

20

(平 30 前)

外 国 語

英 語

(問題部分 1 ～10 ページ)

注意 解答はすべて答案用紙の指定のところに記入しなさい。

外国語 (英 語) 125 点

I 次の文章を読んで、問1～4に答えなさい。(配点35点)

The researchers — Oliver M. O'Reilly, a professor of mechanical engineering, and Christine E. Gregg and Christopher A. Daily-Diamond, students who are pursuing a Ph. D. in mechanical engineering — reported that the force⁽¹⁾ of your foot striking the ground and the motion of your leg combine to help loosen and ultimately untie the knot of your shoelaces.

When running, the foot hits the ground at about seven times the force of gravity. That impact is transmitted to the knot, which stretches and relaxes in response. As the knot loosens, swinging legs apply an inertial* force on the free ends of the laces and pretty soon your laces are flopping around, looking like overcooked spaghetti.

The researchers identified “strong” knots, those commonly associated with square knots, and “weak” knots. For a quick way to know which is which, look at the loops of your shoelaces. A weak knot will typically have one loop pointing toward the toes and one toward the ankle. A stronger knot typically has the loops balanced to the right and the left sides, Mr. Daily-Diamond said. For the shoelace-challenged, there are, of course, other options, such as loafers or sneakers with nylon fasteners.

“We spent countless weekends (A) up and down the hallways and (B) at shoelaces, (C) them (D) apart,” Ms. Gregg said. Initial experiments involved so-called barefoot running shoes, dress shoes, running sneakers and hiking boots. Ms. Gregg said she spent hours sitting on a table, swinging her legs to see if the movement had any effect on the knot. It didn't, and neither did merely stamping her feet.

The force of her feet hitting the floor when she was walking or running eventually caused the shoelaces to come undone. The researchers wrote in an article that the loosening of the knot was “a sudden and catastrophic phenomenon.”

The researchers used a high-speed camera to record Ms. Gregg running, and an accelerometer** was attached to the knots to measure the forces on her feet. Many variables, such as shoe and lace types as well as the tightness of the knot, were not assessed. (2) "If you do a whole bunch of other variables, it just explodes," Mr. O'Reilly said.

Coming up with the hypothesis and testing it took two years. Mr. O'Reilly added that the work was a "labor of love" that took place on nights and weekends after the researchers were done with their full-time jobs.

How does this research matter beyond the inconvenience of having to retie your laces? It has practical applications to things such as improving surgical threads, he said. Mr. O'Reilly said the project was born when he was teaching his daughter, Anna, now 14, how to tie her shoelaces when she was five. He said that for just about all of his 52 years, his laces have come undone. "I didn't want her to inherit my problems," said Mr. O'Reilly, who wears sneakers. So, after his extensive research, how have his laces been? He said with a laugh: "It's catastrophic. Every day."

注 *inertial 慣性の

**accelerometer 加速度計

問 1 下線部(1)を日本語に訳しなさい。

問 2 下線部(2)について, variables の指す内容を明らかにしたうえで, 日本語でわかりやすく説明しなさい。

問 3 空所(A)～(D)に入る語として最も適切なものを下からそれぞれ一つ選びなさい。ただし, 同じ語は一度しか使えません。

coming staring walking watching

問 4 本文の内容と合致する文を下から二つ選び、記号で答えなさい。

- (ア) The study was conducted by two professors and a student.
- (イ) The force of gravity is larger than the force with which the foot hits the ground.
- (ウ) The loosening of shoelaces was reported to be a trivial matter.
- (エ) The researchers conducted the study after they finished their full-time jobs.
- (オ) It was approximately nine years ago that one of the researchers hit on the idea for the study.

Ⅱ 次の文章を読んで、問 1 ～ 5 に答えなさい。(配点 30 点)

Social psychologists have studied the bystander effect and they determined that the more people present when a person needs emergency help, the less⁽¹⁾ likely it is any one of them will lend a hand.

In 1970, psychologists Bibb Latane and John Darley created an experiment in which they would drop pencils or coins. Sometimes they would be in a group, sometimes with one other person. They did this six thousand times. The results? They got help 20 percent of the time in a group, 40 percent of the time with one other person. They decided to raise the stakes, and in their next experiment they had someone fill out a questionnaire. After a few minutes, smoke would start to fill the room, coming in from a wall vent. They ran two versions of the experiment. In one, the person was alone; in the other, two other people were also filling out the questionnaire. When alone, people took about five seconds to get up and panic. Within groups people took an average of 20 seconds to notice. When alone, the subject tended to go inspect the smoke and leave the room to tell the experimenter he or she thought something was wrong. When in a group,⁽²⁾ people just sat there looking at one another until the smoke was so thick that they couldn't see the questionnaire. Only three people in eight runs of the group experiment left the room, and they took an average of six minutes to get up.

The findings suggest the fear of embarrassment plays into group dynamics. You see the smoke, but you don't want to look like a fool, so you glance over at the other person to see what they are doing. The other person is thinking the same thing. Neither of you reacts, so neither of you becomes (A). The third person sees two people acting like everything is OK, so that the third person is even less likely to panic. Everyone is influencing every other person's perception of reality thanks to another behavior called the illusion of transparency. You tend to think other people can tell what you are thinking and feeling just by looking at you. You think the other people can tell you are really

worried about the smoke, but they can't. They think the same thing. No one panics. This leads to pluralistic ignorance⁽³⁾—a situation where everyone is thinking the same thing but believes he or she is the only person who thinks it. After the smoke-filled room experiment, all the participants reported they were panicking on the inside, but since no one else seemed (B), they assumed it must just be their own anxiety.

