



General Certificate of Secondary Education

Environmental Science

Unit 1 Topics in Environmental Science
44401F

Specimen Mark Scheme

For exams June 2011 onwards

The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

For operational papers, 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 meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting 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 the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting 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.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

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Marking Guidance for Examiners GCSE Science Papers

1 General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:
where consequential marking needs to be considered in a calculation;
or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

OWTTE can be used as an abbreviation for 'or words to that effect'

2 Crediting quality of overall response

In questions where there are a number of acceptable responses, the whole answer needs to be considered to ensure that marks that have already been awarded are not contradicted.

3 Emboldening

3.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

3.2 bold **and** is used to indicate that both parts of the answer are required to award the mark.

3.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

4 Marking points

4.1 Marking of Quality of Written Communication (QWC)

In some questions candidates are assessed on using good English, organising information clearly and using specialist terms where appropriate.

Instructions for assessing QWC are given against the appropriate questions in the mark scheme.

4.2 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: Name the part of the cell that carries genetic information from parent to offspring (1 mark)

Candidate	Response	Marks awarded
1	chromosome, gamete	0
2	chromosome, cytoplasm	0
3	chromosome, *nucleus	1
4	nucleus*, cytoplasm	0

Example 2: Name the two products of aerobic respiration. (2 marks)

Candidate	Response	Marks awarded
1	Oxygen, carbon dioxide, water	1
2	Oxygen, carbon dioxide, water, nitrogen	0

4.3 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

4.4 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

4.5 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

4.6 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

4.7 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

4.8 Brackets

(....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

Foundation Tier – 44401F**Question 1 44401F**

	answers	extra information	mark
a(i)	fertilisers		1
	pesticides		1
a(ii)	using higher inputs to help produce higher yields of crops or animals		1
b(i)	laying cage system		1
b(ii)	any one from less food needed mechanised egg collection less loss to predators easier disease control		1
b(iii)	any one from better for health/taste more humane for birds OWTTE		1
b(iv)	any two from no risk from predators easy disease control	accept also shelter from elements OWTTE	2
b(v)	selective breeding		1

c(i)	changes in farming methods, including growing improved varieties of crops	1
c(ii)	any one from poverty natural hazard/disaster eg flood, drought etc political instability/warfare/poor governance OWTTE	1
Total		11

Question 2 44401F

	answers	extra information	mark
a(i)	any two from better farming methods better sewage treatment better hospitals		2
a(ii)	any two from failure to produce enough food for everyone; increases in harmful pollution; exhaustion of non-renewable resources; destruction of wildlife habitats and biodiversity		2
b(i)	MEDC		1
b(ii)	any one from smaller total population little population growth		1
Total			6

Question 3 44401F

	answers	extra information	mark
a(i)	walls		1
a(ii)	any two from loft insulation cavity wall insulation draught-proofing double glazing carpet / floor insulation	Do not accept reductions in heating of the house	2
a(iii)	B		1
a(iv)	insulation by/heat loss from adjoining houses		1
b	any two from specified household economy specified transport economy recycling		2
Total			7

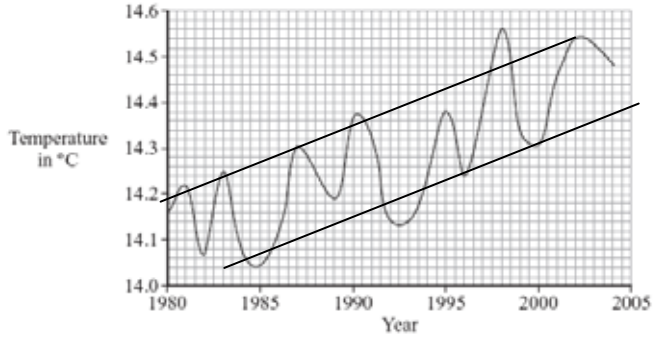
Question 4 44401F

	answers	extra information	mark
a	uranium		1
	fission		1
	turbines		1
	generators		1
b	containment		1
	control rod		1
	fuel rod		1
	coolant		1
c	any two from		2
	does not cause air pollution		
	does not add to Greenhouse Effect	accept does not emit carbon dioxide and does not emit sulfur dioxide / oxides of nitrogen as separate points	
	does not add to acid deposition		
	small volume of fuel used		
Total			10

