AQA

AS
General Studies A

Unit 2 (GENA2) AS Science and Society
Mark Scheme

2760
June 2016

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

GENA2 AS Science and Society

Unit 2 Section A

This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

1.1	**C**	**1.16**	**D**
1.2	**A**	**1.17**	**D**
1.3	**D**	**1.18**	**C**
1.4	**C**	**1.19**	**A**
1.5	**C**	**1.20**	**A**
1.6	**B**	**1.21**	**B**
1.7	**D**	**1.22**	**A**
1.8	**A**	**1.23**	**B**
1.9	**B**	**1.24**	**C**
1.10	**C**	**1.25**	**C**
1.11	**A**	**1.26**	**A**
1.12	**D**	**1.27**	**B**
1.13	**B**	**1.28**	**C**
1.14	**A**	**1.29**	**A**
1.15	**D**	**1.30**	**A**

Unit 2 Section B (AS Science and Society)

INTRODUCTION

The nationally agreed assessment objectives in the QCA Subject Criteria for General Studies are:

AO1	Demonstrate relevant knowledge and understanding applied to a range of issues, using skills from different disciplines.
AO2	Marshal evidence and draw conclusions: select, interpret, evaluate and integrate information, data, concepts and opinions.
AO3	Demonstrate understanding of different types of knowledge, appreciating their strengths and limitations.
AO4	Communicate clearly and accurately in a concise, logical and relevant way.

- The mark scheme will allocate a number or distribution of marks for some, or all, of the above objectives for each question according to the nature of the question and what it is intended to test.
- Mark schemes for individual questions worth more than just a few marks are usually based on **levels** (see further guidance below) which indicate different qualities that might be anticipated in the candidates' responses. The levels take into account a candidate's knowledge, understanding, arguments, evaluation and communication skills as appropriate.
- **Answers given in the mark scheme are not necessarily definitive. Other valid points must be credited, even if they do not appear in the mark scheme.**

Approximate distribution of marks across the questions and assessment objectives for **Unit 2, Section B** (**GENA2/2)**

Question Numbers		**Q2 & Q3**	**Q4 & Q5**	**Q6 & Q7**	**Total marks for Section B**
Assessment Objectives	**AO1**	**12**	**12**	**12**	**12**
	AO2	**8**	**8**	**8**	**8**
	AO3	**5**	**5**	**5**	**5**
	AO4	**10**	**10**	**10**	**10**
Total marks per question		**35**	**35**	**35**	**35**

Levels of Response marking

1. It is essential the **whole response is read** and allocated the level it **best fits**.

2. Marking should be positive, rewarding achievement rather than penalising for failure or omissions. The award of marks must be directly related to the marking criteria.

3. Levels are tied to specific skills. Examiners should **refer to the stated assessment objectives** (see above) when there is any doubt as to the relevance of a student's response. When deciding upon a mark in a level examiners should bear in mind the relative weightings of AOs (see AO grid above).

4. Use your professional judgement to select the level that **best** describes a student's work; assign each of the responses to the most appropriate level according to **its overall quality**, then allocate a single mark within the level. Levels of response mark schemes enable examiners to reward valid, high-ability responses which do not conform exactly to the requirements of a particular level. Length of response should be not be confused with quality: a short answer which shows a high level of conceptual ability, for example, must be recognised and credited at that level.

5. Credit good specialist knowledge when it is applied appropriately to the question, but be aware that the subject is General Studies and responses should be addressed to the general reader. Relevant points that are well developed and substantiated should be well rewarded, as should be arguments that are supported with examples, and not just asserted.

6. Answers should be assessed at the level that is appropriate to the expected knowledge and skills of a post-16 General Studies student. Avoid applying greater demands to responses on topics that are more closely related to your own specialist knowledge.

Assessment of Quality of Written Communication (QWC)

7. Quality of written communication will be assessed in all units where longer responses are required by means of **Assessment Objective 4**. If you are hesitating between two levels, however, QWC may help you to decide.

