AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.1

Homeostasis

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**7**
Available paper years	**2011–2024**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.5.1 Homeostasis

Answer 01 · Mark scheme

March 2011 | BLY1AP | Original Q5 | Legacy

Five	**4**	**3**	**3**	**2**

Answer 02 · Mark scheme

June 2011 | BLY1AP | Original Q3 | Legacy

Three	**4**	**1**	**3**	**2**

4.5.1 Homeostasis

Answer 03 · Mark scheme

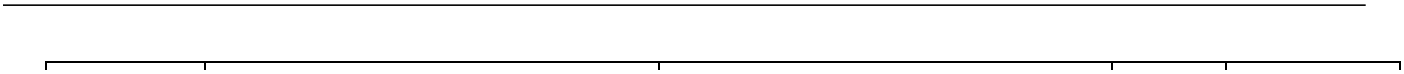
June 2015 | BL1HP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)	detect changes in surroundings **or** detect stimuli convert information to impulse	allow any named stimulus for skin allow send impulse to sensory neurones / brain	1 1	AO1 1.2.1a/b
7(b)(i)	muscle – contract(ion) gland – release / secrete / produce chemical / hormone / enzyme	**1** mark for each effector **1** mark for each response response must match type of effector (if given) ignore examples ignore relax(ation) / movement for contraction do **not** allow expansion for muscles	4	AO1 1.2.1e
7(b)(ii)	any **one** from: • (maintain temperature at which) enzymes work best • so chemical reactions are fast(est) • prevent damage to cells / enzymes	allow prevent enzymes being denatured (by temperature being too high)	1	AO1 1.2.2a
Total			**7**	

4.5.1 Homeostasis

Answer 03 · Mark scheme

June 2015 | BL1HP | Original Q7 | Legacy



4.5.1 Homeostasis

Answer 04 · Mark scheme

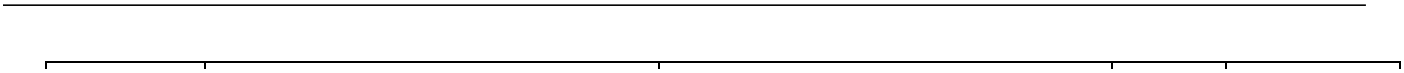
June 2016 | BL3HP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7		ignore hair erection		AO1
	blood vessels supplying skin		1	3.3.2e
	constrict	allow vasoconstriction do **not** allow capillaries /veins constricting do **not** allow moving blood vessel	1	
	less blood flow (to / through capillaries / to skin)	allow blood flows further away from skin surface	1	
	so less energy is lost (to the surroundings)	allow less heat is lost	1	
	‘shivering’ by <u>muscle</u> (contraction)	allow <u>muscles</u> contract (and relax) rapidly	1	
	releasing energy **or** respiring (more)	allow ‘heat produced’ do **not** allow energy produced / made do **not** allow energy **for** respiration allow sweating stops / reduces	1	
Total			**6**	

4.5.1 Homeostasis

Answer 04 · Mark scheme

June 2016 | BL3HP | Original Q7 | Legacy



4.5.1 Homeostasis

Answer 05 · Mark scheme

June 2017 | BL1HP | Original Q3 | Legacy

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>3(a)(i)</td><td><table><tr><th>Liquid</th><th>Organ</th></tr><tr><td>urine</td><td>kidney</td></tr><tr><td>sweat</td><td>skin</td></tr></table></td><td>award 1 mark for each liquid
award 1 mark for each organ correctly linked to the liquid
allow bladder instead of kidney
ignore water as a liquid</td><td>4</td><td>AO1
1.2.2a</td></tr>
<tr><td>3(a)(ii)</td><td>in food / diet / eating</td><td>allow in drinks / water</td><td>1</td><td>AO1
1.1.1a</td></tr>
</table>

Answer 05 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(b)			6	AO1 1.2.1a/b/c/d/e

