrates an understanding of processes involved in environmental reclamation of mines. • Describes a process of reclamation.	3-4
• Provides some relevant information.	1-2

Sample Answer:


Oakbrook mine would have required an environmental impact and social impact assessment prior to its opening, and would likely have to renew these due to concerns about environmental impact. To avoid damaging or destroying sacred cultural sites, a consultative body of Geawegal elders and experts would be set up to provide oversight and advice to the mine operators, and assist reclamation after the conclusion of mining by contributing

Indigenous knowledge of flora, fauna and natural processes in the area. When mining resumes, any ~~material~~ soil and organic material removed from the mine site would have to be conserved and stored in preparation for its re-installation upon the conclusion of mining. Any mine tailings and other hazardous waste would be treated and disposed of to avoid contamination of the rewilded land. Finally, when mining concludes, the open pit would be filled with the reserved soil and rock, vegetation re-introduced and animals identified by the EIS and Indigenous knowledge reintroduced to restore the ecosystem. to begin the process of restoring the natural ecosystem.

Question 26 (6 marks)

a) (3 marks) EES12-14

Criteria	Marks
• Clearly links changes in land use and land cover to enhanced greenhouse effect using cause-and-effect.	3
• Describes appropriate features of land use/cover and enhanced greenhouse effect.	2
• Provides some relevant information.	1

Sample Answer:

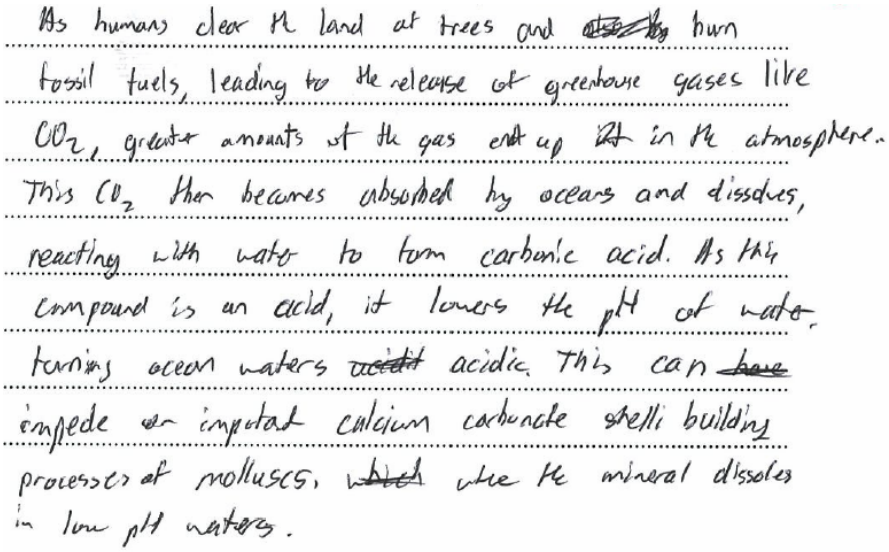
Land use and land cover can cause an enhanced greenhouse gas effect because land cover with flora/trees can sequester carbon and land use for agriculture or industrial activities can emit carbon. Due to this, land cover with fewer flora and land use for agriculture or industry can increase atmospheric CO_2 concentrations, causing the enhanced greenhouse gas effect because CO_2 traps more heat in the atmosphere.

b) (3 marks) EES12-14

Criteria	Marks
• Clearly links human activity to changes in acidity of ocean waters using cause-and-effect.	3
• Describes appropriate features of human activity and changes in acidity of ocean	2

waters.	
• Provides some relevant information.	1

Sample Answer:



Question 27 (5 marks)

a) (1 marks) EES12-12

Criteria	Marks
• Correctly identifies Cyanobacteria	

b) (4 marks) EES12-12

Criteria	Marks
• Clearly links effect of cyanobacteria on atmosphere AND development of the biosphere using cause-and-effect.	4
• Links effect of cyanobacteria on atmosphere OR development of the biosphere using cause-and-effect.	3
• Describes relevant features of the atmosphere AND development of the biosphere.	2
• Provides some relevant information.	1

NOTE: The use of the term "later" in the question means a different geological period. Students are expected to link oxygen production to eventual life on land.

Sample Answer:

Identify the organism responsible for the formation of stromatolites in Australia from 3.4 billion years ago. (1)

Cyanobacteria.

