BOARD OF STUDIES
NEW SOUTH WALES

2010 HSC Biology Marking Guidelines

Section I, Part A

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

Section I, Part B

Question 21

Criteria	Marks
• Correctly completes the F_1 parent genotype, punnet square and phenotype of both offspring	2
• Correctly completes TWO or THREE of the boxes provided	1

Question 22(a)

Criteria	Marks
• Correctly plots data, labels axes and provides line or curve of best fit	3
• Provides some of these features e.g. Does not label an axis properly or does not plot 1 set of data correctly	2
• Provides a correct feature	1

Question 22(b)

Criteria	Marks
• Correctly identifies the human process • Correctly links their response to the data • Correctly links the use of drugs to a change in biodiversity	3
• TWO of the above	2
• ONE of the above	1

Question 23(a)

Criteria	Marks
• Clearly shows, with an example, why hybridisation within a species was undertaken	2
• Defines hybridisation OR • Provides an example of hybridisation within a species	1

Question 23(b)

Criteria	Marks
• Correctly identifies an example of a transgenic species • Provides coherent arguments for AND/OR against both social AND environmental impacts of the technology • Arguments are clearly linked to the named species	5
• Correctly identifies an example of a transgenic species • Provides arguments for and against impact • Provides arguments about social and environmental impacts • Arguments are linked to the named species	4
• Correctly identifies an example of a transgenic species • Provides TWO relevant arguments about the social or environmental impacts	3
• Correctly identifies a transgenic species and provides a relevant argument about the social or environmental impact OR • Provides TWO relevant arguments about the social and/or environmental impacts	2
• Correctly identifies a transgenic species OR • Provides a relevant statement about the social or environmental impacts	1

Question 24

Criteria	Marks
• Completes table correctly identifying independent variable, control, justifications of constant variables and technology used	5
• Completes FOUR rows correctly	4
• Completes THREE rows correctly	3
• Completes TWO rows correctly	2
• Completes ONE row in table correctly	1

Question 25(a)

Criteria	Marks
• Identifies appropriate equipment or resource • Justifies the choice	2
• Identifies appropriate equipment or resource	1

Question 25(b)

Criteria	Marks
• Provides a detailed diagram of xylem tissue and it is a longitudinal section of xylem tissue (not transverse) • Labels/notes a characteristic feature of xylem	3
• Provides a recognisable diagram of xylem tissue and notes a characteristic feature OR • Provides a detailed diagram of xylem tissue	2
• Provides a recognisable diagram of xylem OR notes a characteristic feature	1

Question 26

Criteria	Marks
• Makes a judgement about data related to lung cancer and increased cigarette price • Correctly identifies TWO correlations • Correctly identifies TWO limitations in the data.	4–5
• Makes a judgement about the data related to lung cancer and increased cigarette price • Correctly identifies TWO correlations • Correctly identifies a limitation in the data OR • Makes a judgement about the data related to lung cancer and increased cigarette price • Correctly identifies TWO limitation in the data • Correctly identifies a correlation	4
• Makes a judgement about data and provides either a correlation and a limitation or two correlations/limitations OR • Provides TWO correlations and a limitation OR • Provides TWO limitations and a correlation	3
• Provides TWO correlations or limitations OR • Provides a correlation and a limitation	2
• Identifies a relevant correlation in the data OR • Identifies a limitation in the data	1

Question 27(a)

Criteria	Marks
• Sketches in general terms a specific example of quarantine for protecting animal health in Australia • Sketches in general terms a specific example of quarantine for protecting plant health in Australia	2
• Sketches in general terms a specific example of quarantine for protecting animal or plant health in Australia	1

Question 27(b)

Criteria	Marks
• Correctly explains why the quarantine method is effective	1

Question 28(a)

Criteria	Marks
• Identifies correct name for Y	1

Question 28(b)

Criteria	Marks
• Provides a judgement about the model's effectiveness • Supports their judgement with a piece of evidence, which correctly reflects the rejection process	3
• Provides a judgement about the model's effectiveness • Supports their judgement with a piece of evidence OR • Provides a piece of evidence which correctly links the model and the rejection process	2
• Provides a correct statement relating to organ rejection OR • Provides a general statement that relates to the use of this model	1

