

英 語

問題冊子 2

注 意

「問題冊子 2」に印刷されている問題は、**2** から **4** までで、2 ページから 14 ページまであります。

2 次の対話の文章を読んで、あとの各問に答えなさい。

(*印の付いている単語・語句には、本文のあとに〔注〕がある。)

Four students, Ryoko, Tommy from Sweden, Zoe from the United States, and Kohei are talking in their classroom.

Ryoko: How was your first summer vacation in Japan, Tommy?

Tommy: It was great! My host parents took me to Kumamoto because I wanted to see the castle there.

Zoe: What is so special about the castle?

Tommy: A lot of creative ideas were used to build it.

Zoe: For example?

Tommy: Its stone *foundation was very difficult to climb up and come inside.

Kohei: Ah, I have heard about that.

Tommy: Have you? Then, how about this? The castle had edible walls.

Zoe: What? We can eat the walls?

Tommy: You could. The walls were made of plants, so if *samurai* had to stay in the castle for a long time and couldn't get food, they could eat the walls of the castle.

Kohei: Really? My cousin is doing research on "edible walls."

Zoe: Do we have edible walls in a modern world? I want to know more!

Kohei: People at his college are studying *concrete and he is one of them. They are all studying ways to make concrete more sustainable.

Ryoko: Oh, I've just learned that word. If something is sustainable, it can be used for a long time without causing damage to the environment, right?

Kohei: Yes. Concrete is difficult to recycle. Also, when it is *disposed of, it causes serious damage to the environment.

Tommy: I can imagine that. How is concrete produced?

Kohei: Concrete is made by mixing cement, water and other *materials.

Zoe: What does cement do?

Kohei: It acts like *glue. Every year, more than 4 billion tons of cement is produced. An *impact on the environment is made when cement is produced, carried to and used at the *construction *site. This whole process produces 8% of the world's CO₂, more than from airplanes and ships.

Zoe: Oh, that's a serious problem.

Kohei: They first found a way to recycle concrete by breaking used concrete down into small

pieces and pressing them together again. This process gave them a new idea.

Ryoko: What was it?

Kohei: Making concrete from food loss.

Zoe: Food loss?

Kohei: Vegetables and fruits that are below some standards and cannot be sold in stores. Or, the parts that food factories do not use for their products.

Ryoko: Did you know every year 1.3 billion tons of food, about 30% of the food produced for humans, is lost and wasted around the world? In Japan, the number reaches 6.12 million tons.

Tommy: Then their concrete can be a solution.

Kohei: The kind of food they use decides how strong concrete can be. I was thinking pumpkin could be a good material because its skin is hard. However, concrete made from pumpkin skin is the weakest. On the other hand, concrete made from *hakusai* is almost *twice as strong as concrete made from other foods.

Zoe: Why is that?

Kohei: The researchers think a good balance between *fiber and sugar in *hakusai* makes it strong. The concrete made from *hakusai* can be stronger than normal concrete.

Ryoko: That's surprising!

Kohei: Concrete made from food reduces CO₂ and food loss. Also, we don't need to worry about the limited *resources necessary for cement, and we can dispose of the concrete without damaging the environment.

Zoe: It's really cool that we can help with many problems at the same time!

Tommy: On top of that, we can eat the walls made of that concrete, like the ones in the castle I visited.

Kohei: Yes, that's right.

Zoe: Oh, that's the "cherry on top!"

Ryoko: What? You need a cherry now?

Zoe: No. That means (1).

Kohei: Exactly!

Ryoko: Is there any other sustainable concrete?

Tommy: I heard about a new concrete invented by a Japanese company and a university in Europe. It is a concrete that can repair itself.

Zoe: Self-repairing concrete? I'm curious!

Tommy: Concrete is a very strong material, but it is weak when it is pulled. When it is dry, it *cracks. To cover these weak points, *steel bars are put inside.

Ryoko: Oh, I have seen them before.

Tommy: However, this cracking allows air and water to come inside and damage the steel bars. As a result, the concrete *structure suffers serious damage and falls down.

Zoe: True. It's better if we can use safer concrete structures for longer, right?

