

Question number	Answer	Marks	Guidance
1 a	i Glucagon ii Liver	2	Spelling must be correct
1 b	A change to the normal level initiates a response which reduces the effect/reverses/acts against the change	1	
1 c	1 It is (highly) branched 2 Therefore many ends for condensation/hydrolysis OR 3 Polymer/polysaccharide of (alpha) glucose 4 Therefore can release (lots of) glucose OR 5 Glycosidic bonds 6 Easily broken/hydrolysed to release glucose	2	Answers must be in pair
		5	
2 a	Control of the water potential of the blood	1	
2 b	0.0, 0.0 0.0, 0.0	2	1 mark for each correct row
2 c i	Loop of Henle	1	
2 c ii	1 Ions in medulla reduce water potential (of tissue fluid) 2 Water leaves filtrate (from loop of Henle and collecting duct) 3 By osmosis	3	
		7	
3 a	$\frac{(246 - 53)}{53} \times 100$ 364%	2	Allow 364.15% OR 364.2%
3 b i	Any three from: 1 Between 0 and 30 minutes absorption of water by the blood resulted in less ADH secreted 2 (So) less water was reabsorbed from the second (distal) convoluted tubule and collecting duct 3 Between 60 and 120 minutes excretion of surplus water restored water content of blood/water potential of blood to normal 4 And ADH production has resumed	3 max	
3 b ii	The same amount of chloride ions/salt in larger volume of urine gives a lower concentration	1	
		6	

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4 a	Any two from: 1 Glucose concentration in cell/liver falls 2 Below that in blood (plasma)/higher in blood 3 Creates/maintains glucose concentration/diffusion gradient 4 Glucose enters cell/leaves blood by facilitated diffusion/via carrier(protein)/channel (protein)	2 max	4 Not just diffusion
4 b	Any two from: 1 Insulin sensitivity similar to/not (significantly) different from those with diabetes 2 Overlap of SDs 3 Their sensitivity (to insulin also) improved by GBS	2 max	1 No values for non-obese, so comparisons with 'normal' not possible
4 c	Any three from: 1 Sensitivity (to insulin) does increase 2 But large SD/large variation (after GBS) 3 (So) some showing no/little change/get worse 4 Do not know what sensitivity to insulin is of non-diabetics (who are not obese)	3 max	This part of the question concerns spread of data, not overlap of SDs 2 Accept use of figures/use of SD values to make this point 4 Accept 'normal' as non-diabetic
		7	
5 a i	Where a change triggers a response which reduces the effect of the change	1	Accept a more specific explanation related to water content
5 a ii	Any two from: Sweating, breathing, faeces	2 max	Reject evaporation if sweating or breathing given
5 a iii	Hypothalamus	1	
5 b i	Pituitary	1	Ignore anterior pituitary
5 b ii	Any four from: 1 ADH causes vesicles containing aquaporins to be inserted into membrane/collecting duct wall 2 Water enters cells through aquaporins 3 By osmosis/diffusion/down a water potential gradient 4 (From cell) to capillary 5 Via interstitial fluid/tissue fluid	4 max	
		9	
6 a i	(On graph) – 'X' on either or both of the glucose peaks at 08:30 / 18:30	1	
6 a ii	1 Insulin lowers blood glucose/stimulates uptake of glucose by cells/by liver/by muscles	1 max	Reject lowers body glucose Reject high body glucose

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	OR 2 High blood glucose stimulates insulin secretion		
6 a iii	1 Higher glucose concentrations in diabetic 2 Takes longer time to decrease/remains high (after each meal)	2	
6 b i	1 Correct answer: 40(minutes) OR (if answer incorrect) 2 $\frac{20 \times 16 \times 60}{480}$ OR $\frac{2}{3}$ OR 0.67(h)	2	1 Ignore working. 2 marks 2 Allow 1 mark
6b ii	Any three from: 1 Glucose from glycogen/'glycogenolysis' 2 (Glucose/glycogen) stored in liver/in muscles 3 Glucagon/adrenaline causes glucose release OR raises blood glucose OR causes glycogen → glucose 4 'Gluconeogenesis'/described	3 max	'Glycogen' and 'glucagon' – correct spellings only 4 E.g. from amino acids/from fa.
		9	