2006 HSC Notes from the Marking Centre Biology

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Published by Board of Studies NSW
GPO Box 5300
Sydney 2001
Australia

Tel: (02) 9367 8111
Fax: (02) 9367 8484
Internet: www.boardofstudies.nsw.edu.au

ISBN 978 174147 6736

2007102

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2006 HSC NOTES FROM THE MARKING CENTRE BIOLOGY

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course in Biology. It provides comments with regard to responses to some questions in the 2006 Higher School Certificate Examination, indicating the quality of candidate responses and highlighting the relative strengths and weaknesses of the candidature in each section.

This document should be read along with the relevant syllabus, the 2006 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 Biology.

General Comments

In 2006, approximately 14,000 candidates attempted the Biology examination. The most popular Options were Communication (59%), and Genetics: The Code Broken? (20%).

Teachers and candidates should be aware that examiners may write 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, including the Prescribed Focus Areas. 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. It is important to understand that the Preliminary HSC course is assumed knowledge for the HSC course.

In 2006, at least one question in Section I Part B and one part of the Section II option questions focused on the mandatory skills content in Module 9.1. Candidates who had actively planned and performed practical experiences clearly demonstrated a deeper knowledge and understanding of the content described in this module.

Overall, the level of understanding of Biology concepts indicated by responses was appropriate for most HSC candidates. Candidates need to be reminded that the answer space provided and the marks allocated are guides to the maximum length of response required. Similarly, the key word used in the question gives an indication of the depth of the required response. Candidates should use examination time to analyse the question and plan responses carefully, working within that framework to produce a clear and concise response. This may include the use of dot points, diagrams and/or tables, and avoid internal contradictions. This is particularly important in holistic questions which need to be logical and well structured. There was evidence that some candidates had a very poor knowledge of basic definitions specific to terminology associated with the course.

Better responses indicate that candidates are following the instructions provided on the examination paper. In these responses, candidates:

- do not repeat the question as part of the response
- look at the structure of the whole question and note that in some questions the parts follow from each other (ie responses in part (a) lead to the required response in part (b) etc).

In Section II, the option question is divided into a number of parts. Candidates should clearly label each part of the question when writing in their answer booklets. In part (c) of the 2006 option questions, the best responses presented ideas coherently and included the correct use of scientific principles and ideas. Many candidates wrote a lot of information that was not relevant to the question. Some responses showed evidence of rote learning of an anticipated answer based on a single source. These responses did not address the syllabus content and/or outcomes being assessed and hence did not score full marks. Candidates are required to attempt one question only in Section II, but some candidates responded to more than one option question. Candidates are strongly advised to answer the option they have studied in class.

Section I – Core

Part A – Multiple-choice questions

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

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

Part B

Specific Comments

Question 16

(a) The majority of candidates were able to state a function, structure or location of haemoglobin.

(b) Better responses demonstrated an understanding of the advantage of haemoglobin. Weaker responses showed knowledge of haemoglobin's structure and/or function without addressing adaptive advantage.

Question 17

The majority of candidates demonstrated a sound understanding of the need for organisms to remove metabolic waste products.

Question 18

(a) Most candidates were able to name an adaptation.

(b) Better responses were able to link the maintenance of water balance with a correct physiological reason. Weaker responses did not relate cause and effect.

(c) Better responses outlined the features of good experimental design, including aspects such as control of variables, repetition and data collection.

Question 21

(a) While better responses demonstrated an understanding of the 'one gene – one protein' hypothesis, a significant number of responses demonstrated a lack of knowledge and/or understanding of Beadle and Tatum's experiment.

(b) Better responses demonstrated an understanding that hypotheses are modified to account for new knowledge. Weaker responses showed confusion about the relationship between genes, proteins and polypeptides.

Question 22

(a) Better responses named a transgenic species and its use. Weaker responses gave a general definition but no specific example.

(b) Better responses correctly provided the main features of one process used to produce a transgenic species.

(c) Better responses provided points for and/or against an identified ethical issue arising from the use of a transgenic species.

Question 23

In the better responses, candidates were able to relate Darwin's ideas about the nature and sources of variation to the experiment in which new alleles/varieties by mutagenic radiation were formed.

