E－1

千葉大学

平成31年度入学者選抜学力検査問題

英　　　語

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E－1

千葉大学

平成３１年度個別学力検査等（前期日程）問題

問題冊子配付時の補足説明（著作権処理後）

英語

著作権者から得た出典表記は以下になります。

大問 Ｉ

Does Math Make You Smarter? by Manil Suri, The New York Times, April 13, 2018 (c) 2019 New York Times

大問 Ⅱ

"Life History" by Alison Gopnik from THIS IDEA IS BRILLIANT by JOHN BROCKMAN, Copyright(c) 2018 by Edge Foundation,Inc., Reprinted by permission of HarperCollins Publishers.

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I 次の文章を読み，問１～５の設問に答えなさい。＊が付いている語には，本文の後ろに注があります。

Does studying mathematics enhance your overall mental prowess*?

Abraham Lincoln certainly believed so, embarking on the arduous* task of mastering Euclid's treatises* on geometry to increase his cognitive capacities, in particular his linguistic and logical abilities. This idea — that mathematics strengthens your mind much as physical exercise strengthens your body, helping you negotiate a variety of mental challenges — goes all the way back to Plato. Alive and well in today's world, it is one reason popularly given for why everyone should study mathematics.

So it can come as a surprise (1) to learn that cognitive psychologists have a different take on the issue. Various studies point to the conclusion that subjecting the mind to formal discipline — as when studying geometry or Latin — does not, in general, engender* a broad transfer of learning. There is no sweeping increase of a general capacity for tasks like writing a speech or balancing a checkbook.

But surely a narrower claim is true: that mathematics, so systematically built as it is on inference*, must develop logical thinking. Right?

By "logical," I mean the kind of thinking needed to solve the following problem: Four cards are laid in front of you, each of which, it is explained, has a letter on one side and a number on the other. The sides that you see read E, 2, 5 and F. Your task is to turn over only those cards that could decisively prove the truth or falsity of the following rule: "If there is an E on one side, the number on the other side must be a 5." Which ones do you turn over?

Clearly, the E should be turned over, since if the other side is not a 5, the rule is untrue. And the only other card that should be flipped is the 2, since an E on the other side would again disprove the rule. Turning over the 5 or the F doesn't help, since anything on the other side would be consistent with the rule

— but not *prove* it to be true.
(2)

This innocuous*-looking puzzle, a variation of which was introduced by the British psychologist Peter Wason in 1966, has been called "the single most investigated paradigm in the psychology of reasoning." If you answered E and 2, congratulations: You are among the roughly 10 percent of the public able to solve the puzzle. Many reasons have been advanced for this poor showing, including the lack of relevance of such an abstract exercise to people's daily lives.

Most people reflexively* eliminate the cards not explicitly specified in the rule (the F and the 2) and then continue with slower, more analytic processing only for the E and the 5. In this, they rely on an initial snap judgment about superficial similarity, a tendency that some scholars speculate* evolved in humans because in most real-world contexts, quickly detecting such similarities is a good strategy for survival.

Interestingly, though, it turns out that if the puzzle's abstract rule is translated into terms that are logically equivalent but grounded in real-world experience — as in, "If someone is drinking beer at a bar, she must be at least 21 years of age" — then the success rate jumps to 75 percent or more.

I learned about the Wason selection task and its intricacies* from a fascinating recent book, "Does Mathematical Study Develop Logical Thinking?" by the education and cognition researchers Matthew Inglis and Nina Attridge. They conducted experiments that found that (3) university students studying mathematics were just as likely as those studying history to quickly reject the F and the 2 cards. But differences emerged in the slower, more effortful cogitative* phase that followed, leading to divergent success rates in the end: 18 percent for the mathematics students versus 6 percent for the history students.

Based on results from a slate of such reasoning tasks, Dr. Inglis and Dr. Attridge show that studying higher mathematics (at the advanced secondary and college levels) does lead to an increase in logical ability. In particular, mathematics students become more skeptical* in their reasoning — they begin to think more critically.

But these gains, though significant enough to establish a causal relation between mathematics education and logical thinking, are too modest to settle the debate on how much mathematics should be prescribed as part of a general education, and for which students. (An 18 percent success rate is hardly compelling.) Moreover, there is the possibility of a self-selection effect: Students with the greatest potential to get a benefit in their logical reasoning might be disproportionately attracted to mathematics classes in the first place, so these gains might not apply to the entire population.

In any event, the most crucial finding of such research, in my view, is how much insight the psychological study of learning can contribute to the practical teaching of mathematics — two fields of endeavor that are too often pursued separately. It is sadly telling that while the Wason selection task is well known among psychologists, it is not familiar to most mathematicians and math teachers.

(4) I propose we start to teach the Wason selection task in mathematics courses at the high-school level and higher. The puzzle captures so much that is essential to mathematics: the nuts and bolts of inference, the difficulty of absorbing abstract concepts when removed from the context of real-world experience, the importance of a deliberative cogitative process and the pitfalls of instant intuitive judgments. I presented the puzzle to a recent college class of mathematics majors and they listened with rapt* attention afterward — startled by their lowly 19 percent success rate.

