

## Exercise walk-through

Sleep ■ 1.5

eXercise

## You must be able to

- describe the **sleep cycle** 睡眠周期 and what changes across the night
- state what happens in **REM** 快速眼动 sleep and why it matters
- explain what a **circadian rhythm** is and what disrupts it
- match a **sleep disorder** 睡眠障碍 to its defining feature

## Method — The cycle

Sleep moves through stages of progressively deeper non-REM sleep and then into REM, repeating roughly every 90 minutes. Across the night, deep non-REM shortens and REM periods lengthen.

## Method — REM sleep

In REM, brain activity resembles waking, the eyes move rapidly, most vivid dreaming occurs, and the skeletal muscles are effectively paralysed. REM appears to support memory consolidation and emotional processing.

## Method — Circadian rhythm

A roughly 24-hour biological cycle governing sleep, alertness and body temperature, entrained mainly by **light**. Shift work, jet travel and late-night screens push it out of alignment with the clock.

## Method — Two disorders

**Insomnia** is persistent difficulty falling or staying asleep. **Narcolepsy** is sudden uncontrollable sleep onset, often with immediate REM.

## Practice 2.1 ■ 2 marks

State two things that happen to the body during REM sleep.

## Solution 2.1

Method: Circadian rhythm

### Worked steps

any two of: brain activity resembles waking; the eyes move rapidly; vivid dreaming occurs; skeletal muscles are effectively paralysed **B2**.

## Practice 2.2 ■ 2 marks

Explain what a circadian rhythm is and name the main cue that sets it.

## Solution 2.2

Method: Circadian rhythm

### Worked steps

a roughly 24-hour biological cycle governing sleep, alertness and body temperature **B1**; set mainly by light **B1**.

## Practice 2.3 ■ 1 mark

A student sleeps five hours a night for a week before an exam.

- (a) State one likely effect on memory.
- (b) Explain why cutting sleep short removes proportionally more REM than deep sleep.

## Solution 2.3

Method: The cycle

### Worked steps

(a) poorer consolidation, so weaker recall of what was studied **B1**. (b) REM periods lengthen across the night **B1**, so the hours cut from the end of sleep contain proportionally more REM **B1**.

## Exam-style 3.1 ■ 1 mark

Muscle paralysis during dreaming is characteristic of

**A** stage 1 non-REM

**B** deep non-REM

**C** REM sleep

**D** wakefulness

## Solution 3.1

**A** stage 1 non-REM

**B** deep non-REM

**C** REM sleep



**D** wakefulness

### Worked steps

C. muscle atonia during vivid dreaming is a defining feature of REM.

## Exam-style 3.2 ■ 1 mark

A worker on permanent night shifts sleeps badly on days off. The best explanation is

- A** insomnia caused by anxiety
- B** a circadian rhythm entrained to an unusual light schedule
- C** narcolepsy
- D** too much REM sleep

## Solution 3.2

- A insomnia caused by anxiety
- B a circadian rhythm entrained to an unusual light schedule** 
- C narcolepsy
- D too much REM sleep

### Worked steps

- B.** the rhythm has adapted to the night schedule and is misaligned on days off.

## Exam-style 3.3 ■ 1 mark

A person falls asleep suddenly during a conversation.

- (a) Name the disorder this suggests.
- (b) State one way it differs from ordinary tiredness.

## Solution 3.3

### Worked steps

(a) narcolepsy **B1**. (b) onset is sudden and uncontrollable, often entering REM immediately, rather than gradual drowsiness **B1**.