英　　語

I. Read the following article and answer the questions **(1-9)**.

Beyond the emotional connection adults may feel to the way we learned to write, there is **(A)**a growing body of research on what the normally developing brain learns by forming letters on the page.

In an article this year in the *Journal of Learning Disabilities*, researchers looked at how oral and written language related to attention and what are called "executive function" skills (like planning) in children in grades four through nine, including those with and without learning disabilities.

Virginia Berninger, a professor of educational psychology at the University of Washington and the lead author on the study, told me that evidence from this and other studies suggests that "handwriting — forming letters — engages the mind, and that can help children pay attention to written language."

Last year in an article in the *Journal of Early Childhood Literacy*, Laura Dinehart, an associate professor of early childhood education at Florida International University, discussed several possible associations between good handwriting and academic achievement: Children with good handwriting may get better grades because their work is more pleasant for teachers to read; children who struggle with writing may find that too much of their attention is consumed by producing the letters, and the content is not fully understood.

But can we actually stimulate children's brains by helping them form letters with their hands? In a population of low-income children, Dr. Dinehart said, the ones who had good early writing skills in prekindergarten did better later on in school. She called for more research on handwriting in the preschool years, and on ways to help young children develop the skills they need for "a complex task" that requires the coordination of brain and body to work together.

"This myth that handwriting is just a physical skill is just plain wrong," Dr. Berninger said. "We use body-controlling parts of our brain and body planning, but **(B)**what's very critical is a region of our brain where the visual and language come together, where visual stimuli actually become letters and written words."

Functional brain scans of adults show a characteristic brain network that is activated when they read, and it includes areas that relate to physical processes. This suggested to scientists that the mental process of reading may be connected to the physical process of forming letters. You have to **(C)**see letters in "the mind's eye" in order to produce them on the page, Dr. Berninger said. Brain imaging shows that the activation of this region is different in children who are having trouble with handwriting.

Karin James, a professor of psychological and brain sciences at Indiana University, did brain scans on children who did not yet know how to write by hand. "Their brains don't distinguish letters; they respond to letters the same as to a triangle," she said.

"However, the letters that slightly older children produce themselves are very messy and variable, and that's actually good for how children learn things," Dr. James said. "That seems to be one big benefit of handwriting."

For typically developing young children, typing the letters doesn't seem to generate the same brain activation. As we grow up, most of us transition from writing by hand to using a keyboard, though

like many who teach college students, I have struggled with the question of laptops in class, more because I worry about students' attention wandering than to promote handwriting. Still, studies on note taking have suggested that "college students who are writing on a keyboard are less likely to remember and do well on the content than if writing it by hand," Dr. Dinehart said.

Dr. Berninger said the research suggests that children need introductory training in hand writing and then some systematic attention to typing.

Using a keyboard, and especially learning the positions of the letters without looking at the keys, she said, might well take advantage of the cells that cross-communicate in the brain, since unlike with handwriting, children will use both hands to type.

"What we're advocating is teaching children to be hybrid writers," said Dr. Berninger, "hand writing first for reading — it transfers to better word recognition. Then, starting in late elementary school, typing."

This may be another case where we should be careful that the digital world doesn't take away significant experiences that can have real impact on children's rapidly developing brains. Mastering handwriting, messy letters and all, is a way of making written language your own, in some important ways.

"My overall research focuses on how learning and interacting with the world with our hands has a really significant effect on our cognition," Dr. James said, "on how writing by hand changes brain function and can change brain development."

1. Based on the contents of the article, which of the following is the most appropriate title?

a. Hand-eye Coordination Is Key Factor
b. Handwriting Still Matters
c. The Disadvantages of Producing Letters
d. Typing More Important Than Writing

2. According to the article, which is NOT an advantage of handwriting?

a. attention to written words
b. better memory of content
c. faster typing skills
d. increased word recognition

3. Which of the following is closest in **meaning** to **(A)**?

a. a larger brain
b. better software
c. more data
d. substantial agreement

4. According to the article, which of the following should come first in the early stages of writing development?

a. correcting messy writing
b. learning to type
c. mastering physical skills
d. taking notes on a computer

5. According to the article, why can good handwriting contribute to academic achievement?

a. Children with good handwriting are likely to overlook the content.
b. Children with good handwriting only focus on producing the letters.
c. Good handwriting helps oral skills to develop.
d. Good handwriting is easier for teachers to read.

