



## 2012 HSC Senior Science Marking Guidelines

### Section I, Part A

#### Multiple-choice Answer Key

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

## Section I, Part B

### Question 21 (a)

| Criteria                                                                                                                                                                                                      | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Shows how light can pass through an optical fibre using appropriate equipment including a light source and a method of detecting the light at the other end</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>Identifies either a light source or a method of detection</li> </ul>                                                                                                   | 1     |

### Question 21 (b)

| Criteria                                                                                                                                                                            | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides similarities and differences</li> </ul>                                                                                             | 4     |
| <ul style="list-style-type: none"> <li>Provides a similarity and differences</li> </ul> OR <ul style="list-style-type: none"> <li>Provides similarities and a difference</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Provides similarities OR differences OR a similarity and a difference</li> </ul>                                                             | 2     |
| <ul style="list-style-type: none"> <li>Provides some relevant information</li> </ul>                                                                                                | 1     |

### Question 22 (a)

| Criteria                                                                                                                       | Marks |
|--------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Identifies TWO properties of silicone that make it useful in bionic implants</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>Identifies ONE property of silicone</li> </ul>                                          | 1     |

### Question 22 (b)

| Criteria                                                                                                                                                               | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Identifies TWO safety precautions when testing silicone</li> <li>Provides a reason for each stated safety precaution</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Identifies ONE safety precaution AND provides a reason for safety precaution</li> </ul>                                         | 2     |
| <ul style="list-style-type: none"> <li>Identifies at least one safety precaution</li> </ul>                                                                            | 1     |

### Question 23

| Criteria                                                                                                                                                                                                                                                                            | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Describes the effects of CPR on the heart and lungs</li> <li>Relates these effects to maintaining life</li> <li>Uses correct scientific terminology and demonstrates a logical sequence of thought connecting actions and effects</li> </ul> | 4–5   |
| <ul style="list-style-type: none"> <li>Describes the effects of CPR on the heart <b>and</b> lungs</li> </ul>                                                                                                                                                                        | 3     |
| <ul style="list-style-type: none"> <li>Outlines the effect of CPR on the heart <b>or</b> lungs</li> </ul>                                                                                                                                                                           | 2     |
| <ul style="list-style-type: none"> <li>Provides some relevant information</li> </ul>                                                                                                                                                                                                | 1     |

### Question 24 (a)

| Criteria                                                                                                                                                                                                                                                                                             | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Describes a valid experimental method to test the chosen variable including: <ul style="list-style-type: none"> <li>Repetition or large sample size</li> <li>Data collection method</li> <li>The control</li> <li>Controlled variables</li> </ul> </li> </ul> | 4     |
| <ul style="list-style-type: none"> <li>Outlines a method that demonstrates a sound understanding of scientific method</li> </ul>                                                                                                                                                                     | 3     |
| <ul style="list-style-type: none"> <li>Outlines a method that demonstrates a basic understanding of scientific method</li> </ul>                                                                                                                                                                     | 2     |
| <ul style="list-style-type: none"> <li>Provides a feature of a valid experiment</li> </ul>                                                                                                                                                                                                           | 1     |

### Question 24 (b)

| Criteria                                                                                                         | Marks |
|------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides details of processes used to analyse data</li> </ul>             | 3     |
| <ul style="list-style-type: none"> <li>Provides more than ONE analytical process used to analyse data</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                       | 1     |

**Question 24 (c)**

| Criteria                                                                | Marks |
|-------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>States another factor</li> </ul> | 1     |

**Question 25**

| Criteria                                                                                                                                                                                                                                | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Thorough understanding of the impacts of pacemakers on society</li> <li>Makes a judgement based on the information they described</li> <li>Demonstrates a logical sequence of thought</li> </ul> | 4     |
| <ul style="list-style-type: none"> <li>Sound understanding of the impacts of pacemakers on society</li> <li>Makes a judgement based on the information they described</li> </ul>                                                        | 3     |
| <ul style="list-style-type: none"> <li>Sound understanding of the impacts of pacemakers on individuals</li> </ul>                                                                                                                       | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                                                                                              | 1     |

