BOARD OF STUDIES
NEW SOUTH WALES

2011 HSC Senior Science Marking Guidelines

Section I, Part A

Multiple-choice Answer Key

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

Section I, Part B

Question 21 (a)

Criteria	Marks
• Clearly states why UHMWPE is suitable for use in hip joints	2
• Identifies a property of UHMWPE	1

Question 21 (b)

Criteria	Marks
• Provides support for the argument to use an uncemented implant • Relates its use to the growth of the bone	2
• Describes the uncemented implant OR • Relates its use to the growth of the bone or activity of teenagers	1

Question 22

Criteria	Marks
• Puts forward advantages for each method	3
• Puts forward some advantages	2
• Puts forward an advantage	1

Question 23

Criteria	Marks
• Provides thorough support for the use of microwaves in communication	4
• Provides sound support for the use of microwaves in communication	3
• Provides basic support for the use of microwaves in communication	2
• States any relevant information	1

Question 24 (a)

Criteria	Marks
• States a logical repeatable procedure that includes: identifying appropriate indicator(s) to test the pH, gives some quantitative guidelines AND/OR identifies a safe working practice	4
• States a procedure that identifies appropriate indicator(s) to test the pH and includes some of: identifying a safe working practice, quantitative guidelines, and repetition	3
• States a procedure that includes some of: indicating pH is tested, indicating a safe working practice, quantitative guidelines and repetition	2
• Any relevant statement • Identifies a variable or a relevant procedural step	1

Question 24 (b)

Criteria	Marks
• States that the manufacturer is not making a valid claim and provides a reason	2
• Correct answer 'No' with insufficient reasoning	1

Question 24 (c)

Criteria	Marks
• Provides a valid reason	1

Question 25 (a)

Criteria	Marks
• Relates cause and effect of plaque on blood flow to or from the heart	2
• ONE correct statement	1

Question 25 (b)

Criteria	Marks
• Gives features of TWO methods to reduce the effects of plaque	3
• Gives features of ONE method	2
• Names ONE method	1

Question 25 (c)

Criteria	Marks
• Provides valid methods to check reliability of data collected from secondary sources	2
• Provides a valid method	1

Question 26 (a)

Criteria	Marks
• Locates the FIVE events correctly on the timeline • Timeline is to scale	3
• Timeline is not to scale but all FIVE events are located in the correct sequence on the timeline	2
• Any relevant information is provided	1

Question 26 (b)

Criteria	Marks
• Provides a judgement of the impact on society • Supports judgement with detailed examples	4
• Provides a judgement of the impact on society • Supports judgement with some examples	3
• Provides a judgement of the impact on an individual or on society with a supporting reason OR • Provides some examples	2
• Provides any relevant information	1

Question 27 (a)

Criteria	Marks
• Sketches in general terms ONE verbal and ONE non-verbal form of communication	2
• Sketches in general terms either ONE verbal or ONE non-verbal form of communication OR correctly states ONE verbal or non-verbal form of communication	1

Question 27 (b)

Criteria	Marks
• Identifies TWO systems • Provides correct energy transformations for both systems • Provides applications for both systems	4
• Identifies TWO systems • Provides a correct energy transformation and application OR • Provides correct energy transformations OR applications	3
• Identifies a system • Provides a correct energy transformation OR application	2
• Any relevant information	1

Question 28 (a)

Criteria	Marks
• Labels both axes with time on the horizontal axis • Includes units on labels on axes • Plots points correctly • Draws a curve of best fit	3
• Labels both axes OR • Includes units axes and plots points correctly OR • Draws correct graph with ONE error	2
• Labels an axis and plots one point correctly	1

Question 28 (b)

Criteria	Marks
• Identifies the type of mixture • Supports identification with appropriate reasoning related to the change in light intensity	3
• Identifies the type of mixture and relates this to the change in light intensity or the particles separating out	2
• Incorrect identification of mixture but correct reasoning based on mixture that student identified OR • Correct identification of mixture OR • Correct reasoning without identification of mixture or with incorrect identification	1

Question 29

Criteria	Marks
• Clearly relates the properties of the emulsifier to the other TWO components and the process using the diagram	3
• Describes the effect of the emulsifier on the TWO components of the mixture OR refers to the diagram with a relevant statement	2
• ONE relevant statement/label	1

