

Excretion in Humans

Mark Scheme 2

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Excretion in Humans
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 2

Time Allowed: 60 minutes

Score: /50

Percentage: /100

Question	Answer	Marks	Additional Guidance
1 (a) (i)	plasma ;	[1]	
(ii)	excretion ;	[1]	
(b) 1 2 3 4 5 6	A (ultra)filtration ; small molecules, from blood or glomerulus/into (Bowman's/renal) capsule ; are forced / pushed (out)/under (high) pressure ; B (selective) <u>re</u> absorption ; back into the blood / capillaries ; e.g. of any substance that is filtered or reabsorbed ;	[max 4]	A small particles / examples of relevant small molecules instead of 'small molecules'
(c) (i)	protein ;	[1]	
(ii)	glucose ;	[1]	
(iii)	urea ;	[1]	
(d)	water has been reabsorbed ; by osmosis ; (in / by) collecting duct / nephron / (proximal convoluted) tubule ; <i>idea that</i> by Z there is no change in, sodium ions / urea / solutes, but volume of water is less ;	[max 2]	A loop of Henle

<p>1 (e) (i)</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p>	<p><i>either</i></p> <p>0.35 (g per 100 cm³) ;</p> <p>same concentration as the blood / to be in equilibrium with the blood / to prevent loss or gain, of sodium ions ;</p> <p>prevents / reduces, osmosis ;</p> <p><i>or</i></p> <p>any figure greater than 0 and less than 0.35 (g per 100 cm³) ;</p> <p>excess, sodium / salt, in the blood ;</p> <p>diffusion, from blood / into dialysis fluid ;</p>	<p>[max 2]</p>	<p>Note: Mpts 2 or 3 linked to correct answer for Mpt 1</p> <p>Note: Mpts 5 or 6 linked to correct answer for Mpt 4</p>
<p>(e) (ii)</p>	<p>red blood cells / erythrocytes ;</p> <p>white blood cells / lymphocytes / phagocytes ;</p> <p>platelets / thrombocytes ;</p> <p>(named) plasma protein(s) e.g. fibrinogen, antibodies ; ;</p> <p>(named) hormones ; ;</p> <p>urea / uric acid ;</p> <p>amino acids / (named) vitamins / cholesterol / fats / fatty acids / glycerol / bacteria / virus ; ;</p>	<p>[max 2]</p>	<p>Ignore protein, cells, plasma, (named) gases, iron, (named) toxins, (named) drugs</p> <p>R glucose, (mineral) salt, minerals, sodium, (named) ions, water, carbohydrate, starch, blood, ammonia</p>
<p>(f)</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p>	<p>ref to platelets (in correct context of clotting) ;</p> <p>fibrinogen converted to <u>fibrin</u> ;</p> <p>soluble to insoluble / fibrin is insoluble ;</p> <p>thrombin / enzyme, in context ;</p> <p>mesh / network / web, to trap blood (cells) ;</p> <p>AVP ; e.g. ref to prothrombin or involvement of, calcium ions / clotting factors</p>	<p>[max 3]</p>	<p>A ref to thrombocytes</p>
		<p>[Total:18]</p>	

Question		E Answers		Marks	Additional Guidance											
2	(a)	E – cortex ; F – medulla ; G – <u>ureter</u> ;		[3]												
	(b)	(i)	<table border="1"> <thead> <tr> <th>process</th> <th>letter</th> <th></th> </tr> </thead> <tbody> <tr> <td>diffusion of oxygen</td> <td>H ;</td> <td><i>idea that</i> (oxygen) diffuses, from high concentration/to low concentration/down concentration gradient (into the cell) ;</td> </tr> <tr> <td>active uptake of sodium ions</td> <td>L ;</td> <td><i>idea that</i> (sodium ions) are moved against their concentration gradient/from low to high concentration ;</td> </tr> </tbody> </table>	process	letter		diffusion of oxygen	H ;	<i>idea that</i> (oxygen) diffuses, from high concentration/to low concentration/down concentration gradient (into the cell) ;	active uptake of sodium ions	L ;	<i>idea that</i> (sodium ions) are moved against their concentration gradient/from low to high concentration ;	[4]	<i>mark the columns independently</i>		
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		(ii)	glomerulus ;	[1]												
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				[Total: 13]												

