



JANUARY 2003

ADVANCED GCE UNIT

MARK SCHEME

MAXIMUM MARK: 90

Syllabus / Component: 2805/03

**Options in Biology:
Environmental Biology**

Paper Set Date: 30/01/03

ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

1. Please ensure that you use the **final** version of the Mark Scheme.
You are advised to destroy all draft versions.
2. Please mark all post-standardisation scripts in red ink. A tick (✓) should be used for each answer judged worthy of a mark. Ticks should be placed as close as possible to the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks ($\frac{1}{2}$) should never be used.
3. The following annotations may be used when marking. No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.

x = incorrect response (errors may also be underlined)
^ = omission mark
bod = benefit of the doubt (where professional judgement has been used)
ecf = error carried forward (in consequential marking)
con = contradiction (in cases where candidates contradict themselves in the same response)
sf = error in the number of significant figures
4. The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
5. In cases where candidates are required to give a specific number of answers, (e.g. 'give three reasons'), mark the first answer(s) given up to the total number required. Strike through the remainder. In specific cases where this rule cannot be applied, the exact procedure to be used is given in the mark scheme.
6. Correct answers to calculations should gain full credit even if no working is shown, unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
7. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
- 8.
8. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words that appear in the mark scheme. If the science is correct and answers the question, then the mark(s) should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance

Abbreviations, annotations and conventions used in the Mark Scheme	/	= alternative and acceptable answers for the same marking point
	;	= separates marking points
	NOT	= answers which are not worthy of credit
	()	= words which are not essential to gain credit
	_____	= (underlining) key words which must be used to gain credit
	ecf	= error carried forward
	A	= accept
	R	= reject
	AW	= alternative wording
	ora	= or reverse argument

Question	Expected Answers	Marks
1 (a)	400 000 km removed in last 50 years <u>400 000</u> ; 50 8 000 km per year ;	2
(b)	create more area of land on which to grow crops ; less competition for crops at edge of field ; hedgerows harbour pests and diseases ; easier to use large machinery in bigger fields ; less maintenance / cheaper ; amalgamation of farms ;	max 4
(c)	acts as a corridor ; allows animals to move between areas of woodland without being preyed upon ; to seek sources of food ; to find mates ;	max 3
(d)	loss of food sources ; loss of nesting sites ; loss of protection ;	max 3
(e)	legislation ; declare hedgerows as SSSIs ; provide money / grants for re-establishment of hedgerows ; inform / educate farmers need for hedgerows in wildlife conservation ;	max 3

[Total: 15]

Question	Expected Answers	Marks
2 (a)	<p>1 rain forests act as, carbon sinks / reservoirs ;</p> <p>2 destruction of rainforests contributes to global warming ;</p> <p>3 less carbon dioxide is used in photosynthesis ;</p> <p>4 more carbon dioxide is released (as a result of burning) ;</p> <p>5 less photosynthesis also means less oxygen production ;</p> <p>6 transpiration contributes to atmospheric water content ;</p> <p>7 destruction of rain forests will lead to a, reduction in rainfall / disruption of water cycle ;</p> <p>8 rainforests, are species rich / have high biodiversity ;</p> <p>9 moral responsibility to later generations to maintain biodiversity ;</p> <p>10 rain forests can supply sustainable crops ;</p> <p>11 example of crop ; e.g. nuts / rubber / fruits / plant oils</p> <p>12 may supply new drugs / useful compounds ;</p> <p>13 destruction of rain forests leads to soil erosion (on sloping sites) ;</p>	max 7
	QWC – legible text with accurate spelling, punctuation and grammar ;	1
(b)	<p>trees felled for wood to, sell / export ;</p> <p>cleared to provide land for, agriculture / cash crops ;</p> <p>cleared for building of villages ;</p> <p>cleared for the building of roads ;</p> <p>cleared for, mining / industrial development ;</p>	max 3
(c)	<p>ban on import of wood from, tropical rain forests / unsustainable sources ;</p> <p>introduce labelling system for wood ;</p> <p>international sanctions on countries that continue to remove rain forests ;</p> <p>financial support for setting up / sustainable use of, rain forests ;</p> <p>development of ecotourism ;</p> <p>educate local population as to importance of rain forests ;</p> <p>replanting of trees ;</p> <p>setting up of reserves ;</p> <p>recycling of paper ;</p>	max 4

[Total: 15]