Question 30

Criteria	Marks
• Demonstrates a thorough understanding of how the body functions and relates this to the structure and functioning of appropriate biomedical devices • Uses correct scientific terminology and demonstrates a logical sequence of thought	7–8
• Demonstrates a sound understanding of how the body functions and relates this to the structure and/or functioning of appropriate biomedical devices	5–6
• Demonstrates a basic understanding of how the body functions and relates this to the structure and/or functioning of appropriate biomedical devices	3–4
• Demonstrates a basic understanding of how the body works OR • Demonstrates a basic understanding of how biomedical devices work	2
• Provides any relevant information	1

Section II

Question 31 (a) (i)

Criteria	Marks
• Gives the correct definition of *synthetic polymer*	1

Question 31 (a) (ii)

Criteria	Marks
• States a range of similarity/ies and difference(s) between polystyrene and polyethylene	3
• States similarity/ies and/or difference(s)	2
• States a similarity or difference	1

Question 31 (b)

Criteria	Marks
• Makes a judgement about the extent to which the manufacturers claim is correct • Relates a thermoplastic to its ability to be recycled • Outlines why additives may affect recyclability	4
• Relates a thermoplastic to its ability to be recycled • Outlines why additives may affect recyclability	3
• Relates a thermoplastic to its ability to be recycled • Identifies that additives may affect recyclability	2
• Any relevant information	1

Question 31 (c) (i)

Criteria	Marks
• Includes the ingredients of a natural polymer and the key steps taken to make it	2
• Identifies some ingredients of a natural polymer OR • Identifies some steps in producing a natural polymer	1

Question 31 (c) (ii)

Criteria	Marks
• Makes a valid decision about which material to use • Supports decision with pieces of evidence from table • Relates evidence to the use of mountain bikes	3
• Makes a decision about which material to use • Supports decision with evidence from table	2
• Any relevant information	1

Question 31 (d) (i)

Criteria	Marks
• Explains a benefit	2
• States a benefit	1

Question 31 (d) (ii)

Criteria	Marks
• Demonstrates an understanding of the term biodegradability • Identifies similarity/ies and difference(s) in biodegradability of items in each kitchen	3
• Demonstrates an understanding of the term biodegradability • Identifies similarity/ies OR difference(s) in biodegradability of items in each kitchen	2
• Demonstrates an understanding of the term biodegradability	1

Question 31 (e)

Criteria	Marks
• Shows an understanding of developments in polymer science • Shows a thorough understanding of how problems in polymer science have been reduced • Uses examples to support answer • Demonstrates a logical sequence of thought and uses scientific terminology	7
• Shows an understanding of developments in polymer science • Shows a sound understanding of how problems in polymer science have been reduced • Uses examples to support answer	5–6
• Identifies a development in polymer science • Describes a problem that has arisen • May use examples to support answer	3–4
• Describes a problem or development caused by polymer science	2
• Any relevant information	1

Question 32 (a) (i)

Criteria	Marks
• Names TWO additives used to increase shelf life	1

Question 32 (a) (ii)

Criteria	Marks
• Shows clearly how TWO physical preservation techniques increase shelf life	3
• Shows clearly how ONE physical preservation technique increases shelf life OR • Gives features of TWO physical preservation techniques	2
• Any relevant information	1

Question 32 (b)

Criteria	Marks
• Sketches in general terms THREE purposes for different additives in foods • Provides a supporting statement for each purpose	4
• Sketches in general terms TWO purposes for different additives in foods • Provides a supporting statement for each purpose	3
• Sketches in general terms ONE purpose for an additive in foods • Provides a supporting statement for this purpose OR • Identifies THREE uses of additives in foods	2
• Any relevant information	1

Question 32 (c) (i)

Criteria	Marks
• Correct calculation showing working, including units	2
• Correct answer without working OR • Correct working but incorrect answer OR • Correct identification of dependent variable	1

Question 32 (c) (ii)

Criteria	Marks
• Suggests THREE improvements to the experimental design to produce valid results	3
• Suggests TWO improvements to the experimental design to produce valid results	2
• Suggests an improvement to the experimental design to produce valid results	1

Question 32 (d) (i)

Criteria	Marks
• Correctly identifies *X*, *Y*, *Z*	2
• Correctly identifies ONE of *X*, *Y* or *Z*	1

Question 32 (d) (ii)

Criteria	Marks
• Defines osmosis and relates the process to the model illustrated	3
• Defines osmosis or describes the model	2
• Any relevant information	1

Question 32 (e)

