

# Transport in Animals

## Mark Scheme 1

<b>Level</b>	IGCSE
<b>Subject</b>	Biology
<b>Exam Board</b>	CIE
<b>Topic</b>	Transport in Animals
<b>Paper Type</b>	(Extended) Theory Paper
<b>Booklet</b>	Mark Scheme 1

**Time Allowed:** 70 minutes

**Score:** /58

**Percentage:** /100

Question				Mark	Guidance
1 (a)	function	letter on Fig. 1.1	name	[6]	<p><b>A</b> 'AV valve'  <b>R</b> right atrioventricular valve</p>
structure that separates oxygenated and deoxygenated blood	<b>F</b>	septum ;			
structure that prevents backflow of blood from ventricle to atrium	<b>D</b>	bicuspid / mitral / atrioventricular, <u>valve</u> ;			
blood vessel that carries oxygenated blood	<b>A</b>	aorta			
blood vessel that carries deoxygenated blood	<b>B</b>	pulmonary artery			
structure that prevents backflow of blood from pulmonary artery to right ventricle	<b>H</b>	vena cava ;			
structure that prevents backflow of blood from pulmonary artery to right ventricle	<b>K</b>	semilunar <u>valve</u> ;			
chamber of the heart that contains oxygenated blood	<b>C</b> <b>E</b>	left atrium left ventricle ;			
chamber of the heart that pumps deoxygenated blood	<b>J</b> <b>G</b>	right atrium right ventricle ;			
(b) (i)	<p>pulse rate increases and remains constant ;                      immediate / sudden / steep / rapid / AW, increase in pulse rate ;                      increases from 44–48 <u>bpm</u> to 164–170 <u>bpm</u> ;                      maximum / 164–170 <u>bpm</u>, at, 4 <u>min</u>(utes) / 2 <u>min</u>(utes) after race starts ;</p>			[max 3]	<p><i>units must be used</i>  <b>R</b> exponential                      increases by 120–126 bpm / by 3.5 to 4 times                      or approx. 4</p>

Question		Mark	Guidance
(ii)	<p>adrenaline stimulates increase in, heart/pulse, rate ;                      increase in blood, carbon dioxide (concentration)/acidity, detected ;</p> <p>nerves stimulate heart to beat faster ;</p> <p>ref to muscle contraction/AW ;                      muscles require more energy/muscles are doing more work ;                      (rate of aerobic) respiration increases ;                      increase demand for, oxygen/glucose ;                      ref to removal of, carbon dioxide/lactic acid/heat ;                      more, blood/carbon dioxide, to <u>lungs</u> (per unit time) ;                      more, blood/oxygen/glucose, to <u>muscles</u> ;</p> <p>AVP ; e.g. ref to ATP/vasodilation in muscles</p>	[max 4]	<p><b>A</b> decrease in pH</p> <p>'more' / 'increases', is only needed once</p> <p><b>R</b> 'produce energy' once only</p>
		<b>[Total: 13]</b>	

Question				Marks	Guidance Notes																		
2 (a)	septum ;			[1]																			
(b) (i)	blood flows through heart twice, for one (complete) circuit / to get back to the same point ; one loop to lungs, and one loop to rest of the body ;			[max 1]																			
(ii)	high(er), blood pressure / flow rate (than single circulation) ; allows different blood pressure in each loop ; prevent mixing of oxygenated and deoxygenated blood ; allows animals to have high metabolic rates ; allows animals to be, large / tall ;			[max 1]	<b>A</b> more efficient / faster, delivery / removal, of a named blood component e.g. oxygen <b>I</b> maintain blood pressure																		
(c)	<table border="1" data-bbox="320 715 1173 1267"> <thead> <tr> <th data-bbox="320 715 645 751">description</th> <th data-bbox="645 715 911 751">name of structure</th> <th data-bbox="911 715 1173 751">letter on Fig 1.1</th> </tr> </thead> <tbody> <tr> <td data-bbox="320 751 645 855">heart chamber with the thickest muscular wall</td> <td data-bbox="645 751 911 855">left ventricle</td> <td data-bbox="911 751 1173 855"><b>C ;</b></td> </tr> <tr> <td data-bbox="320 855 645 959">the blood vessel carrying oxygenated blood to the heart</td> <td data-bbox="645 855 911 959">pulmonary vein</td> <td data-bbox="911 855 1173 959"><b>K ;</b></td> </tr> <tr> <td data-bbox="320 959 645 1094">the blood vessel that carries oxygenated blood away from the heart</td> <td data-bbox="645 959 911 1094">aorta</td> <td data-bbox="911 959 1173 1094"><b>P ;</b></td> </tr> <tr> <td data-bbox="320 1094 645 1198">a blood vessel that carries blood away from the kidneys</td> <td data-bbox="645 1094 911 1198">renal vein</td> <td data-bbox="911 1094 1173 1198"><b>M ;</b></td> </tr> <tr> <td data-bbox="320 1198 645 1267">the blood vessel with the largest lumen</td> <td data-bbox="645 1198 911 1267">vena cava</td> <td data-bbox="911 1198 1173 1267"><b>N</b></td> </tr> </tbody> </table>			description	name of structure	letter on Fig 1.1	heart chamber with the thickest muscular wall	left ventricle	<b>C ;</b>	the blood vessel carrying oxygenated blood to the heart	pulmonary vein	<b>K ;</b>	the blood vessel that carries oxygenated blood away from the heart	aorta	<b>P ;</b>	a blood vessel that carries blood away from the kidneys	renal vein	<b>M ;</b>	the blood vessel with the largest lumen	vena cava	<b>N</b>	[4]	one mark for each correct row
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2 (d)	(blood) enters heart at <u>right</u> atrium/ <b>A</b> (from the vena cava/ <b>N</b> ) ; then atrium contracts ; correct ref to atrioventricular valve ; then to <u>right</u> ventricle/ <b>D</b> ; then ventricle contracts ; correct ref to semi-lunar valves ; then pulmonary artery/ <b>J</b> , <u>to lungs</u> / <b>O</b> ;	[max 4]	<b>R</b> contradictions between letters and structures <b>I</b> valves unqualified
(e) (i)	(more) exercise/ <b>AW</b> ; stop/less, smoking ; reduced stress ;	[max 1]	<b>I</b> ref to diet
(ii)	stent ; small mesh tube inserted in artery ; opens / supports, (narrow / weak) artery ; (balloon) angioplasty / dilatation ; (tube / catheter with) balloon inserted into artery ; inflate balloon to widen artery ; by-pass ; (another / shunt) blood vessel joined / grafted / replace, artery ;	[max 2]	max 1 if no named procedure.  <b>I</b> open heart surgery / heart transplants
		<b>[Total: 14]</b>	

