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 18 ページまであります。

問題は次のページからです。

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。）

Kazuo and Haruko are high school students in Tokyo, and they are visiting Indonesia on a science study tour. Diana is a high school student in Indonesia. Kazuo, Haruko, Diana, and Diana's science teacher, Mr. Sari, are talking after joining an SDGs program at Diana's high school.

Kazuo: This is such a beautiful view!

Haruko: You're lucky to go to school by the sea, Diana!

Diana: Yes. I love the view from the school. I'm so happy to hear that you love it, too. The ocean is really beautiful, but as we learned in the program today, there are also some environmental problems.

Kazuo: Before I came here, I was doing research on the sea around Indonesia, and I learned that Indonesia has some marine issues. I also found out about an interesting environmental problem, "ocean *acidification."

Mr. Sari: Yes, that is something that we are talking about these days.

Haruko: Ocean acidification? [(a)] What does "acidification" mean?

Diana: How about researching online?

Mr. Sari: That's a good idea.

Haruko: Yes! I have a tablet with me. Give me a few minutes.

Mr. Sari: Sure. Take your time.

Haruko: Let me see…. OK. I've found some information about acidification! The word "acidification" comes from the word *acid.

Kazuo: Yes. An acid is a *substance that can cause some kinds of changes when it is *combined with water or *metal.

Haruko: Lemon juice is an example of food that has acids in it, right? The acid in lemon juice makes it sour.

Mr. Sari: That's right! Water has some features that need to be in the right condition for living things to grow well. One of those features is called acidity. Acidity means the amount of acid.

Kazuo: Acids can cause *chemical reactions when they touch metal, rocks or other things. These chemical reactions can damage other substances, but it depends on the acidity level.

Haruko: Oh, I see. [(b)]

Diana: I learned about it in my science class. The acidity of a substance is checked with the pH *scale. An acid has a pH which is lower than 7 on the scale. And anything with a pH

which is higher than 7 is *alkaline. A pH of 7 is called “neutral.”

Mr. Sari: Ocean water has a pH of about 8. That means ocean water is almost neutral but a little alkaline. However, scientists found that ocean water has become more *acidic than before in the last 100 to 200 years. (c)

Kazuo: I think I know. Probably because of CO_2? Well, based on a book I read, many things that humans invent, such as cars and factories, *release CO_2 into the air. Too much CO_2 can cause problems in the *atmosphere, and it can also have an effect on the acidity of the ocean.

Diana: The CO_2 in the atmosphere is *absorbed by the top *layer of the ocean. And when CO_2 is absorbed into water, it makes the water more acidic.

Mr. Sari: That’s right! Just as acids can cause metals to break down and do other damage to *surfaces on land, acids can break down the *shells of sea animals. Because ocean water has become more acidic, some animals like some kinds of *clams are having difficulty in keeping their shells healthy.

Haruko: Oh, I heard about that! I read a news article the other day that said, in some areas, ocean water can cause *coral to grow more slowly and damage coral *reefs. These reefs are an important home for many living things. Their health is necessary for many *ecosystems.

(d)

Diana: Exactly! To solve the problem of ocean acidification, it is important for us to reduce CO_2 *emissions. By doing so, we can solve other environmental problems such as global warming.

Haruko: What can we do to reduce CO_2 emissions in our daily lives?

Kazuo: Well… I learned for the first time in the SDGs program that food waste may increase CO_2 emissions and cause global warming. We can reduce our food waste by checking what is in the refrigerator before we go shopping.

Haruko: (e) My parents ride their bicycles to work instead of driving their cars, this is also one of the ways to reduce CO_2 emissions. If more people use bicycles, buses or trains in their daily lives, the situation will get better.

Kazuo: That’s a good example, too.

Haruko: By the way, Diana, you said that Indonesia has “some” marine environmental problems. What are some of the other problems?

Diana: Another big problem is ocean plastic pollution. Ocean plastic pollution is a problem all over the world. According to some research in 2021, every year, 19 to 23 million tons of plastic waste goes into and pollutes rivers and seas.

