

**2004 HSC Notes from
the Marking Centre
Biology**

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2004 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 the 2004 Higher School Certificate Examination, indicating the quality of candidate responses and highlighting the relative strengths and weaknesses of the candidature in each section and each question.

It is essential for this document to be read in conjunction with the relevant syllabus, the 2004 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 2004, approximately 13 000 candidates attempted the Biology examination. The most popular option in 2004 was *Communication* followed by *Genetics – The Code Broken?* and the *Human Story*. The *Biochemistry* option was selected by few candidates in 2004.

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. There was evidence that candidates who spent some time planning a concise response to the specific question being asked tended to achieve better marks. Candidates should be guided by the key word and the mark allocation for the depth of treatment required in a response.

Overall, the candidate's responses were appropriate and indicated a level of understanding of Biology concepts, appropriate for HSC candidates. Candidates need to be reminded that the answer space allocated is a guide 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. 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. A small number of candidates responded to more than one question in this section and there was some evidence of candidates attempting options that they had not studied. All these candidates tended to score low marks.

Section I – Core

Part A – Multiple choice

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

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

Part B

Specific Comments

Question 16

- (a) A significant number of candidates were unable to identify a nucleotide.
- (b) In the better responses candidates outlined three stages of DNA replication in their correct sequence. A significant number of candidates confused the process of DNA replication with the process of protein synthesis.

Question 17

- (a) Most candidates were able to correctly list the three possible genotypes.
- (b) In the better responses, candidates were able to interpret the results of the cross in terms of the genotypes of the parents, the dominance/recessiveness of each characteristic and the ratios shown.
- (c) In the better responses candidates were able to provide the features of two experimental techniques used by Mendel and clearly show how they led to his success.

Question 18

- (a) In the better responses candidates made valid suggestions about what may happen for both populations in terms of the Darwin/Wallace Theory of Evolution. A significant number of candidates confused the distribution of organisms with their abundance.
- (b) In the better responses, candidates provided examples of vertebrate forelimbs, demonstrated an understanding of divergent evolution and related common structures to common ancestry as evidence supporting the theory of evolution.

Question 19

In the better responses, candidates described at least two quarantine measures, explained how they assist in protecting Australia and made judgements about the effectiveness of the measures described. A significant number of candidates simply described quarantine measures without making judgements about their effectiveness.

Question 20

- (a) Most candidates were able to correctly identify one type of T lymphocyte.
- (b) A significant number of candidates had difficulty in providing distinct or different features of the functions of the two types of cells, and instead wrote about where each type of cell was made.

Question 21

In the better responses, candidates clearly linked the increased water salinity to survival of the Murray Cod by relating it to the water balance mechanisms of the fish.

Question 22

Most candidates were able to explain correctly how one of the three strategies is used to control and/or prevent disease. Some candidates simply stated examples of one of the strategies.

Question 23

Most candidates correctly identified the material transported in xylem and phloem, along with the process of movement. A significant number of candidates were unable to name or describe the relevant current theories to explain the movement of substances.

Question 24

This question was generally well answered, with most candidates able to support arguments for continued research into the development of artificial blood.

Question 25

This question assessed skills in both choosing the most appropriate graph and drawing it correctly, and was generally well answered.

- (a) In the better responses, candidates correctly chose to draw a histogram. A significant number of candidates chose to draw a line graph (polygon), but correctly transposed data, labelled axes, chose an appropriate scale and included a key.
- (b) Most candidates correctly suggested additional relevant data that needs to be collected.

Question 26

This question was generally well answered. In the better responses, candidates clearly understood the difference between a pathogen and an insect pest. Most candidates were able to give a piece of equipment or procedure used in the investigation that was relevant to the evidence provided.

Question 27

- (a) This part of the question was generally well answered, with most candidates able to write a correct conclusion based on the information provided.
- (b) In the better responses, candidates were able to provide a safe work practice that was relevant to minimising risks in the experiment given.
- (c) In the better responses, candidates understood the need to minimise build-up of resistance by bacteria in order to maintain the effectiveness of the antibiotic in the future. Poorer responses simply restated the question.

Question 28

In the better responses, candidates demonstrated an understanding that mutations can be beneficial, by elaborating on relevant points to support their argument. Some candidates provided points for and against the quote. A significant number of candidates wrote unnecessarily long answers that exceeded the space provided.

Question 29

This question assessed skills in planning an investigation. In the better responses, candidates stated a correct hypothesis and designed an investigation that included a logical sequence of steps, an appropriate equipment list, correct identification of a dependent/independent variable, correct methods for controlling other variables, awareness of the need for repetition (or a large sample size) and risk assessment.

A significant number of candidates confused a ‘hypothesis’ with an ‘aim’, and some candidates misunderstood the phrase ‘ONE of these conditions’ and discussed only one temperature or pH. Very few candidates included risk assessment in their experimental design.

Section II – Options

Question 30 – Communication

- (a)
 - (i) A significant number of candidates were unable to name the cerebrum.
 - (ii) Better responses gave the features of and/or an annotated diagram/flowchart of the stimulus – response pathway.
- (b)
 - (i) This question required candidates to sketch in general terms the method for a first-hand investigation. Better responses clearly outlined a method using appropriate equipment.

