



**2803/01 Transport**

**January 2006**

**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. Examiners will be expected to use their professional judgment in marking answers that contain more than the number required. Advice about specific cases will be given at the standardisation meeting.
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.

<b>Abbreviations, annotations and conventions used in the Mark Scheme</b>	/	= 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
	<u>      </u>	= (underlining) key words which <b>must</b> 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)	6:1 ; ; <i>working. 3.14 divided by 0.52</i>	2
(ii)	ratio for B is smaller / decreased / AW ; <i>ora</i> by two thirds / AW ; volume increases more rapidly than area / AW ; <i>ora</i>  <i>ecf if wrong calculation in (a) (i)</i>	2 max
(b)	<i>answers must relate to developing a transport system</i>  diffusion not adequate / AW / <i>ora</i> ; as not enough area (relative to volume) ; <i>ora</i> distance too great / cells deep in body / AW ; <i>ora</i> , <b>R</b> large unqualified mass flow system needed ; transport / blood (vascular), systems, link, the parts of the body / named parts ; e.g. of substance needing to be transported ; <b>R</b> 'gases' / 'waste' / 'food' ref to activity / high metabolic rate, of mammals ;	3 max
(c)	alveoli lung villi gut small intestine <b>A</b> intestine capillary bed / capillaries / AW skin qualified e.g. elephant's ears cerebral cortex / brain kidney (tubule) liver AVP ;	1

[Total: 8]

Question	Expected Answers	Marks
2 (a)	<p><b>C ;</b>  <b>B ;</b>  <b>G ;</b>  <b>G ;</b>  <b>C / D ; A if both put down</b>  <b>B / C ; A if both put down</b></p>	<b>6</b>
(b)	<p><u>cardiac</u> ;  <u>myogenic</u> ;  sinoatrial node / SAN ; <b>A</b> pacemaker  stop / prevent / AW ; <b>R</b> delay  atrio-ventricular node / AVN ;  bundle of His / Purkyne fibres <i>or</i> tissue ;</p>	<b>6</b>
(c)	<p>contractions / heart, not coordinated / irregular / AW ;  less / no blood, leaves heart / goes to lungs / goes to body ;  cells / (named) tissue(s) / (named) organ(s) / heart muscle, deprived of oxygen ;  ref to pressure ;  AVP ; e.g. ref to lack of P/R/T on ECG</p>	<b>2 max</b>

[Total: 14]

Question	Expected Answers	Marks
3 (a)	G ; I ;	2
(b) (i)	evaporation of water / water vapour lost (from plants) ; <u>diffusion</u> , into atmosphere / out of leaf / down a water potential gradient / via stomata ; A high to low water potential references  <i>stop if / when candidate says transpiration is 'upward movement of water in plant'</i>	2 max
(ii)	linked to gas exchange / AW ; A refs to <b>both</b> oxygen and carbon dioxide unqualified carbon dioxide for photosynthesis ; open stomata ; large area ; <i>can apply to leaf area or pore area</i> moist mesophyll to (relatively) dry air / water potential gradient / AW ; AVP ; e.g. ref to some cuticular transpiration inevitable / AW link open stomata to daytime when it is hottest / AW	3 max
(iii)	hairs trap water vapour ; R water unqualified / water particles A molecules reduces water potential gradient / stops wind removing vapour / more humid air around leaf ; <i>ecf</i> for water so less transpiration / AW ; AVP ; e.g. ref reflective nature of hairs in context ref to need of xerophytes to conserve water in dry habitat	2 max
(c) 1	in the xylem <u>vessels</u> ; A tracheids	
2	down a, water potential / $\Psi$ , gradient ; R 'along' A refs to high to low water potential	
3	most negative, at the leaf / in the atmosphere ; <i>ora must refer to water potential</i>	
4	transpiration sets up a gradient / AW ; <i>any valid gradient</i>	
5	(places) water (in xylem) under, tension / suction / negative pressure / pull / hydrostatic pressure gradient / AW ;	
6	cohesion ;	
7	description of cohesion ;	
8	ref to hydrogen bonding ;	
9	(continuous) water columns / AW ;	
10	<u>mass flow</u> ;	
11	root pressure, in context / described ;	
12	adhesion described / capillarity ;	
	<i>treat refs to osmosis and descriptions of passage through root as neutral</i>	6 max
	<b>QWC – legible text with accurate spelling, punctuation and grammar ;</b>	1
	<b>[Total: 16]</b>	

Question	Expected Answers	Marks
4 (a) (i)	Bohr ;	1
(ii)	(steep part) corresponds to $pO_2$ in, tissues / cells / organs ; cells / tissues / organs, need (much) oxygen ; change / drop, in $pO_2$ gives, large change / drop in saturation (of haemoglobin) / much release of oxygen / AW ; <b>R</b> refs to increase in $pO_2$ data from Fig. 4.1 to support ;	2 max
(iii)	ref to (more), H ions / carbonic acid ; <b>A</b> formula (forms) haemoglobinic acid ; <b>A</b> HHb (haemoglobin), releases more <u>oxygen</u> / has lower affinity for <u>oxygen</u> / has lower saturation of <u>oxygen</u> ; at a certain partial pressure of oxygen ; data from Fig. 4.1 to support ; <i>must be comparative</i> AVP ; e.g. ref to effect of $CO_2$ on, brain / heart, related to oxygen delivery	2 max
(b)	more heat (in exercising muscle) / increase in body temperature / AW ; (as) respiration releases some energy as heat / AW ; ATP to ADP releases some energy as heat / AW ; (muscle) temperature rises, above normal body temperature / to $45^\circ C$ ; (so) more oxygen release (from haemoglobin / RBCs) / AW ;	2 max
	[Total:	7]