Question 28(c)

Criteria	Marks
• Sketches in general terms the role of TWO named T lymphocytes in organ rejection	4
• Sketches in general terms the role of ONE named T lymphocyte in organ rejection	3
• Sketches in general terms a role of a T lymphocyte in organ rejection OR • Identifies TWO types of T lymphocyte in organ rejection	2
• Sketches in general terms organ rejection OR • Identifies a type of T lymphocyte in organ rejection	1

Question 29(a)

Criteria	Marks
• Correctly identifies TWO responses of plants to temperature change stated in the articles	2
• Correctly identifies ONE response of plants to temperature change stated in the articles	1

Question 29(b)

Criteria	Marks
• Correctly judges each article as either relevant or irrelevant • Provides reasons for judgement on relevance in each case • Correctly judges reliability of each article • Provides reasons for judgement of reliability in each case • Shows clear, coherent, logical progression of ideas	5
• Correctly judges relevance and reliability of each article • Provides some reasons for judgements • Shows some logical progression of ideas	4
• Correctly judges relevance and/or reliability of some articles • Provides some reasons for judgements	3
• Correctly judges an article as relevant or reliable • Provides a reason for the judgement	2
• Correctly judges an article as relevant or reliable	1

Question 30

Criteria	Marks
• Demonstrates a thorough knowledge of biological practices • Demonstrates a thorough knowledge of theories of evolution • Demonstrates clear links between biological practices and theories of evolution • Relates their principles and ideas to the information provided • Demonstrates coherence and logical progression and includes correct use of biological terms	6–7
• Demonstrates a sound knowledge of biological practices and at least one theory of evolution • Demonstrates some links between practices and theories • Demonstrates some links to the information provided • Communicates some scientific principles and ideas in a clear manner	4–5
• Demonstrates some knowledge of a biological practice and/or a theory of evolution • Demonstrates a link between a practice and/or a theory to the information provided • Communicates ideas in a basic form using some general scientific terms	2–3
• States or names a biological practice or theory of evolution	1

Section II

Question 31(a)

Criteria	Marks
• Completes a table that clearly identifies the structures used to detect vibrations in insects, fish and mammals	3
• Presents information in an organised manner to clearly identify structures to detect vibrations in insects, fish and mammals	2
• Provides a table without relevant information OR identifies correct structure	1

Question 31(b)

Criteria	Marks
• Draws TWO labelled diagrams that clearly show the vocal folds when singing a high pitched note and a low pitched note • Includes at least TWO correct labels	4
• Draws TWO diagrams that show the vocal folds when singing a high pitched and a low pitched note	3
• Draws a labelled diagram that shows either high pitched or low pitched	2
• Provides some relevant information	1

Question 31(c)(i)

Criteria	Marks
• Identifies the correct label for Y	1

Question 31(c)(ii)

Criteria	Marks
• Clearly links the structure of the cones to the location in the retina	2
• Identifies a structural feature of cones OR the reason for their location in the retina	1

Question 31(c)(iii)

Criteria	Marks
• Sketches in general terms the role of rhodopsin	2
• States some relevant information about rhodopsin	1

Question 31(d)(i)

Criteria	Marks
• Provides a description of possible causes and why these result in a lack of action potential	4
• Provides a description of TWO possible causes and describes why ONE of these results in a lack of action potential	3
• Provides a possible cause and why it results in a lack of action potential OR • Identifies TWO causes	2
• Provides relevant information	1

Question 31(d)(ii)

Criteria	Marks
• Identifies that animal is blind and sketches in general terms an appropriate change in behaviour	2
• Identifies blindness OR • Sketches in general terms an appropriate change in behaviour	1

Question 31(e)