A significant number of candidates were unable to outline a first-hand investigation to identify the relationship between wavelength, frequency and pitch.

- (ii) Few responses linked the relationship between wavelength, frequency and pitch to an increased understanding of sound or to the investigation.
- (c) Most candidates were able to identify appropriate technologies. Better responses clearly identified issues and gave points for and/or against the use of these technologies and their specific impact on society. A significant number of candidates gave general responses and did not elaborate on the specific impacts of named technologies. Many candidates wrote unnecessarily long responses to this question.
- (d) (i) This part of the question was generally well answered.
- (ii) Better responses clearly related the occurrence of colour blindness with the absorption of light by opsins.
- (iii) Most candidates were able to describe at least two ways in which animals communicate using colour. Fewer responses were able to relate this reliance on colour to the colour vision mechanisms found in animals.

Question 31 – Biotechnology

- (a) (i) Many responses included descriptions of ancient Australian Aboriginal practices without naming a biotechnology.
- (ii) Better responses clearly distinguished early practices of biotechnology from modern methods. Few responses accurately linked selective breeding with biotechnology.
- (b) (i) This question required candidates to sketch in general terms the method for a first-hand investigation. Many responses provided only a generalised method. Better responses included details of equipment and method in point form or numbered steps.
- (ii) Few candidates were able to sketch in general terms the uses of extracted DNA.
- (c) Most candidates were able to provide examples of biotechnology and make statements about the impact of biotechnology on individuals. Better responses clearly identified issues and gave points for and/or against the use of biotechnology and its specific impact on society. Many candidates wrote unnecessarily long responses to this question.
- (d) (i) Most candidates identified the basic steps involved. A significant number of candidates also named restriction and ligase enzymes.
- (ii) Better responses clearly linked the release of the fish with disturbances to food webs or specified effects on predator populations.
- (iii) Better responses concisely showed the relationship between a point of view and the reason.

Question 32 – Genetics: The Code Broken?

- (a) (i) Many candidates were unable to name uracil. Candidates are reminded that the letter U is not a suitable response.
- (ii) This question was generally well answered. Better responses often included clear well-labelled diagrams. Candidate responses indicate that, on the whole, transcription is better understood than translation.
- (b) (i) This question required candidates to sketch in general terms a method for modelling a process. Better responses included detail of the materials used and a step-by-step method followed. A significant number of candidates were unable to outline a method to model linkage.
- (ii) Few candidates could link their increase in understanding of linkage with the investigation.
- (c) Most candidates were able to provide examples of genetic change due to human intervention and make general statements about the impact on society. Better responses clearly identified issues and gave points for and/or against genetic change due to human intervention and its specific impact on society. Many candidates wrote unnecessarily long responses to this question.
- (d) (i) This question was well answered.
- (ii) Better responses included reasons for the differences between the graphs and some features of the mechanisms of polygenic and multiple allele inheritance.
- (iii) A significant number of candidates did not include an example in their response.

Question 33 – The Human Story

- (a) (i) Many responses included both the genus and species names without specifying the genus name.
- (ii) A significant number of responses gave features that classified prosimians as mammals rather than as primates.
- (b) (i) This question required candidates to sketch in general terms a method for modelling a process. Better responses included detail of the materials used and a step-by-step method followed. A significant number of candidates were unable to outline a method to model DNA-DNA hybridisation.
- (ii) This part of the question was well answered.
- (c) Most candidates were able to identify appropriate technologies. Better responses clearly identified issues and gave points for and/or against the use of these technologies and their specific impact on research. A significant number of candidates gave general responses and did not elaborate on the specific impacts on research. Many candidates wrote unnecessarily long responses to this question.

- (d) (i) This part of the question was well answered.
- (ii) Better responses clearly identified at least one anatomical feature from the table and explained how this had changed from a common ancestor as evidence to support human evolution.

Question 34 – Biochemistry

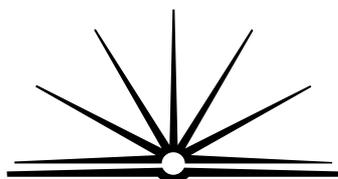
- (a) (i) This part of the question was well answered.
- (ii) Most responses identified the reactants and products of photosynthesis correctly. Better responses gave detailed features of the process.
- (b) (i) This question required candidates to sketch in general terms the method for a first-hand investigation. Many responses provided only a generalised method. Better responses included detail of equipment and method in point form or numbered steps.
- (ii) This part of the question was well answered.
- (c) Most candidates were able to identify new technologies. Better responses clearly identified issues and gave points for and/or against the use of these technologies and their specific impact on research. A significant number of candidates gave general responses and did not elaborate on the specific impacts on research. Many candidates wrote unnecessarily long responses to this question.
- (d) (i) Few candidates were familiar with Tswett's work or could give a correct interpretation of the results of the chromatography data.
- (ii) Better responses gave detailed characteristics and features of chlorophyll and related these to its role in the photosynthetic process.
- (iii) Better responses gave a detailed description of the role of radioactive isotopes, named specific radioactive isotopes, scientific research and the key scientists responsible for the work.

