



**BOARD OF STUDIES**  
NEW SOUTH WALES

## **2011 HSC Biology Marking Guidelines**

### **Section I, Part A**

#### **Multiple-choice Answer Key**

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

## Section I, Part B

### Question 21 (a)

Criteria	Marks
• Names TWO methods used for treating drinking water to reduce the risk of infection	2
• Names a method used for treating drinking water to reduce the risk of infection	1

### Question 21 (b)

Criteria	Marks
• Sketches in general terms how each of the named methods reduce the risk of infection	2
• Sketches in general terms how one named method reduces the risk of infection	1

### Question 22 (a)

Criteria	Marks
• Correctly states the purpose of the experiment	1

### Question 22 (b)

Criteria	Marks
• Correctly provides characteristic and/or features of TWO improvements that relate specifically to the validity of the data collected in the experiment	2
• Correctly provides characteristic and/or feature of ONE improvement that relates specifically to the validity of the data collected in the experiment	1

### Question 22 (c)

Criteria	Marks
• Correctly predicts the pHs that result in the production of clear and cloudy solutions	1

**Question 23**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Names at least THREE scientists involved in determining the structure of DNA</li> <li>• Gives a thorough description of the collaboration and communication between these scientists</li> <li>• Clearly relates this to the effect on their progress in determining the structure of DNA</li> </ul>	5
<ul style="list-style-type: none"> <li>• Names at least TWO scientists involved in determining the structure of DNA</li> <li>• Gives a thorough description of the collaboration and communication between some of these</li> </ul> OR <ul style="list-style-type: none"> <li>• Relates it to their ideas about the structure of DNA</li> </ul>	4
<ul style="list-style-type: none"> <li>• Names at least TWO scientists involved in determining the structure of DNA</li> <li>• Gives a description of the collaboration and communication between some of these</li> </ul> OR <ul style="list-style-type: none"> <li>• Gives a thorough description of the collaboration and communication between non-named but identified scientists</li> <li>• Clearly relates this to the effect on their progress to determining the structure of DNA</li> </ul>	3
<ul style="list-style-type: none"> <li>• Names some scientists involved in determining the structure of DNA</li> </ul> AND EITHER <ul style="list-style-type: none"> <li>• Gives a description of the collaboration and communication between some of these</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies their roles in the discovery of DNA</li> </ul>	2
<ul style="list-style-type: none"> <li>• Names at least ONE scientist involved in determining the structure of DNA</li> </ul> OR <ul style="list-style-type: none"> <li>• Provides a relevant statement about the impact of collaboration or communication on scientific research</li> </ul> OR <ul style="list-style-type: none"> <li>• Provides some correct information about the structure of DNA</li> </ul>	1

**Question 24 (a)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Identifies a viral disease that is controlled by the use of a vaccine</li> </ul>	1

**Question 24 (b) (i)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Indicates ONE main feature of the viral vaccine and links it to a named immune response</li></ul>	2
<ul style="list-style-type: none"><li>Indicates ONE main feature of a vaccine</li></ul> OR <ul style="list-style-type: none"><li>Names an immune response</li></ul>	1

**Question 24 (b) (ii)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Identifies a correct step from the flowchart and relates it to safe use of the vaccine</li></ul>	2
<ul style="list-style-type: none"><li>Identifies a correct step from the flowchart</li></ul> OR <ul style="list-style-type: none"><li>Relates it to a safe use of the vaccine</li></ul>	1

**Question 25 (a)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Identifies BOTH processes that takes place at location identified</li></ul>	2
<ul style="list-style-type: none"><li>Identifies ONE process that takes place at location identified</li></ul>	1

**Question 25 (b)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Identifies the process that occurs due to active transport</li></ul>	1

**Question 25 (c)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Sketches in general terms the increase of aldosterone leading to an increase in salt</li><li>Water retention in blood</li></ul>	2
<ul style="list-style-type: none"><li>Sketches in general terms the action of aldosterone in the regulation of salt</li></ul> OR <ul style="list-style-type: none"><li>Water retention in blood</li></ul>	1

**Question 26 (a)**

<b>Criteria</b>	<b>Marks</b>
• Provides TWO differences and TWO similarities in the data	4
• Provides THREE of the above	3
• Provides TWO of the above	2
• Provides ONE of the above	1

**Question 26 (b)**

<b>Criteria</b>	<b>Marks</b>
• Provides reasons in favour of TWO additional types of data required	2
• Provides a reason in favour of ONE additional type of data required OR • Identifies TWO additional data types	1

**Question 27**

<b>Criteria</b>	<b>Marks</b>
• Sketches in general terms FOUR features of an epidemiological study to identify the cause of the disease	4
• Sketches in general terms features of an epidemiological study to identify the cause of the disease	3
• Describes a feature of an epidemiological study to identify the cause of the disease	2
• Identifies a feature of an epidemiological study	1

**Question 28 (a)**

<b>Criteria</b>	<b>Marks</b>
• Correctly indicates the activation of stem cells • Relates activation to restoration of the skin barrier	2
• Correctly indicates the activation of stem cells OR • Relates activation to restoration of the skin barrier	1

