



RECOGNISING ACHIEVEMENT

**Subject: Environmental Biology: 2805/03**

**Session: January Year: 2002**

**Mark Scheme**

<b>MAXIMUM MARK</b>
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<b>90</b>
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## 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. 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	Unit Code	Session	Year	Version
Page 3 of 11	2805/03	JAN	2002	Final

<b>Abbreviations, annotations and conventions used in the Mark Scheme</b>	/	=	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
	<u>      </u>	=	(underlining) key words which <b>must</b> be used to gain credit
	ecf	=	error carried forward
	AW	=	alternative wording
	ora	=	or reverse argument

Question	Expected Answers	Marks
1.	(a) habitat destruction ; poached / killed / hunted for food ; for sport ; or other reasons ; killed by pollution ; killed directly by pesticides ;	3 max
	(b) inbreeding ; increases risk of inheritance of two harmful recessive alleles ; inbreeding depression ;  captivity / away from natural environment leads to ill-health ; stress / depression / mental illness ;  may reject mates ; not able to select as in wild population ;	2 x 2
	(c) difficulty in moving around natural environment ; susceptible to disease ; unable to integrate with other members of the same species ; poor at competing ;	2
	(d) protect / monitor in their natural habitat ; setting up of game reserves / national parks ;	1
	(e) (i) man has no right to cause other species to become extinct / has caused other species to become endangered, so must be prepared to help save them ; need to save them for future generations ; aesthetic reasons ;	2 max

Mark Scheme	Unit Code	Session	Year	Version
Page 4 of 11	2805/03	JAN	2002	Final

Question	Expected Answers	Marks
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- (ii) some species may be of use in the future ;  
for medical purpose ;  
example ;  
for agricultural / silvicultural purpose ;  
tourism ;

3 max

TOTAL 15

Mark Scheme	Unit Code	Session	Year	Version
Page 5 of 11	2805/03	JAN	2002	Final

Question	Expected Answers	Marks
2.	(a) <i>why removed</i>	
	<p>more land to grow crops / graze animals ;  they harbour disease / pests ;  easier to use large machinery ;  less maintenance / cheaper ;  amalgamation of farms ;</p> <p><i>why of concern to conservationists</i></p> <p>act as valuable wildlife habitats ;  provide nesting / breeding sites ;  provide valuable food supplies ;  act as wildlife corridors ;  reduction of biodiversity ;  reduce wind speed ;  roots bind the soil ;  so removal increases erosion ;  aesthetics ;</p> <p><b>Q – clear, well organised answer using specialist terms ;</b></p>	7 max
	(b) $\frac{11.2 - 1.8}{1.8} \times 100$ ;	
	= 522% ;	2

Mark Scheme	Unit Code	Session	Year	Version
Page 6 of 11	2805/03	JAN	2002	Final

Question	Expected Answers	Marks
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|-----|---|-------|
| (c) | <p>harmful to other organisms / may kill natural predators to the pest ;<br/> reduce species diversity / disrupt food chains ;<br/> many are slow to biodegrade ;<br/> concentrate along food chains / bioaccumulate / bioconcentrate ;<br/> stored in fat deposits of organisms ;<br/> run-off from land carries them into water supplies / causes pollution /<br/> poisons aquatic organisms ;<br/> spray drift ;<br/> residues may be present in human food supplies ;</p>   | 3 max |
| (d) | <p>biological control ;<br/> introduction of predators / parasites / sterilised males of the pest species ;<br/> in order to reduce population size ;</p> <p>crop rotation ;<br/> interrupts life cycle of pests ;<br/> use resistant or tolerant varieties of crops ;<br/> unaffected by pests so yield does not fall ;</p> <p>intercropping ;<br/> wide variety of plants are sown, which encourages natural predators and helps<br/> reduce the spread of pests, especially fungi ;</p> <p>maintain / plant hedgerows ;<br/> act as barriers to pests / provide habitats for predators of pests ;</p> <p>careful choice of, sowing / planting date ;<br/> avoids coinciding critical stages of plant growth with presence of large pest<br/> numbers ;</p> | 2 max |

<b>Mark Scheme</b>	<b>Unit Code</b>	<b>Session</b>	<b>Year</b>	<b>Version</b>
Page 7 of 11	2805/03	JAN	2002	Final

TOTAL 15

Question	Expected Answers	Marks
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3. (a) size needs to be appropriate to species under investigation ;  
sample with increasing size of quadrats ;  
record number of species in each ;  
choose minimum quadrat size to include a majority / 80% of species ;      3

(b) yarrow ;  
  
yarrow is in 16 / 20 quadrats / frequency is 80% ;  
salad burnet is in 12 / 20 quadrats / frequency is 60% ;      3

(c) total number of individuals recorded is 69 ;  
69 / 20 = 3.45 per quadrat ;  
which is 13.8 ;  
m<sup>-2</sup> ;      3

