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。）

Three high school students, Jun, Megumi, Olivia, and Mr. Sato, their science teacher, are talking in the classroom. Olivia is a student from New Zealand.

Jun: Megumi! Close the window! There is a bee outside! Sometimes they come into the classroom.

Megumi: Yes, that's true... wait, I think we had the same conversation with someone last year.

Mr. Sato: I remember that I also had to stop my lesson because of a bee flying into the classroom this time of year. Have you ever wondered why there are so many bees?

Jun: [(1)－a] I just know a lot of bees fly around in this season every year.

Olivia: We also see bees flying in groups in New Zealand, but usually in different months.

Jun: When do you see them, Olivia?

Olivia: I think it's in spring, maybe around October.

Megumi: Do you mean autumn?

Jun: Megumi, New Zealand is in the *Southern hemisphere, the other side from Japan.

Olivia: That's right. So, in October, it is spring in New Zealand.

Mr. Sato: Yes, bees fly in groups in spring in both countries. Bees usually "swarm" in spring. This means some bees move to make a new bee *nest with an old queen when a bee group gets too large. Then a new queen is born in the nest the old queen left.

Jun: Is it hard for many bees to live in one nest?

Mr. Sato: Good question. When the nest is too crowded, bees cannot get enough food, and the number of bees that can survive drops. So, bees swarm to build a new nest and to make their family bigger.

Megumi: I wonder why bees' world is different from humans'. In our society, when families grow, children often leave home. Last year, my older brother got married and left home. Now, he lives with his wife.

Olivia: [(1)－b] My host parents and their parents continue to live in one house, but they have their own kitchens and front doors. I think it's very interesting.

Jun: I see. There are some cases like that, too.

Mr. Sato: Good, I can see you are getting more curious about things. Now, let's get back to the topic of bees. As I said, a new queen is born among the bees in the (2)－a nest, and the (2)－b queen leaves to make a new nest. This allows both the new and the old nests to grow.

Olivia: I see. I didn't know a bee family grows in that way. So, the bee groups I saw in New Zealand last spring were swarming!

Jun: Wow, you experienced two springs in a year! But why does swarming happen in spring?

Mr. Sato: Swarming depends a lot on the weather and seasons. In spring, when it's warm, flowers bloom. It's easier for bees to get food, so they often make new nests. Blooming plants increase the *nectar supply. This makes bees more active.

Jun: I see. So, there are more bees in spring. It's not just their moving season, but also the time to go out to collect food.

Mr. Sato: Bees can remember the types and places of flowers they visit and deliver this information to their nests.

Olivia: I know that! Bees do a special dance called the "waggle dance" to show others where to find food.

Megumi: Waggle dance? What is that like?

Olivia: It's very interesting to see. Bees are dancing in an *figure-eight-shaped pattern. This dance is an effective way to communicate about the location of food.

Jun: Wow, bees are really smart!

Olivia: We can also see that in bees' houses. They look beautiful, and are full of *hexagonal rooms.

Jun: (3)

Mr. Sato: Yes, there is. They have to be that shape. It's called a *honeycomb. Does anyone have any ideas?

Olivia: I've seen honeycombs on my uncle's honey farm. I was surprised that there was no space between the rooms.

Jun: So, it's the best shape to use space.

Olivia: Right. I asked my math teacher about it. She told me that a *hexagon needs less wall *length for the same area than other shapes like a triangle, so it reduces *material use.

Mr. Sato: That's right. In that way, bees can build their honeycombs with less material and effort. A hexagonal *structure is also strong because it doesn't leave any space, and it spreads power from outside. This structure is also used in the wings of airplanes, the bodies of race cars and the walls of buildings for these reasons.

Jun: I think there are many hexagons around us. For example, soccer goal nets, umbrellas, and look, even this pencil, too.

Megumi: Ah! I made hexagonal structures to build classroom stages for our school festival! Now I understand why we used (4) the structures.

Olivia: How do you make the hexagonal structure?

Jun: We use milk packs. First, we make a triangle with one pack. Then, we put six of the same triangles together to make the hexagonal structure.