Question 24

The majority of candidates were able to describe an appropriate method to prevent the spread of the disease "Black spot".

Question 25

Better responses described for a named disease the cause and general effects of an imbalance and clearly distinguished between the effects on microflora and the symptoms of the disease.

Question 26

In the better responses, candidates were able to make a judgement about the procedures using the supporting information provided in the question and referring to the use of different technologies, a variety of methods and one issue. Weaker responses often outlined or described a different approach but failed to make a judgement about the procedures.

Question 27

In the better responses, candidates indicated the main features of an appropriate investigation, chose appropriate groups to study, and made reference to both the table and each category.

Question 28

(a) Most candidates correctly identified inflammation.

(b) Most candidates identified bacteria as the source of infection.

(c) In the better responses, candidates linked the failure to complete the course of antibiotics with how natural selection leads to antibiotic resistance. Weaker responses confused Darwinian and Lamarckian concepts of evolution.

Section II - Options

Question 29 – Communication

(a) (i) Better responses provided corresponding features for both rods and cones rather than features for one with implied differences. A table was often used to effectively and explicitly present the differences.

(ii) Better responses clearly showed the cause and effect relationship between the lack of pigments in the cones and colour-blindness.

(b) (i) Better responses provided the main features of an appropriate procedure with risk assessments and detailed information about the relationship of the parts of their model to the parts of the eye. Many responses included accurate labelled diagrams and demonstrated an understanding of the concept of modelling and the process of accommodation.

(ii) In better responses, candidates were able to clearly identify how their model increased their understanding of accommodation.

(c) Better responses identified a range of hearing and vision technologies and provided detailed descriptions of the benefits and/or limitations of these technologies. Weaker responses were excessively long, showing little evidence of planning or structure.

(d) (i) Better responses stated that the eye is the organ that detects light stimuli in humans. A significant number of candidates called it a tissue rather than an organ.

(ii) Most candidates were able to identify one piece of evidence from the stimulus material. The better responses recognised that some brain function was required to process the sensory input.

(iii) Most candidates were able to describe the role of the brain in coordination. In the better responses, candidates provided a clear link between loss of brain function and impaired coordination.

Question 30 – Biotechnology

(a) (i) In the better responses, candidates identified and sketched in general terms the use of biotechnology in a named early society.

(ii) Better responses clearly linked the use of biotechnology in an early society with the use of organisms to make or modify a product for human benefit.

(b) (i) The better responses provided the main features of an appropriate procedure with risk assessment and an outline of the results obtained. Weaker responses indicated some confusion between the processes of fermentation and the baking of bread.

(ii) Better responses clearly identified how the demonstration increased understanding of the fermentation process. However, this question proved challenging for many candidates.

(c) Better responses identified the issues related to the development of recombinant DNA technology and provided detailed descriptions of the benefits and/or limitations of the applications of this technology. Weaker responses were excessively long, showing little evidence of planning or structure.

(d) (i) Most candidates were able to use the stimulus material to determine that the transgenic plant had improved nutritional value.

(ii) In most responses, candidates were able to provide the main feature of the supporting evidence.

(iii) Most responses made judgements about the commercial use of cloning or genetically modified organisms. Better responses provided evidence to support the judgement.

Question 31 – Genetics: The Code Broken?

(a) (i) In the better responses, candidates provided corresponding features for both somatic and gametic cells rather than features for one with implied differences. A table was often used to effectively and explicitly present the differences.

(b) (i) Better responses provided main features of an appropriate procedure used and the findings obtained about the current understanding of gene expression. Many candidates demonstrated a good understanding of the role of homeotic genes, switching genes on and off, gene cascades and limb development.

(ii) Better responses clearly identified how the findings increased their understanding of the gene expression.

(c) Better responses described major advances in our knowledge of genetics that have changed our understanding of the way genes direct structure, function and development and described benefits and/or limitations of our changed understanding. Weaker responses were excessively long, showing little evidence of planning or structure.

(d) (i) In the better responses, candidates identified the correct genotype that produced the greatest amount of milk as AABB.

(ii) In most responses, candidates provided, in general terms, the effect of the dominant allele on milk production.

(iii) Better responses clearly linked polygenic inheritance with greater variability within a trait.

