

**2003 HSC Notes from
the Marking Centre
Earth and Environmental Science**

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2003 HSC NOTES FROM THE MARKING CENTRE

EARTH AND ENVIRONMENTAL SCIENCE

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course in Earth and Environmental Science. It provides comments with regard to responses to the 2003 Higher School Certificate Examination, indicating the quality of candidate responses and highlighting the relative strengths and weaknesses of the candidature in each section and each question.

It is essential for this document to be read in conjunction with the relevant syllabus, the 2003 Higher School Certificate Examination, the Marking Guidelines and other support documents which have been developed by the Board of Studies to assist in the teaching and learning of Earth and Environmental Science.

General Comments

In 2003, approximately 1250 candidates attempted the Earth and Environmental Science examination.

Teachers and candidates should be aware that examiners may ask questions that address the syllabus outcomes in a manner that requires candidates to respond by integrating their knowledge, understanding and skills developed through studying the course. This reflects the fact that the knowledge, understanding and skills developed through the study of discrete sections, should accumulate to a more comprehensive understanding than may be described in each section separately.

Candidates need to be reminded that the answer space allocated is a guide to the maximum length of the response required.

Section I – Core

Part A – Multiple choice

Question	Correct Response
1	C
2	D
3	C
4	B
5	B
6	C
7	A
8	D

Question	Correct Response
9	A
10	B
11	C
12	D
13	A
14	B
15	A

Part B

Specific Comments

Question 16

- (a) Generally well answered with the majority of candidates identifying two hazards.
- (b) Generally well answered with most candidates stating the effects of hazards from part (a) particularly those impacting on the built environment or agricultural activities. Some candidates looked at the global impacts of volcanoes but the question specifically addressed people living in areas where there is volcanic activity.
- (c) Generally well answered with a large variety of cause and effect relationships given including agricultural, economic and traditional / cultural.

Question 17

- (a) Most candidates were able to plot the points correctly, however many did not use a linear scale or label the correct axes. Drawing ‘a line of best fit’ proved to be quite challenging.
- (b) This question was poorly answered with many candidates focusing on the name of a scientist instead of indicating the features of the research done into ozone depletion. There was considerable evidence of confusion between the concepts of ozone depletion and global warming.

Question 18

- (a) Generally well answered by most candidates who could distinguish between the concept of lithospheric plates and crust. Some responses included a process (eg convection currents) rather than a feature.
- (b) Many candidates only named a hypothesis instead of outlining how each hypothesis explains lithospheric plate movement. Poorer responses showed candidates were confused about the key features of the different hypotheses. The use of diagrams by many proved to be an advantage. The convection current hypothesis was often poorly explained.
- (c) Poorer responses focused on where divergence occurs rather than the question of how the divergent margins formed.

Question 19

The quality of diagrams varied with many poorly labelled. The three features needed to be indicated on each diagram. The diagrams should have been drawn in pencil. When there is a choice in the type of convergent boundary to be drawn, candidates are advised to choose the simplest. Poorer responses indicated that candidates could not distinguish between normal faults and plate boundaries.

Question 20

- (a) Many responses indicated that candidates did not recognise the basis for the difference between the four eons and confused them with eras in the Palaeozoic.
- (b) The role of oxygen in the formation of BIFs was well understood but some candidates described the conditions in the Phanerozoic rather than the Proterozoic. There was evidence of a poor understanding of the concept that BIFs form in the oceans as a result of the build up of oxygen

levels in the ocean and the subsequent reaction with soluble iron. The cyclical nature of this is also very important.

- (c) This was poorly done with many responses showing little understanding of the ratio of stable isotopes (C^{12} to C^{13}) in life forms and its significance in the rocks formed 3800 million years ago. There was evidence of candidates confusing stable isotope ratios with isotopes used for radioactive dating.

Question 21

Generally well answered with most candidates recognising the need for quick burial with fine sediments in a low oxygen environment. A small number of responses exhibited a lack of understanding of the need for lithification and long periods of time.

Question 22

Generally well done. In the poorer responses, candidates restated the question thus not adequately showing how Proterozoic organisms with soft bodies were at a disadvantage.