Logical thinking may be promoted by mathematics, but it is a gradual and complex learning process. Psychological insight into learning, such as that offered by Wason's puzzle, can give students a head start by educating them on the challenges they will face.

出典：Manil Suri. "Does Math Make You Smarter?" *The New York Times*, April 13, 2018.

（注）

prowess　優れた能力
arduous　困難な
treatises　論文
engender　生じさせる
inference　推論
innocuous　どうということもない
reflexively　反射的に
speculate　推測する
intricacies　複雑さ
cogitative　思考の
skeptical　懐疑的な
rapt　うっとりした

問 1　下線部(1)はなぜ "surprise" となるのですか。その理由を日本語で説明しなさい。

問 2　下線部(2)の "it" の具体的な内容を日本語で述べなさい。

問 3　"those" が何を示すかを明らかにして，下線部(3)を日本語に訳しなさい。

問 4　下線部(4)のように筆者が提唱する理由を日本語で述べなさい。

問５　次の文は本文を要約したものです。①〜⑩に入る最も適切な語を下の表のイ)〜ヨ)から選び，その記号を書きなさい。ただし，文頭の語も小文字で表記しています。

It is often said that mathematics enhances our mental prowess. This idea (①) came from Plato. However, some cognitive psychologists (②) with this view. Various studies suggest that it doesn't enhance our (③) to carry out other tasks. In order to (④) the connection between mathematical skill and logical thinking, a puzzle using cards was introduced. Although the puzzle did not look (⑤), only about 10 percent of people were able to solve it. This poor result is (⑥) to be due to the lack of relevance of the task to people's daily lives. When trying to solve the puzzle, many people (⑦) to start by making quick and superficial judgments. This is because they use the skills they (⑧) in real-world contexts. Other experiments revealed greater logical ability in students who studied mathematics at a higher level. (⑨) these factors, it is difficult to decide how much mathematics students should study as part of their general education. We can (⑩) from this research that studying the psychology of learning can enhance the practical teaching of mathematics.

イ)	ability	ロ)	agree	ハ)	although	ニ)	asked
ホ)	complicated	ヘ)	conclude	ト)	despite	チ)	developed
リ)	disagree	ヌ)	investigate	ル)	originally	ヲ)	tend
ワ)	tending	カ)	said	ヨ)	says		

Ⅱ 次の文章を読み，問１～７の設問に答えなさい。＊が付いている語には，本文の後ろに注があります。

Imagine that an Alpha Centauran* scientist came to Earth 150,000 years ago. She might note in passing that the newly evolved *Homo sapiens* were just a little better at tool use, cooperation, and communication than were their primate* relatives. But as a well-trained evolutionary biologist, she'd be far more impressed by their remarkable and unique life history.

"Life history" is the term biologists use to describe how organisms change over time: how long an animal lives, how long a childhood it has, how it nurtures its young, how it grows old. (1)Human life history *is* weird. We have a much longer childhood than any other primate — twice as long as chimps — and that long childhood is related to our exceptional learning abilities. Fossil teeth suggest that this long childhood evolved in tandem* with our big brains; we even had a longer childhood than Neanderthals. We also rapidly developed special adaptations to care for our helpless children — "pair-bonding*" and "alloparents*." Fathers and unrelated kin help take care of human children, (2)which is not the case with our closest primate relatives.

And we developed another unusual life-history feature — post-menopausal* grandmothers. The killer whale is the only other animal we know of that outlives its fertility. The human life span expanded at both ends — a longer childhood and a longer old age. In fact, anthropologists have argued that (3)grandmothers were a key to the evolution of learning and culture. They were crucial for the survival of those helpless children, and they also could pass on two generations' worth of knowledge.

Natural selection often operates on life-history characteristics, and life history plays an important role in evolution in general. Biologists long distinguished between "K" species and "R" species. R species — most fish, for example — may produce thousands of offspring, but most of them die and the rest live only a short time. In contrast, K species — like primates and whales — have only a few babies, invest a great deal in their care, and live a long time. Generally speaking, a K life-history strategy is correlated with a larger brain and higher intelligence. We are (4) the ultimate K species.

Life history is also important because it's especially responsive to information from the environment, not only over evolutionary time but also in the lifetime of a single animal. Tiny water fleas* develop a helmet when they mature to protect them from certain predators*. When the babies, or even their pregnant mothers, detect more predators in the environment, the developmental process speeds up — the helmets grow earlier and larger, even at a cost to other functions. In the same way, in other animals, including human beings, early stress triggers a "live fast, die young" life history. Young animals who detect a poor and risky environment grow up more quickly and die sooner.

