BOARD OF STUDIES
NEW SOUTH WALES

# 2010 HSC Earth and Environmental Science Marking Guidelines

## Section I, Part A

| Question | Answer |
|---|---|
| 1 | A |
| 2 | D |
| 3 | C |
| 4 | C |
| 5 | A |
| 6 | B |
| 7 | D |
| 8 | D |
| 9 | B |
| 10 | B |
| 11 | C |
| 12 | D |
| 13 | A |
| 14 | B |
| 15 | A |
| 16 | C |
| 17 | B |
| 18 | D |
| 19 | C |
| 20 | A |

# Section I, Part B

## Question 21 (a)

| Criteria | Marks |
|---|---|
| • Gives features of TWO named hazards that exist for organisms living near volcanoes | 2 |
| • Gives some relevant information | 1 |

## Question 21 (b)

| Criteria | Marks |
|---|---|
| • Links cause and effect of both named features | 4 |
| • Names TWO features<br>• Links cause and effect of one feature | 3 |
| • Describes TWO features | 2 |
| • Gives some relevant information | 1 |

## Question 22 (a)

| Criteria | Marks |
|---|---|
| • Names the type of plate boundary<br>• Gives the relative motion of the plates on either side of the boundary | 2 |
| • Names the type of plate boundary<br>OR<br>• Gives the relative motion of the plates on either side of the boundary | 1 |

## Question 22 (b)

| Criteria | Marks |
|---|---|
| • Draws a detailed cross-section of a subduction zone<br>• Correctly labels key features | 3 |
| • Draws a cross-section of a subduction zone with labels<br>OR<br>• Provides a diagram with key features labelled | 2 |
| • Gives some relevant information | 1 |

**Question 22 (c)**

| Criteria | Marks |
|---|---|
| • Clearly compares the nature of the two types of boundaries and links these to volcanic activity | 3 |
| • Describes both types of plate boundaries<br>OR<br>• Describes one boundary and links to volcanic activity | 2 |
| • Gives some relevant information | 1 |

**Question 23 (a)**

| Criteria | Marks |
|---|---|
| • Gives correct time interval | 1 |

**Question 23 (b)**

| Criteria | Marks |
|---|---|
| • Details differences between relative and absolute dating techniques<br>• Clearly relates these to dating the trilobite species | 4 |
| • Gives some information for both relative and absolute dating techniques | 2–3 |
| • Gives some relevant information | 1 |

## Question 24

| Criteria | Marks |
|---|---|
| • Draws flowchart with at least THREE stages<br>• Puts steps in correct sequence<br>• Provides appropriate information | 4 |
| • Draws flowchart<br>• Provides some information | 2–3 |
| • Gives some relevant information | 1 |

## Question 25 (a)

| Criteria | Marks |
|---|---|
| • Correctly recognises one impact on the biotic environment | 1 |

## Question 25 (b)(i)

| Criteria | Marks |
|---|---|
| • Sketches in general terms one rehabilitation strategy | 2 |
| • Gives some relevant information | 1 |

## Question 25 (b)(ii)

| Criteria | Marks |
|---|---|
| • Provides details of the scientific basis of the strategy<br>• Relates strategy to a salinity problem | 3 |
| • Outlines the scientific basis | 2 |
| • Gives some relevant information | 1 |

**Question 26 (a)**

| Criteria | Marks |
|---|---|
| • Correctly names four hypotheses | 2 |
| • Correctly names two hypotheses | 1 |

**Question 26 (b)**

| Criteria | Marks |
|---|---|
| • Demonstrates a detailed understanding of the evidence for the hypothesis<br>• Makes a judgement about the evidence | 4 |
| • Demonstrates an understanding of the evidence for the hypothesis | 2–3 |
| • Gives some relevant information | 1 |

**Question 26 (c)**

| Criteria | Marks |
|---|---|
| • Provides a detailed understanding of the theory of evolution<br>• Links evolution to the origin of new species after a mass extinction | 3 |
| • Provides an understanding of the theory of evolution and its relationship to populations | 2 |
| • Gives some relevant information | 1 |