Question 23

Generally well done. Candidates needed to identify components of the plate tectonic process and clearly link these to the extinction event. Most candidates selected the end of Permian mass extinction event. Some responses showed a poor understanding of the word ‘process’ in relation to plate tectonics.

Question 24

- (a) Most candidates were able to identify a banned pesticide and name a pest for which it had been used. DDT was the most popular choice.
- (b) Generally well answered. It is important to state specific details such as toxic or harmful impacts on the environment. There was evidence of many misconceptions about the reason for the ban and these were frequently overexaggerated.
- (c) The better responses included a judgement about the impacts described. A common misconception was that the pesticide caused bioaccumulation and biomagnification rather than these processes resulting from an increasing concentration of the pesticide along the food chain.

Question 25

- (a) This question was generally well answered with many candidates giving more information than was required by the question.
- (b) Most candidates displayed a knowledge of farming practices that cause soil erosion. Some, however, incorrectly thought that all farming practices cause soil erosion.
- (c) Most candidates were able to name two strategies. Poorer responses did not relate the strategies to the reduction in soil erosion caused by humans.

Question 26

- (a) This question was well answered.
- (b) A significant number of candidates described the trends without an explanation.

- (c) Candidates experienced the greatest difficulty with this part of the question. It was important to relate the increased ozone levels to increased ultraviolet light and recognize that the increased ozone occurred after the high level of exhaust emissions. Many responses indicated that candidates appeared to have not read the stimulus material in this question as they discussed reactions in the stratosphere.

Section II – Options

Question 27

- (a) (i) Many candidates described introduced terrestrial species without indicating how they were introduced.
(ii) Many responses were too general. Responses indicated basic knowledge of quarantine methods used in Australia but did not display a deep understanding. In general, candidates wrote about the characteristics and features of the quarantine methods without including how the methods controlled the introduction of species.
- (b) (i) Candidates were generally able to identify the two components of the environment. Many experienced difficulties in summarising their results. Poorer responses focused only on one aspect.
(ii) This was generally well done. Good responses included a description of how variables were controlled, how accurate measurements were made, the need for repetitions and the use of appropriate equipment and methods. Poorer responses described a second-hand investigation.
- (c) There was evidence of a good depth of understanding of biological controls; however, many candidates had difficulty providing a judgement about the use and success of the strategies. There was evidence of confusion between the use of myxomatosis and caliciviruses with immunocontraception.
- (d) Better responses included descriptions of all the trends of a complete graph. Candidates who joined the points on their examination question paper made the trends more obvious, and were less likely to describe only part of the trends shown. This was particularly relevant for non-indigenous animal species A.
- (e) The better responses utilised the four subheadings and clearly supported the argument stated for each factor included in the study.
Poorer responses demonstrated limited understanding of dispersal techniques, lacked detail or described a plant instead of an animal.

Question 28

- (a) (i) Generally well answered.
(ii) Some responses confused the emission of carbon dioxide with ozone destruction rather than the enhanced greenhouse effect. The better responses provided the features of the impacts on the environment.
- (b) (i) This question was not well answered. Good responses included comparisons of volatility, flame brightness and ability to raise the temperature of a given volume of water. A number of candidates focused on the formation of fossil fuels rather than an investigation into their properties. Although asked for a first-hand investigation, many candidates described a second-hand investigation.
(ii) Good responses included a description of how variables were controlled, how accurate measurements were made, the need for repetitions and the use of appropriate equipment and methods.

- (c) Candidates needed to distinguish between current importance and future potential of two alternative energy resources. Many candidates did not address both importance and potential. It was important to make judgements about these resources.
- (d) (i) & (ii) Most candidates clearly described the trends and were able to give reasons for them. They had little difficulty stating reasons for their prediction at 5000m in the drill hole.
- (e) The better responses utilised the four subheadings and clearly supported the argument stated for each factor included in the study. Better responses included the different uses for the different types, grades and ranks of fossil fuels.

