RECOGNISING ACHIEVEMENT

2801 Biology Foundation

January 2005

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 *mark two columns separately first. If letter and part of cell both incorrect, look to see if the part of the cell corresponds to this letter. If so, allow 1 mark ecf*

function	part of cell	label
controls activities of the cell	*nucleus*	*A*
carries out aerobic respiration	mitochondrion / mitochondria ;	D ;
attaches to mRNA in protein synthesis	ribosome(s) / rough ER / RER ;	C ;
produces secretory vesicles	Golgi ;	B ;
contains digestive enzymes	lysosome(s) ;	E ;

8

[Total: 8]

Question			Expected Answers	Marks
2	(a)	(i)	polypeptide ; **A** oligopeptide	1
		(ii)	glycine ; **A** proline / alanine	1
		(iii)	*in this answer assume that* *chain = polypeptide* *molecule = groups of 3 polypeptide chains* **A** *ecf for named amino acid from (ii) but NOT a name of a base* amino acids / glycine **,** small (to allow close packing) ; the small one is **,** every 3rd amino acid / at every level in the molecule ; chains **,** form a tight coil / lie close to each other ; held together by hydrogen bonds ; *ignore other bonds* bonds form between R groups of lysines ; molecules form **,** fibres / bonds with adjacent molecules ; **A** fibril covalent bond between **,** adjacent molecules / CO-NH groups ; fibres composed of parallel molecules ; ends of parallel molecules staggered ; prevents line of weakness ;	2 max
	(b)		cell wall(s) ; β / beta ; **A** B glycosidic ; **NOT** glucosidic 180 ; straight ; **A** polysaccharide / unbranched / linear hydrogen / H ; **NOT** H_2	6
				[Total: 10]

Question	Expected Answers	Marks
3 (a) (i)	long ; thin cell wall ; lack of , waterproof layer / cuticle ; large surface area ; **NOT** if cilia / villi / microvilli / tails / etc present in large numbers ; (membrane) proteins / carriers / channels / aquaporins ; many mitochondria ; AVP ; (adaptation of part of the cell)	**1 max**
(ii)	*if candidate gives a list or a choice, all must be correct* active transport / diffusion / facilitated diffusion / described ; **A** pinocytosis **NOT** passive transport / osmosis / bulk transport	**1**
(iii)	lower <u>water potential</u> inside / ora ; movement , down water potential gradient / from high Ψ to low Ψ ; through , channel proteins / partially permeable membrane / aquaporins / AW ; walls freely permeable ; osmosis ;	**2 max**
(b)	U ; V ; Z ; S ;	**4**
		[Total: 8]

Question			Expected Answers	Marks
4	(a)	(i)	4 ;	1
		(ii)	deoxyribose ; **NOT** ribose phosphate ; nitrogen(ous) / organic / named , base ; **A** purine / pyrimidine **NOT** uracil **NOT** letter **NOT** thiamine / thyamine take a correct base from a list unless that list includes uracil	3
	(b)		**1** 2 , molecules / helices , (of DNA) produced ; **2** identical (molecules of DNA produced) ; **3** (each made up of) 1 , original / parent / old , strand ; **4** 1 new strand ; **5** original / parent / old , strands , act as template / described ; **6** ref to (free DNA) nucleotides ;	3 max
				[Total: 7]

Question			Expected Answers	Marks
5	(a)		caused by , mutation / damage to DNA / ref oncogene / AW ; uncontrolled , mitosis / cell division ; **NOT** growth mass of cells / tumour ; **A** group of cells (product) unspecialised / abnormal ;	**2 max**
	(b)	(i)	(X) 10 / 900% (increase) ; **NOT** 10% increase ignore 1000% increase	**1**
		(ii)	*candidates may use information from the passage* *e.g. typical [NOT average] = 20 units* *threshold = 200 units* **1** no increase , between 0 and 20 units / at low levels / well below threshold , of radon ; **2** radon increasing , from 20 to 200 units / towards threshold , increases risk ; **3** by 10X / 900% ; **4** high radon and smoking gives greatest risk ; **5 & 6** other suitable quantitative <u>risk</u> statement ; ; **7** consequence / relevant effect on cell ;	**2 max**
	(c)		*advantage* make people aware of risk / let people know that their area is safe / could reduce other risks / other suitable suggestion ;	**1**
			disadvantage worry people / lower house prices / migration / other suitable suggestion ;	**1**

Question	Expected Answers	Marks

(d) *only award marking points 1, 6, 9, 14 and 16 if descriptions of the stages are correct- do not award simply for identifying the stages - ignore ref to centrioles*

prophase

1 C ;
2 chromosomes / chromatids , condense / coil / shorten and thicken ;
3 become visible ;
4 consist of two chromatids ;
5 joined by a centromere ; **A** kinetochore **NOT** centrosome

metaphase

6 A ;
7 chromosomes align at , equator / metaphase plate ;
8 attached to spindle by centromeres ;

anaphase

9 B ;
10 centromere splits ;
11 chromatids separate ;
12 move to opposite poles ;
13 by , contraction / shortening , of spindle ;

telophase

14 E ;
15 chromosomes uncoil ;

interphase

16 D ; **A** for a description of early prophase
17 DNA replication ;
18 transcription / formation of mRNA ;

19 AVP ; *these must relate to behaviour of chromosomes*
20 AVP ; e.g. spindle made of microtubules
chromatin becomes chromosomes (in prophase) ora in interphase
centromere leads chromatid to pole
gene switching during interphase

9 max

QWC – clear well organised using specialist terms ; **1**

award the QWC mark if three of the following are used in correct context, but Q = 0 if names of stages of mitosis are used inappropriately

chromatin	equator / metaphase plate
chromatid	DNA replication
centromere	transcription
spindle	

[Total: 17]

Question		Expected Answers	Marks
6	(a)	idea that arachidonate is substrate ; phospholipid source in membrane ; prostaglandin / product , can be , transported / stored ; (S)ER for , lipid / steroid , synthesis / transport ; AVP ; AVP ; e.g. separate from other reactions cytoplasm environment not suitable for , reaction / enzyme ora idea that prostaglandin isolated COX does not , damage / use phospholipids from, other membranes	**2 max**
	(b)	*ibuprofen* competitive ; ibuprofen blocks / arachidonate cannot enter , channel ; **A** substrate cannot reach active site ; *aspirin* non-competitive ; changes shape (of) / blocks ; active site ; AVP ; e.g. <u>allosteric</u> no ESC formed / AW ; *allow once only*	**4 max**
	(c)	**A** *reverse argument as long as question is answered in terms of low temperature* slows , reaction / rate / activity of enzyme / AW ; ref kinetic energy ; molecules moving , slowly / less ; few collisions / collisions less likely ; few ESC formed / ESC less likely to be formed ; reversible / enzyme not denatured / enzyme still works ; ref activation energy ; ref Q_{10} = 2 ;	**4 max**
			[Total: 10]