



2803/01 Transport

January 2004

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 ($\frac{1}{2}$) 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.

Mark Scheme Page 3 of 8	Unit Code 2803/01	Session January	Year 2004	Version Final
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Abbreviations, annotations and conventions used in the Mark Scheme	/ = alternative and acceptable answers for the same marking ; = point NOT = separates marking points R = answers which are not worthy of credit () = reject _____ = words which are not essential to gain credit ecf = (underlining) key words which must be used to gain credit AW = error carried forward A = alternative wording ora = accept or reverse argument
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Question	Expected Answers	Marks
1 (a) (i)	alveolus / alveoli; R air sac	1
(ii)	<i>no mark for diffusion alone</i> down a gradient / from high to low (concentrations); oxygen at high(er) concentration in lung / ora; dissolves in / crosses, water film; (aqueous) path short / short diffusion path; reverse gradient for carbon dioxide; ref to random molecular movement involved in diffusion; ref to maintenance of a steep gradient;	3 max
(b)	(generally) larger / correct ref to size; surface area decreased relative to volume / ora; lung / alveoli, gives increased area (for gas exchange); need for more oxygen; due to, high (metabolic) activity / much respiration / more energy need; cannot exchange across outer surface / no alternative surface; high demand for carbon dioxide removal / AW;	2 max

[Total: 6]

Mark Scheme Page 4 of 8	Unit Code 2803/01	Session January	Year 2004	Version Final
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Question	Expected Answers	Marks
2 (a) (i)	<p><i>tissue fluid</i></p> <p>no red blood cells R Hb few / no, (plasma) proteins a few white blood cells R none no platelets always low pressure some fats not in vessels / AW</p> <p>qualified ref to differences in dissolved gas levels;</p> <p>AVP; e.g. qualified ref to, difference in, speed of flow / water potential / ion content functional difference, such as exchange medium v. transport medium;</p>	<p><i>blood</i></p> <p>red blood cells; (plasma) proteins; full range / more, white blood cells; platelets; pressure higher / variable; more fats; contained in vessels;</p> <p>3 max</p>
(ii)	lymphatic / lymph; A lacteal	1
(b)	<p>1 pressure high at R / AW; 2 ref to heart action causing (hydrostatic) pressure; 3 greater than, osmotic effect / water potential effect / AW; A solute potential 4 capillary wall, is leaky / has pores / AW; 5 lets, fluid / water / plasma / liquid, through <u>and</u> dissolved substances / named substance(s); 6 red blood cells / proteins / some WBC's, cannot get out because too large; 7 pressure low(er) at S; 8 ref to osmotic effect / water potential effect; A solute potential 9 due to plasma proteins; 10 return of fluid / AW, at S / AW; 11 valves / pores, at T / lymph vessel / AW; R semi lunar valve 12 allow, fluid / water / liquid, into lymph vessel / out of tissue fluid; 13 allow proteins out of tissue fluid;</p>	6 max
	QWC – clear, well organised using specialist terms	1

Mark Scheme Page 5 of 8	Unit Code 2803/01	Session January	Year 2004	Version Final
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Question 2 continued**Marks**

- (c) fluid / AW collects; **R** if suggests collection in cells
 (tissue) swells / AW; **R** turgid **R** if implies cells swell
 oedema;
 especial danger, in lungs / pulmonary oedema;
 ref to build up of proteins (from tissues);
 AVP e.g. loss of blood volume;

2 max**[Total: 13]**

Question	Expected Answers	Marks
3 (a)	stem;	1
(b)	phloem; R sieve tube, phloem vessel , single cell type	1
(c)	C;	1

Mark Scheme Page 6 of 8	Unit Code 2803/01	Session January	Year 2004	Version Final
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- (d) *feature and role must match for 2 marks
mark for feature may be awarded even if role is incorrect
both marks may be given in right hand column.*

feature

how it helps

*either **D** or **E***

living;

allows active process / AW;
stops escape of metabolites;

hydrogen pump / co-transporter;

(role in) loading / AW;

plasmodesmata / connections between
sieve tube and companion cell;

allow exchange /AW;

D / companion cell

(many) mitochondria
much respiration / metabolically active;

provide, energy / ATP;

nucleus;

controls functioning of both cells;

E / sieve tube

clear of most organelles /
organelles at edge / little cytoplasm / AW;
R empty
(if specific organelles given, need at least 2)

less resistance / ease of transport
/ AW / more space for transport;

long / elongated / AW;

less resistance / ease of
transport / AW;

sieve plate / (sieve) pores;

connects elements / lets
materials through / AW;
A reduces resistance

joined end to end;

continuous / long distance,
transport;

bi-directional flow;

allows sugar to go to sink both up
and downward / AW;

6 max

[Total: 9]

Mark Scheme Page 7 of 8	Unit Code 2803/01	Session January	Year 2004	Version Final
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Question	Expected Answers	Marks
4	<i>mark for transpiration / evaporation is not freestanding, in each case it must be related to the feature in each section</i>	
(a)	transpiration / evaporation / AW, occurs via stomata; R water loss (generally) warm(er) in day; more evaporation / transpiration will occur (in context); ref to steeper water potential gradient; shutting, stops / reduces, this loss; <i>ora for open at night</i>	2 max
(b)	small surface area; less transpiration / evaporation / AW (in context); R water loss R no transpiration fewer stomata / AW; protection against grazing / AW;	2 max
(c)	hairs trap, water vapour / moisture in air; R just moisture prevent wind effect / AW; reduces water potential gradient; less, transpiration / evaporation / AW (in context); R water loss R no transpiration correct ref to condensation of water vapour;	2 max
		[Total: 6]

Mark Scheme Page 8 of 8	Unit Code 2803/01	Session January	Year 2004	Version Final
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Question	Expected Answers	Marks
5 (a) (i)	10 - 12; 1 - 4; <i>if range given, both figures must be within the range</i>	2
(ii)	to the left and sigmoid; start and finish at the same points as the maternal curve; <i>if curve drawn on right can still give start and finish points if reasonably sigmoid</i>	2
(iii)	to allow, fetus / fetal haemoglobin, to get oxygen (at placenta); at, low / same, partial pressure of oxygen; maternal haemoglobin releases oxygen / AW; ref to higher affinity of fetal haemoglobin (allows it to pick oxygen up);	3 max
(b) (i)	ref carbon dioxide (diffusion / AW, from tissues) to <u>red</u> blood cells; carbon dioxide reacts with water; to give carbonic acid; ref to carbonic anhydrase; carbonic acid, dissociates / AW, releasing, H ⁺ / hydrogen ions; <i>direct reaction of carbon dioxide to H⁺ and HCO₃⁻ = 2 marks</i>	3 max
(ii)	H ⁺ / hydrogen ions, combine with / AW, haemoglobin; R 'mops up' unqualified forms <u>haemoglobinic acid</u> / HHb; <i>accept words or symbols throughout</i>	1 max
[Total:		11]