RECOGNISING ACHIEVEMENT

Subject: Transport Code: 2803/1

Session: June Year: 2001

Mark Scheme

MAXIMUM MARK	60

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 ( ) = 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 ora = or reverse argument

Question	Expected Answers	Marks
1 (a)	**A** coronary, artery / arteries / vessels; **R** cardiac **R** Veins **B** right atrium / auricle; **A** atria **C** pulmonary artery / arteries; **D** left ventricle; **R** ventricles	4
(b)(i)	oxygenated and deoxygenated blood / blood from two sides, would mix / AW; (so) less oxygen delivered (to the tissues) / AW; when the heart beats / AW; less blood leaves the heart / flow to body reduced / ref slower flow; ref to (possibly) lowering blood pressure; AVP; e.g. refs to double circulation altered Increase in heart rate (to compensate)	2 max
(ii)	ref to one way flow affected / general ref to flow back / wrong direction; less blood reaching destination / less blood leaves heart / AW; (when ventricles contract some) blood back to atria; (when ventricles relax some) blood back to ventricles (from arteries); ventricles not closed off / isolated / separated (from atria / arteries); drop in blood pressure;	2 max

(c) **M** pressure in ventricle exceeds that in aorta / artery;
semi lunar / eq. valves, open;
blood, enters aorta / leaves ventricle / pressure rises (in aorta / ventricle);
ventricle, contracting / systole;
R starting to contract

N pressure in ventricle drops below that in atrium;
atrio-ventricular / AV / mitral / bicuspid /, valves open; **R** tricuspid
blood enters ventricle / leaves atrium / atrial pressure, starts to drop / peaks ; **R** if linked to atrial contraction / systole.
ventricle relaxing / relaxed / in diastole;

4 max

A one ref to figures in either **M or N;**
M 8.1 – 8.5
N 0.8 – 1.2

R any refs to heart sounds

max of 3 for either M or N

(d) (ventricle has) more muscle / thick wall / AW (ora for atrium);
(high pressure) as ventricle pumps to body / a greater distance / AW;
atrium only pumps to ventricle / through the atrio – ventricular valve / AW;
less resistance;
some filling by gravity;

2 max

[Total 14]

Question	Expected Answers	Marks
2 (a)	xylem; **R** xylem <u>vessels</u>	1
(b)	*1 for the feature and 1 for the role in each section - apply AW throughout. Must have feature, no mark for role on its own if feature section blank.* thick (cellulose) / lignified wall / rings; prevents collapse (under tension); **R** support alone. **R** waterproofing <u>adhesion</u> linked to lignin; lack of living contents / hollow / empty; **R** dead as feature, but allow role allows free flow; end walls missing / reduced; allows free flow; develop as a completely water filled system; allows tension to move water up considerable heights; ref to pitting / pores / holes; allows lateral movement ; wide, lumen / cavity; ease of flow / large volume; stacked end on end / elongated; forms a continuous tube;	2+2

R refs to narrow and refs to capillary action

Mark (a) and (b) separately, but:

If (a) = xylem, credit phloem features to max of 2 marks i.e. must get Feature and role linked

If (a) = phloem – credit xylem features and roles to a max of 4 so as not to double penalise for getting the name wrong
- credit phloem features to a max of 2 marks i.e. must get feature and role linked for each mark.

(c)

1 active mechanism;
2 uses, energy / ATP;
3 source;
4 to sink;
5 named source linked to 3;
6 named sink linked to 4;
7 ref two way flow / AW;
8 loading into companion cells;
9 pumping of H ions;
10 co-transporter idea / (protein) carriers / pumps;
11 via plasmodesmata (or description) into sieve tube;
12 mass flow / bulk transport;
13 (hydrostatic) pressure;
14 ref to osmotic inflow (creating pressure gradient) / ora at sink;
15 passage via sieve plates;
16 unloading by diffusion / active;
17 AVP; could credit evidence,
18 AVP; travel to phloem via apoplast or symplast, **8 max**
t cells,
mitochondria or the high metabolic rate of companion cells,
lack of much cytoplasm in sieve tube allowing flow.
Ref to cytoplasmic streaming / chemiosmotic theory

QWC – clear, well organised using specialist terms; 1

[Total 14]