Question 32 – The Human Story

(a) (ii) In the better responses, candidates linked the named cultural change to an aspect of human evolution.

(b) (i) Better responses provided the main features of an appropriate procedure and used the findings obtained about the maternal inheritance of mitochondrial DNA. Weaker responses described an irrelevant first-hand investigation.

(ii) Most candidates clearly identified the importance of the study of maternal inheritance of mitochondrial DNA.

(c) Better responses identified a range of technologies such as karyotype analysis, DNA-DNA hybridisation and mitochondrial DNA sequencing, and provided detailed descriptions of the benefits and/or limitations of these technologies in changing our understanding of the evolutionary relationships between humans and other primates. Weaker responses were excessively long, showing little evidence of planning or structure.

(d) (i) Most candidates were able to use the stimulus material to correctly recognise and name *Homo erectus.*

(ii) Better responses used the stimulus material to support the hypothesis.

(iii) In the better responses, candidates referred to the stimulus material to link and provide a judgement as to how this discovery supported the selected model.

Question 33 – Biochemistry

(a) (ii) Better responses identified the scientist and their contribution to our understanding of photosynthesis.

(b) (i) Better responses provided the main features of an appropriate procedure for examining the absorption spectrum with risk assessments and an outline of the results obtained.

(ii) Few candidates were able to show how the results increased their understanding of the role of pigments in photosynthesis.

(c) Better responses identified a range of improvements in microscopy and provided detailed descriptions of the benefits and/or limitations of these improvements on increasing our understanding of cell structures involved in photosynthesis. Weaker responses were excessively long, showing little evidence of planning or structure.

(d) (i) Better responses correctly named X as phosphoglycerate.

(ii) Better responses identified the significance of ATP providing energy at both points Z and Y.

(iii) Better responses described, linked and made a judgement as to how a specific advance in technology increased understanding of the Calvin Cycle.

Biology

2006 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I Part A			
1	1	9.4.2.3.2	H8
2	1	9.3.3.2.3	H9
3	1	9.3.3.2.7	H9
4	1	9.3.1.2.2	H10
5	1	9.3.2.2.4, 9.3.2.3.2, 14.1 (a)	H14
6	1	9.3.2.3.1, 12.3 (c), 14.1 (c)	H12, H14
7	1	9.2.2.2.1, 9.2.2.2.6	H6
8	1	9.2.1.2.8, 12.3 (c), 14.1 (a)	H12, H14
9	1	9.2.3.2.7	H6
10	1	9.2.2.2.4, 14.3 (c)	H14
11	1	9.2.2.2.6	H6
12	1	9.4.1.2.2	H6
13	1	9.4.4.2.2	H6
14	1	9.4.5.2.4, 9.4.4.2.3	H3, H6
15	1	9.4.3.2.2	H3, H6
Section I Part B			
16 (a)	1	9.2.2.2.2	H6
16 (b)	2	9.2.2.2.2	H6, H10
17	3	9.2.3.2.2	H6
18 (a)	1	9.2.3.2.9	H6
18 (b)	2	9.2.3.2.1	H6
18 (c)	4	9.2.3.3.7, 11.2 (c), 14.3 (a)	H11, H14
19 (a)	1	9.2.3.2.6	H6

Question	Marks	Content	Syllabus outcomes
19 (b)	2	9.2.3.2.5	H6
19 (c)	2	9.2.3.2.7	H6
20	3	9.3.3.2.5, 9.3.3.3.3	H9
21 (a)	2	9.3.4.3.2	H6, H9
21 (b)	2	9.3.4.3.2	H3, H6, H9
22 (a)	2	9.3.5.3.2	H4, H7
22 (b)	2	9.3.5.2.2	H3
22 (c)	4	9.3.5.3.2	H4, H10
23	4	9.3.4.2.4, 9.3.4.2.6, 9.3.4.2.5	H9, H10
24	2	9.4.7.2.1	H3, H8
25	3	9.4.4.3.1	H8
26	8	9.1, 9.4.3.1	H11, H12, H13
27	4	9.4.6.1, 9.4.6.2.2, 9.4.6.3.2, 9.1, 11.1 (e), 14.1 (c)	H6, H11, H14
28 (a)	1	9.4.4.2.4	H6
28 (b)	1	9.4.3.2.3	H6
28 (c)	4	9.3.4.3.4, 9.4.3.3.4	H10
Section II **Question 29 — Communication**			
29 (a) (i)	3	9.5.4.2.2	H6
29 (a) (ii)	2	9.5.4.2.5	H6
29 (b) (i)	5	9.5.3.3.1, 11.2 (d), 11.3 (a,b,c)	H11
29 (b) (ii)	1	9.5.3.3.1, 14.1 (b), 14.3 (c)	H14
29 (c)	7	9.5.3, 9.5.6, 14.3 (b)	H3, H14
29 (d) (i)	1	9.5.2.2.1	H6
29 (d) (ii)	2	9.5.7.2.4, 14.1 (b)	H14
29 (d) (iii)	4	9.5.7.2.5	H6