3	(a)	<p>removal from the body / organism / cell R 'excreted from body' 2 poisons / toxins / harmful substances 3 named example OR waste products / of metabolism / respiration / deamination / chemical reactions in cells or in the body 4 substances in excess (of requirements) / AW</p>	[max 3]	<p>lg faeces, egestion, defecation, digestion AW A 'substances that cause harm' / 'harmful' <i>toxic waste products of metabolism / AW = 2 marks</i> ignore routes from body Mpt 3. A named examples, e.g. CO₂, urea, salt, named ions, amino acids</p>										
(b)		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">process that occurs in the kidney tubule</td> <td style="width: 50%; padding: 5px;">letter from Fig. 2.1</td> </tr> <tr> <td style="padding: 5px;">filtration of blood</td> <td style="text-align: center; padding: 5px;">H</td> </tr> <tr> <td style="padding: 5px;">reabsorption of most of the solutes in the filtrate</td> <td style="text-align: center; padding: 5px;">C</td> </tr> <tr> <td style="padding: 5px;">water is absorbed by osmosis to determine the concentration of urine</td> <td style="text-align: center; padding: 5px;">G</td> </tr> <tr> <td style="padding: 5px;">unfiltered blood returns to the renal vein</td> <td style="text-align: center; padding: 5px;">D / E</td> </tr> </table> <p style="text-align: center;">[4]</p>			process that occurs in the kidney tubule	letter from Fig. 2.1	filtration of blood	H	reabsorption of most of the solutes in the filtrate	C	water is absorbed by osmosis to determine the concentration of urine	G	unfiltered blood returns to the renal vein	D / E
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3	component	blood	filtrate	urine	one mark for the filtrate column one mark for the urine column
	red blood cells	✓	✗	✗	
	white blood cells	✓	✗	✗	
	plasma proteins	✓	✗	✗	
	glucose	✓	✓	✗	
	urea	✓	✓	✓	
	salts	✓	✓	✓	
	water	✓	✓	✓	
	[2]				
[Total: 9]					

Question	Answers	Mark	Additional Guidance	
4 (a)	<p>A – B</p> <p>1 urea (concentration) decreases ;</p> <p>2 water (content) increases / decreases ;</p> <p>3 salt (concentration), decreases ;</p> <p>4 ref to, glucose / sugar ; <i>could be increase, decrease or stays the same</i></p>	[max 2]	<p>A 'passes out of blood' / 'passes into blood' / removed / taken out / diffuses in / diffuses out</p> <p>A minerals / any named salt or ion</p>	
(b)	<p><i>advantages of transplants</i></p> <p>1 long term solution / person no longer needs (regular) dialysis ;</p> <p>2 an example of a disadvantage of dialysis ;</p> <p>A pain / tiring / discomfort / takes a long time / fails eventually</p> <p>3 increased freedom / better quality of life / ora ;</p> <p>4 better / more efficient, control of composition of blood ;</p> <p>5 can have wider diet / ora ;</p> <p>6 ref. to cost or economic benefit – to health service or to individual ;</p>	[max 3]	<p>A 'doesn't need to go to clinic / hospital'</p> <p>MP2 is medical issue A any appropriate blood borne disorder</p> <p>MP3 is social issue</p> <p>MP6 R cost unqualified</p> <p>A 'dialysis machine available for others'</p>	
(c) (i)	<p>$I^A I^O \times I^B I^O$;</p> <p>I^A , I^O + I^B , I^O ;</p> <p>$I^O I^O$, (blood group) O ;</p> <p>(allele) I^O recessive to I^A <u>and</u> I^B ;</p> <p>parents must both, have I^O / O / be heterozygous ;</p>	<p><i>accept:</i></p> <p>AO x BO ;</p> <p>A , O + B , O ;</p> <p>OO , (blood group) O ;</p> <p>(allele) O recessive to A <u>and</u> B ;</p>	[max 4]	<p>R one I for the genotypes, e.g. I^{AO}</p> <p>gametes must be derived correctly from the parental genotypes</p> <p>written explanation may be written in terms of parents pass on the allele I^O</p> <p>ignore gene for allele</p>
(ii)	25% / 0.25 / 1/4 / 1 in 4 ;	[1]	R a ratio e.g. 1:3	
[Total: 10]				