6. According to the article, which of the following pairs may be related in handwriting?

a. brain activation and digital world
b. reading and forming letters
c. training and cross-communication
d. visual stimuli and eye movement

7. Which of the following is closest in **meaning** to **(C)**?

a. look at letters with both eyes
b. mentally represent letters
c. put letters from your head
d. visually change letters

8. According to the article, young children who cannot write letters _____.

a. can control brain activation
b. prefer word recognition to production
c. react the same way to letters and shapes
d. use only executive functions to plan

9. According to the article, why is using a keyboard good for children?

a. Brain development will change due to using two hands.
b. Cells can cross-communicate in the brain.
c. Children may become hybrid typists.
d. Learning positions of letters is better for word recognition.

次の問題 [1] , [2] の解答は記述式解答用紙に記入しなさい。

[1] Translate the underlined part **(B)** in the article into Japanese.

[2] In Japan, school children learn to write *hiragana*, *katakana*, and *kanji*. However, due to computers and smartphones, people write less frequently by hand. Do you think college students should use handwriting more frequently? Why or why not?

Write your own ORIGINAL reason in English within 25 words.
Answers over 25 words will not be considered.
Do NOT copy sentences or phrases from the article.

解答用紙の **because** 以降を 25 語以内で書くこと。

II. In each of the following passages **(10-12)**, insert the underlined sentence(s) into the most appropriate position from **(a)** to **(d)**.

10.

They also got fatter and had higher blood glucose levels. Several markers of immune system health also worsened, says the report published in *Current Biology*.

Too Much Light May Take Toll on Muscles and Bones

Every day people are exposed to hours of artificial light from computers, video games, office lights and, for some, 24-hour lighting in hospitals and nursing homes. **(a)** New research in animals shows that excessive exposure to "light pollution" may be worse for health than previously known, taking a toll on muscle and bone strength.

Researchers at Leiden University Medical Center in the Netherlands tracked the health of rats exposed to six months of continuous light compared with a control group of rats living under normal light-dark conditions—12 hours of light, followed by 12 hours of dark. **(b)**

During the study, the rats exposed to continuous light had less muscle strength and developed signs of early-stage osteoporosis*. **(c)**

While research has suggested excessive light exposure could affect cognition, the new research was surprising in that it showed a pronounced effect on muscles and bones. **(d)**

＜注＞

* osteoporosis: 骨粗しょう症

11.

Two mysterious stone rings found deep inside a French cave were probably built by Neanderthals about 176,500 years ago, proving that the ancient cousins of humans were capable of more complex behavior than previously thought, scientists say.

Rings Found in Cave Believed to be Built by Neanderthals

(a)

The structures were made from hundreds of stalagmites* chopped to a similar length and laid out in two oval patterns up to 16 inches high.

(b)

The notion that Neanderthals could have made them defies long-held assumptions that these hominids** were incapable of the complex behavior necessary to work underground.

(c)

Using sophisticated dating techniques, a team led by archaeologist Jacques Jaubert of the University of Bordeaux, France, found that the stalagmites must have been broken off the ground around 176,500 years ago, "making these structures among the oldest known well-dated constructions made by humans."

(d)

＜注＞
*stalagmite(s): 石筍（せきじゅん）
** hominid(s): 旧人類

12.

It had a flexible neck, unlike oceanic dolphins, whose necks are hardly distinguishable from their bodies. She estimates that it lived about 25 million years ago.

