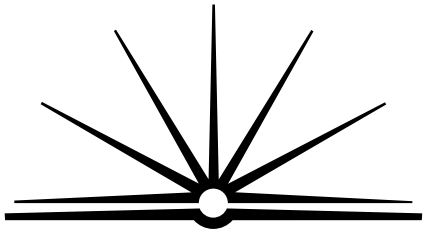

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1999 HIGHER SCHOOL CERTIFICATE
SCIENCE FOR LIFE
NOTES FROM THE EXAMINATION CENTRE

2 Unit

As in previous years, there was a diverse range of candidates sitting the examination. The top candidates showed both good preparation for the exam, and good literacy skills. They were able to interpret the questions and give clear answers.

Section I

Part A Multiple Choice (10 marks)

The number of candidates who presented for the Science for Life examination in 1999 was 3 404.

Question	Correct response	%
1	B	42.76
2	D	92,21
3	A	80.15
4	D	59.35
5	C	86.71
6	A	86.13
7	D	51.31
8	C	73.30
9	B	81.98
10	C	81.95

Part B (Five 3 mark questions)

General Comments

The aspects of the course which candidates found the most difficult to answer were in relation to experimental design and their individual research project. In particular, emphasis should be placed on candidates understanding how to interpret their results in light of the experimental aim and design. As these are both mandatory components of the course, teachers should be careful to ensure that candidates gain a good understanding of these aspects.

Specific Comments

Question 11

(a) This part was well answered. The majority of candidates were able to identify ‘oxygen in food’ as the cause of food losing its freshness.

(b) This part was poorly answered. Few candidates designed an appropriate experiment. Better answers included a control in the design and a comparison was made between the cheese samples.

Question 12

(a) This part was well answered. Most candidates were able to identify the consumer group as being unbiased and therefore trustworthy in their comments.

(b) This part generally was well answered. Some candidates presented an unsubstantiated comment as their response, which did not score marks.

(c) The majority of candidates answered this question well. Most stated that sales would fall if a car rated poorly in safety.

Question 13

Most candidates were able to draw a suitable table and label it accurately. However, some candidates neglected to include an indicator of repetition of the experiment. Numerous candidates tried to draw a graph instead of a table.

Question 14

This question was well answered. Most candidates were able to identify appropriate corrections to the graph, including correctly labelling both axes (temperature in ^{0}C, time in minutes), using an even scale on the vertical axis, from 0^0C to 100^0C; plotting points correctly and titling on the graph.

Question 15

(a)-(b)These parts were well answered by most of the candidates. Most candidates reported a valid project, but some did not relate their understanding of their project to the question asked in the paper. In many responses the purpose of the project was poorly defined.

(c) This part was poorly answered by the majority of candidates. Many candidates simply stated results or conclusions without showing any relationship between the two, or between these and the purpose of the project.

Section II - Modules (15 marks)

General Comments

Some aspects of the course tested showed general improvements in the candidates' responses over previous years. These include drawing and interpreting graphs and constructing and interpreting tables. The exceptions here were graphs or tables which were presented in a manner different from that with which the candidates were familiar (see Horticulture and Marine or River Studies). Some aspects of the modules continue to cause the same problems each year, indicating that candidates have not developed a real understanding of these items. Examples here include the concept of 'noise' in communication and the explanation of a physics principle involved in a sporting movement.

Many candidates appear to have difficulty in interpreting some questions. To do this successfully, candidates need good literacy skills. It is simply not enough to have rote learnt answers, if the candidates cannot then apply the information they have learned to the situation that arises in the module they are answering.

In addition, many candidates answer questions in very general terms and do not demonstrate a clear understanding of or knowledge of the subject. Candidates must practice applying specific knowledge to the question and justifying their responses or opinions with evidence.

Specific Comments

Question 16 - Fashion and Science

This module was attempted by 459 candidates.

(a) (i) Generally this part was well answered, with the majority describing a suitable change. Better candidates made a clear link with science and technology. Some candidates used the information about the mobile phone (stimulus material) but did not add any extra information. These did not score marks.

(ii) Most candidates predicted how the fashion might change, however the link with science and technology was, in general, poorly made. A common response was that cars in the future would be able to fly, but most candidates did not explain how science and technology could cause this change. These candidates did not score full marks.

(b) (i) In general, this part was well answered. Better answers also stated that fashion is continually changing over time.