Question 5 44401F

	answers	extra information	mark
a(i)	photosynthesis solution		1 1
a(ii)	respiration		1
a(iii)	combustion / burning		1
b(i)	increased amounts of carbon dioxide in the atmosphere are likely to cause climate change		1
b(ii)	carbon footprint		1
c(i)	because <u>photosynthesis</u> removes carbon dioxide from atmosphere		1
c(ii)	because carbon dioxide may soon be returned to atmosphere by <u>respiration</u>	accept also returned by combustion	1
Total			8

Question 6 44401F

	answers	extra information	mark
a	1987		1
b	 <p>Temperature in °C</p> <p>Year</p> <p><u>Straight</u> line between lines shown</p>		1
c	rise		1
	with fluctuations		1
d	the graph seems to suggest that it is unlikely that the Earth is heading towards another Ice Age		1
Total			5

Question 7 44401F

	answers	extra information	mark
a(i)	killing for ivory		1
a(ii)	forests cleared for farmland logging of forests	accept population growth	1 1
a(iii)	any one from because they damage crops / houses because they kill / injure people		1
a(iv)	elephants no longer damage crops / kill/ injure people so villagers have no wish / need to kill them	one mark for simple statement second mark for linked explanatory statement	1 1
a(v)	(eco) tourism		1
b(i)	Convention on International Trade in Endangered Species		1
b(ii)	captive breeding and re- introduction schemes	accept awareness raising / research / fundraising for conservation	1
Total			9

Question 8 44401F

	answers	extra information	mark
a(i)	15		1
a(ii)	3		1
a(iii)	360 000		1
a(iv)	too few quadrats	accept identification problems	1
	limited area sampled		1
b(i)	Natural England / Countryside Council for Wales / N Ireland Environment and Heritage Service / Scottish Natural Heritage	accept Forestry Commission / Environment Agency	1
b(ii)	any one from	accept initials if fully correct	1
	RSPB	accept other appropriate nature conservation bodies	
	Wildlife Trusts		
	National Trust	Do not accept RSPCA, Greenpeace or FoE	
	Wildfowl and Wetlands Trust		

b(iii)	Marks awarded for this answer will be determined by the quality of written communication.	
	The answer is coherent and in a logical sequence. It contains a range of appropriate or relevant specialist terms used accurately. The answer shows very few errors in spelling, punctuation and grammar. There is a clear and detailed scientific explanation of why people believe that it is important to conserve wildlife species and habitats.	4
	The answer has some structure and the use of specialist terms has been attempted, but not always accurately. There may be some errors in spelling, punctuation and grammar. There is a scientific explanation of why people believe that it is important to conserve wildlife species and habitats, but there is a lack of clarity and detail.	2-3
	The answer is poorly constructed with an absence of specialist terms or their use demonstrates a lack of understanding of their meaning. The spelling, punctuation and grammar are weak. There is a brief explanation of why people believe that it is important to conserve wildlife species and habitats, which has little clarity and detail.	1
	No relevant content.	0
	Examples of valid points that may contribute to a candidate's response: <ul style="list-style-type: none"> • ethical/moral • aesthetic and recreational • educational/scientific • economic-wildlife species as potential sources of medicines, foodstuffs ,timber ,fuel and genetic resources • wildlife species as part of the Earth's life support system 	
Total		11

Question 9 44401F

	answers	extra information	mark
a	wettest place in England / high rainfall		1
	(water flowing over) hard rocks / impermeable rocks		1
	steep sided valley		1
b	any two from visual impact loss of habitat loss of farmland loss of homes / communities		2
c	any two from recreation (or any specified recreational use) HEP irrigation nature conservation		2
Total			7

Question 10 44401F

	answers	extra information	mark
a	aquifer		1
b	Screening Clarification Filtration Disinfection		1
c	screening / clarification / filtration		1
	because already filtered through rock OWTTE		1
d	X		1
	because water enters aquifer in this area / risk of contamination of water supply OWTTE		1
e	using fertilisers		1
	because they can contaminate (water in) aquifers		1
f	Environment Agency		1
Total			9