Criteria	Marks
• Shows a thorough understanding of how food spoilage occurs • Relates food spoilage to government regulation of labelling in food industry • Uses examples to support answer • Demonstrates a logical sequence of thought and uses scientific terminology	7
• Shows a sound understanding of how food spoilage occurs • Relates food spoilage to government regulation of labelling in food industry • Uses examples to support answer	5–6
• Relates food spoilage to government regulation of labelling in food industry OR describes government regulation in food industry • May use examples to support answer	3–4
• Describes how food spoilage occurs • Describes government regulation of labelling in food industry	2
• Any relevant information	1

Question 33 (a) (i)

Criteria	Marks
• Identifies TWO components of the central nervous system	1

Question 33 (a) (ii)

Criteria	Marks
• States some similarities and differences between the nerve pathways in the TWO situations	3
• States ONE similarity and ONE difference between the TWO situations OR • States TWO differences between the TWO situations OR • States TWO similarities between the TWO situations	2
• States ONE similarity or difference between the TWO situations	1

Question 33 (b)

Criteria	Marks
• States components of the circulatory system and links their function to the transportation of pharmaceuticals around the body	4
• States components of the circulatory system and links a function to the transportation of pharmaceuticals around the body	3
• States components of the circulatory system and identifies roles	2
• Any relevant information	1

Question 33 (c) (i)

Criteria	Marks
• Identifies ONE correct variable on the rate of reproduction of bacteria • Sketches in general terms the effect of this variable	2
• Any relevant information	1

Question 33 (c) (ii)

Criteria	Marks
• Gives characteristics and features of the function of penicillin and relates its role to its effectiveness against both bacteria	3
• Sketches in general terms how penicillin functions and relates its role to its effectiveness against both bacteria	2
• Any relevant information	1

Question 33 (d) (i)

Criteria	Marks
• Identifies some characteristics of the inflammation response	2
• Any relevant information	1

Question 33 (d) (ii)

Criteria	Marks
• Gives main features of some advantages and some disadvantages	3
• Gives features of some advantages OR some disadvantages	2
• Any relevant information	1

Question 33 (e)

Criteria	Marks
• Shows a thorough understanding of a variety of benefits and problems with the use of pharmaceuticals • Relates effects of pharmaceuticals to their use • Uses examples to support answer • Demonstrates a logical sequence of thought and uses scientific terminology	7
• Shows a sound understanding of a variety of benefits and problems with the use of pharmaceuticals • Relates effects of pharmaceuticals to their use • Uses examples to support answer	5–6
• Identifies a benefit and a problem OR some benefits OR some problems with the use of pharmaceuticals • Relates an effect of pharmaceuticals to their use • May provide examples to support their statements	3–4
• Identifies a benefit and a problem OR some benefits OR some problems	2
• Any relevant information	1

Question 34 (a) (i)

Criteria	Marks
• States the meaning of the term '*natural disaster*'	1

Question 34 (a) (ii)

Criteria	Marks
• Names a specific Australian disaster that was the result of both natural and human activity • Relates how both the natural and human activity combined to cause the natural disaster	3
• Names a specific Australian disaster that was the result of both natural and human activity • Outlines the natural OR human activity that caused the disaster	2
• Names a specific Australian disaster that was the result of both natural and human activity OR • Outlines either the natural OR human activity that caused the disaster	1

Question 34 (b)

Criteria	Marks
• Gives the necessary steps that must be followed to locate the epicentre	4
• Gives most steps to locate the epicentre	3
• Makes reference to both graphs without linking to the process of locating the epicentre	2
• Any relevant information	1

Question 34 (c) (i)

Criteria	Marks
• Gives TWO conclusions from these results	2
• Gives ONE conclusion from these results	1

Question 34 (c) (ii)

Criteria	Marks
• Suggests THREE improvements to the experimental design	3
• Suggests TWO improvements to the experimental design	2
• Suggests ONE improvement to the experimental design	1

Question 34 (d) (i)

Criteria	Marks
• States features about how the weather changes	2
• States a feature about the weather that changes OR • States a feature of the weather before **Y** moves across	1

Question 34 (d) (ii)

Criteria	Marks
• Relates examples of technologies to improvements in weather predictions	3
• Relates an example of technology to an improvement in weather prediction	2
• Identifies an example of technology involved in weather predictions OR • Sketches in general terms how weather predictions have improved	1

Question 34 (e)

Criteria	Marks
• Shows a thorough understanding of a range of strategies used to minimise the effect of bushfires • Relates a feature of a strategy to its effectiveness • Uses examples to support answer • Demonstrates a logical sequence of thought and uses scientific terminology	7
• Shows a sound understanding of a range of strategies used to minimise the effect of bushfires • Relates a feature of a strategy to its effectiveness • Uses examples to support answer	5–6
• Identifies strategies used to minimise the effect of bushfires • Describes a feature of a strategy • May provide examples to support statements	3–4
• Identifies a strategy and outlines a feature OR • Identifies more than one strategy	2
• Any relevant information	1

