

2001 HSC Notes from
the Examination Centre
Earth and Environmental Science

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2001 HSC NOTES FROM THE EXAMINATION CENTRE EARTH AND ENVIRONMENTAL SCIENCE

Introduction

These notes are to provide information for teachers and candidates to indicate the nature of candidate responses to the paper and the strengths and weaknesses demonstrated by candidates across the paper.

Specific comments are made on each question and these comments need to be studied in conjunction with the 2001 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.

1250 candidates presented for the 2001 Higher School Certificate Earth and Environmental Science examination. This represents a positive start for the new subject.

The paper offered candidates of all ability levels the opportunity to demonstrate what they knew and could do. It covered a broad range of course outcomes with a significant amount of the course content represented in the questions. The most able candidates produced excellent responses demonstrating a high level of achievement in all the outcomes examined. At the weaker end, some candidates showed little engagement with the subject whilst the majority demonstrated they had addressed the outcomes of the course. The longer response questions elicited responses reflecting the full range of standards expected.

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.

Section I

Part A – Multiple Choice

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

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

Part B

General Comments

Overall, responses to this section of the paper indicated that most candidates had addressed the outcomes and covered the course content. It appeared, however, that some candidates may not have played an active role in some of the skills-based areas of the course. This was evident in questions where the candidates were required to use information from first-hand investigations or researched case studies. Candidates who used general information to answer questions addressing these skills were usually unable to reach a high standard. Most candidates demonstrated familiarity with the key words supplied by the Board of Studies, evidenced by their ability to interpret the questions.

Specific Comments

Question 16

- (a) A significant number of candidates associated basalt with convergence.
- (b) While most candidates had some idea about lithospheric plates, answers were often limited.
- (c) The standard of diagrams varied considerably. Labelling of landform features and environments sometimes lacked clarity and arrows to show the direction of movement were often missing.

Question 17

- (a) This part was generally well answered but some candidates failed to refer to the graph provided to quantify their response.
- (b) Most candidates handled this part very well and provided good explanations of the likely impact on both local and global agriculture. Some responses were too general, using terms such as agriculture ‘suffered’ or ‘was hindered’.

Question 18

Overall, this question was poorly answered, with candidates showing weakness in their ability to provide an ‘outline’ and demonstrating an overall lack of knowledge about how Australia evolved. Some candidates tried to write an outline of plate tectonic theory with occasional reference to Australia’s position in the break up of Pangaea. Many candidates considered geographical rather than tectonic features and poor soils were frequently mentioned.

Candidates who scored well were able to clearly outline the sequence of processes involved and often aided their explanations with reference to a map or diagram.

Question 19

- (a) This part was well answered; most candidates identified the effect of cyanobacteria on the production of oxygen.

- (b) A significant number of candidates incorrectly answered this part because they confused stromatolites with archaeobacteria.
- (c) In this part many candidates stated or described what the environment was like in the Proterozoic rather than explaining the difference in distribution by linking a cause and effect.

Question 20

Most candidates had a good knowledge of the major adaptations and there were excellent answers which linked these adaptations to their advantage for survival.

Question 21

Candidates usually stated or described two hypotheses explaining megafauna decline but failed to compare them.

Question 22

- (a) This part was generally well answered. The better candidates identified carbon dioxide or methane as the main post-Industrial Revolution greenhouse gases, and they unambiguously stated their sources. Some candidates confused carbon monoxide with carbon dioxide.
- (b) In the better answers candidates named and described a well-known control strategy and clearly linked it to the source of their chosen gas, and to the reduced emissions expected. Some candidates merely used terms such as the 'Kyoto Protocol' without showing they knew any of the included strategies. Common mistakes included confusing the Kyoto and Montreal Protocols, and the greenhouse effect with ozone depletion. There was also a common lack of understanding of the difference between filtering and scrubbing. Catalytic converters were often referred to as a carbon-dioxide reduction strategy, and appeared to be poorly understood.

Question 23

This question tested the candidates' ability to synthesise information by analysing the relationships between three graphs and a fourth stated variable. Most candidates recognised the relationship between sea-level variation and marine animal diversity but only the better responses drew out and related the implications of this and its relationship to climate. The majority of candidates were unable to use the graph showing the percentage of oxygen in the atmosphere constructively and often provided conflicting information. Only a small number of candidates indicated that the overall oxygen content appears unrelated, although a big decrease in the percentage of oxygen in the Permian was temporarily associated with the Late Permian mass extinction event. Some candidates suggested this association was most likely to reflect large environmental disturbances rather than a casual relationship.