Biology

2004 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I Part A			
1	1	9.4.3 Col pt 2	H6
2	1	9.4.4 Col 1 pt 1	H6
3	1	9.4.3 Col 2 pt 3	H6
4	1	9.4.3 Col 1 pt 1	H6
5	1	9.4.4 Col 1 pt 4	H6, H14
6	1	9.2.1 Col 2 pt 9	H6
7	1	9.2.2 Col 2 pt 3	H6
8	1	9.2.3 Col 2 pt 2/Col 3 pt 1	H6
9	1	9.2.1 Col 2 pt 5	H6
10	1	9.2.1 Col 1 pt 1	H6
11	1	9.3.5 Col 2 pt 3	H9
12	1	9.3.5 pt 1	H3, H7, H10
13	1	9.3.2 Col 2 pt 4/9.1 12C	H9, H12, H14
14	1	9.3.4 pt 1	H9
15	1	9.3.3 pt 3	H6, H9
Section I Part B			
16	4	9.3.4 Col 2 pt 2	H6, H9, H13
17	7	9.3.4 Col 2 pt 1 9.3.2 Col 2 pt 1, 2, 3	H1, H2, H4, H13
18	6	9.3.1 Col 2 pt 2, 3	H10
19	4	9.4.7 Col 1 pt	H4, H13
20	3	9.4.5 Col 2, pt 1 & 2	H6
21	3	9.2.3 Col 2, pt 1, 2, 3 / Col 7, pt 4	H6
22	3	9.4.7 Col 2, pt 2	H4, H8
23	3	9.2.2 Col 2 pt 6	H6
24	3	9.2.2 Col 3, pt 5	H3
25	6	9.4.6 Col 2, pt 1 / Col 3 pt 1	H12, H13, H14
26	3	9.4.7 Col 3, pt 1	H12
27	4	9.3.4 Col 2 pt 6 9.4.3 Col 2, pt 3	H10, H14
28	3	9.4 Col 2 pt 4	H6, H13
29	8	9.2.1 Col 2, pt 1, 2 / Col 3 pt 1	H6, H11, H12, H13

Question	Marks	Content	Syllabus outcomes
Section II			
Question 30 — Communication			
30 (a)	4	9.5.1 Col 2, pt 1 & 2	H6, H12, H13
30 (b)	6	9.5.5 & 9.5.6 Col 3 pt / Col 2, pt 3–5	H6, H12, H13
30 (c)	7	9.5	H4, H8
30 (d)	8	9.5.4 Col 1, pt 3, 4, 5 / Col 3, pt 2	H6, H7, H14, H12
Section II			
Question 31 — Biotechnology			
31 (a)	4	9.6.1 Col 3, pt 2 / Col 2, pt 2	H6, H8
31 (b)	6	9.6.5 Col 3 pt 1	H6, H11, H12, H13
31 (c)	7	9.6	H1, H3, H4, H7, H13
31 (d)	8	9.6.5 Col 2, pt 1 / Col 2 pt 2	H5, H6, H7, H14, H12
Section II			
Question 32 — Genetics: The Code Broken?			
32 (a)	4	9.7.1 Col 2, pt 1	H9
32 (b)	6	9.7.3 Col 3, pt 2 / Col 2 pt 3, 4	H3, H6, H12, H13
32 (c)	7	9.7	H1, H3, H4, H10
32 (d)	8	9.7.2 Col 2, pt 1, 2. 3. 4 / Col 3 pt 2	H9, H12, H14
Section II			
Question 33 — The Human Story			
33 (a)	4	9.8.1 Col 3, pt 1 / Col 2 pt 6	H7, H10
33 (b)	6	9.8.2 Col 2, pt 6	H3, H6, H12, H13
33 (c)	7	9.8.2	H4, H9
33 (d)	8	9.8.1, 9.8.2, 9.8.3 Col 1–5	H5, H6, H8, H9, H10, H12, H14
Section II			
Question 34 — Biochemistry			
34 (a)	4	9.9.3 Col 2 pt 3	H6
34 (b)	6	9.9.4 Col 1	H3, H6, H12, H13
34 (c)	7	9.9	H4, H9
34 (d)	8	9.9.3 Col 3, pt 3, 4	H6, H12, H14



B O A R D O F S T U D I E S
NEW SOUTH WALES

2004 HSC Biology Marking Guidelines

Section I, Part B

Question 16 (a)

Outcomes assessed: H9

MARKING GUIDELINES

Criteria	Marks
• Correct nucleotide unit boxed	1

Question 16 (b)

Outcomes assessed: H9, H13

MARKING GUIDELINES

Criteria	Marks
• Outline THREE sequenced stages of the replication process correctly	3
• TWO features of the replication process outlined correctly	2
• Correct statement made relating to double-stranded nature of DNA OR	1
• ONE correct feature relating to the replication process	

Question 17 (a)

Outcomes assessed: H4, H13

MARKING GUIDELINES

Criteria	Marks
• Correctly lists THREE possible genotypes	1

Question 17 (b)