<p>3 (a)</p>	<p><i>idea that</i> blood travels through the heart twice during one complete circuit (of the body) ; <i>or</i> pulmonary circulation / to the lungs and systemic circulation / described ;</p>	<p>[1]</p>	<p>A 'one cycle / one full circulation'</p>																	
<p>(b)</p>	<table border="1"> <thead> <tr> <th rowspan="2">organ</th> <th colspan="2">blood vessel</th> </tr> <tr> <th>delivers blood</th> <th>takes blood away</th> </tr> </thead> <tbody> <tr> <td>heart</td> <td>1 vena cava / coronary artery ; 2 pulmonary <b>vein</b></td> <td>1 <b>aorta</b> 2 pulmonary <b>artery</b> ;</td> </tr> <tr> <td>lungs</td> <td><b>pulmonary artery</b></td> <td>pulmonary vein ;</td> </tr> <tr> <td>liver</td> <td>1 <b>hepatic artery</b> 2 hepatic portal vein ;</td> <td><b>hepatic vein</b></td> </tr> <tr> <td>kidney</td> <td>renal <b>artery</b></td> <td>renal <b>vein</b></td> </tr> </tbody> </table>	organ	blood vessel		delivers blood	takes blood away	heart	1 vena cava / coronary artery ; 2 pulmonary <b>vein</b>	1 <b>aorta</b> 2 pulmonary <b>artery</b> ;	lungs	<b>pulmonary artery</b>	pulmonary vein ;	liver	1 <b>hepatic artery</b> 2 hepatic portal vein ;	<b>hepatic vein</b>	kidney	renal <b>artery</b>	renal <b>vein</b>	<p>[5]</p>	
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<p>(c) (i)</p>	<p>high pressure would, burst/damage, capillaries / AW ; capillaries / capillary walls, are, thin / fragile / weak / delicate / narrow ; wall / lining, (of capillary) is one <u>cell</u> thick ;</p>	<p>[max 2]</p>	<p>A 'capillaries cannot withstand pressure'  R thin / thick, 'cell wall'</p>																	



4 (a) (i)	urea / hydrogencarbonate (ions) ;	[1]	Mark first response on each line <b>A</b> lactic acid
	(ii) fibrinogen / insulin ;	[1]	Mark first response on each line
(b) (i)	<u>anaerobic respiration</u> ; <u>oxygen debt</u> / vigorous exercise with insufficient oxygen supply ;	[max 1]	
	(ii) (blood) clotting ; converted into fibrin to form a mesh ;	[1]	
(iii)	<i>any two from</i> dilation of pupils ; reduced blood flow through, digestive system / skin ; <u>increase</u> in, blood pressure or heart rate / pulse / stroke volume ; increase in breathing rate ; increase in oxygen concentration in the blood ; increase in glycogen converted to glucose ; increase in glucose / sugar concentration in the blood ; increase in respiration rate ; increase in blood flow through the muscles ; increase in awareness / anxiety / alertness ; broncho-dilation / widen airways ;	max [2]	

<p>4 (c)</p>	<p>1 (liver cells respond) to insulin if blood glucose is high ;                  2 (enzymes/liver cells) conversion of glucose to <u>glycogen</u> ;                  3 glycogen is stored (in the liver) ;                  4 (liver cells respond) to <u>glucagon</u> if blood glucose is low ;                  5 (enzymes) break down <u>glycogen</u> to glucose ;                  6 ref to, homeostasis / negative feedback ;</p>	<p>max [3]</p>	<p><b>Reject</b> reference of insulin / glucagon production in liver</p>
<p>(d) (i)</p>	<p><math>\frac{3500 - 1300}{1300} \times 100</math>                   169 (%) ;;</p>	<p>[2]</p>	
<p>(ii)</p>	<p>1 <u>nonspecific</u> immune response ;                  2 engulf / ingest / AW, bacteria / pathogens / dead cells ; <b>A</b> phagocytosis                  3 into vacuole ;                  4 use enzymes ;                  5 to digest bacteria / pathogens ;                  6 identify antigen / pathogens, <u>for lymphocytes</u> ;</p>	<p>max [3]</p>	<p><b>Reject</b> destroy disease</p>
<p>(iii)</p>	<p>1 recognition tissue is foreign / AW ;                  2 ref to antigens ;                  3 lymphocytes release antibodies ;                  4 phagocytes / lymphocytes, cause tissue destruction ;</p>	<p>max [3]</p>	
		<p><b>[Total: 17]</b></p>	