RECOGNISING ACHIEVEMENT

2806/03 Biology Practical Examination (A2)

January 2004

Mark Scheme

ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

You are advised to destroy all draft versions.

1. 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 Please ensure that you use the **final** version of the Mark Scheme.
2. 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 answers 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 marks should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance.

Planning Exercise

The mark scheme for the planning exercise is set out on page 4. The marking points **A** to **U** follow the coursework descriptors for Skill P.

Indicate on the plans where the marking points are met by using a tick and an appropriate letter. There are 14 marking points for aspects of the plan and two marks for quality of written communication (QWC).

Practical Test

Pages 5, 6 and 7 have the mark scheme for Questions 1 and 2 for the Practical Test.

A2 Biology. Planning exercise.

Checking Point	Descriptor	The candidate
A	P. 1a	Plans a suitable procedure that includes mixing yeast suspension with different glucose solutions**;**
B	P. 1a	Provides a prediction about uptake of glucose by yeast, e.g. increased concentration = increased uptake**;**
C	P. 1b	Selects appropriate equipment, e.g. syringes, water baths at < 40^{o}C, electronic balance, drying oven**;**
D	P. 3a	Uses scientific knowledge and understanding about membrane structure / or diffusion gradients / basis of Benedict's test**;**
E	P. 3a	Identifies at least two key variables to control, e.g. volumes, temperature, time for leaving yeast with glucose, concentration of yeast, pH**;**
F	P. 3b	Decides on number of measurements to take – minimum of three at each concentration of glucose**;**
G	P. 3b	Decides on a suitable range of observations, minimum five, e.g. 10%, 8%, 6%, 4% and 2%**;**
H	P. 5a	Uses previous practical work, results from preliminary work, or identified secondary source in developing a plan**;**
I	P. 5a	Uses appropriate scientific knowledge and understanding in developing a plan, e.g. ref to transport proteins / glucose uptake**;**
J	P. 5a	Refers to safety, e.g. precaution to take when use of glassware, boiling water, Benedict's reagent**;**
K	P. 5b	Describes how dilutions are prepared from 10% solution of glucose**;**
L	P. 5b	Describes ways of producing precise results, e.g. drying filter paper after filtering and drying to constant mass, ensuring all precipitate collected**;**
M*	P. 5b	Gives a logical, clearly written account with accurate use of scientific terminology (QWC)**;**
N	P. 7a	Uses information from **at least two identified sources** e.g. preliminary work / class practicals / text books / web sites**;**
O	P. 7a	Links plan to detailed scientific knowledge, e.g. respiration, storage, alcoholic fermentation, change in rate of uptake over time (time course graph), population growth**;**
P	P 7a	Shows how data would be presented including units (table or graph) including rate**;**
Q*	P. 7a	Uses spelling, punctuation and grammar accurately (QWC)**;**
R	P. 7b	Justifies main aspects of the strategy, e.g. range of concentrations used, time for which mixture left / replicates to ensure reliability**;**
S	P. 7b	Comments on constraints with reference to number of yeast cells in suspension, possible release of glucose from boiled yeast cells, varying uptake over time, other reducing agents present, use of controls**;**
T	P.7b	Uses calibration graph to convert mass of precipitate to, concentration / mass, of glucose**;**
U	P .7b	Explains how data collected might be used to determine rate of uptake, i.e. initial concentration – final concentration per unit time**;**

Point mark up to **14** by placing letters (A to U **excluding M and Q**) in the margin at appropriate points.

Then award **1** mark for each of M and Q (QWC). **Total: 16**

Question		Expected Answers	Marks
1	(a)	results recorded for A to E; informative column headings, % and time with units; table format, concentration in first column, no units in table; time taken for A is longer than C; time taken for A is longer than E; time taken for C is longer than E; repeats and calculates means;	**max 6**
	(b)	axes round right way glucose concentration = x axis, time taken = y axis; axes labeled and scaled; axes make good use of available space (at least half the page); points accurately plotted; points close to line of best fit; **R** if line is extrapolated	**5**
	(c)	identifies trend - with increasing concentration time taken decreases; not linear / AW; uses figures to show <u>not linear</u>; **A** ecf suggests glucose may reduce (potassium manganate / manganate VII to II); refers to anomalies; **A** 'there are no anomalies' AVP; e.g. further explanation	**max 5**
	(d)	states time for U to discolour; uses intercept; figure correctly read from x axis; uses two samples to determine concentration of glucose;	**max 3**
	(e)	lack of insulin; high level of glucose in blood; large amounts in, renal filtrate; not all glucose reabsorbed; in <u>proximal</u> tubule; detail of method of selective reabsorbtion;	**max 5**
	(f)	identifies 0.32 at 0% as anomalous; suggests paper not dried / weighed too early; results are too high (by 0.32 g); 0.39 / 8%, is anomalous; **A** others if justified suggests all precipitate not collected / AW; **R** paper not dried since this would increase mass	**max 4**

(g) *look for these points - accept ora throughout*

1 colour judgement;
2 collect all precipitate;
3 washing out tubes, before filtering / when filtering;
4 stirring before filtering;
5 residue passes through filter paper;
6 filter more than once;
7 filter paper must be dried to constant mass;
8 small differences in mass;
9 different grades of filter paper / AW;
10 ref to accuracy (timing *or* weighing);
11 replicates;
12 AVP; e.g. a different accuracy comment
13 AVP; ref to temperature
not used a colorimeter
ref to hazards

max 7

[Total: max 30]

Question			Expected Answers	Marks
2	(a)		*two of the following* ribosome; rough ER; transfer vesicles; Golgi apparatus; Golgi / secretory, vesicles; **R** vesicles unqualified	**max 2**
	(b)		*if answer correct award all three marks* diameter measured; **A** 6 - 8 cm / 60 - 80 mm / 60 000 - 80 000 μm; (diameter) divided by magnification; 150 – 200 (μm);	**3**
	(c)	**1**	random;	
		2	different sizes;	
		3	different shapes / irregular shapes;	
		4	larger than surrounding acini / AW;	
		5	loosely packed (cells);	
		6	blood vessels;	
		7	paler (cytoplasm);	
		8	dark / prominent, nuclei;	
		9	nuclei positioned centrally in each cell / AW;	
		10	nucleoli;	
		11	AVP;	**max 4**
	(d)	**(i)**	dark marks / spots / AW; smaller than cells in islet; mostly over islet; general comparison between S and islet in Fig. 2.1;	**4**
		(ii)	receptors (on T-lymphocyte); activated by exposure to antigens on infected cells / ref APCs; attach to host cells (displaying viral proteins / antigens); secrete, H_2O_2 / toxins / enzymes; 'punch' holes in surface membrane of infected cell / AW; kill, infected cell / viruses inside cell / pathogens inside cell;	**max 3**
		(iii)	β cells; condition called insulitis; *award two marks for* β cells are source of insulin	**2**
				[Total: max 14]