RECOGNISING ACHIEVEMENT

2801 Biology Foundation

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)	breaking (glycosidic) bond ; glycosidic / correct bond drawn ; addition of water ;	**R** if incorrect named bond 'covalent' = neutral	**max 2**
	(b)	✓ = *yes* × = *no* *blank = 0*		

		no ;	yes ;
	no ;		no ;
	plants ;		animals ;
	storage / reserve ; **R** 'energy' alone	structural / strength / stops bursting / cell wall / support / gives cell shape ; **R** protects rigid = neutral	

8

[Total : 10]

Question	Expected Answers	Marks
2 (a) (i)	*accept letters only* B C A ;	1
(ii)	*ignore 'early' / 'late' references* **A** anaphase ; **B** prophase ; **C** metaphase ;	3
(iii)	**X** centriole ; **A** centrosome pole / aster = neutral **R** centromere **Y** spindle / spindle fibre / microtubule ; **R** 'fibre' alone **Z** nuclear membrane / nuclear envelope / nucleus ; **R** wall **R** nucleolus	3
(b)	cell , active / metabolism ; **A** idea of requiring, energy / ATP cell , increases in size / growth ; **R** repair synthesis of new , organelles / named example ; replication of , DNA / chromosomes ; **A** doubling / genetic material **R** divide / formation of … centrioles divide ; AVP ; AVP ; e.g. protein synthesis lipid synthesis histone replication accumulation of , energy store / starch / etc chromosomes start to , shorten / thicken	max 2
	[Total:	**9]**

Question			Expected Answers	Marks
3	(a)	(i)	cell membrane ; cytoplasm ; ribosomes ; fat droplets / food store / glycogen ; RNA / tRNA / mRNA ; no vacuoles ; AVP ; **R** lysosomes / DNA / wall	**max 2**
		(ii)	(*main DNA is*) circular / not linear ; not associated with protein / no histones ; **A** no chromosomes a single unit of nuclear material ; not in nucleus ; AVP ; AVP ; e.g. plasmid fewer genes / less "junk" no introns / no exons / ref. lac operon quicker DNA replication *ignore ref. to chromatin*	**max 3**
	(b)	(i)	no formation of mRNA ; no , translation / described ; no , protein / polypeptide , synthesis ; no enzymes made ; no essential proteins made ; AVP ; e.g. consequence ~ no reproduction / no new cell structures formed **R** death	**max 3**
		(ii)	weak wall ; wall bursts ; **A** cell bursts AVP ; AVP ; e.g. affects , growing bacteria / when wall forming ref. osmotic effect cannot reproduce easier for antibodies to , attach / attack more susceptible to entry of ….	**max 2**
				[Total : 10]

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

4 (a)

		✓ ;
	✓ ;	
	✓ ;	

3

(b)

1 nitrogen fixation = nitrogen converted to **,** nitrate (V) / <u>ammonium</u> **;**
2 *Rhizobium* **;**
3 in **,** leguminous plants / suitable e.g. **;**
4 root nodules **;**
5 ref. free-living species **;**

6 lightning converts nitrogen to nitrate (V) **;**

7 denitrifying bacteria / denitrification **,** convert nitrate (V) to nitrogen **;**

8 nitrification / oxidation **,** convert <u>ammonium</u> to nitrate (V) **;**
9 via **,** nitrate III / nitrite **;**
10 *Nitrosomonas* / *Nitrobacter* **;** **R** if in incorrect context
11 carried out by **,** bacteria / prokaryotes **;**

12 plants **,** absorb / use **,** nitrate (V) **;**
13 plants produce <u>amino</u> <u>acids</u> **;**
14 consumption of plants by animals **;**

15 decomposition of **,** dead organisms / excreta **;**
16 conversion of protein to amino acids **;**
17 decomposers convert **,** protein / amino acids / urea **,** to <u>ammonium</u> **;**

18 addition of fertilisers **;**

19 AVP **;** e.g. further detail of any of the processes / organisms

R Haber process / leaching / etc

NO_2^- = *nitrite* NO_3^- = *nitrate* NH_4^+ = *ammonium* **max 9**

QWC ~ clear, well organised using specialist terms ;. **1**

[Total : 13]

Question		Expected Answers	Marks
5	(a)	haemoglobin / myoglobin / enzyme / named enzyme / albumen / insulin / glucagon / globulin / antibody / suitable alternative ;	
		collagen / keratin / elastin / fibrin / silk / suitable alternative ;	2
	(b)	vibration / AW ; bonds break ; **A** disrupt **R** deformed / damaged / affected hydrogen / other correct , bond ; **R** peptide enzyme loses , precise / specific / 3-D , shape ; tertiary structure , disrupted / changed / altered ; active site loses shape ; substrate can no longer , fit / bind ; **A** no enzyme substrate complex formed	max 4
	(c) (i)	lysine ; valine ; tyrosine ;	3
	(ii)	AAG ; GUU ; UAU ;	3
	(d)	*reject references to amino acids being formed but do not penalise twice*	
	(i)	leucine instead of arginine / arginine replaced with leucine ;	1
	(ii)	no change / still serine ; **A** 'serine instead of serine' **R** 'a different sort of serine'	1
			[Total : 14]

Question			Expected Answers	Marks
6	(a)	(i)	active **,** transport / uptake **;**	**1**
		(ii)	polar / water soluble / not lipid soluble / <u>too</u> big **;**	**1**
	(b)		greater surface area / <u>more</u> membrane formed / <u>more</u> microvilli **;** <u>more</u> **,** carriers / transport proteins **;** **A** channels endocytosis / pinocytosis **;** carriers always open **;** **A** channels *treat other suggestions as neutral*	**max 2**
				[Total : 4]