Step 2 Determine a mark

8. Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

9. You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

10. Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

11. An answer which contains nothing of relevance to the question must be awarded no marks.

Marking methods

In fairness to students, all examiners **must** use the same marking methods. The following advice may seem obvious, but all examiners **must** follow it as closely as possible.

1. If you have any doubt about which mark to award, consult your Team Leader.
2. Refer constantly to the mark scheme throughout marking.
3. **Always** credit **accurate, relevant and appropriate** answers which are not given in the mark scheme.
4. Do **not** credit material irrelevant to the question / stated target, however impressive it might be.
5. If you are considering whether or not to award a mark, ask yourself 'Is this student nearer those who have given a correct answer or those who have little idea?'
6. Read the information on the following page about levels of response mark schemes.
7. **Use the full range of marks**. Don't hesitate to give full marks when the answer merits them (a maximum mark does not necessarily mean the 'perfect answer') or give no marks where there is nothing creditable.
8. No half marks or bonus marks can be given under any circumstances.
9. The key to good and fair marking is **consistency**. Once approved, do **not** change your standard of marking.

Marking using 'RM'

0 2 How do scientists explain the origin and expansion of the universe?

[17 marks]

GENERAL GUIDANCE

[Spec: 3.3.1, 3.3.5] Candidates should give a clear and accurate account of the current scientific explanations of the origin and expansion of the universe. Detailed knowledge of any aspect of the question should be rewarded.

Level 3
- 17-16 marks: a very good answer, with accurate and detailed points clearly explained.
- 15-13 marks: a good answer, with some development of relevant information.

Level 2
- 12-10 marks: a quite good answer, with a range of ideas explained.
- 9-7 marks: a modest answer, with some relevant points.

Level 1
- 6-4 marks: a limited answer, but with a few basic points.
- 3-1 marks: a brief, weak answer with little or no relevant information.

Candidates should be able to achieve marks in the highest level with a selection of relevant points, not necessarily the complete range.

***Examiners are reminded** that up to **5 marks** for communication (AO4) are available for this section; well communicated answers should be appropriately rewarded.*

INDICATIVE CONTENT:

The scientifically accepted explanation of the origin of the universe is the 'Big Bang' theory:

- about 13.8 billion years ago, a huge amount of energy expanded violently from a single point; the whole of the universe has been expanding from this 'Big Bang' ever since;

- within seconds, the energy began changing into protons, neutrons and electrons; the first element to form was hydrogen, which was the main element in the first gas clouds; other elements were produced by nuclear fusion (n.b. not fission);

- the giant clouds of primordial elements coalesced to form stars and galaxies; the clouds of gas and dust are pulled together by gravity, they heat up to millions of degrees, the atomic nuclei undergo nuclear fusion and a star is formed; in a working star, there is a balance between gravitational forces pulling material inwards and pressure from hot gases pushing material outwards;

- for example, the Solar System was formed from a cloud of gas and dust drawn together into a disc by gravity; a star (the Sun) was formed at the centre; heavier materials in the cloud stayed closer to the Sun and formed the rocky planets (including Earth); the gas giants (Saturn, Jupiter, Uranus, Neptune) formed further away, and beyond them is the Oort Cloud of ice and dust particles from which come meteorites and comets;

- because of the ‘Big Bang’ explosion, everything in the universe is expanding outwards at high speed; this was confirmed by Hubble’s calculations of ‘red shift’ values for hydrogen in stars moving away from us (in contrast to the ‘blue shift’ seen in the few stars moving towards us);

- further confirmation of the concept of the ‘Big Bang’ was provided by the detection of background radiation, microwaves which are the remnants of the heat generated at the ‘Big Bang’;

- recent research has postulated the existence of ‘dark matter’, which can be inferred from its gravitational effects on visible matter; and ‘dark energy’, which is hypothesised to explain the accelerating expansion of the universe;

- while the current evidence is that the universe is expanding, there is speculation whether it will continue expanding forever, slow down to a ‘steady state’, cool down in a ‘Big Freeze’ or eventually retract and collapse in a ‘Big Crunch’.

Other valid points, not included here, should be credited.

0 3 To what extent does scientific understanding of the origin of the universe and the evolution of life on Earth challenge religious beliefs about creation?