Question 24

This question was very well answered by a number of candidates who made judgements about how their understanding of soil management had been influenced by their first-hand investigations into tracking or compaction. However, many candidates gave general characteristics of compacted soils

which did not appear to be related to experimental results. Others referred to their experimental results but did not link these to management practices.

Question 25

Good answers to this question reflected carefully researched case studies. A few candidates tried to base their answers on a general study of salinity rather than a case study.

- (a) Most candidates answered this part well.
- (b) There were some excellent answers but many candidates provided detailed descriptions of the causes of the salinity problem rather than the impact.
- (c) Good answers evaluated the effectiveness of the rehabilitation strategies to date and in many cases indicated that more time was needed before an accurate evaluation would be possible. Candidates often omitted reference to any negative effects of the strategy.

Question 26

- (a) The majority of candidates chose appropriate scales and accurately plotted and joined the points. However, some incorrectly drew a line of best fit, or linked the data points using straight lines instead of drawing a line through the data points.
- (b) Nearly all candidates recognised that the rate of soil loss increases with the duration of rainfall but better answers used the shape of the curve to provide a more detailed description of this relationship.

Section II – Options

General Comments

The option ‘Introduced Species and the Australian Environment’ was the most popular and was attempted by 73% of the candidature. ‘Organic Geology – A Non-renewable Resource’ and ‘Mining and the Australian Environment’ were attempted by 12% and 11% of the candidature respectively while ‘Oceanography’ was only attempted by 4% of the candidature.

A significant number of candidates attempted more than one option, some answering all four. In some centres a majority of candidates attempted all four options.

The quality of the responses in the options was very wide ranging. In the three most popular options the standard of answers ranged from excellent to very poor. Some of the weakest answers appeared to be from candidates who had not studied the option. Overall, the similar structure of the questions in each option meant that candidates of a similar standard were achieving similar marks.

Question 27 – Introduced Species and the Australian Environment

- (a) This part was well answered. Most candidates were able to identify an appropriate criterion. However, in part (ii) some candidates failed to refer to both the mode and the reason for the introduction of their named species.

- (b) This part was well answered with most candidates demonstrating a good knowledge and understanding of the environment they studied.
- (c) Most candidates were able to state two quarantine methods and give a brief outline of how the methods worked. However, very few candidates were able to analyse the effectiveness of the methods.
- (d) Most candidates correctly described aspects of the graphs though some provided detailed descriptions of each graph without describing the general trend. The majority of candidates provided a clear cause and effect relationship between characteristics of Introduced Species B and its success in Australia.
- (e) Very few candidates were able to critically evaluate one strategy that has been used to rehabilitate an ecosystem. Clear links between the strategy and rehabilitation were rare. The best answers were able to draw on personal experience involving a case study of a rehabilitated site. These answers often included consideration of both the positive and negative aspects of the strategy.

Question 28 – Organic Geology – A Non-renewable Resource

- (a) Most candidates correctly identified a property of coal that changes with increasing rank. The descriptions of how the organic material is extracted from coal varied from the naming of one or two processes to detailed descriptions of the processes involved.
- (b) This part was not well answered. An investigative process needed to be outlined to show the difference between the resulting products. Many candidates did not clearly delineate between the products of complete and incomplete combustion. In general, candidates showed poor knowledge of incomplete combustion and thus could not explain one way in which it affected the environment.
- (c) Most candidates were able to describe one or more trends shown in the table but few adequately analysed the trends.
- (d) This part was very poorly answered. Many candidates showed a weakness in their understanding of the procedures involved in seismic exploration. Few candidates were able to interpret the diagram provided. Good answers suggested a drill hole location using the horizontal scale given. These answers also demonstrated an overall understanding of the stratigraphy and the process of formation of petroleum reservoirs.
- (e) This part produced a range of responses. Most candidates could mention at least one important aspect related to one of the three coal-forming processes. Many responses were simply descriptions of one or more of the processes but the better answers correctly analysed the factors involved.

Question 29 – Mining and the Australian Environment

- (a) Approximately 50% of candidates were unable to name a landmark decision and of those who could, many could not explain the effect of the decision on the exploitation of an ore deposit.

- (b) Some candidates had difficulty naming a specific mineral deposit. Most candidates could state two factors considered in determining the feasibility of a mineral deposit. The majority of candidates were not clear on government policy related to mining and had difficulty linking a stated policy to the decision to mine.
- (c) Most candidates demonstrated the ability to identify trends and relationships in the data, but a significant number of candidates failed to link the trends and relationships to profit. Good answers analysed the data, recognising the relationships between the various components.
- (d) Candidates found this part difficult. Many described what the diagram showed, without relating this to the production of base metal deposits. Most were able to describe an exploration method but few were able to relate this to locating a mineral deposit in an ancient island arc setting.
- (e) The best answers were well structured with sections on exploration, mining and processing. Within each section, judgements were made on how the specific processes involved were likely to impact on the environment. Weaker answers described environmental impacts but did not clearly relate these to exploration, processing or mining.

