A Level AQA Biology

20 Homeostasis – answers

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO
Spec reference</th></tr>
<tr><td>01.1</td><td>
<table>
<tr><td>Type</td><td>type 1 diabetes</td><td>type 2 diabetes</td></tr>
<tr><td>Cause</td><td>genetic / autoimmune response / beta cell destruction</td><td>effector cells become less responsive / diet / genetics AND environment</td></tr>
<tr><td>Typical age at onset</td><td>childhood</td><td>adulthood</td></tr>
<tr><td>Usual treatment</td><td>insulin injections</td><td>idea of dietary control</td></tr>
</table>
</td><td>One mark per correct box for row 1

One mark for correct row 2

One mark per correct box for row 3</td><td>5</td><td>AO1
3.6.4.2</td></tr>
<tr><td>01.2</td><td>idea of more genetic influence on the development of type 1 (than type 2);
idea that (in some cases) type 1 can be caused by an environmental factor (e.g., viral infection);

poor (named) diet / obesity / lack of physical activity associated with type 2;
idea that genetics can influence development of type 2;

idea that many different genes can cause (either type of) diabetes;</td><td></td><td>3 max</td><td>AO1
3.6.4.2</td></tr>
<tr><td>01.3</td><td>type 2 usually develops in adulthood / later in life;</td><td></td><td>1</td><td>AO2
3.6.4.2</td></tr>
<tr><td>01.4</td><td>insulin injections;
idea of regulating diet or reducing weight;</td><td></td><td>2</td><td>AO2
3.6.4.2</td></tr>
<tr><td>01.5</td><td>75% / 3 in 4 chance</td><td></td><td>1</td><td>AO2
3.7.1
MS1.4</td></tr>
</table>

A Level AQA Biology

20 Homeostasis – answers

Question	Answers	Extra information	Mark	AO Spec reference
02.1	*idea of* safe use of scalpel / scissors; wash equipment / hands with detergent;		1 max	AO1 3.6.4.3 ATj/PS 4.1
02.2	(**Y** =) glomerulus; (**Z** =) Bowman's capsule;		2	AO2 3.6.4.3 PS 1.2
02.3	$\frac{0.03\,\text{m}}{0.000\,120\,\text{m}} = 250$ **OR** $\frac{30\,000\,\mu\text{m}}{120\,\mu\text{m}} = 250$; $\times 250$;	If the final answer is incorrect, award one mark for evidence of 'image size / actual size'	2	AO2 3.2.1.3 3.6.4.3 MS 0.1 MS 1.8
02.4	*idea of* high pressure in glomerulus; fenestrations / narrow gaps between endothelial cells in capillaries / glomerulus; basement membrane acts as a filter; podocytes; large molecules prevented from passing into PCT;	Accept afferent arteriole wider than efferent arteriole Accept only small molecules can pass into PCT	4 max	AO1 3.6.4.3
03.1	**D A E B C F**;;;	Award 3 marks for correct final answer If the order is incorrect, award • one mark for D being first and F being last • one mark for A before E	3	AO1 3.6.4.3

A Level AQA Biology

20 Homeostasis – answers

Question	Answers	Extra information	Mark	AO Spec reference
03.2	*proximal convoluted tubule* reabsorbs majority of water; co-transport of glucose / amino acids and sodium ions; (which) lowers water potential (in PCT cells) to enable (water to be reabsorbed by) osmosis; *Loop of Henle* water reabsorption from descending limb; ascending limb is impermeable to water / actively removes ions from the tubule; water potential gradient established; *Collecting duct* (more) water reabsorbed through aquaporins; level of reabsorption determined by action of ADH;	Accept 'PCT' for 'proximal convoluted tubule' Accept any value between 65 and 85 % for 'majority'	4 max	AO1 3.6.4.3
03.3	red blood cells / erythrocytes present; *idea that* red blood cells should not be able to pass out of the glomerulus into a nephron;		2	AO2 3.6.4.3
03.4	all / 100% reabsorbed in PCT;		1	AO1 3.6.4.3
03.5	large sample size / many participants; *idea of* avoiding bias; negative control / group of participants tested without diuretic; control of participant diet / age /gender / health; control of diuretic volume / concentration; a third control variable; suggestion for measuring kidney function ;	e.g., random assignment of participants into experimental groups; double blind trials e.g., time of day that the diuretic is given e.g., measure volume of urine produced over 24 hour period; test glucose concentration in urine	5 max	AO3 3.6.4.3 PS 2.1 PS 2.4

