**General Certificate of Education (A-level)
June 2013**

**General Studies A                    GENA2**

**(Specification 2760)**

**Unit 2: Science and Society**

# Final

# *Mark Scheme*

Mark schemes are prepared by the Principal Examiner 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 examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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.

# Unit 2 Section A

# GENA2  AS Science and Society

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

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

# 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.

- In most cases mark schemes for individual questions are based on *levels* 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.

- Examiners are required to assign each of the candidate's responses to the most appropriate level according to **its overall quality**, then allocate a single mark within the level.  When deciding upon a mark in a level examiners should bear in mind the relative weightings of AOs (see below).  For example, the most weight should be given to AO1, then AO4, then AO2 and finally AO3.

- *Indicative content* is provided as a guide for examiners.  It is not intended to be exhaustive and other valid points must be credited.  Candidates do not have to cover all points mentioned to reach Level 3.

- A response which bears no relevance to the question should be awarded no marks.

**Distribution of marks across questions and assessment objectives for
Unit 2, Section B**

| 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 |

| Level of response | Mark range | Criteria and descriptors for Assessment Objectives 1-4 |
|---|---|---|
| LEVEL 3 | 13–17 (18) | **Good response to question**<br><br>Good to comprehensive knowledge, understanding and approach demonstrating overall grasp of the range and nature of issues (AO1).  Capacity to interpret evidence and sustained ability to present relevant arguments, analysis and exemplification, focusing on the main points of the question (AO2).  Shows some understanding of different types of knowledge, with some appreciation of their limitations in seeking to reach a reasoned and logical conclusion (AO3).  Ability to communicate clearly and accurately in a fluent and organised manner (AO4). |
| LEVEL 2 | 7–12 | **Reasonable attempt to answer question**<br><br>Modest to quite good knowledge, understanding and approach demonstrating some grasp of the nature of some key issues (AO1).  Moderate range of arguments, analysis and exemplification covering some of the main points of the question (AO2).  Limited understanding of different types of knowledge but some ability to work towards or achieve a reasoned conclusion (AO3).  Mostly clear and accurate communication and organisation (AO4). |
| LEVEL 1 | 1–6 | **Limited response to the question**<br><br>Restricted / narrow knowledge and understanding of key issues (AO1).  Simple, perhaps mostly unexplained points – or very narrow range – with limited interpretation or analysis and exemplification (AO2).  Lacking in understanding of different types of knowledge with little or no evidence of ability to work towards a conclusion (AO3).  Variable levels of communication and organisation (AO4). |
| LEVEL 0 | 0 | **No valid response or relevance to the question.** |

**02  Explain the main medical and scientific issues involved in the transplantation of organs and tissues into humans.**

*(17 marks)*

**General guidance**

Candidates should be expected to demonstrate some understanding of the situations in which transplants are necessary, the practical issues involved in a successful transplant, and an awareness of how organs may become available for transplant.

A **poor** to **limited** response will be in Level 1 (1 – 6 marks)
A **modest** to **quite good** response will be in Level 2 (7 – 12 marks)
A **good** to **very good** response will be in Level 3 (13 – 17 marks)

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

**Indicative content**

Organ transplantation is now a relatively common medical procedure that has developed extensively since the 1950s and 60s.  In general, people are now living longer and therefore diseases have a longer time to develop and damage organs.  Diseases which can lead to organ failure include: diabetes, cirrhosis, coronary heart disease, hepatitis C, cystic fibrosis, Crohn's disease.

Organ transplantation involves the removal of an organ from one body to another.  Organs which can be transplanted include: kidney, liver, heart, lungs, pancreas.

In addition, various human tissues can also be transplanted, including: cornea, skin, heart valves, veins.

Organ transplantation is not straightforward.  The human body will reject organs or tissues that are 'foreign' to it.  Antibodies are proteins used by the immune system to attack and destroy foreign substances (antigens).  Therefore, potential organ recipients will be tested using:

- an antibody screen, to determine likely level of rejection
- a blood test – compatibility of blood type between donor and recipient is necessary
- tissue typing – to determine the extent to which the genetic make-up of cells is compatible.

Organs may come from a number of different types of source:

- living donors – those who donate renewable tissue (e.g. skin) or organs which can regenerate (eg part of liver) or where there are 'spare' organs (e.g. kidney).
- deceased donors – those who are brain dead as a result of illness or accident but whose organs can be kept viable by use of a ventilator for sufficient time to complete a transplant.
- xenotransplantation – non-human organs or tissue, e.g. animal heart valves have been successfully used in human patients.
- artificial transplantation – in the early stages of development, the use of synthetic

materials around which stem cells can be grown.

