

Mark Scheme (Results) January 2007

GCE

GCE General Studies (6452/01)

6452: Scientific Horizons

Section A - All questions in section A examine A01

Students should be able to demonstrate relevant knowledge and understanding with application to a range of issues, using skills from different disciplines.

1 In 1514, Copernicus proposed that the Earth travelled around the Sun. This was contrary to popular teaching at the time, which said that the Sun travelled around the Earth.

- (a) How might this proposition have affected the lives of ordinary people at the time? (1)

D

- (b) Why might those in authority at the time have rejected this proposition? (1)

B

2 In many districts, glass containers are collected for recycling. The glass is melted down and made into new containers. It has been suggested that the containers should simply be reused rather than melting them down. (3)

What information do you need to decide whether this is a practical and cost-effective suggestion?

Cost of sorting containers into appropriate types;
Cost of discarding unusable items;
Cost of washing containers;
Cost of transport back to manufacturer;
Cost of storage of excess capacity;
Environmental cost of pollution caused by melting down;
Cost of melting down and remaking containers;
Comparison with cost of reuse;

3 (a) A father, age 55, has had kidney failure and requires treatment by lengthy dialysis each week. One of his children, age 23, has been identified as a potential kidney donor because there is a good tissue match, and he is willing to donate one kidney to his father. (4)

Explain two ethical issues that might arise from this situation.

(For a utilitarian), such an action is right because it increases the happiness of the father;;
It is right because the risk to the son is far less than the risk to the father, (because he is much younger);;
(For believers in some religions), such an action is wrong because it breaches the integrity of the body OR it goes against a religious belief;;
(For a supporter of the social contract and believers in some religions), such an action is right because the child has a duty to the parent;;
It is wrong because the son is younger, has longer to live and is more vulnerable by having only one kidney;;

NB Ignore, in both a. and b. answers which **only** deal with scientific or medical issues.

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- (b) How could the ethical issues differ if the young man had kidney failure and the father was willing to donate. (2)

The risk to the father could be greater in donating a kidney, because he is much older;; The action is right because the father has a responsibility for his children OR because father can prolong son's life;;

- 4 A large store selling electrical goods stated in its advertisements "Some of our deals are finite in supply". (3)

Comment on the use of the word 'finite' in this statement.

Finite means limited; Advertisement therefore implies "few", encouraged customers not to miss a deal; Finite in a mathematical sense might be different to a non-specialist use; If some deals are finite in supply, then the rest must be not finite; If something is not finite, it is by definition infinite; But no stock for a store could possibly be infinite;
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- 5 A graphologist is a person who claims to be able to assess someone's personality from a specimen of his or her handwriting. (3)

Briefly show how this claim could be scientifically tested.

Controlled/random samples from different people; Assess the personalities of these people by independent testing; Allow the graphologist to assess each sample, without knowing who it was from/anonymise the samples; See if there is a correlation between the graphologist's assessments and their personality; Make sure you use sufficient samples to increase the possibility that the correlation is significant; Alternatively, allow several graphologists; to analyse the handwriting of one individual; compare their analyses;

AO1 17 Marks
(Total Section A 17 marks)

Section B - All questions in Section B examine AO4

Students should be able to demonstrate understanding of different types of knowledge and of the relationship between them, appreciating their limitations.

Question 6(e) should also be used to examine AO2

Students should be able to communicate clearly and accurately in a concise, logical and relevant way.

- 6 (a) In lines 19-20 Lord Winston states 'But these lectures have frequently been unwilling or unable to divulge the key information about the molecule - what it is, its structure, or how it is produced.' (1)

From the information in the passage, the most likely reason for this is that

C

- (b) The "ownership of science", mentioned in the title of the source, refers to those who (1)

D

- (c) (i) In the last paragraph (lines 21-22) the conclusion "Commercial interest has meant that more and more scientific details may remain undisclosed". The argument in the paragraph is (1)

C

- (ii) It is stated that (lines 20-21) "This was the very information for which the registrants attended the meeting". This is an example of (1)

B

- (d) Which two of the following are reasoned conclusions to arguments used in the passage? (2)

C; E; Subtract 1 mark from total for each incorrect reason.

- (e) In what ways does the nature of the evidence offered by Lord Winston support his conclusion that “commercial activity changes the ownership of science”? (4)

Points from the following, to a maximum of 4.