**Question 26**

| Criteria                                                                                                                            | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides a detailed explanation of how microflora inhibit the growth of pathogens</li> </ul> | 4     |
| <ul style="list-style-type: none"> <li>Provides sound explanation of how microflora inhibit the growth of pathogens</li> </ul>      | 3     |
| <ul style="list-style-type: none"> <li>Describes an effect of microflora</li> </ul>                                                 | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                          | 1     |

**Question 27 (a)**

| Criteria                                                                                                             | Marks |
|----------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>States a difference in sound quality between AM and FM radio waves</li> </ul> | 1     |

### Question 27 (b)

| Criteria                                                                                                                                                                                 | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>States a feature of each of AM and FM radio waves and relates each feature to how it is used</li> </ul>                                           | 4     |
| <ul style="list-style-type: none"> <li>States a feature of each of AM and FM radio waves and provides one related use</li> </ul>                                                         | 3     |
| <ul style="list-style-type: none"> <li>States a feature of either AM or FM radio waves and relates the feature to how it is used OR states a feature of AM and FM radio waves</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>Provides any relevant information</li> </ul>                                                                                                      | 1     |

### Question 27 (c)

| Criteria                                                                                                                                                                                                               | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>States that two waves are added together in the modulation process</li> <li>Describes how this process results in a wave that differs only in amplitude or frequency</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Outlines how AM and FM modulation occurs</li> </ul>                                                                                                                             | 2     |
| <ul style="list-style-type: none"> <li>Provides any relevant information</li> </ul>                                                                                                                                    | 1     |

### Question 28

| Criteria                                                                                                                                                                                                                              | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Outlines the benefits of an electronic and a non-electronic information system</li> </ul> OR <ul style="list-style-type: none"> <li>Outlines two benefits of using combined systems</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Outlines benefits of a system</li> </ul> OR <ul style="list-style-type: none"> <li>Outlines a benefit of using combined systems</li> </ul>                                                     | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                                                                                            | 1     |

**Question 29 (a)**

| Criteria                    | Marks |
|-----------------------------|-------|
| • States the correct reason | 1     |

**Question 29 (b)**

| Criteria                                                                       | Marks |
|--------------------------------------------------------------------------------|-------|
| • Correctly chooses B and gives reasons for their choice                       | 3     |
| • Chooses B with a reason for their choice                                     | 2     |
| • Chooses B with no reason or chooses incorrect medication with correct reason | 1     |

### Question 30

| Criteria                                                                                                                                                                                                                                                                                                                                                                                           | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides a detailed description of the properties of the substances and thoroughly explains how these chemicals are used on the body</li> <li>Provides examples to support answer (may be of the same type of substance or different)</li> <li>Uses correct scientific terminology and demonstrates a logical sequence of thought</li> </ul>                | 7–8   |
| <ul style="list-style-type: none"> <li>Provides a description of the properties of at least two substances and demonstrates a sound understanding of how these chemicals are used on the body</li> <li>Provides at least ONE example to support their answer</li> </ul>                                                                                                                            | 5–6   |
| <ul style="list-style-type: none"> <li>States the properties for each substance</li> </ul> OR <ul style="list-style-type: none"> <li>States how each is used on the body</li> </ul>                                                                                                                                                                                                                | 4     |
| <ul style="list-style-type: none"> <li>States the properties for TWO substances</li> </ul> OR <ul style="list-style-type: none"> <li>States how TWO substances are used on the body</li> </ul> OR <ul style="list-style-type: none"> <li>Provides a description of a property of at least ONE substance and demonstrates a sound understanding of how this chemical is used on the body</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>States the property of ONE substance and relates it to its use on the body</li> </ul> OR <ul style="list-style-type: none"> <li>Gives TWO or more properties</li> </ul> OR <ul style="list-style-type: none"> <li>Gives TWO or more uses</li> </ul> OR <ul style="list-style-type: none"> <li>Gives TWO or more examples</li> </ul>                         | 2     |
| <ul style="list-style-type: none"> <li>Provides any relevant information</li> </ul>                                                                                                                                                                                                                                                                                                                | 1     |