Our unique human developmental trajectory* has cumulatively* led to much bigger differences in the way we live and behave. (5) A hundred and fifty thousand years ago, the Alpha Centauran biologist wouldn't have seen much difference between adult humans and our closest primate relatives — art, trade, religious ritual, and complex tools were still far in the future, not to mention agriculture and technology. Our long childhood and our extended investment in our children allowed those changes to happen; think of all the grandmothers passing on the wisdom of the past to a new generation of children. Each human generation had a chance to learn a little more about the world from their caregivers, and to change the world a little more themselves.

Evolutionary psychologists have tended to focus on adult men; hunting and fighting got a lot more attention than caregiving. We've all seen the canonical* museum diorama of the mighty early human hunters bringing down the mastodon*. But the children and grandmothers in the background (6) were just as important parts of the story.

You still often read psychological theories describing both the young and the old in terms of their deficiencies, as if they were just preparation for, or decline from, an ideal grown-up human. But new studies suggest that both the young and the old may be especially adapted to receive and transmit wisdom. We may have a wider focus and a greater openness to experience when we're young or old than we do in the hurly-burly* of feeding, fighting, and reproduction that preoccupies our middle years.

"Life history" is an important idea in evolution, especially human evolution. But it also gives us a richer way of thinking about our lives. A human being isn't just a collection of fixed traits but part of an unfolding and dynamic story. (7) And that isn't just the story of our own lives; caregiving and culture link us both to the grandparents who were there before we were born and to the grandchildren who will carry on after we die.

出典：Alison Gopnik. "Life History." Brockman John (ed.), *This Idea Is Brilliant: Lost, Overlooked, and Underappreciated Scientific Concepts Everyone Should Know* (pp.325-328). Harper Perennial, 2018.

（注）

Alpha Centauran　ケンタウルス座アルファ星の
primate　霊長類（の）
in tandem　同時に
pair-bonding　雌雄の絆
alloparents　親代わり
post-menopausal　閉経後の
water fleas　ミジンコ
predators　捕食動物
trajectory　軌跡
cumulatively　累積的に
canonical　標準的な
mastodon　マストドン（長鼻類の哺乳動物）
hurly-burly　大騒ぎ

問 1　下線部(1)について，筆者がこう主張する理由は何ですか。日本語で答えなさい。

問 2　下線部(2)の “which” が指し示すもの（先行詞）は何ですか。該当する部分を英語で抜き出しなさい。

問 3　下線部(3)について，人類学者がこのように述べている理由は何ですか。日本語で説明しなさい。

問 4　下線部(4)の “K species” とはどういうものですか。日本語で説明しなさい。

問 5　本文の内容に則して，下線部(5)を if を使って意味が同じになるように書き直しなさい。

問 6　下線部(6)の文末に省略されている語句を補いなさい。

問 7　下線部(7)について，筆者がこう主張する理由は何ですか。日本語で答えなさい。

Ⅲ 次の文章は欲張り男にまつわる小話です。1～5のかっこ内に，意味が通じるように4語から10語程度の適切な英語を書き入れて，ストーリーを完成させなさい。

Story of a Greedy Man

Once there was a greedy and selfish man, who always wanted to have lots of money and never hesitated to cheat others to make some more. Also, he never wished to share anything with others. He was so selfish that he preferred to keep everything for himself.

This selfish man used to calculate every small aspect of his life and he paid very little to all his servants. He also told a lot of lies to protect his wealth, until one day he was taught a good lesson by his own act.

While hunting in the forest, he lost a small bag, which contained 50 gold coins, so he started searching for the bag of gold coins day and night. He even sent his workers to search for the bag, but (1). He told everyone that he had lost a bag of gold coins and requested them to inform him if they found it. The greedy man was furious for losing so many gold coins.

After a couple of days a ten year old girl, who lived near his house, told her father that she had found a small bag containing 50 gold coins. Her father worked for the greedy man, so he knew that the bag belonged to his master and decided to return it to him.

They were very poor and the father (2), but he was so honest that he felt obliged to return the valuable coins to his master. However, when he returned the bag to his master, the greedy man decided to take advantage of the situation and trick the man to make some more money. So, after counting the money in the bag he started shouting:

"There were 75 gold coins in this bag and you gave me only 50! (3)? You certainly stole them!"

The worker was shocked to hear this and he pleaded to his master that he had returned the exact amount he had found. Selfish and greedy, his master did not believe his story and decided to take the issue to court.

After hearing both sides, the judge asked the worker and his daughter how many coins they had found in the bag and they swore once more it was only 50. To that, the greedy man replied:

"My lord, I had 75 gold coins in my bag and they gave me only 50. Hence, it is quite obvious that (4)!"

The judge then asked:

"Are you sure that your bag had 75 coins?"

"Yes I am certain, my bag contained exactly 75 coins."

The judge took a moment and then made his final judgment:

"Since this gentleman lost a bag of 75 gold coins and the bag found in the forest by this girl has only 50 coins, it is obvious that (5) and it was probably lost by someone else. As there are no claims against the loss of 50 coins, I order this man and his daughter to take the 50 coins as a token of appreciation for their honesty!"