[18 marks]

GENERAL GUIDANCE:

[Spec: 3.3.9, 3.3.10] Candidates should give a balanced discussion of the different perspectives of religion and science, with particular reference to creation and/or evolution, and the extent of any conflict between them.
Answers which are merely assertions of personal belief will not score highly. It is not expected that candidates should address the full range of belief systems mentioned in the MS, but credit should be given to those who consider more than one in their responses.

Level 3
- 18-16 marks: a very good answer, with accurate and detailed points clearly explained.
- 15-13 marks: a good answer, with some development of relevant information.

Level 2
- 12-10 marks: a quite good answer, with a range of ideas explained.
- 9-7 marks: a modest answer, with some relevant points.

Level 1
- 6-4 marks: a limited answer, but with a few basic points.
- 3-1 marks: a brief, weak answer with little or no relevant information.

Candidates should be able to achieve marks in the highest level with a selection of relevant points, not necessarily the complete range.

***Examiners are reminded** that up to **5 marks** for communication (AO4) are available for this section; well communicated answers should be appropriately rewarded.*

INDICATIVE CONTENT:

Nearly all early societies have had **creation myths** which sought to explain how the world and its peoples came into existence at a time when there were no developed scientific explanations. Most modern religions have origins of up to several thousand years ago, and their belief systems often include versions of these creation myths found in their sacred texts.

The development of **scientific explanations** of the natural world was often accompanied by conflict between organised religion and scientific researchers (e.g. Galileo's astronomical ideas in the early 17th century, Darwin's theory of evolution in the mid-19th century).

A clear **distinction emerged between religion and science**:
- religious ideas are based on faith and beliefs deriving from sacred texts (often thousands of years old), as articulated and interpreted by authority figures within the faith community;
- scientific knowledge is based on empirical evidence derived from observation of phenomena and experimentation under controlled conditions, with interpretation using logic and rationality.

This has led **some rationalists** (e.g. Richard Dawkins) to argue that there Is a fundamental conflict between science and religion – if scientific ideas on, for example, the 'Big Bang' or evolution are correct, then religious accounts must be false.

Equally, **some religious believers** insist on the literal truth of their sacred texts and believe that scientific explanations cannot be true.

On the other hand, others have argued that religion and science are 'non-overlapping magisteria', i.e. that they are asking different questions, and that therefore it is possible for science and religion to co-exist. Indeed, some religious believers argue that the 'Big Bang' and evolution can be seen as compatible with their beliefs, or even that they are evidence of them (e.g. 'Big Bang' = the Creation; the claim that the Genesis story broadly matches the scientifically verified order of evolution).

Christianity

- the Old Testament claims that the universe, the world and all creatures in it were created by God in six days;
- some fundamental Christians believe this literally, and that the world was created exactly as it is, that there was no 'Big Bang' and that evolution is false; their views are described as 'creationism', with the concept of 'intelligent design' being a variation;
- other Christians now accept scientific explanations, and regard biblical accounts as symbolic or a parable; they believe that the creation of the universe and the evolution of life are the mechanisms by which God's will is implemented.

Judaism

- the account of creation in the Torah is identical to that of the Christian bible; modern Jewish belief is divided in a similar way to Christian views – some take a literalist view and reject scientific explanations, the majority accept scientific explanations as being the manner in which God's will is carried out.

Islam

- according to the Qu'ran, the heavens and earth, and all of humanity were created by Allah (God); Muslims have a generally positive attitude to science, regarding it as a means of better understanding Allah's creation; however, there are similar divisions to those in Christianity and Judaism regarding the literal or symbolic nature of scientific explanations of the origin of the universe and evolution.

Hinduism

- there are a number of different traditions within Hinduism which describe creation differently, such as akin to the breaking of an egg or the building of a house from timber; all regard Brahman as the creator of the entire universe;
- some argue that the parables in Hindu sacred texts parallel the creation of the universe through the 'Big Bang'; some suggest further that the idea of the 'Big Crunch' leading to another 'Big Bang' and a new universe, parallels Hindu ideas of creation, destruction and reincarnation.

