

# RIPPLE ENGLISH

## ACTIVE LEARNING PROGRAM

Workbook for:

“The Science of Sleep”

問題は解きっぱなしにしないで！

英語資格試験の学習は、**解いた後の復習**をしなければほとんど効果はありません。答え合わせをしておしまいせず、**テキストの音読練習やリスニング、多読学習などのインプット学習**を何度も反復して記憶に定着させましょう。ホームページからダウンロードできる音読練習用のテキストをぜひご活用ください。また、数日置いてから再度解き直すのも効果的です。答えを記憶してしまっているかもしれませんが、回答の根拠をなぞりながら繰り返し解くことで有効な復習になります！

## The Science of Sleep

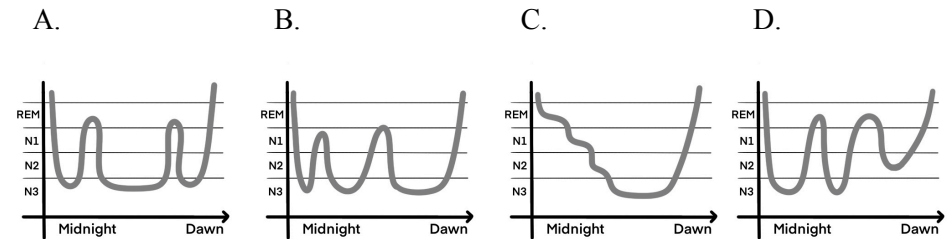
1. Life is short. Though life is already short enough, we are unconscious for a third of it, which has a significant impact on the condition and well-being of the other two thirds. Despite its importance, sleep remains a mystery to many. For example, there is a widely accepted notion of the 90-minute sleep cycle. It says that Non-rapid eye movement or non-REM sleep and REM sleep take turns within every 90-minute cycle, so we should sleep for multiples of 90 minutes. However, the sleep cycle actually **fluctuates** within a range of 60 to 110 minutes, depending on individual differences and daily conditions. Also, REM sleep and non-REM sleep are completely different states in terms of the physiological conditions of the body and brain, and their characteristics and functions are not widely understood by the public. Sleep is essential yet unknown. What happens to the body and brain during a slumber? How will scientific knowledge on sleep help us optimize its quality and quantity?

- (1) The word “fluctuate” in the passage is closest in meaning to
  - A. fix
  - B. vary
  - C. hesitate
  - D. stabilize
- (2) According to paragraph 1, which of the following is true?
  - A. The notion of 90-minute sleep cycle is completely wrong.
  - B. REM and non-REM sleep switch at around every 90 minutes.
  - C. Importance of sleep is overestimated.
  - D. REM and non-REM sleep are barely resemblant to each other.

2. Majority of sleep researchers agree that the quality of sleep is most important, and it is a lot about the regular occurrence of the sleep cycles. In a healthy sleep, non-REM sleep and REM sleep occur exclusively in this order within a 90-minute cycle, and we repeat this cycle 3 to 5 times a night. The overall proportion of non-REM and REM is about 3 to 1, but the ratio within a cycle varies across the night. Non-REM sleep accounts for the majority of the sleep cycle in the first half of the night, while the ratio of REM sleep increases as it gets closer to dawn.
  
3. Non-REM sleep is further subdivided into 3 stages. Stages 1 (N1) and 2 (N2) are often called “light sleep”, and stage 3 is generally understood as “deep sleep.” Stage 1 is sort of a transition period from wakefulness to deeper sleep, and it lasts for less than 10 minutes. Stage 2 plays an important role in refining our memory related to motor skills, such as practicing sports, riding a bike, and playing a musical instrument. It is generally the longest stage, accounting for 50 to 60 percent of the entire sleep. In stage 3 (N3) or deep sleep, the brain rests while showing slow and powerful brain wave activity, and the body recovers its immune function and cardiovascular system. As we fall asleep, we quickly move from stage 1 to stage 3 via stage 2. We stay in stage 3 for a while, undergo stage 2 again, and finally reach REM sleep.
  
4. Again, what matters is that this cycle properly takes place. For example, consider two individuals who get 7 hours of sleep. One of them sleeps 7 hours straight in bed, while the other sleeps 5 hours in bed and 2 hours on the commuter train. Both of them have 7 hours of sleep in total, but the latter case falls far short in terms of the quality because the sleep cycle does not properly occur.

- (3) According to paragraph 2, which of the following is NOT true?
  - A. The ratio of non-REM sleep lowers in the latter half of the night.
  - B. Overall, non-REM sleep is longer than REM sleep.
  - C. Non-REM sleep is more likely to come prior to REM sleep.
  - D. The quality of sleep matters a lot.

- (4) According to paragraph 2 and 3, which of the following best describes the standard sleep pattern?



