OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



MARK SCHEME

B5.4 WHY DO WE NEED TO MAINTAIN A CONSTANT INTERNAL ENVIRONMENT? (HIGHER)

SCORE	PERCENTAGE
/30	%

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Question			Answer/Indicative content	Marks	Guidance
1	a		Water next to the skin will evaporate ✓ Taking heat away from the skin, cooling the person ✓	2 2	
	b		**Any four from**Place same amount of hot water in eachtest tube ✓Take temperature of water withthermometer		
	c	i	**Any two from**Vasoconstriction ✓Muscles in artery walls contract ✓Reduction in blood flow through capillaries		
		ii	Raised temperature helps to kill the microorganism ✓	1	
			Total	**9**	
2	a		pituitary gland	1	**Examiner's Comments**
	b			4	Most candidates could identify that the pituitary glands secretes ADH. **Assume the candidate's answer refers toreturning v**

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Question			Answer/Indicative content	Marks	Guidance
			?any 4 from: blood (plasma) is less concentrated / blood (plasma) is more dilute; (this is detected by) receptors in the brain / (receptors in the) hypothalamus; less / no ADH is secreted; less water is reabsorbed from the urine by the kidney; large(r) quantity of (more) dilute urine produced; Total	5	a candidate may switch from one side to the other, but do not credit the reverse the other, but do not credit the reverse / less argument for a marking point that has already been awarded Examiner's Comments The best responses could explain in detail the logical sequences of stages involved in the regulation of water.

(more) water is reabsorbed from the urine by the kidney;

small(er) quantity of (more) concentrated urine produced

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Question			Answer/Indicative content	Marks	Guidance
3			*Do not credit Yes or No* **Any three from:** hairs lie flat; sweating; evaporates / removes (latent) heat; idea of vasodilation; denaturing of enzymes	3	**ignore** cooling down **Examiner's Comments** As credit was not given for yes or no answers, approximately one third of candidates failed to score on this question. Irrespective of whether candidates thought that Sir Charles Blagden would die, credit was given for how his body would respond. Good answers included reference to sweating, loss of heat by evaporation (references to cooling down were not credited), vasodilation and denaturing of enzymes.
			Total	**3**	
4			B E; D C; F A;	3	if LHS and RHS reversed = 1 mark max Only mark what is inside box unless box contents are crossed out and then mark anything outside of box. **Examiner's Comments** Most candidates found this a difficult question with a lotof candidates scoring no points. Candidates who incorrectly transposed the left hand side with the right hand side, but were otherwise correct, were awarded one mark.
			Total	**3**	

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For example:

effects of adrenaline

Question			Answer/Indicative content	Marks	Guidance
5			*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** • 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** • shivering / muscles rapidly contract • vasoconstriction / muscles in walls of arteries supplying the skin contract **the body**

For example:

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Question			Answer/Indicative content	Marks	Guidance
				4	• 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.
			Total	6	ignore all reference to adaptation and evolution Examiner's Comments This question required the candidates to suggest solutions to a problem. Only the most able candidates scored full marks on this question. Most candidates managed to score one or two marks. Good answers included getting water from food, producing more (ADH), more water reabsorbed/kidneys reabsorb more wat
6			*any four from:*store water;gets water from food;more ADH so keeps more water / kidneys reabsorb more water;sweating, producing more concentrated urine, or staying in the cool (underground) during the day.	4	
			Total	4	

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