**Question 28 (b)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Provides TWO features or characteristics that might be an improvement and relates ONE to the performance of an artificial blood</li></ul>	3
<ul style="list-style-type: none"><li>Provides TWO features or characteristics that might be an improvement</li></ul> OR <ul style="list-style-type: none"><li>Provides ONE feature or characteristic that might be an improvement and relates it to the performance</li></ul>	2
<ul style="list-style-type: none"><li>Provides ONE feature or characteristic that might be an improvement</li></ul>	1

**Question 29**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Completes the table by:<ul style="list-style-type: none"><li>identifying dependent variable</li><li>identifying independent variable</li><li>identifying a control</li><li>providing TWO risks related to safety precaution</li></ul></li></ul>	5
<ul style="list-style-type: none"><li>Completes the table by completing FOUR aspects of the investigation</li></ul>	4
<ul style="list-style-type: none"><li>Completes the table by completing THREE aspects of the investigation</li></ul>	3
<ul style="list-style-type: none"><li>Completes the table by completing TWO aspects of the investigation</li></ul>	2
<ul style="list-style-type: none"><li>Completes the table by completing ONE aspect of the investigation</li></ul>	1

**Question 30 (a)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>Names technology <i>X</i></li><li>Names technology <i>Y</i></li></ul>	2
<ul style="list-style-type: none"><li>Names technology <i>X</i></li></ul> OR <ul style="list-style-type: none"><li>Names technology <i>Y</i></li></ul>	1

**Question 30 (b)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"><li>• Provides a correct statement about the conclusion being invalid</li><li>• Builds a sequence of correct ideas to justify this view based on the experiment</li></ul>	3
<ul style="list-style-type: none"><li>• Provides a correct statement about the conclusion being invalid</li><li>• Gives a correct idea to justify this view based on this experiment</li></ul> OR <ul style="list-style-type: none"><li>• Builds a sequence of correct ideas to justify this view based on the experiment</li></ul>	2
<ul style="list-style-type: none"><li>• Provides a correct statement about the conclusion being invalid</li></ul> OR <ul style="list-style-type: none"><li>• Gives a correct idea to justify this view based on this experiment</li></ul> OR <ul style="list-style-type: none"><li>• Provides a correct statement about reptiles controlling their body temperature</li></ul>	1

**Question 31**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge and understanding of advances in our understanding of biology and their implications for society</li> <li>• Gives a thorough description of major advances in biology that have allowed the development and use of antibiotics</li> <li>• Relates the implications of the development of antibiotics to society</li> <li>• Demonstrates coherence and logical progression and includes correct use of biological terms</li> </ul>	6–7
<ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of advances in our understanding of biology and their implications for society</li> <li>• Gives a description of TWO major advances in biology that have allowed the development and use of antibiotics</li> <li>• Outlines the implications of the development of antibiotics to society</li> <li>• Communicates some scientific principles and ideas in a clear manner</li> </ul>	4–5
<ul style="list-style-type: none"> <li>• Demonstrates some understanding of advances in our understanding of biology and their implications for society</li> <li>• Gives a description of ONE major advance in our understanding that has allowed the development and use of antibiotics</li> <li>• Outlines an implication of the development of antibiotics to society</li> <li>• Communicates ideas in a basic form using some general scientific terms</li> </ul>	2–3
<ul style="list-style-type: none"> <li>• Provides a relevant statement about a major advance in our understanding of biology that could be linked to the development of antibiotics</li> </ul> OR <ul style="list-style-type: none"> <li>• Outlines an implication of the development of antibiotics to society</li> </ul>	1

**Section II**
**Question 32 (a) (i)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Identifies structures <i>A</i> and <i>B</i></li> </ul>	2
<ul style="list-style-type: none"> <li>• Identifies either structure <i>A</i> or structure <i>B</i></li> </ul>	1

**Question 32 (a) (ii)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Names the role of the dendrite</li> </ul>	1



**Question 32 (b)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Draws a graph that correctly shows the relationship between stimulus and changing membrane potential and indicates threshold</li> <li>• Relates the level of stimulus to the formation (or not) of an action potential</li> </ul>	4
<ul style="list-style-type: none"> <li>• Draws a graph that correctly shows the relationship between stimulus and changing membrane potential and indicates threshold</li> </ul> OR <ul style="list-style-type: none"> <li>• Draws a graph that correctly shows the relationship between stimulus and changing membrane potential and relates the level of stimulus to the formation (or not) of an action potential</li> </ul> OR <ul style="list-style-type: none"> <li>• Draws a graph that correctly shows changing membrane potential and indicates threshold, and relates the level of stimulus to the formation (or not) of an action potential</li> </ul>	3
<ul style="list-style-type: none"> <li>• Draws a diagram or graph that correctly shows the relationship between stimulus and changing membrane potential</li> </ul> OR <ul style="list-style-type: none"> <li>• Draws a diagram or graph that correctly shows changing membrane potential and indicates threshold</li> </ul> OR <ul style="list-style-type: none"> <li>• Draws a diagram that correctly shows a stimulus and indicates threshold</li> </ul> OR <ul style="list-style-type: none"> <li>• Relates the level of stimulus to the formation (or not) of an action potential</li> </ul>	2
<ul style="list-style-type: none"> <li>• Draws a diagram or graph that indicates some information about membrane potential and stimulus</li> </ul> OR <ul style="list-style-type: none"> <li>• Relates some information about a stimulus and action potential</li> </ul>	1

