2002 HSC Notes from the Marking Centre Senior Science

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GPO Box 5300
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Australia

Tel: (02) 9367 8111

Fax: (02) 9367 8484

Internet: http://www.boardofstudies.nsw.edu.au

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2002 HSC NOTES FROM THE MARKING CENTRE SENIOR SCIENCE

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course in Senior Science. It provides comments with regard to responses to the 2002 Higher School Certificate Examination, indicating the quality of candidate responses and highlighting the relative strengths and weaknesses of the candidature in each section and each question.

It is essential for this document to be read in conjunction with the relevant syllabus, the 2002 Higher School Certificate Examination, the Marking Guidelines and other support documents which have been developed by the Board of Studies to assist in the teaching and learning of Senior Science.

General Comments

In 2002, approximately 4450 candidates attempted the Senior Science examination.

Teachers and candidates should be aware that examiners may write questions that address the syllabus outcomes in a manner that requires candidates to respond by integrating their knowledge, understanding and skills developed through studying the course. This reflects the fact that the knowledge, understanding and skills developed through the study of discrete sections should accumulate to a more comprehensive understanding than may be described in each section separately.

Section I – Core

Part A – Multiple Choice

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

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

Part B

General Comments

Part B contained questions with a range of mark values. There were questions that enabled most candidates to score some marks but also those that presented opportunities for the more capable candidates to demonstrate their higher level of understanding and depth of knowledge. The questions were framed in such a way that they could be clearly mapped back to the syllabus outcomes.

The candidates showed an improved understanding of the key verbs and provided appropriate responses. Superior responses demonstrated an understanding of more complex concepts required by the higher order questions where students were asked to *discuss, design, explain* or *justify*.

Most candidates made a good attempt to answer the questions by providing relevant information. This enabled them to be awarded marks at the appropriate level. Most candidates demonstrated a level of literacy that enabled them to convey their thoughts and their knowledge satisfactorily.

Although some candidates demonstrated a good understanding of scientific method, misconceptions regarding the design, terminology and identification of the correct experiment being examined were frequently noted.

Specific Comments

Question 16

(a) Most candidates who attempted this question scored full marks. There were very few non-attempts. Incorrect answers included using terms twice and not connecting ‘solution’ with solute and solvent.

Question 17

(a) The majority of candidates responded well to this question with most identifying something harmful about the cleaner from the labelling to support a reason for keeping it out of the reach of children.

(b) Most candidates listed the correct principles in an appropriate order, showing their understanding of first aid procedures. The most common procedures included calling the poisons hotline and drinking water. There were very few non-attempts.

Question 18

Most candidates commented on the validity of the experiment. Better candidates were able to support their comment on validity with some reasoning. This reasoning often extended to experimental design, suggesting changes which would improve the validity. The majority of candidates recognised the experiment as being invalid, indicating the candidature had a reasonable understanding of experimental design. Weaker responses did not discuss the validity but only reiterated data from the results. A significant number of these weaker responses displayed little understanding of the concept of validity or experimental design. A small but significant number of

candidates seemed to lack the confidence to present an argument against the validity of the experiment, often failing to support their affirmative comments leading to contradictions in their discussion.

Question 19

This question presented difficulties for many candidates. Many compared the solubility of liquid soap and shampoo in water. Only a small number of candidates were able to design a valid method, identify the independent and dependent variables and explain reliability.

Many candidates were unable to state correctly the independent and dependent variables.
A large number of candidates recognized the need to control variables in their method but many failed to explain that this was done to ensure reliability.

Question 20

(a) Almost all candidates attempted this question. Superior responses demonstrated a good understanding of the role of the skin. A significant number of responses restated the introductory sentence.

(b) (i) Almost all candidates attempted this question. It was well answered showing strengths in understanding of the risks associated with trialling skin creams. Weaker responses did not qualify their answer by clearly stating the risk associated with trialling skin cream on humans.

(ii) Very few candidates were able to demonstrate a link between consequences and their effects. Superior responses clearly linked two effects and a consequence or two consequences and an effect. Many candidates understood the concept of micro-flora being present on the skin but were unable to describe the effects on these caused by changing the pH of the skin. A small number of candidates used their answers from b (i) to answer b (ii).

Question 21

This question was generally well answered. Superior responses chose the correct numbers from the diagram and could justify their choices appropriately. These candidates exhibited a good knowledge of the circulatory system and demonstrated good skills in interpreting diagrams. Weaker responses were those where candidates could not interpret the diagram and did not identify two correct vessels.

Question 22

This question was well answered by many candidates. They demonstrated a good knowledge and understanding of minimal and non-invasive techniques as well as the reduction of the risks to patients undergoing these procedures compared with the risks of the more traditional invasive surgeries.