Question 29

- (a) (i) Generally well answered with some candidates confusing renewable and recyclable.
(ii) It is important to provide features of the impacts on the environment.
- (b) Good responses described samples that gave differing readings. Better responses included a description of how variables were controlled, how accurate measurements were made, the need for repetitions of the experiment, and the use of appropriate equipment and methods. Many responses did not provide precise results, with most focusing on method and conclusion.
- (c) Good responses recognised that even though there may be no immediate implication, this could change in the future. Many responses did not directly relate the implications of the named landmark decision to the ore body. Many of the implications described were too general.
- (d) (i) & (ii) Generally well done; however some candidates confused the 1999 irregular reading as a trend.
(iii) Many candidates did not provide geological reasons to explain the grades.
- (e) Well answered by the majority of candidates. The better responses utilised the four subheadings and clearly supported the argument stated for each factor included in the study.

Question 30

- (a) Generally well answered.
- (b) (i) Generally well answered with the better responses using a table to summarise the results.
(ii) Many responses described the amount of hatching rather than the rate of hatching. There was considerable evidence that some centres may not have completed a well designed investigation.
Good responses included a description of how variables were controlled, how accurate measurements were made, the need for repetitions of the experiment and the use of appropriate equipment and methods.
- (c) Responses indicated some confusion about the formation of siliceous oozes, with many candidates equating them with terrigenous sediment. The best responses explained the relationship between crustal age and sediment thickness. A significant number of responses provided only the features of each sediment type.
- (d) The majority of candidates were able to describe the trends, give reasons for Site 3 data, and make a prediction. Some candidates did not recognise the low salinity of the Black Sea.
- (e) The better responses utilised the four subheadings and clearly supported the argument stated for each factor included in the study. Poorer responses indicated that candidates found it difficult to select 'appropriate technology'.

Earth and Environmental Science

2003 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
1	1	9.2.4	H14
2	1	9.2.3	H8
3	1	9.2.2	H14
4	1	9.2.1	H2, H14
5	1	9.2.5	H8
6	1	9.4.5	H3, H4
7	1	9.4.6	H13
8	1	9.3.1	H7
9	1	9.3.4	H7
10	1	9.4.3	H14, H6
11	1	9.4.1	H14, H6
12	1	9.3.5	H14
13	1	9.4.1	H7, H10
14	1	9.3.2	H7, H14
15	1	9.3.4	H13, H14
16 (a)	1	9.2.4	H4, H13
16 (b)	2	9.2.4	H4, H13
16 (c)	2	9.2.4	H4, H13
17 (a)	3	9.4.7	H13.1(f, g), H10, H12, H14
17 (b)	2	9.4.7	H10, H12
18 (a)	1	9.2.1	H8
18 (b)	2	9.2.1	H1
18 (c)	3	9.2.1	H14
19	1	9.2.1	H7, H8, H13(e)
20 (a)	1	9.3.1	H7
20 (b)	2	9.3.1	H8

Question	Marks	Content	Syllabus outcomes
20 (c)	2	9.3.1	H1
21	3	9.3.1	H13.1(e), H12
22	4	9.3.3	H8, H12, H13
23	8	9.2.1, 9.3.5	H1, H8
24 (a)	1	9.4.4	H4
24 (b)	1	9.4.4	H1
24 (c)	4	9.4.4	H4
25 (a)	2	9.4.2	H10
25 (b)	2	9.4.2	H10
25 (c)	3	9.4.2	H6, H14.1(d), H14.3(c)
26 (a)	1	9.4.6	H12.3(c)
26 (b)	2	9.4.6	H14.1(a, g)
26 (c)	3	9.4.6	H14.1(a), H14.3(b, d)
27 (a) (i)	1	9.5.6	H10
27 (a) (ii)	2	9.5.6	H4, H10
27 (b) (i)	2	9.5.2	H12, H13
27 (b) (ii)	2	9.5.2	H10, H11.2 (b, c), H12, H13, H14
27 (c)	5	9.5.5	H10, H16
27 (d) (i)	2	9.5	H10, H14.1
27 (d) (ii)	2	9.5	H10, H14.1
27 (d) (iii)	2	9.5	H10, H14.1, H14.3
27 (e)	7	9.5	H4, H10, H13.1, H14.1
28 (a) (i)	1	9.6.1	H6
28 (a) (ii)	2	9.6.5	H4, H6
28 (b) (i)	2	9.6.1	H12, H13
28 (b) (ii)	2	9.6.1	H11.2(b, c), H12, H13, H14
28 (c)	5	9.6.6	H6
28 (d) (i)	2	9.6	H14.1

