

1 (a)				4	one mark per row A nitrogenous waste
	substance	direction of movement	reason		
	amino acids	to fetus/from mother	make proteins/translation/ growth / make cells/AW;		
	carbon dioxide	from fetus	waste gas from respiration		
	glucose	fetus/from mother	(release) energy/respiration/ stored as glycogen;		
	oxygen	fetus/from mother	(gas for) respiration;		
	urea	f fetus/to mother	excretion/metabolic waste;		

Question		Marks	Additional Guidance
1 (b)	iron: for red blood cells/haemoglobin/to transport oxygen/prevent anemia; vitamin D: absorption of calcium; growth/formation/strengthening, of bones/teeth; preventing rickets;	max 2	max 1 from vitamin D
(c) (i)	lymphocytes/white blood cells/leucocytes;	1	white cells unqualified
(ii)	provides (passive) <u>immunity</u> ; protects against, infection/illness/disease/pathogen(s)/AW; reference to disease(s) mother has had; immune system of babies not yet developed; any one function of antibodies;	max 3	functions of antibodies: <ul style="list-style-type: none"> • stop pathogens spreading (in the body) • stop pathogens entering cells • stop pathogens dividing/reproducing/increasing in number • cause pathogens to, clump/agglutinate • immobilise bacteria • kill bacteria • make it easier for phagocytes to ingest pathogens • neutralise toxin(s)/make toxins harmless
(iii)	bonding/AW, with mother; it's free/‘cheap’; sterile/no risk of infection; body temperature; no preparation/easily available; provides, best/complete/most suitable/balanced/AW, nutrients/food; composition/quantity, of breast milk changes to match development; easier to digest/reduced risk of colic; reduce risk of allergies; contraceptive effect; AVP;	max 4	AVPs: no additives protects against, <u>breast</u> cancer/ <u>ovarian</u> cancer children less likely to develop diabetes helps the mother’s body to return to ‘normal’, e.g. weight loss/restores uterus
		[Total: 14]	

Question		Marks	Additional Guidance
2 (a)	<p>1 thick, wall; 2 withstands (blood) pressure; 3 muscular tissue; 4 vasoconstriction / vasodilation; 5 elastic (tissue); 6 recoils to maintain (blood) pressure / smoothes out blood flow; 7 small lumen; 8 maintains (blood) pressure; 9 fibrous tissue; 10 maintains shape / prevents bursting;</p>	<p>max 4</p>	<p>max 3 for structures (MP1, 3, 5, 7 and 9) function marks (MP2, 4, 6, 8, 10) must relate to a structure</p> <p>A tunica media and tunica externa for wall</p> <p>I reference to lining / endothelium</p> <p>R increase</p>
(b) (i)	<p><u>13 kPa</u>;</p>	<p>1</p>	
(ii)	<p>1 blood pressure decreases as cross-sectional area increases (to capillaries); 2 continues to decrease / remains constant, as cross-sectional area decreases (in the veins); 3 speed of blood decreases as cross-sectional area increases (in the capillaries); 4 increases as cross-sectional area decreases in, <u>veins</u> / <u>vena cava</u>;</p>	<p>max 3</p>	

Question		Marks	Additional Guidance
2 (c)	(oxygen) <u>diffuses</u> (from blood to tissue fluid); across the, wall/membranes (of the capillary); down a concentration gradient/from high concentration to low concentration; pressure forces out, water/ (named) solutes; (pressure) filtration;	max 3	
(d)	muscle(s) in arteriole contract; arterioles constrict/ vasoconstriction occurs; less blood flows to, skin/capillaries; decrease in loss of heat (from the blood) by, radiation/ conduction / convection; AVP;	max 3	I capillaries, vasoconstrict/ constrict A 'stops blood flow to skin' R movement of arterioles/ capillaries away from the surface of skin/ AW A prevent heat loss by, radiation/ conduction/ convection e.g. ref to shunt vessel(s)/ blood taking a deeper route
		[Total: 14]	

3 (a) (i)	red blood cell ;	[1]	
(ii)	plasma ;	[1]	
(iii)	capillary ;	[1]	
(b)	oxygen ; carbon dioxide ; water ; glucose ; sodium ions ; amino acids ; urea, (named) hormone(s) ; AVP ;;; e.g. lactic acid	max [3]	
(c) (i)	1150 (%)	[1]	look in the space for working if answer is not in table
(ii)	increase in energy demand in muscle ; for contraction (of muscle) ; increase in respiration in muscle ; <i>increase in blood flow supplies</i> more oxygen ; for aerobic respiration ; more glucose ; more, fat / fatty acids ; <i>increase in blood flow removes</i> carbon dioxide ; lactate / lactic acid ; from anaerobic respiration ;	max [5]	A lot of energy A lot of oxygen A conversion of lactic acid

3	<p>(iii) <i>max 3 for increase blood flow</i> vasodilation ; muscle in wall relaxes ; arterioles / arteries ; widen / dilate ; more blood flows to capillaries ;</p> <p><i>max 3 for decrease blood flow</i> vasoconstriction ; muscle in wall contracts ; arterioles / arteries ; narrow / constrict ; less blood flows to capillaries ;</p>	max [4]	<p>R 'blood vessels' once only</p> <p>allow ecf for 'blood vessels'</p>
[Total:16]			

Question	Answers	Marks	Additional Guidance
4 (a)	J – aorta ; K – pulmonary vein ; L – vena cava ; M – pulmonary artery ;	[4]	
(b) (i) 1 2 3 4 5	1 J – blood goes to the whole body / greater distance ; 2 M – blood goes to the lungs / shorter distance ; 3 J – blood is pumped by, more muscular, ventricle ; 4 M – blood is pumped by, less muscular, ventricle ; 5 greater resistance to blood flow in circulation to the body / ora ;	[max 2]	
(ii)	(blood in K and L) travelled through the capillaries ; larger / wider lumen ;	[2]	
(c) 1 2 3 4 5 6 7	<i>Valve N</i> opens when, atrium contracts ; closes when ventricle contracts ; stops back flow from ventricle to atrium ; <i>Valve O</i> opens when ventricle contracts ; closes when ventricle relaxes ; stops back flow from, J , to ventricle ; description of way in which valve ‘flaps’ or ‘pockets’ prevent backflow ;	[max 4]	
(d)	veins ;	[1]	