Question	Marks	Content	Syllabus outcomes
Section II Question 30 — Biotechnology			
30 (a) (i)	3	9.6.1.2.1	H8
30 (a) (ii)	2	9.6.1.2.2	H8
30 (b) (i)	5	9.6.2.3.1, 11.3 (a,b,c), 11.2 (d)	H11
30 (b) (ii)	1	9.6.2.3.1, 14.1 (b), 14.3 (c)	H14
30 (c)	7	9.6.5.1, 9.6.6.1, 14.3 (b)	H1, H14
30 (d) (i)	1	9.6.7.3.1, 12.3 (c)	H12
30 (d) (ii)	2	9.6.7.2.2, 9.6.7.3, 14.1 (b)	H14
30 (d) (iii)	4	9.6.7	H7
Section II Question 31 — Genetics: The Code Broken?			
31 (a) (i)	3	9.7.3.2.1	H9
31 (a) (ii)	2	9.7.3.2.1, 9.7.3.2.2, 9.7.3.3.1	H9
31 (b) (i)	5	9.7.1.3.2, 14.1 (c), 11.1 (b), 12.3 (a, d) 12.4 (d, e)	H11, H12, H14
31 (b) (ii)	1	9.7.1.3.2, 14.3 (c)	H14
31 (c)	7	9.7, 9.7.8, 14.3 (b)	H1, H14
31 (d) (i)	1	9.7.2.2.1, 9.7.2.3.2, 12.3 (c), 14.1 (a)	H12, H14
31 (d) (ii)	2	9.7.2.2.1, 9.7.2.3.2, 12.3 (c)	H12
31 (d) (iii)	4	9.7.2.2.3, 9.7.2.3.2, 14.1 (a)	H9, H14
Section II Question 32 — The Human Story			
32 (a) (i)	2	9.8.5.2.1	H10
32 (a) (ii)	3	9.8.5.2.2	H10
32 (b) (i)	5	9.8.2.3.3, 11.1 (b), 12.3 (a, b), 14.1 (c)	H10, H11, H12, H14
32 (b) (ii)	1	9.8.4.3.1, 14.1 (h), 14.3 (b)	H10, H14
32 (c)	7	9.8.1.3.3, 9.8.2, 14.3 (b)	H1, H14
32 (d) (i)	1	9.8.3, 12.3 (c)	H10, H12
32 (d) (ii)	2	9.8.3, 12.3 (c)	H10, H12

Question	Marks	Content	Syllabus outcomes
32 (d) (iii)	4	9.8.3.2.3, 14.1 (c)	H10, H14
Section II **Question 33 — Biochemistry**			
33 (a) (i)	2	9.9.1.2.1	H6
33 (a) (ii)	3	9.9.2.2.1	H1, H6
33 (b) (i)	5	9.9.3.3.4, 11.2 (d), 11.3 (a, b, c)	H11
33 (b) (ii)	1	9.9.3.3.4, 14.1 (b)	H14, H12
33 (c)	7	9.9.8, 9.9.3.3.2, 14.3 (b)	H1, H14
33 (d) (i)	1	9.9.6.2.3, 12.3 (c)	H6, H12
33 (d) (ii)	2	9.9.6.2.3, 9.9.6.3	H6
33 (d) (iii)	4	9.9.6, 14.1 (b), 14.1 (g)	H2, H14

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2006 HSC Biology
Marking Guidelines

Section I, Part B

Question 16 (a)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Any ONE structure, function or location	1