Criteria	Marks
• Demonstrates a thorough knowledge of how vision and hearing occur • Clearly links this information to the stimulus material provided • Provides well-supported judgement(s) about how this understanding has affected the development of technologies • Demonstrates coherence and logical progression of ideas and includes correct use of scientific principles	6–7
• Demonstrates a sound understanding of vision and hearing • Identifies some links between this information and the stimulus provided • Provides some judgement about how this understanding has affected the development of technologies • Communicates some scientific principles and ideas in a clear manner	4–5
• Demonstrates a basic understanding of vision and/or hearing or provides some judgement about how this understanding has affected the development of technologies • Communicates ideas in a simple fashion	2–3
• Provides some relevant information	1

Question 32(a)

Criteria	Marks
• Completes a table that clearly identifies appropriate process, micro-organism and product	3
• Presents information in an organised manner to identify some of the components	2
• Provides a table without relevant information OR identifies ONE component	1

Question 32(b)

Criteria	Marks
• Draws a flowchart that clearly shows the sequence of events in the formation of recombinant DNA	4
• Draws a flowchart that shows some of the sequence of events in the formation	3
• Lists the steps in the formation of recombinant DNA	2
• Provides some relevant information	1

Question 32(c)(i)

Criteria	Marks
• Provides information about the biotechnology used	1

Question 32(c)(ii)

Criteria	Marks
• Provides an assessment • Supports assessment with various data sets from the table	4
• Provides an assessment • Supports assessment with ONE data set from table	3
• Describes the data OR • Provides an appropriate assessment with little reference to data	2
• Provides any relevant information	1

Question 32(d)(i)

Criteria	Marks
• Describes how and why RNA interference affects protein synthesis	2
• States the effect of RNA interference	1

Question 32(d)(ii)

Criteria	Marks
• Correctly identifies a use of biotechnology • Provides relevant functions for DNA and RNA for use within the technology or when developing the technology	3–4
• Correctly identifies a relevant biotechnology • Provides some information about the role of DNA or RNA	2
• Provides some relevant information	1

Question 32(e)

Criteria	Marks
• Demonstrates a thorough knowledge of biotechnologies • Demonstrates a thorough knowledge of the associated ethical and social issues • Provides well-supported judgement(s) about how new technologies have caused these issues • Demonstrates coherence and logical progression of ideas and includes correct use of scientific principles	6–7
• Demonstrates a sound knowledge of biotechnologies • Demonstrates a sound knowledge of the associated ethical and social issues • Provides some judgement about how new technologies have caused these issues • Communicates some scientific principles and ideas in a clear manner	4–5
• Demonstrates a basic understanding of biotechnology, ethical and/or social issues or provides some judgement about how the technologies have caused these issues • Communicates ideas in a simple fashion	2–3
• Provides some relevant information	1

Question 33(a)

Criteria	Marks
• Completes table that clearly identifies the effect of the mutations on chromosome number	3
• Presents information in an organised manner to identify the effect of the TWO mutations on chromosome number	2
• Provides a table without relevant information OR identifies the effect of ONE mutation on chromosome number	1

Question 33(b)

Criteria	Marks
• Draws diagrams that clearly show the differences and similarities between the chromosomes in a cell with a diploid number of 4 • Draws a corresponding haploid cell	4
• Draws a diagram of a diploid cell with 4 chromosomes. Shows some similarities and differences between chromosomes • Draws a corresponding haploid cell	3
• Shows similarities and differences between chromosomes in a diagram • Attempts to show the difference between a diploid and a haploid cell	2
• Provides some relevant information	1

Question 33(c)(i)

Criteria	Marks
• Provides correct prediction for both defects	1

Question 33(c)(ii)

Criteria	Marks
• Provides correct phenotypic ratios with working out that clearly supports their conclusion	4
• Provides correct phenotypic ratios and some relevant working out	3
• Provides ONE phenotypic ratio correctly OR • Provides incorrect phenotypic ratios but working out supports the ratios	2
• Provides some relevant information	1

Question 33(d)(i)

Criteria	Marks
• Correctly shows how cross-breeding can be used for determining linked genes • Identifies that recording of phenotypes is required • Describes how the specific ratios can be used to show the relative position of a gene	3
• Correctly identifies that cross-breeding is required • Provides some information about how phenotypes can be used to determine the position of linked genes	2
• Provides some relevant information	1

