AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.3.7

Negative feedback (HT only)

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**2**
Available paper years	**2023–2024**

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.

4.5.3.7 Negative feedback (HT only)

Answer 01 · 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	

4.5.3.7 Negative feedback (HT only)

Answer 01 · Mark scheme

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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**

4.5.3.7 Negative feedback (HT only)

Answer 02 · Mark scheme

June 2024 | 8461/2H | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.1	any **two** from: • same starting position of rule(r) • more precise scale • repeat **and** calculate mean **or** repeat **and** eliminate anomalies • convert distance to time • student (**B**) rests hand / arm on table	allow ensure the starting position of rule(r) is at 0cm allow other control variables allow two control variables for **2** marks allow rule(r) with mm scale ignore more accurate scale	2	AO3 4.5.2.1 RPA7

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	any **two** from: *endocrine system:* • (hormones) via blood • chemical transmission • slower • longer-lasting	allow converse if clearly referring to nervous system allow not via neurones / cells allow not (electrical) impulses allow not electrical signals ignore messages ignore hormones answers must be comparative ignore reference to target organs	2	AO1 4.5.2.1 4.5.3.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	thyroxine	do **not** accept thyroxide ignore reference to TSH / TRH	1	AO1 4.5.3.1 4.5.3.7

4.5.3.7 Negative feedback (HT only)

Answer 02 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.4	any **one** from: • insulin • glucagon		1	AO1 4.5.3.1 4.5.3.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.5	any **two** from: • increases heart rate • increases breathing rate • increases oxygen delivery to cells / tissues / organs • increases glucose delivery to cells / tissues / organs • increases respiration / metabolism • increases sweat(ing)	allow increases blood flow allow examples of cells / tissues / organs allow increases energy release do **not** accept energy produced / made / created allow dilation of pupils allow vasoconstriction in skin **or** vasoconstriction in digestive system allow raises blood sugar / glucose level **or** increase conversion of glycogen to glucose allow vasodilation in (skeletal) muscles **/** brain allow increased blood pressure allow slows digestion allow other correct effects of adrenaline if no other marks awarded allow **1** mark for prepares for 'fight or flight'	2	AO1 4.5.3.7

4.5.3.7 Negative feedback (HT only)

Answer 02 · Mark scheme

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Question	Answers	Mark	AO / Spec Ref.
05.6	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.5.3.4 4.5.3.5 4.5.3.6
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content **contraception:** • use of hormones oestrogen and progesterone **or** progesterone (only) o inhibition of FSH (production / release) - lack of FSH prevents follicle / egg development / maturation - therefore there is no egg to fertilise o inhibition of LH (production / release) - lack of LH prevents ovulation - therefore there is no egg to fertilise • contraceptive methods include oral contraceptive pill, injection, implant, skin patch, IUD / IUS with hormones **treatment of infertility:** • use of FSH o (FSH) stimulates **maturation** of (several) egg(s) / follicle(s) - (FSH) increases number of eggs matured • use of LH o (LH) stimulates ovulation - (LH) allows eggs / follicles to be collected (from ovary) - (so) increased chance of fertilising an egg - IVF and insertion of embryo(s) into uterus • use of progesterone o (to) maintain uterus lining - increased chance of implantation For **Level 3**, details of both contraception and infertility treatment are required.		

Total Question 5	14

4.5.3.7 Negative feedback (HT only)

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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.

Answer 02 · Examiner comments — June 2024 | 8461/2H | Original Q5

Question 5 (standard, standard/high and high demand)

05.1 Almost 30% of students were able to suggest two ways to improve the student’s method for measuring human reaction time, with a further 45% gaining one mark. Some students suggested extensions to the method rather than improvements, such as testing with caffeine or using a computer programme - which did not answer the question. A number of students gave vague responses such as ‘repeat it’ or ‘put the ruler closer to the hand’ which were insufficient for credit at this level.

05.2 Students were asked to give two ways that coordination by the endocrine system is different from coordination by the nervous system. The full range of available marking points were seen for this question, with over half of students gaining full marks. Most comparisons involved ‘slower’, ‘longer lasting’ or reference to ‘electrical impulses’ in the nervous system. The better answers included multiple comparisons in the same sentence ie ‘endocrine is slower but longer lasting’ and ‘nervous involves electrical impulses carried along neurones whereas endocrine is chemicals carried in the blood.’

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4.5.3.7 Negative feedback (HT only)

Answer 02 · Examiner comments June 2024 | 8461/2H | Original Q5

05.3 Over 80% of students correctly identified thyroxine as the hormone produced by gland A. Common errors included naming the gland (thyroid) rather than the hormone, or naming hormones released from the pituitary gland such as FSH, LH or ADH.

05.4 Around 80% of students were able to name one hormone produced by gland B, with insulin being the most popular response. Common incorrect responses named hormones involved in the menstrual cycle. There were mostly good spellings for 'glucagon' which has not been the case in previous years.

05.5 Almost 55% of students could describe two effects of adrenaline on the human body, the most common of which were increased heart rate and increased breathing rate. Some answers lacked detail such as 'increased awareness' or 'they have more energy' which are insufficient for credit at this level. A significant number of students gave the fall-back mark relating to preparing the body for the flight or fight response, which was only credited if no other correct responses had been given.

05.6 This was an extended response question with three levels, the highest of which was set at high demand. Students were asked to explain the use of hormones in both contraception and the treatment of infertility. Less than 10% of students were able to access Level 3, commonly due poor articulation or use of vague scientific terminology. Those that did however, showed very clear links between the correct hormones, their roles in contraception/infertility treatment and the associated consequences of using them.

Around 45% of students obtained marks in Level 2, after correctly explaining the use of at least one hormone for both contraception and infertility. Students that did not include an explanation for both contraception and the treatment of infertility were restricted to Level 1. Students are reminded to read the question carefully and ensure all parts are answered to the same standard. It was noticeable that many students spent more time explaining the roles of hormones in contraception, and then went on to possibly rush their explanation for infertility.

Regarding contraception, many students could refer to progesterone and/or oestrogen, and the subsequent inhibition of FSH and LH, but then did not specifically indicate which hormone undertook which function, and so failed to link to a consequence for either hormone. The general consequence of 'no eggs to fertilise' was regularly seen in place of these.

Regarding infertility, the same pattern was seen, so very few consequential links were credited. However, many students described the process of IVF and insertion of the embryo into the uterus, to gain credit for a general consequence.

The use of progesterone to maintain the uterus lining was often muddled with contraception, and the idea of increased *chance* of implantation, or increased *chance* of fertilising an egg for the use of LH was rarely seen.

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