SCIENCE FOR LIFE

In 1995, 4503 students presented for the examination in Science for Life, compared with 4931 in 1994.

The standard of response to the 1995 examination was very pleasing. The range of responses to the open-ended questions showed the great diversity of material covered in the course. Students' understanding of technology, however, continues to be only average and confusion is still apparent in understanding of the difference between the *greenhouse effect* and *depletion of the ozone layer*.

SECTION I : GENERAL

Part B

Question 11

This question did not discriminate between students since the scale used for the graph and the labelling of the Y-axis reduced the need for student input. Most were able to complete the graph and gained full marks.

Question 12

This produced a wide range of responses since many students were unable to decide the nature of the accident.

(a)   This part was poorly answered; many students felt that *reporting the accident* would have prevented it.

(b)   This was generally poorly answered with nearly half of the students unable to describe ONE laboratory practice nor to explain why it was necessary.'

In answering this question many students tried to relate their responses to the accident involving a virus.

A very poor knowledge of the names of scientific equipment was apparent.

1995 HIGHER SCHOOL CERTIFICATE EXAMINATION

Question 13

(a)   Many students could not work out what the percentage figures stood for - the majority thought it referred to rainfall.

(b)   The failure to show scale on the map seemed to benefit those who were aware of the size and purpose of the specific dams.

        Country students, however, related to farm dams and, as a result, generally gave poorer responses.

Question 14

Students experienced difficulty with this question as the majority had very little concept of a flowchart, consequently there appeared to be some difficulty with the transposing of information to indicate events. Those familiar with flowcharts scored well, whilst less able students relied on simple diagrams to indicate the flow of air. The use of codes or keys was more common than expected, and there appeared to be a significant number of non-attempts.

Question 15

In general this question was answered well with few non-attempts; a few candidates, however, failed to score any marks.

(a)   The majority of students gave a negative reply, assuming that *doctors speculated*. Most students understood the definition of a *scientific process* although those who answered *yes* generally had not understood the question at all.

(b)   Many students identified the progestogen-only pill as being a contributory factor along with the nasal spray containing the hormone oxytocin to help with breast-feeding. Many answers were not specific enough

A number of students did not give a definite answer to either of these questions.

SECTION II : MODULES

Module 1 : Fashion and Science

Question 16

(a)   Generally this was answered well, but candidates often confused the claims made about *Lippy* with those made about lipstick in general.

(b)   Most students realised that experiments or surveys were appropriate investigations. Many, however, failed to use a control in their experiments, and sample sizes suggested were often too small.

Question 17

(a)   Most students answered this question well, their reasons usually being based on personal experience.

(b)   Again, this was generally quite well answered, although poor students tended to restate the question.

Question 18

(a)   Most could clearly name a fashion.

(b)   This part was generally well answered. In poor answers, however, candidates failed to link a fashion change to science or technology.

(c)   About half of the students answered this well. Poor students did not refer to technological or scientific changes that might affect their specific fashion in the future.

Question 19

(a)   In the few good answers to this question, candidates gave satisfactory reasons for assuming that folk medicines are a fashion; many said, for example, that they are either unchanging or used out of necessity rather than from desire.

(b)   (i)   This part was well answered.

        (ii)   Answers here were good.

        (iii)   This was well answered, but *panadol* seems to be the ultimate panacea.

(iv)   Most candidates answered this part well. Poor answers, however, failed to suggest one environmental advantage of using their nominated alternative treatment.

(v)   On the whole this was well answered; poor answers were far too vague.

Module 2 : Horticulture

Many students appeared NOT to realise that this Module started with Question 20.

Question 20

Most students were able to identify and explain why one claim in the advertisement was difficult to test scientifically. Generally, designing an experiment to test ONE claim was not well done, the use of a control and replication as part of the experimental design being omitted in many responses

Question 21

Most students were able to identify specific advantages and disadvantages for their nominated ways of growing plants. Some confused ways of *growing* plants with ways of *reproducing* plants.

Question 22

This question was well answered by the majority of students who were able to describe two appropriate safety practices to be followed if the herbicide, *Downdead*, were spilt on their shirt.

Question 23

Many students were unable to draw a clearly labelled diagram of the life cycle of a plant. Although a number showed the stages, they did not show them in a cycle.

Module 3 : The Human Body

Question 24

(a)   Most students were able to describe correctly only one pattern of height growth for boys and girls.

(b)   This question was well answered. The majority of students realised that a large sample was required; many could describe the mathematical procedure for calculating the average height of 15-year-old girls.

Question 25

Many students had difficulty in answering this question satisfactorily.