Question	Marks	Content	Syllabus outcomes
28 (d) (ii)	2	9.6	H14.1
28 (d) (iii)	2	9.6	H14.1, H14.3
28 (e)	7	9.6	H6, H11.1, H13.1, H14.1
29 (a) (i)	1	9.7.3	H6
29 (a) (ii)	2	9.7.5	H4, H 6
29 (b) (i)	2	9.7.4	H12, H13
29 (b) (ii)	2	9.7.4	H11.2(b, c), H12, H13, H14
29 (c)	5	9.7.2	H4, H6
29 (d) (i)	2	9.7	H14.1
29 (d) (ii)	2	9.7	H14.1
29 (d) (iii)	2	9.7	H14.1, H14.3
29 (e)	7	9.7	H6, H11.1, H13.1, H14.1
30 (a) (i)	1	9.8.1	H7
30 (a) (ii)	2	9.8.1	H7
30 (b) (i)	2	9.8.6	H12, H13
30 (b) (ii)	2	9.8.6	H11.2(b, c), H12, H13, H14
30 (c)	5	9.8.7	H7
30 (d) (i)	2	9.8	H14.1
30 (d) (ii)	2	9.8	H14.1
30 (d) (iii)	2	9.8	H14.1, H14.3
30 (e)	7	9.8	H6, H11.1, H11.3, H13.1, H14.1

2003 HSC Earth and Environmental Science Marking Guidelines

Question 16 (a)

Outcomes assessed: H4, H13

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Identifies two hazards associated with volcanoes that might affect people living in areas of volcanic activity 	1

Question 16 (b)

Outcomes assessed: H4, H13

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Clearly provides characteristics and features of the impact on people of ONE hazard from 16(a) 	2
<ul style="list-style-type: none"> States the impact of one hazard from 16 (a) 	1

Question 16 (c)

Outcomes assessed: H4, H13

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Makes a relationship between cause and effect explaining why people would inhabit an area of active volcanism 	2
<ul style="list-style-type: none"> Identifies one feature of volcanic areas that is favourable for people 	1

Question 17 (a)*Outcomes assessed: H13.1(f,g), H10, H12, H14***MARKING GUIDELINES**

Criteria	Marks
• Correct and appropriate scale on axes. All points plotted correctly. Line of best fit shown	3
• Two of the above	2
• One of the above	1

Question 17 (b)*Outcomes assessed: H10, H12***MARKING GUIDELINES**

Criteria	Marks
• Indicates the main features of the research of one Australian scientist into ozone depletion	2
• States or names some aspect of the research	1

Question 18 (a)*Outcomes assessed: H8***MARKING GUIDELINES**

Criteria	Marks
• Identifies one feature of lithospheric plates	1

Question 18 (b)*Outcomes assessed: H1***MARKING GUIDELINES**

Criteria	Marks
• Indicates the main features of two hypotheses	2
• Names two hypotheses OR	1
• Indicates the main features of one hypothesis	

Question 18 (c)*Outcomes assessed: H14***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Shows cause/effect or provides how/why the named hypothesis results in the formation of divergent marginMust show understanding of divergent margin	3
<ul style="list-style-type: none">Indicates understanding of divergent margin and mentions hypothesis	2
<ul style="list-style-type: none">Describes divergent margin	1

Question 19*Outcomes assessed: H13(e), H7, H8***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Draws clear diagrams of a convergent plate boundary and a divergent plate boundaryCorrectly labels the features listed	6
<ul style="list-style-type: none">Draws diagrams of a convergent and a divergent plate boundaryCorrectly labels at least three of the features	4–5
<ul style="list-style-type: none">Draws a diagram of a convergent plate margin and labels at least two of the features OR <ul style="list-style-type: none">Draws a diagram of a divergent plate boundary and labels at least two of the features OR <ul style="list-style-type: none">Draws partial diagrams of a convergent and divergent plate boundary and labels at least one feature	2–3
<ul style="list-style-type: none">Draws a partial diagram of a convergent or a divergent plate boundary. No labels required	1

Question 20 (a)*Outcomes assessed: H7***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Recalls the basis for the division	1

