RECOGNISING ACHIEVEMENT

2803/01 Transport

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)	(i)	root;	1
		(ii)	D;	1
		(iii)	*note that structure must link to function* lack of cell contents / cytoplasm / AW e.g. hollow, for, reduced resistance / ease of flow / AW**;** **R** dead unless well qualified **R** smooth continuous tube / lack of end walls / AW, for, reduced resistance / ease of flow / AW**;** wide / large lumen (**A** *correct diameters – 0.01 – 0.2 mm),* for reduced resistance / flow / AW**;** wide to carry plenty of water / AW**;** lignin to stop (inward)collapse**;** lignin makes it, waterproof / impermeable**;** lignified / thick, walls, to provide support**;** **R** strength lignin allows adhesion**;** pits to allow lateral movement**;** **A** pores for pits (differentiates) as a continuous column to allow cohesion /AW**;**	max 3
	(b)	(i)	-60**;**	1
		(ii)	lower it / make it more negative / AW**;**	1
		(iii)	*water potential now lower outside the plant* water lost (from roots) / less water uptake**;** by osmosis**;** (in correct context) down / reduced, water potential gradient**;** **R** concentration gradient water stress / become flaccid / wilting / drooping / loss of turgor / stomata close**;** **R** limp / soft / shrink / shrivel / dehydrate (possible) plasmolysis / description**;** (may) die / grow less well / reduced growth / less yield / AW**;**	max 3
				[Total: 10]

Question	Expected Answers	Marks
2 (a) (i)	left ventricle;	1
(ii)	left ventricle;	1
(b) (i)	80;; *(60 divided by 0.75)*	2
(ii)	credit one use of pressure figures with units in **X** or **Y**;	
	at X	
	ventricle is, contracting / in systole; ventricle pressure, equals / exceeds, aortic pressure; lowest aortic pressure / pressure in aorta starts to rise; **R** is rising semilunar / aortic / pocket valves, open; **A** blood passing through named valve blood enters aorta (from ventricle); **A** blood leaves ventricle	
	for last two points **A** *'…about to…' statements*	max 3
	at Y	
	ventricle, is relaxing / in diastole; ventricular pressure, equals / falls below, atrial pressure / ora; atrium at highest pressure; atrioventricular / AV / mitral / bicuspid, valve opens; **A** blood passing through named valve **R** tricuspid / cuspid blood, enters ventricle / leaves atrium;	
	for last two points **A** *'…about to…' statements*	max 3
	[Total:	**10]**

Question	Expected Answers	Marks
3	xerophytes / xerophytic**;** **A** phonetic attempts but **R** –cytes etc transpiration / evaporation / evapotranspiration**;** surface (area) to volume**;** wax / cutin / waxy cuticle / cuticle; **A** accept hairs / trichomes **R** cilia day / AW**;** **A** hottest period / AW **R** 'most of the time'	**5**

[Total: 5]

Question	Expected Answers	Marks
4 (a) (i)	phagocyte / polymorph / neutrophil / granulocyte / eosinophil**;** **R** basophil / lymphocyte / leucocyte / WBC / monocyte / agranulocyte / macrophage	**1**
	reason lobed / AW, nucleus; **R** multinucleate, elongated larger than red blood cell**;** granular cytoplasm**;**	**max 1**
(ii)	increase / AW**;**	**1**
(iii)	**1** means more haemoglobin**;** **2** (so) more oxygen can be picked up / transported / AW**;** **R** efficient, unequal / refs to speed **A** *idea of* 'getting same amount, as before' / at lower altitude low **3** pO_2 / oxygen in short supply, at altitude / AW**;** **4** idea that it compensates for the low oxygen saturation of haemoglobin at altitude**;** **5** (thus) muscle / tissue / organs / cells, supplied / delivered with (sufficient) oxygen**;** **R** body unqualified **6** to allow <u>aerobic</u> respiration**;** **7** to provide energy / ATP / ref to metabolism / AW**;** **R** 'more active' **8** to reduce the chance of, oxygen debt / oxygen deficit / lactate accumulation / suffering from altitude sickness / AW**;** **A** symptoms of altitude sickness, but **not** tired / breathless / feel ill	**max 4**

(b) *reject Hb for haemoglobin on the first occasion where it is used*

C1 carried by haemoglobin / forms oxyhaemoglobin;
C2 haem group / Fe, has affinity / AW, for oxygen;
C3 4 O_2 / 8 O, per haemoglobin;
C4 idea that association varies in ease / AW;
C5 (producing) sigmoid / S shaped, (dissociation) curve; **A** from a diagram
C6 low pO_2 in tissues / AW; **R** body unqualified
C7 (leads to) dissociation / unloading / AW, of O_2 from haemoglobin;
C8 idea that steep part of curve corresponds with max release of O_2 / AW;

to max 5

B1 Bohr effect is the effect of carbon dioxide on the curve / AW;
B2 moves (dissociation) curve to the right; **A** from diagram
B3 (so) more oxygen unloaded / reduces Hb affinity for oxygen;
B4 carbon dioxide forms carbonic acid / H_2CO_3;
B5 ref role of carbonic anhydrase;
B6 carbonic acid dissociates / AW, to produce H^+ / lowers pH;
B7 H^+ replaces O_2 on oxyhaemoglobin / AW;
B8 correct ref to haemoglobinic acid; **A** HHb to max 5

max 6

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

[Total : 14]

Question			Expected Answers	Marks
5	(a)	(i)	alveolus; **A** alveoli / alveolar (air) sac / alveolar space **R** air sac / alveolar wall	1
		(ii)	diffusion;	1
		(iii)	**A** = oxygen **B** = carbon dioxide;	1
	(b)		lack of, substance / surfactant / lipoproteins / AW (to lower surface tension); (so) alveoli are collapsed / less surface area / AW; **R** 'fewer working' ***ecf*** *if (a) (i) is air sac / bronchiole etc* less oxygen (in the correct context); **R** no oxygen insufficient, energy / ATP / respiration (for breathing movements); ref lactic acid build up (in intercostals / diaphragm muscles); AVP; e.g. try to breathe more rapidly problem with inflation of alveoli gene for substance not functioning **R** genetic disease / gene missing etc	max 3
				[Total: 6]