Sikhism

- according to Sikh belief, the universe was created from nothing by Waheguru (God); it is possible to draw parallels between Sikh beliefs and the creation of the universe by the 'Big Bang'; Sikhs also believe that the universe will ultimately be re-absorbed into God – a belief that can be interpreted as similar to the concept of the 'Big Crunch'.

Candidates may refer to other religious belief systems in their response to the question.

Other valid points, not included here, should be credited.

0 4 Explain how 'the direct and indirect effects of smoking' are the cause of ill health and death in human populations.

[17 marks]

GENERAL GUIDANCE:

[Spec: 3.3.8] Candidates should give clear and accurate information on the health effects of smoking, including passive smoking.

Level 3
- 17-16 marks: a very good answer, with accurate and detailed points clearly explained.
- 15-13 marks: a good answer, with some development of relevant information.

Level 2
- 12-10 marks: a quite good answer, with a range of ideas explained
- 9-7 marks: a modest answer, with some relevant points.

Level 1
- 6-4 marks: a limited answer, but with a few basic points.
- 3-1 marks: a brief, weak answer with little or no relevant information.

Candidates should be able to achieve marks in the highest level with a selection of relevant points, not necessarily the complete range.

***Examiners are reminded** that up to **5 marks** for communication (AO4) are available for this section; well communicated answers should be appropriately rewarded.*

INDICATIVE CONTENT:

Tobacco is the biggest single cause of preventable death globally – as the source says, 6 million deaths per year are linked to smoking, and half of all smokers will die prematurely because of their use of tobacco. The likelihood of adverse health effects is directly proportional to the amount of tobacco smoked.

Tobacco is so dangerous because its smoke contains numerous carcinogens, both chemical and radioactive. The principal carcinogens are found in the tars which are produced by smouldering organic matter in the cigarette, pipe tobacco or cigar. Tobacco also contains nicotine, a stimulant which causes physical and psychological dependency.

The **direct effects** of tobacco are caused by the smoking of cigarettes, pipes and cigars, and by the consumption of chewing tobacco and snuff.

The **indirect effects** of tobacco are caused by **passive smoking**. This involves the inhalation of smoke from the burning ends of cigarettes, pipes and cigars, and second hand smoke exhaled by smokers in proximity to those around them, who may include young children and other non-smokers.

The **main ways in which smoking affects health** include:

- **cancer**: smoking significantly increases the risk of many types of cancer, particularly lung cancer, but also including mouth, stomach, pancreatic, and bladder cancers; there is a link between smoking and cervical cancer in women; the toxins in smoke attach themselves to a cell's DNA, causing the death or mutation of the cell into a cancer cell;

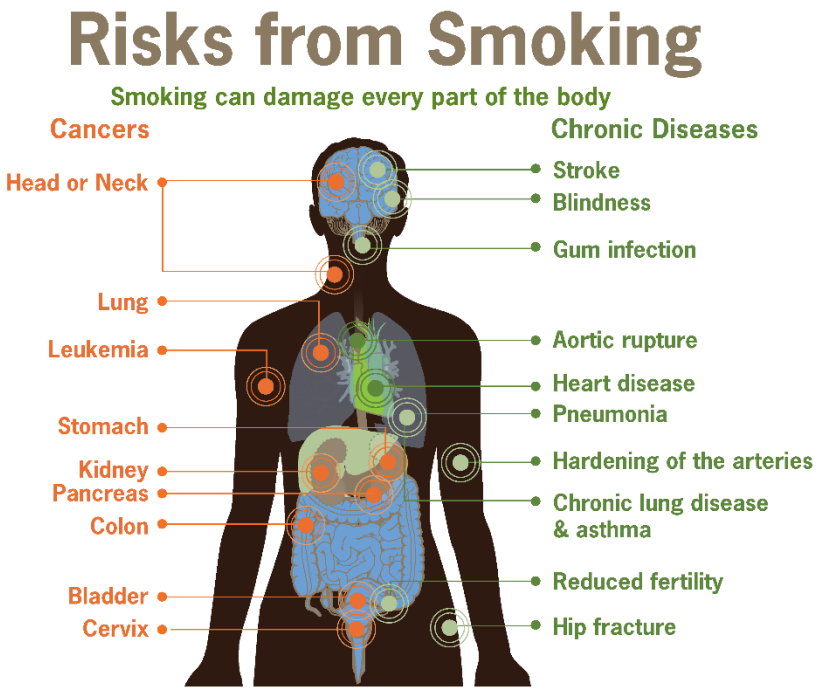
- **pulmonary disease**: exposure to carbon monoxide and cyanide in smoke can lead to loss of elasticity in the alveoli (air sacs in the lungs), causing emphysema and chronic obstructive pulmonary disease (COPD), which is permanent and incurable, damages the lungs, and results in shortness of breath and persistent coughing;