Question 20 (b)*Outcomes assessed: H8***MARKING GUIDELINES**

Criteria	Marks
• Sketches in general terms the reason for the formation of BIFs. Must mention increasing oxygen and reaction with Fe to create a precipitate.	2
• Identifies the role of oxygen in the formation of BIFs	1

Question 20 (c)*Outcomes assessed: H1***MARKING GUIDELINES**

Criteria	Marks
• Sketches in general terms the significance of carbon isotope ratios in organic and inorganic compounds and relates this to presence of living cells	2
• Indicates a change in carbon isotope ratios	1

Question 21*Outcomes assessed: H12, H13.1(e)***MARKING GUIDELINES**

Criteria	Marks
• Student must show a full understanding of fossil formation including <ul style="list-style-type: none">– Death and placement on lake floor/bed in an oxygen-poor environment– Deposition of sediment on dead animal– Lithification of sediment and preservation of hard parts and/or imprints of soft parts	3
• Two of three above	2
• One of three above	1

Question 22*Outcomes assessed: H8, H12, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Identifies advantages and provides points for and/or against hard body parts in terms of predation, protection and defenceRelates the points to Proterozoic organisms with soft parts	3
<ul style="list-style-type: none">Identifies some advantages and attempts to link hard/soft bodied organisms	2
<ul style="list-style-type: none">Identifies some advantages	1

Question 23*Outcomes assessed: H1, H8***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Correctly names a plate tectonic process that is linked to a named extinction eventIdentifies the components of the plate tectonic process that bear relationship to the extinction eventRelates the implications of the plate tectonic process for the extinction event	8
<ul style="list-style-type: none">Correctly names a plate tectonic process that is linked to an extinction eventIdentifies one component of the plate tectonic process and how these relate to the extinction event <p>OR</p> <ul style="list-style-type: none">As for 8 marks but does not correctly name the plate tectonic process or clearly imply the extinction event	6–7
<ul style="list-style-type: none">Indicates a plate tectonic process that is linked to an extinction eventLinks some features of the plate tectonic process to the extinction event	3–5
<ul style="list-style-type: none">Indicates a plate tectonic process that is linked to an extinction eventGives some vague indication of the relationship between the two	2
<ul style="list-style-type: none">Indicates a plate tectonic process that is linked to an extinction event	1

Question 24 (a)*Outcomes assessed: H4***MARKING GUIDELINES**

Criteria	Marks
• Correctly identifies the pest for which this pesticide was used	1

Question 24 (b)*Outcomes assessed: H1***MARKING GUIDELINES**

Criteria	Marks
• Clearly indicates the main reason why this pesticide is now banned or provides two reasons	2
• States a possible reason	1

Question 24 (c)*Outcomes assessed: H4***MARKING GUIDELINES**

Criteria	Marks
• Identifies two impacts of the named pesticide in the environment • Makes a judgement about these impacts	4
• Identifies two impacts and makes an attempt to link one of these impacts of the pesticide on the environment	3
• Identifies two impacts of the named pesticide on the environment OR • Identifies one impact and makes an attempt to link the impact of the pesticide on the environment	2
• Identifies one impact of the pesticide on the environment	1

Question 25 (a)*Outcomes assessed: H10***MARKING GUIDELINES**

Criteria	Marks
• Names one possible cause of soil erosion in an urban area	1

Question 25 (b)*Outcomes assessed: H10***MARKING GUIDELINES**

Criteria	Marks
• Identifies one possible cause of soil erosion on a farming or grazing property	1

Question 25 (c)*Outcomes assessed: H6, H14.1(d), H14.3(c)***MARKING GUIDELINES**

Criteria	Marks
• Identifies two management strategies and identifies how these will reduce soil erosion	4
• Names two strategies and identifies how one will reduce soil erosion	3
• Briefly describes or names two strategies	2
OR	
• Names one strategy and identifies how this will reduce soil erosion	1
• Names or briefly describes one strategy	

Question 26 (a)*Outcomes assessed: H12.3(c)***MARKING GUIDELINES**

Criteria	Marks
• Correctly identifies two compounds that are found in vehicle emissions	2
• Identifies one compound	1

