TOPIC: SLEEP

Circadian Rhythms

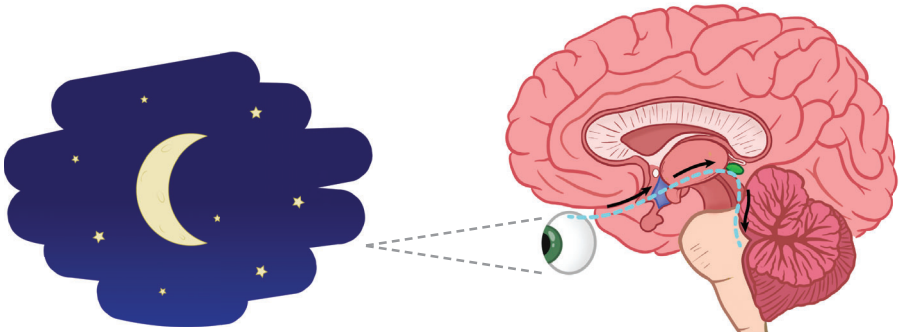
- Many body processes operate on a rhythmic schedule.
- **Circadian Rhythm:** _____ wake cycle in humans → _____ hours.
  - Suprachiasmatic Nucleus (SCN): Structure in the _____ thalamus that controls circadian rhythm.
    - Responds to external cues; mainly _____.

1. Stimulus: Lack of light.

2. Neural impulse; travels to _____.

3. SCN triggers the _____ gland to release melatonin.

4. Body response (sleep).



- SCN can also respond to _____ cues (hormone levels, temperature, eating patterns).
- Circadian rhythms can become _____regulated (ex: jetlag or working night shift).

EXAMPLE

Answer the following questions about circadian rhythms.

a. Two structures are important for regulating the circadian rhythm: the suprachiasmatic nucleus (SCN) and the pineal gland. Which of these structures receives a neural impulse from the eyes? _____

b. Which structure is responsible for releasing hormones? _____

c. What hormone is released by this structure? _____

PRACTICE

True or False: if false, choose the answer that best corrects the statement.

Circadian rhythm describes the daily variations in body temperature.

a) True.

b) False; circadian rhythm describes the monthly hormonal cycle experienced by men.

c) False; circadian rhythm describes the 24-hour sleep-wake cycle.

d) False; circadian rhythm describes the daily changes in the ability to focus.

TOPIC: SLEEP

- **Sleep cycle**: Movement through the different _____ of sleep.
  - Each cycle lasts approx. _____ minutes. People typically experience _____ cycles per night.
- Sleep is divided into 2 general phases:

REM Sleep (Rapid Eye Movement)

Characterized by darting movements of the eyes and vivid _____.

- _____creased heart rate.
- _____creased respiration.
- Paralysis of skeletal muscle.

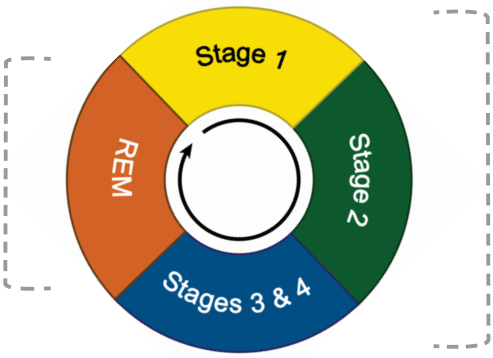
NREM Sleep (non-Rapid Eye Movement)

Subdivided into 4 _____ of light and deep sleep - distinguished by their unique brainwaves.

- _____creased heart rate.
- _____creased respiration.

- _____ sleep cycle includes the NREM stages and a REM phase:

REM



_____

- *Recall*: Brainwaves are visualized using an _____, which measures electrical activity in the brain.

EXAMPLE

Match the following characteristics with the general sleep phase they happen in.

REM: _____

NREM: _____

a. Increased heart rate.
b. Decreased breathing rate.
c. Rapid eye movement.
d. Four distinct stages.
e. Dreams.
f. Decreased respiration.
g. Muscle paralysis.

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Which of the following statements are true about the sleep cycle.

I. The sleep cycle refers to the 24-hour cycle of sleeping and waking.

II. On average, people go through 4-6 cycles per night.

III. The sleep cycle has two general phases.

a)I & II. b) II & III. c) I & III. d) I, II, & III.

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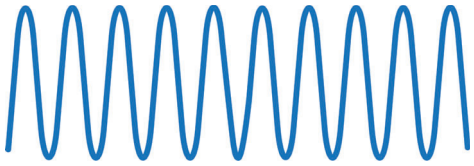
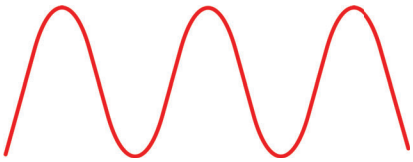
EEG Primer

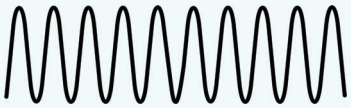
◆ When looking at an EEG we consider ___ things:

	Frequency	Amplitude
Definition:	The _____ of wave cycles per second.	The _____ of the waves.
High		
Low		
Meaning:	Indicates different _____ of brain activity.	Indicates the _____ of the brain activity.