He quotes some evidence from personal experience;

NB - the nature of the evidence (belief/opinion/fact/observation) must be stated or referred to gain both pairs of marks in the following paired marking points:

He observed the behaviour of lecturers who were unable to share their knowledge with other scientists;;
 He gives as his belief, government supports science because it gives the country economic advantages;;
 He gives as his belief, the public/government no longer see science as a central part of our culture;;
 He gives as his belief, the public/government no longer see science as a an essential part of human inquisitiveness;;

IF there is no reference anywhere to the nature of the evidence - MAXIMUM mark of 2.

AO2 Mark Scheme

A mark should be given for the level of written communication using these level guidelines:

The answer is clear and lucid, (writing in correct form is taken as a matter of course) arguments are coherent and well laid out, there are very few grammatical or spelling errors.	3 marks (above average)
The answer is broadly understandable, writing is in the correct form, arguments are on the whole coherent, and grammar and spelling do not inhibit communication.	2 marks (average)
The answer is only understandable in parts, writing may be in an inappropriate form, arguments are not clearly expressed, and in places grammar and spelling inhibit communication.	1 mark (below average)
The answer is badly expressed or fails to treat the question seriously, there may be serious lapses of grammar and spelling OR there is too little of the candidate’s own writing to assess reliably (as is sometimes the case in Section B).	0 marks (exceptionally poor)

NB The Quality of Communication marks are not dependant upon the AO3 mark

AO2: 3 Marks
(Total Section B 13 marks)

Section C -All questions in section C examine AO3 and AO2.

AO3 - Students should be able to marshal evidence and draw conclusions; select, interpret, evaluate and integrate information, data, concepts and opinions.

AO2 - Students should be able to communicate clearly and accurately in a concise, logical and relevant way.

General Guidance on Marking

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for irrelevant or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing relevant, plausible explanations using evidence and for critical and imaginative thinking. Candidates should also be credited for considering more than one point of view. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

Marks for Section C questions should be awarded according to AO3 and AO2 level descriptors

7 Technological innovation is sometimes a feature of human progress, but (17)
 inventions can also have unforeseen adverse consequences.

To what extent should we control the activities of inventors?

Indicative content

AO3 - candidates might follow some or all of these arguments:

- It is impossible to control the activities of inventors, because their inventions start with thinking, and we cannot control people's thoughts
- If the consequences are unforeseen, then what is the point of trying to control inventions?
- Using moral reasoning, it is obviously a good thing to try to prevent bad consequences
- We should not control inventions, because innovation contributes to human progress

However, answers have only rarely focussed on the actual question, which is about controlling scientific/technical activity. Many answers describe innovations and inventions that have mixed effects on society.

As a guide -

Candidates reaching a **maximum of L2** may just briefly mention one or two innovations (eg computers/the Internet), and draw a conclusion that they are good/bad things.

Candidates reaching a **maximum of L3** may mention in more detail one or two innovations and illustrate the effects of them, perhaps briefly, and then draw a conclusion that they are good/bad. They may mention that inventors/technologists/scientists are involved.

Candidates reaching a **maximum of L4** will elaborate on the effects of innovations, describing their good and bad effects (i.e. looking at two viewpoints). They may draw a simple conclusion about the wisdom or otherwise of innovations

Candidates reaching a **maximum of L5** will go beyond L4 by looking at the risks of innovation and making an assessment of these before allowing the innovations to be used. They will show evaluation by commenting on the nature of the risks and the practicality of doing so. They may also comment on the activities of inventors, and the need for them to be allowed to do their work.

8 Evaluate the view that the media should not be allowed to advertise or support special diets unless there is absolute scientific evidence to show that the diets do what they claim. (17)

Indicative content

AO3 - Candidates might follow some or all of the following arguments:

- This cannot be done because science investigations do not give absolute certainty
- This can only be done if it is understood that scientific evidence can only show that a diet **does not** do what it claims.
- This can be done if the media provides a clear explanation of the risks involved.
- The diet may do what it claims, for example in producing weight loss, but with harmful side effects - therefore the media should have to publish this as well.
- Media objectives are more to do with making money (e.g. magazines) and therefore promote their own or celebrity diets, which may or may not be scientifically validated.

Answers only rarely refer to the nature of scientific validation, for example that "absolute scientific evidence" is not possible to obtain. Candidates who discuss this are likely to reach at least L3.

As a guide

Candidates reaching a **maximum of L2** may mention one or two special diets, and draw a simple conclusion, such as - diets ought to be scientifically validated.

Candidates reaching a **maximum of L3** may mention several diets. They may note that they may or may not work, and note that people are different (in their physiology and hence response to different diets). They may discuss the major issue of obesity. They may draw a simple conclusion, such as - diets must be tested widely.