Tommy: Yes. So, they have invented a concrete that repairs cracks just like our skin repairs itself.

Ryoko: Sounds wonderful, but how does it work?

Tommy: By using a special kind of bacteria. First, we create small *capsules that have the bacteria and a *substance called *polylactic acid* inside. That substance is their food.

Zoe: OK.

Tommy: Next, we mix these capsules into the concrete. *Polylactic acid* slowly changes into *calcium lactate* in the concrete, but the bacteria can't do much in the strong concrete. Sometimes, cracks appear in the concrete.

- (2)
- ① They eat the *calcium lactate* and turn it into something called *calcium carbonate*.
 - ② *Calcium carbonate* is like a natural glue.
 - ③ When it rains or air gets into these cracks, that changes the condition of concrete.
 - ④ This change wakes up the bacteria, and they start growing and increasing in number.
 - ⑤ When all the cracks are filled and the concrete is strong again, the bacteria go back to sleep.
 - ⑥ It fills the cracks and repairs the concrete.

They rest until they are needed again.

Kohei: Wow, it's really like magic! People are putting in great efforts to be sustainable!

Ryoko: Let me share my experience. Last weekend, I went to Ginza to see the new 12-*story building made of wood.

Zoe: Is it possible to build such a tall building with wood?

Ryoko: Yes. Though concrete was also used, such as in its foundation, it's still amazing. Now, a Japanese company is planning to build a 70-story building that will be made of 90% wood.

Kohei: Are they the only examples of such buildings?

Ryoko: There are a few more already, and many more are coming up. The number is increasing in many other countries, such as in the United States and in Canada.

Tommy: Actually, my country is one of the first countries ₍₃₎ 【① made ② produced ③ the local area ④ tall buildings ⑤ wood ⑥ of ⑦ in ⑧ to build】.

Zoe: I'm sure it is. But why are people trying to use wood for tall buildings?

Ryoko: First, we can greatly reduce CO₂ if we use wood. Second, wood is a sustainable resource. If we take good care of forests and cut trees in a planned way, we will always have enough trees.

Tommy: Also, because wood is lighter than concrete, we need smaller machines, smaller foundations, and fewer construction workers. Wood can be cut at the factory before we use it. We just have to put the pieces together at the construction site. As a result, wood allows faster and quieter construction, with more eco-friendly materials, less waste, and less CO₂.

Kohei: But Japan is known as a country of earthquakes. Are those buildings strong enough?

Ryoko: Yes. The key is ⁽⁴⁾a new material called “CLT.” CLT looks like a thick wood board, but it is actually a lot of thin wood boards put together. However, the directions of the fibers are important. Wood is strong in the direction of its fibers, but weak in other directions. So, if the boards are put on top of each other in a way that puts their fibers at 90 degrees to each other, they become stronger than normal wood boards. Actually, CLT is stronger than concrete or steel of the same weight.

Zoe: Is CLT strong against fire, too?

Tommy: That’s another very important point. Actually, wood takes time to start burning. CLT takes longer to catch fire than normal wood boards because CLT is made of many boards. When the CLT board closest to a fire *chars, it slows down the temperature rise in other boards. It takes about two to three hours before all the boards become hot and char. This is more than enough time to escape from most buildings. After the fire, charred boards can be changed for new ones.

Kohei: Many years ago, people would never think they would be able to “eat” concrete or that they would build tall buildings out of wood.

Zoe: True. ⁽⁵⁾I want to share these great ideas with my classmates!

〔注〕 foundation	土台	concrete	コンクリート
dispose of ~	~を処分する	material	物質
glue	接着剤	impact	影響
construction	建設	site	現場
twice as...as	2倍…だ	fiber	繊維
resource	資源	crack	ひび割れる
steel	鋼鉄	structure	構造物
capsule	カプセル	substance	物質
~ story	~階建の	char	炭になる

〔問1〕 本文中の空所 (1) に入るものとして最も適切なものは、次の中ではどれか。

- ア something people add to the walls to make them delicious
- イ something that makes the walls more attractive
- ウ something the walls need to become sustainable
- エ something you put on the walls to make them useful