A New Dolphin Species, Long Gone, Found in a Drawer

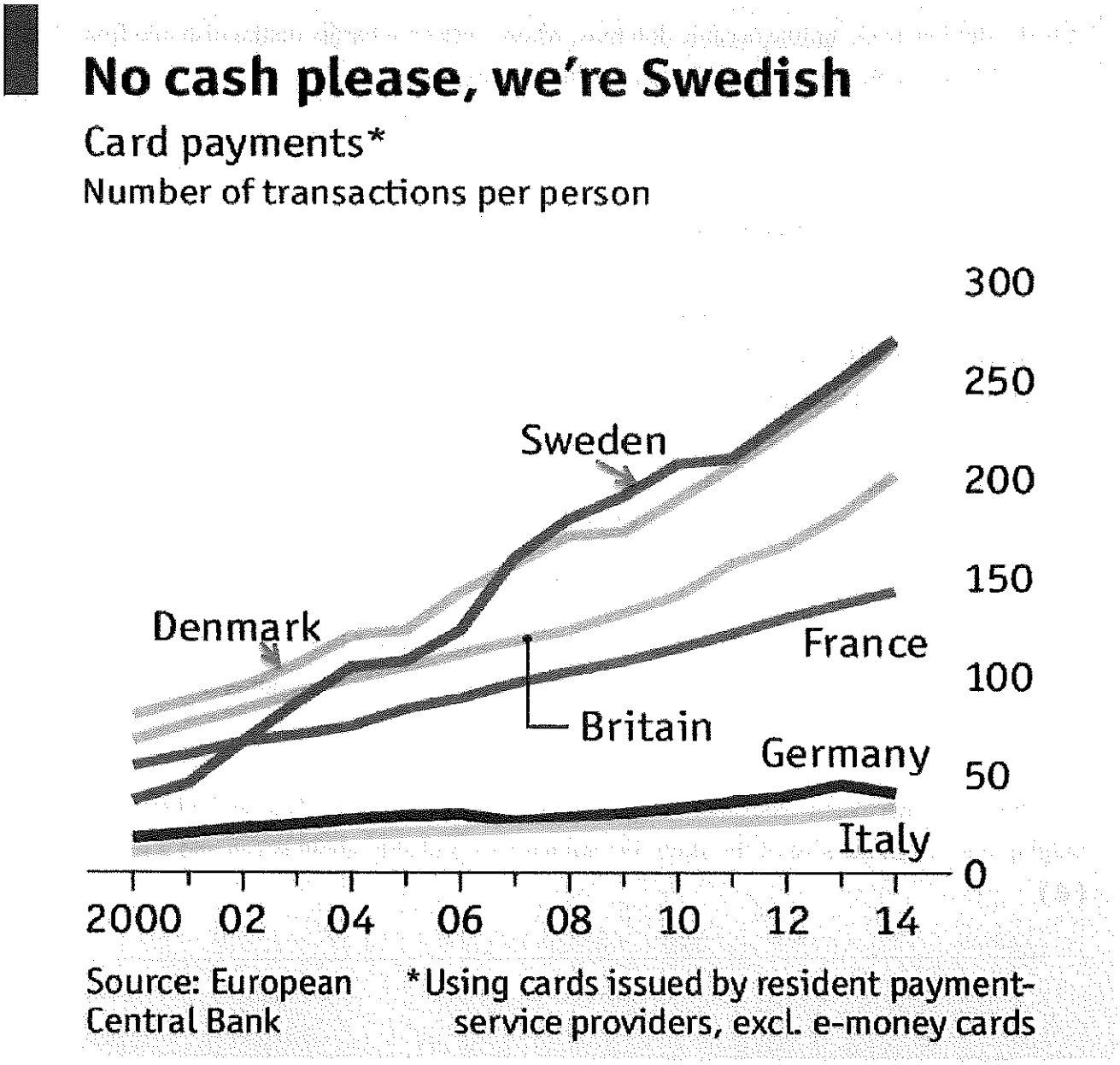
Scientists have determined that a skull that had been sitting in a drawer at the Smithsonian National Museum of Natural History in Washington for more than 60 years belonged to a previously unknown species of extinct dolphin. **(a)**

The animal, whose skull was found in Yakutat, Alaska, in 1951, has been given the name of *Arktocara yakataga*, which can be loosely translated from the Greek as "the north face from Yakutat." **(b)**

There is one descendant of *Arktocara* still existing, the South Asian river dolphin, a freshwater animal that is itself on the edge of extinction. *Arktocara* was almost certainly an oceanic creature. **(c)**

The dolphin's discoverer, Alexandra T. Boersma, a researcher at the National Museum, said that judging only from the size of the skull, the animal was probably about seven and a half feet long. **(d)**

III. Based on the graph below, choose the most appropriate answer to fill in each blank **(13-22)**.



Swedes rarely handle cash; the number of card payments has increased (**13**) by 2014 since 2000 and only one in five payments—5-7% if measured by value—are made in cash today. The situation is similar in Northern Europe; however, in Italy 83% of payments are still in cash. Whereas Norwegians made 456 electronic transactions per person 2016, Italians made only 67 and Romanians 17. Most surprising is Germany's reluctance to (**14**) with "real money". Over three-quarters of German payments are still made in cash.

As countries become richer, they tend to move away from cash on grounds of security, convenience and cost. Consumers may think that cash is free but for banks and retailers it is not. Around 0.5-1% of GDP a year is spent on managing the sorting, cleaning, and moving of cash.

In Scandinavian countries, banks were early promoters of electronic payments and made it easier for customers to use cards. Yet in Germany and much of the south and east, banks have been less proactive. German banks have been much **(15)** to promote electronic and card payments. In Italy relatively few people have credit cards and those who do use them infrequently; in 2010, there were 25 transactions per credit card per year, compared with 114 in **(16)**. This is partly because Italian merchants dislike cards, as banks have tended to charge high fees. In fact, the number of transactions per person by cards in Italy is approximately **(17)** of that in Britain in 2014.