(d) (i) weigh sample of soil ;  
heat at 60 – 106 °C until no further loss in mass ;  
water content =  $\frac{\text{initial mass} - \text{final mass}}{\text{initial mass}} \times 100$  % ;  
repeat and average ;      3

(ii) take dried soil sample ;  
heat strongly till no further loss in mass ;  
take final weight from starting mass ;  
difference = humus content ;  
calculate as percentage of original mass ;  
repeat and average ;      3

TOTAL 15

Mark Scheme	Unit Code	Session	Year	Version
Page 8 of 11	2805/03	JAN	2002	Final

Question	Expected Answers	Marks
4.	(a) aerosols ; refrigeration systems ; air conditioning systems ; polystyrene manufacture ;	2 max
	(b) increase in levels of CFC 11 was very steep ; between 1970 and 2000 ; concentration of ozone began to fall more steeply around 1970 ; and continued to 1990 ;	3
	(c) sunlight breaks down CFCs / release of chlorine free radicals ; chlorine reacts with ozone ; producing chlorine monoxide ; which reacts with an oxygen atom ; to produce free radicals of chlorine again ; this cycle can happen many hundreds of times ;	4
	(d) international agreement to phase out the use of CFCs ; by 2000 ; development of alternatives ; Montreal Protocol (1987) ; ozone layer protection treaty (1989) ;	3
	(e) large amounts of CFCs were released (between 1970 and 1987) ; CFCs are, persistent / long-lasting ; some industrial opposition to phasing them out caused a delay ; not all countries are prepared to reduce CFC production ; fridges / industrial processes, still using CFCs ;	3
		TOTAL 15



Mark Scheme	Unit Code	Session	Year	Version
Page 9 of 11	2805/03	JAN	2002	Final

Question	Expected Answers	Marks
5. (a) (i)	land which has been used by man ; for industry / other development ; may be damaged / polluted ; requires treatment before it can be used beneficially ; e.g. abandoned industrial sites / exhausted mines / spoil heaps / exhausted quarries / disused airfields / disused railway lines / abandoned residential areas ;	1
(ii)	East Anglia is an agricultural area / very little industry ; North West is highly industrialised ; much of which is now in decline ;	2
(b)	a natural change in the species composition of a community / in an area ; over a period of time ; involves a number of stages / seres ; one sere changes conditions favouring establishment of next ; leads to climax community ;	3 max
(c)	presence of buildings / concreted areas ; absence of top soil ; presence of toxic waste ; instability ;	2 max
(d)	add layer of top soil ; sow fast-growing grass seeds ; roots will stabilise surface ; speed up growth by adding fertiliser ; add mulch ; to retain water / increase organic content ; sow legumes ; such as clover / lupins ; these increase fertility / nitrogen content of the soil ; plant shrubs ; finally plant sapling trees ;	6
	<b>Q – legible text with accurate spelling, punctuation and grammar</b>	1

TOTAL 15

<b>Mark Scheme</b>	<b>Unit Code</b>	<b>Session</b>	<b>Year</b>	<b>Version</b>
Page 10 of 11	2805/03	JAN	2002	Final

Question	Expected Answers	Marks
6.	<p>(a) extensive farm ;</p> <p>output : input of intensive farm = 20650 : 10 040 ;            = 2 ;            output : input of extensive farm = 3440 : 245 ;            = 14 ;            input of intensive : input of extensive = 10 040 : 245 ;            = 41 ;            output of intensive : output of extensive = 20650 : 3440 ;            = 6 ;</p> <p><b>Note : give credit for correct qualitative statements, which do not use actual figures.</b></p>	4
	<p>(b) increased use of fertilisers ;            provides more nutrients for crop plants ;            leading to greater yields ;</p> <p>increased use of pesticides ;            reduces pest damage / loss of yield ;</p> <p>increased use of machinery ;            allows much larger areas to be cultivated ;            in a shorter period of time ;</p> <p>use of electricity ;            allows buildings to be kept warmer ;            so animals lose less energy ;</p> <p>more feed given to animals ;            provides more concentrated nutrients ;            improves growth rates ;</p> <p>use of antibiotics / growth hormones ;            improves animal growth rates ;</p>	3 x 2

Mark Scheme	Unit Code	Session	Year	Version
Page 11 of 11	2805/03	JAN	2002	Final

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- (c) legumes possess root nodules ;  
which harbour *Rhizobium* bacteria ;  
*Rhizobium* fix nitrogen ;  
convert nitrogen gas to nitrates / ammonium compounds ;  
when legumes are ploughed into the soil it increases levels of  
nitrogen-containing compounds ;  
as a result of decomposition ;  
and nitrification ;  
which can be taken up by crop plants ;  
to be incorporated into amino acids / proteins ;  
increasing growth rates / productivity ;

5

TOTAL 15