Question 11 44401F

Question 1 44401H

	answers	extra information	mark
a(i)	decreases		1
a(ii)	% ground covered by shrub layer		1
a(iii)	number of blue tits / pied flycatchers		1
a(iv)	any one from:- tree / shrub layer species because species may have different preferences time of day / year because species may be active / present at different times use / disturbance in woods because species may respond differently	one mark for simple statement second for linked explanatory statement	1 1
a(v)	92		1
b(i)	excluding sheep will allow shrub growth which encourages flycatchers / because of natural succession	one mark for simple statement second for linked explanatory statement	1 1
b(ii)	excluding sheep would allow growth of shrubs, etc. / natural succession therefore causing reduction in the rare plant	one mark for simple statement second for linked explanatory statement	1 1

c	Facilities nature trails / interpretative facilities / hides / wildlife feeding stations / nest boxes reasons include educating public / allowing close observation of wildlife / increasing wildlife populations	accept any valid facility not included in question together with relevant reason	1 1
Total			12

Question 12 44401F

Question 2 44401H

	answers	extra information	mark
a(i)	No Yes	both correct for 1 mark	1
a(ii)	any two from noise visual impact risk to wildlife disturbance to TV signals deters tourists		2
a(iii)	Marks awarded for this answer will be determined by the quality of written communication.		
	The answer is coherent and in a logical sequence. It contains a range of appropriate or relevant specialist terms used accurately. The answer shows very few errors in spelling, punctuation and grammar. There is a clear and detailed scientific explanation of the benefits of obtaining energy from wind power rather than fossil fuels.		4
	The answer has some structure and the use of specialist terms has been attempted, but not always accurately. There may be some errors in spelling, punctuation and grammar. There is a scientific explanation of the benefits of obtaining energy from wind power rather than fossil fuels, but there is a lack of clarity and detail.		2-3
	The answer is poorly constructed with an absence of specialist terms or their use demonstrates a lack of understanding of their meaning. The spelling, punctuation and grammar are weak. There is a brief explanation of the benefits of obtaining energy from wind power rather than fossil fuels, which has little clarity and detail.		1
	No relevant content.		0
	Examples of scientific points that may contribute to a candidate's response: <ul style="list-style-type: none"> • does not emit carbon dioxide therefore does not add to Greenhouse Effect • does not emit sulfur dioxide/oxides of nitrogen therefore does not add to acid deposition • does not burn fossil fuels therefore does not cause air pollution 		

b(i)	development which meets present needs without compromising the ability of <u>future</u> generations to achieve their needs and aspirations OWTTE	mention of future essential for second mark	1 1
b(ii)	any one from will control floods allowing safer use of river valley in future will generate as much electricity as 10 coal fired power stations therefore reducing air pollution / conserving resources	one mark for simple statement second mark for linked explanatory statement	1 1
b(iii)	any one from people have to move therefore can't enjoy homes in <u>future</u> Yangtze River Dolphin / historic sites / unpolluted water harmed affects enjoyment of <u>future</u> generations	one mark for simple statement second for linked explanatory statement needs at least implicit mention of future harm / deprivation for second mark.	1 1
Total			13

Question 13 44401F

Question 3 44401H

	answers	extra information	mark
a(i)	<p>Action:</p> <p>any one from:</p> <p>pondweed same size / species</p> <p>same volume / concentration of solution</p> <p>same light intensity</p> <p>same time of day</p> <p>Reason:</p> <p>because stated factor likely to affect rate of photosynthesis</p> <p>OWTTE</p>		1
a(ii)	bubble count checked by second observer	accept replicates	1
a(iii)	<p>any three from:-</p> <p>initial rise</p> <p>followed by fall</p> <p>fall steeper</p> <p>credit accurate reference to values</p>	see section 2 of the Marking Guidelines	3

b(i)	need to maintain optimum temperature	see section 2 of the Marking Guidelines	1
	if too cold vents closed		1
	if too hot vents opened		1
b(ii)	raises temperature		1
	provides extra carbon dioxide		1
b(iii)	housed livestock / poultry or specific eg of this		1
Total			12