6.9 Biological Rhythms: Circadian, Infradian and Ultradian: 10-minute Pack

AQA 7182 · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 Define a circadian rhythm and give one example relevant to human behaviour, as studied in biological rhythms.

(Total for Question 1 is 1 mark)

2 A nurse works permanent night shifts and reports persistent sleepiness during the night shift and difficulty sleeping during the day. Identify two negative consequences of chronic night shift work on health or performance and briefly explain each consequence in terms of circadian disruption.

(Total for Question 2 is 4 marks)

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3 Outline Siffre's cave study of circadian rhythms (context: isolation from natural light) and one key finding from that study.

(Total for Question 3 is 2 marks)

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4 Explain briefly how the suprachiasmatic nucleus (SCN) acts as an endogenous pacemaker in the sleep-wake cycle.

(Total for Question 4 is 2 marks)

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Mark scheme · 6.9 Biological Rhythms: Circadian, Infradian and Ultradian: 10-minute Pack

Question 1

A circadian rhythm is a biological cycle of roughly 24 hours; example, the sleep-wake cycle or core body temperature cycle oe **B1**

Answer: A circadian rhythm is a biological cycle of about 24 hours; example: the human sleep-wake cycle.

Question 2

identifies a consequence such as increased risk of accidents or reduced alertness during night shifts oe **M1**

explains this in terms of circadian misalignment, e.g. being awake when the body is biologically primed for sleep reduces alertness and increases error risk oe **A1**

identifies a second consequence such as long-term health risks, e.g. increased risk of cardiovascular problems or impaired metabolic regulation oe **M1**

explains that chronic disruption of circadian rhythms can affect hormone timing, sleep quality and metabolic processes, increasing long-term health risk oe **A1**

Answer: Consequences: (1) Increased risk of accidents and reduced night-time alertness because the nurse is active when the circadian drive for sleep is strong, impairing performance. (2) Long-term health risks, such as higher risk of cardiovascular and metabolic problems, because chronic circadian disruption alters hormone timing and sleep quality.

Question 3

describes Siffre spending extended periods in underground caves isolated from external light cues oe **M1**

reports a key finding, e.g. Siffre's free-running sleep-wake cycle lengthened to about 25 to 30 hours, showing endogenous control oe **A1**

Answer: Siffre lived in caves isolated from daylight for extended periods; his free-running sleep-wake cycle lengthened to about 25 to 30 hours, indicating internal pacemakers operate without light cues.

Question 4

identifies SCN in the hypothalamus as the primary endogenous pacemaker controlling circadian rhythms oe **B1**

explains that the SCN receives light information from the retina and sends timing signals to regulate sleep-wake patterns and other rhythms oe **B1**

Answer: The SCN, in the hypothalamus, functions as the main endogenous pacemaker for circadian rhythms; it receives light information from the retina and coordinates timing signals that regulate the sleep-wake cycle and related physiological rhythms.

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