Version 1.0

General Certificate of Education (A-level)
June 2011

Science in Society SCIS1

(Specification 2400)

Unit 1: Exploring key scientific issues

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.

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1	a	i	• white blood cells attack bacteria • antibodies produced • engulf/ingest bacteria	**2**	any 2 for 1 mark each
1	a	ii	• washing hands and surfaces • use tissue when sneezing • putting patient in isolation • covering open wounds	**1**	any 1 for 1 mark each
1	b	i	• random mutation in genes • lead to a few bacteria resistant to antibiotics • increased chance of surviving • resistant individuals reproduce • frequency of mutation spreads/more resistant bacteria	**3**	any 3 for 1 mark
1	b	ii	• target was met • June 2004 (2nd point) 1700, Mar 2008 (1st point) was 750 • reduction of more than 50% / reduction of approx. 56% • *accept reasonable comparison of suitable data points*	**2**	any 2 for 1 mark each
1	b	iii	• know where infections are • can target measures to treat MRSA to infected patients • increases pressure on hospitals to reduce cases	**1**	any 1 for 1 mark each
1	c		• ill patients / weakened immune system • medical staff moving from patient to patient • confined area / opportunity for cross-infection	**2**	any 2 for 1 mark each
2	a		• data is more reliable, • fair test, • allows comparisons between cars	**1**	any 1 for 1 mark each

2	b		• variety of roads, • different traffic conditions, • repeated 5 times • repeated at different times of day	**2**	any 2 for 2 marks
2	c	i	• combustion of hydrocarbon • burning of hydrocarbon in oxygen	**1**	any 1 mark for 1 mark
2	c	ii	• incomplete combustion of hydrocarbon	**1**	1 mark
2	c	iii	• VCA:163 Passive: 124.4 • Reduction: 38.6 g/km • % reduction (38.6/163)x100% • 23% reduction	**2**	2 marks for correct answer Or 1 mark for correct reduction if answer incorrect.
2	c	iv	• More CO2 – more fuel being used • passive produces less CO2 than aggressive • implies that driving passively uses less fuel or vice versa	**2**	any 2 for 1 mark each
3	a	i	• coronary heart disease (CHD), • type 2 diabetes • some cancers	**1**	any 2 for 1 mark
3	a	ii	• people living longer • infectious diseases being treated better • changing lifestyle • changing diet	**1**	any 1 for 1 mark
3	b	i	• first survey to look at current conditions / health / activity / diet	**1**	any 1 for 1

3	b	ii	• acts as a comparison, • judge if there is a change / not due to changing conditions in whole country, • more reliable	**1**	any for 1 mark each

3	c	i	• hard to detect small change in mean when the spread of values is greater than the change being detected • mean difficult to compare – could have same mean but with very different range *award mark for correct use of data from table to illustrate point*	**2**	any 1 for 1 or 2 marks

3	c	ii	• might misremember – decrease accuracy, • might change behaviour over year – decrease accuracy	**1**	any 1 for 1 mark

3	d		Diet • intervention areas better diet to start with • % of healthy diet approx doubled • control diet got worse • diet improved in areas where IHHP used Smoking • number of smokers increased initially • decreased in all areas by 3 years • small effect Physical Activity • amount of activity decreased initially • activity increased in all areas • activity increased more in iHHP area. • very wide range so may not be significant	**6**	

Level	Descriptor An answer will meet most of the criteria given in the level descriptor		Mark range
3	**Good** Claims supported by an appropriate range of evidence Good use of information or ideas about science, going beyond those given in the question Argument well structured with minimal repetition or irrelevant points Accurate and clear expression of ideas with only minor errors of grammar, punctuation and spelling	**Includes all three aspects**	**5 - 6**
2	**Modest** Claims partially supported by evidence Good use of information or ideas about science given in the question but limited beyond this The argument shows some attempt at structure The ideas are expressed with reasonable clarity but with a few errors of grammar, punctuation and spelling	**Includes only two aspects**	**3 - 4**
1	**Limited** Valid points but not clearly linked to an argument structure Limited use of information or ideas about science Unstructured Errors in grammar, punctuation and spelling or lack of fluency	**Only one aspect**	**1 - 2**
0	**Incorrect or no response**		**0**

4	a	i	• 0.32 mya *Accept 0.2 – 0.4 mya*	**1**	1 mark

4	a	ii	Homo habilis *Accept reasonable spelling errors*	**1**	1 mark

4	a	iii	• age often based on only a few fossils, • hard to date fossils accurately • often rely on radioactive dating which will have a range of possible values.	**1**	any 1 for 1 mark each

4	a	iv	• only one skeleton on flores • shared traits of both	**1**	any 1 for 1 mark

4	b		• isolated on island • variation in individuals, • characteristic gives them better chance of surviving, • pass on genes to next generation, • over long time more organisms with that characteristic • over long time get change in whole population	**3**	any 3 for 1 mark each

