OCR
RECOGNISING ACHIEVEMENT

JANUARY 2003

ADVANCED SUBSIDIARY GCE UNIT

MARK SCHEME

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MAXIMUM MARK: 60

Syllabus / Component: 2801

Biology Foundation

_____

Paper Set Date: 15/01/03

ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

1. Please ensure that you use the **final** version of the Mark Scheme.
    <u>You are advised to destroy all draft versions.</u>

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. <u>No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.</u>

    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 <u>part</u> question should be indicated in the margin provided on the right hand side of the page. The mark <u>total</u> 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 <u>and</u> 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
	( )	= 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
	R	= reject
	ora	= or reverse argument

Question	Expected Answers	Marks

1 **(a)** **(i)**   nuclear **,** envelope / membrane **;** **R** wall   **1**

(ii)   *Correct answer = 2 ticks, 2 marks*

7 cm / 70 mm   *or* $^{measurement}/_{7\,\mu m}$ **;**   **A** 71 mm / 70 000 μm

(magnification = x) 10 000 **;**   **A** 10 143   **NOT** units (e.g. mm)   **2**

(b)   **B**   6 **;**
                 C   2 **;**
                 D   5 **;**
                 E   1 **;**
                 F   4 **;**   **5**

[Total: 8]

Question	Expected Answers	Marks

2 (a) *in either order*
liver **;**
muscle **;**   **A** *kidney*

α / alpha **;**
4 **;**
6 **;**

in either order
amylopectin **;**
amylose **;**   **R** amylase   **7**

(b) *treat absence column as neutral unless answer is incorrect – ignore
absence columns if nothing written in them*

starch **;** *carbohydrate is neutral*
blue / blue-black / deep purple (from yellow / orange-yellow) **;**
ignore precipitate in present column

lipid / fat / oil / triglyceride **;**
milky / emulsion / cloudy / white (from clear) **;**   **4**

(c) *in either order*
protein **; A** polypeptide
     named protein = neutral
     R amino acids
non-reducing sugar **;**
     carbohydrate = neutral
     R any mention of reducing sugars, sucrose   **2**

                                                        [Total: 13]

Question	Expected Answers	Marks

3 **(a)**   *correct answer = 2 ticks = 2 marks*

$^6/_{0.5}$ / $^6/_{30(seconds)}$;
12 ;   **2**

    (b)   *assume candidates are referring to the initial rate unless otherwise stated.*
substrate = H_2O_2

(concentration of) substrate molecules , high at the start / higher than later ;
     A reactant **R** reacta<u>nts</u>
all / most / many , active sites occupied ;
more chance of substrate / fewer substrate molecules , entering active site ;
more product made per unit time ;   **max 2**

(c)   E1   increased enzyme concentration increases rate of reaction ; *ora*
       E2   more active sites available ;   *ora*
       E3   more / greater chance that , substrate molecules enter / collide with, active site ;   *ora*
       E4   more product produced (per unit time) ;   *ora*
       E5   linear increase as long as plenty of substrate available ;

       T1   slow reaction at low temperatures ;
       T2   suitable ref movement / energy, of, molecules / enzyme / substrate, related to temperature ;
       T3   few (cold) / more frequent (warmer) , collisions (between enzyme and substrate) / ESC formed ;
       T4   (in warm temp) collisions (occur with more energy) to break bonds ;
       T5   at high temperatures enzymes are denatured ;
       T6   molecule vibrates breaking bonds (within enzyme molecule) ;
       T7   suitable graph ; *axes labelled and suitable line*

       P1   (significant) change from optimum reduces rate of reaction ;
       P2   H ions interact with R groups (of amino acids) ;
       P3   affect bonding within, enzyme / active site ;
       P4   pH that is very different from optimum will denature enzyme ;
       P5   suitable graph ; *axes labelled and suitable line*

       D1   tertiary structure / 3D shape, altered ;
       D2   active site loses (precise) structure ; **A** substrate no longer fits into active site

       S1   inhibitor reduces rate of reaction ;
       S2   bind to enzyme ;
       S3   (binds) at active site and blocks it ;
       S4   (binds) at another site and distorts shape of active site ;
       S5   substrate unable to bind with active site ;
       S6   correct description competitive and non-competitive ;
       S7   correct description reversible and non-reversible ;
       S8   correct description end product inhibition ;
       S9   suitable graph ;

       A1   AVP; e.g. coenzymes, allosteric inhibitors, activators, phosphorylation
       A2   AVP; NOT further development of above points   **max 10**

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

                                                       [Total: 15]

Question   Expected Answers   Marks

4   *look for ticks, ignore crosses*
           reject 'hybrid' ticks

	✓	;
✓		;
✓	✓	;
✓	✓	;
✓		;

                                                                                    5

                                                        [Total: 5]

Question	Expected Answers	Marks

5 (a) (i)   short distance to travel (from air to blood) **;**
                  ora if referring to thick - treat others as neutral   **1**

(ii)   large surface area **;**
           good blood supply **;**
           capillaries very close to alveoli **;**
           steep concentration gradient (maintained) **;**
           ventilation of gases / constant blood flow **;**
           A moist **;**   **max 2**

(b) (i)   <u>mitosis</u> (in context of cancer) **;**
               uncontrolled / AW **;**
               producing a **,** mass of cells / tumour **;**
               unspecialised / not functioning **;**
               ref. metastasis / description **;**
               AVP **;** e.g. genetically identical (cancer) cells
                         malignant / ref benign + qualification
                         all originate from a single cell
                         more likely in areas with greater cell division
                         mutation associated with division   **max 3**

(ii) **NOT** stress / pollution / diet

ionising radiation **;**
UV light **;**
X rays **;**
gamma rays **;**
smoking / tobacco **;**
named carcinogen **; ;** (*two marks*)
    tar
    aniline dyes
    asbestos
    radon
    benzpyrene
    benzene
    vinyl chloride
    organophosphates
    etc.
(named) virus **;**
heredity / family history / genetic predisposition / possession of oncogenes **;**
low fibre diet / high fat diet / alcohol **;**
free radicals **;**
increased age **;**
ref. weakened immunity **;**
high voltage power cables / mobile phones **;** **max 2**

(iii) cancer cells / tumour **,** deprived of blood **;**
deprived of oxygen **;**
deprived of glucose / (named) nutrients **;**
reduces respiration / causes death of cells **;**
CO_2 / waste products, not removed **;**
stops spread of cancer cells **;**
lack of energy for, mitosis / replication **;** **max 2**

[Total: 10]

Question	Expected Answers	Marks

6 (a)   *two of*

leech / <u>young</u> perch / char / minnow / alder-fly larva ;   **1**

(b) (i)   provides <u>total</u> energy input to an ecosystem / can synthesise its food /
        photosynthetic / converts light energy into chemical energy /
        autotroph / AW ;   *ignore 'starts food chain' unqualified*
    algae / phytoplankton ; **NOT** detritus   **2**

(ii)   feeding level / position in a food chain / position in food web ;
    e.g. ; (freshwater snail is a primary consumer / suitable alternative)
        NOT herbivore / carnivore   **2**

(iii)   (interacting) community of organisms and their environment / idea of biotic
        and abiotic ;
    lake ;   **2**

(c)   ref. not about, 10% (as might be expected) / 3% (for producers) ;

reason for efficient light absorption ; **A** argument for inefficient producer
    e.g. lack of shading
        less reflection
        absorb more wavelengths
        etc.

reason for greater efficiency in primary consumer ;
    e.g. eating large proportion of plant
        mechanism for dealing with cellulose
        etc.   **max 2**

[Total: 9]