Question 33(d)(ii)

Criteria	Marks
• Correctly describes three genetic processes which show how linkage maps alone cannot be used for determining a genome	3
• Correctly describes some genetic processes that relate to problems in determining the genome using linkage maps alone	2
• Provides some relevant information	1

Question 33(e)

Criteria	Marks
• Demonstrates a thorough knowledge of gene cascades and gene cloning • Demonstrates a thorough knowledge of applications of these technologies • Provides well-supported judgement(s) about how this understanding has affected the development of these technologies • Demonstrates coherence and logical progression of ideas and includes correct use of scientific principles	6–7
• Demonstrates a sound knowledge of gene cascades and gene cloning • Demonstrates a sound knowledge of applications of these technologies • Provides some judgement about how this understanding has affected the development of these technologies • Communicates some scientific principles and ideas in a clear manner	4–5
• Demonstrates a basic understanding of gene cascades, gene cloning and/or their associated technologies or provides some judgement about how an understanding of these has affected the development of technologies • Communicates ideas in a simple fashion	2–3
• Provides some relevant information	1

Question 34(a)

Criteria	Marks
• Completes a table that clearly identifies the relevant features	3
• Presents information in an organised manner to identify TWO features	2
• Provides a table without relevant information OR identifies ONE feature	1

Question 34(b)

Criteria	Marks
• Diagrams anatomically correct • Labels appropriate parts correctly • Shows difference between feet	4
• Diagrams anatomically correct • Labels some parts • Shows a difference between feet	3
• Diagrams somewhat correct • Provides some correct labelling	2
• Provides some relevant information	1

Question 34(c)(i)

Criteria	Marks
• Compares pattern of inheritance correctly	1

Question 34(c)(ii)

Criteria	Marks
• Provides a judgement • Clearly supports their judgement with comprehensive arguments pertaining to both nuclear DNA and mitochondrial DNA	4
• Provides a judgement • Supports their judgement with some arguments pertaining to both nuclear DNA and mitochondrial DNA	3
• Provides a judgement that is supported by a relevant argument OR • Provides relevant arguments	2
• Provides any relevant information	1

Question 34(d)(i)

Criteria	Marks
• Provides appropriate reasons for both collection and presentation of data	3–4
• Provides reasons for either data collection or presentation	2
• Provides any relevant information	1

Question 34(d)(ii)

Criteria	Marks
• Correctly proposes the name and regional location of the hominin species	2
• Correctly proposes a name or a region	1

Question 34(e)

Criteria	Marks
• Provides a thorough comparison of the cultural development of humans and primates • Proposes relevant directions in the future evolution of humans and primates • Provides well supported judgement(s) about how the cultural development of each could affect future evolution • Demonstrates coherence and logical progression of ideas and includes correct use of scientific principles	6–7
• Provides a sound comparison of the cultural development of humans and primates • Provides some ideas on directions for the future evolution of humans and primates • Provides some judgement about how the cultural development of each could affect future evolution • Communicates some scientific principles and ideas in a clear manner	4–5
• Describes the cultural development of humans or primates • Outlines the cultural development of humans and primates AND/OR • Proposes some relevant directions for future evolution of humans and/or primates and/or a judgement about this • Communicates ideas in a simple fashion	2–3
• Provides some relevant information	1

Question 35(a)

Criteria	Marks
• Completes a table that clearly identifies the contributions	3
• Presents information in an organised manner to identify TWO scientists' contributions	2
• Provides table without relevant information OR identifies ONE scientist's contribution	1

Question 35(b)

Criteria	Marks
• Draws a flowchart that clearly shows the sequence of events in a named radioactive tracer being used to show a relevant biochemical pathway	4
• Draws a flowchart that shows some of the steps in the process OR • Provides a complete flowchart but radioactive tracer is not named	3
• Lists some of the steps in the process	2
• Provides some relevant information	1

Question 35(c)(i)

Criteria	Marks
• Identifies both axes correctly	1

Question 35(c)(ii)