Kazuo: Has Indonesia done anything yet?

Mr. Sari: Yes. In 2018, the government set a goal to cut 70 percent of the marine plastic waste by 2025. To reach this goal, the government has been working with many companies and local people to reduce plastic waste.

Diana: In fact, many volunteers clean the beaches and the rivers. I often join volunteer groups to help clean. I (2)【 ア make　イ there　ウ want　エ safe for　オ live　カ to　キ the beaches　ク that　ケ the animals 】. Hmm…. Do you have marine plastic waste issues in Japan?

Haruko: Yes, we do. I learned in class that the amount of plastic waste is increasing.

Mr. Sari: What can you do to reduce marine plastic waste in Japan?

Kazuo: Most of the marine plastic waste comes from things we use only once, so reducing the use of plastic, such as plastic bags or cups, is very important like cleaning the rivers and the beaches.

Haruko: I want to do some kind of volunteer work like Diana. I'll look for a group to join when I get back to Tokyo. I hope I can learn more about marine environmental issues, other environmental problems, and the way to solve them together.

Diana: I hope you can!

Mr. Sari: That's a great idea!

Haruko: Yes, let's keep in touch!

Kazuo: Yes, I can't wait to hear about what your SDGs program does next.

〔注〕
acidification　酸性化
combine　結合する
scale　尺度
release　放出する
layer　層
clam　貝
ecosystem　生態系
acid　酸
metal　金属
alkaline　アルカリ性の
atmosphere　大気
surface　表面
coral　サンゴ
emission　排出
substance　物質
chemical reaction　化学反応
acidic　酸性の
absorb　吸収する
shell　甲殻
reef　岩礁

〔問１〕 本文の流れに合うように，［ (a) ］～［ (e) ］の中に英文を入れるとき，最も適切なものを次の中からそれぞれ**一つずつ**選びなさい。ただし，同じものは二度使えません。

ア Do you know why this is happening?

イ This problem is because of ocean acidification, right?

ウ That's a good example.

エ I've never heard of it.

オ I don't think that is helpful.

カ How can we check the acidity level?

〔問２〕 (2)【 **ア** make　**イ** there　**ウ** want　**エ** safe for　**オ** live　**カ** to　**キ** the beaches　**ク** that　**ケ** the animals 】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番目**と**４番目**と**７番目**にくるものは，それぞれ**ア**～**ケ**の中ではどれか。

〔問３〕 次の (A), (B) について，本文の内容に合っている英文を全て選ぶとき，最も適切なものは，それぞれ下の**ア**～**コ**の中ではどれか。

(A)

① If the acidity of water is in the right condition, it allows living things in the ocean to grow well.

② Chemical reactions which are caused by acids can always damage other things at any level of acidity.

③ Though ocean water itself is a little acidic, it has become more and more acidic during the last 100 to 200 years.

④ The health of coral reefs is very important for a lot of living things because the reefs are their home.

ア	①	**イ**	②	**ウ**	③
エ	④	**オ**	① ②	**カ**	① ③
キ	① ④	**ク**	② ③	**ケ**	② ④
コ	③ ④				

(B)

① Before Kazuo joined the SDGs program in Indonesia, he learned that food waste leads to more CO_2 emissions.

② In 2018, the government of Indonesia decided to decrease the amount of ocean plastic waste to 30 percent by 2025.

③ Kazuo thinks the only way to reduce the use of plastic is to do volunteer work such as cleaning the rivers.

④ Haruko would like to join a volunteer group to learn more about marine issues if she visits Indonesia again.