Question 16 (b)

Outcomes assessed: H6, H10

MARKING GUIDELINES

Criteria	Marks
• Describes ONE advantage	2
• Identify ONE advantage	1

Question 17

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Links maintaining normal function of cells/tissues/organs/organisms with accumulation of waste products AND changes in chemical balance	3
• Links any two of maintaining normal function of cells/tissues/organs/organisms OR accumulation of wastes OR changes in chemical balance	2
• States ONE correct reason	1

Question 18 (a)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Names one CORRECT adaptation	1

Question 18 (b)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Links maintaining water balance with ONE correct physiological reason	2
• States ONE physiological reason	1

Question 18 (c)

Outcomes assessed: H11, H14

MARKING GUIDELINES

Criteria	Marks
• Outlines method including variables, repetition, controls and data to be collected about the structure	3–4
• Brief or incomplete description includes some elements of a first-hand investigation	1–2

Question 19 (a)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Correctly names TWO blood components	1

Question 19 (b)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Correctly explains why BOTH passive and active transport are needed	2
• Correctly explains why EITHER passive OR active transport are needed	1

Question 19 (c)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Correctly sequences a change in water balance with the release/inhibition of ADH with effect	2
• Incomplete sequence	1

Question 20

Outcomes assessed: H9

MARKING GUIDELINES

Criteria	Marks
• Correctly explains TWO processes (which can include genetic and/or environmental processes)	3
• Correctly explains ONE process	2
• Only identifies process(es)	1

Question 21 (a)

Outcomes assessed: H6, H9

MARKING GUIDELINES

Criteria	Marks
• Completely summary of evidence	2
• Incomplete summary of evidence	1

Question 21 (b)

Outcomes assessed: H3, H6, H9

MARKING GUIDELINES

Criteria	Marks
• Explains the need to modify the hypothesis to account for new knowledge	2
• Outlines appropriate new knowledge	1

Question 22 (a)

Outcomes assessed: H4, H7

MARKING GUIDELINES

Criteria	Marks
• Correctly identifies one transgenic species and states its use	2
• Correctly identifies one transgenic species OR • States a use for any transgenic species	1

Question 22 (b)

Outcomes assessed: H3

MARKING GUIDELINES

Criteria	Marks
• Correctly outlines one process	2
• Identifies one process	1

Question 22 (c)

Outcomes assessed: H4, H10

MARKING GUIDELINES

Criteria	Marks
• Names one ethical issue and discusses at least two points for and/or against OR • Names one ethical issue and identifies at least three points for and/or against	3–4
• Names one ethical issue and provides one point for or against	2
• Names one ethical issue OR • Provides one point for or against	1

Question 23

Outcomes assessed: H9, H10

MARKING GUIDELINES

Criteria	Marks
• Links Darwin's understanding of the nature and source of variation in populations with the formation of new alleles/varieties by mutagenic radiation	3–4
• Identifies the aspect of Darwin's Theory of Evolution by Natural Selection by the experiment and identifies the cause of mutation OR • Outlines the source of variation as mutagenic radiation	2
• Identifies the aspect of Darwin's Theory of Evolution by Natural Selection supported by the experiment OR • Identifies the cause of mutation	1

Question 24

Outcomes assessed: H3, H8

MARKING GUIDELINES

Criteria	Marks
• Describes appropriate method	2
• Identifies appropriate method	1

Question 25

Outcomes assessed: H8

MARKING GUIDELINES

Criteria	Marks
• Identifies an appropriate disease AND describes the cause AND general effects of an imbalance	3
• Identifies an appropriate disease • Describes a cause OR • Describes general effects of an imbalance	2
• Identifies an appropriate disease OR • Outlines a cause OR • Outlines general effects of an imbalance	1

Question 26

Outcomes assessed: H11, H12, H13

MARKING GUIDELINES

Criteria	Marks
• Makes a judgement using supporting information including reference to the use of different technologies, a variety of methods and at least one issue	7–8
• Describes approaches using supporting information including references to the use of different technologies, a variety of methods and at least one issue	5–6
• Outlines approaches with reference to different technologies, a variety of methods, and one issue	3–4
• States TWO of the following: – identifies that a variety of technologies were used – identifies that a variety of methods were used – identifies one appropriate issue	2
• Identifies one appropriate issue OR • Identifies that a variety of technologies were used OR • Identifies that a variety of methods were used • OR • Identifies a method and a technology used	1