Question 30 – Oceanography

- (a) Candidates demonstrated a knowledge of the ends of the visible light spectrum but a significant number indicated the wrong end in their answer. Most candidates were unable to link the distribution of aquatic plants to the red end of the visible spectrum.
- (b) Most candidates were able to relate the precipitation of salts in natural water bodies to either loss of water, increase in concentration or drop in temperature. Most candidates described the procedure used in their first-hand investigation to demonstrate the relationship between solubility and water temperature. No candidate correctly explained the relationship between temperature of a water body and the precipitation of a common salt.
- (c) Candidates were able to describe many of the processes and characteristics associated with mineral deposits at hydrothermal vents. Some candidates were unable to relate the processes and characteristics of hydrothermal vent communities to the chemical processes of mineral deposit formation.
- (d) Most candidates were able to state a method that could be used to date the ocean floor but few described the method. Few candidates were able to explain the likely outcome of continued subduction of the Solomon Sea plate or of continued spreading of the Woodlark Basin. Candidates did however relate continued plate interaction to the likely impacts of tectonic forces on local populations.
- (e) The majority of candidates could describe how either echo sounders or magnetometers operate but few demonstrated a good knowledge of both. Generally candidates were unable to identify the relationship between these techniques and the improvement of our understanding of the oceans.

Earth & Environmental Science

2001 HSC Examination Mapping Grid

| Question | Marks | Content | Syllabus outcomes |
|----------|-------|---------------|-------------------|
| 1 | 1 | 9.2.2 | H1 |
| 2 | 1 | 9.2.2 | H2 |
| 3 | 1 | 9.2.4 | H4 |
| 4 | 1 | 9.2.4 | H3 |
| 5 | 1 | 9.2.4 | H14 |
| 6 | 1 | 9.3.3 | H2 |
| 7 | 1 | 9.3.3 | H8 |
| 8 | 1 | 9.3.2 | H7 |
| 9 | 1 | 9.3.5 | H1 |
| 10 | 1 | 9.3.5 | H8 |
| 11 | 1 | 9.3.3 | H7 |
| 12 | 1 | 9.4.1 | H9 |
| 13 | 1 | 9.4.4 | H10 |
| 14 | 1 | 9.4.7 | H6 |
| 15 | 1 | 9.4.1 | H12 |
| 16 (a) | 1 | 9.2.1 | H2 |
| 16 (b) | 2 | 9.2.1 | H1 |
| 16 (c) | 3 | 9.2.1 | H7, H13 |
| 17 (a) | 2 | 9.2.5 | H4 |
| 17 (b) | 4 | 9.2.5 | H7, H8, H14 |
| 18 | 8 | 9.2.3 | H5, H7, H8, H13 |
| 19 (a) | 1 | 9.3.1 | H8 |
| 19 (b) | 1 | 9.3.1 | H7 |
| 19 (c) | 2 | 9.3.1 | H7, H8 |
| 20 | 4 | 9.3.4 | H7, H13 |
| 21 | 5 | 9.2.5 , 9.3.5 | H1, H2, H14 |
| 22 (a) | 1 | 9.4.6 | H9 |
| 22 (b) | 2 | 9.4.6 | H3 |
| 23 | 7 | 9.2.5, 9.3.5 | H7, H8, H13, H14 |
| 24 | 5 | 9.4.2 | H10, H11, H14 |
| 25 (a) | 1 | 9.4.3 | H7, H9 |
| 25 (b) | 3 | 9.4.3 | H10 |
| 25 (c) | 4 | 9.4.3 | H3, H4, H5 |
| 26 (a) | 2 | 9.4.2 | H13 |
| 26 (b) | 2 | 9.4.2 | H8, H14 |