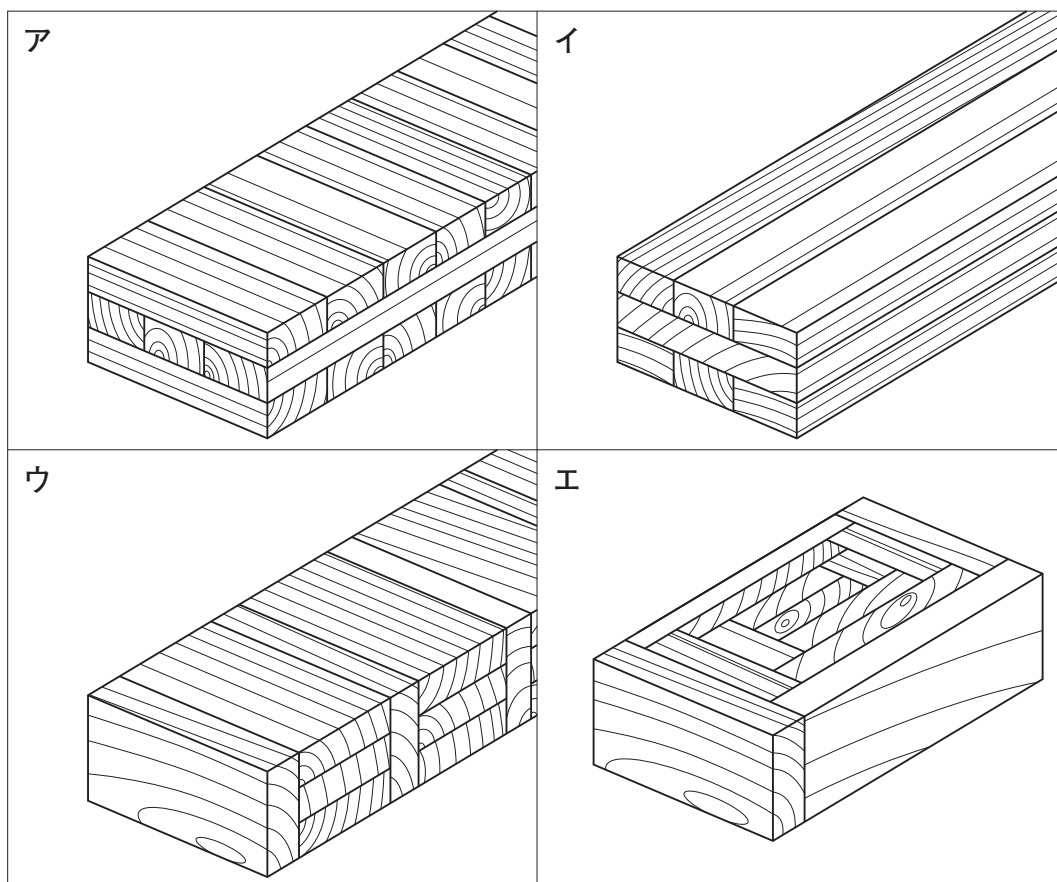
〔問2〕 ⁽²⁾ 中の①～⑥を適切な順番に並べたとき、2番目と5番目にくるものの組み合わせとして最も適切なものは、次のア～カの中ではどれか。

	2 番目		5 番目
ア	①	—	③
イ	①	—	④
ウ	④	—	⑤
エ	④	—	⑥
オ	⑥	—	②
カ	⑥	—	④

〔問3〕 ⁽³⁾ 【① made ② produced ③ the local area ④ tall buildings ⑤ wood ⑥ of ⑦ in ⑧ to build】 とあるが、本文の流れに合うように、【 】内の単語・語句を正しく並べかえたとき、①～⑧の中で3番目と5番目と7番目にくるものの組み合わせとして最も適切なものは、次のア～カの中ではどれか。

	3 番目		5 番目		7 番目
ア	①	—	⑤	—	⑦
イ	①	—	⑧	—	②
ウ	②	—	③	—	⑥
エ	②	—	④	—	⑦
オ	⑧	—	①	—	②
カ	⑧	—	⑤	—	⑦