Question 27

Outcomes assessed: H6, H11, H14

MARKING GUIDELINES

Criteria	Marks
• Outlines an appropriate investigation referring to each category AND referring to the table	4
• Outlines an appropriate investigation referring to TWO categories AND referring to the table	3
• Outlines an investigation referring to ONE category AND referring to the table OR • Outlines an investigation referring to each category without referring to the table	2
• Outlines an investigation referring to ONE category	1

Question 28 (a)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Identifies correct human defence adaptation	1

Question 28 (b)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Identifies bacteria as the source of infection	1

Question 28 (c)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
• Links failure to complete the course of antibiotics with how natural selection leads to antibiotic resistance	4
• Outlines how natural selection leads to antibiotic resistance	2–3
• Identifies that natural selection can lead to antibiotic resistance OR • Identifies failure to complete the course of antibiotics as selecting agent	1

Section II

Question 29 (a) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Outlines THREE differences	3
• Outlines TWO differences	2
• Outlines ONE difference	1

Question 29 (a) (ii)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Links absence of at least one of the types of cones with colour blindness	2
• Identifies that cones are involved with colour vision OR • Identifies that rods are not involved	1

Question 29 (b) (i)

Outcomes assessed: H11

MARKING GUIDELINES

Criteria	Marks
• Appropriate procedure with relevant results, including detailed information about procedure AND result	5
• Appropriate procedure AND/OR relevant results	3–4
• Limited procedure AND/OR • Limited result	1–2

Question 29 (b) (ii)

Outcomes assessed: H14

MARKING GUIDELINES

Criteria	Marks
• Any relevant statement	1

Question 29 (c)

Outcomes assessed: H3, H14

MARKING GUIDELINES

Criteria	Marks
• Describes how at least one vision and one hearing technology have assisted people • Discusses benefits and/or limitation of advances in both hearing and vision technology • Provides a response that demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	7
• Describes how one vision and one hearing technology have assisted people • Describe the benefits or limitations of at least one technology in both vision and hearing	5–6
• Describes how two advances have assisted people • Identifies at least one benefit or limitation of each advance	3–4
• Outline how one advance in hearing or vision technology has assisted people OR • Identifies two advances in hearing or vision technology	2
• Identifies one advance in hearing or vision technology	1

Question 29 (d) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Identifies the eye	1

Question 29 (d) (ii)

Outcomes assessed: H14

MARKING GUIDELINES

Criteria	Marks
• Outlines one piece of evidence	2
• Identifies one piece of evidence	1

Question 29 (d) (iii)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Links the description of the correct functioning of the brain with coordination of behaviour	4
• Links the description of one role of the brain with coordination	3
• Describes one role of the brain	2
• Outlines one role of the brain	1

Question 30 (a) (i)

Outcomes assessed: H8

MARKING GUIDELINES

Criteria	Marks
• Outlines TWO features of the use of biotechnology in an early society	3
• Outlines ONE feature of the use of biotechnology in an early society	2
• Identifies ONE use of biotechnology in an early society	1

Question 30 (a) (ii)

Outcomes assessed: H8

MARKING GUIDELINES

Criteria	Marks
• Links use outlined in (i) with concept of biotechnology	2
• Outlines meaning of biotechnology	1

Question 30 (b) (i)

Outcomes assessed: H11

MARKING GUIDELINES

Criteria	Marks
• Appropriate procedure with relevant results including detailed information about procedures and/or results	5
• Appropriate procedure AND • Relevant results	3–4
• Limited procedure AND/OR • Limited result	1–2

Question 30 (b) (ii)

Outcomes assessed: H14

MARKING GUIDELINES

Criteria	Marks
• Any relevant statement	1

Question 30 (c)