The main cause of the failure of transplants is from the rejection of the transplanted organ or tissue by the recipient's immune system. Rejection can be overcome by

- careful matching of donor and recipient to determine the closest possible matching of antigens
- recipients of organs from other bodies taking immuno-suppressant drugs for the rest of their lives.

This may make them susceptible to other diseases and opportunistic infections as a result of their reduced immune response.

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

**03 Discuss the ethical implications of organ transplantation and of proposals to increase the supply of organs for transplantation.**

*(18 marks)*

**General guidance**

Candidates should be expected to discuss ethical concerns regarding the nature and timing of death, and the choices individuals may face. They should also be expected to comment on any proposals to increase the supply of organs for transplantation, particularly those mentioned in the stimulus material.

A **poor** to **limited** response will be in Level 1 (1 – 6 marks)
A **modest** to **quite good** response will be in Level 2 (7 – 12 marks)
A **good** to **very good** response will be in Level 3 (13 – 18 marks)

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

**Indicative content**

There are a number of ethical concerns around the issue of organ donation and, in particular, pressures to expand the supply of organs and access to them.

**Definition of death**

Organs from people who have died and whose hearts and lungs have ceased functioning are less likely to be successful. Transplants of organs from individuals who are brain dead, but who can be kept alive on ventilators, are more successful – but there are issues of judgement as to exactly when death occurs and who makes choices about turning off life-support machines.

Advances in detecting brain activity in those previously considered brain dead make decisions even more difficult. There is also concern that the wish to use viable organs may lead to premature decisions about ending treatment and turning off life-support systems. Medical advances now mean that some people who might previously have had life-support machines turned off can now survive in a 'persistent vegetative state' or with 'locked-in syndrome'.

**Consent**

The current system in the UK is by 'opting-in' to a donor register; potential donors have to consciously declare their wish for their organs to be used. Although many individuals do so, the force of inertia means that most do not. Relatives may be asked for permission for organs to be harvested; but this is often a highly stressful time when many people will be unwilling or unable to take difficult decisions.

The system proposed for Wales, already in use in many European nations, is 'presumed consent'; it is presumed that organs can be used unless the individual has registered a specific decision to not allow this. In this case, the force of inertia favours donation. The benefit of this is that the number of organs available for transplant is likely to increase significantly. However, there are concerns about possible intrusion on an individual's human rights, and that the state is exercising control over the bodies of individuals.

A different view is that the state should 'nudge' individuals to change behaviour by offering rewards or incentives rather than by direct intervention.

**Altruistic donation**

This is the donation of organs by living donors, either to relatives or to others in need.  This can be perceived as a highly moral act, though there may be pressure exerted externally on potential donors which could be regarded as unethical.

**Payment**

In the UK, payment for the donation of organs is illegal, though the practice is common in some other countries.  One view is that payment will increase the numbers of organs available, and will reward those who make the donation.  On the other hand, it can be seen as a means of predominantly wealthy recipients exploiting predominantly poor donors.  It goes against the principle of medical treatment on the basis of need rather than ability to pay.

**Transplant tourism**

Patients from wealthy countries such as the UK can travel to other nations to gain access to organs, usually for significant payment.  Apart from the issue of payment itself, there is concern that often only a small amount of the fee goes to donors or families of donors.  There is also a concern that organs used in these circumstances may not be well screened, leading to failure and/or infection.

**Organ trafficking**

In cases of short supply, the possibility exists of trafficking of organs for profit, with attendant exploitation of donors or their families and an increased danger of rejection or infection.

**Forced donation**

In some circumstances, it is alleged that organs are extracted without consent – eg the alleged use of organs of executed prisoners in China.  Organs are sometimes taken from street children and other vulnerable individuals in South America and elsewhere, often by force or deception.

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

**04  Explain the significant 'ecological and social problems' the world is facing and outline the reasons for them.**

*(17 marks)*

**General guidance**

The extract identifies a number of areas which candidates may wish to explore in answer to this question, including overpopulation, overconsumption, environmentally malign technologies, biodiversity loss and climate change.  Candidates should be expected to use these textual clues, and to give some specific examples of how they contribute to ecological and social problems

A **poor** to **limited** response will be in Level 1 (1 – 6 marks)
A **modest** to **quite good** response will be in Level 2 (7 – 12 marks)
A **good** to **very good** response will be in Level 3 (13 – 17 marks)

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

**Indicative content**

**Overpopulation**

- the population of the world passed 7 billion at the end of 2011; it is expected to reach 9 billion some time before 2050

- the trend is slowing – the most rapid rise was in the mid-20th century

- the reasons for the rapid increase include medical and health advances, and improved agricultural productivity.