**Question 27**

| Criteria | Marks |
|---|---|
| • Displays an ability to relate theory to practical application by<br>- giving logical order of steps in the investigation and<br>- assessing reliability of results | 4 |
| • Outlines an investigation | 2–3 |
| • Gives some relevant information | 1 |

**Question 28**

| Criteria | Marks |
|---|---|
| • Demonstrates a thorough knowledge of the features of the Australian continent that have resulted in low fertility | 3 |
| • Demonstrates a knowledge of some features of the Australian continent that are related to low fertility | 2 |
| • Gives some relevant information | 1 |

## Question 29

| Criteria | Marks |
|---|---|
| • Demonstrates an understanding of the impact of pesticides/chemicals on the food chain | 2 |
| • Gives some relevant information | 1 |

## Question 30

| Criteria | Marks |
|---|---|
| • Demonstrates a thorough depth or breadth of knowledge and understanding of relevant geological processes and relevant human activities since the industrial revolution (causes)<br>• Demonstrates a thorough depth or breadth of knowledge and understanding of local climate changes and global climate changes (effects)<br>• Clearly links/relates/analyses relationships between causes and effects | 7–8 |
| • Displays a sound knowledge and understanding of geological processes and human activities since the industrial revolution (causes)<br>• Displays a knowledge and understanding of local climate changes and global climate changes (effects)<br>• Attempts to link/relate/make judgements between causes and effects | 5–6 |
| • Demonstrates a basic knowledge of local and/or global climate change, geological processes and human activity<br>• Communicates ideas in a basic form using general scientific terms | 3–4 |
| • Demonstrates a limited knowledge of local or global climate change or geological processes or effects of human activity<br>• Communicates simple ideas | 1–2 |

# Section II

## Question 31 (a)

| Criteria | Marks |
|---|---|
| • Demonstrates a detailed knowledge of two relevant methods | 4 |
| • Provides some knowledge of two relevant methods<br>OR<br>• Provides a detailed knowledge of one relevant method | 2–3 |
| • Gives some relevant information | 1 |

## Question 31 (b) (i)

| Criteria | Marks |
|---|---|
| • Describes the trend/s of the graph | 1 |

## Question 31 (b) (ii)

| Criteria | Marks |
|---|---|
| • Sketches in general terms reasons for the population increase of the introduced pest species | 3 |
| • Identifies reasons why the pest species increased<br>OR<br>• Sketches in general terms a reason for the population increase of the introduced pest species | 2 |
| • Gives some relevant information | 1 |

## Question 31 (c)

| Criteria | Marks |
|---|---|
| • Demonstrates a detailed understanding of the Bradley method and one other relevant method<br>• Gives the differences between the methods | 4 |
| • Provides some understanding of the Bradley method and one other relevant method<br>• Attempts to give the differences between the methods | 2–3 |
| • Gives some relevant information | 1 |

**Question 31 (d) (i)**

| Criteria | Marks |
|---|---|
| • Gives a valid hypothesis | 1 |

**Question 31 (d) (ii)**

| Criteria | Marks |
|---|---|
| • Gives a logical description of a well-designed investigation<br>• Links investigation to the hypothesis in (d) (i)<br>• Recognises dependent and independent variable<br>• Demonstrates the need for accuracy/reliability and a control where needed | 4 |
| • Outlines an investigation with some aspects missing | 2–3 |
| • Gives some relevant information | 1 |

**Question 31 (e)**

| Criteria | Marks |
|---|---|
| • Sketches in general terms one successful method | 2 |
| • Gives some relevant information | 1 |

**Question 31 (f)**

| Criteria | Marks |
|---|---|
| • Demonstrates a thorough (depth or breadth) of knowledge and understanding of the Australian environment<br>• Demonstrates a thorough (depth or breadth) of knowledge and understanding of introduced species<br>• Clearly makes judgements on the impact of introduced species<br>• Demonstrates a coherent and logical progression of thought and includes correct use of scientific principles and ideas | 5–6 |
| • Demonstrates some knowledge and understanding of the Australian environment and introduced species<br>• Makes a judgement on the impact of introduced species<br>• Communicates some scientific principles and ideas in a clear manner | 3–4 |
| • Recalls some relevant knowledge of Australian environments and/or introduced species<br>• Communicates ideas in a basic form, using general terms | 1–2 |