(ii) This part was generally poorly answered. Few candidates adequately described a cultural change. Poorer answers were vague and brief, only stating a fashion item and the culture. Better candidates described how a fashion had developed as a result of a cultural influence.

(iii) Most candidates described two factors other than cultural. Some candidates stated a fashion rather than a factor influencing the fashion. Many examples were non-specific. Poorer responses repeated factors rather than presented two separate factors. Some candidates gave correct examples, but did not relate them to the correct factor.

(c) (i) The majority of candidates answered this question very well. A small number of responses were too broad and did not mention the specific detrimental effect.

(ii) The majority of candidates answered this question very well, giving two relevant and unrelated reasons as to why people choose to follow harmful fashion.

Question 17 - Horticulture

This module was attempted by 456 candidates.

(a) (i) This part was generally well answered by most candidates. The majority of the candidates recognised photosynthesis as the essential role or were able to recognise that the process produced oxygen and food.

(ii) This part was well answered. The majority of candidates specified one other essential role played by plants. However, poorer responses simply included a restatement of the answer from (a) (i). These did not score marks.

(b) (i) This part was well answered by the majority of candidates.

(ii) This part generally was well answered. Better candidates recognised that the leaves were eaten and suggested that an insecticide or pesticide could be used to further improve the plant's health. Poorer candidates stated two other elements given in the table in the question, but did not state why these should be used to improve the plant's health.

(c) (i) Most candidates stated the two variables required from the graph given in the question; that is, light intensity and temperature. However, poorer responses included the labels from the axes on the graph (oxygen production and light intensity) and gave them as the variables. Many candidates misinterpreted the meaning of lines A, B and C on the graph, thinking they were labelling lines. Poorer responses failed to recognise that oxygen production stabilised after a certain point.

(ii) This part of the question was poorly answered by the majority of the candidates. Better answers listed more than one conclusion.

(d) (i) This part was well answered by the majority of candidates, who used the stimulus material and selected GREEN HOUSE as the method of growing plants. Many stated how the environment changed, the most common response being an increase in temperature and humidity in the greenhouse.

(ii) This part was poorly answered by most candidates. Better responses related the change in the environment to an advantage to the grower.

(e) (i) This part was well answered by most candidates. Poorer responses neglected to name the feature that made the plant useful. Most candidates used the information in the question and explained why the feature made the plant useful.

(ii) This part was poorly answered by most candidates. Only a minority correctly drew and labelled two reproductive parts of a plant.

Question 18 - The Human Body

This module was attempted by 1011 candidates.

(a) (i) Better responses gave harmful activities that were voluntary and were typical of that stage. Poorer responses mentioned only the stages themselves, or events that were not under the control of the individual.

(ii) Those candidates who scored well in part (i) also scored well here. Poorer responses chose activities for which they did not know the harmful effects. In a question such as this one, it is important that candidates read the entire question before they begin to answer.

(iii) In general, this question was poorly answered. Marks were awarded for the presentation of information in a poster format, or for listing the design elements of a suitable poster. Poorer responses just repeated their answer from part (ii).

(b) (i) This part was generally well answered. Some candidates had difficulties distinguishing between the ‘cause’ of the disease and the ‘effects’ of the disease. AIDS was the most common disease given.

(ii) Candidates who selected diseases other than AIDS gave better responses to this part. Most candidates who selected AIDS simply stated that there was no cure. They did not discuss the treatments and appeared to have little understanding of how AIDS causes disease.

(iii) This part was generally well answered. Better responses gave explanations of how to prevent the disease, whereas poorer answers relied on the use of catch phrases such as ‘safe sex’ and ‘slip, slop, slap’ and demonstrated limited understanding of how these preventative measures work.

(c) (i) This part was very well answered. Students were easily able to select Vinny’s answer as correct.

(ii) 1 No marks were awarded for this section. Better candidates gave the name of an activity, whereas poorer candidates stated general terms such as ‘pollution’, ‘garbage’.

2 This part was not well answered. Candidates did not appropriately name the part of the biosphere affected by the activity named in 1. Most stated general terms like ‘air’ or ‘water’ rather than the ‘atmosphere’ or ‘the ocean’ or ‘lake’.

3 This part was generally answered satisfactorily, although the poorer candidates confused the greenhouse effect with the hole in the ozone layer.