EXAMPLE

Which of the following waves has a **higher** frequency? _____

a)



b)

Which of the following waves has a **lower** amplitude? _____

a)

b)

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PRACTICE

James is a graduate student working in a sleep lab. He is analyzing EEGs, focusing on the height of the waves. Based on this information, what *specific* aspect of the EEGs is James studying?

a) Frequency.

b) Amplitude.

c) Wavelength.

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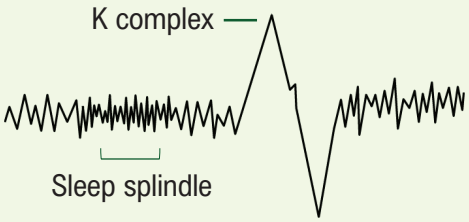
Stage	EEG
Awake **Description:** Fully conscious. **EEG:** _____ waves; high frequency, low amplitude.	
Stage 1 **Description:** _____ state of sleep. **EEG:** _____ waves; lower frequency than beta waves.	
Stage 2 **Description:** Moderately deep sleep. **EEG:** _____ bursts of activity: • _____ spindles (very high frequency). • ____ complexes (very high amplitude).	
Stages 3 & 4 **Description:** _____ sleep. **EEG:** _____ waves; lowest frequency, highest amplitude.	
REM **Description:** Dreaming, partial paralysis, increased heart rate. **EEG:** Resemble _____ waves. (Resembles being _____).	

Memory Tool:

Busy **b**eta waves

Tired **t**heta waves

Deep sleep **d**elta waves

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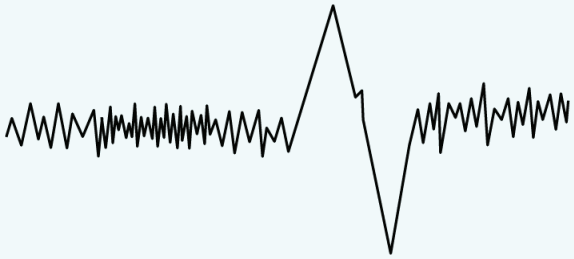
EXAMPLE

Match each EEG below with the stage of sleep it is showing. Identify any key features that help you make that determination.

a. Stage: _____ Feature: _____

b. Stage: _____ Feature: _____



c. Which stage would be the most difficult to distinguish from being awake on the EEG?

_____

PRACTICE

Select the answer choice that correctly defines the EEG feature.

a) Beta waves: lowest frequency & highest amplitude.

b) Sleep spindles: very high amplitude.

c) K complex: very high frequency.

d) Delta waves: lowest frequency & highest amplitude.

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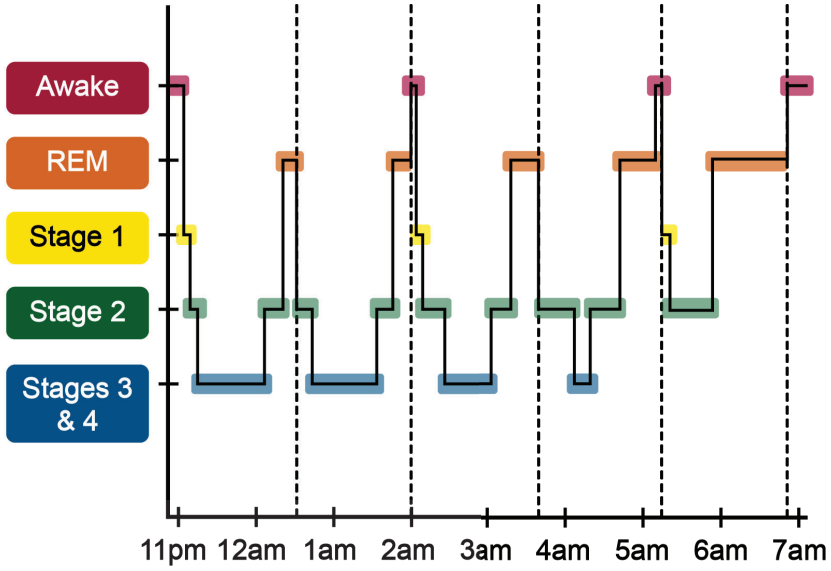
Sleep Patterns in a Typical Night

◆ As the night progresses, the amount of time in each stage of sleep _____.



Takeaways

Throughout the night:

- Stages 3 & 4: ____
- REM: _____
- Only re-enter stage 1 if we _____ up.

EXAMPLE

In each scenario below, list what stage of sleep would likely come *next*:

a. Leaving stage 3 & 4: _____

b. After waking up in the middle of the night: _____

c. After REM sleep: _____

PRACTICE

Which of the following statements are true about sleep patterns?

I. Stage 3 & 4 sleep gets longer as the night goes on.

II. Each sleep cycle typically last between 90-120 minutes.

III. REM cycles get longer as the night goes on.

a)I & II. b) I & III. c) II & III. d) I, II, & III.