〔問 4〕 (4) a new material called "CLT." を表す図として最も適切なものは、次の中ではどれか。



〔問5〕 ⁽⁵⁾ I want to share these great ideas with my classmates! とあるが、次のスライドは、Zoe が Ryoko, Tommy, Kohei と一緒に後日英語の授業で行ったプレゼンテーションの目次である。下のプレゼンテーションの**原稿**の空所 に **30 語以上の英語**を自分で考えて書きなさい。

英文は二つ以上にしてもよい。なお、「,」「.」「!」「?」などは語数に含めないものとする。また、I'll のような「'」を使った語や e-mail のような「-」で結ばれた語はそれぞれ 1 語と扱うこととする。

スライド

A Creative Idea to be Sustainable

1. What is edible concrete?
2. Why is edible concrete sustainable?
 - (a) CO₂
 - (b) food loss
 - (c) resources
 - (d) the way of disposing
3. Final Message

原稿

Hi, I'm Zoe. I'm going to explain why edible concrete can be sustainable from the point of food loss.

Thank you. Next, Kohei will explain that edible concrete can be a solution to the other problems.

〔問6〕 本文の内容と合っているものを、次のア～クの中から二つ選びなさい。

- ア In the castle Tommy visited, *samurai* ate the walls made of plants in emergencies, so he saw many holes in the walls.
- イ The biggest environmental impact of concrete is the CO₂ produced when the concrete is carried to the construction site by airplane and ship.
- ウ Every year, about 30% of the food produced for humans is lost and wasted around the world, and Japan holds responsibility for about 5% of that loss and waste.
- エ The good balance between fiber and sugar makes concrete made from *hakusai* stronger than concrete made from other foods.
- オ If concrete structures are damaged, they can be repaired by covering cracks with a thin material like skin.
- カ The new 12-story building in Ginza was made of 90% wood, and it is the first of its kind in the world.
- キ Thanks to construction using wood, it is possible to build tall buildings faster and in a more sustainable way than using concrete.
- ク The way boards are put together in CLT makes it strong against fire because the different fiber directions make CLT burn fast and char.

3 次の文章を読んで、あとの各問に答えなさい。

(*印の付いている単語・語句には、本文のあとに〔注〕がある。)

Do you still remember what you ate for lunch a week ago? Do you remember the name of a train station you used only once? If you don't remember them, don't worry. ⁽¹⁾You are not alone. Everybody experiences this every day. There are things you can easily remember, and things that you easily forget. For example, you will not forget the movie you watched with your best friend, but you could forget your ID and password. Though you remember and forget different things, everyone wishes for a good memory. (2) - a

Memories are *formed in an area called the *hippocampus in the *brain. A lot of kinds of memories are formed there. First, your brain works very hard to remember everything it experiences, although you don't notice that. The information it receives is put in the hippocampus, and after that the brain selects the information to keep. When it is kept in your brain, it becomes a memory. If you don't use a memory in your brain, the memory will become weaker and weaker, and you will forget it in the end. So, if you want to remember something for a long time, you need to use it. A person who knows a lot of English words uses new words many times a day to remember them all. Also, when you meet a person for the first time, it is a good idea to call his or her name often. (2) - b

Having a good memory seems good because people don't want to forget anything. Do you think you would feel happy if you could remember everything? How about your brain? It already has a lot of information and more information is still coming in. It has to *cope with all this information for you. (2) - c

*Neuroscientists were interested in a good memory and wanted to know how the brain forms memories. They thought forgetting was a problem with the memory systems because the brain's mission was to get and keep information. For a long time, scientists have known that our brain has a memory tool box and that it is used to form memories. However, over the past ten years or so, scientists did experiments on small fish and discovered that their brain removes some old memories and prepares space for new information. They also found that their brain has a different memory tool box for forgetting in the same area. This is true for humans because humans and animals have the same brain system. Some memories are kept in our brain, and others are removed from it by using these memory tool boxes. (2) - d

How does the brain decide which information it should remember? Among the memories in our brain, it chooses the important ones to save, and they become strong memories.