## Section II

### Question 31 (a)

| Criteria                                                                                                                                                                                                                    | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Identifies fossil fuels (or coal, gas, oil) as the source of petrochemicals</li> <li>Relates the diminishing supply of petrochemicals to the supply of synthetic polymers</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>States that the supply of petrochemicals will run out</li> </ul>                                                                                                                     | 2     |
| <ul style="list-style-type: none"> <li>States that synthetic polymers are made from petrochemicals OR</li> <li>States that petrochemicals come from fossil fuels</li> </ul>                                                 | 1     |

### Question 31 (b) (i)

| Criteria                                                                                                                                               | Marks |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Plots points accurately on labelled axes showing quantities, units and scales and draws a line graph</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Plots a reasonable graph with one or more errors</li> </ul>                                                     | 2     |
| <ul style="list-style-type: none"> <li>Any aspect of a graph that is correct, which could include a graph heading</li> </ul>                           | 1     |

### Question 31 (b) (ii)

| Criteria                                                                                                                                                                                                             | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Indicates on the graph to show how an interpolated value was arrived at using the line or clearly describes the process AND</li> <li>States the interpolated value</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>States the interpolated value or correctly indicates how to obtain the interpolated value on the graph OR describes the process</li> </ul>                                    | 1     |

### Question 31 (c)

| Criteria                                                                                                                                                                  | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Identifies natural polymers</li> </ul> AND <ul style="list-style-type: none"> <li>Relates a property of each to its use</li> </ul> | 4     |
| <ul style="list-style-type: none"> <li>Identifies natural polymers and relates a property to their uses</li> </ul>                                                        | 3     |
| <ul style="list-style-type: none"> <li>Identifies a natural polymer and relates a property to its use</li> </ul>                                                          | 2     |
| <ul style="list-style-type: none"> <li>Identifies a natural polymer OR a property</li> </ul>                                                                              | 1     |

### Question 31 (d) (i)

| Criteria                                                                                                                   | Marks |
|----------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides a detailed description of how to check the validity of a source</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Provides a sound description of how to check the validity of a source</li> </ul>    | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                 | 1     |

### Question 31 (d) (ii)

| Criteria                                                                                                                                | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Demonstrates a thorough understanding of the issues associated with plastic recycling</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Demonstrates a sound understanding of the issues</li> </ul>                                      | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                              | 1     |

### Question 31 (e)

| Criteria                                                                                                                                                                                                                                                                                | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Demonstrates a thorough understanding of how and why plastics are widely used in society</li> <li>Provides examples to support the answer</li> <li>Uses correct scientific terminology and demonstrates a logical sequence of thought</li> </ul> | 6–7   |
| <ul style="list-style-type: none"> <li>Demonstrates a sound understanding of how plastics are used in society</li> <li>May provide example(s)</li> </ul>                                                                                                                                | 4–5   |
| <ul style="list-style-type: none"> <li>Demonstrates a basic understanding of how plastics are used in society</li> </ul>                                                                                                                                                                | 2–3   |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                                                                                                                                              | 1     |

**Question 32 (a)**

| Criteria                                                                                                                                                                                                                                        | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>States that cheeses and yoghurts contain microorganisms</li> <li>Relates the lack of growth of other microorganisms to the chemicals produced naturally by the bacteria in cheese and yoghurt</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>States that they contain microorganisms OR natural preservatives</li> <li>States that these can inhibit growth of other microbes</li> </ul>                                                              | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                                                                                                      | 1     |

**Question 32 (b) (i)**

| Criteria                                                                                                                                               | Marks |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Plots points accurately on labelled axes showing quantities, units and scales and draws a line graph</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Plots a reasonable graph with one or more errors</li> </ul>                                                     | 2     |
| <ul style="list-style-type: none"> <li>Any aspect of a graph that is correct, which could include a graph heading</li> </ul>                           | 1     |