Question 26 (b)*Outcomes assessed: H14.1(a), H14.1(g)***MARKING GUIDELINES**

Criteria	Marks
• Relates cause and effect for the trend on the graph	2
• Either describes trend or gives cause	1

Question 26 (c)*Outcomes assessed: H14.1(a), H14.3(b), H14.3(d)***MARKING GUIDELINES**

Criteria	Marks
• Puts forward one reason for the trend in ozone concentration	2
• Gives one reason briefly	1

Question 27 (a) (i)*Outcomes assessed: H10***MARKING GUIDELINES**

Criteria	Marks
• Correctly indicates one way in which a non-indigenous animal and a non-indigenous plant have been introduced into Australian coastal waters and harbours	1

Question 27 (a) (ii)*Outcomes assessed: H4, H10***MARKING GUIDELINES**

Criteria	Marks
• Details the main characteristics and features of two quarantine methods that are used to control the introduction of non-indigenous species	2
• Details the main characteristics and features of one quarantine method that is used to control the introduction of non-indigenous species	1
OR	
• Names two quarantine methods used to control the introduction of non-indigenous species	

Question 27 (b) (i)*Outcomes assessed: H12, H13***MARKING GUIDELINES**

Criteria	Marks
• Expresses relevant details of both biotic and abiotic investigation results relevant to the effects of introduced species on an environment	2
• List or names both a biotic and an abiotic component investigated in an environment	1
OR	
• Expresses relevant details for biotic or abiotic investigation results relevant to the effects of introduced species on an environment	

Question 27 (b) (ii)*Outcomes assessed: H10, H11.2(b), H11.2(c), H12, H13, H14***MARKING GUIDELINES**

Criteria	Marks
• Provides characteristics or features of the investigation that were included to ensure data collected were valid and reliable	2
• Briefly provides characteristics or features to show how the collection of data was valid OR reliable	1

Question 27 (c)*Outcomes assessed: H10, H16***MARKING GUIDELINES**

Criteria	Marks
• Makes a value judgement on the use and success of two strategies used as forms of biological control	5
• Makes a value judgement on the use and success of one strategy used as forms of biological control AND • Makes a value judgement on the use or success of another strategy	4
• Makes a value judgement on the use and success of one strategy used as forms of biological control OR • Makes a value judgement on the use or success of two strategies	3
• Describes two strategies OR • Makes a value judgement on the use or success of one strategy	2
• Describes or names one strategy	1

Question 27 (d) (i)*Outcomes assessed: H10, H14.1***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Provides characteristics of the trends for the non-indigenous animal species A and the indigenous animal species	2
<ul style="list-style-type: none">Provides characteristics of the trend for either the non-indigenous animal species A or the indigenous animal species OR <ul style="list-style-type: none">Provides briefly the characteristics of the trends for non-indigenous species A OR the indigenous animal species	1

Question 27 (d) (ii)*Outcomes assessed: H10, H14.1***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">States reasons to support the trend	2
<ul style="list-style-type: none">Identifies briefly reasons for the trend	1

Question 27 (d) (iii)*Outcomes assessed: H10, H14.1, H14.3***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Suggests what might happen to the population of non-indigenous animal species B giving an ecological reason ORSuggests what might happen to the population of non-indigenous animal species B based on the interaction between this and the other species shown on the graph	2
<ul style="list-style-type: none">Suggests what might happen to the population of non-indigenous animal species B based on trends in the graph	1

Question 27 (e)*Outcomes assessed: H4, H10, H13.1, H14.1***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Gives supporting arguments why each of the numbered items should be included in the study	7
<ul style="list-style-type: none">• Gives supporting arguments why three of the numbered items should be included in the study	5–6
<ul style="list-style-type: none">• Briefly describes each numbered item and states that it should be included OR <ul style="list-style-type: none">• As for 7 marks for 2 numbered items OR <ul style="list-style-type: none">• Gives brief arguments for 3 numbered items	3–4
<ul style="list-style-type: none">• Briefly describes several numbered items OR <ul style="list-style-type: none">• As for 7 marks for 1 numbered item OR <ul style="list-style-type: none">• Gives brief arguments for one or two numbered items	1–2

Question 28 (a) (i)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Identifies one renewable and one non-renewable energy resource	1

