

Mark Scheme (Results) Summer 2007

GCE

GCE General Studies (6452) Paper 01

General Guidance on Marking

All candidates must receive the same treatment.

Examiners should look for qualities to reward rather than faults to penalise. This does **not** mean giving credit for incorrect or inadequate answers.

Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

Candidates must make their meaning clear to the examiner to gain the mark.

Crossed out work should be marked **UNLESS** the candidate has replaced it with an alternative response.

When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the Team Leader must be consulted.

Using the mark scheme

The mark scheme gives:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should **NOT** receive credit.

- 1 / means that the responses are alternatives and either answer should receive full credit.
- 2 () means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
- 3 Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.

6452: Scientific Horizons

- 1 Was it the discovery of antibiotics or the invention of the light bulb that led to a scientific revolution? Explain why. (2)

1.1 Discovery of antibiotics;
1.2 which changed medical understanding of how to treat bacteria/radical new way to treat disease/paradigm shift;
1.3 Invention of the light bulb was technological innovation/based on known science/did not change scientists' view of the world;

Do not award any marks if light bulb is identified as scientific revolution.

- 2 Some medical studies show that drinking red wine reduces the risk of heart attacks. Briefly list information you would need to decide whether or not drinking red wine is good for your general health. (3)

2.1 What are the ingredients/what is concentration of alcohol;
2.2 Red wine might have other (side) effects on the body may be good or bad/affect particular organs/may differ in short and long term;
2.3 What are moderate/regular amounts/for how long is wine drunk;
2.4 Is the effect on heart attacks different in different people/is medical or family history or age important/how much is risk of heart attack reduced;
2.5 What other factors have an effect eg diet/exercise;

Do not award any marks for any references to other ways of reducing heart attacks; descriptions of experimental/test procedures; reference to validity of studies;

- 3 List two advantages and two disadvantages of street lighting in cities, towns and villages

Advantages

3.1.1 Reduce danger (for pedestrians or drivers or cyclists) of accidents/tripping/falling/bumping into things;
3.1.2 Reduce/deters danger of attack/mugging/crime;
3.1.3 Increases feelings of security;

Disadvantages

3.2.1 Wasteful of energy/electricity/cost of maintenance or installation/global warming;
3.2.2 Increases light pollution/obscures stars;
3.2.3 Eyesore/detrimental effect on appearance;

Do not award any marks for any reference to sleep disturbance; references to wildlife;

- 4 (a) A newspaper headline stated, "Scientists proved bumblebees can't fly". (1)

This is an inaccurate statement because:

- A- Scientists can prove anything
- B- Scientists cannot explain how any insect flies
- C- Bumblebees have a completely new method of flying
- D- It is easy to observe that bumblebees can fly

D

- (b) Explain why a newspaper headline on a science item can be misleading. (2)

4.1 Headlines are short/abbreviated/brief/oversimplified/exaggerated/sensationalist;
4.2 Science dealt with may be complex/obscure/not simple;
4.3 Intended to catch the eye/attract attention;
4.4 Journalist is not a scientist / has misunderstood the item;
4.5 Scientific language can be obscure//words can have different meanings in science;
4.6 journalist may wish to put a biased view/may manipulate the facts/may be reporting a minority view;

- 5 At sea level, pure water boils at 100°C. (1)

This is an example of a scientific:

- A hypothesis
- B observation
- C paradigm
- D theory

B

This example is commonly quoted (very misleadingly) as a scientific law, which is why this (law) is not given as a possible answer.

- 6 It is claimed that one in three people will experience an electrical emergency in their home. On average it costs £600 to repair the damage. (4)
Use this information to explain whether or not it is worth paying an annual insurance premium of £30 against electrical emergencies.

6.1 Does one person = one home (the quote differs);
6.2 Need to know the time over which the risk is assessed/it is a probability not definite;
6.3 $\text{£}600 / \text{£}30 = 20$ years cover/premiums;
6.4 People live longer than this/pay premiums for longer than this;
6.5 In that time you will have paid more than £600 in premiums;
6.6 The premiums are more than the cost of breakdown;
6.7 Therefore it is not worth taking out the insurance;
6.8 Other factors - peace of mind/convenience/ability to pay lump sum/cost is an average may be more or less/may have more than 1 breakdown/high probability so worth taking insurance;

Do not credit calculations based on £30 as a monthly premium (ie no marks for 6.3 6.4 6.5, 6.6 or 6.7).

Allow up to 2 marks for a calculation based on some other time period less than 20 years eg 10 years = £300 which is less than £600 so worth taking out insurance/saves money gains 2 marks.

AO1 17 Marks
(Total Section A 17 marks)

Section B

- 7 (a) "Scientists have found that good dancing is also a sign of genetic perfection." (lines 2-3) (1)

Which one of the following explanations best justifies this statement?