- **cardiovascular disease**: carbon monoxide in smoke reduces the blood's ability to carry oxygen around the body; prolonged exposure can make this permanent, increasing the risk of heart attacks and stroke; smoking also increases the level of blood cholesterol;

- **sexual effects**: smoking significantly increases the likelihood of impotence in men, as a result of arterial narrowing; it increases the chances of infertility in women, as a result of its effects on the ovaries;

- **pregnancy**: smoking in pregnancy significantly increases the risk of miscarriage, low birth weight, and has also been linked to behaviour problems in children;

- **psychological effects**: smokers often claim that smoking reduces stress; however, studies have demonstrated that smokers are more likely to suffer stress and depression than non-smokers; the apparent reduction in stress is likely to be the alleviation of withdrawal symptoms caused by lack of nicotine.



Other valid points, not included here, should be credited.

0 5 Discuss whether e-cigarettes should be encouraged or discouraged and whether their use should be permitted in public places, such as workplaces and restaurants.

[18 marks]

GENERAL GUIDANCE:

[Spec:] Candidates should give a balanced discussion of the pros and cons of e-cigarettes and their use in public places.

Level 3
- 18-16 marks: a very good answer, with accurate and detailed points clearly explained.
- 15-13 marks: a good answer, with some development of relevant information.

Level 2
- 12-10 marks: a quite good answer, with a range of ideas explained.
- 9-7 marks: a modest answer, with some relevant points.

Level 1
- 6-4 marks: a limited answer, but with a few basic points.
- 3-1 marks: a brief, weak answer with little or no relevant information.

Candidates should be able to achieve marks in the highest level with a selection of relevant points, not necessarily the complete range.

***Examiners are reminded** that up to **5 marks** for communication (AO4) are available for this section; well communicated answers should be appropriately rewarded.*

INDICATIVE CONTENT:

An e-cigarette (electronic cigarette) is a battery-powered vaporiser which replicates the tobacco cigarettes. E-cigarettes do not contain tobacco, but work by heating a liquid solution containing nicotine, flavourings and other chemicals. The user inhales a 'vapour' containing nicotine, but without the other elements of tobacco smoke. It is argued that they therefore enable users to meet their need for nicotine, but without inhaling the carcinogenic content of tobacco smoke.

Should their use be discouraged?

- they can be seen as an 'entry' route to tobacco smoking for children and other non-smokers, leading them to become addicted to nicotine;
- even if they are relatively harmless in themselves, they can be seen as legitimising the idea of smoking;
- there have been no long-term studies as to their use, so it is not known what the long term effects on health might be; however, a recent study (February 2015) has shown that e-cigarettes may damage the lungs;
- there is a lack of regulation, so there is no certainty what any particular type of e-cigarette contains;
- because of the lack of accepted standards, it is possible that some types of e-cigarette may well contain potentially toxic chemicals;
- even if they are not carcinogenic, their use is likely to create nicotine addiction for those who do not use traditional cigarettes.

Should their use be encouraged?

- they can be seen as being similar to other nicotine substitute products (patches, gum, sprays) which are not regarded as harmful, and are often recommended to assist people to give up smoking tobacco;
- they can be seen as being safer than traditional cigarettes, in that they do not contain the carcinogens that cigarettes contain;
- evidence suggests that they are mainly used by people trying to give up smoking – as such they should be encouraged;
- regulations are being introduced by the EU requiring information on ingredients to be provided.