Outcomes assessed: H13

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Correct description of parents given as heterozygous • Demonstrates understanding that green is dominant over yellow • Indicates correctly 1560: 482 is a 3:1 ratio that shows the expected offspring from heterozygous plant OR <ul style="list-style-type: none"> • Correctly annotated Punnet square 	3
<ul style="list-style-type: none"> • Any TWO of the above 	2
<ul style="list-style-type: none"> • Any ONE of the above OR <ul style="list-style-type: none"> • Just reproducing the correct Punnet square 	1

Question 17 (c)

Outcomes assessed: H1, H2

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • TWO correctly described techniques using biological terms that are clearly linked to his success 	3
<ul style="list-style-type: none"> • ONE correctly described technique using biological terms that is clearly linked to his success OR <ul style="list-style-type: none"> • TWO correctly described techniques that Mendel used 	2
<ul style="list-style-type: none"> • ONE correct experimental technique used by Mendel identified 	1

Question 18 (a)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Makes a valid prediction for BOTH populations in terms of Darwin/Wallace Theory of Evolution 	3
<ul style="list-style-type: none"> • Makes a valid prediction for ONE population in terms of Darwin/Wallace Theory of Evolution 	2
<ul style="list-style-type: none"> • Makes one valid prediction without making reference to Darwin/Wallace Theory of Evolution OR <ul style="list-style-type: none"> • Provides correct information about Darwin/Wallace Theory of Evolution without making a prediction 	1

Question 18 (b)*Outcomes assessed: H10***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Clearly state that common structures support common ancestryDemonstrate understanding of the idea of divergent evolutionProvides at least ONE correct example of vertebrate forelimbs	3
<ul style="list-style-type: none">Describes that whilst the forelimbs have the same basic arrangement, the function varies (in different organisms)Provides at least ONE correct example of vertebrate forelimbs OR <ul style="list-style-type: none">Makes correct reference to divergent evolution and common ancestry without an example OR <ul style="list-style-type: none">Either point from above with example	2
<ul style="list-style-type: none">Identifies that different vertebrate's forelimbs have the same basic structure OR <ul style="list-style-type: none">Correctly names ONE example of vertebrate forelimbs	1

Question 19*Outcomes assessed: H4, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Describes at least TWO appropriate quarantine measures internal and/or external to Australia• Describes how they assist in protecting Australia from disease/pests, relating their effectiveness in Australia• Makes judgements about the effectiveness of quarantine measures in Australia	4
<ul style="list-style-type: none">• Describes TWO appropriate quarantine measures and relates their effectiveness• Makes judgement about the effectiveness of these measures	3
<ul style="list-style-type: none">• Describes an appropriate quarantine measure and relates it to the effectiveness of quarantine measure OR <ul style="list-style-type: none">• Describes an appropriate quarantine measure and relates it to the effectiveness of quarantine measure• Makes a judgement about the effectiveness of a named quarantine measure	2
<ul style="list-style-type: none">• Outlines an appropriate quarantine measure OR <ul style="list-style-type: none">• Makes a statement about the effectiveness of quarantine in Australia	1

Question 20 (a)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correct identification of ONE type of T-cell	1

Question 20 (b)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Demonstrated understanding of the differences between B-cells and T-cells function• Relates function to role in immune system	2
<ul style="list-style-type: none">• Description of B-cells or T-cells function	1

Question 21*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correctly explains the water balance mechanisms of fresh water fish• Clearly shows links between increased salinity and the survival of Murray Cod	3
<ul style="list-style-type: none">• Describes water balance mechanism of freshwater fish• Outlines implication of increased salinity for the survival of Murray Cod	2
<ul style="list-style-type: none">• Outlines water balance mechanism of fresh water fish• OR• Correct implication of increased salinity for the survival of Murray Cod	1

Question 22*Outcomes assessed: H4, H8***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correct example used to explain how a public health strategy/pesticide/genetic engineering strategy has been used to prevent/control disease in a community	3
<ul style="list-style-type: none">• Correct example used to describe how a public health program/pesticide/genetic engineering strategy has been used to prevent/control disease in a community	2
<ul style="list-style-type: none">• Correctly named example of public health strategy/pesticide/genetic engineering strategy used to control or prevent disease within a community• OR• Correct outline of the purpose of public health program/pesticide/genetic engineering strategy	1

Question 23*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Appropriate comparisons showing correct identification of theories relating to movement in xylem and phloem• Correct identification of material transported in each of the xylem and phloem• Correct identification of direction of movement of materials in each of xylem and phloem	3
<ul style="list-style-type: none">• Any TWO of the above	2
<ul style="list-style-type: none">• Any ONE of the above	1

Question 24*Outcomes assessed: H3***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Supports arguments for continued research into development of artificial blood	3
<ul style="list-style-type: none">• Arguments for the use of artificial blood, without justification OR	2
<ul style="list-style-type: none">• One valid argument justified	
<ul style="list-style-type: none">• States an appropriate advantage for the use of artificial blood	1