Megumi: They look like a honeycomb when they are put together. I haven't thought much about the shape, but I have been trying to collect so many milk packs. Now, I know that there is a reason for the shape.

Jun: [(1) – c] Maybe there are still more examples around us. Are there other similar cases?

Mr. Sato: Actually, bees' behaviors are related to the weather.

Megumi: Really? That's interesting. How are the weather and their behaviors connected?

Mr. Sato: For example, there's an expression saying "If bees fly low, it will rain hard." People say it because bees fly lower when *humidity rises.

Megumi: Why do they do that?

Olivia: *Insects probably can't fly well if their wings get wet.

Mr. Sato: That's right. Bees can notice changes in humidity. People have watched the behavior of living things to guess the weather for a long time.

Megumi: [(1) – d] She said, "When a cat washes its face, it will rain." She also explained that cats' *whiskers can feel humidity more easily than humans.

Jun: I know one expression about weather. Though it's not related to animals or insects, my grandfather said, "Morning *fog is a good sign."

Mr. Sato: That's another weather tradition. At night, the ground gets cool and fog sometimes appears. Then the sun rises and the fog clears. When this happens, it will be a sunny day.

Olivia: In New Zealand, we say, "Red sky at night, *shepherd's delight." There's probably a similar reason for that, too.

Mr. Sato: Yes, some sayings and actions have reasons. By thinking about "why," we can understand the systems behind things. This is the fun part of watching and learning about nature.

Jun: From now, we'll pay more attention to the things around us and ask ourselves "why" to understand them better.

Megumi: Me, too! Even small things can lead to new discoveries by asking "why."

Mr. Sato: Exactly. (5) Everyone, today's talk is just the beginning. Keep asking yourself questions and pay attention to everything around you.

Olivia: OK. We will remember to "bee" always curious.

〔注〕
Southern hemisphere　南半球
nectar supply　蜜の供給
hexagonal　六角形の
hexagon　六角形
material　素材
humidity　湿度
whiskers　ひげ
shepherd's delight　羊飼いの喜び
nest　巣
figure-eight-shaped pattern　8 の字型
honeycomb　蜂の巣
length　長さ
structure　構造
insect　昆虫
fog　霧

〔問1〕会話の流れに合うように，本文中の空所 [(1)－a] ～ [(1)－d] の中に英文を入れるとき，最も適切なものを次の**ア**～**ク**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 I don't think that is always true.
イ I learned where they come from.
ウ That reminds me of my grandmother.
エ Bees learn a lot of things from humans.
オ However, bees are always moving to different home.
カ Bees give us great ideas for daily life.
キ Well, I've never thought about that carefully.
ク My parents told me about other expressions.

〔問２〕会話の流れに合うように，本文中の空所 (2)－a と (2)－b 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。

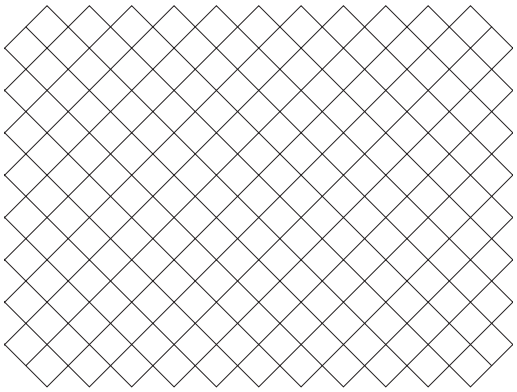
	(2)－a	(2)－b
ア	new	new
イ	new	old
ウ	old	new
エ	old	old

〔問３〕会話の流れに合うように，本文中の空所 (3) に入る発言を **10 語以上 15 語以下の英語**で書きなさい。

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４〕(4) the structures を表す図として最も適切なものは，次の中ではどれか。ただし，**ア**～**エ**の図において，線で囲まれた部分は，１つの milk pack で作られた空間を表す。