**Question 32 (a)**

| Criteria | Marks |
|---|---|
| • Demonstrates a detailed knowledge of ONE renewable and ONE non-renewable resource<br>• Gives details of how each is used to produce energy | 4 |
| • Provides knowledge of ONE renewable and/or ONE non-renewable resource<br>• Gives details of how at least ONE is used to produce energy | 2–3 |
| • Gives some relevant information | 1 |

**Question 32 (b) (i)**

| Criteria | Marks |
|---|---|
| • Gives the trend of the graph | 1 |

**Question 32 (b) (ii)**

| Criteria | Marks |
|---|---|
| • Sketches in general terms changes apart from vitrinite reflectance that occur during coalification | 3 |
| • Sketches in general terms ONE change apart from reflectance that occurs during coalification<br>OR<br>• Identifies changes | 2 |
| • Gives some relevant information | 1 |

**Question 32 (c) (i)**

| Criteria | Marks |
|---|---|
| • Correctly names ONE method | 1 |

**Question 32 (c) (ii)**

| Criteria | Marks |
|---|---|
| • Demonstrates a detailed knowledge of how petroleum accumulates | 3 |
| • Provides some knowledge of how petroleum accumulates | 2 |
| • Gives some relevant information | 1 |

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**Question 32 (d) (i)**

| Criteria | Marks |
|---|---|
| • Gives a valid hypothesis | 1 |

**Question 32 (d) (ii)**

| Criteria | Marks |
|---|---|
| • Gives a logical description of a well-designed investigation<br>• Links investigation to the hypothesis in (d) (i)<br>• Recognises dependent and independent variable<br>• Demonstrates the need for accuracy/reliability and a control where needed | 4 |
| • Outlines an investigation with some aspects missing | 2–3 |
| • Gives some relevant information | 1 |

**Question 32 (d) (iii)**

| Criteria | Marks |
|---|---|
| • Sketches in general terms two ways of limiting emissions | 2 |
| • Gives some relevant information | 1 |

**Question 32 (e)**

| Criteria | Marks |
|---|---|
| • Demonstrates a thorough (depth or breadth) of knowledge and understanding of alternative energy sources<br>• Demonstrates knowledge of fossil fuels<br>• Clearly makes a judgement about the potential of alternative energy sources<br>• Demonstrates a coherent and logical progression of thought and includes correct use of scientific principles and ideas | 5–6 |
| • Demonstrates some knowledge and understanding of alternative energy and fossil fuels<br>• Makes a judgement about the potential of alternative energy sources<br>• Communicates some scientific principles and ideas in a clear manner | 3–4 |
| • Recalls some relevant knowledge of alternative energy and/or fossil fuels<br>• Communicates ideas in a basic form, using general terms | 1–2 |

**Question 33 (a)**

| Criteria | Marks |
|---|---|
| • Identifies TWO relevant geophysical methods<br>• Gives detailed accounts of both methods | 4 |
| • Names ONE relevant geophysical method and<br>• Gives detailed account of this method<br>OR<br>• Identifies TWO relevant geophysical methods and<br>• Gives general accounts of both methods | 2–3 |
| • Gives some relevant information | 1 |

**Question 33 (b) (i)**

| Criteria | Marks |
|---|---|
| • Gives the nature of the relationship between age and location of iron ore deposits | 1 |

**Question 33 (b) (ii)**

| Criteria | Marks |
|---|---|
| • Demonstrates a detailed knowledge of the genesis of iron ore | 3 |
| • Provides some knowledge of the genesis of iron ore | 2 |
| • Gives some relevant information | 1 |

**Question 33 (c) (i)**

| Criteria | Marks |
|---|---|
| • Gives definition of both waste rock and ore | 2 |
| • Gives some relevant information | 1 |