4	c		No: • this only happens for a short time. As more research accumulates over time they do reach agreement • data are always open to more than one interpretations so different scientists can quite reasonably have different views • thinking up an explanation involves creative thought so different scientists can propose different explanations Yes: • scientists should collect enough evidence to present a convincing case before saying what they think • scientists should spend more time discussing things before going public • disagreement is confusing for public	**3**	any 3 for 1 mark each *can award up to 1 mark for good/extended explanation*

5	a	i	• energy of radiations absorbed, • cause mutations, • break molecules up • damage to DNA	**1**	any 1 for 1 mark

5	a	ii	number of radioactive decays in 1 sec	**1**	1 for 1 mark
5	a	iii	2 mark for points, 1 mark for smooth curve	**3**	
5	a	iv	different numbers of neutrons	**1**	
5	b	i	• untested treatment / may not work • type and nature of side effects • at least half will have bad reactions, • how long treatment will last	**2**	any 2 for 1 mark each
5	b	ii	• larger sample size • determine dosage / side effects • randomised / double blind trials • compare effectiveness with current treatment	**2**	Any 2 for 1 mark each
5	c		• CHT25 acts at site of cancer/X rays must go through skin • less damage to healthy tissue • smaller total radiation does needed for same effect on cancerous cells	**2**	any 2 for 1 mark each
6	a		• egg removed/donated • sperm used to fertilise egg outside body • one (or more) healthy embryo implanted in woman	**2**	any 2 for 1 mark each
6	b	i	No: • there is a difference in the mean / figures quoted • the range overlaps Yes: • difference in mean / figures quoted	**2**	only no gets full marks
6	b	ii	• IVF 48/700 , NC 63/1240 • IVF 6.9%, NC 5.1% • IVF more likely to be born with birth defect (or vice versa)	**3**	must give explanation, no marks for just choosing IVF or NC.

6	c	i	• difference no greater than could be due to chance	**1**	for 1 mark
6	c	ii	• parents more likely to worry • more likely to have birth defect which needs medical treatment	**1**	for 1 mark
6	c	iii	• need to have matched samples, • other factor could cause/decrease health problems, • to take into account the birth defects	**2**	any 2 for 1 mark each
7	a	i	• collection of large number of stars	**1**	1 mark
7	a	ii	• visible light, • gamma, • radio, • X-ray, • infrared, • UV	**1**	any 2 for 1 mark
7	a	iii	• galaxies are a long way away. • Can't send spaceship • only way to get information	**1**	any 1 for 1 mark
7	a	iv	• initially nothing • universe/time started from tiny singularity • explosion/rapid expansion • 13.7 billion years ago • everything we see	**2**	any 2 for 1 mark each
7	b	i	• can compare results • get replication	**1**	any 1 for 1 mark each

7	b	ii	• look for other explanations/factors • other scientists try to replicate findings	**2**	any 2 for 1 mark each
7	b	iii	• one viewpoint result only • took long time for supporting measurements to be made.	**1**	any 1 for 1 mark
7	c		• very expensive, • discoveries not limited to one country, • allows collaboration, • saves duplication of equipment	**2**	any 2 for 1 mark each
8	a	i	• change in genetic information of organism	**1**	
8	a	ii	• (government) organisation which makes sure rules (about animal care) are kept	**1**	
8	a	iii	• need to be able to test on similar diseases • can give animals potential treatments • can look at the effect of different genes	**2**	any 2 for 1 mark each
8	b	i	• can see changes quickly, • research finished quickly, • easy to get more animals	**1**	any 1 for 1 mark
8	b	ii	Yes: • 'higher species' used less, • people feel strongly about dogs, cats and rabbits – few used in research, • most people don't care about fish or rats – more used in research No: • numbers used depends on practical issues • more quick breeding species used • hard to keep big mammals – so fewer used	**1**	any 1 for 1 mark

8 c

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3	**Good** Claims supported by an appropriate range of evidence Good use of information or ideas about science, going beyond those given in the question Argument well structured with minimal repetition or irrelevant points Accurate and clear expression of ideas with only minor errors of grammar, punctuation and spelling	**Includes ethical and scientific argument for / against unbiased**	**5 - 6**
2	**Modest** Claims partially supported by evidence Good use of information or ideas about science given in the question but limited beyond this The argument shows some attempt at structure The ideas are expressed with reasonable clarity but with a few errors of grammar, punctuation and spelling	**Includes only ethical or scientific unbiased**	**3 - 4**
1	**Limited** Valid points but not clearly linked to an argument structure Limited use of information or ideas about science Unstructured Errors in grammar, punctuation and spelling or lack of fluency	**Biased in one direction**	**1 - 2**
0	**Incorrect or no response**		**0**

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