Explain the effects of these organisms on the atmosphere and the later effect on the development of the biosphere. (4)

1) 2)

Cyanobacteria were the first photosynthetic organisms, using carbon dioxide and water to produce oxygen, water and sugars via sunlight. This Due to this, CO_2 levels in the ocean dropped, causing a drop in atmospheric CO_2 which became dissolved to replenish the lost CO_2. On the other hand, O_2 levels then increased in the oceans, before being released into the atmosphere. When O_2 gas the reacted with UV radiation from the sun, the molecule was broken into singular O atoms and returned as the allotrope O_3, forming the ozone layer. This provided a protective layer that large amounts prevented UV radiation from reaching the Earth. This then served as a requisite for the development of the biosphere, protecting life forms from mutations that could impede on their survival. The O_2 in the waters acted as a poison to anaerobic organisms, killing them off and allowing the development of more complex, aerobic organisms, eventually moving onto land protected from UV.

Central continued

Question 28 (6 marks)

a) (1 marks) EES12-15

Criteria	Marks
• Correctly identifies as renewable or non-renewable with appropriate justification.	1

b) (2 marks) EES12-15

Criteria	Marks
• Outlines appropriate example.	2
• Identifies appropriate example.	1

c) (3 marks) EES11/12-6

Criteria	Marks
• Demonstrates an understanding of value of selected resources. • Makes a judgement supported by arguments regarding the importance of the resource for the future.	3
• Provides some value of the selected resource. • Makes a judgement regarding the importance of resource for the future.	2
• Provides some use of the selected resource.	1

Sample Answer:

Name of resource: Concrete

(a) Identify the resource as renewable or non-renewable and justify your response. (1)

Non-renewable as it is created from geological resources which are limited and do not replenish

(b) Outline an example of how the resource is used. (2)

Concrete is mainly used in constructions such as the building of Barangaroo wharf in Sydney. This is due to its durable, rigid properties which make it suitable for the use.

(c) Assess the future importance of the resource. (3)

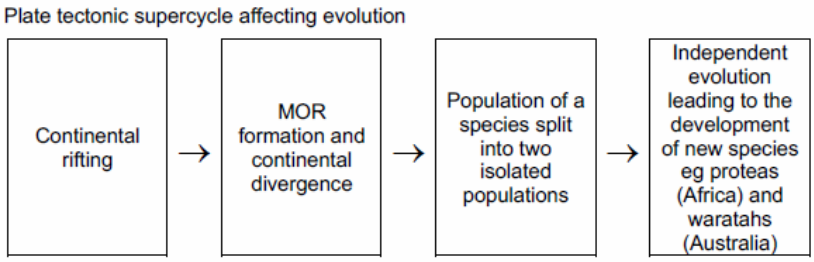
Concrete will remain important in the future as it is a main material used in global construction and does not have any viable alternatives on a large scale. However, it is also a large contributor to CO_2 emissions during the process chemistry of production. Therefore it will remain important as will research into finding an alternative or reducing or CO_2 production that will and is occuring.

Question 29 (4 marks) EES12-12

Criteria	Marks
• Identifies relevant component(s) of the PTSC. • Identifies relevant component(s) of evolution. • Uses cause-and-effect to connect PTSC to evolution. • Uses a logical sequence. • Creates a flow chart using a suitable format.	4
• Identifies relevant component(s) of the PTSC. • Identifies relevant component(s) of evolution. • Links PTSC to evolution. • Uses a logical sequence. • Creates a flow chart using a suitable format.	3
• Identifies relevant component(s) of the PTSC. • Identifies relevant component(s) of evolution. • Links PTSC to evolution.	2
• Identifies relevant component(s) of the PTSC. OR • Identifies relevant component(s) of evolution. OR • Creates a flow chart using a suitable format.	1

Sample Answer:

Change in stage of PTSC -> New selection pressure -> Effect of selection pressure on biosphere



Question 30 (5 marks) EES12-15

Criteria	Marks
• Demonstrates an understanding of Aboriginal Peoples or Torres Strait Islander Peoples as sustainable resource managers. • Provides appropriate example. • Draws-out and relates implications of example provided.	5
• Demonstrates a detailed knowledge of Aboriginal Peoples or Torres Strait Islander Peoples as sustainable resource managers. • Describes implications of appropriate example.	4
• Recalls a basic knowledge of Aboriginal Peoples or Torres Strait Islander Peoples as sustainable resource managers. • Provides an example.	3
• Provides some information of Aboriginal Peoples or Torres Strait Islander Peoples as sustainable resource managers.	2
• Provides some relevant information.	