ア



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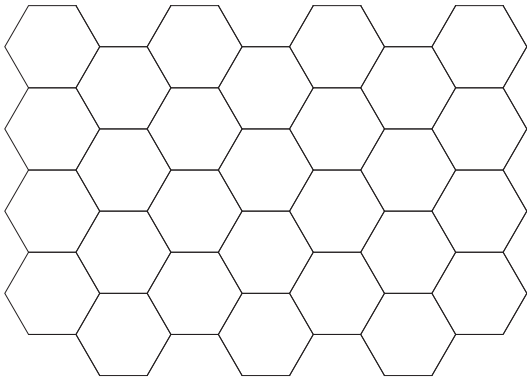

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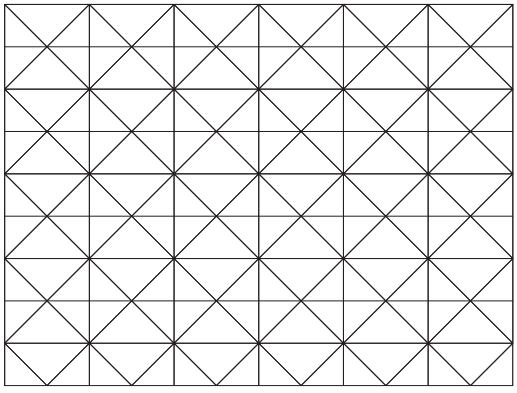
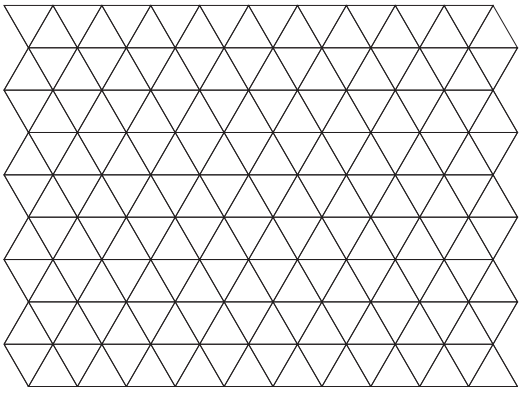


エ



〔問５〕 (5) Everyone, today's talk is just the beginning. とあるが，本文を踏まえた上で，Mr. Sato が Megumi，Jun，Olivia に期待する行動を次のように書き表すとき，［　　］に入るものとして最も適切なものは，下の**ア**～**エ**の中ではどれか。

Mr.Sato hopes that ［　　］.

ア　they will stay curious and try to learn new things about the world around them

イ　they will give up trying to have fun when they look for the answers to the questions

ウ　they will try to discover new things if they are asked to do

エ　they will look at the systems in nature without thinking about the reasons

〔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　People in New Zealand see bees' swarming in seasons that are different from Japan.

イ　Bee nests get too crowded because bees swarm.

ウ　Groups of bees move to other places in spring because they can get food more easily than in different seasons.

エ　Bees do the waggle dance to tell other bees about the weather.

オ　Olivia was surprised to see that bees' houses have a lot of space between rooms.

カ　The structure of honeycombs are not often used for products around us because it increases the effort we need to make.

キ　Some bees' behaviors help people guess what the weather will be like.

ク　Mr. Sato said that the ground gets cool after the fog clears in the morning.

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。）

According to one view of history, glass might be one of the oldest *materials. In fact, the people living in the Middle East began to use glass around 5000 years ago. However, we can't say how they learned to make glass or when exactly people started to make things with this useful material. In the beginning of its history, glass was used to make *ornaments and accessories for rich people, so it was not so popular among everyone else. This means that the use of glass in the past was not so common. [(1)－a] We cannot imagine what life without glass would be like. (2) So, why have many people kept creating different products with this material and using them? What makes glass so special?

Glass has various unique features that allow people to create many kinds of products. One is that it is *transparent. Windows are a good example. Because glass is transparent, we can get light from the sun. At the same time, windows don't allow the air or rain from outside to come in. As a result, we can have both enough light in our rooms and a comfortable environment to live in.