Question 25 (a)
Outcomes assessed: H12, H13
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Correctly labelled axes • Correct choice of graph i.e. Histogram / Bar • Key clearly indicated • Correct transposition of both sets of data • Appropriate scale – full use of grid provided (i.e. > 50% of grid) 	5
<ul style="list-style-type: none"> • Correct choice of graph i.e. Histogram / Bar • Correctly labelled axes • Key clearly indicated Plus one of either <ul style="list-style-type: none"> • Correct transposition of both sets of data OR <ul style="list-style-type: none"> • Appropriate scale – full use of grid provided (i.e. > 50% of grid) OR <ul style="list-style-type: none"> • All points correct as per 5marks except 2 line graphs are drawn 	4
Any THREE of these: <ul style="list-style-type: none"> • Correct choice of graph, ie histogram/bar • Correctly labelled axes • Key clearly indicated • Appropriate scale – full use of grid provided (i.e. > 50% of grid) • Correct transposition of both sets of data 	3
<ul style="list-style-type: none"> • Correctly draws graph (any kind) of one or two columns with either • Appropriate key OR <ul style="list-style-type: none"> • Labelled axes 	2
<ul style="list-style-type: none"> • Correct attempt at representing information graphically 	1

Question 25 (b)*Outcomes assessed: H14, H13***MARKING GUIDELINES**

Criteria	Marks
• Correct relevant data suggested	1

Question 26*Outcomes assessed: H12***MARKING GUIDELINES**

Criteria	Marks
• Correct evidence of pathogen and pest • Equipment/procedure linked is relevant to the pest/pathogen evidence provided	3
• Correct evidence of pathogen and pest • Equipment/procedure provided <u>not</u> relevant to either evidence	2
• At least ONE form of correct evidence provided	1

Question 27 (a)*Outcomes assessed: H14, H10***MARKING GUIDELINES**

Criteria	Marks
• Correct conclusion for experiment	1

Question 27 (b)*Outcomes assessed: H14, H10***MARKING GUIDELINES**

Criteria	Marks
• ONE correct relevant safety practice minimising risk associated with handling or identifying microbes	1

Question 27 (c)*Outcomes assessed: H14, H10***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Identification of the need to minimise build up of resistance by bacteria to antibiotics• Understanding the need to maintain the effectiveness of the antibiotic against that bacteria in the future	2
<ul style="list-style-type: none">• Identification of the need to minimise build up of resistance by bacteria to antibiotics OR <ul style="list-style-type: none">• Understanding the need to maintain the effectiveness of the antibiotic against that bacteria in the future	1

Question 28*Outcomes assessed: H6, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Appropriate issues identified and elaborated to support the argument provided• Understanding that mutations can be beneficial is demonstrated	3
<ul style="list-style-type: none">• Attempt at providing appropriate argument for the issues identified OR <ul style="list-style-type: none">• Understanding that mutation can be beneficial is demonstrated	2
<ul style="list-style-type: none">• Correct definition of mutation OR <ul style="list-style-type: none">• A qualified statement about the accuracy of the quote	1

Question 29*Outcomes assessed: H11, H12, H13, H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Hypothesis stated for the factor being tested• Appropriate method very well constructed, it may include:<ul style="list-style-type: none">– Logical sequence of steps– Appropriate equipment identified– Risk assessment– Identification of dependent/independent variable– Replication of large sample size– Methods of controlling other variables	7–8
<ul style="list-style-type: none">• Correct hypothesis stated• Appropriate method well constructed as above, but not all of the elements of an investigation OR <ul style="list-style-type: none">• Appropriate method very well constructed, as above but correct aim stated as hypothesis	5–6
<ul style="list-style-type: none">• Relevant hypothesis or aim stated• Sound attempt at elements of an investigation	3–4
<ul style="list-style-type: none">• Basic attempt at writing a relevant report/method	2
<ul style="list-style-type: none">• Any relevant element of experimental method identified	1

Section II

Question 30 (a) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none">Correctly identified part of brain involved in perception and interpretation of light and sound	1

Question 30 (a) (ii)

Outcomes assessed: H13, H12

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none">Correctly described stimulus response pathwayMay include an annotated diagram or flow chart	3
<ul style="list-style-type: none">At least TWO correct sequences of the stimulus – response pathway described OR <ul style="list-style-type: none">Correct flow chart diagram only	2
<ul style="list-style-type: none">Correct identification of stimulus – response pathway with majority of terms used correctly	1

Question 30 (b) (i)

Outcomes assessed: H6, H12, H13

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none">Provides a thorough method that is logical, sequential and appropriate, identifying the equipment required, if relevant (this can be achieved through a fully labelled diagram)	4
<ul style="list-style-type: none">Provides a method that is sequential and appropriate. (This may include a fully labelled diagram)	3
<ul style="list-style-type: none">Provides a brief method that is appropriate	2
<ul style="list-style-type: none">Provides some steps that could be appropriate	1

Question 30 (b) (ii)*Outcomes assessed: H6, H12, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Relevant identification of investigation result• Link to area of investigation	2
<ul style="list-style-type: none">• Relevant identification of investigation result	1