ア	①	**イ**	②	**ウ**	③
エ	④	**オ**	① ②	**カ**	① ③
キ	① ④	**ク**	② ③	**ケ**	② ④
コ	③ ④				

〔問４〕 次の文章は，本文で述べられている内容についてまとめたものである。(a) ～ (d) の中に，それぞれ適切な**英語１語**を入れなさい。

The sea around Indonesia is very beautiful but there are some marine problems. One of them is “ocean acidification.” “Acidification” is a word (a) from the word “acid.” “Ocean acidification” means the pH level of the ocean is lower than 7. Recently, ocean water has become more acidic so it is difficult for some sea animals to stay (b). Ocean acidification may be caused by CO_2 emissions from things (c) by humans, so we must reduce them. Another problem is ocean plastic pollution. This is serious in Indonesia but people there are continuing efforts to solve the problem. The government has been working with a lot of companies and local communities. Also, a lot of people work as (d) to clean the rivers and the beaches for sea animals. In Japan we often hear about ocean plastic pollution issues, so we must try hard in our daily lives to make the situation better.

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。）

Animals communicate with each other in several ways such as through gestures, *pheromones, and by creating sounds. People give information or express ideas or feelings through spoken words or sign language. We call this “talking.” People have believed that it is a unique way of communication that only humans use. However, some researchers have recently found that “talking” is [(1)]. Let’s take the *titmouse, a small bird, as an example. Even though their brain size is smaller than the size of a human’s, they can connect more than 20 “words” to produce more than 200 “sentences” when they *chirp and communicate with each other.

What about ants? They are smaller than birds and seem very quiet to us. You have probably heard that they communicate with each other by producing some kinds of *substances from their bodies, but in fact, they have many ways to communicate. They also communicate by producing [(2)] as other animals including humans do. Like other insects, ants have three main body parts: the head, thorax, and abdomen. The thorax is the middle part of their body and it is like their “*chest,” and the abdomen is the lower part. Between these two parts, there are other special parts, and they use them to create different sounds by *rubbing them against each other. These sounds are (3)【 ア difficult for　イ that　ウ it　エ us　オ small　カ to　キ is　ク so 】hear them. However, over the last ten years or so, scientists studying ants have listened to these sounds and have connected them to the ants’ behavior.

Japanese ant researchers used a small *recorder in an ant *colony and recorded the sounds the ants made. This allowed them to hear their *lively sounds. They collected a large amount of recorded data and *analyzed it to find the difference between the sounds that the ants made and those that they did not make. This *process was quite hard for the researchers because it could not be done by AI or any other deep learning systems. As a result, they discovered that ants make more than 10 different types of sounds, and they communicate with each other by using these sounds when they want to share information.

One of the most interesting facts is that the louder colonies were the ones with larger colonies. One kind of ant that can be the most “talkative” is the leaf cutter ant. As the name shows, these ants cut leaves and carry them to their *nests. They can even carry leaves that are many *times bigger than their bodies very quickly and easily. (4)If they were humans, this would mean that humans could hold about 220 kilograms and run at the speed of 25 kilometers in an hour. After they carry the leaves to their nests, they use them to grow mushrooms served as food for the queen ant and baby ants. Each ant has their own job. Queen ants have to produce eggs, and worker ants’ jobs are to take care of the babies, grow mushrooms, gather leaves, and so on. There are also *guardian ants

that protect the colony from *enemies. [ア] All these ants with different jobs are living in a big nest with many rooms that are connected by tunnels. [イ] Though small ones have fewer rooms with about 100 ants, the leaf cutter ants' *are made up of millions of ants working together. [ウ] As you can see, it is not simple for millions of ants with different jobs to live together in a large community. [エ] Researchers think that they may need better *teamwork to live in harmony in a large colony.

The researchers also found that the number of sounds made by the ants is related to their kind of job. Among the leaf cutter ants, the most talkative ones in the colony create 7,700 sounds in 15 minutes. These ants move around inside or outside to pass around information because they *manage and *coordinate the whole colony, such as by cutting and carrying leaves, and cleaning their bodies when they return from outside.

（6）

The researchers' discoveries tell us how ants "talk" to each other and how important communication is for them to keep their society going, and they also give us an opportunity to think about our human society. What does "talking," or having a conversation mean to us humans or why is this important for our society? Though researchers have discovered many things, there are still so many things we do not know about ants.

Not only that, our world is full of mysteries. *Exploration is like going on an adventure and finding solutions to problems that no one has solved before. So, remember that you are on an exciting adventure when you ask a question or find something you are curious about. Keep exploring, stay curious, and have fun because the world is full of amazing things to discover.