**Question 32 (b) (ii)**

| Criteria                                                                                                                                                                                                             | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Indicates on the graph to show how an interpolated value was arrived at using the line or clearly describes the process AND</li> <li>States the interpolated value</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>States the interpolated value or correctly indicates how to obtain the interpolated value on the graph OR describes the process</li> </ul>                                    | 1     |

### Question 32 (c)

| Criteria                                                                                                                                                                                                                                                                                                                                                   | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Demonstrates a thorough understanding of the relationship between people's perceptions, scientific information and marketing</li> <li>• Includes how labelling can affect a consumer's choice of food product and recognition of how negative labelling can be misleading</li> <li>• Includes examples</li> </ul> | 4     |
| <ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of the relationship between people's perceptions, scientific information and marketing</li> <li>• Includes how labelling can affect a consumer's choice of food product and recognition of how negative labelling can be misleading</li> <li>• Includes an example</li> </ul>  | 3     |
| <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of the effect of negative labelling on people</li> </ul> OR <ul style="list-style-type: none"> <li>• States examples of negative labelling</li> </ul>                                                                                                                          | 2     |
| <ul style="list-style-type: none"> <li>• Any relevant information</li> </ul>                                                                                                                                                                                                                                                                               | 1     |

### Question 32 (d) (i)

| Criteria                                                                                                                     | Marks |
|------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Provides a detailed description of how to check the validity of a source</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>• Provides a sound description of how to check the validity of a source</li> </ul>    | 2     |
| <ul style="list-style-type: none"> <li>• Any relevant information</li> </ul>                                                 | 1     |

### Question 32 (d) (ii)

| Criteria                                                                                                                        | Marks |
|---------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Outlines (using an example) a benefit and a problem in using food additives</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>• Outlines a benefit OR a problem in using food additives</li> </ul>                     | 2     |
| <ul style="list-style-type: none"> <li>• Any relevant information</li> </ul>                                                    | 1     |

### Question 32 (e)

| Criteria                                                                                                                                                                                                                                                                                                                                                                                            | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Demonstrates a thorough understanding of conditions for growth and reproduction of microorganisms</li> <li>• Links microorganism conditions to the development of food preservation techniques</li> <li>• Provides examples to support the answer</li> <li>• Uses correct scientific terminology and demonstrates a logical sequence of thought</li> </ul> | 6–7   |
| <ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of conditions for growth and reproduction of microorganisms</li> <li>• Links microorganism conditions to the development of food preservation techniques</li> <li>• May provide example(s)</li> </ul>                                                                                                                   | 4–5   |
| <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of conditions for growth and reproduction of microorganisms</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of the development of food preservation techniques</li> </ul>                                                                                              | 2–3   |
| <ul style="list-style-type: none"> <li>• Any relevant information</li> </ul>                                                                                                                                                                                                                                                                                                                        | 1     |

### Question 33 (a)

| Criteria                                                                                                                             | Marks |
|--------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Provides reasons why it is advantageous to have more than one type of antibiotic</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>• Outlines why it is advantageous to have more than one type of antibiotic</li> </ul>         | 2     |
| <ul style="list-style-type: none"> <li>• Identifies a benefit or problem of using antibiotics</li> </ul>                             | 1     |

### Question 33 (b) (i)

| Criteria                                                                                                                                                 | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Plots points accurately on labelled axes showing quantities, units and scales and draws a line graph</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>• Plots a reasonable graph with one or more errors</li> </ul>                                                     | 2     |
| <ul style="list-style-type: none"> <li>• Any aspect of a graph that is correct, which could include a graph heading</li> </ul>                           | 1     |

**Question 33 (b) (ii)**

| Criteria                                                                                                                                                                                                             | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Indicates on the graph to show how an interpolated value was arrived at using the line or clearly describes the process AND</li> <li>States the interpolated value</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>States the interpolated value or correctly indicates how to obtain the interpolated value on the graph OR describes the process</li> </ul>                                    | 1     |