Question 30 (c)*Outcomes assessed: H4, H8***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Appropriate issues identified with relevant points for and/or against• Well developed argument demonstrating (link) understanding of impact on society using relevant examples (Answer may be represented as diagram, table, annotated flowcharts, mind maps)• Argument follows a logical sequence, with the use of appropriate biological terminology	6–7
<ul style="list-style-type: none">• Appropriate issues identified with an attempt to illustrate points for and against• Simply identified link with impact on society with at least ONE example• Limited use of biological terminology	4–5
<ul style="list-style-type: none">• Appropriate issues identified• Attempt at demonstrating an understanding of the impact on society	2–3
<ul style="list-style-type: none">• Identified an appropriate issue relevant to the theme	1

Question 30 (d) (i)*Outcomes assessed: H6, H7, H14, H12***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correct identification of THREE types of cones, red, blue and green• Understanding that variance in stimulation of the THREE cones results in combination of different colours	2
<ul style="list-style-type: none">• Correct identification of THREE types of cones, red, blue and green OR <ul style="list-style-type: none">• Understanding that variance in stimulation of the THREE cones results in combination of different colours	1

Question 30 (d) (ii)*Outcomes assessed: H6, H7***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correct identification of cause for colour blindness being missing or insufficient particular opsins in the respective colour blindness• Link with inability to detect certain colours or contrast	2
<ul style="list-style-type: none">• Correct identification of cause for colour blindness for missing or insufficient particular opsins• No link	1

Question 30 (d) (iii)*Outcomes assessed: H6, H7***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correctly describes the uses of colour for communication in animals• Identifies at least TWO different animals and describe how they perceive colour	4
<ul style="list-style-type: none">• Correctly outlines the uses of colour for communication in animals• Identify at least TWO different methods animals may detect colour	3
<ul style="list-style-type: none">• Correct statement about the use of colour for communication in animals AND/EITHER <ul style="list-style-type: none">• At least ONE method of colour vision in an identified animal OR <ul style="list-style-type: none">• Colour vision clearly linked to animal's environment	2
<ul style="list-style-type: none">• ONE example of use of colour for communication in an animal OR <ul style="list-style-type: none">• Correct statement about the purpose of colour for communication in animals	1

Question 31 (a) (i)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Name of an appropriate Australian Aboriginal use of biotechnology OR <ul style="list-style-type: none">• A clear description of aquaculture	1

Question 31 (a) (ii)*Outcomes assessed: H6, H8***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Provides correct characteristics and features of early biotechnology and describes how breeding animals is an example	3
<ul style="list-style-type: none">Correct description of early biotechnology OR <ul style="list-style-type: none">Defines what is meant by early biotechnology	2
<ul style="list-style-type: none">Makes a statement about the use of biotechnology OR <ul style="list-style-type: none">Defines biotechnology OR <ul style="list-style-type: none">Identifies an example of biotechnology	1

Question 31 (b) (i)*Outcomes assessed: H6, H12, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Provides a thorough method that is logical, sequential and appropriate, identifying the equipment required, if relevant (this can be achieved through a fully labelled diagram)	4
<ul style="list-style-type: none">Provides a method that is sequential and appropriate. (This may include a fully labelled diagram)	3
<ul style="list-style-type: none">Provides a brief method that is appropriate	2
<ul style="list-style-type: none">Provides some steps that could be appropriate	1

Question 31 (b) (ii)*Outcomes assessed: H6, H12, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Correctly outlines TWO uses of extracted DNA in Biotechnology	2
<ul style="list-style-type: none">Correctly outlines ONE use of extracted DNA OR <ul style="list-style-type: none">Identifies TWO uses	1

Question 31 (c)

Outcomes assessed: H1, H3, H4, H7, H13

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Appropriate issues identified with relevant points for and/or against • Well developed argument demonstrating a link between understanding of impact on society using relevant examples • Argument follows a logical sequence with the use of appropriate biological vocabulary 	6–7
<ul style="list-style-type: none"> • Appropriate issues identified with an attempt to illustrate points for and/or against • Simple identified links with impact on society with at least ONE example • Limited use of biological vocabulary 	4–5
<ul style="list-style-type: none"> • Appropriate issue(s) identified • Attempt at demonstrating an understanding of the impact on society 	2–3
<ul style="list-style-type: none"> • Identifies an appropriate issue relevant to the theme 	1

Question 31 (d) (i)

Outcomes assessed: H5, H6, H7, H12, H14

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Correctly outlines in sequence the process of gene splicing to produce recombinant DNA 	2
<ul style="list-style-type: none"> • Outlines ONE correct step OR <ul style="list-style-type: none"> • States TWO correct steps OR <ul style="list-style-type: none"> • Makes a correct statement about production of recombinant DNA 	1

Question 31 (d) (ii)

Outcomes assessed: H5, H6, H7, H12, H14

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Puts forward a viable proposal as to the effect on the environment 	2
<ul style="list-style-type: none"> • Makes a statement about the consequence of mating fluorescing and non fluorescing fish OR <ul style="list-style-type: none"> • Makes a statement about the effect on the environment 	1