| Question | Marks | Content | Syllabus outcomes |
|--|-------|--------------|-------------------|
| Introduced Species and the Australian Environment | | | |
| 27 (a) (i) | 1 | 9.5.1 | H10 |
| 27 (a) (ii) | 2 | 9.5.1 | H10 |
| 27 (b) (i) | 2 | 9.5.2 | H10, H14 |
| 27 (b) (ii) | 2 | 9.5.2 | H10, H13 |
| 27 (c) | 4 | 9.5.6 | H1, H10, H13 |
| 27 (d) (i) | 2 | 9.5.3 | H4 |
| 27 (d) (ii) | 4 | 9.5.3 | H1, H10 |
| 27 (e) | 8 | 9.5.5 | H4, H10, H13 |
| Organic Geology – A Non-renewable Resource | | | |
| 28 (a) (i) | 1 | 9.6.1 | H6 |
| 28 (a) (ii) | 2 | 9.6.4 | H6 |
| 28 (b) (i) | 2 | 9.6.5 | H9, H11 |
| 28 (b) (ii) | 2 | 9.6.5 | H10, H13 |
| 28 (c) | 4 | 9.6.6 | H4, H6, H13 |
| 28 (d) (i) | 2 | 9.6.3 | H3 |
| 28 (d) (ii) | 4 | 9.6.3 | H11 |
| 28 (e) | 8 | 9.6.2, 9.6.3 | H3, H4, H6, H13 |
| Mining and the Australian Environment | | | |
| 29 (a) (i) | 1 | 9.7.3 | H10 |
| 29 (a) (ii) | 2 | 9.7.3 | H6 |
| 29 (b) (i) | 2 | 9.7.4 | H10 |
| 29 (b) (ii) | 2 | 9.7.4 | H4, H14 |
| 29 (c) | 4 | 9.7.1 | H6, H13, H14 |
| 29 (d) (i) | 2 | 9.7.2 | H1, H6 |
| 29 (d) (ii) | 4 | 9.7.2 | H6 |
| 29 (e) | 8 | 9.7.5 | H4, H10, H13 |
| Oceanography | | | |
| 30 (a) (i) | 1 | 9.8.3 | H7 |
| 30 (a) (ii) | 2 | 9.8.3 | H7 |
| 30 (b) (i) | 2 | 9.8.2 | H7 |
| 30 (b) (ii) | 2 | 9.8.2 | H11, H14 |
| 30 (c) | 4 | 9.8.6 | H1, H7, H13 |
| 30 (d) (i) | 2 | 9.8.2 | H2, H7 |
| 30 (d) (ii) | 4 | 9.8.2 | H2, H7 |
| 30 (e) | 8 | 9.8.8 | H1, H3, H7, H13 |

2001 HSC Earth and Environmental Science Marking Guidelines

Question 16 (a) (1 mark)

Outcomes assessed: H2

MARKING GUIDELINES

| Criteria | Marks |
|------------|-------|
| • Andesite | 1 |

Question 16 (b) (2 marks)

Outcomes assessed: H1

MARKING GUIDELINES

| Criteria | Marks |
|--|-------|
| • Defines a lithospheric plate | 2 |
| • Identifies one feature of a lithospheric plate | 1 |

Question 16 (c) (3 marks)

Outcomes assessed: H7, H13

MARKING GUIDELINES

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none"> Diagram/cross section of a subducting ocean–ocean plate boundary with direction of movement and a possible landform feature or environment labelled | 3 |
| <ul style="list-style-type: none"> Diagram/cross section showing convergent boundary and either environment or direction or landform feature | 2 |
| <ul style="list-style-type: none"> Diagram/cross section showing convergent boundary, no direction or environment shown <p>OR</p> <ul style="list-style-type: none"> Correct identification of a landform feature or environment with respect to the diagram drawn | 1 |

Question 17 (a) (2 marks)

Outcomes assessed: H4

MARKING GUIDELINES

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> Provides features of the impact, in terms of magnitude or duration or other | 2 |
| <ul style="list-style-type: none"> States an impact or effect | 1 |

Question 17 (b) (4 marks)

Outcomes assessed: H7, H8, H14

MARKING GUIDELINES

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none"> Links a likely impact to its effect on both global and local agriculture | 4 |
| <ul style="list-style-type: none"> Links a likely impact to its effect on either global or local agriculture <p>AND</p> <ul style="list-style-type: none"> Describes either a cause or effect on global or local agriculture | 3 |
| <ul style="list-style-type: none"> Describes either a cause or effect on agriculture <p>OR</p> <ul style="list-style-type: none"> Describes both the global and local effects, with no linking to a cause | 2 |
| <ul style="list-style-type: none"> Describes either a global or local effect | 1 |

Question 18 (8 marks)*Outcomes assessed: H5, H7, H8, H13***MARKING GUIDELINES**

| Criteria | Marks |
|--|--------------|
| <ul style="list-style-type: none">Indicates the processes commencing in the Archaean with old crust, including an indication of the main features of two or more subsequent processesSequences the processesIndicates general ages of geological regions | 7–8 |
| <ul style="list-style-type: none">Indicates the main features of two processes of continent formation including references to particular geological regionsIndicates the direction of growth through time | 5–6 |
| <ul style="list-style-type: none">Names two processes and indicates the direction of growth through time OR <ul style="list-style-type: none">Outlines one process with references to particular geological regions | 3–4 |
| <ul style="list-style-type: none">Names one process and/or indicates growth outwards | 1–2 |