Question 26

(a)   Answers to this question were satisfactory.

Question 27

(a)   Here the majority of students achieved the correct answer and also gave the correct units.

(b)   A number of students were obviously aware of the need for a balanced diet. Many, however, simply repeated the data given in the question saying, for example, *the snack contained a lot of caffeine*.

Question 28

A large number of students did not attempt the question, often because they confused the answers for Questions 28 and 29. Some clearly indicated that they did not understand what the question was asking.

Rather than designing an investigation, many students answered an imaginary question "Why do people change their behaviour while travelling?".

The majority interpreted *travelling* as meaning using a bus or car.

Question 29

Numerous students used the stimulus material in the previous question to answer this question.

(a)   Students were able to name a disease, but many failed to give the correct cause, for example, *caused by a bacteria or virus*.

(b)   Answers here were satisfactory.

(c)   A large number of students were unable to describe how the disease is transmitted.

(d)   This part was satisfactorily answered.

Module 4 : Science Fiction

Question 30

All parts of this question were well answered and showed a good comprehension of the technology used in everyday life in 1995.

Question 31

Part (a) of this question was well answered. In part (b), however, many responses were too superficial.

Question 32

Most students could not answer the question correctly because they quoted from the passage and failed to answer the question.

Question 33

Most candidates could design experiments and, consequently, this question was generally well answered. It was pleasing to see that many students could follow the specific scientific method.

Question 34

Part (a) of the question was generally not answered well since the majority of students simply restated the law already given. In part (b), although the robots would be able to recognise the fact that there was a conflict, they would find it difficult to express it in words.

Question 35

(a)   Here most students ignored the stimulus material and, consequently, their answers about aliens was over-simplified.

(b)   This part of the question was generally well answered.

Module 5 : Science of Toys

Question 36

(a)   (i)   Most students answered correctly saying either *yes* or *no*.

        (ii)   A number of students could justify a *yes* answer. Those answering *no* often incorrectly attributed this to the dangers associated with a pool. Many students, however, failed to appreciate that all toys have an element of danger.

(b)   (i)   A number of candidates could not identify one form of mental development in children. Most of their answers were restricted to a narrow range of possibilities. Those with poor language skills found it difficult to understand the requirements of the question and to express their answer clearly.

        (ii)   Play as a form of development was not clearly understood, so most students failed to make the link to an activity. Many stated possible outcomes rather than stating **how** the outcome could be achieved, and some merely described the picture.

        (iii)   Few students appeared to understand what constitutes a physical development, showing an inability to discriminate between mental and physical development. Many answers consisted of only one word, or alluded to a physical development in general terms.

        (iv)   The relationship between the physical development and its associated activity was not always clearly understood.

Those who understood the question often scored well; others who did not understand its implications failed to score.

Question 37

(a)   (i)   A number of students failed to specify which age group (*under* or *over* 5 years) they were discussing. Some failed to relate the small size of the block to the danger of swallowing it, or the difficulty children might have in handling it.

        (ii)   This question was generally well answered.

(b)   A majority of students stated that the scissors were:
- made of plastic/metal
- sharp
- ight/heavy.

These were not visible features of these specific scissors which, in fact, had rounded ends, appeared to be an appropriate size for small hands, and to be made of plastic with a protected metal cutting edge.

Question 38

Most students were able to design an appropriate investigation. Many, however, did not make use of an adequate sample size or their chosen method was not based on scientific principles.

Question 39

Students successfully named particular developments but had difficulty in describing how these were applied to the design of the specific toy.

Module 6 : Sport Science

Question 40

(a)   On the whole this was fairly well answered. A number of students failed to state how *they* would lace their shoes, and gave only a very general answer. A significant number of candidates simply quoted from the diagram and the information given.

(b)   Most candidates treated this as a comprehension-type question and, again, quoted directly from the diagram saying,

It is beneficial because we can avoid foot aches.

Many candidates failed to indicate any benefit of the research, but merely stated that people had different kinds of feet or said *to make them fit better*.

(c)   This part of the question became the discriminator; many candidates failed to state that the difficulty arose because the two methods of tying suggested were contradictory. Most candidates identified the two styles necessary but failed to state that they can be blended or combined.

Question 41

Approximately 15% of the candidature did not attempt this question.

Although the majority of candidates chose to draw the poster, a number simply described a poster design verbally.

Many candidates failed to provide scientific reasons for getting fit but gave social reasons instead. The majority failed to design a poster which reflected the stimulus material provided.

Question 42

The greater number of candidates named *anabolic steroids*. Many candidates failed to show any understanding of how *fitness* was affected by their chosen drug.