The better answers were either succinct responses that outlined the reduction in risks (with clearly implied knowledge of the techniques) linked to the reduced need for exploratory surgery as a

diagnostic procedure, or they were a fairly lengthy comparison of the two new procedures with invasive surgery, highlighting the reduction in risks to the patient.

Candidates were able to engage with the question by demonstrating either a limited knowledge of the techniques or of a generalized risk reduction. Some candidates listed advantages and disadvantages of the techniques rather than discussing the risk reduction made possible using these techniques.

This extended response also resulted in candidates presenting misconceptions about keyhole surgery, viz:

- it is only skin deep
- it is fast and simple
- it requires no general anesthetic.

Question 23

(a) The majority of candidates were able to describe the function of heart valves although most failed to adequately describe their structure. Many candidates confused the valves of the heart with those of the veins and many also referred to valves in arteries.

(b) Many candidates were able to identify and discuss the advantages and disadvantages of the model shown, with the majority of candidates including a reference to one-way flow in their answer. A significant number of candidates just commented on the worth of the model without including the advantages and disadvantages. Many candidates seemed not to appreciate the value of models in Science.

Question 24

A small number of candidates were able to demonstrate the skills required by this question. Superior responses listed a number of historical events linked with technological advances plotted on a suitably scaled timeline with approximate dates.

Question 25

(a) This question was very well answered with most candidates able to identify one appropriate communication technology.

(b) Many candidates were able to describe general properties and uses of electromagnetic waves but few were able to relate specific properties to their uses.

Question 26

(a) Candidates were required to demonstrate their knowledge of the processes of transmission and reception of faxes. Superior answers correctly interpreted the information provided in the diagram and built upon it, clearly linking the steps in the correct sequence. Weaker answers restated information from the diagram with only slight changes or interpretation. Many candidates scored well on this part of the question.

(b) Superior answers to this section of the question clearly emphasised the linkage between the processes of scanning, coding/decoding, transmission and the subsequent reproduction of the sent message. Weaker answers did not address the scanning and subsequent digitisation of the image. However, digitisation for transmission was generally well addressed by most of the candidates.

Question 27

This question asked candidates to write a scientific report on the ways in which waves can be modified to carry information.

Superior responses showed valid experimental design. Candidates:

- explained their method clearly so that the experiment could be repeated
- supported their method with clear, labeled diagrams
- used tables to represent their observations, often with simple diagrams to show how waves were modified
- made valid conclusions based on the results
- used the terms *aim*, *method*, *observations* and *conclusion* correctly.

Weaker responses indicated a poorer understanding of how experiments should be reported or showed little understanding of the experiment described in the syllabus that was being examined. These weaker answers were demonstrated by:

- inappropriate experiment. Candidates often reported on one of the other five first-hand investigations listed in the core topic 'Information Systems'
- poor description of the method ie the way the experiment was set up
- writing notes (information) rather than writing an experimental report.

Section II – Options

Question 28

(a) (i) A significant number of candidates gave incomplete answers - failing to mention 'micro-organisms'.

(ii) Most candidates were able to identify at least two impacts of plastic bags but did not *describe* how these impacted on the environment eg plastic bags block drains (causing flooding).

(b) (i) The majority of candidates correctly answered 'fossil fuels' which was contained in the passage.

(ii) Most candidates were able to identify two or more relevant points from the passage or from their studies. However, many candidates failed to make a judgement of President Clinton's belief based on a full discussion of these points.

(c) The better responses identified and explained the major characteristics of thermosetting and thermoplastic substances AND clearly linked these properties to their usage.

Weaker responses failed to give clear explanations and provided weak or no links between properties and usage.

(d) (i) The majority of candidates answered this question well. A very small number incorrectly named a synthetic polymer.

(ii) Almost all candidates identified two other properties of the named polymer, although quite a few responded inadequately with general properties of natural polymers eg 'elasticity' rather than 'high (or low) elasticity'.

(iii) Most candidates were able to identify at least two variables that needed to be controlled but often only weakly justified them in terms of how they could affect the validity or reliability of the results.

Question 29 – Preservatives and Additives

(a) (i) Most candidates provided a correct response although some referred to 'food colourings' or 'artificial colourings' as natural food dyes

(ii) Many candidates had difficulty in 'describing' three effects. Superior responses described food dyes as causing a change in colour and the impact of this on appearance and consumer appeal.

(b) (i) A majority of candidates identified *nisin* as the bacteriocin.

(ii) The majority of candidates failed to make a judgement as to the worth of labelling but were able to explain the need for labelling.