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

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Names at least TWO roles of the cornea</li> </ul>	2
<ul style="list-style-type: none"> <li>• Names a role of the cornea</li> </ul>	1

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

Criteria	Marks
<ul style="list-style-type: none"> <li>• Correctly identifies the problem associated with myopia</li> <li>• Provides correct information on how LASIK corrects this defect</li> </ul>	3
<ul style="list-style-type: none"> <li>• Correctly identifies the problem associated with myopia</li> <li>• Identifies that the surgery is used to correct focus</li> </ul>	2
<ul style="list-style-type: none"> <li>• Provides some correct information about myopia</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies that the surgery is used to correct focus</li> </ul>	1

**Question 32 (d)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Compares the range of frequencies detected by humans and TWO other mammals</li> <li>• Relates possible reasons for differences between the range of frequencies detected by humans and TWO other mammals</li> </ul>	5–6
<ul style="list-style-type: none"> <li>• Identifies the range of relative frequencies detected by humans and ONE other mammal</li> <li>• Relates possible reasons for differences between the range of relative frequencies detected by humans and ONE other mammal</li> </ul> OR <ul style="list-style-type: none"> <li>• Describes the structure of a human ear and compares it to the different structure used by ONE other mammal</li> <li>• Relates possible reasons for this different structural arrangement</li> </ul>	3–4
<ul style="list-style-type: none"> <li>• Identifies a correct relative range of frequencies detected by humans and ONE other mammal</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies a possible reason for differences between the range of relative frequencies detected by TWO mammals</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies a reason for differences in the anatomical arrangement of the ear structure in a human and ONE other mammal</li> </ul>	2
<ul style="list-style-type: none"> <li>• Identifies the range of frequencies detected by a mammal</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies a reason for a mammal to hear within a certain frequency range</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies differences in the ear structure in ONE other mammal</li> </ul>	1

**Question 32 (e)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge and understanding of the anatomy and function of the human ear and the role of the brain in responding to stimuli</li> <li>• Links how the use of hearing aids and cochlear implants assists hearing with reference to the conditions</li> <li>• Demonstrates coherence and logical progression and includes correct use of biological terms</li> </ul>	6–7
<ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of the anatomy and function of the human ear and the role of the brain in responding to stimuli</li> <li>• Outlines how the use of hearing aids and cochlear implants assists hearing with reference to at least one condition</li> <li>• Communicates some scientific principles and ideas in a clear manner</li> </ul> OR <ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge and understanding of the anatomy and function of the human ear to send messages to the brain for interpretation</li> </ul> OR <ul style="list-style-type: none"> <li>• Outlines how the use of hearing aids and cochlear implants assist hearing with reference to at least one condition</li> <li>• Communicates some scientific principles and ideas in a clear manner</li> </ul>	4–5
<ul style="list-style-type: none"> <li>• Demonstrates some understanding of the anatomy and function of the human ear and/or the role of the brain in responding to aural stimuli</li> <li>• Identifies the use of hearing aids or cochlear implants in assisting hearing</li> <li>• Communicates ideas in a basic form using some general scientific terms</li> </ul>	2–3
<ul style="list-style-type: none"> <li>• Identifies the use of hearing aids or cochlear implants in assisting hearing</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies the role of the brain in coordinating the correct interpretation of sensory signals</li> </ul>	1

**Question 33 (a) (i)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Identifies components <i>A</i> and <i>B</i></li> </ul>	2
<ul style="list-style-type: none"> <li>• Identifies component <i>A</i> or <i>B</i></li> </ul>	1

**Question 33 (a) (ii)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Names the process shown in the diagram</li> </ul>	1

**Question 33 (b)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Draws a diagram that correctly depicts transcription and translation</li> <li>• Relates the production of different products to transcription and translation</li> </ul>	4
<ul style="list-style-type: none"> <li>• Draws a diagram that correctly depicts transcription and translation</li> </ul> OR <ul style="list-style-type: none"> <li>• Relates the production of different products to transcription and translation</li> </ul>	3
Any TWO of the following: <ul style="list-style-type: none"> <li>• Draws a diagram that correctly depicts transcription</li> <li>• Relates the production of different products to transcription</li> <li>• Draws a diagram that correctly depicts translation</li> <li>• Relates the production of different products to translation</li> </ul>	2
<ul style="list-style-type: none"> <li>• Draws a diagram that depicts some information about transcription</li> </ul> OR <ul style="list-style-type: none"> <li>• Draws a diagram that depicts some information about translation</li> </ul> OR <ul style="list-style-type: none"> <li>• Relates the production of different products to transcription or translation</li> </ul>	1