Outcomes assessed: H1, H14

MARKING GUIDELINES

Criteria	Marks
• Discusses benefits and/or limitations of at least TWO applications • Describes the impact of at least TWO applications • Outlines at least ONE rDNA method • Provides a response that demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	7
• Describes the impact of at least TWO applications • Attempts to discuss benefits and/or limitations of at least ONE application • Outlines at least ONE rDNA method	5–6
• Describes the impact of applications • Outlines at least ONE rDNA method	3–4
• Outlines ONE method of rDNA technology OR • Outlines ONE application of rDNA technology	2
• Identifies ONE method of rDNA technology OR ONE application of rDNA technology	1

Question 30 (d) (i)

Outcomes assessed: H12

MARKING GUIDELINES

Criteria	Marks
• Correct identification	1

Question 30 (d) (ii)

Outcomes assessed: H14

MARKING GUIDELINES

Criteria	Marks
• Correct outline of one piece of evidence	2
• Correct identification of one piece of evidence	1

Question 30 (d) (iii)

Outcomes assessed: H7

MARKING GUIDELINES

Criteria	Marks
• Assessment of the decision with reference to at least THREE pieces of evidence	4
• Assessment of the decision with reference to at least TWO pieces of evidence	3
• Assessment of the decision with reference to at least ONE piece of evidence OR • Outline of TWO pieces of evidence	2
• Outline of ONE piece of evidence	1

Question 31 (a) (i)

Outcomes assessed: H9

MARKING GUIDELINES

Criteria	Marks
• Outlines THREE differences	3
• Outlines TWO differences	2
• Outlines ONE difference	1

Question 31 (a) (ii)

Outcomes assessed: H9

MARKING GUIDELINES

Criteria	Marks
• Explains one reason	2
• Outlines one reason	1

Question 31 (b) (i)

Outcomes assessed: H11, H12, H14

MARKING GUIDELINES

Criteria	Marks
• Appropriate procedure with relevant findings including detailed information about procedures and/or findings	5
• Appropriate procedures and/or relevant findings	3–4
• Limited procedure And/or • Limited findings	1–2

Question 31 (b) (ii)

Outcomes assessed: H14

MARKING GUIDELINES

Criteria	Marks
• Any relevant statement	1

Question 31 (c)

Outcomes assessed: H1, H14

MARKING GUIDELINES

Criteria	Marks
• Well-linked discussion of at least TWO major advances, their role in structure, function and development along with our understanding of the processes involved • Provides a response that demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	7
• Describes major advances and links these with structure, function or development of an organism • Attempts to discuss how advances have changed our understanding	5–6
• Describes major advances and links these with structure, function or development of an organism	3–4
• Outlines one major advance OR • Outlines one way in which genes can direct the structure, function or development of an organism	2
• Identifies one way in which genes can direct the structure, function or development of an organism OR • Identifies one advance in our knowledge of genetics	1

Question 31 (d) (i)

Outcomes assessed: H12, H14

MARKING GUIDELINES

Criteria	Marks
• Identifies correct genotype	1

Question 31 (d) (ii)

Outcomes assessed: H12

MARKING GUIDELINES

Criteria	Marks
• Outlines the effect on milk production	2
• Identifies the effect on milk production	1

Question 31 (d) (iii)

Outcomes assessed: H9, H14

MARKING GUIDELINES

Criteria	Marks
• Clearly explains the link between polygenic inheritance on variability within a trait	4
• Describes ONE effect of polygenic inheritance and links this with variability within a trait OR • Explains ONE effect of polygenic inheritance	3
• Describes ONE effect of polygenic inheritance	2
• Defines polygenic inheritance OR • Identifies ONE effect of polygenic inheritance	1

Question 32 (a) (i)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
• Names TWO correct examples	2
• Names ONE correct example	1

Question 32 (a) (ii)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
• Links clear description of ONE cultural change named in part (a) (i) with human evolution	3
• Describes ONE change named in part (a) (i)	2
• Identifies ONE feature of human evolution	1

Question 32 (b) (i)

Outcomes assessed: H10, H11, H12, H14

MARKING GUIDELINES

Criteria	Marks
• Appropriate procedure with relevant findings including detailed information about procedure and/or findings	5
• Appropriate procedure AND/OR • Relevant findings	3–4
• Limited procedure AND/OR • Limited findings	1–2

Question 32 (b) (ii)

Outcomes assessed: H10, H14

MARKING GUIDELINES

Criteria	Marks
• Relevant correct statement	1

Question 32 (c)