Criteria	Marks
• Outlines how and why chromatography and ONE other technology are useful • Provides links to photosynthesis in non-green plants	4
• Identifies how and why chromatography has been useful • Identifies another relevant technology • Attempts link to photosynthesis in plants	3
• Identifies how or why a technology has been useful • Attempts to make link to photosynthesis in plants OR • Outlines how and why a technology is useful	2
• Provides any relevant information	1

Question 35(d)

Criteria	Marks
• Provides a judgement for each of the scientific observations conclusions and clearly supports their judgements with arguments pertaining to both light-dependent and light-independent pathways	5–6
• Provides a judgement supported with some arguments pertaining to both light-dependent and light-independent pathways	4
• Provides some judgements that are supported and linked to two of the observations	3
• Provides a judgement that is supported by an argument OR • Provides relevant arguments linked to an observation	2
• Provides any relevant information	1

Question 35(e)

Criteria	Marks
• Demonstrates a thorough knowledge of photosynthesis • Demonstrates a thorough knowledge of associated technologies that can be used to help with greenhouse gas issues • Provides well-supported judgement(s) about how understanding photosynthesis could lead to the development of relevant technologies • Demonstrates coherence and logical progression of ideas and includes correct use of scientific principles	6–7
• Demonstrates a sound knowledge of photosynthesis • Demonstrates a sound knowledge of technologies that can be used to help with greenhouse gas issues • Provides some judgement about how understanding photosynthesis could lead to the development of relevant technologies • Communicates some scientific principles and ideas in a clear manner	4–5
• Demonstrates a basic understanding of photosynthesis and/or relevant technologies and/or provides a judgement about how this understanding has affected the development of the technology • Communicates ideas in a simple fashion	2–3
• Provides some relevant information	1

Biology

2010 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I Part A			
1	1	9.3.1.2.2	H10
2	1	9.3.4.3.5	H1, H2, H9
3	1	9.4.4.2.1	H6
4	1	9.2.3.3.4	H6
5	1	9.3.3.2.5, 9.3.3.3.1	H9
6	1	9.2.1.2.5, 9.2.3.1	H6
7	1	9.4.3.2.1	H4, H1
8	1	9.2.3.2.5, 9.2.3.2.6	H6
9	1	9.2.1.3.1	H14.1a, H14.1b
10	1	9.2.2.2.4, 9.2.2.3.1, 9.2.1.2.2	H6, H14.1h
11	1	9.3.5.2.1	H4, H9
12	1	9.2.2.2.1	H6
13	1	9.3.4.2.1	H9, H12.3c, H14.2.b
14	1	9.3.2.3.1, 9.3.3.3.2	H9, H14.2.c, H14.1g
15	1	9.3.3.2.9	H7, H14.1d
16	1	9.3.4.3.3, 9.3.4.2	H9, H14.1g
17	1	9.4.3.2.2	H6
18	1	9.4.3.2.2	H6, H11.1d, H12.3c, H12.4b
19	1	9.4.3.3.2	H2
20	1	9.4.5.2.1, 9.4.5.2.2	H6, H13.1e
Section I Part B			
21	2	9.3.2.1, 9.3.2.3.2, 9.3.3.2.7, 9.3.2.2.3	H9, H13.1d
22(a)	3	9.4.3	H13.1f, H13.1g
22(b)	3	9.3.1.2.1, 9.4.3.3.2	H4, H7, H10, H14.1a, H14.1d
23(a)	2	9.3.2.3.3	H9
23(b)	5	9.3.5.3.2	H4, H7
24	5	9.2.2.3.3	H11.2a, H11.2b
25(a)	2	9.2.2.3.6	H11.3a-c
25(b)	3	9.2.2.2.6	H13.1e
26	5	9.4.6.1, 9.4.6.2.1, 9.4.6.3.1	H2, H3, H12.3c, H14.1a, H14.1f, H14.1g
27(a)	2	9.4.7.2.1, 9.4.7.3.2	H4, H8
27(b)	1	9.4.7.3.3	H7, H8
28(a)	1	9.4.4.2.2	H6, H12.3c
28(b)	3	9.4.4.2.2, 9.4.4.2.3	H2, H6, H14.1f
28(c)	4	9.4.5.2.4	H6