〔注〕
pheromone　フェロモン
substance　物質
recorder　録音機
analyze　分析する
～ times　～倍
be made up of ～　～からなる
manage　運営する
titmouse　シジュウカラ
chest　胸
colony　集団
process　過程
guardian　守衛
coordinate　まとめる
chirp　さえずる
rub　こする
lively　にぎやかな
nest　巣
enemy　敵
teamwork　チームワーク
exploration　探究

〔問１〕 本文の流れに合うように，［　(1)　］の中に英語を入れたとき，最も適切なものは，次の**ア**～**エ**の中ではどれか。

ア　a unique way of communication that only humans can use
イ　not a way of sharing information but a way of expressing ideas
ウ　something special that only humans and birds can do
エ　something that not only humans but also other living things do

〔問２〕 本文の流れに合うように，［ (2) ］の中に入る**同じ段落中**の適切な**英語１語**を書きなさい。

〔問３〕 (3)**【ア** difficult for　**イ** that　**ウ** it　**エ** us　**オ** small　**カ** to　**キ** is　**ク** so**】**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番目**と**４番目**と**７番目**にくるものは，それぞれ**ア**～**ク**の中ではどれか。

〔問４〕 (4)If they were humans, this would mean that humans could hold about 220 kilograms and run at the speed of 25 kilometers in an hour. について，その内容を表した英文として最も適切なものは，次の**ア**～**エ**の中ではどれか。

ア　It will be hard for humans to hold about 220 kilograms and run at the speed of 25 kilometers in an hour.
イ　It will be easy for humans to hold about 220 kilograms and run at the speed of 25 kilometers in an hour.
ウ　It will be hard for leaf cutter ants to hold about 220 kilograms and run at the speed of 25 kilometers in an hour.
エ　It will be easy for leaf cutter ants to hold about 220 kilograms and run at the speed of 25 kilometers in an hour.

〔問５〕 次の英文は，［ ア ］～［ エ ］のいずれかに入る。この英文を入れるのに最も適切な場所を選びなさい。

A whole nest of leaf cutter ants is about the size of a car.

〔問６〕 ［ (6) ］の中には，次のA～Cの英文が入る。本文の流れに合うように正しく並べかえたとき，その組み合わせとして最も適切なものは，下の**ア**～**カ**の中ではどれか。

A On the other hand, some ants, like guardian ants, produce fewer sounds than the talkative worker ants.

B Because their job is to protect their colony, they do not need to move around, so when they make noise, they just produce simple sounds to tell others to be careful.

C If they have to do jobs that need more teamwork, they create more sounds.

ア	A → B → C	イ	A → C → B	ウ	B → A → C
エ	B → C → A	オ	C → A → B	カ	C → B → A

〔問７〕 次の (A)，(B) について，本文の内容に合っている英文を全て選ぶとき，最も適切なものは，それぞれ下の**ア**～**コ**の中ではどれか。

(A)

① The titmouse, a small bird, can give information or express ideas or feelings by using sign language.

② Ants use pheromones to create different sounds by rubbing their special body parts each other.

③ Japanese ant researchers were able to analyze only the sounds ants made by using technology such as AI.

④ According to Japanese ant researchers, ants share information by using more than 10 different kinds of sounds.

ア	①	**イ**	②	**ウ**	③
エ	④	**オ**	① ②	**カ**	① ③
キ	① ④	**ク**	② ③	**ケ**	② ④
コ	③ ④				

(B)

① Leaf cutter ants cut leaves and carry them to their nests because the leaves are given as food to the queen ant and baby ants.

② A big nest of leaf cutter ants has many rooms, and there are hundreds of ants doing different jobs in it.

③ If the job of the leaf cutter ants is to cut and carry leaves, they create many sounds and move around inside or outside of their nests.

④ We have an opportunity to think about our society through the research about the leaf cutter ants.

