

GCSE 2004

June Series



Mark Scheme

Environmental Science – Higher (3441)

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 from:

Publications Department, Aldon House, 39, Heald Grove, Rusholme, Manchester, M14 4NA
Tel: 0161 953 1170

or

download from the AQA website: www.aqa.org.uk

Copyright © 2004 AQA and its licensors

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

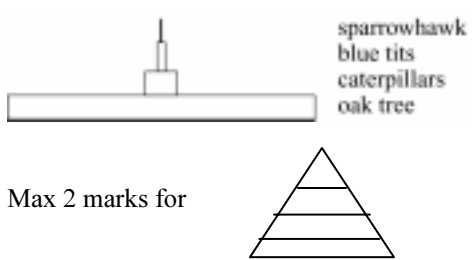
The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334. Registered address AQA, Devas Street, Manchester. M15 6EX.

Dr Michael Cresswell Director General

Higher Tier 3441H

Question 1 3441H

Question 6 3441F

	answers	extra information	mark
a(i)	sun		1
(ii)	badgers, weasels, owls	any two must be correct for one mark	1
(iii)	increase in blue tits decrease in moth caterpillars or aphids		1 1
b(i)	oak tree widest bar symmetrical about centre line correctly labelled	 <p>Max 2 marks for</p>	1 1 1
(ii)	weasels and owls are at higher trophic level/further along food chains limited amounts of energy passed from one trophic level to the next therefore insufficient energy to support larger numbers of weasels and owls		3
Total			10

Question 2 3441H

Question 7 3441F

	answers	extra information	mark
a(i)	nitrogen		1
	oxygen		1
	carbon dioxide		1
(ii)	respiration		1
	forms the ozone layer		1
b(i)	more carbon dioxide (middle box ticked)		1
(ii)	Earth needed to retain more heat to maintain similar temperatures to today therefore more carbon dioxide needed to provide a stronger greenhouse effect (OWTTE)	1 mark for simple statement, second for linked explanation If top box ticked max 1 mark for explanation in terms of increased fossil fuel use or decreased tree cover	2
Total			8

Question 3 (continued) 3441H

Question 8 (continued) 3441F

	answers	extra information	mark
(ii)	Any one from	1 appropriate use	1
	landfill site clear site/create impermeable lining (unless inert waste only)	second for suitable action	1
	industrial heritage museum retain existing structures/provide specified visitor provision		
	redevelop for other industry clear site/landscape/build new factory units		
	appropriate recreational/nature conservation use (not water based) clear site/landscape/visitor provision	credit obtaining planning permission for appropriate use	
Total			10

Question 4 3441H

Question 9 3441F

	answers	extra information	mark
a(i)	initial rise		1
	followed by decline		1
	or		
	overall decline		
	with fluctuations		
(ii)	Any four from		4
	cod/total weight of cod able to breed has fallen below the sustainable level		
	and is still falling		
	cod are being caught faster than they can breed		
	if this trend continues cod will become extinct in the North Sea		
	with catastrophic results for the fishing industry		
b(i)	Any one from		1
	refusal to accept evidence of decline of stock		
	(fear of) loss of employment or income		
(ii)	use of nets with larger mesh size		1
	allows smaller fish to escape		1
	and mature to breeding size/age OWTTE		1
Total			10

Question 5 3441H

Question 10 3441F

	answers	extra information	mark
a(i)	<p>catch samples of aquatic life</p> <p>identify (and count) organisms found</p> <p>different organisms have different levels of tolerance of pollution</p> <p>responding primarily to levels of dissolved oxygen</p> <p>credit specific example of type of organism correctly linked to qualitative description of level of pollution</p> <p>compare species found with published descriptions</p>	<p>maximum 2 marks for disjointed statements. Linked explanation needed for higher marks.</p>	4
(ii)	<p>they need a second site as control/as basis for comparison</p> <p>this site must be upstream of the sewage works</p>		1 1
(iii)	<p>Any two from</p> <p>organic matter/untreated sewage/human waste</p> <p>(plant) nutrients</p> <p>chemicals</p>	<p>accept specified nutrients for 2 marks</p>	2
b(i)	<p>Official licence/permission to discharge</p> <p>specified amounts of effluent</p>		1 1
(ii)	<p>Environment Agency</p>		1
c(i)	<p>cooling tower</p>		1
(ii)	<p>water/steam</p>		1

continued

Question 5 (continued) 3441H

Question 10 (continued) 3441F

	answers	extra information	mark
(iii)	tower cools water from power station before discharge/return to river allowing water to contain more dissolved oxygen which is needed by (most) aquatic organisms	maximum 2 marks for disjointed statements. Linked explanation needed for higher marks.	3
Total			16