Question 31 (d) (iii)*Outcomes assessed: H5, H6, H7, H12, H14***MARKING GUIDELINES**

Criteria	Marks
• Correctly explains TWO differing points of view	4
• Identifies differing points of view • Provides an explanation for ONE point of view	3
• Outlines ONE point of view OR • Provides an explanation about the use of biotechnology for producing zebra fish	2
• Any correct statement or example of biotechnology	1

Question 32 (a) (i)*Outcomes assessed: H9***MARKING GUIDELINES**

Criteria	Marks
• Correctly identifies N base	1

Question 32 (a) (ii)*Outcomes assessed: H9***MARKING GUIDELINES**

Criteria	Marks
• Coherent answer, including both transcription and translation • Use of correct terms with logical sequence of steps leading to polypeptide production	3
• Translation outlined and transcriptions outlined	2
• Transcription outlined <u>or</u> translation outlined	1

Question 32 (b) (i)*Outcomes assessed: H3, H6, H12, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Provides a thorough method that is logical, sequential and appropriate, identifying the equipment required, if relevant (this can be achieved through a fully labelled diagram)	4
<ul style="list-style-type: none">Provides a method that is sequential and appropriate. (This may include a fully labelled diagram)	3
<ul style="list-style-type: none">Provides a brief method that is appropriate	2
<ul style="list-style-type: none">Provides some steps that could be appropriate	1

Question 32 (b) (ii)*Outcomes assessed: H3, H6, H12, H13***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Relevant identification of investigation resultLink to area of investigation	2
<ul style="list-style-type: none">Relevant identification of investigation result	1

Question 32 (c)*Outcomes assessed: H4, H3, H1, H10***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">Appropriate issues identified with relevant points for and/or againstWell developed argument demonstrating (link) understanding of impact on society using relevant examplesArgument follows a logical sequence with the use of appropriate biological vocabulary	6–7
<ul style="list-style-type: none">Appropriate issues identified with an attempt to illustrate points for and againstSimply identified link with impact on society with at least ONE exampleLimited use of biological vocabulary	4–5
<ul style="list-style-type: none">Appropriate issues identifiedAttempt at demonstrating an understanding on the impact on society	2–3
<ul style="list-style-type: none">Identified an appropriate issue relevant to the theme	1

Question 32 (d) (i)

Outcomes assessed: H9, H12, H14

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> Correctly identifies egg size as a polygenic trait 	1

Question 32 (d) (ii)

Outcomes assessed: H9, H12, H14

MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> A <u>clear</u> discussion of the reasons for the differences in the kind of shapes of the graphs/info contained/illustrated Fully describes mechanisms of both polygenic and multiple allele inheritance 	4
<ul style="list-style-type: none"> Fully discusses mechanisms of both polygenic and multiple allele inheritance OR <ul style="list-style-type: none"> Describes the two mechanisms including reference to shape or kind of graph 	3
<ul style="list-style-type: none"> Describes mechanisms of both polygenic and multiple allele inheritance OR <ul style="list-style-type: none"> Describes ONE mechanism and identifies reason for kind or shape of graphs it relates to OR <ul style="list-style-type: none"> Fully describes one mechanism 	2
<ul style="list-style-type: none"> Describes mechanism of polygenic or multiple allele inheritance OR <ul style="list-style-type: none"> Relates each mechanism to the kind or shape of the corresponding graph OR <ul style="list-style-type: none"> Superficial comparison between polygenic and multiple allele inheritance 	1

Question 32 (d) (iii)*Outcomes assessed: H9, H12, H14***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Outlines giving a clear understanding of the use of highly variable DNA• An example/named use	3
<ul style="list-style-type: none">• Outlines giving clear understanding of the use of highly variable DNA OR <ul style="list-style-type: none">• Outline the use of highly variable DNA, giving example	2
<ul style="list-style-type: none">• Indicates the basis of the use of highly variable DNA OR <ul style="list-style-type: none">• ONE example e.g. Pedigree testing/paternity testing	1

Question 33 (a) (i)*Outcomes assessed: H7, H10***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correctly names the genus for humans	1

Question 33 (a) (ii)*Outcomes assessed: H7, H10***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Correctly names and describes THREE or more characteristics of prosimians	3
<ul style="list-style-type: none">• Correctly names TWO characteristics and describes these two OR <ul style="list-style-type: none">• Names THREE characteristics and describes at least ONE	2
<ul style="list-style-type: none">• Names and describes ONE characteristic OR <ul style="list-style-type: none">• Names at least TWO characteristics	1

Question 33 (b) (i)

Outcomes assessed: H3, H13, H12 & H6

MARKING GUIDELINES

Criteria	Marks
• Provides a thorough method that is logical, sequential and appropriate, identifying the equipment required, if relevant (this can be achieved through a fully labelled diagram)	4
• Provides a method that is sequential and appropriate. (This may include a fully labelled diagram)	3
• Provides a brief method that is appropriate	2
• Provides some steps that could be appropriate	1

Question 33 (b) (ii)

Outcomes assessed: H3, H1

MARKING GUIDELINES

Criteria	Marks
• Relevant identification of investigation result	2
• Link to area of investigation	
• Relevant identification of investigation result	1