ア	①	**イ**	②	**ウ**	③
エ	④	**オ**	① ②	**カ**	① ③
キ	① ④	**ク**	② ③	**ケ**	② ④
コ	③ ④				

〔問８〕 次の［　　］内の英語を読み，それに対して，**40 語以上 50 語以内**の英語の文章を **1 つの段落**にまとめて書きなさい。「.」「,」「!」「?」などは，語数に含めません。これらの符号は，解答用紙の下線部と下線部の間に入れなさい。

Some ants use sounds as one of the ways to communicate with others. In human society, when you communicate with other people, what other ways do you use?

You have to include all the points below:

- One way to communicate with others
- What situation it is used in
- How it is helpful

4 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。）

Turkey has two important *straits, and they are known as the *Turkish Straits. The Turkish Straits are between the Asian and the European *continents and have played an important part in international business, government, and so on. Many tourists visit one of the Turkish Straits for sightseeing. A lot of Turkish people know that it is related to Japan. Do you know the strait, the Bosphorus Strait? Now, let's look at a part of the history of the Bosphorus Strait, and how Japan is related to this strait.

The Bosphorus Strait is in Istanbul, Turkey's largest city. The Asian side to the east is a living area, and the European side to the west is a business area. The city is the only one in the world that is in both Asia and Europe. Many people cross this strait to live their lives. There are many ships that often cross the strait every day, and [(1)] at low prices. [(2)-a], three large bridges for cars and four *undersea tunnels pass through this strait. These four tunnels include a water tunnel, a car tunnel, a train tunnel, and a tunnel used for both cars and trains. Japanese *engineering was used in the *construction of one of the bridges known as the Second Bosphorus Bridge, and one of the tunnels, the Marmaray Tunnel.

The first Bosphorus Bridge was built in 1973 with British support. [(2)-b], *traffic jams were a terrible problem. To solve this problem, the Turkish government wanted to build a new bridge. In 1988, Japanese engineering was chosen to build the Second Bosphorus Bridge about 5 kilometers to the north from the first bridge. Because Japanese and Turkish engineers respected each other and worked very hard together, they were able to finish the construction in 30 months though they thought they would need 36 months. The construction of the second bridge was one of the greatest events for the local people because they had to travel between east and west by using boats or crossing the busy bridge. [(2)-b], even after the construction of the second bridge, the traffic situation did not change. People had to drive for two hours to cross the bridge or cross the strait by ship for 30 minutes.

In the late 1990s the Turkish government set up a big project to build an undersea tunnel through the Bosphorus Strait to stop the daily traffic jams and reduce air pollution caused by gases from cars. The idea of running an undersea tunnel first came around in the 1860s, and so the plan was designed. This was a topic that was discussed for many years, but many professional engineers around the world gave up the construction because of the natural features and *currents of the strait. The Turkish government began planning in 1997, and then they saved the necessary money in 1999. Japan decided to provide support for Turkey in 2003, and the construction began the next year. Because Istanbul had a long history, some historical sites from the ancient periods, and even

historical things from 8,500 years ago were discovered during the construction. The construction was stopped while the Turkish government and history researchers *investigated each site after they were discovered. [(2)-c], the project took about four years longer to finish than the original plan.

The undersea part of the tunnel is about 1,400 meters, and the construction was done by using the same construction engineering used in Tokyo, "*immersed construction method." The project was to *construct 11 small square-shaped tunnels and to connect all of them under the ocean floor at a *depth of about 60 meters. These small tunnels are different from common ones. The shape of each one is like a box and each box is 110 meters long. [ア] They come together to make one long square-shaped tunnel. [イ] The construction was very hard. [ウ] The difficult point in the construction was the feature of this strait. [エ] The currents in the Bosphorus Strait are moving fast in different directions at the upper and lower levels. [オ] After that, they were covered with something to *fix them to the ground.

(4) The Marmaray Tunnel was a world first tunnel in two ways. First, it is the world's deepest immersed tunnel, a tunnel constructed by immersing a box made of 11 tunnels into the ocean floor. Second, it was the first tunnel in the world to succeed in connecting *tube-shaped tunnels which came from the land on both the Asian and the European sides with a square-shaped immersed tunnel under the sea. Tunnel *excavators could not be used in the undersea tunnel part. After eleven tunnels became one long tunnel, engineers carefully connected the about 1.4 kilometers of undersea tunnel to the ground tunnel.

