OCR

RECOGNISING ACHIEVEMENT

2805/03 Environmental Biology

January 2004

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.

Mark Scheme

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
	R	= reject
	A	= accept
	AW	= alternative wording
	ora	= or reverse argument

Question	Expected Answers	Marks

1 **(a)** deforestation ;
habitat destruction ;
killed / poached ;
reason ;
AVP ; e.g. second reason **max 3**

(b) (risks from) inbreeding ;
inbreeding depression ;
increased risk inheriting two harmful recessive alleles ;
risk of genetic disorder / disease increased ;
reduction in variation ;
ref to selective disadvantage ; **max 3**

(c) away from their natural habitat ;
ref to diet ;
captivity can lead to ill health ;
reduced fertility ;
mental illness / repetitive behaviour / stress ;
lack of compatibility between partners / AW ; **max 3**

(d) *prevents germination by*

reducing / preventing, respiration ;
reducing / preventing, enzyme action ;
reducing risk of infection ; **max 2**

(e) large numbers of seeds can be stored ;
from a range of varieties ;
maintains gene pool ;
retains genetic diversity ;
ref to alleles / genes ;
for reintroduction on extinction in the wild ;
for breeding future crop varieties ;
e.g. desirable characteristics ;
AVP ; ; e.g. ref to medicinal properties **max 5**

[Total :   16]

Question	Expected Answers	Marks

2 (a) *descriptions*

no / little, increase 1910 – 1940 ;
ref to times of increase (insects + fungi from 1940, weeds from late 1970s) ;
numbers of resistant insects climbed steadily from 1940 to 2000 ;
from very low / 30 to over 500 species ;
resistant fungi and weeds increased less steeply ;
in 2000, both had reached between 200 and 300 ;   max 3

explanations

very little pesticide used before 1940 ;
much greater use of insecticides at an earlier stage ;
resistance created by mutations ;
ref to selection ;
huge numbers of insect pests ;
so greater numbers become resistant ;
ref to generation times / qualified ;

A alternative explanations about fungi and weeds   max 3   **max 5**

(b) harmful to non-target species ;
reduce biodiversity ;
disruption of food chains ;
bioaccumulation / bioconcentration ;
slow to biodegrade ;
toxic effect on humans ;   **max 2**

(c) intensive – accept ora for extensive

1 high stocking rates / high density ;
2 animals kept, in sheds / close together ;
3 need to be supplied with (high quality) feed ;
4 high energy input ;
5 animals prone to disease ;
6 use of antibiotics ;
7 use of pesticides ;
8 ref to growth promoting hormones ;
9 labour intensive ;
10 can be kept on small areas of land ;
11 problems with, waste / slurry ;
12 high cost, of, inputs / feed / concentrates / AW ;
13 any other named cost ;
14 use of fossil fuels ;
15 ref to selective breeding ;

16 high productivity / fast growth rates ;
17 high reproduction rate / high birth rate ;
18 low death rate / low mortality ;
19 high economic return ;
20 ref age at which calves are first born ;
21 ref age of slaughter ;

22 extensive systems on poor grazing ;

23 use of figures from Table 2.1 to make comparisons or to support
24   statements above ; ;

25 AVP ; e.g. consequences of intensive
26 AVP ;   **max 7**

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

[Total: 15]

Question	Expected Answers	Marks

3 (a) fertilisers / organic waste / sewage / farm waste / fish farm waste ;

fertilisers cause algal bloom ;
increases amount of organic waste ;
leads to increased levels of decomposition ;
by bacteria ;
aerobic ;
bacterial populations increase ;
more oxygen removed from water ; **max 4**

(b) *one mark from each section + four other marks*

(i) allows calculation of mean BOD ;
mean more reliable than single sample / AW ; **A** ref to anomalies

(ii) Winkler method ;
detail ; e.g. titration
or
probe ;
detail ; e.g. calibration, use of data-logging software

(iii) prevent photosynthesis ;
by algae ;
which would produce oxygen / increase oxygen levels ;

(iv) standard / valid comparison for different samples ;
provides optimum temperature ;
for (bacterial) respiration ;

(v) standard length of time for different samples / same for all samples ;
allows time for significant decrease in oxygen levels ;
easier to measure larger decreases with accuracy ; **max 9**