A Level AQA Biology

20 Homeostasis – answers

Question	Answers	Extra information	Mark	AO Spec reference
04.1	activates adenylate cyclase; ATP converted to cAMP; cAMP activates protein kinases / other enzymes; glycogen converted to glucose;		3 max	AO1 3.6.4.2
04.2	*pancreas* alpha cells detect reduction in blood glucose concentration; glucagon secreted; ref. negative feedback; *liver* gluconeogenesis; glycogenolysis; reduction in the amount of glucose taken up by hepatocytes;	 Accept description of gluconeogenesis Accept description of glycogenolysis	4 max	AO1 3.6.4.1 3.6.4.2
05.1	*for diabetic* higher baseline / starting concentration; greater increase; slower decrease; does not return to baseline;	Allow reverse argument throughout	3 max	AO2 3.6.4.1 3.6.4.2
05.2	*for diabetic* effector / liver cells less responsive; to insulin; less glucose absorbed from the blood; (and) converted to glycogen / fats;	Allow reverse argument throughout	3 max	AO2 3.6.4.1 3.6.4.2

A Level AQA Biology

20 Homeostasis – answers

Question	Answers	Extra information	Mark	AO Spec reference
06.1	*idea of* standardised temperature measurement procedure; use thermometer with , high resolution / low uncertainty ; take repeat readings / increase sample sizes ; control activity of groups during experiment	e.g., tympanic measurement of core temperature tends to be more accurate than oral or axillary measurements. All students would need to use the same measurement (preferably tympanic). *NOTE: Repeats (or increasing sample sizes) may reduce the impact of random measurement errors and increase the accuracy of the mean value.*	3 max	AO3 3.6.4.1 PS 2.1
06.2	$\sigma^2 = 0.0144$ and 0.0484; $\left(\frac{0.0144}{13}\right) + \left(\frac{0.0484}{14}\right) = 0.004\,564\,834$; $\sqrt{0.004\,564\,834} = 0.067\,563\,56$; $\frac{0.1}{0.067\,563\,56} = 1.480$;	Award 4 marks for correct final answer Accept 1.48 or any correct rounding of calculator value Allow errors carried forward from steps 1, 2 and 3 of the calculation If the final answer is incorrect, award one mark for each correct step, up to a maximum of 3 marks.	4	AO2 3.6.4.1 PS 3.2 MS 1.9
06.3	no significant difference between the means of the two groups; (greater than) 95% probability that the differences are due to chance;	Accept reverse arguments if the calculated value in 6.2 is greater than 2.060	2	AO3 3.6.4.1 PS 3.2 MS1.9

A Level AQA Biology

20 Homeostasis – answers

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO
Spec reference</th></tr>
<tr><td>07</td><td>The following are suitable topic areas from the specification that could be used to describe celling signalling in animals.

In order to fully address the question and reach the highest mark bands, students must also include at least five topics in their answer, to demonstrate a synoptic approach to the essay.

<table>
<tr><th>Specification reference</th><th>Topic area</th></tr>
<tr><td>3.2.3</td><td>Transport across membranes</td></tr>
<tr><td>3.2.4</td><td>Immune system</td></tr>
<tr><td>3.3.4</td><td>Mass transport</td></tr>
<tr><td>3.6.1.2</td><td>Receptors</td></tr>
<tr><td>3.6.2</td><td>Nervous co-ordination</td></tr>
<tr><td>3.6.4</td><td>Homeostasis</td></tr>
</table>

Students may be able to show the relevance of other topics from the specification.

Note: other topics from beyond the specification can be used, providing they relate to the title and contain factually correct material of at least an A-level standard. Credit should not be given for topics beyond the specification which are below A-level standard.</td><td></td><td>25</td><td>3.2.3
3.2.4
3.3.4
3.6.1.2
3.6.2
3.6.4</td></tr>
</table>

A Level AQA Biology

20 Homeostasis – answers

Skills box answers

Question	Answer
1	Drawn in pen – should be pencil Lines too thick Lines too rough Lines uneven
2