The researchers decided to raise the stakes once more. This time, they had people fill out a questionnaire while the experimenter, a woman, shouted in the other room about how she had injured her leg. When alone, 70 percent of people left the room to check on her. When in a group, 40 percent checked. If you⁽⁴⁾were to walk on a bridge and see a boy in the water screaming for help, you would feel a much greater urge to leap in and pull him to safety than you would if you were part of a crowd. When it's just you, all the responsibility to help is yours.

問 1 下線部(1)の内容として最も適切なものを下から一つ選び、記号で答えなさい。

- (ア) The chance of someone giving support is great.
- (イ) The likelihood of someone raising their hands is limited.
- (ウ) The possibility of someone offering help is small.
- (エ) The probability of someone using their hands is high.

問 2 下線部(2)を日本語に訳しなさい。

問 3 空所(A)と空所(B)に共通して入るものとして、最も適切な語を下から一つ選び、記号で答えなさい。

- (ア) alarmed (イ) assured (ウ) composed
- (エ) experienced (オ) satisfied

問 4 下線部(3)の内容として最も適切なものを下から一つ選び、記号で答えなさい。

- (ア) When alone, people tend not to accept what they see and hear.
- (イ) When in a group, people tend not to accept what they see and hear.
- (ウ) When in the presence of others, people tend not to follow what other people do.
- (エ) When isolated, people tend not to follow what other people do.

問 5 下線部(4)を日本語に訳しなさい。

Ⅲ 次の文章を読んで、問 1 ～ 4 に答えなさい。(配点 30 点)

All of a sudden the telephone rang — abnormally loud, like an alarm clock waking me from the worst dream of my life. My surge of relief was indescribable. I tripped and nearly fell on my face in my headlong dive to grab it. I was certain it was my mother, but the caller ID stopped me cold: NYDoCFS.

New York Department of — what? After half a beat of confusion, I snatched up the phone. “Hello?”

“Hello there,” said a voice of quiet and almost scary gentleness. “To whom am I speaking?”

“Theodore Decker,” I said, taken aback. “(A)”

“My name is Marjorie Beth Weinberg and I’m a social worker in the Department of Child and Family Services.”

“What is it? Are you calling about my mother?”

“You’re Audrey Decker’s son? Is that correct?”

“My mother! (B) Is she all right?”

A long pause — a terrible pause.

“What’s the matter?” I cried. “Where is she?”

“Is your father there? May I speak to him?”

“He can’t come to the phone. What’s wrong?”

“I’m sorry, but it’s an emergency. I’m afraid it’s really very important that I speak to your father right now.”

“What about my mother?” I said, rising to my feet. “Please! Just tell me where she is! What happened?”

“You’re not by yourself, are you, Theodore? (C)”

“No, they’ve gone out for coffee,” I said, looking wildly around the living room.

“Your father, too?”

“No, he’s asleep. Where’s my mother? Is she hurt? What’s happened?”

"I'm afraid I'll have to ask you to wake your dad up, Theodore."

"No! I can't!"

"(D)"

"He can't come to the phone! Why can't you just tell me what's wrong?"

"Well then, if your dad's not available, maybe it's best if I just leave my contact information with you. Please tell him to get in touch with me as soon as possible. It's really very important that he returns the call."

After I got off the telephone, I sat very still. According to the clock on the stove, which I could see from where I sat, it was 2:45 in the morning. Never had I been alone and awake at such an hour. The living room — normally so airy and open, filled with my mother's presence — had shrunk to a cold, pale discomfort, like a vacation house in winter.

(1) I picked up the phone book; I put it down. The idea of calling the police terrified me. I had just convinced myself that I ought to go and look for her,
(2) when the doorbell shattered the silence and my heart leaped up for joy.

Scrambling, skidding to the door, I struggled with the lock. "Mom?" I called, sliding the top bolt, throwing open the door — and then my heart dropped, a six-story drop. Standing on the doormat were two people I had never seen in my life: an Asian woman with a short and wild haircut, a Hispanic guy in shirt and tie. There was nothing at all threatening about them, but though they both had kindly expressions on their faces, I understood the instant I saw them that my life, as I knew it, was over.

問 1 空所(A)～(D)に入る最も適切なものを下からそれぞれ一つ選び、
記号で答えなさい。ただし、同じ記号は一度しか使えません。

- (ア) I'm afraid it's very important.
- (イ) Is there an adult with you?
- (ウ) Where is she?
- (エ) Who is this?

問 2 居間が下線部(1)のようにたとえられている理由を、30 字以内の日本語で説明しなさい。ただし、句読点も 1 字に数えます。

問 3 下線部(2)を日本語に訳しなさい。

問 4 本文の内容と合致する文を下から二つ選び、記号で答えなさい。

- (ア) Theodore was very happy to know that the telephone call was from NYDoCFS.
- (イ) Theodore was anxious about his mother's whereabouts.
- (ウ) At the time of the telephone call, Theodore's father was taking an afternoon nap at home.
- (エ) After some hesitation, Theodore finally called the police.
- (オ) Theodore was extremely disappointed when he opened the door and saw who was there.

IV Look at the pictograms (A) and (B), both of which represent a hot spring, and answer the following questions. (配点 30 点)

(A)



(B)



- (1) Which pictogram do you think is more appropriate for tourists from overseas? Why do you think so? Write your answer in English. (around 60 words)

- (2) What kind of action do you think the local governments in Japan should take to attract more overseas tourists to Japanese hot springs? Introduce your own ideas. Write your answer in English. (around 60 words)