小 論 文(120分)



【注意事項】

1 試験開始の合図があるまで、この問題冊子の中を見ないで下さい。

;

- 2 この問題冊子は4ページあります。また、問題は7問です。全問に解答して下さい。
- 3 解答用紙は、横書きで使用して下さい。
- 4 試験中に問題冊子の印刷不鮮明、ページの落丁・乱丁・汚れ等に気がついた場合は、 手を挙げて監督者に知らせて下さい。
- 5 問題冊子、解答用紙(白・2枚)には、試験開始後、監督者の指示にしたがって、受 験番号欄に受験番号を、氏名欄に氏名を、見やすい数字、文字で記入して下さい。
- 6 受験番号が正しく記入されていない場合は、採点できないことがあります。
- 7 問題冊子中の余白は適宜利用してかまいませんが、どのページも切り離さないで下 さい。また、解答用紙は、解答欄以外の箇所を使用しないで下さい。
- 8 下書き用紙(黄緑・1枚)を解答用紙と間違えないように、注意して下さい。
- 9 試験終了後、問題冊子、解答用紙、下書き用紙は全て回収しますので、持ち帰らないで下さい。

}

次の英文を読んで設問に答えなさい。

In July 2016, a heat wave hit Boston, with daytime temperatures averaging 92 degrees for five days in a row. Some local university students who were staying in town for the summer got lucky and were living in dorms with central air-conditioning. Other students, not so much — they were stuck in older dorms without A.C.

Jose Guillermo Cedeño Laurent, a Harvard researcher at the time, decided to take advantage of this natural experiment to see how heat, and especially heat at night, affected the young adults' cognitive performance. He had 44 students perform math and self-control tests five days before the temperature rose, every day during the heat wave, and two days after.

"Many of us think that we are immune to heat," said Dr. Cedeño, now an assistant professor of environmental and occupational health and justice at Rutgers University. "So something that I wanted to test was whether that was really true."

It turns out even young, healthy college students are affected by high temperatures. During the hottest days, the students in the un-air-conditioned dorms, where nighttime temperatures averaged 79 degrees, performed significantly worse on the tests they took every morning than the students with A.C., whose rooms stayed a pleasant 71 degrees.

A heat wave is once again blanketing the Northeast, South and Midwest. (1)<u>High temperatures</u> can have an alarming effect on our bodies, raising the risk for heart attacks, heatstroke and death, particularly among older adults and people with chronic diseases. But heat also takes a toll on our brains, impairing cognition and making us irritable, impulsive and aggressive.

(①)

Numerous studies in lab settings have produced similar results to $_{(2)}$ Dr. Cedeño's research, with scores on cognitive tests falling as scientists raised the temperature in the room. One investigation found that just a four-degree increase — which participants described as still feeling comfortable — led to a 10 percent average drop in performance across tests of memory, reaction time and executive functioning.

This can have real consequences. R. Jisung Park, an environmental and labor economist at the University of Pennsylvania, looked at high school standardized test scores and found that they fell 0.2 percent for every degree above 72 Fahrenheit^{*}. That might not sound like a lot,

but it can add up for students taking an exam in an un-air-conditioned room during a 90degree heat wave.

In another study, Dr. Park found that the more hotter-than-average days there were during the school year, the worse students did on a standardized test — especially when the thermometer climbed above 80 degrees. He thinks that may be because greater exposure to heat was affecting students' learning throughout the year.

The effect was "more pronounced for lower income and racial minority students," Dr. Park said, possibly because they were less likely to have air-conditioning, both at school and at home.

(②)

Researchers first discovered the link between heat and aggression by looking at crime data, finding that there are more murders, assaults and episodes of domestic violence on hot days. The connection applies to nonviolent acts, too: When temperatures rise, people are more likely to engage in hate speech online and honk their horns in traffic.

Lab studies back this up. In one 2019 experiment, people acted more spitefully toward others while playing a specially designed video game in a hot room than in a cool one.

So-called reactive aggression tends to be especially sensitive to heat, most likely because people tend to interpret others' actions as more hostile on hot days, prompting them to respond in kind.

Kimberly Meidenbauer, an assistant professor of psychology at Washington State University, thinks this increase in reactive aggression may be related to heat's effect on cognition, particularly the dip in self control. "Your tendency to act without thinking, or not be able to stop yourself from acting a certain way, these things also appear to be affected by heat," she said.

(③)

Researchers don't know why heat affects our cognition and emotions, but there are $_{(3)a}$ couple of theories.

One is that the brain's resources are being diverted to keep you cool, leaving less energy for everything else. "If you're allocating all of the blood and all the glucose to parts of your brain that are focused on thermoregulation, it seems like it's very plausible that you just wouldn't have enough left for some of these kind of higher cognitive functions," Dr. Meidenbauer said.

You could also be distracted and irritable because of how hot and miserable you feel. It turns out that's actually one of the brain's coping responses. If you can't get cool, your brain will "make you feel even more uncomfortable so that finding the thing you need to survive will become all consuming," explained Shaun Morrison, a professor of neurological surgery at Oregon Health and Science University.

Heat's effect on sleep could play a role, too. In the Boston study, the hotter it got, the more students' sleep was disrupted — and the worse they performed on the tests.

The best way to offset these effects is to cool yourself off, as soon as possible. If you don't have access to air-conditioning, fans can help, and be sure to stay hydrated. It might sound obvious, but what matters most for your brain, mood and cognition is how hot your (4) is, not the temperature outside.

"How Heat Affects the Brain", by Dana G. Smith, The New York Times, June 19, 2024 より引用・一部改変

*注 72 Fahrenheit: カ氏72度。セ氏22.2度相当の温度。

- 問1. 下線部(1)の文章を日本語に訳しなさい。
- 問2. 下線部(2)のDr. Cedeñoが行った研究の方法とその結果を、それぞれ日本語 100字以内で述べなさい(句読点を含む)。
- 問3. (①)(②)(③)は、各セクションのタイトルが入ります。 最も適切なタイトルを、下からそれぞれ1つ選び、記号で答えなさい。
 - \mathcal{T} . How heat affects video games
 - \checkmark . How heat hurts our cognition
 - $\dot{\mathcal{D}}$. Why murders decrease on hot days
 - \perp . What's happening in the brain
 - 才. How heat improves emotions
 - 力. Why heat makes us aggressive
- 問4. カ氏72度の環境で受験した生徒の得点が1000点であった場合、カ氏90度の 環境で受験した場合、得点は何点になると考えられるか、本文中に述べら れている内容に基づいて答えなさい。
- 問5. 下線部(3)のa couple of theoriesの内容について、それぞれ日本語で説明しな さい。
- 問6. (④)に入る最も適切な英単語1語を書きなさい。
- 問7. 本文を読んで、暑さが脳に与える影響について懸念されることを本文中から2つ取り上げ、その懸念に対してあなたの生活の中で取り組めることと、 社会として取り組むべきことを日本語600字以内で述べなさい(句読点を 含む)。