Question 33 (c)
Outcomes assessed: H4, H9
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Appropriate technologies identified with relevant points for and/or against • Well developed argument demonstrating (link) understanding of impact on research using relevant examples • Argument follows a logical sequence, with the use of appropriate biological vocabulary 	6–7
<ul style="list-style-type: none"> • Appropriate technologies identified with an attempt to illustrate points for and against • Simply identified link with impact on research with at least ONE example • Limited use of biological vocabulary 	4–5
<ul style="list-style-type: none"> • Appropriate technologies identified or technology outlined • Attempt at demonstrating an understanding of the impact on research 	2–3
<ul style="list-style-type: none"> • Identified an appropriate technique relevant to the theme 	1

Question 33 (d) (i)
Outcomes assessed: H5, H8, H10, H9, H6, H14, H12
MARKING GUIDELINES

Criteria	Marks
<ul style="list-style-type: none"> • Correctly draws and labels table • Correctly completes all <u>three</u> rows (6 cells) of the table 	4
<ul style="list-style-type: none"> • Draws and labels a table • Correctly completes at least TWO complete rows (4 cells) of the table 	3
<ul style="list-style-type: none"> • Draws and labels a table • Correctly completes at least ONE row (2 cells) of the table 	2
<ul style="list-style-type: none"> • Draw table – three rows/three columns – correct label on each column/row OR	1
<ul style="list-style-type: none"> • Correct description of difference of at least one feature without a table 	

Question 33 (d) (ii)*Outcomes assessed: H10, H8, H5, H14, H12***MARKING GUIDELINES**

Criteria	Marks
• Identifies TWO anatomical features from their table and explains evolutionary perspective	4
• Identifies TWO anatomical features from the table and explains one from an evolution perspective	3
• Identifies ONE anatomical feature and explains one evolutionary perspective	2
• Identifies at least ONE anatomical feature	1

Question 34 (a) (i)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
• Correct identification of organelle	1

Question 34 (a) (ii)*Outcomes assessed: H6***MARKING GUIDELINES**

Criteria	Marks
• Correct description of photosynthesis indicating products, reactants and energy transfer	3
• Outlines some aspects correctly	2
• Identifies some aspects correctly	1

Question 34 (b) (i)*Outcomes assessed: H3, H6, H12, H13***MARKING GUIDELINES**

Criteria	Marks
• Provides a thorough method that is logical, sequential and appropriate, identifying the equipment required, if relevant (this can be achieved through a fully labelled diagram)	4
• Provides a method that is sequential and appropriate. (This may include a fully labelled diagram)	3
• Provides a brief method that is appropriate	2
• Provides some steps that could be appropriate	1

Question 34 (b) (ii)*Outcomes assessed: H3, H6, H12***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Relevant identification of investigation result• Link to area of investigation	2
<ul style="list-style-type: none">• Relevant identification of investigation result	1

Question 34 (c)*Outcomes assessed: H4, H9***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Appropriate technologies identified with relevant points for and/or against• Well developed argument demonstrating (link) understanding of impact on research using relevant examples• Argument follows a logical sequence, with the use of appropriate biological vocabulary	6–7
<ul style="list-style-type: none">• Appropriate technologies identified with an attempt to illustrate points for and against• Simply identified link with impact on research with at least ONE example• Limited use of biological vocabulary	4–5
<ul style="list-style-type: none">• Appropriate technologies identified or technology outlined• Attempt at demonstrating an understanding of the impact on research	2–3
<ul style="list-style-type: none">• Identified an appropriate technique relevant to the theme	1

Question 34 (d) (i)*Outcomes assessed: H6, H14, H12***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Chromatography AND <ul style="list-style-type: none">• Green plants have more than one pigment (separates by chromatography)	2
<ul style="list-style-type: none">• ONE of the above	1

Question 34 (d) (ii)*Outcomes assessed: H6, H14, H12***MARKING GUIDELINES**

Criteria	Marks
Any TWO of these described <ul style="list-style-type: none">• Energized chlorophyll produces electrons• Electrons used to produce H and O from H₂O, ATP and NADPH₂• H + O components are used to produce glucose OR <ul style="list-style-type: none">• Any ONE thoroughly explained	2
<ul style="list-style-type: none">• ONE of the above	1

Question 34 (d) (iii)*Outcomes assessed: H6, H14, H12***MARKING GUIDELINES**

Criteria	Marks
<ul style="list-style-type: none">• Thorough explanation of the use of radioactive isotopes to describe photosynthetic pathways AND <ul style="list-style-type: none">• Names Hill or Calvin or Ruben	4
<ul style="list-style-type: none">• Correct explanation of the use of radioactive isotopes to describe photosynthetic pathways AND <ul style="list-style-type: none">• Names Hill or Calvin or Ruben	3
<ul style="list-style-type: none">• Correct explanation of the use of radioactive isotopes to describe photosynthetic pathways	2
<ul style="list-style-type: none">• Correctly states the role of isotopes OR <ul style="list-style-type: none">• Names scientist correctly	1