Candidates reaching a **maximum of L4** may mention several diets and the ways in which they may be advertised. They may mention the problems of testing diets, or may note that the problem of "proving" effectiveness. They may consider the role of the media in promoting diets. They consider more than one view, and draw a conclusion that may include reference to media motives, or the nature of diets.

Candidates reaching a **maximum of L5**, in addition to the features of L4, will consider other issues, such the freedom of the media, or the nature of scientific proof, in more detail. When drawing a conclusion they draw in two or more of these issues, and relate these well to the evidence in their essay.

9 Many people read horoscopes every day. (17)
Argue for and against the idea that the predictions of astrologers should be taken seriously.

Indicative content

AO3 - Candidates might follow some or all of the following arguments:

- Because many people read horoscopes, there must be something in them
- People only believe the bits of a prediction that they want to, therefore they are self-fulfilling prophecies
- People forget about unsuccessful predictions, and remember ones that seem to come true (this is an example of confirmation bias)
- It is possible to test some predictions objectively, and when this is done there is no evidence to support the predictions
- The predictions are so vague that they can always be made to appear to be confirmed.

Some candidates confuse "astrology" with "astronomy". Candidates making this error are unlikely to proceed further than L2

Candidates reaching a **maximum of L2** may mention more than one simple fact about astrological predictions and horoscopes. They may draw a conclusion such as "astrology is impossible", or "the prediction are sometimes true".

Candidates reaching a **maximum of L3** may mention some facts about astrology and how it is reported in the media. They may draw a simple conclusion such as scientific evidence for horoscopes is lacking, or so many people read their horoscopes that the predictions must be true.

Candidates reaching a **maximum of L4** mention facts about astrology, but make alternative explanations of their apparent widespread use. They may draw a conclusion that involves self-fulfilling prophecy. Other answers may stress that a person's beliefs may be at the heart of this activity, and that it therefore a matter of personal belief, which is difficult to challenge.

Candidates reaching a **maximum of L5** have the characteristics of L4 but develop the notion of self-fulfilling prophecies further. They may also refer to the reasons why the media promote horoscopes. They may also refer to scientific analysis of horoscopes or the ways in which they may be disproved.

A03 Level Descriptors and Mark Distributions

No marks are to be awarded for answers that are completely irrelevant or frivolous.

Level 1	<p>Partial and inconclusive answers</p> <p>Selects and marshals a limited range of evidence relevant to the question, but with no conclusion either implied or explicit.</p>	1-2 marks
Level 2	<p>One-sided answer with a simple conclusion</p> <p>Selects and marshals a limited range of evidence to draw a simple conclusion, which may or may not be appropriate. There may be little explanatory comment.</p>	3-7 marks
Level 3	<p>A developed answer which examines one viewpoint</p> <p>Selects and interprets evidence, and uses it to draw a justified conclusion(s). Explanatory comment is simple and restricted.</p>	8-10 marks
Level 4	<p>A developed answer which looks at two sides of the argument.</p> <p>Selects, interprets and begins to evaluate evidence to show awareness of differing points of view, and uses it to draw a justified conclusion(s).</p> <p>At the lower end different viewpoints are addressed in a superficial way with few specifics and little development.</p> <p>At the top end there is development of one of the viewpoints.</p>	11-13 marks
Level 5	<p>A balanced answer evaluating a range of evidence which examines contrasting viewpoints.</p> <p>Selects, interprets and evaluates a range of information, concepts and opinions relevant to the question. Marshals and evaluates the evidence to draw a justified, substantiated conclusion(s).</p> <p>At the lower end the range of information is limited.</p> <p>At the top end the range of evidence is wider.</p>	14-17 marks
	Total A03: 17 Marks	

A mark should be given for the level of written communication using these level guidelines:

The answer is clear and lucid, (writing in correct form is taken as a matter of course) arguments are coherent and well laid out, there are very few grammatical or spelling errors.	3 marks (above average)
The answer is broadly understandable, writing is in the correct form, arguments are on the whole coherent, and grammar and spelling do not inhibit communication.	2 marks (average)
The answer is only understandable in parts, writing may be in an inappropriate form, arguments are not clearly expressed, and in places grammar and spelling inhibit communication.	1 mark (below average)
The answer is badly expressed or fails to treat the question seriously, there may be serious lapses of grammar and spelling OR there is too little of the candidate's own writing to assess reliably.	0 marks (exceptionally poor)
NB The Quality of Communication marks are not dependant upon the A03 mark	

A02: 3 Marks
(Total Section C 20 marks)