**Question 33 (c)**

| Criteria                                                                                                                                                                | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides a detailed description linking differences in structure to their functions for both arteries and capillaries</li> </ul> | 4     |
| <ul style="list-style-type: none"> <li>Provides an outline that links a difference in structure to function for both arteries and capillaries</li> </ul>                | 3     |
| <ul style="list-style-type: none"> <li>States differences between arteries and capillaries</li> </ul>                                                                   | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                              | 1     |

**Question 33 (d) (i)**

| Criteria                                                                                                                   | Marks |
|----------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides a detailed description of how to check the validity of a source</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Provides a sound description of how to check the validity of a source</li> </ul>    | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                 | 1     |

**Question 33 (d) (ii)**

| Criteria                                                                                                                                                        | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides a detailed description of aspects of the circulatory system involved in potentially killing bacteria</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Outlines an aspect of the circulatory system that shows how it can help kill bacteria</li> </ul>                         | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                      | 1     |

### Question 33 (e)

| Criteria                                                                                                                                                                                                                                                                                                                                                                         | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Demonstrates a thorough understanding of the work of both scientists</li> <li>• Links their work to how it has helped us to understand the causes and prevention of disease</li> <li>• Provides examples to support the answer</li> <li>• Uses correct scientific terminology and demonstrates a logical sequence of thought</li> </ul> | 6–7   |
| <ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of the work of both scientists</li> <li>• Links their work to how it has helped us to understand the causes and prevention of disease</li> <li>• May provide example(s)</li> </ul>                                                                                                                   | 4–5   |
| <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of the work of one scientist</li> </ul> OR <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of causes or methods of prevention of disease</li> </ul>                                                                                                                      | 2–3   |
| <ul style="list-style-type: none"> <li>• Any relevant information</li> </ul>                                                                                                                                                                                                                                                                                                     | 1     |

### Question 34 (a)

| Criteria                                                                                                                                                                                                 | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Describes a property of radar</li> <li>• Relates property to monitoring and prediction of weather patterns</li> </ul>                                           | 3     |
| <ul style="list-style-type: none"> <li>• Outlines a property of radar</li> </ul> OR <ul style="list-style-type: none"> <li>• Outlines the uses of radar in the prediction of weather patterns</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>• Any relevant information</li> </ul>                                                                                                                             | 1     |

**Question 34 (b) (i)**

| Criteria                                                                                                                                               | Marks |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Plots points accurately on labelled axes showing quantities, units and scales and draws a line graph</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Plots a reasonable graph with one or more errors</li> </ul>                                                     | 2     |
| <ul style="list-style-type: none"> <li>Any aspect of a graph that is correct, which could include a graph heading</li> </ul>                           | 1     |

**Question 34 (b) (ii)**

| Criteria                                                                                                                                                                                                                   | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Indicates on the graph to show how an interpolated value was arrived at using the line graph or clearly describes the process AND</li> <li>States the interpolated value</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>States the interpolated value or correctly indicates how to obtain the interpolated value on the graph OR describes the process</li> </ul>                                          | 1     |

**Question 34 (c)**

| Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>States two types of disasters</li> <li>Outlines a way that humans can increase the effects of each disaster</li> <li>Outlines a way that humans can decrease the effects of each disaster</li> </ul>                                                                                                                                                                                                                                                                                              | 4     |
| <ul style="list-style-type: none"> <li>States two types of disasters</li> <li>Outlines a way that humans can decrease the effects of each disaster</li> <li>Outlines a way that humans can increase the effect of ONE disaster</li> </ul> OR <ul style="list-style-type: none"> <li>States two types of disasters</li> <li>Outlines a way that humans can increase the effects of each disaster</li> <li>Outlines a way that humans can decrease the effect of ONE disaster</li> </ul>                                                   | 3     |
| <ul style="list-style-type: none"> <li>Outlines way(s) that humans can increase the effects of ONE disaster</li> <li>Outlines way(s) that humans can decrease the effects of ONE disaster</li> </ul> OR <ul style="list-style-type: none"> <li>States two types of disasters</li> <li>Outlines way(s) that humans can increase the effects of each disaster</li> </ul> OR <ul style="list-style-type: none"> <li>States two types of disasters</li> <li>Outlines way(s) that humans can decrease the effects of each disaster</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1     |