**Question 33 (c) (ii)**

| Criteria | Marks |
|---|---|
| • Sketches in general terms two ways gangue minerals may become economically viable | 2 |
| • Gives some relevant information | 1 |

**Question 33 (d) (i)**

| Criteria | Marks |
|---|---|
| • Gives a valid hypothesis | 1 |

**Question 33 (d) (ii)**

| Criteria | Marks |
|---|---|
| • Gives a logical description of a well-designed investigation<br>• Links investigation to the hypothesis in (d) (i)<br>• Recognises dependent and independent variable<br>• Demonstrates the need for accuracy/reliability and a control where needed | 4 |
| • Outlines an investigation with some aspects missing | 2–3 |
| • Gives some relevant information | 1 |

**Question 33 (e)**

| Criteria | Marks |
|---|---|
| • Sketches in general terms TWO reasons | 2 |
| • Gives some relevant information | 1 |

**Question 33 (f)**

| Criteria | Marks |
|---|---|
| • Demonstrates a thorough (depth or breadth) of knowledge and understanding of mining in Australia<br>• Demonstrates a thorough (depth or breadth) of knowledge and understanding of non-geological factors<br>• Clearly makes a judgement about the role of non-geological factors in mining expansion<br>• Demonstrates a coherent and logical progression of thought and includes correct use of scientific principles and ideas | 5–6 |
| • Demonstrates some knowledge and understanding of mining in Australia and non-geological factors<br>• Makes judgements about the role of non-geological factors in mining expansion<br>• Communicates some scientific principles and ideas in a clear manner | 3–4 |
| • Recalls some relevant knowledge of mining in Australia<br>• Communicates ideas in a basic form, using general terms | 1–2 |

**Question 34 (a)**

| Criteria | Marks |
|---|---|
| • Demonstrates a knowledge of deep sea and continental margin sediments | 4 |
| • Provides an understanding of deep sea and continental margin sediments | 2–3 |
| • Gives some relevant information | 1 |

**Question 34 (b) (i)**

| Criteria | Marks |
|---|---|
| • Gives the features of the main circulation pattern in the Pacific Ocean | 1 |

**Question 34 (b) (ii)**

| Criteria | Marks |
|---|---|
| • Demonstrates a detailed knowledge of the oxygen supply on the ocean floor | 3 |
| • Provides some knowledge of the oxygen supply | 2 |
| • Gives some relevant information | 1 |

**Question 34 (c) (i)**

| Criteria | Marks |
|---|---|
| • Relates the margins and centres of oceans to their respective ages | 2 |
| • Gives some relevant information | 1 |

**Question 34 (c) (ii)**

| Criteria | Marks |
|---|---|
| • Names ONE technological development<br>• Provides an understanding of how it is used to date the sea floor | 2 |
| • Gives some relevant information | 1 |

**Question 34 (d) (i)**

| Criteria | Marks |
|---|---|
| • Gives a valid hypothesis | 1 |

**Question 34 (d) (ii)**

| Criteria | Marks |
|---|---|
| • Gives a logical description of a well-designed investigation<br>• Links investigation to the hypothesis in (d) (i)<br>• Recognises dependent and independent variable<br>• Demonstrates the need for accuracy/reliability and a control where needed | 3–4 |
| • Outlines an investigation with some aspects missing | 2 |
| • Gives some relevant information | 1 |

**Question 34 (d) (iii)**

| Criteria | Marks |
|---|---|
| • Sketches in general terms TWO factors that affect salinity | 2 |
| • Gives some relevant information | 1 |

**Question 34 (e)**

| Criteria | Marks |
|---|---|
| • Demonstrates a thorough (depth or breadth) of knowledge and understanding of the oceans' resources and how the oceans are exploited<br>• Demonstrates a thorough (depth or breadth) of knowledge and understanding of laws and regulations<br>• Clearly makes a judgement about the impact of laws<br>• Demonstrates a coherent and logical progression of thought and includes correct use of scientific principles and ideas | 5–6 |
| • Demonstrates some knowledge and understanding of the oceans' resources, society's use of the oceans and laws relating to the oceans<br>• Makes a judgement about the impact of laws<br>• Communicates some scientific principles and ideas in a clear manner | 3–4 |
| • Recalls some relevant information<br>• Communicates ideas in a basic form, using general terms | 1–2 |