(c)   Good reasons for advising against using the drug were given. Many candidates, however, tried to explain or expand on the concept of ideals and fairness, and often repeated part of their answers.

Question 43

The majority of students correctly used a stretch/no-stretch comparison as well as another controlling variable such as type or length of exercise. A very small number suggested an objective measure of comparing soreness of muscles, the aspect for which exercises were specifically looking.

Question 44

Most candidates very ably answered (a), but in (b) many just gave the converse of their answer to part (a). A few incorrectly referred to a different sport in answering (b).

A sizeable number of students did not relate their reason back to the nominated sport.

Question 45 : The Mountaineer's Dream

(a)   Some students neither stated nor implied the sport for which the watch function was to be used. Some ignored the clause *while you are participating in the sport*. A small number of candidates incorrectly copied watch functions from the list given.

(b)   This question was, on the whole, well answered, with most students correctly stating why the specific function would improve performance or how safety would be increased.

Module 7 : Disasters

Question 46

Most students had a good understanding of the definition of a natural disaster; unfortunately a minority did not relate their understanding to the question asked.

Question 47

(a)   The majority of students could name and locate a disaster.

(b)   Most could state what caused the specific disaster.

(c)   Answers here were poor. Although students could state examples of human behaviour, they could not relate how human behaviour contributed to the effects of this disaster.

(d)   Many students failed to name a science and technology that could reduce the effects of this disaster, and had difficulty in showing how a science or technology could reduce such effects.

Question 48

(a)   The majority of students could name emergency service people found at a disaster. A number of students used generalised terms, rather than referring to specific groups.

(b)   Many students did not state clearly the role of each of the service groups identified.

Question 49

There was a lot of misinterpretation of this question. Many students did not understand that they were to design a feasible scientific investigation to determine if there is a correlation between car accidents and star signs. A number did not specify a sample size or a relevant time-frame for such an investigation. Some focussed on the stimulus material (only testing Virgos and Aquarians), while many did not give enough thought to the methods they would use to interpret their results.

Question 50

A number of students had difficulty in distinguishing between *expectation* and *behaviour*. Some chose events that were not disasters as the subject of their posters, while a small number did not specify a particular disaster. Approximately a quarter of the candidates failed either to design or draw a poster, merely indicating information to be used on such a poster.

Module 8 : Managing Natural Resources

Question 51

(a)   This question was answered well.

(b)   Almost all students had difficulty in interpreting the model, being unable to link the information supplied and the diagram, e.g. many wrote only in terms of *dotted lines* and *the glasshouse*, **not** in terms of heat rays and the atmosphere.

(c)   This was generally well answered but, as in the previous question, some still had problems with model interpretation.

(d)   Most students understood experimental design.

They included controls, they varied the CO_2 between samples, but often confused the *greenhouse effect* with increased *CO_2*, i.e. they assumed that the *CO_2* would be higher in a greenhouse than outside, or their answer suggested that heat trapped in greenhouses makes plants grow better, which was irrelevant to the question.

The majority of students realised that variables had to be kept constant,but often mentioned only one or two, e.g. H_2O, sunlight.

Sample size and/or experimental repetition were not dealt with well.

Most also failed to recognise the fact that they should *measure* some parameter for plant growth, and simply stated that the results should be recorded or plants compared.

Question 52

(a)   Although students had no difficulty in rewriting sections of the stimulus material, developing a good point by extending the concepts presented difficulties, e.g.

  •   *The project will reduce waste - **extension** - therefore less space will be needed for tips*.

  •   *Cheap fertiliser produced - **extension** - could be sold for profit*.

(b)   (i)   This was generally well answered, but students often failed to suggest two reasonable problems that may exist in using worms as a food for people.

(ii)   Most strategies suggested for solving the problems mentioned were acceptable.

(iii)   Many students gave only a one word answer to this question, or failed to discriminate between food in general and protein-rich food.

Question 53

(a)   Students generally realised that they were asked to give advice to politicians in North America about planning for the future. These students understood that, in North America, people had to reduce their oil consumption and, therefore, they had to find alternative energy resources.

(b)   Here many repeated their answer for part (a). The majority could not link the usage of non-renewable resources to the rate of population growth in Africa.

Question 54

This question was very poorly answered. Many students, whilst mentioning renewable and non-renewable resources and how they affect the environment, failed to realise or to mention the interdependence of all components of the environment.

Module 9 : Marine or River Studies

Question 55

(a)   The majority of students had difficulty in drawing an appropriate conclusion from the information given. Many simply read figures from the graph.

(b)   This section was generally well answered and most students were able to state that Australia was in Group I.