**Question 34 (d) (i)**

| Criteria                                                                   | Marks |
|----------------------------------------------------------------------------|-------|
| • Provides a detailed description of how to check the validity of a source | 3     |
| • Provides a sound description of how to check the validity of a source    | 2     |
| • Any relevant information                                                 | 1     |

**Question 34 (d) (ii)**

| Criteria                                                                         | Marks |
|----------------------------------------------------------------------------------|-------|
| • Detailed description of energy transfer and energy transformation of bushfires | 3     |
| • Outlines an energy transfer OR energy transformation of bushfires              | 2     |
| • Any relevant information                                                       | 1     |

**Question 34 (e)**

| Criteria                                                                                                                                                                                                                                                                                                                                                      | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Demonstrates a thorough understanding of how earthquakes are predicted</li> <li>• Makes a judgement linking scientific advances to earthquake prediction</li> <li>• Provides examples to support the answer</li> <li>• Uses correct scientific terminology and demonstrates a logical sequence of thought</li> </ul> | 6–7   |
| <ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of how earthquakes are predicted</li> <li>• Makes a judgement linking scientific advances to earthquake prediction</li> <li>• May provide example(s)</li> </ul>                                                                                                                   | 4–5   |
| <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of how to predict earthquakes</li> </ul> OR <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of scientific advances to predict earthquakes</li> </ul>                                                                                                  | 2–3   |
| • Any relevant information                                                                                                                                                                                                                                                                                                                                    | 1     |

### Question 35 (a)

| Criteria                                                                                                                                                    | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Relates the use of booster rockets to the mass of the rocket, mass of fuel and the necessary acceleration</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Relates the use of booster rockets to an aspect of the rocket or its launch</li> </ul>                               | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                                                                  | 1     |

### Question 35 (b) (i)

| Criteria                                                                                                                                               | Marks |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Plots points accurately on labelled axes showing quantities, units and scales and draws a line graph</li> </ul> | 3     |
| <ul style="list-style-type: none"> <li>Plots a reasonable graph with one or more errors</li> </ul>                                                     | 2     |
| <ul style="list-style-type: none"> <li>Any aspect of a graph that is correct, which could include a graph heading</li> </ul>                           | 1     |

### Question 35 (b) (ii)

| Criteria                                                                                                                                                                                                             | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Indicates on the graph to show how an interpolated value was arrived at using the line or clearly describes the process AND</li> <li>States the interpolated value</li> </ul> | 2     |
| <ul style="list-style-type: none"> <li>States the interpolated value or correctly indicates how to obtain the interpolated value on the graph OR describes the process</li> </ul>                                    | 1     |

### Question 35 (c)

| Criteria                                                                                                        | Marks |
|-----------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>Provides explanations of reasons for the telescopes' location</li> </ul> | 4     |
| <ul style="list-style-type: none"> <li>Provides explanations of a reason for the location</li> </ul>            | 3     |
| <ul style="list-style-type: none"> <li>Identifies reasons for the location</li> </ul>                           | 2     |
| <ul style="list-style-type: none"> <li>Any relevant information</li> </ul>                                      | 1     |

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

| Criteria                                                                   | Marks |
|----------------------------------------------------------------------------|-------|
| • Provides a detailed description of how to check the validity of a source | 3     |
| • Provides a sound description of how to check the validity of a source    | 2     |
| • Any relevant information                                                 | 1     |

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

| Criteria                                                                                      | Marks |
|-----------------------------------------------------------------------------------------------|-------|
| • Demonstrates a thorough understanding of the effects on human health of time spent in space | 3     |
| • Demonstrates a sound understanding of the effects on human health of time in space          | 2     |
| • Any relevant information                                                                    | 1     |