# Earth and Environmental Science

## 2010 HSC Examination Mapping Grid

| Question | Marks | Content | Syllabus outcomes |
|---|---|---|---|
| **Section I Part A** | | | |
| 1 | 1 | 9.2.1.2.2 | H6, H7 |
| 2 | 1 | 9.2.4.2.8 | H7, H8 |
| 3 | 1 | 9.2.3.2.1, 9.2.3.3.1 | H7, H8 |
| 4 | 1 | 9.2.1.2.4, 9.2.1.3.1 | H7, H8 |
| 5 | 1 | 9.2.3.2.2 | H7 |
| 6 | 1 | 9.2.5.2.1, 14.1 | H2, H7, H14 |
| 7 | 1 | 9.3.1.2.1 | H2, H7 |
| 8 | 1 | 9.3.2.2.3 | H7 |
| 9 | 1 | 9.3.1.2.2 | H7 |
| 10 | 1 | 9.3.1.2.5 | H1, H3 |
| 11 | 1 | 9.3.4.2.3 | H7 |
| 12 | 1 | 9.3.5.3.3 | H2, H7, H8 |
| 13 | 1 | 9.3.3.3.1, 14.3, 14.1 | H7, H14 |
| 14 | 1 | 9.4.5.3.1 | H1, H4 |
| 15 | 1 | 9.4.7.2.1, 9.4.7.3.1 | H7 |
| 16 | 1 | 9.4.5.2.1 | H6, H7, H9 |
| 17 | 1 | 9.4.2.3.1, 9.4.2.2.1 | H7, H9 |
| 18 | 1 | 9.4.6.2.3 | H7 |
| 19 | 1 | 9.4.6.2.1, 14.1 | H7, H13 |
| 20 | 1 | 9.4.2.2.1, 9.4.2.3.2, 14.1 | H14 |
| **Section I Part B** | | | |
| 21 (a) | 2 | 9.2.4.2.3, 9.2.4.2.4, 9.2.4.2.5 | H7 |
| 21 (b) | 4 | 9.2.4.2.3 | H7 |
| 22 (a) | 2 | 9.2.1.2.3 | H7 |
| 22 (b) | 3 | 9.2.1.2.3, 14.1, 13.1 | H7, H13 |
| 22 (c) | 3 | 9.2.4.3.1, 9.2.4.2.1 | H7, H14 |
| 23 (a) | 1 | 9.3.3.2.1, 12.1 | H7 |
| 23 (b) | 4 | 9.3.3.2.2, 9.3.3.2.1, 9.3.3.2.3 | H7, H12, H13 |
| 24 | 4 | 9.3.1.2.4, 13.1, 14.1 | H7, H13 |
| 25 (a) | 1 | 9.4.3.3.1 | H7, H10 |
| 25 (b) | 2 | 9.4.3.2.2, 9.4.3.2.1 | H7, H10 |
| 25 (c) | 3 | 9.4.3.3.4 | H7, H10, H12 |
| 26 (a) | 2 | 9.3.5.2.5 | H7, H13 |
| 26 (b) | 4 | 9.3.5.3.1, 9.3.5.2.5 | H7, H14 |
| 26 (c) | 3 | 9.3.4.2.1, 9.3.4.2.3, 9.3.5.2.1 | H1, H8, 14.1d |