Question 19 (a) (1 mark)*Outcomes assessed: H8***MARKING GUIDELINES**

| Criteria | Marks |
|--|--------------|
| <ul style="list-style-type: none">Effect given | 1 |

Question 19 (b) (1 mark)*Outcomes assessed: H7***MARKING GUIDELINES**

| Criteria | Marks |
|--|--------------|
| <ul style="list-style-type: none">Appropriate environment stated | 1 |

Question 19 (c) (2 marks)*Outcomes assessed: H7, H8***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> • Identifies the general type and lack of predators or competitors as primary reason with correct linking of cause and effect <p>OR</p> <ul style="list-style-type: none"> • Identifies a specific environmental change as primary reason with correct linking of cause and effect | 2 |
| <ul style="list-style-type: none"> • Identification of lack of predators without elaboration <p>OR</p> <ul style="list-style-type: none"> • Identification of a specific environmental change without elaboration | 1 |

Question 20 (4 marks)*Outcomes assessed: H7, H13***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> • States four relevant major adaptations applicable to animals <p>OR</p> <ul style="list-style-type: none"> • States at least two relevant major adaptations applicable to animals • For two of these adaptations, correctly links each adaptation with one advantage for survival on land that the adaptation provides <p>OR</p> <ul style="list-style-type: none"> • States at least three relevant major adaptations applicable to animals • For one of these adaptations, correctly links the adaptation with one advantage for survival on land that the adaptation provides | 4 |
| <ul style="list-style-type: none"> • States three relevant major adaptations applicable to animals <p>OR</p> <ul style="list-style-type: none"> • States at least two relevant major adaptations applicable to animals • For one of these adaptations, correctly links the adaptation with one advantage for survival on land that the adaptation provides | 3 |
| <ul style="list-style-type: none"> • States two relevant major adaptations applicable to animals <p>OR</p> <ul style="list-style-type: none"> • States one relevant major adaptation applicable to animals • Links this adaptation with one advantage for survival on land that it provides | 2 |
| <ul style="list-style-type: none"> • States one relevant major adaptation applicable to animals <p>OR</p> <ul style="list-style-type: none"> • Indicates an enhanced ability without naming the adaptation that made it possible | 1 |

Question 21 (5 marks)*Outcomes assessed: H1, H2, H14***MARKING GUIDELINES**

| Criteria | Marks |
|--|--------------|
| <ul style="list-style-type: none">• Describes two correctly identified, accepted, hypotheses explaining megafauna decline• Indicates the aspects(s) that the hypotheses have in common or that make them differ | 4–5 |
| <ul style="list-style-type: none">• Outlining of two hypotheses but no comparison between them OR <ul style="list-style-type: none">• Good description of one hypothesis that explains megafauna extinctions | 2–3 |
| <ul style="list-style-type: none">• Poor description of one hypothesis for megafauna extinctions | 1 |

Question 22 (a) (1 mark)*Outcomes assessed: H9***MARKING GUIDELINES**

| Criteria | Marks |
|--|--------------|
| <ul style="list-style-type: none">• Correctly identifies a source of a named greenhouse gas that has increased in the last few centuries | 1 |

Question 22 (b) (2 marks)*Outcomes assessed: H3***MARKING GUIDELINES**

| Criteria | Marks |
|---|--------------|
| <ul style="list-style-type: none">• Describes a control strategy for the named greenhouse gas• Outlines how the strategy will decrease emissions of the greenhouse gas by linking the target of the strategy and the source of the gas | 2 |
| <ul style="list-style-type: none">• Names a strategy for control of emission of gas without explaining it | 1 |

Question 23 (7 marks)*Outcomes assessed: H7, H8, H13, H14***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Analyses the relationships | 6–7 |
| • Links the graphs using specific relationships | 4–5 |
| • Describes the trends in the graphs | 2–3 |
| • Any general interpretation of the graph | 1 |

Question 24 (5 marks)*Outcomes assessed: H10, H11, H14***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Comprehensive description of experimental results of two or more experiments and how these have relevance to soil management OR • Describes the change in own understanding of soil management as a result of carrying out two or more described investigations | 4–5 |
| • Comprehensive description of only one experimental result and relevance to soil management OR • Description of two experimental results but no linkage to soil management | 2–3 |
| • Description of one result but no linkage to soil management | 1 |