4 Better responses explained how the damage could be reduced, whereas poorer responses used single terms like ‘recycle’ or ‘reuse’ with no explanation.

Question 19 - Science Fiction

This module was attempted by 587 candidates.

The standard for the answers generally was good. However, many candidates continue to give very general responses even when the questions required a description, explanation or examples.

(a) (i) This part was generally well done. Most candidates stated and used an appropriate scale to draw a correctly apportioned diagram. Some candidates neglected to label the parts as required in the question and so did not score full marks.

(ii) Better answers related to the inability of the wings to support the increased mass/weight or to aerodynamic problems, for example, increased air resistance.

(b) (i) This part was generally well answered. Poorer answers gave general uses eg. ‘surgery’ without specifying for what surgery it was used.

(ii) The best responses gave clear descriptions of the use of the device.

(c) Better candidates described some valid test for a living thing; for example, a test designed to elicit a response, or a test for a nearby non-earth substance or non-earth spacecraft. Responses such as ‘checking for vital signs’ were too vague to score marks.Tests that related only to humans or to mammals were poor responses as they did not show that the candidate realised that a variety of life forms exist. Poorer responses also included ‘did not know our language’ or ‘looked different’.

(d) (i) This part was well answered. A good range of examples was given by candidates and included time travel, invisibility, shrinking, matter transfer and speed-of-light space travel.

(ii) Generally the responses were poor explanations. Most candidates did not show a good understanding of the limits of current scientific understanding or of current technological limitations. Many candidates simply stated ‘we don’t have the technology’ which did not score marks.

(iii) Many candidates answered this well, clearly describing a harmful effect. Many answers were vague and did not address the question asked.

(e) This question generally was well answered. Good responses related to the collection of evidence from nearby, such as debris from the blast, testing for radiation in the area and interviewing witnesses.

(f) (i) This question presented some difficulties for many candidates. Good responses referred to human reactions to the discovery of alien life, including religious beliefs and the effects on technology. Poorer answers concentrated on ‘aliens coming to destroy us’.

(ii) This part generally was well answered. Better responses gave explanations of why they would need to exchange that piece of information.

Question 20 - Science of Toys

This module was attempted by 1 324 candidates.

In general, the questions in this section were better answered than in previous years. Candidates scored well when they showed clear links between different parts of the questions.

(a) (i) This part was very well answered. Some poorer responses however, used the expression 'affects the hearing' without giving a specific effect.

(ii) Generally, better responses established a link between the technology associated with the toy and the change in method of play.

(iii) This part was not as well answered as the first two parts. Many candidates did not describe technological developments as required by the question, but stated general terms such as 'technology' or 'computers'. Poorer responses did not state how this particular development has changed the toy.

(b) (i) This part was generally well answered. Better responses used headings that were discriminatory, and selected a small number of headings only. Poorer responses selected headings that resulted in many overlaps between their categories.

(ii) This part was generally well answered. Poorer responses did not explain their reasons for categorising a toy, but simply restated the heading; e.g. 'I put it in the boys' toys categories because boys play with it.'

(iii) In general this part was well done. Better responses gave details about the toys and the reasons they may be of concern to parents. Some candidates described toys that may be a safety concern instead. These candidates did not score marks.

(c) (i) This part generally was well answered. Better answers fully explained the consequences that might arise when a toddler played with the toy. Some candidates described toys that were suitable for a toddler rather than toys that were unsuitable. Many candidates did not accurately explain the inadequacies of a toddler.

(ii) Only a minority of candidates gained full marks here. Better responses gave a description of the toy, selected physical or mental development, but not both, used the table that was given and gave more than one activity. Some candidates did not use the given table, but made up their own table. This reduced the marks they could gain.

(d) (i) This part was very poorly answered. Few candidates named a specific branch of science.

(ii) This part was poorly answered. Most candidates simply described one feature of a toy, but did not describe a link.

(iii) This part was generally well answered. Better responses described the safety feature and clearly linked the feature to the age group intended for the toy, or explained the aspects of the feature.

Question 21 - Sport Science

This module was attempted by 1 079 candidates.

Better answers showed that these candidates possessed good literacy skills, both in interpreting the information given in the question and in expressing their answers.

(a) (i) This part generally was well answered. Good answers selected the food which most deviated from a quality diet, thus showing an understanding of significant differences.