Although digitally **(18)** Scandinavians may be comfortable buying groceries on their smartphones, a deep-rooted aversion to being tracked lies behind German distrust. A recent survey revealed that two in five Germans don't use mobile payments **(19)** concerns about data security. When the German finance ministry recently proposed a limit on cash payments at €5,000, a daily newspaper organized a protest. Italians were equally **(20)** when a limit on cash payments over €1,000 was introduced in 2011. Last year it was loosened to €3,000.

(21) slow progress, once a country reaches 100 card transactions per person per year, people realize they can survive without cash. As the share of transactions made in cash falls, their overall costs increase.

Of course there are negative aspects to moving away from cash. Installing card machines can be costly. The poor, many of whom lack bank accounts, would need to be included. Concerns about losing anonymity are **(22)**. However, cash will always be the obvious contingency in case systems break down.

13.	a. at least 20 times	b. double	c. more than sixfold	d. no less than 300
14.	a. agree	b. comply	c. dispense	d. satisfy
15.	a. better	b. faster	c. slower	d. worse
16.	a. Britain	b. Denmark	c. France	d. Sweden
17.	a. half	b. one-fifth	c. one-tenth	d. two-third
18.	a. awkward	b. independent	c. reluctant	d. sophisticated
19.	a. because of	b. in charge of	c. in spite of	d. regardless of
20.	a. angered	b. distracted	c. encouraged	d. entertained
21.	a. Along with	b. But for	c. Despite	d. Due to
22.	a. deniable	b. incredible	c. reasonable	d. unreliable

IV. Based on the following dialogue, table, and pie chart, answer the questions **(23-31)**.

Tokyo International Conference Center

Professor Oyama (Chairperson): Thank you, Professor Pham. Next, we have our final speaker for today, Professor Yukie Saito. Please give her a round of applause.

Professor Saito: Good morning, and thank you for attending today's session on memory and age. Today I'll be speaking about the timeline of memory from infants to early adolescents. First I will give an overview of memory milestones and next I will talk about **(A)**. Finally, I will answer any questions that you may have. Earlier, Professor Pham mentioned that even infants are able to form short memories. Professor Pham, how old were the infants in your study?

Professor Pham: They were between 0 years and 2 years old.

Professor Saito: So even very young babies were able to form memories. However, as the babies turned 2 or 3 years old, the memories still could not be recalled. In fact, by the time children are **(B)**, they cannot remember approximately 60% of their memories before the age of 3.

Professor Pham: That is a very surprising result, indeed.

Professor Saito: It is not until early adolescence that children can remember events with any accuracy or **(C)** longevity. Next, I'll discuss the kinds of earliest memories that people are most likely to report.

Professor Pham: Could you tell me how many people you asked?

Professor Saito: Of course, there were **(D)** people in total, as shown on the pie chart.

Professor Pham: Thank you.

Professor Saito: Now you can see the different categories of memory.

Professor Pham: There are many different kinds, aren't there? Are there any other memory types that are not represented in the chart?

Professor Saito: Not that I have discovered. As you can see, "Family Moments" is the most frequently remembered category of memory. There may be several reasons for this, such as because the total amount of time spent with family members is higher than other types of events. In my future research, it might be good to categorize all the memory types that people can remember, not just their earliest reported memory. With that remark, I should conclude my presentation. Thank you very much for your attention.

Professor Oyama: Thank you for your presentation today. Do you have any questions or comments, Professor Pham?

Professor Pham: Well, I'm just wondering whether adolescents have the same memory capabilities.

Professor Saito: Perhaps Professor Oyama can speak on that subject at tomorrow's session, as he studies memory in adolescents.

Professor Pham: Ah, I see.

Professor Saito: Thank you for your question. Do you have any more questions?

Professor Pham: **(E)**

Professor Oyama: In that case, we should finish here. Professor Saito, thank you again for your interesting and inspiring talk today. We look forward to hearing more of your research at next year's conference.

