RECOGNISING ACHIEVEMENT

2805/03 Environmental Biology

June 2003

Mark Scheme

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 (½) 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. 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
	R	=	reject
	( )	=	words which are not essential to gain credit
	___	=	(underlining) key words which **must** be used to gain credit
	ecf	=	error carried forward
	AW	=	alternative wording
	A	=	accept
	ora	=	or reverse argument

Question	Expected Answers	Marks
1 (a)	beautiful scenery ; containing a wide diversity of habitats; of a wide diversity of species ; some of which may be, rare / endangered ; important, migratory / breeding sites ; may have important geophysical features ; (potential) amenity value ;	**max 4**
(b)	very large areas ; large numbers of visitors ; large local population ;	**max 2**

(c) *max 6 for each aspect*

problems

P1 very large numbers of visitors ;
P2 traffic congestion ;
P3 pollution ;
P4 litter ;
P5 footpath erosion ;
P6 ref harm to wildlife / habitats ;
P7 ref problems associated with, industry / mining / farming ;
P8 AVP ; e.g. planning / conflicts / financial restrictions
P9 AVP ;

max 6

solutions

S1 restrict access to vehicles ;
S2 charge entry fee ;
S3 park and ride schemes / improved public transport ;
S4 introduce close seasons ;
S5 fencing off some areas ;
S6 provide adequate car parking facilities ;
S7 picnic sites ;
S8 litter bins ;
S9 redirect damaged paths ;
S10 repair damaged paths / provide decked pathways ;
S11 introduction of planning controls ;
S12 wardens / rangers ;
S13 AVP ; e.g. visitor centres etc.

max 6 **max 8**

QWC – legible text with accurate spelling, punctuation and grammar ; **1**

[Total: 15]

Question			Expected Answers	Marks
2	(a)		sulphur (from protein) in the fossil fuels ; is oxidised on burning ;	max 1
	(b)		sulphur dioxide gas dissolves ; to form, sulphurous acid; **A** sulphuric acid some sulphur dioxide is oxidised to form sulphur trioxide ; sulphur trioxide dissolves to form sulphuric acid ; both acids dissociate to release H^+ ions which causes the rain to be, acidic / of a lower pH ;	max 4
	(c)		use low sulphur containing fossil fuels ; fit power station, scrubbers / filters ; reduce fossil fuel consumption ; use alternative energy source(s) / named source(s) ; **R** reference to catalytic converters	max 2
	(d)	(i)	vehicle exhaust emissions ;	1
		(ii)	fitting of catalytic converters ; reduce number of vehicles / improve public transport ; lean burn / more efficient engines ;	1
	(e)		high level of industrial activity in UK ; large number of coal-fired power stations ; little investment in alternatives ; prevailing winds carry gases towards Scandinavia ;	max 2
	(f)	(i)	crown die-back ; leaves are discoloured / pigments are leached / direct damage to leaves ; damages stomatal mechanisms ; ref consequence ; reduced, photosynthesis / productivity ; root damage ;	max 2
		(ii)	causes increased mucus production in fish ; which blocks the gills ; reduces gas exchange ; reduces absorption of calcium ; which reduces growth ; of crustaceans ; specified effect on food chain / disruption ; ref increased solubility of metals, such as aluminium ; ref toxic effects ; AVP ; ;	max 2
				[Total: 15]

Question			Expected Answers	Marks
3	(a)		grid set out over area ; random number tables used to generate co-ordinates ; quadrat placed at these points ; number of periwinkles counted in each quadrat ; repetitions ;	max 4
	(b)		140.3, 204.3, 160.6 and 234.0 / 233.9 / 233.95 ; ; **A** up to 2 decimal places *2 correct figures = 1 mark, 4 correct figures = 2 marks* addition of all four values ; correct answer (739.2) ;	4
	(c)	(i)	reject ;	1
		(ii)	with one degree of freedom ; at the 5% confidence level ; the chi-squared value is 3.84 ; calculated value exceeds this ;	3
	(d)		predation ; food availability ; disease ; degree of exposure / wave action ; tide levels ; competition ; ability to withstand desiccation ; colour of seaweed / level of camouflage ;	max 3
				[Total: 15]

