

# 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 **3** までで、2 ページから 17 ページまであります。

2 次の対話文を読んで、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。)

*Erika and Yuta are junior high school students. Olivia came to Japan from the UK three months ago, and is now staying with Erika's family. They are members of the cooking club. One day, after school, they are in the cooking room for the club meeting and are talking about their presentation at a school event.*

*Erika:* What topic do you want to choose for our presentation, Yuta?

*Yuta:* I thought your research on salad \*dressing last year was very interesting.

*Olivia:* Can you tell me about it?

*Erika:* Sure. The simplest kind of dressing is made of oil, \*vinegar, salt and pepper. What do you usually have to do to the dressing before putting it on your salad?

*Olivia:* We have to shake it a lot.

*Erika:* Exactly. I wanted to know why we do that, so I started doing research.

*Olivia:* I see.

*Erika:* Vinegar is made of water with different things mixed in it. If you shake oil and water together, it seems mixed. That's called emulsion. In this emulsion, tiny oil \*drops are spread out in the water. But the oil soon rises to the top, and the water goes to the bottom. This happens because water and oil like to stay with their own kind.

*Yuta:* In your research, you said \*mayonnaise is also an emulsion, right?

*Olivia:* Really?

*Erika:* Yes. Mayonnaise also includes oil and vinegar.

*Olivia:* But in mayonnaise, they are still mixed together even after a long time. How can that happen?

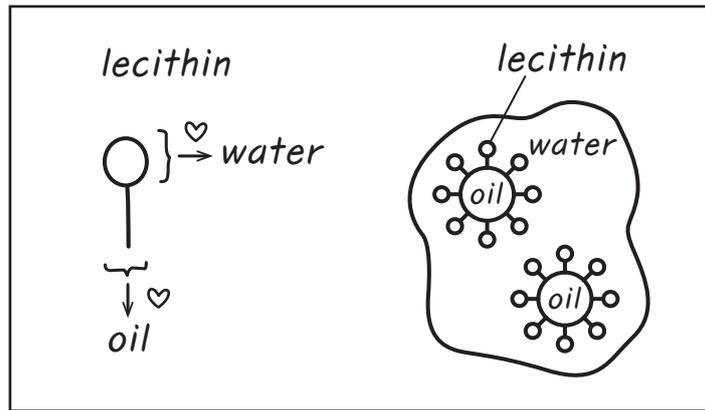
*Erika:* Yuta, do you remember an important thing added in mayonnaise?

*Yuta:* Of course. We add egg \*yolk.

*Erika:* Right. The key is something inside egg yolk called lecithin. Lecithin is a helper.

*Olivia:* A helper? How does it work?

*Erika starts to draw pictures on a piece of paper.*



Erika: This part of lecithin \*sticks to oil, and this part sticks to water. Lecithin (1) like a little bridge between them. So, tiny oil drops can be spread out in the water for a long time.

Olivia: Now I understand why mayonnaise is an emulsion.

Mr. Doi, a home economics teacher, comes in and listens to them.

Erika: There are some other interesting things about eggs. Do you like boiled eggs?

Yuta: Yes. I like eggs with a \*fully cooked white part and a \*half cooked yolk.

Olivia: Me, too. I usually boil eggs for seven minutes. Erika, you like hard boiled eggs, right?

Erika: Yes. I like eggs with a fully cooked white part and a fully cooked yolk, so I usually boil eggs for thirteen minutes or more to make both the white part and the yolk \*firm. By the way, have you ever had *onsen* eggs, Yuta?

Yuta: Yes. (2)-a, Olivia? They look like boiled eggs, but with a half cooked white part and a firmer yolk.

Olivia: I tried one when I went on a trip with Erika's family last month. I liked it very much. I hear it's difficult to make *onsen* eggs. You should \*heat the center but shouldn't heat the white part too much.

Yuta: How is it possible?