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

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Distinguishes between qualitative and quantitative data and gives examples of each taken from the text</li> </ul>	2
<ul style="list-style-type: none"> <li>• Distinguishes between qualitative and quantitative data without examples from the text</li> </ul> OR <ul style="list-style-type: none"> <li>• Gives examples from the text but does not distinguish between quantitative and qualitative data</li> </ul>	1

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

Criteria	Marks
<ul style="list-style-type: none"> <li>Correctly defines biotechnology and provides an argument for or against the activity of the ants being considered as biotechnology and provides the outcome</li> </ul>	3
<ul style="list-style-type: none"> <li>Correctly defines biotechnology and provides an argument for or against the activity of the ants being considered as biotechnology</li> </ul> OR <ul style="list-style-type: none"> <li>Provides an argument for or against the activity of the ants being considered as biotechnology and provides the outcome</li> </ul> OR <ul style="list-style-type: none"> <li>Correctly defines biotechnology and provides the outcome</li> </ul>	2
<ul style="list-style-type: none"> <li>Correctly defines biotechnology</li> </ul> OR <ul style="list-style-type: none"> <li>Identifies the activity of the ants being considered as biotechnology</li> </ul> OR <ul style="list-style-type: none"> <li>Provides the outcome of the ants' activity</li> </ul>	1

**Question 33 (d)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Defines recombinant DNA technology</li> <li>Indicates the purpose of recombinant DNA technology</li> <li>Shows the relationship between the use of recombinant DNA technologies and risks AND benefits to society</li> </ul>	5–6
<ul style="list-style-type: none"> <li>Indicates the outcome of recombinant DNA technologies</li> <li>Shows the relationship between the use of recombinant DNA technologies and the risks OR benefits to society</li> </ul>	3–4
<ul style="list-style-type: none"> <li>Identifies risks OR benefits to society</li> </ul> OR <ul style="list-style-type: none"> <li>Identifies ONE risk and ONE benefit to society</li> </ul> OR <ul style="list-style-type: none"> <li>Shows the relationship between the use of recombinant DNA technologies and ONE risk OR benefit to society</li> </ul>	2
<ul style="list-style-type: none"> <li>Identifies a risk OR benefit to society</li> </ul>	1

**Question 33 (e)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge and understanding of technologies that could be used to extract enzymes, amplify genes or recombine DNA</li> <li>• Correctly identifies features and characteristics of THREE technologies that could be applied to developing or producing the enzymes</li> <li>• Clearly states how the technologies are linked to development or improved production</li> <li>• Demonstrates coherence and logical progression and includes correct use of biological terms</li> </ul>	6–7
<ul style="list-style-type: none"> <li>• Demonstrates sound understanding of technologies that could be used to extract enzymes, amplify genes or recombine DNA</li> <li>• Correctly identifies features and characteristics of TWO technologies that could be applied to developing or producing the enzymes</li> <li>• Clearly states how the technologies are linked to development or improved production</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Correctly identifies THREE technologies that could be applied to developing or producing the enzymes</li> <li>• Clearly states how a technology is linked to development or improved production</li> <li>• Communicates some scientific principles and ideas in a clear manner</li> </ul>	4–5
<ul style="list-style-type: none"> <li>• Demonstrates some understanding of technologies that could be used to extract enzymes, amplify genes or recombine DNA</li> <li>• Correctly identifies TWO technologies that could be applied to developing or producing the enzymes</li> <li>• Clearly states how the technologies are linked to development or improved production</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Correctly identifies THREE technologies that could be applied to developing or producing the enzymes</li> <li>• Communicates ideas in a basic form using some general scientific terms</li> </ul>	3
<ul style="list-style-type: none"> <li>• Demonstrates an understanding of technologies that could be used to extract enzymes, amplify genes or recombine DNA</li> <li>• Correctly identifies TWO technologies that could be applied to developing or producing the enzymes</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Correctly identifies ONE technology that could be applied to developing or producing the enzymes</li> <li>• States how the technologies are linked to development or improved production</li> </ul>	2
<ul style="list-style-type: none"> <li>• Correctly identifies and describes a technology that could be applied to developing or producing enzymes</li> </ul>	1

**Question 34 (a) (i)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Names types of mutations for 1 and 2</li> </ul>	2
<ul style="list-style-type: none"> <li>Names types of mutations for either 1 or 2</li> </ul>	1

**Question 34 (a) (ii)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Identifies the effect of the mutation</li> </ul>	1

**Question 34 (b)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Draws Punnett squares or other diagram that correctly show inheritance of ABO blood groups and Rhesus factors to produce offspring with different blood group genotypes and phenotypes from the parent genotypes</li> </ul>	4
<ul style="list-style-type: none"> <li>Draws Punnett squares or other diagram that correctly show inheritance of ABO blood groups and Rhesus factors to produce offspring with different blood group genotypes from the parent genotypes</li> </ul>	3
<ul style="list-style-type: none"> <li>Draws a Punnett square or clearly indicates inheritance of ABO blood groups or Rhesus factors to produce offspring with different blood group genotypes and/or phenotypes from the parent genotypes</li> </ul>	2
<ul style="list-style-type: none"> <li>Uses correct genotype notation for either ABO blood group or Rhesus factor</li> </ul>	1