- A It is a fact that Charles Darwin linked dancing and genetic perfection.
- B It is a fact that people admire the dancing ability of others.
- C Good dancers have a greater degree of body symmetry.
- D Scientists have made a very detailed set of bodily measurements on body symmetry.

C

- (b) "The scientists found that symmetrical males were judged by females to be significantly better dancers." (lines 24-25) (1)

This is an argument based on:

- A induction
- B analogy
- C deduction
- D authority

A - induction

- (c) Which two of the following statements from the source are examples of opinion? (2)

- A "... the universal human need to dance is part of an evolutionary phenomenon known as sexual selection" (lines 3- 4)
- B "... dancing is indeed linked to physical well-being ..." (lines 6 - 7)
- C "... dance may have evolved to be so important in human culture ..." (line 12)
- D "The videos were edited to eliminate any obvious signs of symmetry." (lines 16)
- E "... the most detailed set of bodily measurements on symmetry available for any group of human beings" (lines 20 - 21)

A and C

- (d) The conclusion to this source is that there is a scientific explanation for the sexiness of a person's dancing. Using three pieces of evidence from the source, show how this conclusion is justified. (6)

Explain in each case whether the evidence is fact or opinion and why.

7.1 An experiment has been carried out/evidence is based on results of a study; (fact);

7.2 The experiment has demonstrated a correlation; between male body symmetry and female judgment of quality of dancing; (fact);

7.3 Male body symmetry is a measure of/is related to biological fitness/genetic fitness/genes; (fact);

7.4 In Darwin's theory of sexual selection individuals choose mates on physical attractiveness; (opinion);

In each of 7.1-7.4 candidates can gain 1 mark for selecting a piece of evidence and 1 mark (consequential) for saying whether that piece of evidence is fact or opinion, up to a maximum of 6 marks.

Do not allow references to line numbers instead of quotes. Ignore any references other than those above.

For 7.1 do not credit "A study has found.." where this is quoted as part of 7.2. we are looking for an explicit reference to the fact that the findings are based on research or are the result of a study

Allow objective evidence instead of fact and subjective evidence instead of opinion.

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 too 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 AO3 mark

AO2: 3 Marks
(Total Section B 13 marks)

Section C

All questions 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.

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

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.

- 8 It is possible to vaccinate people against several dangerous and easily transmitted diseases. The risk involved in these vaccinations is very small. Examine the arguments for and against compulsory vaccination for everyone. (17)

Candidates might follow some or all of these arguments:

- The risks of vaccination may be small for each individual vaccination, but we don't know how the risks might combine for several vaccinations
- What is the nature of the risk (minor reactions/ disability/ death)?
- If we vaccinate everybody for everything, the assumption is that the whole population benefits
- If we don't vaccinate everybody, then some people are still at risk
- The costs of vaccinating everybody need to be balanced against the cost of treating those who later get the disease(s).
- The costs (financial and emotional) of possible long term illness/death for individuals/families need to be evaluated
- What are the risks of vaccinating people against their will?
- How do we deal with people who refuse to allow themselves (or their dependents) to be vaccinated?
- How do we distinguish between scientific (medical) and moral/ethical issues?
- What conclusion can be drawn from the evidence raised?

Level	A03 level criteria	Mark	Indications of level Q8
0	Irrelevant or facetious answer	0	
1	Partial and inconclusive answer Selects and marshals a limited range of evidence relevant to the question, but with NO CONCLUSION either implied or explicit	1	Answer may include simple reference to a specific vaccination or may comment on the risk involved or a general description of vaccination.
2	Superficial or formulaic answer with a simple conclusion Selects and marshals a limited range of evidence to draw a simple conclusion or express a personal opinion, which may not be appropriate. The answer may consider two views in a simple for/against format with little explanatory comment or relevant evidence	2-6	Answer may comment on vaccination as a procedure and why it is carried out and draw a simple conclusion eg everyone should be vaccinated or it is not necessary to vaccinate everyone. Answers may mention compulsion.
3	An answer which develops mainly one viewpoint, but which may refer briefly to other viewpoints. Selects and interprets a moderate range of specific evidence, and uses it to draw a justified conclusion.	7-11	Answer may develop a positive view of vaccination eg that the effects of a disease are so bad that society and not just individuals need to be protected OR Answer may develop a negative view of vaccination that it carries risks for individuals and may refer to nature of risks in medical procedures. Conclusion may refer only superficially to these views but might include a brief reference to compulsion.
4	A developed answer which examines coherently, and in a more balanced way, two sides of the question. Selects, interprets and begins to evaluate specific evidence to show awareness of differing points of view, and uses it to draw a justified conclusion(s)	12-16	Answer may develop arguments supporting or rejecting vaccinations in general and reflecting on the benefits to society and the individual. They may make a significant observation on the nature of medical risks. Answer may develop views on the general issue of compulsion in medical treatments and make a comparison with eg fluoridation of water. Answer draws a balanced conclusion on vaccination in general and compulsion in particular.
5	A fully balanced perceptive answer	17	

- 9 Science has been described as simply 'organised knowledge'. If this is true, (17)
scientists have to be good organisers of knowledge.
Assess arguments for and against these descriptions of science and scientists.