(3)

ア In the past, there were some memories that were necessary for both people and animals to survive. イ If they didn't remember the places to get food and where dangerous spots were, it would be a serious problem. ウ Humans developed writing to pass the memories to their children. エ So, some old information is saved if it is important. オ At the same time, some new information is removed if it's not important.

Now we are living in an *information age. We get more information than in the past, so our brain is busier now to survive in this modern sea of information.

While you are *awake, information is always coming into your brain. By the end of a day, your brain has become full of memories. Your brain cannot cope with all of them. So, it will say, "Oh no. There's no more space for new memories. I need to forget some information that is not important." Forgetting is one of the many actions needed to survive. When you eat and drink to survive, these actions only take a short time. However, when the brain removes *unnecessary information and keeps the important information to survive, it takes a longer time. Although it is still a mystery why we sleep, this forgetting *function of the brain can be one of the reasons for it. Probably you have felt that your head is clearer when you wake up. This may happen because

As you have already read, visiting the same memory many times makes the memory . It also has another function. It will help you forget some bad memories. Have you ever felt after you talk with someone about your bad memories? If you have, there is a good reason for that. When you talk with someone about them, you have to bring back the bad memories and this is not easy. However, this remembering may lead to forgetting them. While you are looking back on them, your brain can use the memory tool box for forgetting.

If your brain couldn't *release unnecessary information, this could be a headache. If you had such a brain, you would have to live with all the information that you get every day. You couldn't forget anything at all. You couldn't even forget unnecessary things, such as the color of a car that passed by a minute ago. It could be really hard to cope with all the memories in your brain. If you saw the same dog in the morning and the evening, your brain couldn't recognize that you saw the same dog because they looked different. If your memory is too good, it would be difficult for you to understand the world around you.

Memory needs remembering and forgetting at the same time. Forgetting in balance with memory is useful to survive in this *fast-moving information age. Also, if forgetting is used in effective ways, it helps you to move forward and live a better life. As this *passage shows, . Please do not forget this!

〔注〕 form 形成する	hippocampus 海馬（大脳の一部の名前）
brain 脳	cope with ～ ～を処理する
neuroscientist 脳科学者	information age 情報化時代
awake 目覚めている	unnecessary 不必要な
function 機能	release 放出する
fast-moving 急速に進む	passage 文章

〔問 1〕 ⁽¹⁾ You are not alone. のここでの意味として最も適切なものは、次の中ではどれか。

- ア You will find someone who has the same problem.
- イ Somebody is standing right next to you.
- ウ Nobody wants you to be alone.
- エ You have shared some time with other people.

〔問 2〕 文章の流れに合うように、本文中の空所 ～ の中に次のア～エを入れるとき最も適切なものは、それぞれ次の中ではどれか。

- ア By repeating it, you can remember it better.
- イ Now, scientists know that forgetting is not a mistake by the brain.
- ウ So, your brain may not feel the same.
- エ But what exactly is memory?

〔問 3〕 ⁽³⁾ の中のまとまりをよくするために取り除いた方がよい文は、下線部ア～オの中ではどれか。

〔問 4〕 文章の流れに合うように、本文中の空所 に 15 語以上の英語を書きなさい。

英文は二つ以上にしてもよい。なお、「,」「.」「!」「?」などは語数に含めないものとする。また、I'll のような「'」を使った語や e-mail のような「-」で結ばれた語はそれぞれ 1 語と扱うこととする。

〔問5〕 文章の流れに合うように、本文中の空所 と に英語を入れるとき最も適切な組み合わせは、次のア～エの中ではどれか。

	(5) - a		(5) - b
ア	stronger	－	lighter
イ	stronger	－	heavier
ウ	weaker	－	lighter
エ	weaker	－	heavier

〔問6〕 本文中の空所 に入るものとして最も適切なものは、次の中ではどれか。

- ア by remembering and forgetting, you can tell what is good or bad
- イ when you believe that something is bad, it will never turn into a good thing
- ウ if something gives you a headache, you should think it's a positive sign
- エ everything has two sides, so don't decide something is good or bad too early