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	identifies one type of receptor **or** the stimulus it detects **or** refers to at least one type of neurone **or** refers to passage of information **or** at least one response by an effector	identifies at least one link between: one type of receptor **and** the stimulus it detects **and / or** refers to at least one type of neurone **and / or** refers to passage of information **and / or** at least one response by an effector	identifies one type of receptor **and** the stimulus it detects **and** refers to different types of neurone **and** refers to passage of information **or** at least one response by an effector

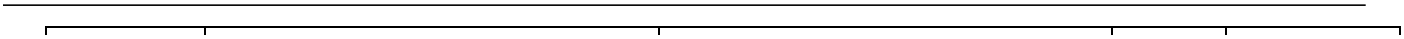
examples of biology points made in the response:	extra information:
• *(R & S)* (receptors in) skin detects pressure / pain / change in temperature	*(R & S)* = receptor and stimulus
• *(R & S)* (receptors in) eyes detect light	*(P)* = passage of information
• *(R & S)* (receptors in) ears detect sound	*(N)* = type of neurone
• *(R& S)* (receptors in) ears detect changes in position	*(E)* = response by effector
• *(R& S)* (receptors on) tongue detects chemicals / taste	
• *(R & S)* (receptors in) nose detects chemicals / smell	
• *(N)* sensory / relay / motor neurone	
• *(P)* neurones carry impulses / electrical information	allow electrical signals ignore messages
• *(P)* ref to synapse	
• *(P)* (release of) chemical information at / across synapse	allow neurotransmitter or named neurotransmitter
• *(E)* muscle contracts	
• *(E)* gland releases hormone / chemical / enzyme	

Total		11

4.5.1 Homeostasis

Answer 05 · Mark scheme

June 2017 | BL1HP | Original Q3 | Legacy



4.5.1 Homeostasis

Answer 06 · Mark scheme

June 2023 | 8461/2H | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.1		allow answers in terms of insulin for hormone **A** and / or glucagon for hormone **B** allow answers in terms of blood glucose (concentration) for substance **Q**		AO3 4.5.3.7 4.5.3.2 4.5.3.1
	if (concentration of substance) **Q** becomes high (hormone) **A** is released / used		1	
	if (concentration of substance) **Q** becomes low (hormone) **B** is released / used		1	
	hormone(s) / **A** / **B** brings (concentration of) substance **Q** back to ideal / normal		1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	(thyroxine) increases (basal) metabolic rate	allow (thyroxine) increases metabolism allow (thyroxine) increases respiration allow (thyroxine) increases reactions in cells	1	AO1 4.5.3.7 4.4.2.1 4.4.2.3
	<u>respiration</u> releases energy	allow <u>respiration</u> releases heat do **not** accept energy being produced / made / created allow <u>respiration</u> is exothermic	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	(kidney) tubules less permeable to water		1	AO1
	(so) less water is reabsorbed	allow (so) less water taken back into the blood	1	AO1
	(so) more water in urine causing increased rate of production (of urine)	allow (so) more water in urine causing increased volume (of urine)	1	AO2
	(so) more water in urine causing lower concentration of dissolved substances (in urine)	(so) more water in urine causing more dilute urine	1	AO2 4.5.3.3

Total Question 5	9

4.5.1 Homeostasis

Answer 07 · Mark scheme

June 2024 | 8461/2H | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.1	regulation / control / maintenance of internal conditions	allow keeping internal conditions the same	1	AO1 4.5.1
	for optimum conditions for cell(s) / enzyme(s) (activity)	allow a description of optimum functioning of cell / body	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.2	glucose **and** urea are filtered (out of the blood)	allow a description of filtration of glucose **and** urea (out of the blood)	1	AO1 4.5.1 4.5.3.3
	protein is not filtered (out of the blood)		1	
	all glucose reabsorbed	allow all glucose absorbed back into the blood	1	
	urea (mostly) not reabsorbed **or** urea passes out in urine	allow urea not absorbed back into the blood	1	

4.5.1 Homeostasis

Answer 07 · Mark scheme

June 2024 | 8461/2H | Original Q8

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.3	(increased / high) ADH increases water reabsorption **or** (increased / high) ADH increases permeability to water	allow converse for decreased / low / no ADH	1	AO1
	(water reabsorption) from kidney tubules		1	AO1
	(so) ADH increases the concentration (of urine)		1	AO1
	(so) ADH decreases the <u>volume</u> (of urine)		1	AO2 4.5.1 4.5.3.3

Total Question 8	10

4.5.1 Homeostasis

Answer 06 · Examiner comments

June 2023 | 8461/2H | Original Q5

Question 5

This question was about homeostasis controlled by hormones.