Question	Expected Answers	Marks
3 (a)	reference to size increasing / increase implied / large; need for systems faster than diffusion / diffusion too slow / AW; central regions further from surface / diffusion path too long /AW; ref to separation of different specialised areas; correct ref to surface area to volume; ref to movement of a named requirement; **A** nutrients, waste, gases but **R** food (may) have high metabolic rates / more active;	**3 max**

(b) *one mark per row*

feature	red blood cell	lymphocyte	phagocyte
possesses a nucleus	×	✓	✓
produces antibodies	×	✓	×
possesses ER	×	✓	✓
contains haemoglobin	✓	×	×

4 max

[Total 7]

Question	Expected Answers	Marks
4 (a)	loss of water vapour / evaporation; **R** loss of water from (aerial) surfaces of plants / leaves / mesophyll; diffusion (of water vapour); via stomata / into atmosphere / down a water potential (ψ) gradient;	**2 max**
(b)	Linked to gas exchange; open stomata implied; need to absorb carbon dioxide; wet surfaces (to 'dry' air) / ref to high to low water potential; AVP; e.g. large surface area, cooling effect, upward movement uptake of minerals.	**2 max**
(c)(i)	13 ;	**1**
(ii)	20 *;* **A** 6.6 per hour	**1**
(d)	increase in light; ref stomata (open) / (increased) internal surface area exposed / AW; increase in temperature; more evaporation / more KE / more diffusion / AW; ref warm air holding more water vapour / water potential gradient steeper; ref wind; removal of boundary layer / steeper gradient / AW; decreased humidity / drier; steeper water potential gradient / AW;	**2 + 2**
(e)(i)	xerophyte / xerophytic; **R** xerocyte [but accept phonetic attempts]	**1**

(ii) *one mark for the feature and one mark for how it contributes to success*

thick / waxy /waterproof, cuticle / leaf surface; **R** skin
reduces loss (via epidermis); **A** stops
reflects light;

hairs / trichomes;
trap water vapour / AW;

sunken stomata / AW;
trap water vapour / AW;

stomata shut in day; **R** smaller stomata
little / no, loss via stomata;

hypodermis / thick (walled) epidermis / AW;
reduce loss via (general) surface AW;

small internal air spaces; **2+2**
small surface area / quickly saturated / AW;

small leaves / needles / spines / fewer leaves; **A** no leaves
less area (for loss) / fewer / no stomata;
spines prevent being eaten / AW;

rolled / curled (**R** coiled) leaves;
stomata 'inside' / saturated air trapped / AW;

thick / succulent / fleshy (stem / leaf); **A** succulence. **A** (large) water
holds / stores water; stores;
used in adverse times / AW;

long / deep / extensive roots / shallow;
reach water;

low water potential of roots / AW;
increase uptake AW;

fewer stomata / stomata less dense;
reduced water loss / AW;

dense rosette habit / AW;
out of wind / stomata protected / AV;

tolerant of desiccation / AW;
loose water with out damage / death;

ephemeral life cycle / AW;
complete reproduction when (sufficient) water present; **2 + 2**

look out for other acceptable features::

[Total 15]

Question	Expected Answers	Marks
5 (a)	***correct answer = 2 ticks = 2 marks***	
	if answer incorrect, check the working and award a max of one mark	
	6.1 - 4.9 = 1.2; (the calculation mark if answer wrong]	
	$\frac{100}{4.9} \times 1.2$	
	= 24.48(%) take 24 – 25(%);;	
	R if in excess of 3 d.p. in answer but still allow calculation mark	**2**
	A a calculation mark which ends up subtracting c. 80% from 100%	
(b)	More erythropoetin / EPO; more cells / faster production / reticulocytes; more haemoglobin; (so) more oxygen carried / more oxygen to, body / tissues / cells; ref sustaining aerobic respiration; (so) more energy release; (so) more ATP; less lactate / lactic acid / oxygen deficit delayed /AW;	
	R refs to lung capacity, muscle size, capillary network, myoglobin, cardiac output.	**3 max**
(c)(i)	Bohr (effect / shift);	**1**
(ii)	23;	**1**
(iii)	more respiration; more / higher partial pressue / pressure, carbon dioxide (produced); refs to H ions / carbonic acid / haemoglobinic acid; HbO / Hb releases oxygen / lower affinity for oxygen / correct DPG ref; at a given partial pressure of oxygen; ref to comparative figures; **A** use of 23% figure from above	**3 max**
		[Total 10]