

WJEC (Wales) Biology GCSE
Topic 1.4 Circulatory System
in Humans
Questions by Topic - Mark
Scheme

1.

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)	Pulmonary vein	1			1		
		(ii)	Stop backflow (of blood)/ ensure blood only flows in one direction/ stops blood travelling backwards/ owtte Reject prevent backflow of blood into the ventricle	1			1		
	(b)	(i)	I	16.0 – 3.3 = 12.7 (kPa)		1		1	1
			II	<ul style="list-style-type: none"> aorta takes blood to the body + pulmonary artery takes blood to lungs / aorta carries blood {further/ a greater distance}/ {thicker (muscular) wall/greater pressure} in left ventricle Reject pumping blood with reference to artery		1		1	
		(ii)	I	{Blood pressure/ kPa} (in the capillaries) is {low/ lowest/ very low} Reject lower			1	1	
			II	Thin (walls)/ one cell thick	1			1	
	Question 1 total				3	2	1	6	1

2.

Question			Marking details	Marks available						
				AO1	AO2	AO3	Total	Maths	Prac	
2	(a)		blood passes through the heart twice (1) during each full circuit/ cycle (1) Linked to 1 st mark point OR blood must pass through pulmonary (1) and systemic system (1)	2			2			
	(b)	(i)	Bicuspid (valve)/left atrio-ventricular valve/ mitral/	1			1		1	
	(c)		Any three (x1) from: Valve opens when heart/ ventricle contracts (1) Valve closes when heart/ ventricle relaxes (1) Prevents backflow (of blood) (1) (from aorta) to (left) ventricle (1)		3		3			
	(d)		left ventricle pumps blood to the body(1) right ventricle pumps blood to the lungs/ not as far}(1)	2			2			
	(e)		heart is a muscle (1) (exercise) increases heart size/ heart gets stronger with (exercise)/ (exercise) builds up heart size (1) Heart becomes more muscular = 2 marks			2	2			
	(f)	(i)	CO 5 minutes = 70 x 70 = 4900 + CO 20 minutes = 110 x 70 = 7700 (1) (1 mark for calculating both cardiac outputs)		1		1	1		
		(ii)	57/57.1/57.142857 = 2 marks If incorrect award 1 mark for 2800/4900 x 100 Incorrect rounding of above answer ECF from (i)		2		2	2		
	Question 2 total				5	6	2	13	3	1

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)		X tricuspid <u>valve</u> / right {atrio-ventricular/ AV} <u>valve</u> (1) Y pulmonary vein (1)	2			2		
	(b)	(i)	Atria: Accept range from 3.2 to 3.3 Ventricles: 16.0		1		1	1	
		(ii)	(Blood pressure is) <u>lower</u> in right ventricle/ <u>higher</u> in left ventricle (1) (Answer must be comparative ie lower not low; higher not high.) Thicker wall in left ventricle/ thinner wall in right / left ventricle more muscular(1) Because left ventricle pumps blood {around body/ further}/ right ventricle pumps blood {(only) to the lungs/ shorter distance} (1)	3			3		
			Question 3 total	5	1	0	6	1	0

4.	Question	Marking details	Marks Available
	(a)	(i) Coronary <u>artery</u> ;	1
		(ii) Clotting; {Stopping/ blocking/ reducing} blood flow to heart muscle;	2
		(iii) Capillaries;	1
	(b)	(i) 14 (au);	1
		(ii) Glucose/ oxygen;	1
		Question 4 total	[6]

5.

Marking details

Marks
Available

Indicative content

6

The muscle of the right ventricle contracts and pumps blood through the valves of the pulmonary artery into the lungs. Blood then leaves the lungs, passing into the pulmonary vein, re-entering the heart in the left atrium.

5-6 marks

The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.

3-4 marks

The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.

1-2 marks

The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.

0 marks

The candidate does not make any attempt or give a relevant answer worthy of credit

6.

Question	Marking details	Marks Available
6 (a)	Heart disease/circulatory disease/stroke/clogged arteries/mobility issues/diabetes; NOT heart attack/failure	1
(b)	{Burns/ uses up} {fat/ <u>stored</u> energy}; NOT burns {calories/energy}/ lose weight	1
	Question 6 Total	[2]

7.	Marking details		Marks available																	
			AO1	AO2	AO3	Total	Maths	Prac												
Indicative content <table border="1"> <thead> <tr> <th>Arteries</th> <th>Veins</th> </tr> </thead> <tbody> <tr> <td>• thick {muscle/ walls }</td> <td>• thin {muscle/walls}</td> </tr> <tr> <td>• narrow lumen</td> <td>• large lumen</td> </tr> <tr> <td>• blood away from the heart</td> <td>• take blood to heart</td> </tr> <tr> <td>• under high pressure</td> <td>• under low pressure</td> </tr> <tr> <td></td> <td>• have valves to prevent backflow.</td> </tr> </tbody> </table> <p>5-6 marks Detailed description of artery and vein (including reference to valves for 6 marks) <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i></p> <p>3-4 marks Some detail of artery and some detail of veins <i>There is a line of reasoning, which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i></p> <p>1-2 marks Some detail of artery or some detail of veins <i>There is a basic line of reasoning, which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i></p> <p>0 marks: No attempt made or no response worthy of credit.</p>			Arteries	Veins	• thick {muscle/ walls }	• thin {muscle/walls}	• narrow lumen	• large lumen	• blood away from the heart	• take blood to heart	• under high pressure	• under low pressure		• have valves to prevent backflow.	6					
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	• have valves to prevent backflow.																			
Question total			6	0	0	6	0	0												