Outcomes assessed: H1, H14

MARKING GUIDELINES

Criteria	Marks
• Well-linked discussion of at least TWO advances and how they have informed, changed or improved our understanding • Provides a response that demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	7
• Describes at least TWO advances in technology and links them to changes in our understanding • Attempts to discuss how advances have changed our understanding	5–6
• Describes at least TWO advances in technology and links them to changes in our understanding OR • Describes how advances have changes our understanding	3–4
• Outlines ONE advance in technology OR • Outlines ONE change in understanding	2
• Identifies one advance in technology OR • Identifies one change in our understanding	1

Question 32 (d) (i)

Outcomes assessed: H10, H12

MARKING GUIDELINES

Criteria	Marks
• Correct names ONE species of *Homo*	1

Question 32 (d) (ii)

Outcomes assessed: H10, H12

MARKING GUIDELINES

Criteria	Marks
• Correctly outlines ONE piece of information	2
• Correctly identifies of ONE piece of information	1

Question 32 (d) (iii)

Outcomes assessed: H14, H10

MARKING GUIDELINES

Criteria	Marks
• Assessment of the discovery • Clearly links the discovery of *Homo floresiensis* with EITHER the 'Out of Africa' model OR the 'Theory of Regional Continuity'	4
• Clearly links the discovery of *Homo floresiensis* with EITHER the 'Out of Africa' model OR the 'Theory of Regional Continuity'	3
• Outlines ONE piece of information and relates this to EITHER the 'Out of Africa' model OR the 'Theory of Regional Continuity'	2
• Outline of the 'Out of Africa' model OR • Outline of the 'Theory of Regional Continuity'	1

Question 33 (a) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• States TWO correct reasons	2
• States ONE correct reason	1

Question 33 (a) (ii)

Outcomes assessed: H1, H6

MARKING GUIDELINES

Criteria	Marks
• Names ONE correct scientist, and outlines contribution	3
• Names ONE correct scientist and limited outline	2
• Names ONE correct scientist	1

Question 33 (b) (i)

Outcomes assessed: H11

MARKING GUIDELINES

Criteria	Marks
• Appropriate procedure with relevant results, including detailed information about procedure and/or results	5
• Appropriate procedure AND • Relevant results	3–4
• Limited procedure AND/OR • Limited results	1–2

Question 33 (b) (ii)

Outcomes assessed: H12, H14

MARKING GUIDELINES

Criteria	Marks
• Any relevant statement	1

Question 33 (c)

Outcomes assessed: H1, H14

MARKING GUIDELINES

Criteria	Marks
• Describes the development of both the light and electron microscope • Discusses the impact of both on our understanding of photosynthetic cell structures • Makes reference to the internal structure of chloroplasts • Provides a response that demonstrates coherence and logical progression and includes correct use of scientific principles and ideas	7
• Describes the development of both the light and electron microscope AND • Discusses the impact of both on our understanding of photosynthetic cell structures or makes reference to the internal structure of chloroplasts	5–6
• Outlines development of both light and electron microscopes with brief understanding of photosynthetic cell structures OR • Details the development of the light microscope or the electron microscope with reference to our understanding of photosynthetic cell structures	3–4
• Outlines developments in microscopy	2
• Identifies ONE advance in microscopy	1

Question 33 (d) (i)

Outcomes assessed: H6, H12

MARKING GUIDELINES

Criteria	Marks
• Correctly identifies X as Phosphoglycerate	1

Question 33 (d) (ii)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• States significance of 'Y' and 'Z'	2
• States significance of 'Y' OR • States significance of 'Z'	1

Question 33 (d) (iii)

Outcomes assessed: H2, H14

MARKING GUIDELINES

Criteria	Marks
• Clearly links knowledge and understanding of the Calvin Cycle with specific advances in technology • Assessment of advances	4
• Clearly links knowledge and understanding of the Calvin Cycle with specific advances in technology	3
• Identifies both ONE advance in technology and ONE improvement in knowledge about the Calvin Cycle OR • Describes either ONE advance in technology or ONE improvement in knowledge about the Calvin Cycle	2
• Identifies ONE advance in technology in relation to the Calvin Cycle OR • Identifies ONE improvement in knowledge about the Calvin Cycle	1