(c) Most candidates were able to recall some food preservation techniques but only a small proportion were able to describe their impact on society and to link that to a 'scientific understanding' of the causes of food spoilage. Superior responses described the work of Pasteur, Koch and Lister or described the role of bacteria or microbes in food spoilage. Poorer responses did not link the preservation methods to their effect on micro-organisms.

(d) (i) Most candidates were able to determine the correct temperature although some gave a range rather than the 'minimum safe temperature'.

(ii) Overall, most candidates were able to determine a percentage within an appropriate range, with working. Candidates were then able to identify an appropriate temperature from the table.

(iii) A significant number of candidates discussed how to minimise the risks without clearly identifying the cause of the risk.

(e) The risks described related to controlling contamination and the potential effect on the health of the experimenter, safety in handling hot liquids, and procedures for obtaining accurate and reliable results (risk to the validity of the experiment).

Question 30

(a) (i) Most candidates had little difficulty with this question. Some candidates, having named the brain and spinal chord, then went on to add other information invalidating their answer.

(ii) Many candidates did not draw a flow chart, nor did they concentrate on 'what happens to aspirin'. Instead they wrote about the functions of aspirin in the nervous system.

(b) (i) Most candidates were able to correctly identify an aspect of the experiment that would make it invalid.

(ii) Good responses showed a detailed understanding of the workings of the nervous system by describing in detail the roles of all the parts of the nervous system involved in producing a response from the stimulus.

(iii) A significant number of candidates showed a limited understanding of the nervous system by describing a reflex arc or linking the optic nerve directly to the spinal chord. Very weak responses merely stated what one would see happening without linking the action to the nervous system.

(c) Very few candidates gave a complete answer to this question. While most of the candidates were able to identify the symptoms of inflammation, the majority did not describe what was meant by this term nor did they clearly explain the advantages and disadvantages of inflammation to the body.

(d) (i) Almost all candidates identified a variable that needed to be controlled. A few responded with 'temperature'.

(ii) A majority of candidates selected a 'best' temperature for growing bacteria. While many of these candidates compared the growth rates from data given in the table, only a few justified their answer with any calculations.

(iii) Most candidates clearly identified a risk to humans in their answer. Many named several correct steps needed to reduce the risk, but did not clearly describe the steps that they would take to reduce the risk. A small number of candidates chose poor lab techniques in culturing bacteria as the risk (to the culture).

Question 31 Disasters

(a) (i) Most candidates were able to identify isobars.

(ii) Few candidates described movement from one air pressure system to another. Most candidates simply stated some facts about air pressure systems.

(b) (i) The better responses accounted for the different amounts of damage by giving detailed explanations of different reasons involving intensity or populations. Many weaker responses simply repeated information given in the question.

(ii) Many candidates gave a clear response to this question, however, the examples of problems given were often not specific to earthquakes.

(c) Most candidates could identify an early warning device for a disaster. A few of the weaker candidates outlined preventative measures. Where early warning devices were identified the response lacked depth and detail. A small number of weaker candidates referred to technological developments associated with events after a disaster has occurred.

A significant number of candidates identified several devices within a system but provided a limited description or no description of their method of operation.

The stronger candidates discussed in detail the science that underpinned the technological developments and clearly described how the device provided an early warning or how the device as an element within a system provided an early warning.

(d) (i) Most candidates correctly identified a factor that promoted the occurrence or spread of a bushfire. A small but significant number of candidates interpreted *promote* as prevent.

(ii) The question was well answered by the majority of candidates. Many candidates gave detailed descriptions of steps to take.

(iii) Most candidates provided a clear outline of the investigation and used a format with the headings *aim*, *method* and *results*. The weaker responses failed to give a clear description of a method to their findings

Question 32 – Space Science

(a) (i) The concept of a 'circadian rhythm' was fairly well understood by most of the candidates and the human sleep/waking cycle was most often given as an example.

(ii) Candidates who were able to correctly identify a circadian rhythm were mostly able to state activities that could maintain the rhythm. Superior responses showed how the activities could 'mimic' conditions on earth eg by simulating day/night conditions.

(b) (i) Superior responses identified the product or service either as being one that existed before the space program (such as weather forecasting) and was improved due to the space program or one which was developed specifically for the space program (such as miniaturization of computer systems), and then was extended to everyday applications.

Poorer responses stated rather than compared uses.

(ii) The better candidates commented on social and economic outcomes such as unemployment and a more sedentary lifestyle due to communications technology such as satellite TV. Poorer candidates did not make a judgement but simply stated effects of the space program using many examples from part (i).

(c) The majority of responses identified the mountain as the preferred location stating several reasons (light, air pollution, better viewing conditions) favouring it.

Fewer candidates related the conditions in the chosen location to the operation of the telescope. Superior responses discussed light haze, interference in the image, reduced clarity and reduced contrast as the negative aspects of a coastal location in relation to the operation of a telescope.