Question 35 (a) (i)

Criteria	Marks
• States TWO situations in which a person could experience weightlessness on Earth	1

Question 35 (a) (ii)

Criteria	Marks
• Shows the relationship between gravity and weightlessness for the International Space Station (ISS)	3
• Gives characteristics and features of the ISS	2
• Makes a correct statement	1

Question 35 (b)

Criteria	Marks
• States role and reason for all three components	4
• States role and reason for some components	3
• States role or reason for some components	2
• States a role or reason	1

Question 35 (c) (i)

Criteria	Marks
• States TWO conclusions	2
• States ONE conclusion	1

Question 35 (c) (ii)

Criteria	Marks
• Suggests THREE improvements to the experimental design	3
• Suggests TWO improvements to the experimental design	2
• Suggests ONE improvement to the experimental design	1

Question 35 (d)

Criteria	Marks
• States specific examples of information collected by either Voyager space probe about the universe	2
• States a relevant piece of information about Voyager	1

Question 35 (e)

Criteria	Marks
• Relates improvements in technology to increased quality of information about the universe	3
• Relates an improvement in technology to information about the universe that the technology provided OR • Identifies some improvements in technology	2
• Identifies an improvement in technology	1

Question 35 (f)

Criteria	Marks
• Shows a thorough understanding of a range of problems faced by humans travelling in space • Relates problems to appropriate solutions • Uses examples to support answer • Demonstrates a logical sequence of thought and uses scientific terminology	7
• Shows a sound understanding of a range of problems faced by humans travelling in space • Relates problems to solutions • Uses examples to support answer	5–6
• Identifies a problem faced by humans travelling in space • Relates problem to a solution • May use examples to support answer	3–4
• Describes a problem or solution	2
• Any relevant information	1

Senior Science

2011 HSC Examination Mapping Grid

Section I
Part A

Question	Marks	Content	Syllabus outcomes
1	1	9.3.3.2.3	H9
2	1	9.3.5.2.2, 9.3.5.3.1	H10
3	1	9.3.1.2.1	H8
4	1	9.2.1.2.3	H8
5	1	9.2.1.3.1	H8
6	1	9.2.5.2.3, 9.2.5.2.1	H8, H9
7	1	9.2.3.2.2, 9.2.3.2.4	H7
8	1	9.3.4.2.1	H9
9	1	9.2.3.2.5	H8
10	1	9.4.1.3.1	H10
11	1	9.3.2.3.3	H3
12	1	9.4.6.2.1, H11.2 (b)	H2, H11
13	1	9.2.5.2.5, H12.3 (c)	H8, H12
14	1	9.2.5.2.4, H11.2 (a)	H2, H11
15	1	9.4.2.3.1, H14.1 (a)	H10, H14 H10, H14
16	1	9.4.4.3.1, 9.4.3.2.2	H10
17	1	9.4.1.2.5	H10
18	1	9.4.6, H14.1 (b) and (c)	H10, H14
19	1	9.4.6.2.1, H12.4 (b)	H12
20	1	9.4.5.2.3, H14.1 (g), H14.3 (d)	H10, H14

Part B

Question	Marks	Content	Syllabus outcomes
21 (a)	2	9.3.3.2.6	H3, H8
21 (b)	2	9.3.3.2.9, 9.3.3.2.10	H9
22	3	9.2.4.3.2, 9.2.5.3.1, H14.3 (c)	H7, H8, H14
23	4	9.4.2.2.2, 9.4.3.2.1, 9.4.3.2.2	H3, H10
24 (a)	4	9.2.3.3.3, H11.2	H2, H8, H11
24 (b)	2	9.2.3.3.2, H14.1 (c)	H8, H14
24 (c)	1	H14.3 (c)	H2, H14
25 (a)	2	9.3.2.2.8	H9, H7
25 (b)	3	9.3.2.2.9	H4, H7
25 (c)	2	9.3.2.3.6, H12.3 (b) and (d)	H12
26 (a)	3	9.4.1.3.2, H13.1 (a) and (e)	H1, H13
26 (b)	4	9.4.1.3.2	H4, H10
27 (a)	2	9.4.1.2.3	H3, H10