People might be surprised that glass is also a very strong material. Though many people believe glass is easy to break and we can enjoy its *fleeting beauty, glass has an excellent *chemical stability. Let's look at another material. When time passes, plastic will be damaged. On the other hand, glass does not become worse over time, so things made with this material will last almost forever. Thanks to this feature, we can see old glass products in almost their original condition at museums. And the glass *lens on the space *telescope of the rocket used in 1968 was so strong that it survived the *gravity acceleration when the rocket was sent to space, and really high and low temperatures while the rocket was traveling through space.

Here is a question that sounds easy but is actually very hard to answer. "What is glass?" The material looks like a *solid, but some scientists say that it is something more like a *liquid that became hard. Most parts of glass are *silica, and silica is easy to *process. Scientists have made many kinds of glass with silica and other *chemical elements. [(1)－b]

With many useful features and types of glass, people have always created many different products. *Glass containers were one of the earliest products and many people used them in their home. In the middle of the thirteenth century, people started to use a "reading stone" that was put on the letters printed in books. This product allowed the letters to look bigger, so people could see the letters more easily. Reading stones quickly became common all around Europe. At the end of the century, eyeglasses were invented. These tools also helped people read books and see far away. In the seventeenth century, people invented telescopes to look at

space. Later, in the 1980s, there were more and more things using information technology, and the Internet became closer to many people. One example of the technology glass supports is *optical fiber. It helps people send information quickly around the world. So, thanks to glass, we can now use the Internet. In this way, glass has made our lives more convenient and comfortable.

Today, scientists are making efforts to realize an eco-friendly society. One problem is our energy use. The amount of energy we use in our lives has been increasing so much that saving energy is now one of the most important missions. (1)－c Scientists have been trying to make better glass windows for buildings and houses. These windows do not allow the heat outside to come into the building in summer, but keep the heat inside in winter. So, we don't have to often use air conditioners and we may be able to save energy. Also, glass bottles can help realize an eco-friendly society. They are made of natural materials. After glass bottles are *melted many times, their *composition will not change, so we can use them again and again. So, scientists say glass is a good material for effective recycling. (3)【① the glass bottles ② 100 years ③ are ④ ago ⑤ the ones ⑥ from ⑦ today ⑧ made】, and glass bottles in 100 years will be made from today's ones.

Not only the features of glass but also people's ways of thinking have allowed them to make new glass products one after another and use them. (4) ア In the 2010s, one company was trying to make thin glass for televisions, and the engineers of the company were so curious that one question came to mind. イ What would happen if they could make the thinnest glass in the world? ウ They believed thin glass would not stay in fire for a long time before it was melted. エ Though they did not know what they would use it for, they decided to take a step for it. オ In order to make such a glass, they tried experiments many times to check that it would not break. In the end, they created a glass that can be *bent, and now it is used for smartphones. Glass can be processed in many ways, and this feature allowed the engineers to try to make it very thin. This is one of the products that were born from curious engineers' ideas and efforts.

In addition, the engineers of that company are trying to create (5) another new product that seems impossible to make. It is called a "glass battery." They believe the product can be used like *lithium-ion batteries. Lithium-ion batteries used for smartphones and electric cars need chemical elements that are very expensive, or not easy to find. On the other hand, one of the chemical elements glass batteries need is more common. This means it will be cheaper and easier to prepare than chemical elements for lithium-ion batteries. If the use of the glass batteries becomes common, the prices of batteries will be lower. This may allow us to buy products such as electric cars at cheaper prices. Also, glass batteries are safer to use because they cannot catch fire. You might be able to see these batteries around you someday. It is hard

to think of the idea of using glass for batteries, but the unique features of glass let engineers look at many *possibilities.

Glass is just one example of materials we have used for a long time. Of course, it is important to try to discover things that nobody has known yet, and to create new things from nothing. However, it is also necessary for us to look at the things we have already known from a different point of view. Look around you. The world is full of new possibilities.