(d) (i) Most responses indicated that gravity is a force that pulls down on the body, requiring muscles to work against gravity. A significant number of candidates mentioned the effects on the muscles of living in micro-gravity, without indicating how gravity works on the body to maintain muscle tone.

(ii) Many responses indicated types of activities and machines or aids which could be included in an exercise program. In a number of responses there was little understanding of the use of these in a low gravity environment and mention was made of lifting weights and jogging.

(e) Superior responses provided a program of exercises covering all major muscle groups.

Senior Science

2002 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
1	1	9.2.5	H9
2	1	9.2.2	H8
3	1	9.2.1	H8
4	1	9.2.1	H7, H8, H14
5	1	9.2.5	H7, H8, H14
6	1	9.3.1	H9
7	1	9.3.2	H9
8	1	9.3.3	H4, H9
9	1	9.3.4	H7, H12
10	1	9.3.4	H7, H9
11	1	9.3.5	H2, H7, H9
12	1	9.4.2	H10
13	1	9.4.2	H3, H10
14	1	9.4.4	H10, H12, H14
15	1	9.4.6	H10
16	3	9.2.1	H11
17 (a)	1	9.2.5	H7, H8, H11
17 (b)	2	9.2.5	H7, H8, H11
18	4	9.2.1	H2, H7, H8, H11, H13
19	6	9.2.1	H8, H11, H12, H13
20 (a)	1	9.2.3	H9
20 (b) (i)	1	9.2.3	H9, H12
20 (b) (ii)	3	9.2.3	H7, H8
21	3	9.3.2	H3, H7, H9, H14
22	7	9.3.5	H4, H9, H13
23 (a)	2	9.3.2	H9, H13
23 (b)	3	9.3.2	H3, H4, H9, H14
24	4	9.3.2	H3, H4, H9, H13
25 (a)	1	9.4.5	H10
25 (b)	3	9.4.3	H3, H10, H13
26 (a)	3	9.4.5	H10, H13
26 (b)	5	9.4.1, 9.4.5,	H10, H13
27	8	9.4.2	H2, H10, H11, H13

Question	Marks	Content	Syllabus outcomes
28 (a) (i)	1	9.5.4	H6, H8
28 (a) (ii)	3	9.5.4	H4, H8
28 (b) (i)	1	9.5.2	H6
28 (b) (ii)	5	9.5.2	H5, H6, H13
28 (c)	7	9.5.3	H4,H6, H8, H13
28 (d) (i)	1	9.5.1	H6
28 (d) (ii)	2	9.5.1	H6
28 (d) (iii)	5	9.5.1, 9.5.2	H6, H11
29 (a) (i)	1	9.6.2	H6
29 (a) (ii)	3	9.6.2	H6, H8
29 (b) (i)	1	9.6.4	H6
29 (b) (ii)	5	9.6.5	H7, H8, H13
29 (c)	7	9.6.2, 9.6.3	H4, H8, H13
29 (d) (i)	1	9.6.3	H12
29 (d) (ii)	3	9.6.3	H12
29 (d) (iii)	4	9.6.3	H12
30 (a) (i)	1	9.7.1	H9
30 (a) (ii)	3	9.7.3	H7, H9, H13
30 (b) (i)	3	9.7.1	H14
30 (b) (ii)	3	9.7.1	H9, H13
30 (c)	7	9.7.3	H7, H13
30 (d) (i)	2	9.7.4	H11
30 (d) (ii)	3	9.7.4	H14
30 (d) (iii)	3	9.7.4	H12
31 (a) (i)	1	9.8.2	H10
31 (a) (ii)	3	9.8.2	H10
31 (b) (i)	3	9.8.3	H4, H10
31 (b) (ii)	3	9.8.5	H4, H13
31 (c)	7	9.8.5	H4, H10, H13
31 (d) (i)	1	9.8.3	H10
31 (d) (ii)	3	9.8.3	H3, H4, H14
31 (d) (iii)	4	9.8.3	H11, H14

Question	Marks	Content	Syllabus outcomes
32 (a) (i)	1	9.9.3	H7
32 (a) (ii)	3	9.9.3	H7
32 (b) (i)	2	9.9.6	H4, H6
32 (b) (ii)	4	9.9.6	H4, H6, H13
32 (c)	7	9.9.5	H4, H13, H14
32 (d) (i)	2	9.9.3	H7
32 (d) (ii)	6	9.9.3	H7, H11, H14

BOARD OF STUDIES
NEW SOUTH WALES

2002 HSC Senior Science
Marking Guidelines

Section I
Part B

Question 16

Outcomes assessed: H11

MARKING GUIDELINES

Criteria	Marks
• All boxes correctly labelled	3
• At least two of solution/colloid/emulsion in correct box	2
• At least one of solution/colloid/emulsion in correct box	1