Question 6 3441H

	answers	extra information	mark															
a(i)	36		1															
	54		1															
(ii)	(soil) texture		1															
b(i)	<table border="1"> <thead> <tr> <th></th> <th>Soil A</th> <th>Soil B</th> </tr> </thead> <tbody> <tr> <td>Drainage</td> <td>good</td> <td>poor</td> </tr> <tr> <td>Ease of cultiv.</td> <td></td> <td>poor</td> </tr> <tr> <td>Nutrient status</td> <td></td> <td></td> </tr> <tr> <td>Water holding</td> <td>poor</td> <td>good</td> </tr> </tbody> </table>		Soil A	Soil B	Drainage	good	poor	Ease of cultiv.		poor	Nutrient status			Water holding	poor	good	1 mark for each column correctly completed	2
	Soil A	Soil B																
Drainage	good	poor																
Ease of cultiv.		poor																
Nutrient status																		
Water holding	poor	good																
(ii)	Soil A	(no mark for selection of soil)																
	sandy soils are usually acidic because sandy soils are heavily leached (OWTTE)		1 1															
c	soil is renewable because it can regenerate itself (by natural processes) but mismanagement may lead to soil being eroded faster than it can regenerate	answer must include explanation of soil as both renewable and non-renewable resource for 3 marks	3															
Total			10															

Question 7 3441H

	answers	extra information	mark
a(i)	Sedimentation		1
	removes larger/heavier particles		
	by settlement to bottom of tank		1
	Filtration		1
	removes finer particles/odour/taint		1
	by straining/absorption by charcoal/fine sand filter beds		1
(ii)	chlorination/disinfection/sterilization	accept use of ozone or uv radiation	1
	kills/ensure water is free of		1
	pathogens/harmful micro organisms		1
(iii)	aquifer/borehole		1
	particles will have been filtered out		1
	by passage through rocks		1
b(i)	with meter people pay for amount used		1
	and will therefore tend to use less to reduce cost OWTTE		1

continued

Question 7 (continued) 3441H

	answers	extra information	mark
(ii)	<p>Water companies</p> <p>Any one of</p> <p>prevention of leaks</p> <p>hose pipe bans</p> <p>Domestic</p> <p>Any one of</p> <p>grey water recycling</p> <p>hippos</p> <p>dual flush lavatory</p> <p>specified personal economy measure</p> <p>water efficient devices e.g. dishwashers</p> <p>reduced garden watering</p> <p>collection of rainwater</p>		<p>1</p> <p>1</p>
Total			14

Question 8 3441H

	answers	extra information	mark
a(i)	the range/variety of living organisms		1
(ii)	new varieties have desirable characteristics (e.g. high yield/disease resistance)		1
	old varieties cease to be commercially viable (OWTTE)		1
	therefore they are no longer grown		1
(iii)	Any three of loss of varieties leads to narrowing of gene pool so genes may no longer be available for future breeding programmes to cope with disease (or other specified breeding aim)		3
(iv)	Information needed authors/sponsors/source of article		1
	Reason to check for bias (OWTTE) or full article in case extract has been used unfairly out of context		1
b	housing of animals		1
	to restrict movement/control temperature/reduce food/energy wastage		1
Total			11

Question 9 3441H

	answers	extra information	mark
a(i)	wet deposition dry deposition	both must be completed for 1 mark	1
(ii)	sulphur dioxide oxides of nitrogen	(accept specified NO _x)	1 1
(iii)	pollution which crosses international boundaries/borders or pollution originating in one country and affecting another		1
b(i)	increase/spread in range		1
(ii)	Law Clean Air Acts/compulsory use of catalytic converters led to reduced emissions/wider dispersal of pollutants Technology FGD/catalytic converters/low NO _x boilers/low sulphur coal/switch to gas/increased use of renewables led to reduction in emissions	do not double credit catalytic converters	1 1 1 1
c	random sampling/transect sample identify and record lichens at different locations compare findings with published descriptions method depends on varying pollution tolerance of different lichen species		4
Total			13

Question 10 3441H

	answers	extra information	mark
a(i)	landscape preservation		1
(ii)	1950s mainly northern and western while more recent are southern and eastern		1
	or 1950s mainly highland areas more recent are of lower altitude		1
	or 1950s larger more recent smaller		
b(i)	58 216		1
(ii)	<p>Forestry Commission plantations/felled areas spoil landscape preservation of which is an aim of NPs</p> <p>Ministry of Defence noise/hazard incompatible with peaceful enjoyment</p> <p>Water companies reservoir construction spoil landscape/may destroy local communities/wildlife habitats</p>	<p>1 mark for each organisation 2 marks for reason (1 mark for simple statement, second for linked elaboration)</p> <p>different reason must be offered for each organisation</p>	6

continued

Question 10 (continued) 3441H

	answers	extra information	mark
c	<p>Quality of Written Communication Correct use of scientific terms (<i>honeypot sites; erosion; zoning</i>)</p> <p>Problem : Solution</p> <p>Traffic improved public transport access restrictions on sensitive routes directing traffic towards routes with greater capacity road charges provision of ‘honeypot sites’ outside NPs</p> <p>Footpath erosion construction of robust paths access restrictions/re-routing</p> <p>Litter education provision of bins penalties</p> <p>Access conflicts clear signing of footpaths, etc.</p> <p>Conflicts between different recreational uses zoned use restrictions of specific activities</p> <p>Holiday homes – local people priced out of housing market provision of low cost housing for local people</p> <p>Disturbance to wildlife creation of nature reserves public education</p>	<p>1 mark per problem</p> <p>max 3 marks for simple list of problems with no solutions</p> <p>1 mark per solution to max of 3 for any single problem</p> <p>credit up to max of 2 marks in total for specific case study examples</p>	<p>1</p> <p>7</p>
Total			18