Question 25 (a) (1 mark)*Outcomes assessed: H7, H9***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Correctly identifies cause of salinity problem in named area • No mark for stating area | 1 |

Question 25 (b) (3 marks)*Outcomes assessed: H10***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Provides the features of the effect on both abiotic and biotic environment | 3 |
| • Provides the features of the effect on either abiotic or biotic environment | 2 |
| • One effect stated | 1 |

Question 25 (c) (4 marks)*Outcomes assessed: H3, H4, H5***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Describes the strategy used to rehabilitate a saline-affected area • Describes positive and negative aspects of implementing the strategy • Makes a judgement on the overall value of the strategy | 4 |
| • Describes the strategy used to rehabilitate a saline-affected area • Describes the effect of the strategy on the area | 3 |
| • Brief description of strategy used to rehabilitate a saline-affected area | 2 |
| • Brief description of one aspect of the strategy | 1 |

Question 26 (a) (2 marks)*Outcomes assessed: H13***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Appropriate scales on axes • At least six points correctly plotted and joined | 2 |
| • Axes scales correct OR • At least 6 points plotted correctly | 1 |

Question 26 (b) (2 marks)*Outcomes assessed: H8, H14***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Indicates the features of the relationship between L and R, using the changes in gradient of the curve | 2 |
| • Statement indicating that there is an increase in soil loss with increased duration | 1 |

Question 27 (a) (i) (1 mark)*Outcomes assessed: H10***MARKING GUIDELINES**

| Criteria | Marks |
|--------------------------------|-------|
| • Correct criterion identified | 1 |

Question 27 (a) (ii) (2 marks)*Outcomes assessed: H10***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Names an introduced species (no mark) | 2 |
| • Indicates the features of an appropriate mode of introduction AND provides an appropriate reason for introduction | |
| • Named species with description of appropriate mode OR appropriate reason | 1 |

Question 27 (b) (i) (2 marks)

Outcomes assessed: H10, H14

MARKING GUIDELINES

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> Names species and environment (no mark) Description correctly relating an aspect of the environment to its vulnerability to invasion | 2 |
| <ul style="list-style-type: none"> Names species and environment (no mark) Indicates one feature of the environment | 1 |

Question 27 (b) (ii) (2 marks)

Outcomes assessed: H10, H13

MARKING GUIDELINES

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> Outlines a cause-effect relationship to explain the effect of the introduced species on the environment | 2 |
| <ul style="list-style-type: none"> Limited explanation of effect or consideration of an effect that is not particularly important | 1 |

Question 27 (c) (4 marks)

Outcomes assessed: H1, H10, H13

MARKING GUIDELINES

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none"> Describes two procedures and indicates their effectiveness at specifically preventing the introduced species | 4 |
| <ul style="list-style-type: none"> Describes two relevant quarantine procedures but effectiveness of only one analysed | 3 |
| <ul style="list-style-type: none"> Analyses the effectiveness of one quarantine method Describes one procedure and indicates its effectiveness at specifically preventing the introduced species | 2 |
| OR | |
| <ul style="list-style-type: none"> Describes two procedures without evaluating effectiveness | |
| <ul style="list-style-type: none"> States one relevant quarantine method | 1 |

Question 27(d) (i) (2 marks)*Outcomes assessed: H4***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Indicates the features of the trends in the graph for the named species | 2 |
| • Trends in the graph for one of the required mammals correctly described | 1 |

Question 27 (d) (ii) (4 marks)*Outcomes assessed: H1, H10***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Names at least two attributes commonly used to describe organisms • Establishes a causal link between conditions in the environment and attributes of an introduced species that may have contributed to its success | 3–4 |
| • Explains how one characteristic contributed to success OR • Lists a range of characteristics | 1–2 |

Question 27 (e) (8 marks)*Outcomes assessed: H4, H10, H13***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Names an ecosystem and describes an appropriate rehabilitation strategy • Makes a judgement about the value of the strategy in terms of the problems caused by the introduced species, the methods of rehabilitation and their outcomes | 7–8 |
| • Discusses the problems caused by introduced species, the methods of rehabilitation and the outcomes | 5–6 |
| • Description of area, problems and species provided • Limited discussion of aims and outcomes | 3–4 |
| • Names or outlines a strategy used to rehabilitate areas affected by introduced species | 1–2 |

Question 28 (a) (i) (1 mark)*Outcomes assessed: H6***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Names a property of coal that changes with increasing rank | 1 |

Question 28 (a) (ii) (2 marks)*Outcomes assessed: H6***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Indicates the features of the processes of crushing and washing | 2 |
| • Indicates the features of one of the processes of crushing OR washing | 1 |