(ii) This part generally was well answered. Better responses used the table as required by the question. Some candidates used information not in the table, e.g. drinking water.

(b) (i) This part generally was well answered. Better answers addressed the sense of achievement that the participant experienced reaching their goal as well as the thrill experienced while doing the sport.

(ii) Better answers stated a risk related to the sport and suggested a suitable way to reduce that risk.

(c) (i) This part was well answered. Most candidates named a sport.

(ii) This part was well answered by some candidates. There was confusion shown by some candidates with the drawing and naming of a body type. Poorer answers gave very small drawings in which the features could not be distinguished. Good answers used stylised drawings or gave clear structural features of the named body type.

(iii) Poorer answers confused body type features with features required to play the sport.

(d) This question was generally well answered. Some candidates seemed confused by the stimulus material.

(i) Most candidates were able to explain correct methods of dealing with sports injuries, for example, many candidates discussed the RICE method of dealing with injury.

(ii) Better answers gave a way of preventing sports injuries and an explanation of the science behind the method, relating it to sports physiology and biology.

(e) (i) Candidates in general were able to select a sport and a skilled movement.

(ii) This part was poorly answered. Better answers described the physics principle involved, whereas poorer answers simply incorporated the words of the stimulus material with no understanding of the concept demonstrated.

Question 22 - Disasters

This module was attempted by 2 190 candidates.

(a) (i) This part was very well answered, with most candidates naming a reasonable cause such as an earthquake, short circuit or similar.

(ii) This part was very well answered. Most candidates named two technologies which could minimise the effects of a fire, for example, safety switches, sprinklers or fire extinguishers.

(iii) This part was poorly answered. Few candidates were able to draw a suitable flow chart. To score marks, candidates needed to show clear steps, a starting and a finishing point (eg. Put the fire out), and relationships between the steps with an arrow.

(iv) This part was very well answered. Some candidates had rote learned an answer, which they recorded without regard to the question. These candidates did not score the mark, as they did not answer the question asked. This practice is to be discouraged, as rarely does it produce a good answer.

(b) (i) This part was well answered. Most candidates stated that the number of deaths and destruction of property constituted a disaster.

(ii) This part was very poorly answered as most candidates simply contradicated the answer for part (i). Better candidates demonstrated a good understanding of the term disaster, and were able to express this well.

(c) This part was generally well answered. Poorer answers were simply a restatement of the stem, which did not score marks. To score marks, candidates needed to give a clear advantage such as ‘quick response’.

(d) (i) This part was very well answered. Most candidates extracted the required information from the graph.

(ii) This part was well answered. The majority of candidates named an appropriate device for water conservation, such as drip irrigation.

(iii) This part was poorly answered. Better responses stated that water was a limited resource. A common misconception was that using too much water leads to drought.

(iv) This part was well answered in general. Most candidates drew a poster. Those that copied a poster from one of the Sydney Water posters did not score marks.

Question 23 - Managing Natural Resources

This module was attempted by 396 candidates.

In general, the candidates attempting this module did well.

(a) (i) Many candidates found the concept of a koala as a resource difficult to explain. Better candidates supported their answers with well-thought-out reasons.

(ii) This part was generally well answered, although the word 'sustain' proved difficult for many candidates. Good answers clearly described ways in which use of the resource can be reduced or replaced with more efficient technology.

(b) (i) Better answers showed an understanding of the relationship between CO_2 levels and global warming. Many candidates confused global warming and the depletion of the ozone layer in all parts of this question.

(ii) This part was very well answered. Good responses demonstrated had a clear understanding of the consequences of global warming, what changes were expected to occur and why.

(iii) This part was poorly answered. Many candidates lacked the background knowledge to answer this question well. Few candidates gave strong arguments to support their answer. Better answers gave both a reason and an explanation for the reason.

(iv) This part was well answered by most candidates. Better answers clearly showed a link between reducing greenhouse gas emissions and global warming.

(c) This question was very well answered by most candidates.

(i) Most candidates interpreted the stimulus material correctly and stated from it an advantage of geothermal systems.

(ii) Similarly, most candidates stated a disadvantage from the stimulus material.

(iii) Better responses identified another energy source and clearly stated two advantages and two disadvantages of this source.

Question 24 - Marine or River Studies

This module was attempted by 756 candidates.