〔問7〕 本文の内容と合っているものを、次のア～クの中から二つ選びなさい。

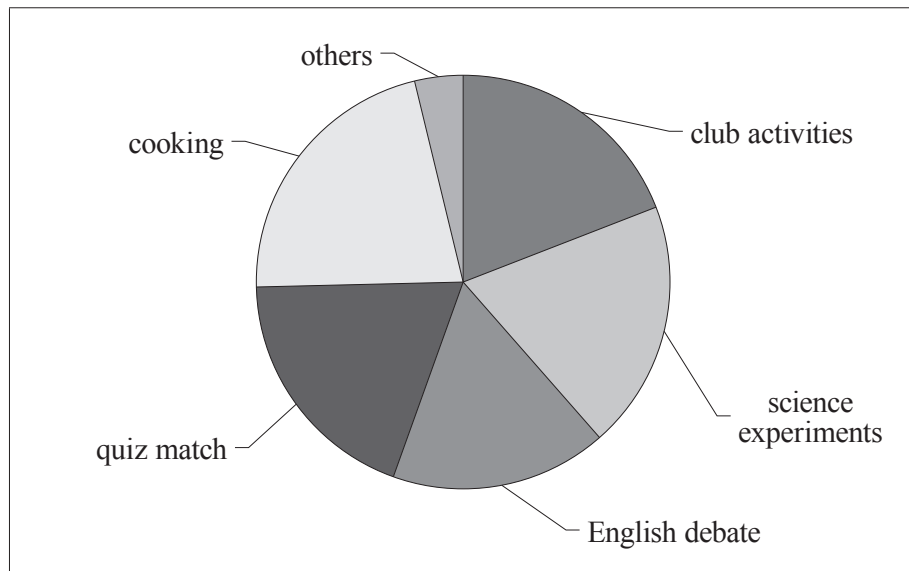
- ア The movie you watched with your best friend is harder to remember than the lunch you ate a week ago.
- イ The brain selects which information to keep and it sends the information to the hippocampus.
- ウ If someone you first met calls your name often, that means his brain is trying to cope with too much information.
- エ Over the past ten years, scientists have discovered a memory tool box which is used to form memories.
- オ Through the experiments on small fish, scientists discovered that there was another memory tool box used to forget things.
- カ Our brain does not have to work as hard as in the past because we are now in an information age.
- キ More time is needed to eat and drink to survive than to choose which memory is necessary to keep.
- ク You sometimes need to remember things that make you feel bad when you want to forget them.

4 Hibiya 高校の生徒会は、交換留学生の体験入学で一緒にどのようなことをするのか、話し合おうとしています。生徒アンケートの結果は、資料1のようになりました。1つの案に絞るために話し合うには、資料2に示された Type-A と Type-B では、どちらで議論する方が良いと思いますか。50 語程度の英語で説明下さい。

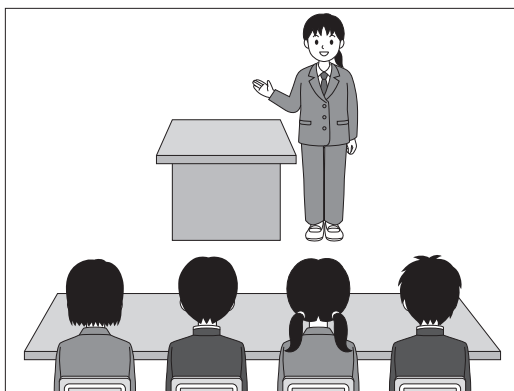
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資料1： Student survey

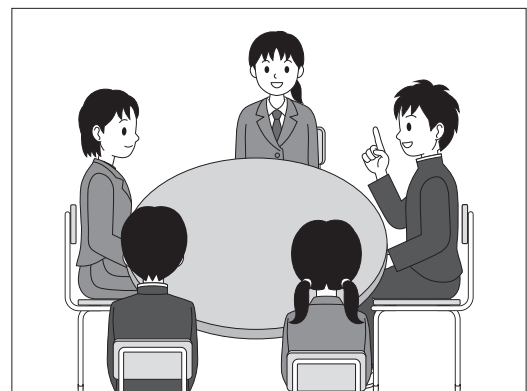
〔質問〕 Which is the best event to do with the students from overseas?



資料2： Type-A



Type-B



6
日

英

記