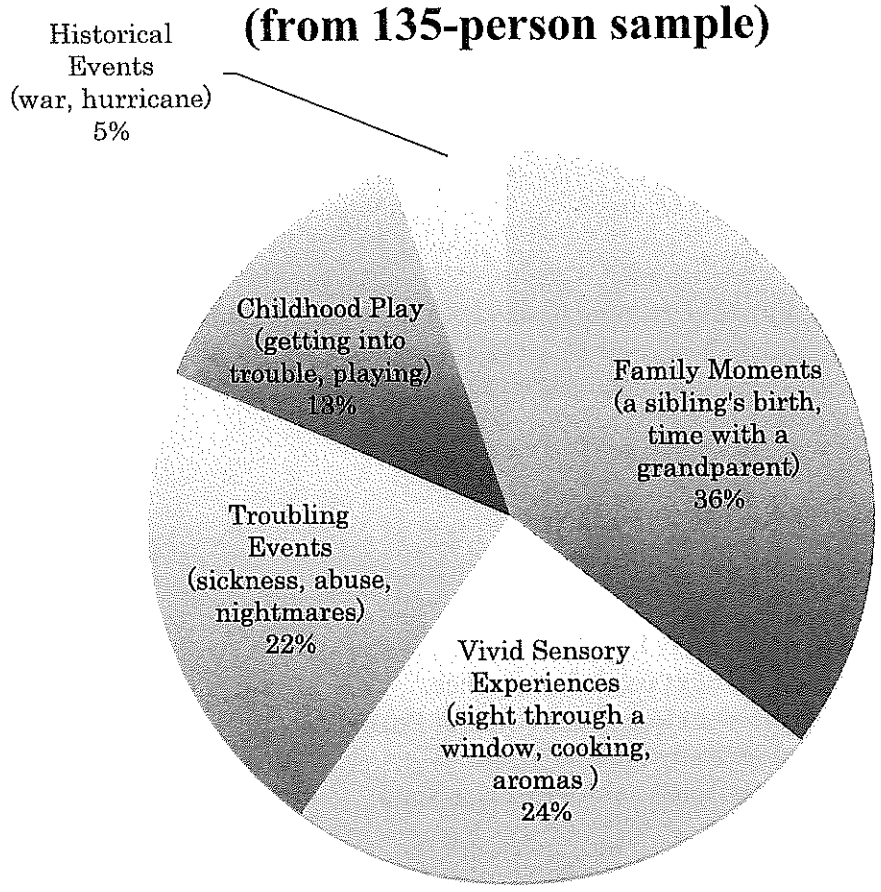
Professor Saito: Thank you very much for attending and for your participation. I'll be available for more questions after this session and later during lunch time.

Memory Milestones

Infant (0–2 years): Research hints that infants form brief memories.
Toddler (2–3 years): Toddlers begin to form memories of facts and events. Yet they are short-lived because the hippocampus*—key for long-term memories—is still maturing.
Young child (4–7 years): Short-term memory improves. Prospective memory—the ability to plan and remember to execute the plan—starts to emerge.
Child (8–10 years): Children have now forgotten about two thirds of their memories before age three. Recall of facts and spatial relationships improves greatly.
Early adolescent (10–12 years): As hippocampal** growth cools down, connections in that region start to be selectively cut, and long-term memory improves. The ability to consciously suppress memories appears to increase as well.

＜注＞
* hippocampus:　海馬　　**hippocampal:　海馬の

Memory Type (from 135-person sample)



23. What does Professor Saito speak about in **(A)**?
a. age of adolescence
b. memory type
c. reported age
d. type of people

24. Which of the following completes the sentence in **(B)**?
a. 3
b. 4-7
c. 8-10
d. 10-12

25. Which of the following is closest in **meaning** to **(C)**?
a. certainty
b. distant time
c. length
d. short term

26. Which of the following completes the sentence in **(D)**.
a. 5
b. 8
c. 135
d. 270

27. Choose the best answer for **(E)**.
a. No, I haven't got it.
b. Not at this time, thank you.
c. Yes, I will consider it later.
d. Yes, let's proceed to the next one.

28. If a person could remember spending time reading books with their parents, this would best be classified as a ___ memory type.

a. childhood play
b. family moment
c. historical event
d. troubling event

29. Based on the dialogue, what will most likely happen next?
a. Everyone will leave and prepare for next year's conference.
b. People will start to talk with Professor Oyama or Professor Pham.
c. The audience members will stop listening and eat lunch.
d. The session will end and people can speak with Professor Saito.

30. Based on the dialogue, what will Professor Saito be most likely to speak about at next year's conference?

a. A topic that Professor Pham proposes
b. At what age people stop remembering things
c. Memory types for all childhood memories
d. The effects of infants and memory aging

31. Which of the following would be the best name for this presentation?
a. A Study of Older People and Memory Topics
b. Humans' Long-Term Memory
c. The Problem of Time and Memory
d. Young Children and First Reported Memories