Should their use be permitted in public places? Yes:

- if it is accepted that the vapour does not contain carcinogens, there can be no danger to users or to those nearby (as with 'secondary smoke'), so there is no reason to ban the use of e-cigarettes in offices or other public places;
- if they were permitted in public places, it would reduce likelihood of groups of smokers hanging around entrances or smokers' shelters.

Should their use be permitted in public places? No:

- it is still not certain whether e-cigarettes are harmful to users, and there is no certainty of their effects on those nearby;
- it is now an accepted norm that smoking is not permitted in public places – amending this to permit e-cigarettes would undermine the current consensus;
- it may be difficult to distinguish between tobacco smokers and e-cigarette users in public places, hindering enforcement of the smoking ban;
- even if it is accepted that they are safe, their use can still be seen as intrusive and offensive to bystanders;
- there are many legal and healthy practices which are not socially acceptable in public places – why should e-cigarettes be any different?

Other valid points, not included here, should be credited.

0 6 Examine the causes of global warming and the potential consequences for humanity in the 21st century.

[17 marks]

GENERAL GUIDANCE:

[Spec: 3.3.1, 3.3.10] Candidates should give clear and accurate information on the causes of global warming and climate change, and should identify some of the likely impacts on human society.

Level 3
- 17-16 marks: a very good answer, with accurate and detailed points clearly explained.
- 15-13 marks: a good answer, with some development of relevant information.

Level 2
- 12-10 marks: a quite good answer, with a range of ideas explained.
- 9-7 marks: a modest answer, with some relevant points.

Level 1
- 6-4 marks: a limited answer, but with a few basic points.
- 3-1 marks: a brief, weak answer with little or no relevant information.

Candidates should be able to achieve marks in the highest level with a selection of relevant points, not necessarily the complete range.

***Examiners are reminded** that up to **5 marks** for communication (AO4) are available for this section; well-communicated answers should be appropriately rewarded.*

INDICATIVE CONTENT:

Greenhouse gases
Greenhouse gases include water vapour, carbon dioxide, nitrous oxide and methane. They occur naturally in the atmosphere. Variations in their concentrations can effect temperature and climate. Short wave radiation from the sun (visible and UV) can penetrate our atmosphere; but re-radiated long wave radiation (IR/heat) can be absorbed by greenhouse gases, raising the temperature of our atmosphere.

Global warming
It is widely accepted that the increased amounts of greenhouse gases, particularly carbon dioxide and methane, released into the atmosphere as a result of human industrial activity in the last 150 years or so, is the cause of global warming. It is anticipated that, without significant restraint in human activities, global temperatures will rise by between 2^oC and 4^oC by the end of the century.

Causes of global warming
The increased production of greenhouse gases comes about principally as a result of the burning of fossil fuels (oil, coal, gas) in industrial production, as fuel for transport, and in the generation of electricity for domestic and industrial purposes. Extensive deforestation also contributes to global warming, as a result of the burning of trees, and the diminished absorption of carbon dioxide by the reduced tree and plant cover. Intensive livestock farming is a significant producer of methane.

Climate change

Global warming affects the climate in a number of ways. Although average temperatures have risen, and are expected to continue doing so, this is not uniform across all parts of the world. Changes in the amount of glacier and polar ice will affect the climate, as will changes in sea temperatures and currents. Some areas will get much hotter, others will remain much the same or even be cooler; some areas will experience drought, others will face increased precipitation; extreme weather events (storms, floods, hurricanes, etc) are likely to become more frequent.

Potential consequences

These include:

- alterations in crop yields, with some areas becoming much less productive; this could cause food shortages and increased risk of famine in some areas;
- increased risks of diseases such as malaria, as a result of the spread of mosquitoes;
- increased risk of flooding and other extreme weather events is likely to damage property, cause deaths;
- areas of low-lying countries (e.g. Holland, Bangladesh) may become uninhabitable;
- fish stocks will be affected by changing sea temperatures and currents – this may have both positive and negative effects;
- increased pressure on animal populations, which may face extinction, lose habitat, increase or decrease their range, come into conflict with humans as a result of habitat change;
- migration of populations from negatively affected areas to less affected areas could create political tensions and conflict;
- disputes over resources, particularly water, could lead to conflict between nation states.