**Overconsumption:**

- consumption of finite fuel sources, particularly coal, gas and oil is leading towards the potential depletion of reserves;  the concept of 'peak oil' might be referred to

- overconsumption of scarce resources is responsible for the reduction in the area of rainforest across the globe

- it can be argued that most modern societies are based on excessive consumption of food, energy and many other of the world's resources.

**Environmentally malign technologies:**

- the reliance on coal, oil and gas for energy by many newly-industrialising countries is recognised as having a significantly damaging effect on the environment

- many industrial processes create serious environmental pollution – eg carbon emissions, sulphur oxides (causing acid rain), nitrous oxides,  CFCs (currently banned)

- the demand for rare metals and minerals for use in digital technology products is having a detrimental environmental effect in source countries.

**Biodiversity loss:**

- pressure on habitats by human residence or utilisation is a major cause of threats to endangered species – eg some species of tiger, giant pandas, bonobos

- overfishing and hunting are a threat to life in the oceans and areas of Africa, South America and Asia

- the loss of variety of plant and animal species can have consequences for the health of wider ecosystems, as well as limiting potential future scientific breakthroughs.

**Poverty:**

- there is a significant (and widening) gap in wealth between developed and developing societies, on the one hand, and those societies which have yet to develop, on the other

- there is a widening gap between rich and poor in many developed societies, including the UK, as a result of the economic policies of recent decades

- there are differing views of the importance and validity of measures of relative and absolute poverty.

**Climate change:**

- there is a scientific consensus that carbon and other greenhouse gas emissions are leading to the warming of the planet, with seriously detrimental effects for humans and other species

- industrial development and the reliance of transport systems on fossil fuels are widely regarded as the major cause of climate change

- potential consequences of climate change include rising sea levels, unpredictable weather, melting polar caps and glaciers, and desertification of wide areas of land.

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

**05   Consider what measures the government and individuals in the UK could take to help make the transition to 'a more sustainable future'.**

*(18 marks)*

**General guidance**

The question requires candidates to consider measures in the UK to promote sustainability. However, the problems identified in the extract, which have been examined in Question 04, are global in scale.  Examiners should therefore expect candidates to focus on what can be done by governments and individuals in Britain – but that may well have a global dimension in terms of international policy and the work of NGOs elsewhere in the world.

A **poor** to **limited** response will be in Level 1 (1 – 6 marks)
A **modest** to **quite good** response will be in Level 2 (7 – 12 marks)
A **good** to **very good** response will be in Level 3 (13 – 18 marks)

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

**Indicative content**

The issues considered here should have a predominantly UK focus, but may also have a global dimension.

**Overpopulation:**

- the rate of population growth could reduce as a result of birth control education and promotion

- political and economic policies to favour smaller families; improved economic and social status of women

- development of urbanised and industrialised societies tend to be associated with declining family size.

**Overconsumption:**

- attempts to promote a society and economy based on lower expectations and reduced demand for consumer goods

- policies which challenge corruption and waste

- promotion of 'reduce, reuse, recycle' strategies

- development of renewable energy usage.

**Environmentally damaging technologies:**

- cleaning up industrial processes

- developing and expanding the use of alternative fuels for private and public transport

- renewable sources of energy could replace damaging carbon-based energy

- there might be some discussion of technologies such as nuclear power and GM crops, which some people regard as malign (though others might regard them as part of the solution, not the problem).

**Biodiversity loss:**

- measures to protect habitats from development
- use of regulation and enforcement to protect endangered species
- promotion of nature reserves and captive breeding programmes
- organised tourism to provide income for locals, as an alternative to living off endangered species.

**Poverty:**

- fair trade policies (rather than neo-liberal 'free' trade policies) might ease the disparity in wealth between developed economies and others
- politically, individual societies could promote policies of redistribution of wealth and income
- economic policies could be aimed at enabling poorer, low-technology communities and societies to develop in an appropriate way.

**Climate change:**

- many of the other measures already discussed could contribute to the alleviation of climate change
- candidates may also consider large scale geo-engineering proposals, such as cloud whitening, space mirrors or carbon capture techniques.

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

**06  Examine different research methods that are used by social scientists investigating changes in institutions such as the family.**

*(17 marks)*

**General guidance**

Candidates should be able to demonstrate their knowledge of research methods used in social sciences. They should be able to explain the nature of quantitative and qualitative methods and to comment on their different uses.

A **poor** to **limited** response will be in Level 1 (1 – 6 marks)
A **modest** to **quite good** response will be in Level 2 (7 – 12 marks)
A **good** to **very good** response will be in Level 3 (13 – 17 marks)

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

**Indicative content**

Social scientists seek to take a scientific approach to understanding and explaining social institutions. However, unlike the physical sciences, social science is concerned with groups and individuals capable of making choices and interacting with others in complex ways. Therefore, the methods used in social science are of necessity different to those used in physical and natural science.