In April 2010, the world's first successful *connection of tunnel boxes and tunnels from the ground on the Asian side was *completed. In February 2011, the other connection was done on the European side. Asia and Europe were connected by one tunnel for the first time. The idea of an undersea tunnel across the Bosphorus Strait was called "Turkey's 150-year dream," and it has finally come true. Before, (5) 【 a lot / to / it / east to / took / travel / of / from / time / west 】, but now people can travel in just four minutes by using trains that pass through this tunnel. The *Prime Minister at the time gave a speech at the opening event in 2013, and he said "Marmaray [(6)-a] people, countries and continents, and at the same time [(6)-b] the past with the future." People of Turkey celebrated the 100th *anniversary of founding the country in 2023 and the two symbols of *partnership between Japan and Turkey crossing the Bosphorus, will greatly help the next 100 years of the two countries.

〔注〕 strait　海峡
undersea　海底
traffic jam　交通渋滞
immerse　沈める
fix　固定する
connection　接続
Turkish　トルコの
engineering　工学技術
current　潮流
construct　建設する
tube-shaped　筒状の
complete　完成させる
continent　大陸
construction　建設
investigate　調査する
depth　深さ
excavator　掘削機
Prime Minister　首相
anniversary of founding the country　建国記念日
partnership　パートナーシップ

〔問１〕 本文の流れに合うように，［　(1)　］の中に英語を入れたとき，最も適切なものは，次の**ア**～**エ**の中ではどれか。

ア　local people use them for traveling overseas
イ　local people use them for daily traveling
ウ　foreign tourists use them for traveling overseas
エ　foreign tourists use them for sightseeing

〔問２〕 本文の流れに合うように，［(2)-a］，［(2)-b］，［(2)-c］の中に単語を入れたとき，そ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。

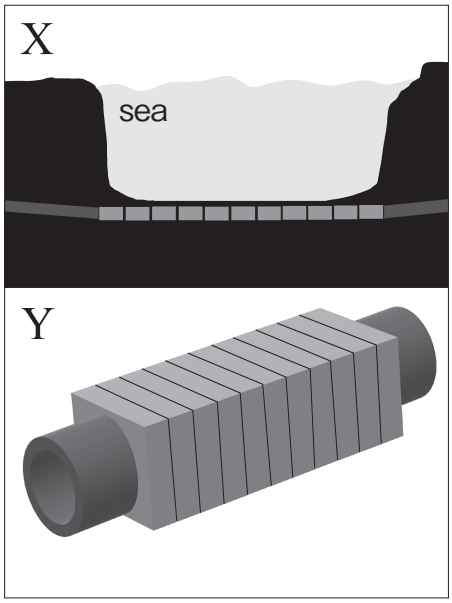
	(2)-a	(2)-b	(2)-c
ア	However	Also	Finally
イ	However	Finally	Also
ウ	Also	However	Finally
エ	Also	Finally	However
オ	Finally	Also	However
カ	Finally	However	Also

〔問３〕 次の英文は，［ **ア** ］～［ **オ** ］のいずれかに入る。この英文を入れるのに最も適切な場所を選びなさい。

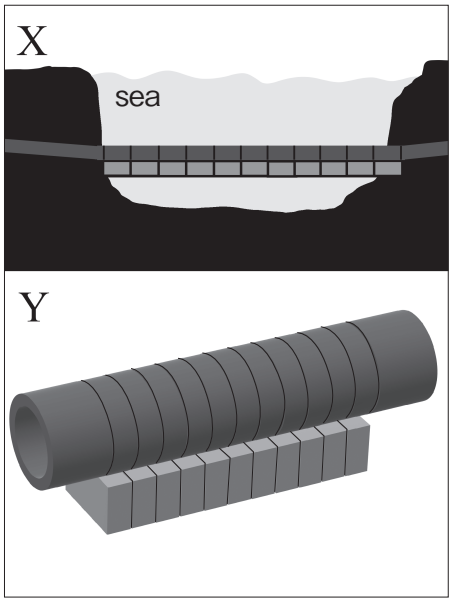
Because of this, engineers had to work against the difficult currents of the Bosphorus Strait to put the boxes on the ocean floor, 60 meters below the top of the sea.