Question	Expected Answers	Marks
3 (a) (i)	<p>add barium sulphate to soil sample ; add distilled water ; add universal indicator solution ; shake and allow to settle ; compare colour change with pH colour chart ; repeat ; calculate mean ;</p> <p>OR</p> <p>add distilled water to sample ; insert <u>calibrated</u> probe ; data-logging equipment / software ; repeat with other samples ; calculate mean ;</p>	max 4
(ii)	<p>different types of bedrock ; soil A more likely to be on chalk / limestone ; soil C more likely to be on sandstone / granite ; pH of soil C may be a result of large amount of decaying organic matter ; AVP e.g. acid rain ;</p>	1
(b)	<p>water displaces air ; which reduces levels of oxygen ; reduces aerobic respiration of roots ; anaerobic conditions encourage denitrifying bacteria ; nitrate levels are reduced in soil ; ref to salt water / effects of salt water ;</p>	max 4
(c)	<p>take a sample of soil and add water ; shake vigorously and allow to settle ; different sized particles settle at different levels ; measure volume of each distinct level settled out ;</p> <p>OR</p> <p>use of sieves ; ref to various mesh sizes ; separation of different sized particles ; measurement of amount in each sieve ;</p>	max 4
(d)	<p>retains moisture ; maintains soil structure / ref crumb structure ; slowly decays to release valuable nutrients ;</p>	max 2
		[Total: 15]
Question	Expected Answers	Marks
4 (a)	to remove any, (solid) particles / suspended matter ;	1

- (b) (i) *lead*
from old lead water pipes ;
if water source is near lead deposits / mine ;
petrol fumes ;
phosphate
fertilisers washed off farmland ;
detergents in waste water ; 2
- (ii) inhibition of enzyme activity ;
stunted growth of plants ;
damage to, nervous system / brain, in animals; **A** reduced IQ
damage to, immune system / kidneys, in mammals ; max 2
- (c) maintenance of, healthy / strong, teeth ; 1
- (d) (i) chlorine ;
ultra-violet light ;
ozone ;
boiling ;
steratabs ; max 2
- (ii) contamination from sources of sewage ;
contamination from farm slurry ;
qualification ; 2
- (iii) can lead to, serious intestinal infections / diarrhoea / cholera / other
named infection ; 1
- (e) (i) in agricultural areas ;
(nitrate) from inorganic fertilisers ;
are washed from land into water supplies ; max 2
- (ii) high levels of nitrate are poisonous to babies ;
cause 'blue baby syndrome' / methaemoglobinaemia ;
reduces ability of haemoglobin to transport oxygen ;
possible link with stomach cancer ; max 2

[Total: 15]

Question	Expected Answers	Marks
5 (a)	<p>blanket of, carbon dioxide / other named gas(es), around the earth ; allows, high energy / short wavelength rays, from the sun to enter earth's atmosphere ; when these are, reflected / radiated, from the surface of the earth ; they have lost energy ; and the longer, wavelength rays / infra-red rays, cannot escape through the blanket of gases ; causes temperature of atmosphere to rise ;</p>	max 4
(b)	<p>melting of polar icecaps ; expansion of water in oceans ; rising sea levels ; flooding of lowland areas ; climatic changes ; affects on distribution of, plant / animal, species ; affect on agriculture ; certain pests may thrive in warmer conditions ;</p>	max 3
(c) (i)	<p><i>carbon dioxide</i> increased burning of fossil fuels ; deforestation ; increased number of vehicles ; (allow only once) <i>methane</i> increased amount of decomposing, rubbish / waste ; increased numbers of cattle ; increased areas of rice paddy fields; <i>nitrous oxide</i> increased numbers of vehicles ;</p>	max 3
(ii)	<p>reduce reliance on fossil fuels ; develop alternative sources of energy ; introduction of a carbon tax ; improve insulation of buildings ; improve public transport systems ; encourage, walking / cycling ; collect methane to use as a fuel ; reduce levels of waste / encourage recycling / reduce landfill ; reduce deforestation / encourage afforestation ; education / increase public awareness ;</p>	max 3
(d)	<p>plants can gain as much carbon dioxide through fewer stomata ; but lose less water through transpiration ; which is an advantage ; AVP ;</p>	max 2

[Total: 15]

Question	Expected Answers	Marks
6 (a) (i)	site with, animal / plant, species / communities, of interest ; habitat of, rare / endangered, species ; important breeding site ; overwintering site ; site with, geological / physiographical, feature of special interest ;	max 2
(ii)	an area under, threat / named threat, from modern farming techniques ; controlled by DEFRA ; financial support to farmers to maintain traditional land use ; strict control / no application, of nitrate fertilisers / pesticides ;	max 2
(b)	membership fees ; donations / legacies ; industrial sponsorship ; selling goods ; payments to visit reserves ; organisation of events ;	max 3
(c)	1 purchase of land ; 2 setting up of, nature / bird, reserves ; 3 managing of such reserves / full time wardens ; 4 recruiting / training, volunteers ; 5 education and raising public awareness ; 6 through advertising / national campaigns ; 7 giving talks / lectures ; 8 publishing magazines ; 9 bird / wildlife, surveys ; 10 lobbying, Members of Parliament / Government ; 11 monitoring any activities which might harm, wildlife / habitats ; 12 prosecuting, egg collectors / dealers in endangered species ;	max 7
	QWC – well organised using specialist terms	1

[Total: 15]