OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



MARK SCHEME

B5.3 HOW DO HORMONES CONTROL RESPONSES IN THE HUMAN BODY? (HIGHER)

SCORE	PERCENTAGE
/13	%

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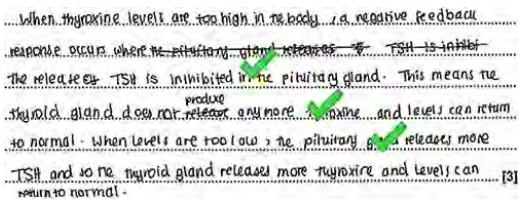
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Question			Answer/Indicative content	Marks	Guidance
1	a		*Please refer to the marking instructions on page 5 of this mark scheme for guidance on how to mark this question.* **Level 3 (5–6 marks)** Explains in detail the effects of adrenaline and links this to the benefits of these effects and to the mechanisms that warm the body. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Explains the effects of adrenaline **and** the effects of adrenaline to cellular respiration. **OR** Explains the effects of adrenaline and mechanisms that warm the body. **OR** Explains the effects of adrenaline to cellular respiration and mechanisms that warm the body. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Describes thermoregulation mechanisms that warm the body but does **not** consider adrenaline. **OR** Demonstrates knowledge of the effects of adrenaline **OR** The effects of adrenaline to cellular respiration. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.* **0 marks** *No response or no response worthy of credit.*	6 (AO 1.1 × 4) (AO 2.1 × 2)	**AO1.1 Demonstrating knowledge of the effects of adrenaline** For example: • adrenaline causes heart rate to increase • adrenaline causes breathing rate to increase • adrenaline causes liver to break down stored carbohydrate/glycogen • adrenaline causes muscle contraction/vasoconstriction/decreases blood flow to skin and digestive organs/diverts blood flow to muscles • contraction of erector pili muscles **AO2.1 Applying synoptic knowledge to link the effects of adrenaline to cellular respiration required for thermoregulation** For example: • increased heart rate pumps more oxygen and glucose around the body to supply cells, and removes waste products (carbon dioxide, lactic acid) more quickly • increased breathing rate provides more oxygen, and removes carbon dioxide more quickly • breakdown of carbohydrate/glycogen in liver provides glucose • all of these enable increased cellular respiration • cellular respiration provides ATP/energy for muscle contraction • cellular respiration is an exothermic process/heats the body **AO1.1 Demonstrating knowledge of thermoregulation mechanisms that warm the body** For example: • shivering / muscles rapidly contract • vasoconstriction / muscles in walls of arteries supplying the skin contract

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					• goosebumps / erector muscles in skin contract to raise hairs (and trap air) Examiner's Comments This was a high demand question requiring clear links between the effects of adrenaline on the body, how this effects cellular respiration and how thermoregulation mechanisms warm the body. Candidates responded well with approximately 80% credited Level 2/3. A common misconception concerning vasoconstriction, involved candidates talking about blood vessels/capillaries moving away from the surface of the skin.
	b	i	the **pituitary gland** secretes/makes **TSH** (thyroid stimulating hormone) ✓ (**TSH** causes the) **thyroid gland** to make **thyroxine** ✓ **Thyroxine** inhibits **TSH** production ✓	3 (AO 1.1 × 3)	**thyroxine** causes the **pituitary gland** to stop making **TSH** = 2 marks Examiner's Comments Some candidates were aware of thyroxine being made in the thyroid gland, however very few were aware of TSH and its role in this process. Exemplar 8  When thyroxine levels are too high in the body, a negative feedback response occurs where the pituitary gland releases ~~s~~ TSH is inhibi~~ted~~ The released TSH is inhibited in the pituitary gland. This means the thyroid gland does not produce/release anymore thyroxine and levels can return to normal. When levels are too low, the pituitary gland releases more TSH and so the thyroid gland releases more thyroxine and levels can return to normal. [3] This response clearly identifies where both hormones are made and the effect that each have on each other. It gained 3 marks.

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Question			Answer/Indicative content	Marks	Guidance
		ii	thyroxine binds to (thyroxine) receptors (on the cell surface) ✓ this causes (an increase in) gene expression of the gene(s) coding for adrenaline receptors ✓ this causes an increase in protein synthesis ✓ this causes the cell to make (more) adrenaline receptors ✓	4 (AO 2.1 × 4)	ALLOW thyroxine attaches to receptors Examiner's Comments Candidates' knowledge of this section of the specification (B5.3.1 & 5.3.2) is in need of improving.
			Total	13	

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