

A-LEVEL SCIENCE IN SOCIETY

SCIS4 Case Study of a Scientific Issue
Mark scheme

8770
June 2014

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

Question	Answers	Additional comments/guidance	Mark	ID details
1	<ul style="list-style-type: none"> • Not biased – example of bias/lack of bias • issues are complex so opinions may differ • to reassure the public 	<ul style="list-style-type: none"> • accept <i>reasonable explanation of why risks are assessed</i> 	2	
2	Water supply / fluid contamination <ul style="list-style-type: none"> • wells cracking contaminating ground water • large amount of water needed during the process – insufficient ground water • chemicals in fluid used Environmental issues <ul style="list-style-type: none"> • Road traffic / noise / fuel spillage • gas deposits near cities / towns 	1 mark for identifying/describing issue 1 mark for explanation	2	
3	<ul style="list-style-type: none"> • tax revenues / cheap energy • gas security / potential large quantities of gas available in UK • half of CO₂ emitted as coal 	any 2 for 1 mark each	2	

4	<p>Possible examples include:</p> <ul style="list-style-type: none"> • comparison to conquistador / Eldorado / gold rush • description as frack-heads / drug users • zealots • talking feverishly • Blackpool as Dallas • fantasise about miraculous treasures <p>explanations may include:</p> <ul style="list-style-type: none"> • appear greedy • untrustworthy / foolish • almost swearing • fantasies – not realistic idea 	<p>Any 2 for 1 or 2 marks each</p> <p>(1 for suitable phrase, 1 for suitable explanation)</p>	4	
5	<ul style="list-style-type: none"> • US used to oil and gasfields / have had fracking longer • greater population density in UK (USA bigger) • drilling more likely to be near people in UK • in US people can get money for having drilling on their land/financial incentive • mineral rights belong to crown in UK • would mean disruption in 'home counties'/ richer areas / NIMBY 	<p>not <i>geology of shale beds</i></p> <p><i>allow Americans don't know about fluid composition/don't understand all the risks</i></p>	4	
6	<ul style="list-style-type: none"> • country which has reduced the amount of carbon dioxide • produced by e.g. transport, manufacturing. 	1 mark each	2	
7	<ul style="list-style-type: none"> • gas which stops IR radiation from leaving earth surface • some gases better at stopping IR than others / suitable description of example 	any 2 for 1 mark each	2	

8	<ul style="list-style-type: none"> regulations for methane, by HSE, planning permission regulations (current regulation / controls in place) consultations (public opinion) seismic risk measurement (environmental issues) report from Royal Soc and Royal Academy (technical feasibility) seismic magnitudes (risks to human health) risk assessment to be carried out (risks to environment) reduce reliance on imported gas (benefits to the country) learned bodies, research papers, reports, consultations (general sources of evidence) 	credit examples of types of evidence from the text.	4	
9	<ul style="list-style-type: none"> regulation reduces risk of an activity / maintains standards provide overview / look after public interest can punish companies that don't follow the rules 	any 2 for 1 mark each	2	
10	<ul style="list-style-type: none"> risk is measure of probability of harm and severity (in a given situation) 	do not credit ideas about perceived risk	2	
11	<ul style="list-style-type: none"> too short time / don't know about long term effects rare events / too few cases to study don't know all the outcomes / unexpected outcomes 		2	
12	ALARP used because: <ul style="list-style-type: none"> always some risk not <u>technically</u> possible to reduce risks (to zero) cost too much to reduce risks (to zero) keeps risk at a level that is acceptable protects workers / public to a (reasonable) safe level limit risks to a level that can be achieved 	<i>allow reduces risk while still allowing a profit / process to occur</i>	4	

13	<ul style="list-style-type: none"> • 5 different authors from 3 different universities in 2 different countries • variety of specialisms • Data/photographs from other people • Discussion with 4 people • comments (2 people) different university/country 	accept <i>acknowledgement of other researchers</i> for 1 mark	2	
14	<ul style="list-style-type: none"> • reviewers provide useful comments to amend the article • gets the view of other experts in the field • check that methods and conclusions are <u>reasonable</u> • helps to ensure level of quality. • eliminates claims based on poorly designed/conducted research • can prevent flawed data interpretation 	do not credit <i>ideas about finding the truth</i> do not credit <i>ideas about repeating the experiment to collect more data</i>	2	
Total			36	

Question 15				
Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 4 and apply a 'best-fit' approach to the marking.				
0 marks	Level 1 (1–3 marks)	Level 2 (4–6 marks)	Level 3 (7–9 marks)	Level 4 (10-12 marks)
	<ul style="list-style-type: none"> Mentions only fracking / greenhouse gases 	<ul style="list-style-type: none"> limited information about fracking (1 or 2 points) limited discussion of greenhouse gases 	<ul style="list-style-type: none"> links greenhouse gases to global warming information about fracking (3+points) may be one sided 	<ul style="list-style-type: none"> balanced view of fracking (4+points) links greenhouse gases to global warming (correct science)
<p>examples of the points made in the response</p> <ul style="list-style-type: none"> greenhouse gases – CO₂, water vapour, methane etc information about production of greenhouse gases role of greenhouse gases in global warming legislation in place to reduce production of greenhouse gases / details of plans to reduce them <p>Fracking effect on greenhouse gases</p> <ul style="list-style-type: none"> fracking releases methane shale gas is a fossil fuel – will add CO₂ to atmosphere when burnt shale gas could release less CO₂ than other fossil fuels (coal) could be used as a temporary measure to reduce CO₂ in short term distracts from investment in renewables. 				<p>extra information</p> <p>For full marks, answer should be well structured (possibly with a title)</p> <p>Would also expect to see (implicit) reference to the sources.</p>

Question 16				
Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 4 and apply a 'best-fit' approach to the marking.				
0 marks	Level 1 (1–3 marks)	Level 2 (4–6 marks)	Level 3 (7–9 marks)	Level 4 (10–12 marks)
	only one point or irrelevant points	gives own view supports argument with 1 or 2 points	gives own view and supports argument with 2+ points provides simple counter argument for own viewpoint may include reference from sources	gives own view 3+ points provides counter argument for own viewpoint information from sources referred to.
examples of the points made in the response <i>risks of fracking:</i> <ul style="list-style-type: none"> • earthquakes water issues <ul style="list-style-type: none"> ○ contamination of ground water, ○ storage and transport of fracking fluid • environmental damage <ul style="list-style-type: none"> ○ noise ○ fuel leaks ○ release of greenhouse gases ○ building in built up / scenic areas • regulatory issues <i>support for fracking:</i> <ul style="list-style-type: none"> • possible use as lower carbon fossil fuel / transition fuel • reduce need for buying gas from abroad • provide jobs / economic growth • very small earthquakes – limited risk 				extra information <ul style="list-style-type: none"> • likely to be limited amount of shale gas in UK • prevent development of renewables • new technology so untested • bias in source materials (funding etc)