Question 17 (a)

Outcomes assessed: H7, H8, H11

MARKING GUIDELINES

Criteria	Marks
• States an appropriate reason, drawn from the information given	1

Question 17 (b)

Outcomes assessed: H7, H8, H11

MARKING GUIDELINES

Criteria	Marks
• Any two reasonable first aid steps following ingestion of poison	2
• Any one reasonable first aid step following the ingestion of poison	1

Question 18

Outcomes assessed: H2, H7, H8, H11, H13

MARKING GUIDELINES

Criteria	Marks
Demonstrates a depth of understanding of the link between • experimental design, AND • validity of conclusions Students must support their argument with evidence	4
Demonstrates some depth of understanding of • experimental design, AND • validity of conclusions	3
Shows some depth of understanding of • experimental design, OR • validity of conclusions	2
Shows limited understanding of • experimental design, OR • validity of conclusions	1

Question 19

Outcomes assessed: H8, H11, H12, H13

MARKING GUIDELINES

Criteria	Marks
• A reasonable description of the experimental design that would appropriately compare the solubility of oil in liquid soaps and shampoos • Correct dependent and independent variables • Acknowledgment that some variables need to be controlled, with some examples	5–6
• A limited description of the experimental design • Correct dependent and independent variables AND/OR • Acknowledgment that some variables need to be controlled, with some examples	3–4
• A limited description of the experimental design AND/OR • Correct dependent and independent variables, OR • Acknowledgment that some variables need to be controlled, with some examples	1–2

Question 20 (a)

Outcomes assessed: H9

MARKING GUIDELINES

Criteria	Marks
• Identifies one role NOT already given in the question	1

Question 20 (b) (i)

Outcomes assessed: H9, H12

MARKING GUIDELINES

Criteria	Marks
• Any reasonable answer that identifies a risk	1

Question 20 (b) (ii)

Outcomes assessed: H7, H8

MARKING GUIDELINES

Criteria	Marks
• At least two consequences AND the effect of at least one consequence OR • At least one consequence AND at least two effects of the consequence	3
• At least two consequences OR • At least two effects OR • At least one consequence AND at least one effect	2
• At least one consequence OR • At least one effect	1

Question 21

Outcomes assessed: H3, H7, H9, H14

MARKING GUIDELINES

Criteria	Marks
• Identifies vessels numbered 4 and 5 AND • explains that oxygenated blood returns through vessel 4 and remains oxygenated in vessel 5	3
• Identifies vessels numbered 4 and 5 • AND • explains that oxygenated blood returns through vessel 4 OR that it remains oxygenated in vessel 5 • OR • Indicates vessel 4 or 5 only and justifies the choice	2
• Identifies vessels numbered 4 and 5	1

Question 22

Outcomes assessed: H4, H9, H13

MARKING GUIDELINES

Criteria	Marks
• Demonstrates an understanding of invasive and minimally or non-invasive techniques • Outlines the impacts of each technique on a patient and how the new techniques have led to a reduction in risks to patients OR • Outlines the impact of one technique in detail • Includes suitable examples	6–7
• Demonstrates an understanding of invasive and minimally or non-invasive techniques • Outlines an impact of a technique • Includes one example	4–5
• Demonstrates an understanding of invasive and minimally or non-invasive techniques	2–3
• One correct statement about any of the techniques	1

Question 23 (a)

Outcomes assessed: H9, H13

MARKING GUIDELINES

Criteria	Marks
• Provides features of at least one structure AND • One function of heart valves	2
• Provides features of at least one structure OR • one function of heart valves	1

Question 23 (b)

Outcomes assessed: H3, H4, H9, H14

MARKING GUIDELINES

Criteria	Marks
• One advantage AND • One disadvantage AND • Either one more advantage OR one more disadvantage	3
• One advantage AND one disadvantage OR • Two advantages OR • Two disadvantages	2
• One advantage OR • One disadvantage	1

Question 24

Outcomes assessed: H3, H4, H9, H13

MARKING GUIDELINES

Criteria	Marks
• A list of more than THREE events and advances showing sequencing with approximate dates	4
• Two or three events or advances correctly sequenced	2–3
• One correct event or advance shown	1

Question 25 (a)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
• Names a correct technology	1

Question 25 (b)

Outcomes assessed: H3, H10, H13

MARKING GUIDELINES

Criteria	Marks
• At least TWO correct properties related to their correct uses in communication systems	3
• One correct property related correctly to its use OR • Two correct properties, not related to use OR • Two correct uses, not related to properties	2
• One correct property or one correct use	1

Question 26 (a)