NOTE: Many who use example of fire stick farming mistake the practice as a method of hazard reduction rather than sustainable resource management.

Sample Answer:

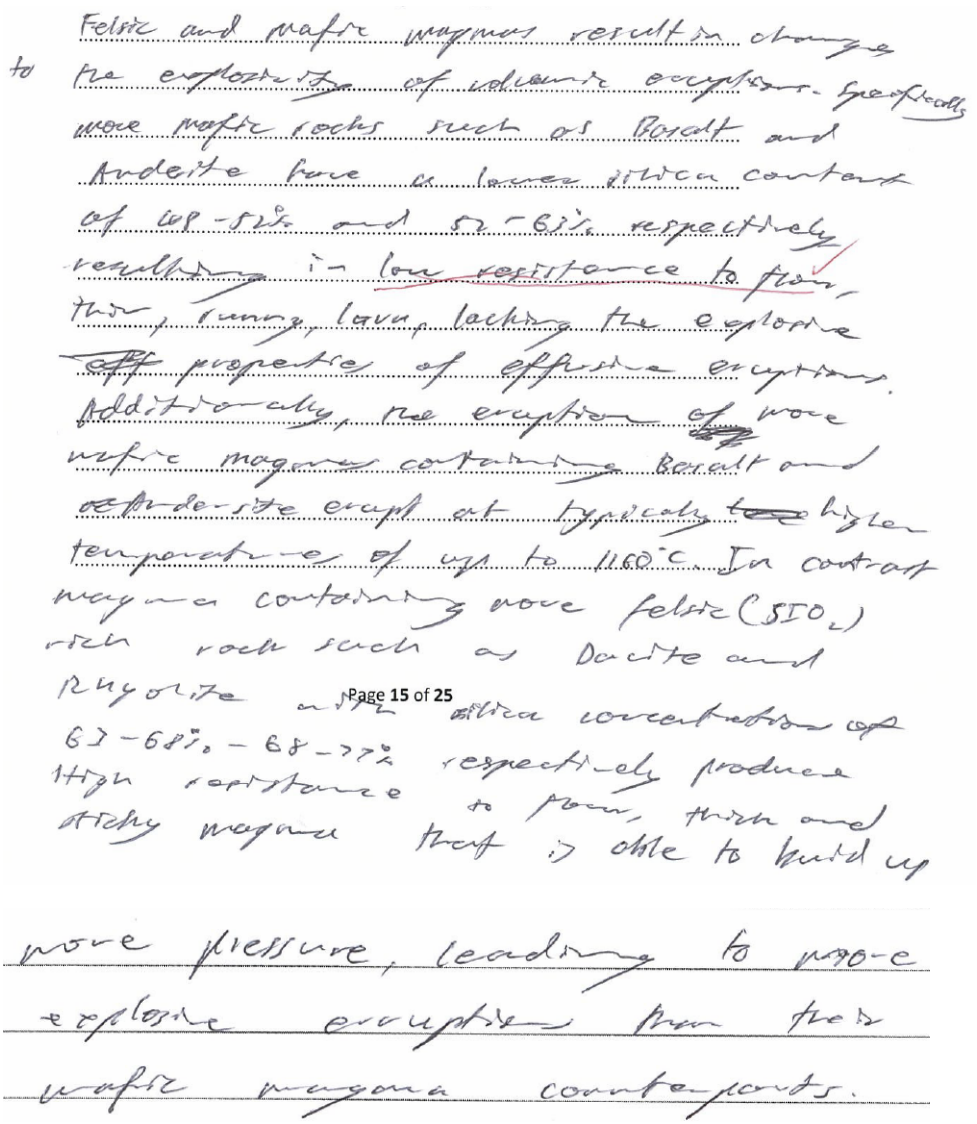
Fire stick farming is a major technique used by Aboriginal People, like the Djelk Traditional owners in the Nothern Territory, to sustainably manage the land and food resources. Here, they engage in cool, mosaic burns which are low-intensity fires, in order to burn away low-lying savannah grasses and dry vegetation. By doing so, they allowe for the encouragement of native vegetation and bush tucker species adapted to fires to germinate, providing a major source of food to the community. Additionally, by burning the dry undergrowth, they decrease the fuel load after bushfires during dry seasons, allowing fires to be less intense and devasting. This allows for the better management of agricultural resources by preventing the burning of crops like yams in an intese. fire. Here, ATSI people, like the Djelk People, have considered meeting the needs for the future in preventing the destruction of crops whilst allowing to meet their own needs through the germination of bush tucker, allowing them to become sustainable resource managers!

