		Do no outsia	ot write ide the
1 0	Read the following passage.		<i>)0X</i>
	North American black bears can hibernate for up to 7 months without food or water. The bears survive using the fat stores in their bodies. The bears build up the fat stores during the summer. During hibernation, the heart rate of black bears decreases from a summer mean of 55 beats per minute to 14 beats per minute. Their metabolic rate falls by 75%.	5	
	In many mammals, 'uncoupling proteins' help to maintain a constant body temperature during hibernation. Uncoupling proteins are found in the inner mitochondrial membrane and act as proton channels during chemiosmosis. However, these proton channels do not generate ATP.		
	In the mountains of North America, when winter changes into spring, the coat colour of snowshoe hares changes from white to brown. Climatic changes have caused the snow to melt earlier. This has reduced the survival rate of snowshoe hares in these habitats. The change in coat colour occurs when new fur replaces old fur. This is called moulting. Recent research has shown	10	
	that snowshoe hares within a population moult at different times. Moulting at different times could be a major factor in ensuring the survival of snowshoe hare populations.	15	
	Use the information in the passage and your own knowledge to answer the follo questions.	wing	
10.1	Black bears can hibernate for up to 7 months without food or water (lines 1–2).		
	Suggest and explain how. [3 r	narks]	



1 0.2	During hibernation, the heart rate and the metabolic rate of black bears decrease	Do not writ outside the box
	(lines 3–5). Use your knowledge of the nervous control of heart rate to describe how these are	
	linked. [4 marks]	
	In many mammals, 'uncoupling protains' help to maintain a constant body	
	temperature during hibernation (lines 6–7).	
	Suggest and explain how. [2 marks]	
	Question 10 continues on the next page	



10.4	Climatic change has reduced the survival rate of snowshoe hares in mountain habitats	Do not write outside the box
	(lines 11–13).	
	Suggest and explain how. [2 marks]	
10.5	Snowshoe hares within a population moult at different times (line 15).	
	Explain how this could ensure the survival of snowshoe hare populations in these	
	mountain habitats. [4 marks]	
		15
	END OF QUESTIONS	