- (5) According to paragraph 4, fragmented sleep falls far short in terms of quality because
  - A. the quantity of sleep will not be enough.
  - B. the commuter train is far less comfortable than the bedroom.
  - C. the sleep cycle will be disturbed.
  - D. the sleep environment is as important as the length.

5. During Japan's Heian Period (9th to 12th Century), people believed that seeing someone in their dreams indicated the person was secretly in love with them. In modern days, Sigmund Freud and other psychologists regarded dreams as targets for psychological analysis, assuming that dreams reflect our deepest wishes, which turned out to be non-scientific. Dreams have long been a mystery for humanity, so have been for sleep scientists in the last several decades. Most of the dreams we remember in the morning are seen during REM sleep, and REM sleep itself is also a mystery. Even though we are asleep, our brainwaves are as active as or more than when we are awake, so it is often impossible to distinguish REM sleep from wakefulness measuring just electrical brainwave activity. What are the functions of REM sleep? Why do we have dreams?
6. First, REM sleep offers us emotional recovery. When we have a distressing experience during the day, REM sleep takes the emotional sharp edges off those difficult memory so that we find them less emotionally **intense** the next morning.
7. REM sleep also boosts our creativity. During REM sleep, our brain organizes and combines distantly related information and knowledge in our memory. It seems that the brain is trying every possible combination of ideas and experiences: combinations we never think of during rational and obstinate wakefulness. We often wake up with a solution for a previously difficult problem, probably because REM sleep figured it out from a wide variety of possibilities.
8. REM sleep plays these important roles for our mental health and creativity, and dreams may have something to do with those functions. Dreams are often emotional and bizarre because REM sleep is the session for psychological recovery and mold-breaking brainstorming. Do dreams have some significant role in themselves? Or are they merely by-products of REM sleep, just like the heat from a lightbulb? Up till now, we haven't found a clear answer. Sleep researchers and neuroscientists are still working to resolve the mystery of dreams.
- (6) According to paragraph 5, which of the following is true?  
A. Freud and other psychologists made a great contribution to resolve the mystery of dreams.  
B. Our brainwaves during REM sleep is indistinguishable from the one when we are awake.  
C. We see dreams only during REM sleep.  
D. Dreams reveal what we subconsciously want.
- (7) The word "intense" in the passage is closest in meaning to  
A. urgent  
B. agresive  
C. fierce  
D. sentimental
- (8) According to paragraph 7, what is the brain doing during REM sleep?  
A. It is cleaning up the waste.  
B. It is trying unlikely conjunctions of memory.  
C. It is logically figuring out solutions to difficult problems.  
D. It is getting ready to wake up.
- (9) According to paragraph 8, which of the following is true?  
A. Dreams certainly have important functions.  
B. Dreams are the by-product of REM sleep.  
C. The heat from a lightbulb is an unnecessary by-product of its function.  
D. The functions of REM sleep is still unknown.

9. One of the most popular questions on sleep is about morning types and evening types. Generally speaking, morning types are praised, while evening types are often labeled as lazy. For example, you must have seen an article introducing a successful executive who gets up early everyday. Seemingly, studying or working before sunrise appears **diligent** and admirable. However, putting aside such impressions, what does science exactly say? Is an early bird actually praiseworthy?
10. To put it simply, one's sleeping pattern, also known as chronotype, is mostly determined by genetics. For example, if you are an evening person, it is likely that one or both of your parents is an evening type. What time we feel drowsy or energized is fixed primarily by birth. If you are an evening type, your body and brain will not be able to function well in the early morning, no matter how hard you try. Roughly speaking, morning types, evening types, and those in between each account for one-third of the population. The reason for this division lies in the hunter-gatherer era. In order to increase their survival rate, humans evolved so that each one has a different rhythm of their lives within the same community. A community composed of people with different chronotypes is unlikely to face the most vulnerable situation, where everyone in the community falls asleep. Genetics divides people into different chronotypes, so it is not only a matter of diligence or discipline.
11. First of all, praise for early birds is oversimplifying the logic. If morning types are more likely to be successful, it is probably because they can focus on their most important work in time when they are refreshed and uninterrupted by calls and meetings. Being a morning type is not the direct cause of their success. What is important is to find a sleeping habit that fits you.
- (10) The word "diligent" in the passage is closest in meaning to
- A. dignified
  - B. hardworking
  - C. respectable
  - D. productive
- (11) According to paragraph 10, which of the following is true?
- A. Hunter-gatherers have different chronotypes than people in agricultural society.
  - B. One's chronotype is fixed once he or she matures.
  - C. Humans evolved to have different chronotypes within a group.
  - D. One's chronotype is his or her choice.
- (12) According to paragraph 11, what is really important?
- A. Avoiding meetings and calls in the morning.
  - B. Getting up as early as your chronotype allows.
  - C. Discovering the best lifestyle for you.
  - D. Focusing on your most important work.