Outcomes assessed: H10, H13

MARKING GUIDELINES

Criteria	Marks
• Three steps shown in the correct sequence	3
• Three steps not in correct sequence OR • Two correct steps in correct sequence	2
• One correct step	1

Question 26 (b)

Outcomes assessed: H10, H13

MARKING GUIDELINES

Criteria	Marks
• Correct interpretation of information in diagram AND • At least three correct statements about the coding of images (photo–electric conversion, digital signals, electrical impulses)	4–5
• Correct interpretation of information in diagram AND • At least two correct statements about the coding of images	2–3
• Correct interpretation of information in diagram OR • One correct statements about the coding of images	1

Question 27

Outcomes assessed: H2, H10, H11, H13

MARKING GUIDELINES

Criteria	Marks
• Describes the aim, equipment and method clearly enough to allow it to be repeated • Provides at least one observation • Any valid conclusion based on the results	7–8
• Describes activity, including results in some detail • Any conclusion based on the results	5–6
• Rudimentary description of activity lacking in cohesion and lacking a clear description of the results obtained OR • Describes fully an investigation not related to wave modulation	3-4
• Brief description of activity, typically one or two parts only OR • A theoretical description of wave modulation	1–2

Section II

Question 28 — Polymers

Question 28 (a) (i)

Outcomes assessed: H6, H8

MARKING GUIDELINES

Criteria	Marks
• Correct definition of biodegradability	1

Question 28 (a) (ii)

Outcomes assessed: H4, H8

MARKING GUIDELINES

Criteria	Marks
• Describes at least two impacts	3
• Names two impacts OR • Describes one impact	2
• Names one impact	1

Question 28 (b) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Names a correct source of raw materials	1

Question 28 (b) (ii)

Outcomes assessed: H5, H6, H13

MARKING GUIDELINES

Criteria	Marks
Students use in their answers: • A discussion of a number of points, some of which must be drawn from the passage and some from knowledge beyond the passage AND • Makes a judgement based on the discussion	4–5
Students include in their answer: • Points discussed in the passage and points from beyond the passage to describe issues raised in the statement of President Clinton's beliefs	2–3
• Students name at least one relevant point from the passage OR • At least one point from beyond the passage	1

Question 28 (c)

Outcomes assessed: H4, H6, H8, H13

MARKING GUIDELINES

Criteria	Marks
• Shows detailed understanding of the properties and uses of plastics by identifying the major characteristics of thermosetting and thermoplastic substances and linking these characteristics to their usage	7
• Shows a sound understanding of the properties and uses of plastics linking their properties to their usage	5–6
• Shows some understanding of the properties of plastics by describing these properties OR by describing some ways in which plastics are used	3–4
• States some uses or properties of plastics	1–2

Question 28 (d) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Names a correct natural polymer	1

Question 28 (d) (ii)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Identifies two other properties	2
• Identifies one other property	1

Question 28 (d) (iii)

Outcomes assessed: H6, H11

MARKING GUIDELINES

Criteria	Marks
• Shows a sound understanding of experimental methods by identifying variables that need to be controlled and justifying them in terms of validity or reliability of the results	5
• Identifies at least two variables and provides only a weak justification OR • Identifies one variable and provides a detailed justification	3–4
• States at least one variable	1–2

Question 29 — Preservatives and additives

Question 29 (a) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Names one natural food dye	1

Question 29 (a) (ii)

Outcomes assessed: H6, H8

MARKING GUIDELINES

Criteria	Marks
• Describes three effects of adding food dyes	3
• Describes two effects of adding food dyes OR • Names three effects of adding food dyes	2
• Describes one effect of adding food dyes OR • Names two effects of adding food dyes	1

Question 29 (b) (i)

Outcomes assessed: H6

MARKING GUIDELINES

Criteria	Marks
• Correctly identifies nisin as the bacteriocin	1

Question 29 (b) (ii)

Outcomes assessed: H7, H8, H13

MARKING GUIDELINES

Criteria	Marks
• Students can answer question by addressing aspects of both control and labelling, or only one of these. • At least three reasons given with an explanation or discussion of at least two of these • A stated judgement based on their examples	4–5
• Students can use both control and labelling, or one of these • Two reasons given with brief explanation of one or both, or three unsupported reasons stated OR • Makes a judgement based on one reason with explanation	2–3
• One reason given	1

Question 29 (c)

Outcomes assessed: H4, H8, H13

MARKING GUIDELINES

Criteria	Marks
• Demonstrates a sound knowledge of a link between at least one cause of food spoilage and a preservation technique • Shows a sound knowledge of how science contributed to an understanding of why the mentioned method preserves food • Describes a link between this development and better food preservation • Describes at least one impact on society	6–7
• Demonstrates a knowledge of a link between one cause of food spoilage and a preservation technique • Shows a limited knowledge of the contribution of science to understanding why the method preserves food • States a link to food preservation • States one impact on society	4–5
• States a scientific discovery related to the causes of food spoilage • Relates this discovery to one method of preserving food • States a simple impact on society	2–3
• States one method of food preservation OR • States an impact on society OR • States one historical development OR • States one cause of food spoilage	1