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

Criteria	Marks
<ul style="list-style-type: none"> <li>Provides main features of selective breeding</li> <li>Provides main features of cloning</li> </ul>	2
<ul style="list-style-type: none"> <li>Provides main features of selective breeding</li> </ul> OR <ul style="list-style-type: none"> <li>Provides main features of cloning</li> </ul> OR <ul style="list-style-type: none"> <li>Provides ONE feature of both selective breeding and cloning</li> </ul>	1

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

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Identifies parts in favour of and against the scientific claim</li> <li>• Indicates main features of both selective breeding and cloning with regard to the change in genetic nature in a species</li> </ul>	3
<ul style="list-style-type: none"> <li>• Identifies parts in favour of and against the scientific claim</li> <li>• Indicates main features of selective breeding with regard to the change in genetic nature in a species</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies parts in favour of and against the scientific claim</li> <li>• Indicates main features of cloning with regard to the change in genetic nature in a species</li> </ul>	2
<ul style="list-style-type: none"> <li>• Makes some correct statement about selective breeding</li> </ul> OR <ul style="list-style-type: none"> <li>• Makes some correct statement about cloning</li> </ul> OR <ul style="list-style-type: none"> <li>• Makes some correct statement about genetic modification</li> </ul>	1

**Question 34 (d)**

<b>Criteria</b>	<b>Marks</b>
<ul style="list-style-type: none"> <li>• Clearly identifies the type of information and methods used to acquire information in the HGP and traditional inheritance studies</li> </ul>	5–6
<ul style="list-style-type: none"> <li>• Clearly identifies the type of information in the HGP and traditional inheritance studies</li> </ul>	3–4
<ul style="list-style-type: none"> <li>• Makes a correct statement about the way the HGP is used to identify the location of genes</li> <li>• Makes a correct statement about the way traditional inheritance studies are used to identify the location of genes</li> </ul>	2
<ul style="list-style-type: none"> <li>• Makes a correct statement about the way the HGP is used to identify the location of genes</li> </ul> OR <ul style="list-style-type: none"> <li>• Makes a correct statement about the way traditional inheritance studies are used to identify the location of genes</li> </ul>	1



**Question 34 (e)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Provides features and characteristics of <b>THREE</b> technologies that could be applied to study relationships between species</li> <li>• Demonstrates a thorough knowledge and understanding of technologies that could be applied to identifying the relationships</li> <li>• Clearly states how the technologies are linked to the example of dingo relationships</li> <li>• Demonstrates coherence and logical progression and includes correct use of biological terms</li> </ul>	6–7
<ul style="list-style-type: none"> <li>• Provides features and characteristics of <b>TWO</b> technologies that could be applied to study relationships between species</li> <li>• Demonstrates a sound understanding of technologies that could be applied to identifying the relationships</li> <li>• Clearly states how the technologies are linked to the example of dingo relationships</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Correctly identifies <b>THREE</b> technologies that could be applied to study relationships between species and a characteristic or feature of <b>ONE</b> technology</li> <li>• Clearly states how the technologies are linked to the example of dingo relationships</li> <li>• Communicates some scientific principles and ideas in a clear manner</li> </ul>	4–5
<ul style="list-style-type: none"> <li>• Correctly identifies <b>TWO</b> technologies that could be applied to study relationships between species and a characteristic or feature of <b>ONE</b> technology</li> <li>• Demonstrates some understanding of technologies that could be applied to identifying the relationships</li> <li>• Clearly states how the technologies are linked to the example of dingo relationships</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Correctly identifies <b>THREE</b> technologies that could be applied to study relationships between species</li> <li>• Clearly states how the technologies are linked to the example of dingo relationships</li> <li>• Communicates ideas in a basic form using some general scientific terms</li> </ul>	3
<ul style="list-style-type: none"> <li>• Correctly identifies <b>THREE</b> technologies that could be applied to study relationships between species</li> <li>• Demonstrates a limited understanding of technologies that could be applied to identifying the relationships</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Correctly identifies <b>TWO</b> technologies that could be applied to study relationships between species and describes <b>ONE</b> technology</li> </ul> <p>OR</p>	2

<ul style="list-style-type: none"> <li>• Correctly identifies TWO technologies that could be applied to study relationships between species</li> <li>• Clearly states how the technologies are linked to the example of dingo relationships</li> </ul>	
<ul style="list-style-type: none"> <li>• Correctly identifies TWO technologies that could be applied to study relationships between species</li> </ul> OR <ul style="list-style-type: none"> <li>• Correctly identifies and describes ONE technology that could be applied to study relationships between species</li> </ul>	1

