

1 (a) (i)	1 2 3 4	removal from the, body/organism/cell ; (of) poisons/toxins/harmful substances ; named example (or) waste products of, metabolism/respiration/deamination/chemical reactions in cells ; substances in excess (of requirements) / AW ;	[max 3]	
(ii)	carbon dioxide/water (vapour) ;		[1]	
(iii)	1 2 3 4 5 6 7	deamination (of amino acids) ; removal of nitrogen-containing part of amino acids ; to produce urea ; urea/AW, passes into blood ; breakdown of, hormones/toxins/drugs/excess vitamins ; breakdown of, worn out red blood cells ; excretory products put in bile ; e.g. cholesterol	[max 3]	

Question	E	Answers	Marks	Additional Guidance																				
1 (b)		<table border="1"> <thead> <tr> <th>Function</th> <th>Name</th> <th>letter from Fig.4.1</th> </tr> </thead> <tbody> <tr> <td>blood is filtered</td> <td>cortex</td> <td>K ;</td> </tr> <tr> <td>concentration of urine is determined</td> <td>medulla</td> <td>L</td> </tr> <tr> <td>urine flows to the bladder</td> <td>ureter</td> <td>N ;</td> </tr> <tr> <td>blood is carried into the kidney</td> <td>renal artery</td> <td>P ;</td> </tr> <tr> <td>blood flows out of the kidney</td> <td>renal vein</td> <td>O ;</td> </tr> </tbody> </table>	Function	Name	letter from Fig.4.1	blood is filtered	cortex	K ;	concentration of urine is determined	medulla	L	urine flows to the bladder	ureter	N ;	blood is carried into the kidney	renal artery	P ;	blood flows out of the kidney	renal vein	O ;	[4]	one mark for each correct name and matching letter		
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(c) (i)		urea ; ammonia ; uric acid ; creatinine ; (named) salt / ions ; e.g. Na ⁺ , Cl ⁻ , Mg ²⁺ , Ca ²⁺ , HCO ₃ ⁻ water ; (named) toxins ; hormones ;	[max 2]	ignore glucose / sugar / urine / amino acids																				
(ii)		<table> <tbody> <tr> <td>1</td> <td><i>advantage</i></td> </tr> <tr> <td>2</td> <td>patients do not need to return to clinic for dialysis / AW ;</td> </tr> <tr> <td>3</td> <td>can eat normally / do not need to eat a restricted diet / AW ;</td> </tr> <tr> <td>4</td> <td>periods of feeling unwell reduced / absent ;</td> </tr> <tr> <td>5</td> <td><i>disadvantage</i></td> </tr> <tr> <td>6</td> <td>need, immunosuppressant / AW, drugs ;</td> </tr> <tr> <td>7</td> <td>risk of death / infection, during / after, the operation ;</td> </tr> <tr> <td>8</td> <td>rejection of kidney ;</td> </tr> <tr> <td></td> <td>finding a compatible donor ;</td> </tr> <tr> <td></td> <td>AVP ; e.g. water retention</td> </tr> </tbody> </table>	1	<i>advantage</i>	2	patients do not need to return to clinic for dialysis / AW ;	3	can eat normally / do not need to eat a restricted diet / AW ;	4	periods of feeling unwell reduced / absent ;	5	<i>disadvantage</i>	6	need, immunosuppressant / AW, drugs ;	7	risk of death / infection, during / after, the operation ;	8	rejection of kidney ;		finding a compatible donor ;		AVP ; e.g. water retention	[max 2]	one mark for an advantage and one mark for a disadvantage
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		Total:	[15]																					

2 (a)	E – cortex ; F – medulla ; G – ureter ;	[3]	
(b)	1 (ultra)filtration ; 2 high blood pressure assists filtrate to pass through glomerulus / capsule ; 3 proteins / blood cells, too big to move out of capsule / glomerulus ; 4 filtrate / named example, small enough to move through ; 5 filtrate consists of water and dissolved salts / ions / named ion / glucose / urea ; 6 ref to capillaries ;	[ma 3]	
(c)	movement of (ions / large molecules) through the cell membrane ; (ions/large molecules) against a concentration gradient ; using energy (from respiration) ; use of protein / carrier in membranes ;	[ma 2]	R along the concentration gradient
(d)	water ; salt(s) / ions / minerals / named ion ;	[ma 1]	

2 (e) (i)	Substance	before dialysis	Concentration in used dialysis fluid	Concentration in fresh dialysis fluid	[max 3]
	glucose	normal		same ;	
	salt	high		low ;	
	urea	high		none ;	
	toxins	high	high	low	
(ii)	1	dialysis membrane is partially permeable ;			[ma 4]
	2	minerals / salts / ions / urea, move by diffusion ;			
	3	from high concentration to low concentration / down a concentration gradient ;			
	4	water, moves by osmosis ;			
	5	(osmosis is the movement of water) from high water potential to low water potential across membrane ;			
	6	proteins / blood cells too large to move across membrane ;			
	7	glucose is not removed by dialysate (same concentration) ;			
	8	fresh dialysate maintains a concentration gradient ;			
(f)	fewer diet / fluid intake restrictions ; no need for regular visits to hospital ; less unwell / tired / nausea / headaches / less pain (after surgery) ; no needles / no fistula, permanently in arm ;				[max 3]
(g)	avoid rejection ; stop immune system attacking new kidney ;				[max 1]
					[Total: 20]

Question		Marks	Additional Guidance
3 (a)	removal from the, body / organism / cell; poisons / toxins / harmful substances; waste product(s), of metabolism / respiration / deamination / chemical reactions; substances in excess (of requirements) / AW;	max 3	A 'substances that cause harm' / 'harmful' A named example e.g. CO ₂ , urea, salt, named ions, amino acids toxic waste products of metabolism / AW = 2 marks
(b) (i)	protein;	1	
(ii)	glucose;		
(iii)	urea and salts;	1	A sodium / ions
(c)	any three from: pelvis; ureter; bladder; urethra;	max 3	
(d)	homeostasis;	1	
		[Total: 10]	