Question 29 (d) (i)

Outcomes assessed: H12

MARKING GUIDELINES

Criteria	Marks
• Correctly identifies the temperature	1

Question 29 (d) (ii)

Outcomes assessed: H12

MARKING GUIDELINES

Criteria	Marks
• Correct % agar covered (33%). Accept a range between 30–40% • Correct temperature of soup as 37°C. Accept range between 35°C–40°C • Suitable method for calculation of the above information drawn from data given	3
• Correct % agar covered and correct temp OR • Correct % agar and suitable method detailed OR • Correct temp and suitable method detailed	2
• Correct % agar OR • Correct temp OR • Statement of suitable method for working out % or temp	1

Question 29 (d) (iii)

Outcomes assessed: H12

MARKING GUIDELINES

Criteria	Marks
• More than one risk identified • Discusses at least one risk in depth including cause of risk, how to minimise or prevent risk, reasons for minimising risk OR • Discusses at least two risks in some depth	4
• Discusses one risk in depth OR • Discusses two risks in less depth OR • Identifies at least two risks and briefly states how to minimise one	2–3
• Identifies two risks in performing investigation	1

Question 30 — Pharmaceuticals

Question 30 (a) (i)

Outcomes assessed: H9

MARKING GUIDELINES

Criteria	Marks
• Identifies two main parts of the central nervous system	1

Question 30 (a) (ii)

Outcomes assessed: H7, H9, H13

MARKING GUIDELINES

Criteria	Marks
• Any three intermediate steps in the correct sequence	3
• Any two intermediate steps in the correct sequence OR • Any three intermediate steps (not in sequence)	2
• Any intermediate step	1

Question 30 (b) (i)

Outcomes assessed: H14

MARKING GUIDELINES

Criteria	Marks
• States one appropriate reason	1

Question 30 (b) (ii)

Outcomes assessed: H9, H13

MARKING GUIDELINES

Criteria	Marks
• Shows a detailed understanding of the workings of the nervous system by describing in detail the role of the parts of the nervous system in arriving at a response (catching) from the stimulus (seeing or feeling the ruler fall)	5
• Shows an understanding of the working of the nervous system by giving a limited account of how a stimulus leads to a response	3–4
• Names some parts of the nervous system OR • Names one part of the nervous system and identifies its features or its role	1–2

Question 30 (c)

Outcomes assessed: H7, H13

MARKING GUIDELINES

Criteria	Marks
• Describes what is meant by inflammation AND explains at least two advantages and two disadvantages by referring to the way inflammation affects the body	7
• Describes what is meant by inflammation and explains one advantage and one disadvantage by describing how inflammation affects the body OR • Explains at least two advantages AND two disadvantages	5 –6
• Identifies one advantage and one disadvantage and explains each OR • Identifies at least two advantages and two disadvantages	3–4
• Identifies one advantage or disadvantage and explains it by how it affects the body OR • Identifies two advantages or disadvantages	1–2

Question 30 (d) (i)

Outcomes assessed: H11

MARKING GUIDELINES

Criteria	Marks
• Names one correct variable	1

Question 30 (d) (ii)

Outcomes assessed: H14

MARKING GUIDELINES

Criteria	Marks
• Identifies the best temperature supported by a calculation of rate of growth using the data in the table OR • Justifies any value chosen using valid arguments based on the data given	3
• Identifies a temperature, based on figures taken from the table but not used in a calculation of growth rate	2
• Identifies the temperature	1

Question 30 (d) (iii)

Outcomes assessed: H12

MARKING GUIDELINES

Criteria	Marks
• Identifies one risk correctly • Clearly describes at least two correct steps which would reduce this risk	3–4
• Identifies one risk correctly • Outlines one step to reduce the risk	2
• Identifies one risk correctly OR • States a suitable step for reducing a risk	1

Question 31 — Disasters

Question 31 (a) (i)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
• Names the lines correctly as isobars	1

Question 31 (a) (ii)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
• Provides key features of the movement of air in terms of the pressure systems, the isobars and direction of rotation	3
• Provides key features of air movement between pressure system in terms of pressure differences AND the isobars OR the direction of rotation	2
• Correctly identifies an aspect of movement of air between pressure systems	1

Question 31 (b) (i)