Question 31 (5 marks) EES12-13

Criteria	Marks
• Clearly links features of different types of magma to the explosivity of volcanic eruptions using cause-and-effect. • Refers to multiple explicit aspects of data provided.	5
• Links a feature of magma to explosivity of eruptions using cause-and-effect. • Refers to an explicit aspect of data provided.	4
• Describes relevant features of different types of magma and the explosivity of eruptions. • Refers to features of data provided.	3
• Identifies some relevant components of different types of magma or explosivity of eruptions.	2
• Provides some relevant information.	1

NOTE: Need to use words (if not numerical values) directly from data source. EG: "density" is not used in data, nor are terms like "felsic/mafic", "bubbly" or "viscous." These terms would have to be defined using terms in the data before used in response.

Sample Answer:

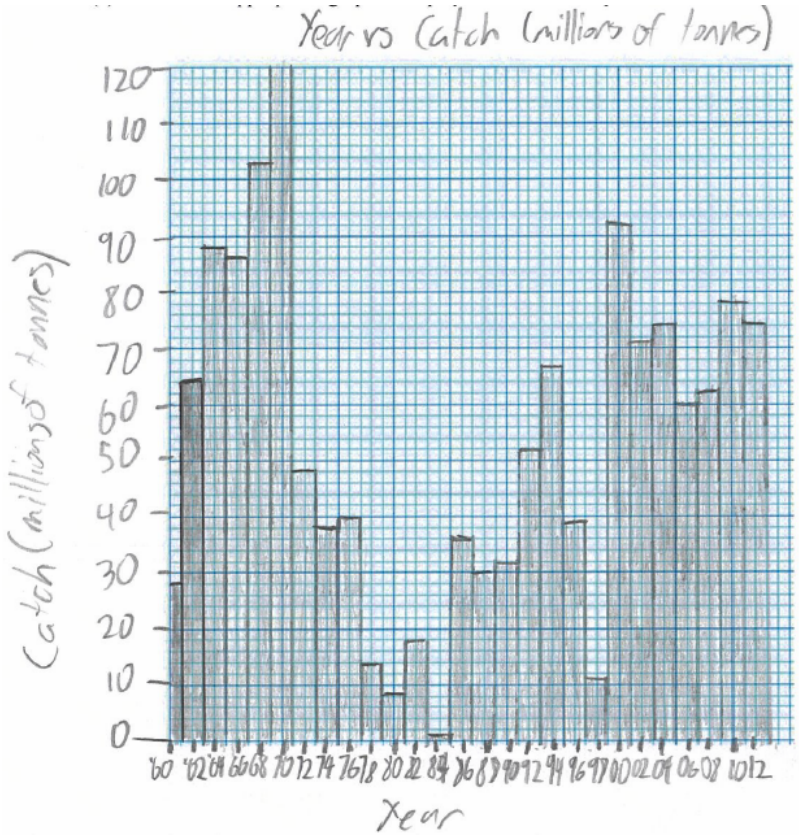


Question 32 (6 marks)

a) (4 marks) EES11/12-4

Criteria	Marks
• Labels axis including units. • Correct axis for variables chosen • Scales axis correctly. • Plots columns correctly.	4
• Provides any THREE of the above. OR • Plots line or other graph type correctly	3
• Provides any TWO of the above.	2
• Provides at least one correct component of graph.	1

Sample Answer:



b) (2 marks) EES11/12-5

Criteria	Marks
• Correctly identifies two effects based on information provided.	2
• Correctly identifies one effect based on information provided.	1