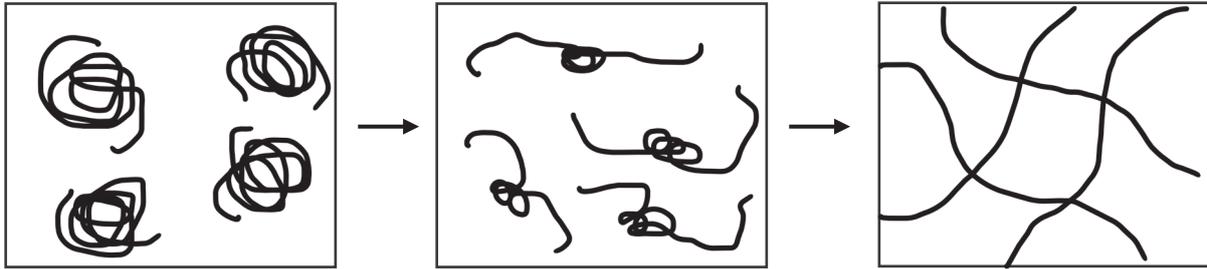
Erika: Mr. Doi, you told me there is a special way to make *onsen* eggs. Could you tell us about it again?

Mr. Doi: Sure. You can make *onsen* eggs because the white part and the yolk have different types of \*proteins. Do you remember why eggs get firm when they're cooked?

Erika: Well, there is a change in the protein.

Mr. Doi: That's right. Look at this.

Mr. Doi draws some pictures.



Mr. Doi: Most of the proteins in \*raw eggs are tiny folded \*strings, so they can move freely. When eggs are heated, their protein strings \*unfold. Then, they stick to each other and make a kind of net. This makes eggs firm.

Yuta: So, what happens when we make *onsen* eggs?

Mr. Doi: Actually, the white part and the yolk get firm at different temperatures. According to a book, the white part begins to get firm at around 58°C, becomes half cooked at around 60°C to 65°C, and then is fully cooked at around 75°C to 80°C.

Olivia: What about the yolk?

Mr. Doi: The yolk starts to get firm at around 65°C and becomes fully cooked between 68°C and 70°C.

Olivia: I see. The yolk gets firm at a lower temperature, right?

Mr. Doi: Exactly. So, if you keep the temperature between 65°C and 70°C, the white part doesn't get firm, but the yolk does. In this way, you can slowly heat an egg and make an *onsen* egg.

Yuta: I want to make some.

Mr. Doi lets the three students use his tablet. They find a recipe for *onsen* eggs on the internet. Yuta reads it.

Yuta: Boil water, and then cool it a little. Put an egg in a bowl and \*pour the hot water on the egg. Try to (3) keep the temperature at around 70°C for thirty minutes... What will happen if we take the egg out earlier?

Erika: Shall we try it as an \*experiment?

Olivia: I want to do research on temperature and time.

Erika: That'll be interesting. Let's do that!

The next week, Erika, Yuta and Olivia do an experiment and show the results to Mr. Doi.

| Temperature (°C) |            | Time (minute)   |              |              |              |              |
|------------------|------------|-----------------|--------------|--------------|--------------|--------------|
|                  |            | 7               | 13           | 15           | 25           | 30           |
| 65-70            | White part | Raw/Half cooked |              | Half cooked  |              | Half cooked  |
|                  | Yolk       | Raw/Half cooked |              | Half cooked  |              | Fully cooked |
| 70-75            | White part |                 | Half cooked  |              | Half cooked  |              |
|                  | Yolk       |                 | Half cooked  |              | Fully cooked |              |
| 80-85            | White part | Half cooked     | Fully cooked | Fully cooked |              |              |
|                  | Yolk       | Raw/Half cooked | Half cooked  | Fully cooked |              |              |
| 95-100           | White part | Fully cooked    | Fully cooked |              |              |              |
|                  | Yolk       | Half cooked     | Fully cooked |              |              |              |

Mr. Doi: You did very well!

Erika: Thank you, Mr. Doi.

Olivia: Now I understand how *onsen* eggs are made.

Mr. Doi: With this knowledge, you can also make some desserts like Japanese pudding.

Olivia: I love Japanese pudding.

Yuta:  ?

Erika: I know that. Mix eggs with milk and sugar, and then heat it in a \*steamer.

Yuta: I want to make some and eat it.

Mr. Doi: If you are going to make pudding, don't forget that the temperature is important.