| Question | Marks | Content | Syllabus outcomes |
|---|---|---|---|
| 27 | 4 | 9.4.2.3.1, 12.1, 14.2, 12.4 | H4, H6, H9, H11 |
| 28 | 3 | 9.4.1.2.1 | H4, H6, H9, H10 |
| 29 | 2 | 9.4.4.2.1, 9.4.4.3.1 | H4, H9, H10 |
| 30 | 8 | 9.2, 9.4, 13.1 | H14, H6, H7, H8, H9, H13, H14 |
| **Section II**<br>**Question 31 — Introduced Species and the Australian Environment** | | | |
| 31 (a) | 4 | 9.5.6.2.1 | H1, H10 |
| 31 (b) (i) | 1 | 9.5.2.2.2, 14.1 | H10, H14 |
| 31 (b) (ii) | 3 | 9.5.3.2.1 | H7, H10 |
| 31 (c) | 4 | 9.5.5.3.2 | H7, H10 |
| 31 (d) (i) | 1 | 9.5.2.2.2, 11.2, 14.1 | H10, H14 |
| 31 (d) (ii) | 4 | 9.5.2.2.2, 12.1, 14.2, 14.3 | H11, H12, H14 |
| 31 (e) | 2 | 9.5.5.2.4 | H7 |
| 31 (f) | 6 | 9.5.2, 9.5.3, 9.5.4, 9.5.1 | H4, H10, H13, H14 |
| **Section II**<br>**Question 32 — Organic Geology – A non-renewable Resource** | | | |
| 32 (a) | 4 | 9.6.1.2.1, 9.6.1.3.2, 9.6.6.2.1 | H6 |
| 32 (b) (i) | 1 | 9.6.1.2.4, H14.1 | H10, H14 |
| 32 (b) (ii) | 3 | 9.6.1.2.4 | H2, H6 |
| 32 (c) (i) | 1 | 9.6.3.2.1 | H3, H6 |
| 32 (c) (ii) | 3 | 9.6.3.2.3 | H6 |
| 32 (d) (i) | 1 | 9.6.1.3.2, 11.2, 14.1 | H10, H14 |
| 32 (d) (ii) | 4 | 9.6.1.3.2, 12.1, 14.2, 14.3 | H11, H12, H14 |
| 32 (e) | 2 | 9.6.5.2.2 | H7 |
| 32 (f) | 6 | 9.6.1, 9.6.4, 9.6.5, 9.6.6 | H4, H10, H13, H14 |
| **Section II**<br>**Question 33 — Mining and the Australian Environment** | | | |
| 33 (a) | 4 | 9.7.4.2.1 | H6 |
| 33 (b) (i) | 1 | 9.7.1.2.1 | H14 |
| 33 (b) (ii) | 3 | 9.7.1.2.2 | H6, H7 |
| 33 (c) (i) | 2 | 9.7.3.2.3 | H7 |
| 33 (c) (ii) | 2 | 9.7.3.2.4, 9.7.3.2.6 | H6, H7, H9 |
| 33 (d) (i) | 1 | 9.7.4.3.2 | H10, H11, H14 |
| 33 (d) (ii) | 4 | 9.7.4.3.2, 14.2, 12.1, 14.3 | H11, H12, H14 |
| 33 (e) | 2 | 9.7.5.2.2 | H1, H4, H7 |
| 33 (f) | 6 | 9.7.2.9.7.3, 9.7.4.9.7.5 | H4, H10, H13, H14 |
| **Section II**<br>**Question 34 — Oceanography** | | | |
| 34 (a) | 4 | 9.8.7.2.1, 9.8.7.3.1 | H7 |
| 34 (b) (i) | 1 | 9.8.4.2.1 | H2, H7 |
| 34 (b) (ii) | 3 | 9.8.4.2.2 | H2, H7 |
| 34 (c) (i) | 2 | 9.8.2.2.1 | H7 |

| Question | Marks | Content | Syllabus outcomes |
|---|---|---|---|
| 34 (c) (ii) | 2 | 9.8.2.3.1 | H1, H7 |
| 34 (d) (i) | 1 | 9.8.3.3.3 | H10, H14 |
| 34 (d) (ii) | 4 | 9.8.3.3.3, H12.3, H14.2, H14.3 | H11, H12, H14 |
| 34 (d) (iii) | 2 | 9.8.3.2.1, 9.8.3.2.2 | H7 |
| 34 (e) | 6 | 9.8.1, 9.8.3, 9.8.5, 9.8.6 | H4, H10, H13, H14 |