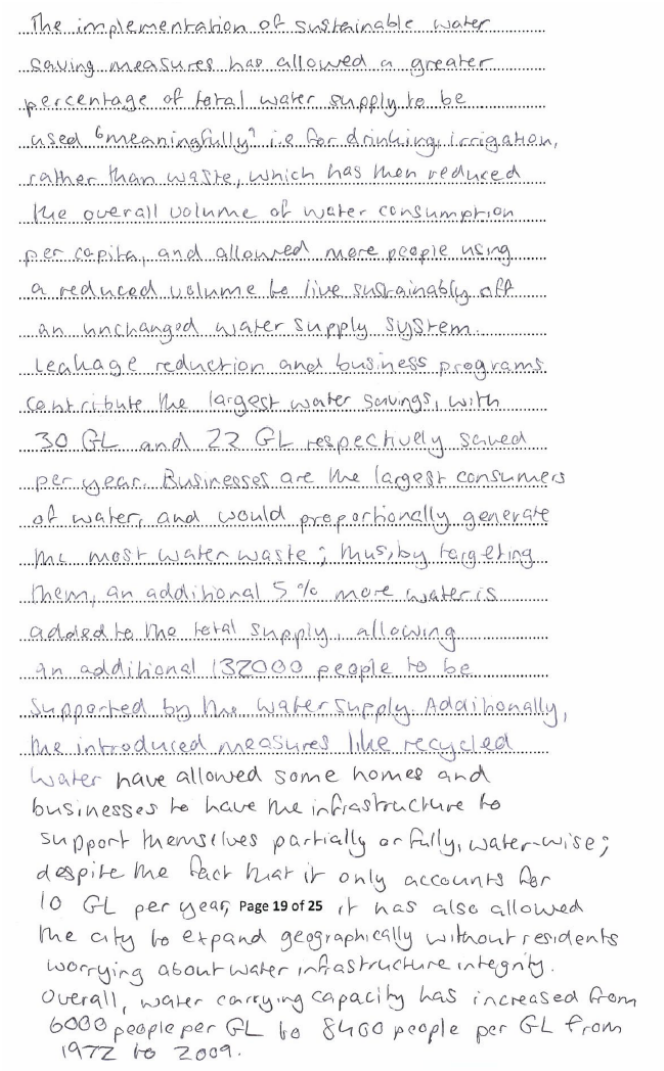
Sample Answer:

Following each El Nino event there was a significant fall in the number of tonnes of fish caught, however following a two to four years, the anchovy catches began to increasing

Question 33 (7 marks) EES12-15

Criteria	Marks
• Demonstrates an understanding of sustainable resources providing for larger populations. • Draws-out and relates appropriate components of water saving measures and sustainable population growth. • Refers to multiple explicit aspects of data provided.	7
• Demonstrates a detailed knowledge of sustainable resources providing for larger populations. • Describes some links between water saving measures and sustainable population growth. • Refers to an explicit aspect of data provided.	5-6
• Demonstrates a basic knowledge of sustainable resources providing for larger populations. • Refers to features of data provided.	3-4
• Provides some information of sustainable resources providing for larger populations.	2
• Provides some relevant information.	1

Sample Answer:

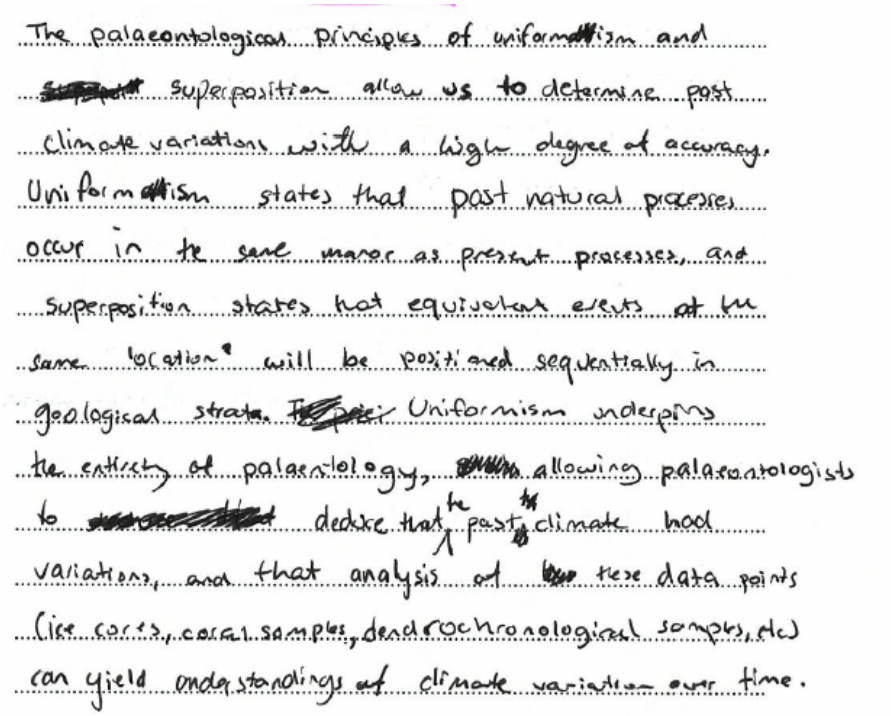

The implementation of sustainable water saving measures has allowed a greater percentage of total water supply to be used 'meaningfully' i.e for drinking, irrigation, rather than waste, which has then reduced the overall volume of water consumption per capita, and allowed more people using a reduced volume to live sustainably off an unchanged water supply system. Leakage reduction and business programs contribute the largest water savings, with 30 GL and 22 GL respectively saved per year. Businesses are the largest consumers of water, and would proportionally generate the most water waste; thus, by targeting them, an additional 5% more water is added to the total supply, allowing an additional 137000 people to be supported by the water supply. Additionally, the introduced measures like recycled water have allowed some homes and businesses to have the infrastructure to support themselves partially or fully, water-wise; despite the fact that it only accounts for 10 GL per year, it has also allowed the city to expand geographically without residents worrying about water infrastructure integrity. Overall, water carrying capacity has increased from 6000 people per GL to 8400 people per GL from 1972 to 2009.

Question 34 (9 marks) EES12-12, EES12-14

Criteria	Marks
• Demonstrates an extensive knowledge and understanding of recent evidence for climate change AND the reliable consistency found between the pieces of evidence. • Demonstrates an extensive knowledge and understanding of the application of appropriate palaeontological principles. • Draws-out and relates appropriate components of evidence for climate change to palaeontological principles. • Demonstrates a coherent and logical progression of thought and consistently uses appropriate scientific terminology.	9
• Demonstrates thorough knowledge and understanding of recent evidence for climate change and the reliable consistency found between the pieces of evidence. • Demonstrates thorough knowledge and understanding of the application of appropriate palaeontological principles. • Describes some links between components of evidence for climate change to palaeontological principles. • Demonstrates a coherent and logical progression of thought and consistently uses appropriate terminology	7-8
• Demonstrates sound knowledge of recent evidence for climate change.	

• Demonstrates sound knowledge of the application of palaeontological principles. • Uses relevant terminology and/or progression of thought	5-6
• Demonstrates basic knowledge of recent evidence for climate change. AND/OR • Demonstrates basic knowledge of palaeontological principles. • Uses suitable terminology	3-4
• Provides some relevant information	1-2

Sample Answer:


The palaeontological principles of uniformitism and superposition allow us to determine past climate variations with a high degree of accuracy. Uniformitism states that past natural processes occur in the same manor as present processes, and superposition states that equivalent events at the same location will be positioned sequentially in geological strata. Uniformism underpins the entirety of palaeontology, allowing palaeontologists to deduce that the past climate had variations, and that analysis of these data points (ice cores, coral samples, dendrochronological samples, etc) can yield understandings of climate variation over time.

Additionally, by the principle of superposition, subsequent strata within a sample were deposited sequentially. This allows palaeontologists to measure the change in climate over the course of singe deposits or sets of deposits, such as by measuring the gaseous contents of past atmospheres in bubbles in ice cores, or by measuring the changing width of tree ring sizes. By cross-referencing various samples- both within other samples of the same type, such as comparing tree rings globally to look for overlap- and with samples of different types, such as by comparing said dendrochronological timelines to gas bubbles or coral or stalactite samples, a complete and continuous timeline can be made of Earth's climate over time. Additional data points contribute additional understanding of climate variations, as opposed to local variation in weather. Thus, a complete, accurate and reliable timeline of global climate can be built, using palaeontological principles applied to samples of tree rings, ice cores, coral samples, and stalactites.