Erika finds a recipe for Japanese pudding on the internet.

Erika: According to the recipe, when we make pudding, we need to leave the steamer a little open.

Yuta:  ?

Olivia: To make the temperature a little lower?

Erika: I think so. From our experiment, we learned both the white part and the yolk of eggs become firm when they are heated between  for  minutes.

Yuta: What will happen if we don't leave the steamer a little open?

Olivia: I think the pudding will become too hard.

*Erika:* When I was in elementary school, I made pudding with my brother. But the pudding I made for the first time didn't look very nice. It was hard, and there were some tiny holes and \*bubbles on the top.

*Mr. Doi:* Actually, when you cook pudding on high heat, the pudding becomes hard too fast. Also, when the pudding gets too hot, it starts to boil. This makes more bubbles inside the pudding.

*Erika:* So, if the temperature inside the steamer reaches more than 90°C, the pudding gets hard before the bubbles can escape, and the bubbles that stay inside make small holes.

*Mr. Doi:* Exactly. At about  , fewer bubbles are created, so the pudding looks nicer. It is also softer when it is cooked around that temperature.

*Olivia:* Temperature is really important to make nice pudding.

*Yuta:* By the way, pudding usually comes with \*caramel sauce, but is it really necessary?

*Erika:* Yes, it is. It just doesn't feel like pudding without it.

*Olivia:* Caramel sauce is bitter but sweet because it is made of sugar and water. I like pudding with lots of caramel sauce.

*Mr. Doi:* That's the point. There's a reason for putting caramel sauce on pudding.

*Erika:* Could you tell us more?

*Mr. Doi:* Sure. The amount of sugar in pudding makes a difference.

*Olivia:*  ?

*Mr. Doi:* Remember the pictures I drew last week. You learned how proteins change when they are heated. Protein strings unfold when they are heated. When sugar is added, it is not easy for the protein strings to stick to each other and make a kind of net.

*Yuta:* So, if we add a lot of sugar, will the pudding become not only sweet but also soft? That sounds nice.

*Mr. Doi:* Yes, but be careful. If you add too much sugar, the pudding becomes too soft and breaks easily.

*Erika:* Oh, <sup>(5)</sup> I got it! We eat pudding with caramel sauce made from a lot of sugar to keep the \*balance.

*Olivia:* I see.

*Yuta:* Eggs are really interesting. We can make so many different types of dishes with them.

*Olivia:* <sup>(6)</sup> Eggs are simple, but 【 ① many ② when ③ can ④ heat ⑤ in ⑥ change ⑦ we ⑧ ways ⑨ they 】 them or mix them with other things.

*Erika:* Exactly. I want to know how eggs change when the white part and the yolk are mixed and heated. How about doing more research on eggs for our presentation?

|               |                  |         |       |             |        |
|---------------|------------------|---------|-------|-------------|--------|
| 〔注〕 dressing  | ドレッシング           | vinegar | 酢     | drop        | 粒      |
| mayonnaise    | マヨネーズ            | yolk    | 卵黄    | stick to ~  | ~にくっつく |
| fully cooked  | 完全に火の通った         |         |       | half cooked | 半熟状態の  |
| firm          | 堅い               | heat    | 熱を加える | protein     | タンパク質  |
| raw           | 生の <sup>なま</sup> | string  | ひも    |             |        |
| unfold        | (折りたたんだものが)広がる   |         |       | pour        | 注ぐ     |
| experiment    | 実験               | steamer | 蒸し器   | bubble      | 気泡     |
| caramel sauce | カラメルソース          |         |       | balance     | バランス   |

〔問1〕 本文の流れに合うように、の中に英語を入れるとき、最も適切なものは、次の中ではどれか。

- ア mixes oil and water
- イ connects oil and water
- ウ protects water from oil
- エ removes water from oil

〔問2〕 本文の流れに合うように、～の中に英語を入れるとき、最も適切なものを次のア～キ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 How do you make it
- イ How do you like it
- ウ How about you
- エ Why do we have to do that
- オ Why do you know that
- カ What do you mean
- キ What do you like to make

〔問3〕 <sup>(3)</sup>keep the temperature at around 70°C for thirty minutes とあるが、このようにする目的を次のように表現するとき、の中にどのような英語を入れるのがよいか。本文中の連続する9語で答えなさい。

It is necessary to keep the temperature at around 70°C for thirty minutes to make eggs with .

