

Question			Answer	Marks	Guidance
1	(a)	(	liver ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
1	(a)	(i)	<p>1 (high intake of protein) leads to a large amount of amino acids ;</p> <p>2 (excess) amino acids cannot be stored ;</p> <p>3 <u>amino acids</u> deaminated or <u>amine</u> group / NH_2 , removed / converted to ammonia ;</p> <p>4 (large amount of) ammonia enters ornithine cycle (for conversion to urea) ;</p> <p>5 increased , <u>blood</u> / <u>plasma</u> , concentration of urea (leads to more urea in , filtrate / urine) ;</p> <p>6 high concentration of , amino acids / urea , in blood increases water absorption from urine ;</p>	3 max	<p>1 Must emphasise the idea of <i>leading to</i> , more / too many / lots of , amino acids</p> <p>3 DO NOT CREDIT deamination of protein IGNORE amino group</p> <p>4 ACCEPT ref to urea cycle instead of ornithine cycle correct diagram of the cycle</p>
1	(b)		diabetes (mellitus) ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT kidney disease / nephritis / kidney failure / pregnancy IGNORE type 1 or 2</p>

Question			Answer	Marks	Guidance
1	(c)	(	(human) chorionic gonadotrop(h)in / hCG;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT phonetic spelling (a vowel between the ch and r) DO NOT CREDIT chronic ACCEPT combinations of lower and upper case letters DO NOT CREDIT letters in the incorrect order (eg hGC)</p>

Question			Answer	Marks	Guidance
1	(c)	(i)	<p>1 LH binds to , anti-LH / its complementary (free / mobile / with dye) , antibodies ;</p> <p>2 this (LH-anti-LH) antibody complex moves along (test stick together with urine) ;</p> <p>3 this (LH-anti-LH) antibody complex binds (only) with , immobilised antibodies specific to them / lower band of immobilised antibodies ;</p> <p>4 (only) control antibodies bind with , immobilised antibodies specific to them / upper band of immobilised antibodies ;</p> <p>5 <i>idea that</i> binding of antibody (with dye to its immobilised anti-antibody) produces coloured line ;</p> <p>6 2 lines indicates , positive result / presence of LH or darker line = more LH or 'control' / top , line indicates the strip is working (correctly) or 'control' / top , line alone indicates no LH ;</p>	<p>3 max</p>	<p>ACCEPT joins / attaches , for 'bind' throughout IGNORE 'reacts with' DO NOT CREDIT active site / enzyme references instead of antibodies If a candidate's <u>whole</u> answer is in terms of pregnancy testing, DO NOT CREDIT mps 1, 2 & 3</p> <p>1 ACCEPT hormone for LH 'specific' for 'complementary'</p> <p>2 IGNORE urine moving along the stick on its own</p> <p>5 Award in context of either LH or control line</p> <p>6 DO NOT CREDIT this alternative in context of positive pregnancy result</p>
			Total	9	

Question		Answer	Marks	Guidance
2	(a)	<p>E (proximal / first / distal / second) convoluted tubule / PCT / DCT ;</p> <p>F (lumen of) Bowman's / renal , capsule ;</p>	2	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>E ACCEPT collecting duct DO NOT CREDIT loop of Henle (as not in cortex) DO NOT CREDIT 'cells of ...' / tube IGNORE 'nephron tubule' / nephron</p>

Question			Answer	Marks	Guidance
2	(b)	(	<p>1 afferent arteriole , has diameter greater than that of / is wider than , efferent arteriole ;</p> <p>2 build up of / high , hydrostatic / blood , pressure ;</p> <p>3 endothelium / wall , of , <u>capillary</u> / <u>glomerulus</u> , has , (small) pores / fenestrations ;</p> <p>4 (these allow) ultrafiltration ;</p>	2 max	<p>1 IGNORE different / larger / smaller, without suitable qualification</p> <p>IGNORE thicker / thinner</p> <p>3 ACCEPT holes / gaps instead of pores</p> <p>IGNORE epithelium</p> <p>DO NOT CREDIT cell wall</p> <p>DO NOT CREDIT podocytes / basement membrane if linked to capillary structure</p> <p>IGNORE podocytes / basement membrane if linked to the Bowmans capsule</p>
			<p>QWC – technical terms used appropriately and spelt correctly ;</p>		<p>1</p> <p>Use of three terms from: afferent, efferent, arteriole, hydrostatic, endothelium, fenestrations, ultrafiltration (or derived term)</p> <p>Please insert a QWC symbol next to the pencil icon, followed by a tick (✓) if QWC has been awarded or a cross (×) if QWC has not been awarded</p> <p>You should use the green dot to identify the QWC terms that you are crediting.</p>
2	(b)	(i)	podocyte(s) ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks

Question			Answer	Marks	Guidance
2	(c)	(	<p><i>if kidney cannot filter so substances remain in blood</i></p> <p>1 increase / high , in urea ; 2 increase / high , in , (named) ions / (named) salts ; 3 increase / high , in water ; 4 AVP ;</p> <p>OR</p> <p><i>if problems cause substances to be lost indiscriminately</i></p> <p>5 decrease / low , in , protein / blood cells ; 6 decrease / low , in , (named) ions / (named) salts ; 7 decrease / low , in , glucose / amino acids / vitamins ; 8 decrease / low , in water ;</p>	2 max	<p>Candidate's answer can only come from one section of the mark scheme if type of failure not specified. However, all marks are available if clearly linked to the type of failure.</p> <p>3 IGNORE ref to water potential 4 e.g. • high(er) levels of , creatinine / (named) hormone • high(er) levels of , metabolite / toxin , breakdown</p> <p>for mps 5-8 DO NOT CREDIT 'no' / 'none' / 'zero'</p> <p>7 IGNORE sugar 8 IGNORE ref to water potential</p> <p>Note 'increase in urea' = 1 (mp 1) 'increase in salt and water' = 2 (mps 2 & 3) 'low in protein but high in urea' = 1 (mp 5, but not mp 1 as different type of failure and has not been specified)</p>

Question			Answer	Marks	Guidance
2	(c)	(i)	<p><i>if not closely matched</i></p> <p>1 donated kidney will be recognised as , foreign / non-self ;</p> <p>2 antigens / glycoproteins , (on donated kidney) will be different ;</p> <p>3 causing rejection ;</p> <p>4 (response) by immune system ;</p> <p>5 use of immuno-suppressant drugs ;</p> <p>6 ref to need for suitable size in specific case (e.g. if recipient is a small child) ;</p>	<p>3 max</p>	<p>CREDIT ora for all mark points</p> <p>1 Needs the idea of the body <i>recognising</i> the foreign nature</p> <p>4 CREDIT a description of immune response DO NOT CREDIT ref to <u>autoimmunity</u></p>
			Total	11	

Question		Expected Answer	Mark	Additional Guidance
3	(a)	<p>P cortex ;</p> <p>Q ureter ;</p>		<p>Mark the first answer for each letter. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>Q Correct spelling only DO NOT CREDIT incorrect spelling of ureter</p>

Question			Expected Answer	Mark	Additional Guidance
3	(b)	(i)	<p>1 ultrafiltration ;</p> <p>2 afferent arteriole is wider than efferent arteriole ;</p> <p>3 high blood pressure in glomerulus / high(er) hydrostatic pressure in glomerulus (than in Bowman's capsule) ;</p> <p>4 <i>idea that</i> endothelium / wall of capillary , has gaps to , allow / prevent , passage (of substances / cells) ;</p> <p>5 <i>idea that</i> basement membrane stops removal of , large molecules / cells ;</p> <p>6 podocytes / epithelial cells of Bowman's capsule , have (finger-like) projections / processes ;</p> <p>7 (projections) ensure gaps to allow passage (of substances) ;</p>	3 max	<p>4 e.g. fenestrations in capillary wall don't allow red blood cells to leave DO NOT CREDIT cell walls of capillaries</p> <p>5 e.g. basement membrane (only) allows small molecules to pass through</p>
			<p>QWC – technical terms used appropriately and spelt correctly ;</p>		1