(c)   The majority of students showed little understanding of the reason for presenting information as a scatter group rather than as a line graph.

Question 56

(a)   This part was well answered by the majority of students.

(b)   Here candidates appeared confused by the phrase *water as a raw material for industry*.

(c)   This part was well answered by almost all candidates.

Question 57

More than 90% of candidates answered this question successfully. Poor responses resulted from students' not giving sufficient detail about indirect forms of polluting the waterways.

Question 58

This question was well answered, although many students were unable to describe the use of variables or the appropriate use of a control in planning their experiment.

Question 59

The majority of students answered this well, although misunderstandings arose from many students' trying to answer the question twice. Some filled in the table then proceeded to answer each separate part again.

General Comments

1.   Students need to give details and examples for answers rather than generalisations.

2.   Statements of conclusions need to be supported by fact or reason.

3.   Where questions call for **two** reasons, **two** facts or **two** descriptions, the required number must be given.

A significant number of candidates began answering the module on the right hand page of the question book, even though the module questions began on the left hand (facing) page. Answers to this left (facing) page were subsequently omitted.

Module 10 : Biotechnology

Question 60

This question was very poorly answered. Students could not apply the definition of biotechnology to the specific situation and then produce relevant questions.

Question 61

All but a few students drew a table. A number, however, were unaware of a specific example of biotechnology that could be used to benefit humans. Many, although their concept was correct, found it difficult to organise their information under the appropriate headings and to give sufficient detail.

Question 62

(a)   Almost all students could retrieve the relevant information from the text.

(b)   This was well answered, and most students gave an adequate description.

(c)   The concept of experimental design was, on the whole, well understood. Controls were set up and variables fixed, but students often did not use a sufficiently large sample or repeat the experiment. In addition, a number failed to *qualify* results, simply *measuring* and usually making only a visual comparison.

Question 63

(a)   (i)   Here information retrieval was good.

(ii)   In this part students found it difficult to apply the *rules* and present a reasoned argument. Many said *it wasn't natural*, *it was against nature*.

Question 64

Module 11 : Communications

Question 65

(a)   This was quite well answered, although some students found it difficult to distinguish between the type of transmission and the pay TV supplier.

Question 66

This question was answered poorly by many students who responded with broad generalisations about lasers without providing an example of who would use the lasers for purposes other than communication.

Question 67

Almost all students were able to present another type of communication as a flowchart, although few used arrows to indicate direction. A number found it difficult to identify sources of interference and the medium of transmission, but most could identify encoding and decoding steps for their chosen communication.

A number of students tried to incorporate feedback into their flowchart and this often resulted in a complicated answer in which some steps were poorly identified.

Question 68

Most students answered well; a wide range of communication technologies were suggested, often supported with good reasons.

Question 69

This question proved very difficult for many students. Some merely described their views of what a smile could mean, relatively few, however, provided good survey or experimental designs.

Module 12 : Consumer Science

Many students did not appear to realise that this Module started with Question 70 which appeared on an even-numbered page.

Question 70

Most students were able to frame two survey questions about the use of disposable nappies.

Parts (b) and (c) were well answered. In part (d), however, some students gave generalised environmental problems without explaining the relationship of such problems to the use of disposable nappies. Part (e) was, on the whole, well answered.

Question 71

Students listed a range of products that have been changed by advances in science and technology, those most frequently given being cars, computers, telephone, television and sports shoes. Many students were unable to describe clearly how either science or technology was directly related to the changes in the product listed in part (a).

Question 72

(a)   The majority of students were able to state one claim about the Sealit product made in the advertisement.

(b)   It was pleasing to note that many used a control as part of their investigation to test the claim made in part (a). The need for replication in the investigation was, however, often overlooked.

Question 73

This question was well answered by many students, the majority of whom realised that a scientific claim must be testable in some manner.

Module 13 : Space Science

Question 74

(a)

and
      Most students were able to give an example of a satellite and suggest two ways in

(b)
      which satellites provide information about the Earth.

(c)   The term *recently* was loosely interpreted by students, many of whom suggested events ranging from the *Big Bang* to the *Star of Bethlehem* and today's rising of the sun. Any event within recorded history was accepted.

Question 75

This question was well answered.

Question 76

Most students were able to design an acceptable investigation to study the possible advantages of using teflon in trousers. A small number only tested trousers with teflon but provided no control.

Question 77

(a)   Most students could suggest what might happen to the piece of Apollo II labelled *X*. This was answered well.

(b)   Some students confused problems experienced by the astronauts with engineering problems such as reaching escape velocity. The majority successfully described solutions for the problems they identified.