(a) (i) Most candidates presented an appropriate graph, although not all candidates were able to show competent graphing skills. Candidates gained marks for: correctly labelling axes, using an appropriate scale, accurately drawing the columns and indicating in a clear way that Dong caught zero fish.

(ii) This part generally was well answered, with the better candidates drawing a flow chart and indicating the direction of flow of the process, correct sequencing and also Theo's role at the beginning and the end of the process. Some candidates drew a food chain instead of a flow chart.

(iii) 1 This part was well answered. Almost all candidates were able to name two appropriate activities.

2 This question was poorly answered, with most candidates giving superficial answers. Few candidates stated clear contributions of the activity named in 1 to beach pollution. Most gave beach littering or spilt or leaked oil or petrol from boats, without stating any effect on marine life or human society.

(b) (i) Most candidates correctly selected 'nitrates' as the highest value. This question was well answered.

(ii) This part was poorly answered. In judging the water as polluted or not, the explanations of many candidates revealed difficulties interpreting the information from the table, especially the row headings, '% of sites with results outside/within acceptable levels.' Their responses indicated that they interpreted the data in the table as amounts or concentrations of pollutants.

(iii) This part was well answered. Most candidates had a clear idea of the components of a fair test. Better responses included using same sites, at same time of day, same weather conditions, same amount of sampled water, cleaning equipment between each test.

(c) The simple step of removing the silt trap was well answered by most candidates. However, the stating of observations and comparisons needed to confirm or deny the responsibility of the silt trap for the increase in fish numbers was poorly answered.

Question 25 - Biotechnology

This module was attempted by 83 candidates.

There was a wide range of quality in the responses to this module. Many responses did not score the marks, as the candidates' responses were too general and did not give specific examples. This was especially the case in (b) (iii) and (c) parts (i), (ii) and (iii).

(a) (i) The better responses interpreted the information from the table, and related the effectiveness of the non-disease causing bacteria compared to the antibiotics to the increased percentage survival and harvest in ponds 3 and 4 compared with pond 1 and 2. The poorer responses referred in general terms to survival being higher, but failed to indicate how this information was gained from the table or relate this to the particular treatments in the question.

(ii) Most candidates were able to answer this question satisfactorily, with a range of responses including cost, repetition of the experiment, keeping other variables constant and the need for data from a control group.

(b) (i) Candidates answered this question well, being able to interpret the information in the stimulus material and apply it to the question asked.

(ii) Some candidates answered this question well, but others were very vague about the description of the ethical problem. Better answers discussed the possibility of infecting an otherwise well person with the disease.

(iii) Poorer responses did not identify a suitable biotechnology, or were confused between a biotechnology and other technologies. Many did not outline an ethical issue and resorted to a bland statement about people not having the right to 'play God'. This answer did not score marks. Better responses discussed current issues about human rights, the issues surrounding genetically modified foods, and people's right to know what they are eating.

(c) This question was poorly answered in general. Few candidates showed a good understanding of how biotechnology is performed and the advantages for that particular biotechnology compared to traditional techniques. All candidates chose a technology that applied to plants. Some candidates did not recognise a biotechnology, and did not compare this with a traditional technique. Similarly, few candidates identified a known disadvantage of the biotechnology compared to the traditional technique. They gave some idea of what problems may arise, but did not give examples of problems that are known.

(i) This question was well answered by most candidates, who stated suitable reasons for the wide release of these bacteria, such as the potential for a wide reduction in the incidence of cancer.

(ii) This part was also well answered. Most candidates are aware of the potential problems associated with the release of such an organism, and were able to put their ideas into words.

(iii) This was generally well done. Most candidates understood that the decision required the input of many people including those researchers with the knowledge and understanding of the organism, the average person whose life may be affected in many ways and governments.

Question 26 - Communication

This module was attempted by 535 candidates.

(a) (i) In general candidates answered this question well, with the majority identifying a problem with a communication system.

(ii) This part was well answered. Candidates were able to identify a means of fixing the problems they stated in part (i).

(b) (i) This part generally was well done. Most candidates gave symbols/numbers or a reverse alphabet for the entire alphabet.

(ii) The majority of candidates were able to use their own code to encode the message as required by the question. Some candidates made errors in using their own code.

(c) (i) This question was poorly answered. Many candidates seemed to have difficulty understanding the question. The majority of candidates rewrote the description section of the table as a response, for which they did not score marks.