Question 28 (a) (ii)*Outcomes assessed: H4, H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Describes two impacts of the resource	2
<ul style="list-style-type: none">• Describes one impact or names two impacts	1

Question 28 (b) (i)*Outcomes assessed: H12, H13***MARKING GUIDELINES**

Criteria	Marks
• Expresses concisely the relevant details of the results of the investigation	2
• Lists or names several results of the investigation	1

Question 28 (b) (ii)*Outcomes assessed: H11.2(b), H11.2(c), H12, H13, H14***MARKING GUIDELINES**

Criteria	Marks
• Provides characteristics and features of the investigation that were included to ensure data collected were valid and reliable	2
• Briefly provides characteristics and features to show how the collection of data was valid or reliable	1

Question 28 (c)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
• Gives relative importance and potential for two alternative energy sources	5
• Names two energy sources and describes either importance OR	3–4
• Gives the potential of each	
• Names two alternative energy sources	1–2

Question 28 (d) (i)*Outcomes assessed: H14.1***MARKING GUIDELINES**

Criteria	Marks
• Provides characteristics and features for two trends on the graph	2
• Provides characteristics and features for one trend on the graph OR	1
• Briefly provides characteristics and features of two trends on the graph	

Question 28 (d) (ii)*Outcomes assessed: H14.1***MARKING GUIDELINES**

Criteria	Marks
• States reasons to support one trend identified in part 28(d)(i)	2
• Briefly identifies reasons for the trend	1

Question 28 (d) (iii)*Outcomes assessed: H14.1, H14.3***MARKING GUIDELINES**

Criteria	Marks
• Suggests a value for specific energy and hydrogen content and gives a geological reason	2
• Suggests a value for each	1

Question 28 (e)*Outcomes assessed: H6, H11.1, H13.1, H14.1***MARKING GUIDELINES**

Criteria	Marks
• Gives supporting arguments why each of the numbered items should be included in the study	7
• Gives brief arguments why each of the numbered items should be included OR • As for 7 marks for 3 numbered items	5–6
• Briefly describes each numbered item and states that it should be included OR • As for 7 marks for 2 numbered items OR • Gives brief arguments for 3 numbered items	3–4
• Briefly describes several numbered items OR • As for 7 marks for 1 numbered items OR • Gives brief arguments for one or two numbered items	1–2

Question 29 (a) (i)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
• Identify one renewable and one non-renewable resource	1

Question 29 (a) (ii)*Outcomes assessed: H4, H6***MARKING GUIDELINES**

Criteria	Marks
• Provides characteristics and features of two impacts	2
• Provides characteristics and features of one impact	1

Question 29 (b) (i)*Outcomes assessed: H12, H13***MARKING GUIDELINES**

Criteria	Marks
• Expresses concisely the relevant details of the results of the investigations	2
• List or name at least one result of the investigation	1

Question 29 (b) (ii)*Outcomes assessed: H11.2, H12, H13, H14***MARKING GUIDELINES**

Criteria	Marks
• Describes the features of the investigation that were included to ensure data collected were valid and reliable	2
• Briefly describes how the collection of data was valid and reliable	1

Question 29 (c)*Outcomes assessed: H4, H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Names the decision and names the ore bodyDiscusses in detail present and future implications making a judgement	4–5
<ul style="list-style-type: none">Names decision and ore body and briefly explains implications	3–5
<ul style="list-style-type: none">Names decision and ore body	1–2

Question 29 (d) (i)*Outcomes assessed: H14.1***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Provides characteristics and features of the trends for annual production and annual profits	2
<ul style="list-style-type: none">Provides characteristics and features of the trend for either annual production or annual profits OR <ul style="list-style-type: none">Briefly provides characteristics and feature of the trends for annual production and annual profits	1

Question 29 (d) (ii)*Outcomes assessed: H14.1***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">States reasons to support one of the trends identified in part 29(d)(i)	2
<ul style="list-style-type: none">Briefly identifies reasons for one of the trends	1

Question 29 (d) (iii)*Outcomes assessed: H14.1, H14.3***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Predicts grades for each and gives a reason for each	2
<ul style="list-style-type: none">• Predicts grades for both OR <ul style="list-style-type: none">• One prediction and gives a reason	1