〔注〕 material 素材
transparent 透明な
chemical stability 化学的安定性
telescope 望遠鏡
solid 固体
silica シリカ
chemical element 化学元素
optical fiber 光ファイバー
composition 組成
lithium-ion battery リチウムイオン電池
ornaments and accessories 装飾品
fleeting はかない
lens レンズ
gravity acceleration 重力加速度
liquid 液体
process 加工する
glass container ガラスの容器
melt 溶かす
bent bend（曲げる）の過去分詞
possibility 可能性

〔問1〕本文の流れに合うように，本文中の空所 (1)－a ～ (1)－c に次の①～⑥のいずれかの英文を入れるとき，最も適切な組み合わせは，下の**ア**～**カ**の中ではどれか。

① On the other hand, people did not have to use glass to survive.
② But it was not so easy to make various kinds of glass, so most of their efforts failed.
③ There are some examples that show glass can be a part of the solution.
④ However, glass has become one of the most important materials for our lives today.
⑤ There are a few examples that show how glass bottles can help solve the problem.
⑥ In fact, people may not know how many kinds of glass there are in the world.

	(1)－a	(1)－b	(1)－c
ア	①	②	③
イ	①	⑥	②
ウ	②	③	①
エ	②	⑥	⑤
オ	④	②	⑤
カ	④	⑥	③

〔問2〕(2) So, why have many people kept creating different products with this material and using them? とあるが，以下はある生徒が，本文全体を読んで書いたこの質問に対する答えである。前後の英文につながるように，［　　］の中に**30語以上40語以下の英語**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。

People have been able to create and use glass for a long time for the two main reasons. ［　　］

［　　］

For these two reasons, glass has been used for thousands of years.

〔問３〕 (3)【① the glass bottles ② 100 years ③ are ④ ago ⑤ the ones ⑥ from ⑦ today ⑧ made】とあるが，文章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。なお，文頭にくる語も小文字になっている。

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

〔問４〕 (4)［　　］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５〕 (5)another new product に関する説明として，最も適切なものは次の中ではどれか。

ア　It is easier to find the chemical element for the lithium-ion batteries than the one for the new product.

イ　If the product becomes common and more people use them, the prices of electric cars will be lower.

ウ　The features of glass did not help the engineers think of the idea of using glass for batteries.

エ　The lithium-ion batteries can be used more safely than the new product because the chemical elements for them are cheaper.

〔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　We don't know when glass started to be used but we know how people learned to make it.

イ　We can keep comfortable temperatures because windows don't allow the air and light to come in.

ウ　Glass survived gravity acceleration and big changes in temperatures during the space travel in the 1960s.

エ　People started to use reading stones before glass containers were common among rich people.

オ　After reading stones became common in Europe, eyeglasses were invented in the thirteenth century.

カ　Thanks to information technology, telescopes were invented to look at the space in the seventeenth century.

キ　By saving energy, we will be able to create better glass windows used for buildings and houses.

ク　Nobody has tried to discover how to create new things with the ideas they have already known.

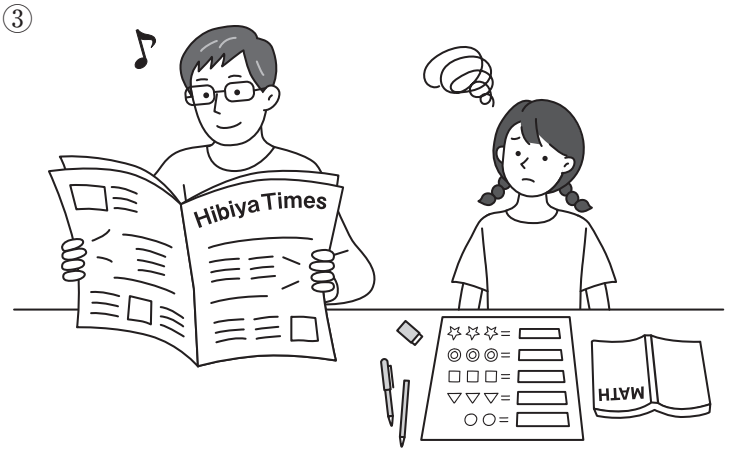
4 次の①～③のイラストに描かれた場面を説明した上で，それについてのあなたの考えを **50 語程度の英語**で書きなさい。

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。

①

②

③



7
日
英
語