27 (b)	4	9.4.1.2.5, 9.4.1.3.1	H3, H10
28 (a)	3	9.2.1.2.3, H13.1 (f)	H13
28 (b)	3	9.2.1.3.2	H8
29	3	9.2.1.3.5, 9.2.2.2.1, H14.1 (f)	H8, H14
30	8	9.3.1, 9.3.2, 9.3.3, 9.3.4	H1, H3, H9

Section II

Question 31 — Polymers

Question	Marks	Content	Syllabus outcomes
31 (a) (i)	1	9.5.2.2.1, 9.5.1.2.1	H8
31 (a) (ii)	3	9.5.2.2.1, 9.5.2.3.3	H8
31 (b)	4	9.5.3.2.3, 9.5.3.2.4, 9.5.4.3.1, H14.1 (b) and (d)	H8, H14
31 (c) (i)	2	9.5.2.3.1, H11.3 (a)	H11
31 (c) (ii)	3	9.5.2.2.1, 9.5.2.3.2, H14.1 (e)	H3, H8, H14
31 (d) (i)	2	9.5.3.2.4	H4
31 (d) (ii)	3	9.5.4.2.2, 9.5.4.2.3	H6
31 (e)	7	9.5.4, 9.5.2.2, 9.5.2.2.3	H1, H4, H6, H8

Question 32 — Preservatives and Additives

Question	Marks	Content	Syllabus outcomes
32 (a) (i)	1	9.6.1.2.2, 9.6.2.2.4	H8
32 (a) (ii)	3	9.6.2.2.2, 9.6.2.3.1	H3, H8
32 (b)	4	9.6.1, 9.6.2.2.4, 9.6.2.3.6	H4, H8
32 (c) (i)	2	9.6.3, H11.2 (a), H12.4 (b), H12.3 (c)	H2, H11, H12
32 (c) (ii)	3	9.6.3.2.2, H11.2 (c), H12.4 (d)	H2, H11, H12
32 (d) (i)	2	9.6.3.3.3	H9, H13
32 (d) (ii)	3	9.6.3.3.3	H8
32 (e)	7	9.6.2, 9.6.3, 9.6.4, 9.6.5	H3, H8

Question 33 — Pharmaceuticals

Question	Marks	Content	Syllabus outcomes
33 (a) (i)	1	9.7.1.2.1	H9
33 (a) (ii)	3	9.7.1.2.2, 9.7.1.2.6	H7, H9
33 (b)	4	9.7.2	H3, H9
33 (c) (i)	2	9.7.4.2.3	H7
33 (c) (ii)	3	9.7.4.2.4, 9.7.4.2.5, H14.1 (d)	H8, H14
33 (d) (i)	2	9.7.3.2.1, H14.1 (f)	H7, H9, H14
33 (d) (ii)	3	9.7.3.2.3, 9.7.3.3.1	H7, H9
33 (e)	7	9.7.2, 9.7.3	H4, H8, H9

Question 34 — Disasters

Question	Marks	Content	Syllabus outcomes
34 (a) (i)	1	9.8.1	H10
34 (a) (ii)	3	9.8.1.2.4, 9.8.1.3.2	H10
34 (b)	4	9.8.3.2.3, 9.8.3.3.1, 14.1 (f)	H10, H14
34 (c) (i)	2	9.8.3.3.6, H14.1 (a) and (b)	H14
34 (c) (ii)	3	9.8.3.3.6, 9.8.3.2.5, H11.2 (c)	H2, H10, H11
34 (d) (i)	2	9.8.2.3.2, 9.8.2.3.3, H14.1 (a) and (d)	H10, H14
34 (d) (ii)	3	9.8.2.2.4, 9.8.2.2.5, 9.8.2.2.6	H1, H3, H10
34 (e)	7	9.8.5, 9.8.3.3.5	H4, H6, H10

Question 35 — Space Science

Question	Marks	Content	Syllabus outcomes
35 (a) (i)	1	9.9.2.2.2	H7
35 (a) (ii)	3	9.9.2.2.3	H10
35 (b)	4	9.9.4.2.1, 9.9.4.2.2, 9.9.4.2.3	H8, H10
35 (c) (i)	2	9.9.3.2.6, H14.1 (a), (b)	H14
35 (c) (ii)	3	9.9.3.3.1, H11.2 (c)	H11
35 (d)	2	9.9.5.3.1	H1, H10
35 (e)	3	9.9.5.2.5, 9.9.5.3.2	H1, H3, H10
35 (f)	7	9.9.3, 9.9.5.2.1	H3, H8, H9