〔問４〕 次の各図において，Ｘはボスポラス海峡とそこを通るトンネルの縦断図，ＹはＸのトンネルの構造を表している。(4)The Marmaray Tunnel を表す図として正しいのは，次の**ア**～**エ**の中ではどれか。

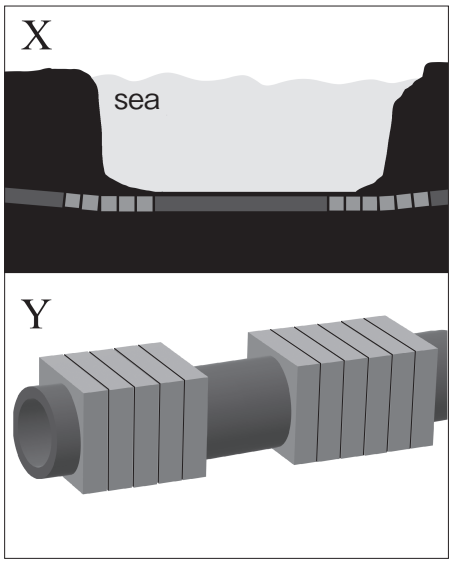
ア



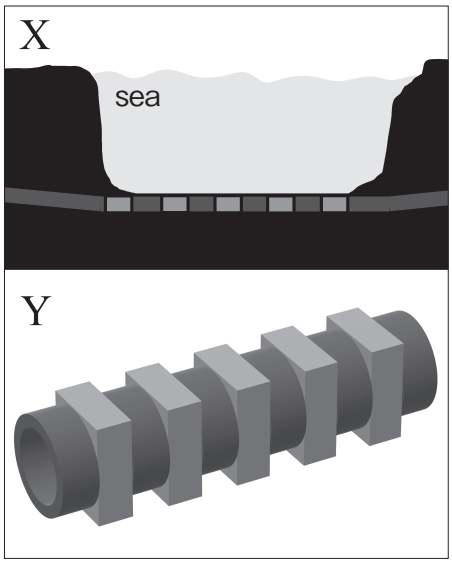
イ



ウ



エ



〔問５〕 (5)【 a lot / to / it / east to / took / travel / of / from / time / west 】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なさい。

〔問６〕 本文の流れに合うように，(6)-a ，(6)-b の中に**共通して入る英語１語**を書きなさい。

〔問７〕 次の (A), (B) について，本文の内容に合っている英文を全て選ぶとき，最も適切なものは，それぞれ下の**ア**～**コ**の中ではどれか。

(A)

① The Turkish government asked Japan to build the first and the second bridges to stop the traffic jams.

② The Turkish government set up the construction project because they wanted to reduce air pollution caused by cars.

③ The Turkish government had enough money to build the Marmaray Tunnel, but they could not begin their project in 1997.

④ The Turkish government and history researchers found sites with long histories before they started their project.

ア	①	**イ**	②	**ウ**	③
エ	④	**オ**	① ②	**カ**	① ③
キ	① ④	**ク**	② ③	**ケ**	② ④
コ	③ ④				

(B)

① The Turkish government connected two types of tunnels in the same way used in Tokyo.

② The Marmaray Tunnel goes under the sea and it connects the Asian and the European parts in Istanbul.

③ The opening event of the Marmaray Tunnel was held nine years after the construction began.

④ The Turkish government will celebrate the partnership between Japan and Turkey in 100 years.

ア	①	**イ**	②	**ウ**	③
エ	④	**オ**	① ②	**カ**	① ③
キ	① ④	**ク**	② ③	**ケ**	② ④
コ	③ ④				

不
西
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語