Question	Marks	Content	Syllabus outcomes
29(a)	2	9.2.1.2.9	H12.3c
29(b)	5	9.2.1.2.9	H12.3b, H12.4d
30	7	9.3.1.2, 9.3.1.3.1, 9.3.1.3.2	H2, H4, H7, H10,
Section II **Question 31 — Communication**			
31(a)	3	9.5.6.2.1	H6, H13, H16
31(b)	4	9.5.5.2.3	H6, H13.1e
31(c)(i)	1	9.5.4.2.2	H6, H12.3c
31(c)(ii)	2	9.5.4.2.2	H6, H12.3c
31(c)(iii)	2	9.5.4.2.3	H6
31(d)(i)	4	9.5.7.3.2, 9.5.7.3.3	H6, H14.1d, H14.1g, H14.1h
31(d)(ii)	2	9.5.7.2.5	H6, H14.1d, H14.1h
31(e)	7	9.5.1, 9.5.3.2.6, 9.5.6.2.6, 9.5.7.2.5	H3, H4, H6, H14.3b
Section II **Question 32 — Biotechnology**			
32(a)	3	9.6.3.3.1	H6, H13.1b
32(b)	4	9.6.5.3.2, 9.6.5.2.1, 9.6.5.2.2	H6, H13.1e
32(c)(i)	1	9.6.1.2.2, 9.6.1.2.3	H4, H7, H12.3c
32(c)(ii)	4	9.6.1.2.2, 9.6.1.2.3	H4, H12.3c, H10
32(d)(i)	2	9.6.4.1	H6
32(d)(ii)	4	9.6.6.2.2, 9.6.4.2.1	H3, H6
32(e)	7	9.6.7.1, 9.6.7.3.1, 9.6.7.2.2	H4, H14.3b
Section II **Question 33 — Genetics: The Code Broken?**			
33(a)	3	9.7.6.2.1	H6, H9, H13.1b
33(b)	4	9.7.3.2.1	H9, H13.1e
33(c)(i)	1	9.7.3.2.3	H9
33(c)(ii)	4	9.7.3.2.3, 9.7.3.2.2	H9, H13.1e, H14.1c, H14.1f, H14.3b
33(d)(i)	3	9.7.3.2.4	H9, H12.2a
33(d)(ii)	3	9.7.4.3.1	H3, H9
33(e)	7	9.7.8.2.2, 9.7.8.2.3	H3, H4, H5, H14.3b
Section II **Question 34 — The Human Story**			
34(a)	3	9.8.1.3.1	H10, H13.1b
34(b)	4	9.8.1.2.5	H13.1b
34(c)(i)	1	9.8.2.2.6, 9.8.2.3.3	H9, H12.3c
34(c)(ii)	4	9.8.2.2.6, 9.8.2.3.3	H1, H9, H12.3c
34(d)(i)	4	9.8.1.3.3, 9.8.3.2.1	H12.4d, H14, H14.1d
34(d)(ii)	2	9.8.3.2.1, 9.8.3.2.2	H10, H12.3c
34(e)	7	9.8.2.1, 9.8.5.1, 9.8.6.1, 9.8.4.1	H1, H3, H4, H10
Section II **Question 35 — Biochemistry**			
35(a)	3	9.9.2.2.1	H6, H13.1b

Question	Marks	Content	Syllabus outcomes
35(b)	4	9.9.5	H6, H13.1b
35(c)(i)	1	9.9.3.3.4	H6, H12.3c
35(c)(ii)	4	9.9.3	H1, H6
35(c)(iii)	1	9.9.3.3.4	H1, H6
35(d)	6	9.9.2.1, 9.9.2.2.1, 9.9.2.2.3, 9.9.2.3.3, 9.9.5.2.4, 9.9.6.2.3	H1, H2, H6, H12.3a, H12.3c, H12.3d, H14.1a, H14.1b, H14.1c, H14.3c, H14.3d
35(e)	7	9.9.1.1, 9.9.1.2.1	H3, H4