**Question 35 (e)**

| Criteria                                                                                                                                                                                                                                                                                                                                                                                    | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <ul style="list-style-type: none"> <li>• Demonstrates a thorough understanding of developments in Australian and other countries' technologies</li> <li>• Links developments in technology to our understanding of the universe</li> <li>• Provides examples to support the answer</li> <li>• Uses correct scientific terminology and demonstrates a logical sequence of thought</li> </ul> | 6–7   |
| <ul style="list-style-type: none"> <li>• Demonstrates a sound understanding of developments in technologies</li> <li>• Links developments in technology to our understanding of the universe</li> <li>• May provide example(s)</li> </ul>                                                                                                                                                   | 4–5   |
| <ul style="list-style-type: none"> <li>• Demonstrates a basic understanding of developments in technologies</li> </ul> OR <ul style="list-style-type: none"> <li>• Demonstrates a basic knowledge of our understanding of the universe</li> </ul>                                                                                                                                           | 2–3   |
| • Any relevant information                                                                                                                                                                                                                                                                                                                                                                  | 1     |

# Senior Science

## 2012 HSC Examination Mapping Grid

### Section I Part A

| Question | Marks | Content                         | Syllabus outcomes |
|----------|-------|---------------------------------|-------------------|
| 1        | 1     | 9.2.5.2.7                       | H8                |
| 2        | 1     | 9.3.3.3.1, 14.1g                | H8, H14           |
| 3        | 1     | 9.4.1.2.5                       | H10               |
| 4        | 1     | 9.3.2.2.1                       | H9                |
| 5        | 1     | 9.3.2.2.2                       | H9                |
| 6        | 1     | 9.3.4.3.1                       | H9                |
| 7        | 1     | 9.3.4.2.1, 12.3c                | H9, H12           |
| 8        | 1     | 9.3.3.2.2                       | H9                |
| 9        | 1     | 9.2.1.2.3                       | H8                |
| 10       | 1     | 9.3.4.3.2                       | H7, H8            |
| 11       | 1     | 9.4.4.2.1                       | H3                |
| 12       | 1     | 9.3.5.3.1                       | H3, H9            |
| 13       | 1     | 9.4.6.2.2                       | H10               |
| 14       | 1     | 9.3.3.2.8, 9.3.3                | H8                |
| 15       | 1     | 9.2.1.3.4                       | H8                |
| 16       | 1     | 9.2.5.2.2                       | H9                |
| 17       | 1     | 9.2.3.3.1, 12.2b                | H12               |
| 18       | 1     | 9.3.1.3.1, 14.3c,               | H14               |
| 19       | 1     | 9.4.3.2.2, 13.1d, 14.1f         | H13, H14          |
| 20       | 1     | 9.4.6.3.2, 9.4.4.3.1, 9.4.6.2.1 | H10               |

### Section I Part B

| Question | Marks | Content                    | Syllabus outcomes |
|----------|-------|----------------------------|-------------------|
| 21 (a)   | 2     | 9.4.6.3.1, 9.1.11.3        | H6, H11           |
| (b)      | 4     | 9.4.6, 9.4.3               | H10               |
| 22 (a)   | 2     | 9.3.3.2.4                  | H8                |
| (b)      | 3     | 9.3.3.3.5, 12.1d, 11.3b    | H12, H11          |
| 23       | 5     | 9.3.4.2.2, 13.1a, 14.3b    | H9, H13, H14      |
| 24 (a)   | 4     | 9.3.2.3.1, 11.2b, c, 11.3a | H11               |
| (b)      | 3     | 12.4, 13.1e,f, 14.1a       | H12, H13, H14     |
| (c)      | 1     | 14.3c                      | H14               |
| 25       | 4     | 9.3.2.3.3, 9.3.1, 14.3b    | H4, H14           |
| 26       | 4     | 9.2.3.2.2, 9.2.3.2.4       | H7                |
| 27 (a)   | 1     | 9.4.3.3.1                  | H10               |
| (b)      | 4     | 9.4.3.2.3                  | H10               |

| Question | Marks | Content             | Syllabus outcomes |
|----------|-------|---------------------|-------------------|
| (c)      | 3     | 9.4.2.3.1           | H10               |
| 28       | 3     | 9.4.1.2.6           | H3                |
| 29 (a)   | 1     | 9.2.4.3.1           | H8                |
| (b)      | 3     | 9.2.4.3.1, 14.1d    | H8, H14           |
| 30       | 8     | 9.2.2, 9.2.4, 14.3b | H8, H14           |