(ii) This question was not attempted by many candidates, and was poorly answered in general. Few candidates gave a description for minimising noise.

(iii) This part was well answered. The majority of candidates identified another form of communication other than the telephone that uses optic fibre technology.

(iv) This part was well answered. The majority of candidates gave two clear advantages of using optic fibre technology.

(d) (i) Many candidates seemed to have difficulty identifying the purpose of the advertisement. Better answers clearly identified the purpose as giving information about the parenting courses available.

(ii) Candidates generally stated ways the advertisement was effective by including ideas such as: catchy phrases and words, picture of a cute baby and so on. Poorer answers focussed on the content of the advertisement, rather than it as a form of communication.

(iii) This part was very well answered. Better answers were able to identify the elements of layout and chosen language to the effectiveness of attention getting.

Question 27 - Consumer Science

This module was attempted by 411 candidates.

(a) (i) Most candidates constructed a table to include two suitable headings. Few candidates then included a column for the final and intial messages.

(ii) A majority of candidates was able to successfully explain how to calculate the mass of paint using a subtraction of masses.

(b) This part was poorly answered by the majority of candidates. Candidates appeared to have difficulty interpreting the question, and their answers reflected a general lack of detailed information. Good answers gave an example of a preference, then explained how it affects resource usage, for example, ‘choose a more energy efficient fridge so less coal is burned to produce electricity’.

(c) (i) In general the standard of graphing was sufficient for most candidates to be able to score marks.

(ii) Better answers used the results from the graph to arrive at an accurate answer.

(d) (i) No marks were awarded for this section. Most candidates named a product.

(ii) This part was generally well done. Many candidates chose aerosol cans with CFC propellants leading to a depletion of the ozone layer.

(iii) Better responses provided sufficient detail in the description to allow a distinction between the new and old product.

(iv) This part was poorly answered by the majority of candidates. Many answers were vague and did not provide sufficient detail to answer the question adequately. For example, many candidates simply stated ‘Test the product’, which did not score marks. Good answers added testing the product for harmful side effects, both before and after the product goes on sale.

(e) (i) Few candidates specifically mentioned large-scale scientific testing and thorough research conducted by scientists as a means of influencing consumer decisions. As a consequence, the quality of responses was poor.

(ii) Very few candidates successfully provided two detailed (and different) responses for this question. Good answers included: harm to human health, the ecosystem or the environment, and lack of labelling of food product.

Question 28 - Space Science

This module was attempted by 374 candidates.

Overall, the candidates scored well, which suggests that, in general, candidates possessed a sound understanding of the space science module.

The candidates scored marks for identifying specific issues is space science and also for following these through with adequate explanation. Candidates gained marks for providing clear descriptions of the impact on humanity of space technologies.

(a) (i) A majority of candidates listed suitable developments.

(ii) The candidates misunderstood the depth required for some answers by only giving single word or very brief responses to questions. A misconception for a large number of candidates was to list 'uses' of technologies rather than a clear definition of the 'role' played by the technology.

(iii) Most candidates chose to explain the excessive cost or distance as their reason.

(b) (i) Many candidates displayed difficulty in distinguishing between the 'role' played by satellites and the 'uses' of satellites. Many responses offered were too simplistic. A good answer explained how satellites relay signals to the other side of the Earth and allow us to transmit over a widespread area.

(ii) Many candidates had difficulty in giving answers that showed a clear advantage of satellites over other technologies. Better answers related to the difficulties of, for example, running cables all over the world, and the chances of breakdown or damage to the cable.

(c) (i) Most candidates seemed to lack the knowledge required to answer this question appropriately. It seemed that the majority of candidates misinterpreted the question to ask for examples of space spin-offs. Better responses provided responses that detailed benefits directly derived from experimentation in space.

(ii) Better responses argued a case for each side, with appropriate examples for support. Poorer responses gave emotive but unsupported arguments.

(d) (i) Some candidates did not appear to understand what functions were. Good answers included exercise, waste disposal, eating.

(ii) Many candidates had trouble expressing how their chosen function is actually performed in space.

(e) (i) This question was generally well done. Most candidates both described the piece of space junk and explained clearly how it was left in orbit.

(ii) Good answers discussed the effect on astronauts.

(iii) A majority of candidates mentioned an acceptable fate of space junk eg. falls to earth, burns up on re-entry or continues orbiting, causing damage.