**Question 35 (a) (i)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Identifies the oldest layer twice and the youngest layer</li> </ul>	2
<ul style="list-style-type: none"> <li>• Identifies the oldest layer twice or the youngest layer</li> </ul>	1

**Question 35 (a) (ii)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Identifies the relative dating technique</li> </ul>	1

**Question 35 (b)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Draws diagrams that correctly support TWO alternate views of the evolutionary relationship between FOUR identified hominids of the same genus</li> </ul>	4
<ul style="list-style-type: none"> <li>• Draws diagrams that correctly support TWO alternative views of the evolutionary relationships between TWO or THREE hominids of the same genus</li> </ul>	3
<ul style="list-style-type: none"> <li>• Correctly identifies TWO alternative views of the evolutionary relationship between at least TWO identified hominids</li> </ul>	2
<ul style="list-style-type: none"> <li>• Correctly identifies some information about hominid evolution</li> </ul>	1

**Question 35 (c) (i)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Links TWO appropriate pieces of data from source to evidence of advanced culture</li> </ul>	2
<ul style="list-style-type: none"> <li>• Links ONE appropriate piece of data from source to evidence of advanced culture</li> </ul> OR <ul style="list-style-type: none"> <li>• Identifies TWO appropriate pieces of data</li> </ul>	1

**Question 35 (c) (ii)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Provides a correct definition of species</li> <li>Identifies the unique combination of hominid features in <i>Homo floresiensis</i></li> <li>Identifies isolation and space and time as appropriate for speciation</li> </ul> OR <ul style="list-style-type: none"> <li>Provides arguments for and/or against validity</li> <li>Identifies the unique combination of hominid features in <i>Homo floresiensis</i></li> <li>Identifies isolation and space and time as appropriate speciation</li> </ul>	3
<ul style="list-style-type: none"> <li>TWO of the above</li> </ul>	2
<ul style="list-style-type: none"> <li>ONE of the above</li> </ul>	1

**Question 35 (d) (i)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Provides information about mechanisms of evolution</li> <li>Correctly identifies similarities AND/OR differences between the evolution of early and current <i>Homo sapiens</i></li> </ul>	3–4
<ul style="list-style-type: none"> <li>Provides information about mechanisms of evolution</li> <li>Identifies some characteristics of the evolution of both early and current <i>Homo sapiens</i></li> </ul>	2
<ul style="list-style-type: none"> <li>Provides some information about mechanisms of evolution</li> </ul> OR <ul style="list-style-type: none"> <li>Identifies some characteristics of the evolution of both early and current <i>Homo sapiens</i></li> </ul>	1

**Question 35 (d) (ii)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Relates increased time for evolution in Africa to longer opportunity for divergence</li> <li>Relates recent migration from some parts of Africa to new isolated habitats to shorter opportunity for divergence</li> </ul>	2
<ul style="list-style-type: none"> <li>Relates increased time for evolution in Africa to longer opportunity for divergence</li> </ul> OR <ul style="list-style-type: none"> <li>Relates recent migration from some parts of Africa to new isolated habitats to shorter opportunity for divergence</li> </ul>	1

**Question 35 (e)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge and understanding of technologies and data that could be used to test the hypothesis</li> <li>• Provides characteristics and features of TWO technologies</li> <li>• Identifies the type of data that can be obtained from TWO technologies</li> <li>• Identifies how data is analysed for each of the TWO technologies</li> <li>• Relates the data analysis to the specific matter of the degree of evolutionary proximity between the TWO species</li> <li>• Demonstrates coherence and logical progression and includes correct use of biological terms</li> </ul>	6–7
<ul style="list-style-type: none"> <li>• Demonstrates sound understanding of technologies and data that could be used to test the hypothesis</li> <li>• Provides characteristics and features of TWO technologies</li> <li>• Identifies the type of data that can be obtained from the TWO technologies</li> <li>• Identifies how data are analysed for each of the TWO technologies</li> <li>• Communicates some scientific principles and ideas in a clear manner</li> </ul>	4–5
<ul style="list-style-type: none"> <li>• Demonstrates some understanding of technologies and data that could be used to test the hypothesis</li> <li>• Provides characteristics and features of TWO technologies</li> <li>• Identifies the type of data that can be obtained from TWO technologies (same technologies)</li> <li>• Communicates ideas in a basic form using some general scientific terms</li> </ul>	3
<ul style="list-style-type: none"> <li>• Demonstrates a limited understanding of technologies and data that could be used to test the hypothesis</li> <li>• Provides characteristics and features of TWO technologies</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Identifies the type of data that can be obtained from TWO technologies identified</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Identifies how data are analysed for each of TWO technologies</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Identifies a number of relevant features for ONE technology</li> </ul>	2
<ul style="list-style-type: none"> <li>• Identifies ONE appropriate technology</li> </ul>	1

**Question 36 (a) (i)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Names the pathway</li> </ul>	1

**Question 36 (a) (ii)**

Criteria	Marks
• Names both molecules <i>A</i> and <i>B</i>	2
• Names either molecule <i>A</i> or <i>B</i>	1