Question 28 (b) (i) (2 marks)*Outcomes assessed: H9, H11***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Indicates an appropriate procedure for determining the degree of combustion including the apparatus (brief description or diagram) with the characteristics measured | 2 |
| • Describes the apparatus or the characteristics measured | 1 |

Question 28 (b) (ii) (2 marks)*Outcomes assessed: H10, H13***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • States one result or product from the incomplete combustion of fossil fuels | 2 |
| • Describes one effect it has on the environment | |
| • States one result/product or an effect on the environment | 1 |

Question 28 (c) (4 marks)

Outcomes assessed: H4, H6, H13

MARKING GUIDELINES

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> Identifies the main trends in the 2 sets of data, accurately describing relationship between the data and providing an explanation of one or more main trends in the data | 4 |
| <ul style="list-style-type: none"> Describes the trends, but relationships between variables in the table are poorly addressed | 2–3 |
| <ul style="list-style-type: none"> Limited description of trends, NO relationships between variables described | 1 |

Question 28 (d) (i) (2 marks)

Outcomes assessed: H3

MARKING GUIDELINES

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none"> Indicates the relation to seismic refraction (includes the use of ‘acoustic velocity’ OR ‘differences in seismic response’) or reflection of waves | 2 |
| <ul style="list-style-type: none"> States that the lines are due to seismic refraction/reflection | 1 |

Question 28 (d) (ii) (4 marks)

Outcomes assessed: H11

MARKING GUIDELINES

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> Proposes a correct location stated as metres from the origin and explains why the position was chosen in terms of the geology | 4 |
| <ul style="list-style-type: none"> Proposes a correct location and gives some explanation | 2-3 |
| OR | |
| <ul style="list-style-type: none"> Chooses a wrong location with an explanation that has some merit | |
| <ul style="list-style-type: none"> States a correct statement relating to petroleum targets | 1 |

Question 28 (e) (8 marks)*Outcomes assessed: H3, H4, H6, H13***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none">Correctly describes the relationship between accumulation, preservation and maturation and the environmental factors that control each within a typical geographical environment using correct terminology and relates these processes directly to geographical /physical environments | 7–8 |
| <ul style="list-style-type: none">Provides description of the three processes OR <ul style="list-style-type: none">Provides descriptions of two processes and states the general geological/physical environment in which the processes occur | 5–6 |
| <ul style="list-style-type: none">Provides description of two processes or describes one process and states general geological/environmental conditions under which the process occurs | 3–4 |
| <ul style="list-style-type: none">States one environmental factor and/or the process to which it relates | 1–2 |

Question 29 (a) (i) (1 mark)*Outcomes assessed: H10***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none">Appropriate landmark decision named | 1 |

Question 29 (a) (ii) (2 marks)*Outcomes assessed: H6***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none">The decision named is described and linked to the possible effect on exploitation of an ore deposit | 2 |
| <ul style="list-style-type: none">Describes the decision or describes one possible effect on exploitation | 1 |

Question 29 (b) (i) (2 marks)*Outcomes assessed: H10***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Mineral deposit named and correctly states 2 factors used to determine feasibility | 2 |
| • Mineral deposit named and correctly states 1 factor used to determine feasibility | 1 |

Question 29 (b) (ii) (2 marks)*Outcomes assessed: H4, H14***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Discussion of relationship between stated Government policy and the decision to mine | 2 |
| • Government policy stated OR • Decision to mine or not mine a particular area stated | 1 |

Question 29 (c) (4 marks)*Outcomes assessed: H6, H13, H14***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Identifies the trends and relationships to profit of at least three different components viz. price of zinc, cost, income, type of mining operation or tonnage | 4 |
| • The trend of at least two components identified and at least one related to profit | 3 |
| • The trend of at least one component identified and related to profit | 2 |
| • The trend of one component described | 1 |

Question 29 (d) (i) (2 marks)*Outcomes assessed: H1, H6***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none">Indicates the features of the processes of dissolution and precipitation and how these result in a mineral deposit | 2 |
| <ul style="list-style-type: none">Precipitation described OR <ul style="list-style-type: none">Dissolution described | 1 |

Question 29 (d) (ii) (4 marks)*Outcomes assessed: H6***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none">Describes the method and identifies the issue that would affect its appropriateness in locating this type of deposit | 3–4 |
| <ul style="list-style-type: none">Method named and described OR <ul style="list-style-type: none">Method named and appropriateness indicated | 2 |
| <ul style="list-style-type: none">Appropriate method named with no further definition | 1 |