Candidates might follow some or all of the following arguments:

- What do we understand by "knowledge", and what examples can we give?
- What do we understand by "science" and how can we exemplify it?
- Science should be considered a kind of human activity - a way of solving particular kinds of problems
- Knowledge comes in many different forms (any discussion of this could be helpful) - scientific knowledge is that obtained in scientific investigations, and some philosophers take it as empirical/observational.
- However science, by developing theories, enables us to make powerful generalisations about the world, and in that sense might be thought of as "organising knowledge".

Candidates will, hopefully, use some examples of scientific knowledge/ theories /investigations to help their case.

Level	AO3 level criteria	Mark	<i>Indications of level Q9</i>
0	Irrelevant or facetious answer	0	
1	Partial and inconclusive answer Selects and marshals a limited range of evidence relevant to the question, but with NO CONCLUSION either implied or explicit	1	Answer may make a simple reference to the nature of science eg experiments/theories or may make a simple comment on "knowledge".
2	Superficial or formulaic answer with a simple conclusion Selects and marshals a limited range of evidence to draw a simple conclusion or express a personal opinion, which may not be appropriate. The answer may consider two views in a simple for/against format with little explanatory comment or relevant evidence	2-6	Answer may comment on how science is carried out with one or two specific examples eg experiment, observation, measurement. Answer may show how knowledge is organized in a very simple fashion. The conclusion may make a simple link between science and knowledge.
3	An answer which develops mainly one viewpoint, but which may refer briefly to other viewpoints. Selects and interprets a moderate range of specific evidence, and uses it to draw a justified conclusion.	7-11	Answer may offer a developed commentary on the nature of science, reflecting on its methodology. OR Answer may develop an argument which relates science to general forms of knowledge. OR Answer may show how science "organises" knowledge by producing theories which explain observations. OR Answer may dispute the idea that science is simply knowledge. Answer draws a straightforward conclusion from their evidence.
4	A developed answer which examines coherently, and in a more balanced way, two sides of the question. Selects, interprets and begins to evaluate specific evidence to show awareness of differing points of view, and uses it to draw a justified conclusion(s)	12-16	Answer makes an assessment of how knowledge might be organized (dictionaries, encyclopaedias, etc) or how it might be obtained. Answer describes how scientists support explanation with evidence, or how theories can explain observable events, or make predictions. Answer makes comparisons between science and other forms of knowledge and draws a conclusion.
5	A fully balanced perceptive answer	17	

- 10 **Generating electricity by nuclear reactors does not produce carbon dioxide, the principal greenhouse gas causing global warming and climate change. Evaluate the suggestion that all countries should therefore adopt nuclear power.** (17)

Candidates might follow some or all of the following arguments:

- Arguments in favour of the suggestion would include the given one of reducing greenhouse gases
- Effect of power stations on the environment (in other ways) may also be beneficial.
- However there are issues of cost (long term costs of dealing with the radioactive waste produced)
- What is the availability of raw materials?
- Are the materials and technology readily (and fairly) available to all countries?

Level	A03 level criteria	Mark	Indications of level Q10
0	Irrelevant or facetious answer	0	
1	Partial and inconclusive answer Selects and marshals a limited range of evidence relevant to the question, but with NO CONCLUSION either implied or explicit	1	Answer may make some general comments about generating electricity OR nuclear reactors OR climate change.
2	Superficial or formulaic answer with a simple conclusion Selects and marshals a limited range of evidence to draw a simple conclusion or express a personal opinion, which may not be appropriate. The answer may consider two views in a simple for/against format with little explanatory comment or relevant evidence	2-6	Answer may make simple comments on the relationship between nuclear power generation and climate change OR states that nuclear power generation presents unacceptable long-term risks OR states that nuclear power is a good way forward..
3	An answer which develops mainly one viewpoint, but which may refer briefly to other viewpoints. Selects and interprets a moderate range of specific evidence, and uses it to draw a justified conclusion.	7-11	Answer includes some comment on cost/benefit balance and develops the view that nuclear power generation is a sensible way forward OR develops the view that nuclear power generation is too risky. Draws a conclusion consistent with one or other view.
4	A developed answer which examines coherently, and in a more balanced way, two sides of the question. Selects, interprets and begins to evaluate specific evidence to show awareness of differing points of view, and uses it to draw a justified conclusion(s)	12-16	Answer may develop viewpoints by introducing other arguments concerning the potential reduction of CO2 emissions or absorbing CO2 which might be less risky than building new reactors. OR Answer may develop points which refer to other countries (eg France) which are already committed to nuclear power and questions the possibility of international collaboration. Answer reaches a justified conclusion from a balanced argument which examines points for and against nuclear power.
5	A fully balanced perceptive answer	17	

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 too 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)