〔問4〕 本文の流れに合うように、 と  の中に英語を入れるとき、その組み合わせとして最も適切なものは、次のア～コの中ではどれか。ただし、 は本文中に2箇所ある。

|   | <input type="text" value="(4)-a"/> | <input type="text" value="(4)-b"/> |
|---|------------------------------------|------------------------------------|
| ア | 65°C – 70°C                        | seven                              |
| イ | 65°C – 70°C                        | fifteen                            |
| ウ | 65°C – 70°C                        | thirty                             |
| エ | 70°C – 75°C                        | thirteen                           |
| オ | 70°C – 75°C                        | twenty-five                        |
| カ | 80°C – 85°C                        | seven                              |
| キ | 80°C – 85°C                        | thirteen                           |
| ク | 80°C – 85°C                        | fifteen                            |
| ケ | 95°C – 100°C                       | seven                              |
| コ | 95°C – 100°C                       | thirteen                           |

〔問5〕 <sup>(5)</sup>I got it! とあるが、このとき Erika の言いたい内容を最もよく表しているものは、次の中ではどれか。

- ア I understand there is a reason for eating pudding with sauce made from a lot of sugar.
- イ I understand we can make many kinds of dishes with eggs.
- ウ I understand why caramel sauce keeps pudding soft.
- エ I understand sugar helps protein strings in eggs stick to each other.

〔問6〕 (6) Eggs are simple, but 【 ① many ② when ③ can ④ heat ⑤ in ⑥ change ⑦ we ⑧ ways ⑨ they 】 them or mix them with other things. とあるが、本文の流れに合うように、【                    】内の単語を正しく並べかえたとき、【                    】内で1番目と3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。

|   | 1 番目 | 3 番目 | 7 番目 |
|---|------|------|------|
| ア | ⑦    | ④    | ②    |
| イ | ⑦    | ⑤    | ⑨    |
| ウ | ⑦    | ⑥    | ②    |
| エ | ⑨    | ④    | ②    |
| オ | ⑨    | ④    | ⑦    |
| カ | ⑨    | ⑥    | ②    |

〔問7〕 本文の内容と合っているものを、次のア～キの中から二つ選びなさい。

- ア In an emulsion, tiny drops of water are spread out in the oil, but the water soon moves to the top.
- イ When Erika makes boiled eggs, she usually boils eggs for thirteen minutes or more to make both the yolk and the white part fully cooked.
- ウ Mr. Doi taught the three students how proteins in eggs change with heat.
- エ Yuta explained to the other two students why mayonnaise is an emulsion and how *onsen* eggs are made.
- オ In the students' experiment, eggs became hard boiled when they were heated for thirty minutes.
- カ The three students made salad dressing, *onsen* eggs and Japanese pudding together for their presentation.
- キ When Erika made pudding for the first time, she failed to make tiny holes and bubbles in it.

〔問 8〕 次の英文は、ある日 Olivia がイギリスの母親に送ったメールである。本文の内容に合うようにするには、( a ) ～ ( c ) の中にそれぞれどのような英語を入れるのがよいか。本文中の 1 語で答えなさい。なお、同じ記号の空所には同じ単語が入る。

Hi Mom,

Sorry, I'm late to reply.

Last week, I talked with Erika and Yuta about our ( a ). Erika's interesting research moved me to learn more about science in ( b ). We shared our ideas, and Mr. Doi helped us understand how things are made through the eyes of science. Mr. Doi is a home economics teacher and he studied natural science at university. I realized many teachers have a lot of experience.

On Monday, after our experiment of boiling eggs, we made sandwiches with all the boiled eggs and some mayonnaise. Erika told me the other day that it is an ( c ) of oil and vinegar. The sandwiches were so good. Yuta ate a lot!

Today, we decided to do more research to give a ( a ) on eggs. There are various ways of ( b ) eggs. Next week, we will make Japanese pudding. I'll let you know how it goes.