## Section II

| Question           | Marks | Content                            | Syllabus outcomes |
|--------------------|-------|------------------------------------|-------------------|
| <b>Question 31</b> |       | <b>Polymers</b>                    |                   |
| (a)                | 3     | 9.5.2.2.2, 9.5.2.2.3, 9.5.2.3.3    | H6                |
| (b) (i)            | 3     | 9.5.1.3.2, 13.1f                   | H13               |
| (b) (ii)           | 2     | 12.3c, 14.1c                       | H12, H14          |
| (c)                | 4     | 9.5.1.2.5                          | H8                |
| (d) (i)            | 3     | 9.5.4.3.3/4, 12.4d                 | H12               |
| (d) (ii)           | 3     | 9.5.4                              | H6, H4            |
| (e)                | 7     | 9.5                                | H4, H8, H6        |
| <b>Question 32</b> |       | <b>Preservatives and Additives</b> |                   |
| (a)                | 3     | 9.6.4.2.1, 9.6.4.2.2.2             | H8                |
| (b) (i)            | 3     | 9.6.3, 13.1f                       | H13               |
| (b) (ii)           | 2     | 9.6.3, 12.3c, 14.1c                | H12, H14          |
| (c)                | 4     | 9.6.5.2.1                          | H4                |
| (d) (i)            | 3     | 9.6.2.3.3, 12.4d                   | H12               |
| (d) (ii)           | 3     | 9.6.5, 9.6.2                       | H8                |
| (e)                | 7     | 9.6.3, 9.6.2, 9.6.4                | H3                |
| <b>Question 33</b> |       | <b>Pharmaceuticals</b>             |                   |
| (a)                | 3     | 9.7.4.3.5, 9.7.4.2.6               | H8                |
| (b) (i)            | 3     | 9.7.4.3.2, 13.1f                   | H13               |
| (b) (ii)           | 2     | 9.7.4.3.2, 12.3c, 14.1c            | H12, H14          |
| (c)                | 4     | 9.7.2.2.1, 9.7.2.3.1               | H9                |
| (d) (i)            | 3     | 9.7.2.3.1, 12.4d                   | H12               |
| (d) (ii)           | 3     | 9.7.3                              | H9                |
| (e)                | 7     | 9.7.4.3.1                          | H1                |

| <b>Question 34</b> |   | <b>Disasters</b>     |          |
|--------------------|---|----------------------|----------|
| (a)                | 3 | 9.8.2.2.5            | H10      |
| (b) (i)            | 3 | 9.8.3.3.1, 13.1f     | H13      |
| (b) (ii)           | 2 | 12.3c, 14.1c         | H12, H14 |
| (c)                | 4 | 9.8.1, 9.8.4         | H6       |
| (d) (i)            | 3 | 12.4d                | H12      |
| (d) (ii)           | 3 | 9.8.3.2.7            | H10      |
| (e)                | 7 | 9.8.3.2.4            | H1       |
| <b>Question 35</b> |   | <b>Space Science</b> |          |
| (a)                | 3 | 9.9.4.2.3            | H8, H10  |
| (b) (i)            | 3 | 9.9.2.2.1, 13.1f     | H13      |
| (b) (ii)           | 2 | 12.3c, 14.1c         | H12, H14 |
| (c)                | 4 | 9.9.5.2.4            | H10      |
| (d) (i)            | 3 | 12.4d                | H12      |
| (d) (ii)           | 3 | 9.9.3                | H7       |
| (e)                | 7 | 9.9.5                | H3       |