In particular, it is impossible (not to say unethical) to confine human beings in a laboratory to conduct experiments on them, making variables difficult to control. And it is impossible to predict behaviour of human beings with the same certainty that it is possible to predict some natural events, because of the ability of individuals to exercise choice and free will.

Social science methods can broadly be split into **quantitative methods**, which seek to measure and quantify behaviour; and **qualitative methods** which are more concerned with gaining an understanding of the experience of individuals and groups.

**Quantitative methods**

**Primary methods** involve the researcher finding out information directly from the individuals and groups being studied.

- **surveys** are the most usual means of finding this information; they use a variety of means of securing the required information

- unless the population being investigated is small, surveys require a **sample** of the population being studied to be selected: sampling methods include random sampling and stratified sampling

- the survey requires the gathering of information from the sample; this can be done using **questionnaires** or **structured interviews**

- these can include **closed questions** (which produces a specific, quantifiable response) or **open questions** (which allows for a more discursive response).

**Secondary methods** include the use of material gathered by government and commercial organisations for their own purposes.

- the **Census** gathers information from every household every ten years, and is an invaluable source for basic information

- the government also publishes a large amount of statistical information on a variety of topics; much of this is drawn together in **Social Trends**, a document published annually.

**Qualitative methods**

Methods which explore the experience of individuals and groups, rather than gathering information for statistical analysis, include:

- **unstructured interviews**, in which the respondent can explain their behaviours and attitudes in their own words

- **focus group** – a form of unstructured interview with a group sampled to represent the population being studied

- **non-participant observation**, in which the researcher observes behaviour in social situations

- **participant observation**, in which the observer becomes part of a group to better understand the behaviour and interactions that occur

- **case study** – a detailed analysis of a particular group

- **longitudinal study** – a detailed study of a group over a period of time, to note the changes in behaviour of the same group of individuals.

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

**07  Consider the extent to which the family in the UK is changing, and discuss the social and economic consequences of this change.**

*(18 marks)*

**General guidance**

Candidates should be expected to demonstrate their knowledge of a variety of different family structures and be able to explain why there is such diversity.  They should be able to discuss a range of consequences of the changing pattern of family life.

A **poor** to **limited** response will be in Level 1 (1 – 6 marks)
A **modest** to **quite good** response will be in Level 2 (7 – 12 marks)
A **good** to **very good** response will be in Level 3 (13 – 18 marks)

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

**Indicative content**

Family structures have changed significantly since industrialisation, and particularly in the last 50 years.  The main theme is of diversity of family structures.  The **reasons** for this increased diversity include:

- increased geographical mobility
- increased social mobility
- immigration from diverse cultures
- changed status of women
- declining family size
- increase in the proportion of older people in the population
- increase in proportion of women in the workforce.

Families now take many **diverse forms**, including:

- **extended family** – several generations of the same family live together, or in close proximity, and maintain regular contact and interaction; this was thought to be becoming less important, but it remains a feature of modern society, especially in families of Asian origin
- **nuclear family** – consists of mother, father and children, with limited contact with other members of the wider family
- **single-parent families** – as a result of the declining incidence of marriage and increasing divorce rates, there is a greater proportion of single-parent families in which one adult (usually a mother) brings up children alone
- **reconstituted families** – made up of two families separated or divorced coming together after a second marriage
- **same-sex families** – same-sex couples can now be formally recognised in civil partnerships, and may decide to raise children through adoption or surrogacy
- **single-person households** – not strictly 'families', but they are now an increasing proportion of the population as a result of separation and divorce, and increased longevity, particularly of women.

Some of the **social consequences** of this diversity include:

- changing roles within family relationships, more sharing of responsibilities, or symmetrical relationships

- lack of (usually) male role models in some families, sometimes linked to anti-social and criminal behaviour

- some religious groups are critical of non-traditional family forms

- the decline of 'traditional' families is claimed by some to be linked to low aspirations and low educational achievement

- elderly relatives are less likely to be cared for by family members

- legal changes have been made to reflect the changing nature of relationships (eg civil partnerships, inheritance laws, maternity and paternity leave).

Some of the **economic consequences** of this diversity include:

- increased demand for childcare facilities

- single-parent families may struggle financially and fall into poverty

- several generations of the same family may share one house for economic reasons

- increased demand for social care facilities for the elderly

- debate on use of taxation policy to encourage 'traditional' families

- equality laws relating to discrimination in the workplace and in public services

- the housing market and housing strategy have changed to reflect the different make-up of households (more single person and smaller households)

- maternity and paternity leave is regarded by some as a significant burden on businesses.

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