Question 29 (e) (8 marks)*Outcomes assessed: H4, H10, H13***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| <ul style="list-style-type: none">Clearly describes and makes judgements on the likely impact on the environment of a range of factors involved in exploration, mining and processing of the named deposit | 7–8 |
| <ul style="list-style-type: none">Describes and makes judgements on the likely impact on the environment of some factors involved in two of exploration, mining and processing of the named deposit | 5–6 |
| <ul style="list-style-type: none">Identifies the likely impact on the environment of some factors involved in two of exploration, mining and processing | 3–4 |
| <ul style="list-style-type: none">Identifies some likely impacts on the environment but does not properly link these to exploration, mining or processing | 1–2 |

Question 30 (a) (i) (1 mark)*Outcomes assessed: H7***MARKING GUIDELINES**

| Criteria | Marks |
|----------------------------------|-------|
| • States correct end of spectrum | 1 |

Question 30 (a) (ii) (2 marks)*Outcomes assessed: H7***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Relates differential light penetration to the distribution of marine plants | 2 |
| • Identifies an example of different marine plant distribution but does not relate to differential light penetration | 1 |

Question 30 (b) (i) (2 marks)*Outcomes assessed: H7***MARKING GUIDELINES**

| Criteria | Marks |
|---|-------|
| • Indicates the procedure used, including the apparatus and the method of measurement | 2 |
| • Indicates either the procedure used, including the apparatus OR the method of measurement | 1 |

Question 30 (b) (ii) (2 marks)*Outcomes assessed: H11, H14***MARKING GUIDELINES**

| Criteria | Marks |
|--|-------|
| • Describes one example of the effect of temperature on precipitation of salt in a natural body of water and relates this to a cause | 2 |
| • Briefly describes either the cause or the effect | 1 |

Question 30 (c) (4 marks)*Outcomes assessed: H1, H7, H13***MARKING GUIDELINES**

| Criteria | Marks |
|--|--------------|
| <ul style="list-style-type: none">Indicates characteristics of the processes at a hydrothermal vent including hot water circulating, scavenging, concentration and transport of elements followed by precipitation of minerals and the support of the biotic communities | 4 |
| <ul style="list-style-type: none">Indicates characteristics of some processes operating at hydrothermal vents, including how mineral deposits form, and the biotic communities they support | 3 |
| <ul style="list-style-type: none">Briefly describes one process or characteristic of mineral deposits formed and one process or characteristic of the biotic communities at hydrothermal vents | 2 |
| <ul style="list-style-type: none">Briefly describes one process or characteristic of mineral deposits formed <p>OR</p> <ul style="list-style-type: none">Briefly describes one process or characteristic of the biotic communities at hydrothermal vents | 1 |

Question 30 (d) (i) (2 marks)*Outcomes assessed: H2, H7***MARKING GUIDELINES**

| Criteria | Marks |
|---|--------------|
| <ul style="list-style-type: none">Correctly indicates the features of a method used to date the ocean floor | 2 |
| <ul style="list-style-type: none">Names method with no description | 1 |

Question 30 (d) (ii) (4 marks)

Outcomes assessed: H2, H7

MARKING GUIDELINES

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> Describes the tectonic processes operating in both the Solomon sea and Woodlark Basin and relates these to their likely outcome | 4 |
| <ul style="list-style-type: none"> Briefly describes the tectonic processes operating in both the Solomon Sea and Woodlark Basin and the likely outcome for one of these | 3 |
| <ul style="list-style-type: none"> Briefly describes the tectonic processes operating in both the Solomon sea and Woodlark Basin <p>OR</p> <ul style="list-style-type: none"> Briefly describes the processes in one and the likely outcome | 2 |
| <ul style="list-style-type: none"> Briefly describes the tectonic process operating in one area <p>OR</p> <ul style="list-style-type: none"> The likely outcome for one area | 1 |

Question 30 (e) (8 marks)

Outcomes assessed: H1, H3, H7, H13

MARKING GUIDELINES

| Criteria | Marks |
|---|-------|
| <ul style="list-style-type: none"> For the two technologies, indicates the type of data obtained from the instrument used Describes how the operation of each technology and the data produced, aid our understanding of the oceans | 7–8 |
| <ul style="list-style-type: none"> For one technology provides a level 7–8 answer and for the other technology only provides the way it operates and data produced | 5–6 |
| <ul style="list-style-type: none"> For two technologies, describes the way each operates and the data produced <p>OR</p> <ul style="list-style-type: none"> Provides a level 7–8 answer for only one technology | 3–4 |
| <ul style="list-style-type: none"> For two technologies, describes the way each operates OR the data produced <p>OR</p> <ul style="list-style-type: none"> For one technology describes the way it operates and the data produced | 1–2 |