Question 29 (e)*Outcomes assessed: H6, H11.1, H13.1, H14.1***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Gives supporting arguments why each of the numbered items should be included in the study	7
<ul style="list-style-type: none">• Gives brief arguments why each of the numbered items should be included OR <ul style="list-style-type: none">• As for 7 marks for 3 numbered items	5–6
<ul style="list-style-type: none">• Briefly describes each numbered item and states that it should be included OR <ul style="list-style-type: none">• As for 7 marks for 2 numbered items OR <ul style="list-style-type: none">• Gives brief arguments for 3 numbered items	3–4
<ul style="list-style-type: none">• Briefly describes several numbered items OR <ul style="list-style-type: none">• As for 7 marks for 1 numbered item OR <ul style="list-style-type: none">• Gives brief arguments for ONE or TWO numbered items	1–2

Question 30 (a) (i)*Outcomes assessed: H7***MARKING GUIDELINES**

Criteria	Marks
• Recognises and names the probable origins of the ocean waters	1

Question 30 (a) (ii)*Outcomes assessed: H7***MARKING GUIDELINES**

Criteria	Marks
• Provides characteristics and features of the link between the evolution of the atmosphere and the oceanic waters	2
• Names the probable origins of the atmosphere	1

Question 30 (b) (i)*Outcomes assessed: H12, H13***MARKING GUIDELINES**

Criteria	Marks
• Expresses concisely the relevant details of the results of the investigation	2
• Lists or names several results of the investigation	1

Question 30 (b) (ii)*Outcomes assessed: H11.2(b, c), H12, H13, H14***MARKING GUIDELINES**

Criteria	Marks
• Provides characteristics and features of the investigation that were included to ensure data collected was valid and reliable	2
• Briefly provides characteristics and features of how the collection of data was valid or reliable	1

Question 30 (c)
Outcomes assessed: H7
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Provides characteristics and features of the 2 types of sediment in terms of the origins and relates this to the sites of deposition on the ocean floor. Must include reference to the MOR and CCD 	5
<ul style="list-style-type: none"> Provides characteristics and features of the origin of the 2 types of sediment and briefly where they occur on the ocean floor OR <ul style="list-style-type: none"> Provides characteristics and features of the distribution on the ocean floor of the 2 types of sediment including reference to the MOR and CCD but not their origins 	3–4
<ul style="list-style-type: none"> Briefly provides characteristics and features of the distribution of sediment types on the ocean floor or their origins OR <ul style="list-style-type: none"> As for 3–4 marks for only ONE sediment type 	1–2

Question 30 (d) (i)
Outcomes assessed: H14.1
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Provides characteristics and features of the trends shown by the curves one and three 	2
<ul style="list-style-type: none"> Provides characteristics and features of the trends shown by curve one or curve three 	1

Question 30 (d) (ii)
Outcomes assessed: H14.1
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> States reasons to explain the trends identified in part 30(d)(i) for curve three 	2
<ul style="list-style-type: none"> Identifies reasons for the trend 	1

Question 30 (d) (iii)*Outcomes assessed: H14.1, H14.3***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Suggests what might happen to salinity levels in the Marmara Sea giving suitable reasons	2
<ul style="list-style-type: none">• Suggests what might happen to salinity levels in the Marmara Sea but does not support suggestion	1

Question 30 (e)*Outcomes assessed: H6, H11.1, H11.3, H13.1, H14.1***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Gives supporting arguments why each of the numbered items should be included in the study	7
<ul style="list-style-type: none">• Gives weak arguments why each of the numbered items should be included <p>OR</p> <ul style="list-style-type: none">• As for 7 marks for 3 numbered items	5–6
<ul style="list-style-type: none">• Briefly describes each numbered item and states that it should be included <p>OR</p> <ul style="list-style-type: none">• As for 7 marks for 2 numbered items <p>OR</p> <ul style="list-style-type: none">• Gives brief arguments for 3 numbered items	3–4
<ul style="list-style-type: none">• Briefly describes several numbered items <p>OR</p> <ul style="list-style-type: none">• As for 7 marks for 1 numbered item <p>OR</p> <ul style="list-style-type: none">• Gives brief arguments for one or two numbered items	1–2