Other valid points, not included here, should be credited.

0 7 Discuss the extent to which governments and companies are likely to move away from dependency on fossil fuel and shift to renewable forms of energy.

[18 marks]

GENERAL GUIDANCE:

[Spec: 3.3.8, 3.3.10] Candidates should consider reasons why governments and companies remain largely committed to fossil fuel production and use, and suggest why and how they may ultimately be persuaded to move towards greater use of renewable energy.

Level 3
- 18-16 marks: a very good answer, with accurate and detailed points clearly explained.
- 15-13 marks: a good answer, with some development of relevant information.

Level 2
- 12-10 marks: a quite good answer, with a range of ideas explained.
- 9-7 marks: a modest answer, with some relevant points.

Level 1
- 6-4 marks: a limited answer, but with a few basic points.
- 3-1 marks: a brief, weak answer with little or no relevant information.

Candidates should be able to achieve marks in the highest level with a selection of relevant points, not necessarily the complete range.

***Examiners are reminded** that up to **5 marks** for communication (AO4) are available for this section; well-communicated answers should be appropriately rewarded.*

INDICATIVE CONTENT:

Maintaining dependency

The **fossil fuel (oil, gas, coal) companies** have a vested interest in maintaining the status quo in fuel production and resisting moving to renewable forms of energy generation:

- they make significant profits from the generation of energy from non-renewable sources;
- they would lose their massive investments in infrastructure (coal mines, oil and gas platforms, etc), land and resources;
- they have detailed knowledge and expertise of the technology and finances of their industry, but little or none of the alternatives – to change would be difficult and expensive;
- there is a belief that all the progress and prosperity of the last two centuries has been based on the effectiveness of fossil fuel energy generation – to change direction could jeopardise future prosperity, according to this view;
- new exploitation of oil and gas reserves (such as shale gas in the UK) may weaken incentives to invest in developing alternatives;
- there is no government or global market incentive to invest in a transition from fossils fuels to renewables – whether in the form of penalties or subsidies.

Manufacturing industries which are dependent on fossil fuels have similar short-term interests: their investment, profits and infrastructure are largely predicated on the use of fossil fuels. To change would require massive new investment and re-engineering, with the danger of a decline or collapse in their businesses.

Governments may also be seen as having a vested interest in the status quo, though perhaps not such a direct one:

- governments are often close to business elites, and depend on them in maintaining confidence in the future of the economy;
- in some countries (e.g. USA), fossil fuel companies make very large contributions to the major political parties, in the expectation that, when in government, they will support their interests;
- governments rely heavily on tax revenues from fossil fuel consumption – changing to renewable energy sources could disrupt and significantly reduce revenue, with consequences for government programmes;
- governments are responsive to public opinion, which may be antagonistic to some forms of renewable energy – e.g. wind turbines; the public are likely to be unwilling to pay potentially higher prices for renewable energy;
- governments are reluctant to make the 'first move' in moving to renewables in case it gives other countries a competitive advantage in industrial production.

Shift to renewables?

On the other hand, it can be argued that both governments and companies have much to gain by challenging vested interests and taking a longer term view (20+ years), by moving away from fossil fuel based energy generation.

Governments

- governments have a moral obligation to preserve the environment on a global scale; political leaders can gain credibility and support by working to limit the effects of global warming;
- the Stern Report (2006) demonstrated that the costs of living with global warming are greater than the costs of moving to a renewable energy based world economy – governments could save money (as well as lives) by challenging vested interests;
- governments could create greater economic growth by supporting new technologies and industries, based on renewable energy.

Companies

- companies could open up new markets based on the use of renewable energy and new technologies, leading to higher profits in the long run;
- 'early adopters' of new technologies, including renewable energy, could gain an economic advantage by becoming leaders in their field;
- the costs of extracting fossil fuels are increasing as new sources are more difficult to extract – renewable energy will ultimately be a cheaper and more readily accessible option in the future.

Other valid points, not included here, should be credited.