05.1 Most students understood the simple representation of negative feedback shown in Figure 8 for the regulation of the concentration of a substance dissolved in the blood. The main omission, by one-quarter of students, was in not pointing out that the action of each hormone would return the concentration back to the ideal, or normal, concentration. Just under one-half of students gained full marks.

05.2 Understanding of the action of thyroxine, in the context of raising body temperature, was very limited. Many invoked temperature-regulation mechanisms such as vasoconstriction. Only 1 in 9 fully appreciated that thyroxine raised the metabolic rate and that one aspect of this – respiration – would release energy, or heat.

05.3 Table 2 showed the effects of different concentrations of ADH in the blood on the concentration of dissolved substances in urine and on the rate of urine production. Students had to explain the effects of a decrease in ADH between two of the values in the table. Hardly any mentioned that a lowering of ADH would decrease the permeability of the kidney tubules to water. Many understood that the change would decrease the reabsorption of water by the kidneys but the consequential effect on the urine was often poorly explained – few could relate the volume increase and the concentration decrease to more water being in the urine. Only 1 in 40 scored all 4 marks and only one-quarter scored half-marks. Some students just described the function of ADH without relating their answer to the decrease given in the question. Others used the inadequate term ‘absorption’ rather than reabsorption. Others thought that absorption related to water entering the kidney tubule rather than leaving it.

4.5.1 Homeostasis

Answer 07 · Examiner comments

Question 8 (standard/high and high demand)

08.1 Almost 60% of students could give an appropriate definition for homeostasis and so gained the first marking point. However, many did not expand the definition to include providing optimum conditions for cellular/enzyme activity and so marking point 2 could not be awarded. Fewer than 10% of students scored full marks in this question.

08.2 Students were asked to describe what happens to glucose, protein and urea in the kidneys. There was confusion seen between the role of the liver and the kidney with a noticeable number of students stating that protein was deaminated or that glucose was stored as glycogen by the kidney. Many students struggled to articulate the filtering process and lacked clarity communicating absorption/reabsorption and what this meant in terms of where the substances ended up.

For marking point 1 many students rightly identified glucose and urea as being filtered from the blood by the kidneys. However, many also stated that protein was also filtered, which then made marking point 2 not accessible. Although a large number of students knew that glucose was reabsorbed, they did not make clear it was *all* the glucose being reabsorbed. Marking point 4 was the most common mark seen, with many using the second alternative 'urea passing out in the urine' to gain credit.

5% of students gained full marks, with the majority of students gaining 1 or 2 marks.

08.3 Students were asked to explain how ADH affects the production and concentration of urine by the kidneys. Over one third of students were not able to gain any marks on this question, with 5% of students not attempting it at all.

There appears to be a lot of confusion amongst students regarding the trigger for the production of ADH, with many students thinking ADH stops being released when blood is more concentrated. Students that did get marking point 1 correct however, often got muddled regarding the effect ADH had on the kidney tubules, and the consequences on urine production - often getting the ideas completely the wrong way around.

1 in 5 students gained a mark in this question which was most commonly for marking points 1 or 4. Marking point 2 was rarely seen, with many students simply referring to 'the kidney' rather than the tubules themselves.

Those that were clear that high ADH decreases the volume of urine, often did not communicate it clearly for credit in marking point 4 at this high level of demand. There was also some difficulty understanding the term 'concentration' with many students getting muddled between water concentration and urea concentration.

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