**Question 36 (b)**

Criteria	Marks
• Draws a diagram showing the main sites of light absorption and provides characteristics and features of the photosystem	4
• Draws a diagram showing the main sites of light absorption and provides a characteristic or feature of a photosystem	3
• Draws a diagram OR clearly indicates some characteristics related to photosynthesis	2
• Provides some information about light absorption and photosynthesis	1

**Question 36 (c)**

Criteria	Marks
• States the correct reasons for AND/OR against using the isotopes	4–5
• States most of the reasons for AND/OR against using the isotope	2–3
• States a reason for OR a reason against using the isotope	1

**Question 36 (d)**

Criteria	Marks
• Provides detailed characteristics and features of how the work of the other named scientists was brought together by Mayer's ideas	5–6
• Provides some characteristics and features of how the work of at least ONE named scientist was brought together by Mayer's ideas	3–4
• Provides some information about Mayer's ideas on photosynthesis	2
• Provides some information about photosynthesis correctly linked to a scientist	1

**Question 36 (e)**

Criteria	Marks
<ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge and understanding of the technologies that would be used to carry out your role in the scientific team</li> <li>• Provides characteristics and features of TWO technologies</li> <li>• Identifies the type of data that can be obtained from the TWO technologies</li> <li>• Identifies how data is analysed for each of the TWO technologies</li> <li>• Relates the use of the technology to testing the hypothesis</li> <li>• Demonstrates coherence and logical progression and includes correct use of biological terms</li> </ul>	6–7
<ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of the technologies that would be used to carry out your role in the scientific team</li> <li>• Provides characteristics and features of TWO technologies</li> <li>• Identifies the type of data that can be obtained from the TWO technologies</li> <li>• Identifies how the data is analysed for each of the technologies</li> <li>• Communicates some scientific principles and ideas in a clear manner</li> </ul>	4–5
<ul style="list-style-type: none"> <li>• Demonstrates some understanding of the technologies that would be used to carry out your role in the scientific team</li> <li>• Provides characteristics and features of TWO technologies</li> <li>• Identifies the type of data that can be obtained from the TWO technologies</li> <li>• Communicates ideas in a basic form using some general scientific terms</li> </ul>	3
<ul style="list-style-type: none"> <li>• Demonstrates a limited understanding of the technologies that would be used to carry out your role in the scientific team</li> <li>• Provides characteristics and features of TWO technologies</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Identifies the type of data that can be obtained from the TWO technologies</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Identifies how data are analysed for each technology</li> </ul>	2
<ul style="list-style-type: none"> <li>• Identifies ONE appropriate technology</li> </ul>	1

# Biology

## 2011 HSC Examination Mapping Grid

### Section I Part A

Question	Marks	Content	Syllabus outcomes
1	1	9.3.1.2.2, 9.3.3.2.2	H6, H9
2	1	9.2.2.2.1	H6
3	1	9.2.1.3.1, 9.2.1.2.3, 9.2.1.2.4, 9.2.1.2.6	H6
4	1	9.3.3.2.2, 9.3.3.2.3	H9
5	1	9.3.2.2.6, 9.3.2.2.3, 9.3.2.2.4, 9.3.2.3.2	H9
6	1	9.4.5.1	H1, H3
7	1	9.4.2.2.2, 9.4.2.1	H4
8	1	9.4.5.2.1, 9.4.5.2.2	H6
9	1	9.4.3.2.2, 14.3c	H6, H14
10	1	9.3.4.2.5, 9.3.5.2.1, 9.3.3.2.5	H7, H9
11	1	9.2.2.2.6, 14.1a, 14.1g, 14.1f, 12.3c	H6, H12
12	1	9.2.3.3.5	H7
13	1	9.2.2.2.4, 12.3c	H6, H12
14	1	9.4.4.2.1	H6
15	1	9.3.1.2.2, 14.1g	H10, H14
16	1	9.4.5.2.1, 9.4.5.2.2, 12.3c	H6, H12
17	1	9.3.2.2.4, 9.3.3.3.2, 14.1a, 14.1f	H9, H14
18	1	9.2.2.2.3, 12.3c, 14.1a	H6, H12, H14
19	1	9.4.3.3.2, 9.4.3.2.3	H8
20	1	9.3.4.2.7	H10

### Part B

Question	Marks	Content	Syllabus outcomes
21 (a)	2	9.4.2.3.2	H3, H4, H6
21 (b)	2	9.4.2.3.2	H3, H4, H6
22 (a)	1	9.2.1.3.1, 9.2.1.2.1, 9.2.1.2.2, 14.1a, 12.3c	H14, H12
22 (b)	2	9.2.1.3.1, 14.3c	H14
22 (c)	1	9.2.1.3.1, 14.1c	H14
23	5	9.3.4.3.5	H1, H2
24 (a)	1	9.4.5.3.1	H3, H4, H8
24 (b) (i)	2	9.4.5.3.1	H3, H4, H6
24 (b) (ii)	2	9.4.5.2.3	H3, H4, H6
25 (a)	2	9.2.3.2.6, 14.1f	H6, H14
25 (b)	1	9.2.3.2.5	H6
25 (c)	2	9.2.3.2.7	H6
26 (a)	4	9.4.6, 12.3c	H12