12. In order to have a good night of sleep, what can we do? First and foremost, we need to establish a regular sleeping habit: going to bed and getting up at the same time everyday, whether on weekdays or weekends. Most living creatures, including Homo sapiens, have an internal 24-hour clock, known as a circadian rhythm, and irregular sleeping habits significantly disrupt this biorhythm. If you wake up 3 hours later on weekends than on weekdays, it is virtually equal to having 3 hours of jet lag every week. Sometimes we have to stay up late or get up earlier than usual. In this case, it's better to maintain either the usual bedtime or wake-up time, rather than shifting the entire sleep time.
13. Second, stay away from your phone before bedtime. Not only blue light but also the stimulation and excitement from social media can disrupt your sleep.
14. Thirdly, we need to take care of the time we drink alcohol and caffeinated beverages. You might be under the impression that alcohol helps you have a sound sleep. In fact, alcohol facilitates the onset of sleep, but it negatively affects the quality of sleep. Your sleep becomes fragmented with brief awakenings, which we don't usually remember. Alcohol also suppresses REM sleep, especially during the latter half of the night. You should avoid drinking at least 3 hours before bedtime. Caffeine also has a huge impact on our sleep. It takes five to seven hours to remove caffeine in your body by half, and a half is still powerful. The last cup of coffee should be taken preferably before 3 p.m.
15. There are also things proven to enhance the quality of sleep, such as mindfulness meditation, moderate exercise during the day, and taking a bath 90 minutes before bedtime. Good sleep is the greatest gift for your tomorrow self. It's worth making every effort to ensure it.

- (13) According to paragraph 12, which of the following is true?
- A. We should sleep as long as the schedule allows.
  - B. We should maintain the same duration of sleep no matter what happens.
  - C. Jet lag is as detrimental to our condition as sleep deprivation.
  - D. Bedtime and wake-up time should be as consistent as possible.

- (14) According to paragraph 14, which of the following is NOT true?
- A. Alcohol should be taken only right before bedtime.
  - B. Caffeine requires about 6 hours to be extracted from the body by half.
  - C. Alcohol helps you fall asleep quickly.
  - D. Alcohol deteriorates the quality of sleep.

- (15) According to paragraph 12 to 15, which of the following is NOT mentioned as tips for better sleep?

- A. practicing meditation
- B. bathing
- C. keeping away from digital devices before bedtime
- D. intensive exercise

## Answers

- (1) B
- (2) D
- (3) C
- (4) D
- (5) C
- (6) B
- (7) C
- (8) B
- (9) C
- (10) B
- (11) C
- (12) C
- (13) D
- (14) A
- (15) D

(1) 文中の“fluctuate（変動する）”と最も意味が近いのは

- A. fix（固定する）
- B. vary（変わる）**
- C. hesitate（ためらう）
- D. stabilize（安定する）

(2) 1段落の内容に合致するのは？

- A. The notion of 90-minute sleep cycle is completely wrong.（90分の睡眠サイクルという概念は完全に間違っている）
- B. REM and non-REM sleep switch at around every 90 minutes.（レム睡眠とノンレム睡眠は約90分ごとに切り替わる）
- C. Importance of sleep is overestimated.（睡眠の重要性が過大評価されている）
- D. REM and non-REM sleep are barely resemblant to each other.（レム睡眠とノンレム睡眠はほとんど似ていない）**
- B：90分ごとに切り替わるのではなく、90分の1サイクルの中で切り替わるので誤り。

(3) 2段落の内容に合致しないのは？

- A. The ratio of non-REM sleep lowers in the latter half of the night.（夜の後半になるとノンレム睡眠の割合が低くなる）
- B. Overall, non-REM sleep is longer than REM sleep.（全体として、ノンレム睡眠はレム睡眠よりも長い）
- C. Non-REM sleep is more likely to come prior to REM sleep.（ノンレム睡眠はレム睡眠よりも前に起こる可能性が高い）**
- D. The quality of sleep matters a lot.（睡眠の質は非常に重要だ）
- C：nonREM→REMの順でしか発生しないので、「可能性が高い」という次元の話ではないので誤り。

(4) 2, 3段落によると、一般的な睡眠パターンをもっともよく表しているのは？

前半のサイクルにノンレム睡眠が長く現れ、後半のサイクルにレム睡眠が増えているDが正解。

(5) 4段落によると、断片的な睡眠が質の点で大いに劣る理由は、

- A. the quantity of sleep will not be enough.（睡眠の量が十分でないから）
- B. the commuter train is far less comfortable than the bedroom.（通勤電車は寝室よりはるかに快適でないから）
- C. the sleep cycle will be disturbed.（睡眠サイクルが乱れるから）**
- D. the sleep environment is as important as the length.（睡眠環境は睡眠の長さと同じくらい重要だから）