8.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a)	2	A pulmonary artery; B vena cava;		anterior/ posterior/ inferior/superior	
	(b)	4	<ul style="list-style-type: none"> • blood flows between left and right ventricles; • {both sides of heart/both ventricles} contain a <u>mixture of oxygenated and deoxygenated</u> blood (OWTTE)/left ventricle will contain partially oxygenated blood; • <u>blood {sent to body/ in the aorta}</u> will {be <u>partially oxygenated/</u> have less oxygen than it should have}; • resulting in not enough oxygen supplied to <u>cells/tissues/organs/muscles</u>; 			Blood leaving left ventricle/ going to the body is deoxygenated
Total Mark		6				

9.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a) i	1	vena cava;	caval vein		
	ii	1	two correct arrows drawn; aorta arrow points to the body X arrow points to the heart;			
	iii	2	lungs; systemic;			systematic
	(b) i	1	capillary;	capillaries		
	ii	2	walls are thin; so allow for <u>diffusion</u> ;	walls one cell thick		
Total Mark		7				

2.

Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept									
(a)	(i)	1 1	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Gametes</td> <td>D</td> <td>D</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>Dd</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>Dd</td> </tr> </table> <p>F1</p> <p>Gametes correct 1 mark Mechanics of cross correct 1 mark If use different letters cannot award gametes mark but can award mechanics mark</p>	Gametes	D	D	d	Dd	Dd	d	Dd	Dd			
Gametes	D	D													
d	Dd	Dd													
d	Dd	Dd													
(a)	(ii)	1 1	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Gametes</td> <td>D</td> <td>d</td> </tr> <tr> <td>D</td> <td>DD</td> <td>Dd</td> </tr> <tr> <td>d</td> <td>Dd</td> <td>dd</td> </tr> </table> <p>F2</p> <p>Gametes correct 1 mark Must use any two of their F₁ offspring from (i) Mechanics of cross correct (must generate a 3:1 ratio) [If incorrect letters are used in (a)(i) allow ECF for (a)(ii) to access both marks] If different letters used in second punnett square to first = 0 marks</p>	Gametes	D	d	D	DD	Dd	d	Dd	dd			
Gametes	D	d													
D	DD	Dd													
d	Dd	dd													
(b)		1	repeatability/increased confidence in results	Identify anomalies		Reliability/accuracy/validity/reproducibility									
(c)		1	So that the {work/results/experiments} can be {verified/confirmed}/ to see if they get the {same/ similar/different} results/ reproducibility;		To see if Mendels work was right/ correct/ true	Repeatability/validity/accuracy/reliability									
Total Mark		6													

10.

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
(a)			484/ 485 = 2 marks 484.5 = 1 mark If answer incorrect award 1 mark for correct working eg $1615 \times \frac{30}{100}$ or 1615×0.3 or $1615 \times 0.1 \times 3$		2		2	2	
(b)			increased confidence/ to be able to draw a valid conclusion/ increase validity NOT reliable/ fair testing/ accuracy			1	1		
(c)	(i)		2		1		1		
	(ii)		9		1		1	1	
	(iii)		capillaries	1			1		
	(iv)		<u>More oxygen is supplied</u> (1) More lactic acid is produced <u>More glucose is supplied</u> (1) More anaerobic respiration takes place <u>More aerobic respiration takes place</u> (1) More than 3 underlined – 1 for each additional underline Award 0 if all five responses underlined	3			3		
(d)			{energy/ glucose/ sugar/ calories/ kJ} are {in excess/ not used}(1) {Stored/ builds up} as fat (1)	2			2		
			Question total	6	4	1	11	3	0

11.

Question	Marking details	Marks Available
11 (a)	(i) Cell drawn , irregular outline with inclusion; Nucleus and cell membrane correctly labelled;	2
	(ii) (For red blood cell) carries <u>oxygen</u> ; (For platelets) clotting;	2
(b)	Any two from urea; carbon dioxide; soluble foods/ glucose/ amino acids/ sugar; protein; salts; hormones; antibodies; <i>(reject- references to heat distribution)</i> <i>NOT waste/ drugs/ named drugs/nutrients</i>	2
(c)	(i) I A; II D;	2
	(ii) <u>Harvey</u> ;	1
	Question 11 total	[9]

12.

Question

Marking details

Marks
Available

(a) (i)

name of cell	function
given	carry oxygen;
lymphocyte; NOT white blood cell	given
given	<ul style="list-style-type: none">• Ingest/ take in/ digest/ engulf; NOT eat/ destroy• bacteria/microorganisms/ pathogen/ microbes; NOT disease
given	(blood) clotting;

- (ii) no nucleus/thin in centre/ (bi)concave; NOT doughnut 2
more light passes through (centre);
accept less stain
NOT less haemoglobin in the middle

Question 12 Total

[6]

13.

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
(a)	(i)		Drawing with Cell with inclusion(to represent nucleus) (1)Name – white blood cell/ phagocyte/ lymphocyte(1) Function – {defence/ protection} against {disease/ pathogen/ infection/ bacteria/ viruses}/ destroy bacteria/ provide immunity/ produce antibodies/ produce antitoxins/ engulf bacteria (1) NOT fight	2	1		3		
	(ii)		Plasma (1) Any two (x1) from: carbon dioxide (1) Urea (1) soluble food/ soluble nutrients/ glucose/ proteins/ named soluble nutrient (1) hormones (1) antibodies (1)	3			3		
	(iii)		9 (cm ³) = 2 marks must use units if answer not written on answer line If incorrect award 1 mark for: 20 x 45/100 or 20 x 0.45		2		2	2	
(b)			Platelets present in sample (1) Cause (blood) clotting/ coagulation (1)		2		2		2
			Question total	5	5	0	10	2	2