26 (b)	2	9.4.6, 12.4a	H12
27	4	9.4.6.1, 11.2c	H11
28 (a)	2	9.4.1.2.2, 9.4.1.3.1, 9.4.4.2.1, 12.3c	H12
28 (b)	3	9.2.2.3.5, 12.3c	H3, H12
29	5	9.4.2.3.1, 11.2a	H11
30 (a)	2	11.1e, 12.2a	H11, H12
30 (b)	3	9.2.1.3.3, 9.2.1.2.8, 14.1b	H6, H14
31	7	9.2.2.1, 9.2.1.3.1, 9.3.3.2.2, 9.3.4.2.3, 9.3.4.2.4, 9.3.4.2.5, 9.4.2.2.1, 9.4.2.3, 9.4.3, 9.4.3.2.2, 14.3b	H1, H4, H8, H7, H10, H14

**Section II**
**Question 32 — Communication**

Question	Marks	Content	Syllabus outcomes
32 (a) (i)	2	9.5.7.3.1	H6, H13
32 (a) (ii)	1	9.5.7.3.1	H6
32 (b)	4	9.5.7.2.3, 9.5.7.3.3, 13.1b, 13.1e, 13.1f	H6, H13
32 (c) (i)	2	9.5.2.2.1, 9.5.3.3.1, 9.5.3.2.2	H6
32 (c) (ii)	3	9.5.3.2.5	H6, H4
32 (d)	6	9.5.6.3.2	H6
32 (e)	7	9.5.1, 9.5.6.3, 14.3b	H3, H6, H14

**Question 33 — Biotechnology**

Question	Marks	Content	Syllabus outcomes
33 (a) (i)	2	9.6.5.3.4, 9.6.5.2.2, 12.3c, 13.1e	H6, H12, H13
33 (a) (ii)	1	9.6.5.3.4, 9.6.5.2.2	H6
33 (b)	4	9.6.4.2.1, 13.1a, 13.1e	H6, H13
33 (c) (i)	2	9.6.1.2.2, 11.1b	H11
33 (c) (ii)	3	9.6.2.1, 14.1c, 14.3c	H6, H14
33 (d)	6	9.6.5, 9.6.6, 9.6.7	H4, H8
33 (e)	7	9.6.5, 9.6.6, 9.6.4, 14.3b	H3, H4, H8, H6, H14

**Question 34 — Genetics: The Code Broken?**

Question	Marks	Content	Syllabus outcomes
34 (a) (i)	2	9.7.6.2.1, 14.1a, 12.3c	H6, H9, H12, H14
34 (a) (ii)	1	9.7.1.2.1, 9.7.6.2.1, 12.3c, 14.1e	H12, H14
34 (b)	4	9.7.2.2.1, 9.7.2.2.2, 9.7.2.3.1, 13.1b, 13.1e	H9, H13
34 (c) (i)	2	9.7.7.2.1, 9.7.7.2.2, 9.7.7.3.1	H6
34 (c) (ii)	3	9.7.2.2.1, 9.7.7.3.1	H6, H4
34 (d)	6	9.7.2, 9.7.4	H4, H9
34 (e)	7	9.7.3, 9.7.4.2.3, 9.7.4.2.4, 14.3b	H2, H3, H6, H14



**Question 35 — The Human Story**

Question	Marks	Content	Syllabus outcomes
35 (a) (i)	2	9.8.2.2.4, 12.3c	H10, H13.1, H12.3
35 (a) (ii)	1	9.8.2.2.4	H10
35 (b)	4	9.8.3.2.1, 9.8.3.3.1, 9.8.2.2.5, 13.1b, 13.1e	H10, H13
35 (c) (i)	2	9.8.3.2.2, 9.8.5.2.1	H10
35 (c) (ii)	3	9.8.3.2.1	H10
35 (d) (i)	4	9.8.3.2.3, 9.8.4.1	H10
35 (d) (ii)	2	9.8.3.2.3, 9.8.3.3.3, 9.8.4.2.1, 9.8.4.3.1	H10
35 (e)	7	9.8.2.2.6, 9.8.2.3.1, 9.8.2.3.2, 14.3b	H3, H10

**Question 36 — Biochemistry**

Question	Marks	Content	Syllabus outcomes
36 (a) (i)	1	9.9.6.3.1, 13.1e, 12.3c	H6, H12, H13
36 (a) (ii)	2	9.9.6.2.3, 13.1e, 12.3c	H6, H13, H12
36 (b)	4	13.1b, 9.9.4	H6, H13
36 (c)	5	9.9.5, 11.3c	H2, H6, H11
36 (d)	6	9.9.2.2	H1, H6
36 (e)	7	9.9.3.2.2, 9.9.3.2.3, 9.9.3.3.4, 9.9.3.3.3, 14.3b	H3, H6, H14