Outcomes assessed: H4, H10

MARKING GUIDELINES

Criteria	Marks
• A statement of at least two suitable reasons for the difference, with a description of at least one of these reasons OR • A statement of at least 3 suitable reasons for the difference	3
• Statement of one suitable reason and a description OR • Statement of two suitable reasons	2
• Statement of one reason	1

Question 31 (b) (ii)

Outcomes assessed: H4, H13

MARKING GUIDELINES

Criteria	Marks
• Correctly states a type of emergency service which would be useful in an earthquake • Describes at least one task this service performs • Describes at least one problem faced in performance of the task	3
• Correctly states a type of emergency service • Describes one task performed OR • Describes a problem faced	2
• States a type or name of an emergency service OR • States the role of an emergency service OR • States a problem faced by an emergency service	1

Question 31 (c)

Outcomes assessed: H4, H10, H13

MARKING GUIDELINES

Criteria	Marks
• Names a disaster or type of disaster • Describes how the device or system provides early warnings • Clearly relates the development of the device to science or technology	6–7
• Names a disaster or type of disaster • Gives details of one development or early warning device • Gives details of how the device or system works	4–5
• States or names an early warning device • Simple statement of how it works	2–3
• States or names an early warning device	1

Question 31 (d) (i)

Outcomes assessed: H10

MARKING GUIDELINES

Criteria	Marks
• One correct factor identified	1

Question 31 (d) (ii)

Outcomes assessed: H3, H4, H14

MARKING GUIDELINES

Criteria	Marks
• At least three steps outlined, that would help to save lives in a bushfire situation OR • Two steps outlined, with a detailed description given for at least one of these steps	3
• Two steps outlined OR • One step outlined, with a detailed description included	2
• One step outlined	1

Question 31 (d) (iii)

Outcomes assessed: H11, H14

MARKING GUIDELINES

Criteria	Marks
• A clearly stated aim which relates to the method • Clearly stated simple method which allows understanding of what was done • A description of at least one finding which can be made according to method used	4
• An aim • Method which gives an idea of what was done • Statement of one finding from methods used	3
• Aim and statement of method OR • Aim and simple statement of a finding OR • Method and simple statement of a finding	2
• Simple statement of an aim OR a method OR a finding	1

Question 32 — Space Science

Question 32 (a) (i)

Outcomes assessed: H7

MARKING GUIDELINES

Criteria	Marks
• Correctly identifies one example of a circadian rhythm in humans	1

Question 32 (a) (ii)

Outcomes assessed: H7

MARKING GUIDELINES

Criteria	Marks
• Describes the features of an activity likely to help maintain a circadian rhythm highlighting how the features mimic conditions on Earth	3
• Gives the features of an activity likely to help maintain a circadian rhythm	2
• States one activity likely to help maintain a circadian rhythm	1

Question 32 (b) (i)

Outcomes assessed: H4, H6

MARKING GUIDELINES

Criteria	Marks
• Names one product or service from the list and correctly identifies at least one similarity or difference between its original use and its current use	2
• Names one product or service from the list and states either its current use or its original use OR • Names a product or service from the list and states both its current and original use	1

Question 32 (b) (ii)

Outcomes assessed: H4, H6, H13

MARKING GUIDELINES

Criteria	Marks
• Uses at least two spin-offs from space research as examples to give some features of how they may impact on society and makes a reasoned judgement as to the positive or negative value	4
• Uses at least one spin-off from space research to describe one impact they have had on society OR • Describes an impact on society of space research and makes a value judgement	2–3
• Names one spin-off from space research OR • States one impact that spin-offs have had on society	1

Question 32 (c)

Outcomes assessed: H4, H13, H14

MARKING GUIDELINES

Criteria	Marks
• States the mountain top as the preferred location • Justifies the choice by referring to the conditions likely to prevail at each location and how these impact on the operation of a telescope	7
• States or infers the mountain top as the preferred location • Describes the conditions likely to prevail at each location	5–6
• States or infers preferred location • Describes the conditions likely to prevail at this location	3–4
• States or infers a preferred location and states a simple reason for the choice	1–2

Question 32 (d) (i)

Outcomes assessed: H7

MARKING GUIDELINES

Criteria	Marks
• Provides the features of the effect of the force of gravity on the body that helps maintain muscle tone	2
• States the action of the force of gravity	1

Question 32 (d) (ii)

Outcomes assessed: H7, H11, H14

MARKING GUIDELINES

Criteria	Marks
• Provides a comprehensive range of physical activities, including any equipment or aids, that can be realistically carried out in a spacecraft and will help maintain the muscle groups in the body	5–6
• Provides a range of physical activities, including any equipment used but lacks EITHER by not addressing a majority of muscle groups OR not all being feasible in a spacecraft	3–4
• Provides at least two activities and indicates the muscles they would maintain	1–2