Mark Scheme

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(c)   add clean water ;
to dilute pollution ;
aerate ;
to increase rate of decomposition ;
removal of sediment ;
contains, decomposing matter / decomposers ;
AVP ; ;

                                                     max 2

     R long term measures to prevent pollution

(d)   **1**   use key to identify indicator species ;
         2   note presence / absence (of named species) ;
         3   or abundance ;
         4   how sample sites located ;
         5   repeat (over period of time) ;
         6   how results might indicate pollution levels / use of named index / scale ;   **max 3**

                                                                      [Total: 18]

Question		Expected Answers	Marks
4 **(a)**		technological developments in fishing industry / named example ; larger nets ; too many boats ; larger areas fished ; young fish removed from populations ; factory ships ;	**max 3**
(b)		reduce number of vessels / use licences / decommission boats ; restrict time spent fishing / closed seasons ; restrict areas fished ; quotas ; restrict size of nets ; minimum mesh size ; AVP ;	**max 4**
(c)	1	population numbers controlled by, feeding / predators ;	
	2	food, chains / webs, disrupted ; **A** description / example	
	3	some population(s) / named species, will increase (out of control) ;	
	4	reason using information from Fig. 4.1 ;	
	5	other population(s) / named species, will, decrease / disappear altogether ;	
	6	reason using information from Fig. 4.1 ;	
	7	ref to predator-prey ;	
	8	removal of cod, upsets relationships throughout web / has a 'knock-on' effect ;	
	9	balance of producers to consumers is upset ;	
	10	ref to other interactions not shown ; (Fig. 4.1 is part of food web)	
	11	(named) population(s) may increase or decrease with explanation (ref to balance of factors shown in Fig. 4.1) ;	
	12	AVP ; e.g. ref to parasites	
	13	AVP ; seabirds ref to fishing further down the food chain	**6 max**
		QWC - clear, well organised using specialist terms;	**1**

[Total : 14]

Question	Expected Answers	Marks

5 **(a)** animals move around ;
immigration / emigration ;
camouflage ;
burrow / hide / under water ;
nocturnal ;
in large groups e.g. herds ;
AVP ;   **max 3**

(b) **(i)** *award two marks if correct answer (18 023) is given*

$\dfrac{1426 \times 1365}{108}$;

= 18 023 ;   **2**

(ii) photographing is equivalent to catching a sample ;
and marking individuals ;
able to recognise whales when photographed a second time ;
no / minimal, births / deaths ;
no / minimal, immigration / emigration ;
individuals mix randomly with rest of population ;   **max 4**

(c) method for capture e.g. net / trap ;
mark ;
that does not damage / hinder animals / ref predators ;
method of marking ;
named place on body ;
count marked individuals in second sample (alternative to second
          photograph) ;   **max 3**

                                                                                     [Total: 12]

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Question	**Expected Answers**	**Marks**

6 **(a)** **(i)** site with rare / endangered species ;
important habitat ;
important breeding site ;
overwintering site ;
site with geological / physiographical features of interest ; **max 3**

(ii) may not carry out specified activities, which might jeopardise reason for SSSI
status / AW ;
e.g. building ;
without seeking appropriate consent ;
from DEFRA / appropriate minister / English Nature / Scottish Natural
Heritage / Countryside Council for Wales ; **max 2**

(b) **(i)** relatively large area ;
rural ;
beautiful scenery ;
contains wide diversity of habitats ;
of wide diversity of species ;
people live (and work) in National Parks ;
farming / industry, operates in National Parks ;
development, restricted / controlled ;
accessible to public / facilities provided ; **max 4**

(ii) large numbers of visitors ;
volume of traffic ;
pollution / litter ;
footpath erosion ;
disturbance / damage, to wildlife habitats ;
conflicts with, local residents / businesses / farmers ;
qualified ; **max 4**

(c) financial support given to farmers to maintain traditional land use ;
set aside ;
encouraged to re-establish, traditional meadows / water meadows ;
encouraged to, grow / plant, hedgerows ;
strict control of nitrate fertilisers ;
strict control of use of pesticides ; **max 2**

[**Total:** **15**]

Mark Scheme