Question			Expected Answers	Marks
4	(a)		does not involve the use of chemicals ; makes use of other organisms ; predators / parasites ;	max 2
	(b)		pesticides, are harmful to other organisms / may kill natural predators to the pest ; reduces species diversity / disrupts food chains ; many pesticides are, slow to biodegrade / long lasting ; they concentrate along food chains / bioaccumulate / bioconcentrate ; stored in fat deposits of organisms ; ref effects on top carnivores ; e.g. egg shell thinning poisonous to those applying them ; **A** ref to humans / asthma sufferers pests can build up a resistance ; run-off from land carries them into water supplies / causes pollution / poisons aquatic organisms ; problems of residues in food ; AVP ; e.g. pesticides need to be used repeatedly	max 5
	(c)		requires good knowledge and understanding of relationship between pest and control species ; not always effective over large areas of crops ; control species may damage populations of species other than the pest / control species may become a pest ; if species used is non-native it may upset balance of natural ecosystems ; pest may not be eliminated altogether ; conditions may not suit control species / suitable species may not exist ; pesticides have more immediate effect ;	max 2
	(d)	(i)	to sterilise them ;	1
		(ii)	it reduces their reproductive success ; females mating with sterilised males will not lay fertile eggs ;	max 1
	(e)	(i)	growing mixed crops in the same field / mixing rows of crops ; reduces the spread of, pests / diseases ; predators of pests on one crop may live on other species with which it is mixed ; one species can interfere with detection of other species by pest ; e.g. by producing chemicals / scents	max 2

(ii) different species may be harvested at different times so land is always under cultivation ;
reduces soil erosion ;
some species of crops may offer, protection / support to other species ;
different crop species have different mineral requirements ;
legumes can be grown with non-legumes ;
which helps to maintain soil fertility ;
increased yields ; **max 2**

[Total: 15]

Question	Expected Answers	Marks
5 (a)	*max 6 for conservation points*	
	P1 preservation implies a museum approach ;	
	P2 involves keeping things as they are ;	
	C1 conservation requires an active management approach ;	
	C2 to ensure the survival of (an endangered) species ;	
	C3 example ;	
	C4 surveys ;	
	C5 creating / making use of, nature reserves ;	
	C6 captive breeding ;	
	C7 release into wild ;	
	C8 seed banks / botanic gardens ;	
	C9 ref gene pool ;	
	C10 example of role in conservation ; e.g. reintroducing endangered species	
	C11 maintenance of existing habitats or ecosystems ;	
	C12 introduction of native species ;	
	C13 grazing or burning maintains grassland / other valid example ;	
	C14 prevents succession to, woodland / other valid climax ;	
	C15 reclamation of damaged habitats *or* ecosystems / habitat creation ;	
	C16 e.g. sand dune blow outs / other valid example ;	
	C17 by planting of marram grass / other valid example ;	
	C18 ref coppicing / pollarding ;	
	C19 conservation requires planning controls ;	
	C20 AVP ;	**max 7**
	QWC – clear, well organised, using specialist terms ;	**1**

(b) (i) *reduction*
charge for waste disposal ;
provision of compost bins ;

re-use
make refill bottles / boxes cheaper ; (can be given here *or* under reduction)
money back on bottles ;
providing labels to use envelopes more than once ;
appeals by charities ;

recycling
collection service for goods to be recycled ;
provision of separate bins to separate rubbish ;
provision of more recycling points ;

education and information campaigns ; **A** once only

AVP ; **max 3**

(ii) less need for landfill sites ;
reduces methane emissions ;
less need for incineration ;
reduced pollution ;
saves raw materials ;
saves damage to, environment / habitats ;
saves, energy / fossil fuels ; **max 4**

[Total: 15]

Question			Expected Answers	Marks
6	(a)	(i)	a natural change in species composition, of a community / in an area ; over a period of time ; involves a number of, stages / seres / examples of seres ; one sere changes conditions favouring establishment of next ; ref niche creation ;	**max 3**
		(ii)	succession in area that has, previously undergone succession / previously been colonised ; the starting point is more advanced than primary succession ; suitable example of cause ;	**max 2**
		(iii)	the community that is established at the end of the succession ; example ;	**max 1**
	(b)		farmers, maintain a 'false' climax / prevent natural climax ; by removing trees to create agricultural land ; by burning ; grazing / mowing, grassland / moorland ; by ploughing / planting / harvesting crops ; use of, herbicides / pesticides ;	**max 3**
	(c)		golf course ; lawn / garden ; urban park; managed moorland ; hedgerows ; man-made, ponds / lakes ; AVP ;	**max 2**

(d) *credit change + reason for change*

disappearance of hedgerows ;
create more land for growing crops ;

increased use of chemicals ;
higher yields ;

monocultures ;
increase production of given crop on available area of land ;

reduction in diversity of farms / species farmed ;
intensification of agriculture ;

increased use of large machinery ;
allow larger areas of land to be cultivated ;

farms have become more intensive ;
to increase output / increase farmers income ;

increased organic farming ;
environmental / health reasons ;

AVP ; e.g. changes due to provisions of subsidies, BSE etc.
AVP ; **max 4**

[Total: 15]