(6) 5段落の内容に合致するのは？

- A. Freud and other psychologists made a great contribution to resolve the mystery of dreams.（フロイトと他の心理学者は、夢の謎を解決するために多大な貢献をした）
- B. Our brainwaves during REM sleep is indistinguishable from the one when we are awake.（レム睡眠中の脳波は、起きているときの脳波と区別できない）**
- C. We see dreams only during REM sleep.（私たちはレム睡眠中にのみ夢を見る）
- D. Dreams reveal what we subconsciously want.（夢は私たちが潜在意識で望んでいることを明らかにする）
- C：本文では、「起床時に覚えている」夢はREM睡眠中に見ると述べているので、夢を見ること自体はREM睡眠中に限ったことではない。実際、ノンレム睡眠中にも夢は発生していると言われている。

(7) 文中の“intense”と最も意味が近いのは

- A. urgent（緊急の）
- B. agresive（攻撃的な、積極的な）
- C. fierce（強烈な）**
- D. sentimental（感傷的な）

(8) 7段落によると、レム睡眠中の脳は何をしているか？

- A. It is cleaning up the waste.（老廃物を清掃している）
- B. It is trying unlikely conjunctions of memory.（ありそうもない記憶の結合を試みている）**
- C. It is logically figuring out solutions to difficult problems.（難しい問題に対する解決策を論理的に考え出している）
- D. It is getting ready to wake up.（目覚める準備をしている）
- Dは、内容としては正しい可能性がある。覚醒の準備段階という役割もあることが一部の研究で示唆されているが、本文中では述べられていないので誤り。

(9) 8段落の内容に合致するのは？

- A. Dreams certainly have important functions.（夢には確かに重要な役割がある）
- B. Dreams are the by-product of REM sleep.（夢はレム睡眠の副産物だ）
- C. The heat from a lightbulb is an unnecessary by-product of its function.（電球の熱は、機能から生じる不要な副産物だ）**
- D. The functions of REM sleep is still unknown.（レム睡眠の機能はまだ分かっていない）
- AもBも仮説の段階なので、間違いなくそうであるとは言い切れないことが本文中で示唆されている。

(10) 文中の“diligent（勤勉な）”と意味が最も近いのは

- A. dignified (威厳のある)
- B. hardworking (勤勉な)**
- C. respectable (立派な)
- D. productive (生産的な)

(11) 10段落の内容に合致するのは？

- A. Hunter-gatherers have different chronotypes than people in agricultural society. (狩猟採集民は農耕社会の人々とは異なるクロノタイプを持っている)
- B. One's chronotype is fixed once he or she matures. (クロノタイプは、成長すると固定される)
- C. Humans evolved to have different chronotypes within a group. (人間は、グループ内で異なるクロノタイプを持つように進化した)**
- D. One's chronotype is his or her choice. (クロノタイプはその人個人の選択だ)

(12) 11段落によると、本当に大切なことは？

- A. Avoiding meetings and calls in the morning. (朝に会議や電話を避けること)
- B. Getting up as early as your chronotype allows. (クロノタイプが許す限り早く起床すること)
- C. Discovering the best lifestyle for you. (自分に最適な生活スタイルを見つけること)**
- D. Focusing on your most important work. (最も重要な仕事に集中すること)

(13) 12段落の内容に合致しているのは？

- A. We should sleep as long as the schedule allows. (スケジュールが許す限りたくさん寝るべき)
- B. We should maintain the same duration of sleep no matter what happens. (何が起こっても同じ睡眠時間を維持する必要がある)
- C. Jet lag is as detrimental to our condition as sleep deprivation. (時差ぼけは、睡眠不足と同じくらい私たちの体調に悪影響を及ぼす)
- D. Bedtime and wake-up time should be as consistent as possible. (就寝時間と起床時間は可能な限り一貫していることが望ましい)**

(14) 14段落の内容に合致しないものは？

- A. Alcohol should be taken only right before bedtime. (アルコールは就寝直前にのみ摂取すべきだ)**
- B. Caffeine requires about 6 hours to be extracted from the body by half. (カフェインが体内から半分抽出されるのに約6時間かかる)
- C. Alcohol helps you fall asleep quickly. (アルコールはすぐに眠りにつくのに役立つ)
- D. Alcohol deteriorates the quality of sleep. (アルコールは睡眠の質を低下させる)

(15) 12から15段落で、より良い睡眠のコツとして言及されていないものは？

- A. practicing meditation (瞑想の実践)
- B. bathing (入浴)
- C. keeping away from digital devices before bedtime (就寝前にデジタル機器を遠ざける)
- D. intensive exercise (激しい運動)**

本文中ではmoderate exercise (適度な運動) とあるのでDが誤り。