Question			Expected Answer	Mark	Additional Guidance
3	(b)	(ii)	<p>1 (large) protein / amino acids , present ;</p> <p>2 blood (cells) present ;</p> <p>3 glucose present ;</p> <p>4 more water present / more dilute ;</p> <p>5 more , ions / salts / electrolytes , present ;</p> <p>6 (more) vitamins present ;</p>	2 max	<p>Mark as prose - award marks wherever they occur</p> <p>1 ACCEPT more , protein / amino acids ACCEPT appropriately named protein e.g. albumin / antibodies / immunoglobulins</p> <p>3 DO NOT CREDIT more glucose</p>
3	(c)	(i)	protein / polypeptide ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE alpha helix / intrinsic / transmembrane DO NOT CREDIT glycoprotein</p>
3	(c)	(ii)	<p>1 the ions (in solution) are too large to pass through the channel or the channel is too narrow for the ions (in solution) to pass through ;</p> <p>2 shapes not compatible ;</p> <p>3 <i>idea that</i> positive charge (in the channel) repels the (positively charged) ions ;</p>	2 max	<p>Mark the first <u>two</u> suggestions</p> <p>1 ACCEPT gap / hole for channel</p> <p>3 DO NOT CREDIT repels and/or attracts</p>
			Total	11	

Question		Expected Answers		Marks	Additional Guidance
4	(a)	1	<u>water potential</u> / Ψ , of plasma / outside cells , would be higher than that of the (blood) cells ;	2 max	1 Must be a clear comparative statement relating to outside and inside cells CREDIT ora IGNORE water concentration
		2	water would enter (blood) <u>cells</u> ;		2 IGNORE osmosis / down water potential gradient
		3	blood cells , swell / (might) burst / lyse ;		3 CREDIT haemolysis / haemolysed DO NOT CREDIT plasmolysis / turgid <i>Note:</i> 'cells become turgid and burst' = 0 'cells swell and become turgid' = 0
4	(b)		<i>type of monomer</i> amino acid ; <i>name of bond</i> peptide / amide ;	2	Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks DO NOT CREDIT amine IGNORE covalent DO NOT CREDIT dipeptide / polypeptide

Question		Expected Answers	Marks	Additional Guidance
4	(c)	<p>1 osmoreceptor / neurosecretory ; 2 hypothalamus ;</p> <p>3 axon(s) ; 4 posterior pituitary ;</p> <p>5 collecting duct ;</p> <p>6 (plasma / cell) membrane(s) ; 7 aquaporins(s) ; 8 osmosis ;</p>	8	<p>Mark the first answer on each prompt line in the passage. If the answer is correct and an additional answer is given for that 'gap' that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT phonetic spelling throughout</p> <p>1 ACCEPT osmotic receptor 2</p> <p>3 4 DO NOT CREDIT 'pituitary' without correct qualification</p> <p>5 ACCEPT distal (convoluted) tubule / second convoluted tubule 6</p> <p>7 DO NOT CREDIT aqua pores 8</p>

Question		Expected Answers	Marks	Additional Guidance	
4	(d)	1	<i>how ADH is dealt with as a protein</i> in , liver / hepatocytes ;	1	DO NOT CREDIT if linked directly to excretion eg 'excreted by the liver'
		2	hydrolysis / acted on by protease ;	2	'broken down' is not quite enough
		3	deamination / amine group removed / formation of ammonia / formation of NH ₃ ;	3	DO NOT CREDIT 'amine group deaminated'
		4	ornithine cycle / formation of urea / formation of CO(NH ₂) ₂ ;	4	DO NOT CREDIT 'amino acid enters ornithine cycle'
		5	amino acids / keto acids , used in (named) metabolic pathway ;	5	eg <ul style="list-style-type: none"> • amino acids used for protein synthesis • keto acids used in , Krebs cycle / respiration • used in gluconeogenesis
		6	<i>how ADH or urea is dealt with as a small molecule</i> in kidney ;	6	
		7	(ultra)filtered from blood / moves from blood into nephron ;	7	
		8	(because) small molecule ;	8	
		9	urea not (all) reabsorbed / ADH not reabsorbed / (ADH or urea) present in urine ;	9	DO NOT CREDIT 'removed as urine'
		10	<u>excreted</u> ;	10	DO NOT CREDIT if linked directly to the liver eg 'excreted by the liver'
		TOTAL	3 max 15		