Love,

Olivia

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。)

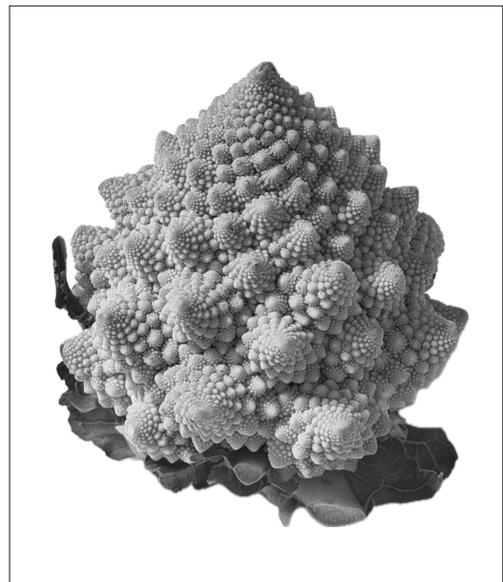
We see many lines, \*curves, and shapes like triangles and circles in daily life. For example, you can see straight lines in most windows. Most books are rectangles, and we enjoy round or square cookies. If you look carefully around you, you can find mysterious, beautiful shapes even in the natural world. Rainbows show beautiful curves after rain. On a turtle's \*shell, you can see shapes like \*hexagons. A long time ago, people started to study rules in lines, shapes and space. This kind of study is called geometry.

Geometry is a part of math. 'Geo' means earth, and 'metry' means to \*measure. In ancient Egypt, the big river there often got too full and covered the ground. So, after this happened, people had to measure the land again. This is probably the beginning of geometry. Geometry is not only a classroom subject but also something that is part of our daily life. By studying nature or things in front of us and using that knowledge, we have improved our lives.

Now let's look at some interesting \*geometric shapes found in nature.

There are shapes that look the same even after we move them or turn them over. We call this symmetry. Many beautiful things in nature have symmetry. One kind of symmetry is <sup>(1)</sup>line symmetry. If one side of a shape looks like the mirror image of the other across the line in the middle, the shape has line symmetry. For example, in the natural world, a butterfly has the same shape on both sides like a mirror image. Many flowers, leaves and animals also show line symmetry.

Have you ever seen romanesco? It's a green vegetable that looks like broccoli, but its shape is unique. Look at this picture. You can see many small \*bumps on the \*surface. The bumps also have even smaller bumps on them. Each bump has almost the same shape as the whole romanesco. This kind of repeating \*structure at different sizes is called a fractal. Trees also have this structure. A tree has a big \*trunk, and from the trunk, big \*branches grow. From the big branches, smaller branches grow, and then, even smaller branches grow again. Each part looks like the whole tree. Maybe trees and romanesco grow in an \*efficient way, and because of this, their shapes become fractals.



Now let's take a butterfly again as another example. How many eyes does a butterfly have?

When you look at the surface of a butterfly's round eye very carefully, something amazing becomes clear. <sup>(2)</sup> ① any ② between ③ can ④ many ⑤ see ⑥ space ⑦ you ⑧ without ⑨ tiny hexagons ] them. In fact, each of these hexagons is a small eye. With a lot of tiny eyes on the round shape, butterflies can see what is happening around them without moving.

Nature often chooses shapes that are simple and efficient. Geometry helps us understand shapes and rules in the natural world. We use this knowledge in many things around us to make our lives better.

Since ancient days, people around the world have created beautiful \*patterns by using geometric shapes. For example, geometric patterns are often found on  or . In Japan, patterns made of hexagons put together are called “*kikkō*,” and people have loved these patterns since a long time ago. The word “*kikkō*” means “turtle shell.” Turtles are symbols of long life, so people believe that *kikkō* patterns bring them a long life and protect them. *Kikkō* patterns are used in many things such as kimonos or temples. Some *kikkō* patterns have only hexagons. Others have lucky flowers or animals inside to make the designs more attractive. In this way, people have loved geometric patterns and used them to create beautiful designs for a long time.

Symmetry is often used in design. We may feel its \*balance is calm and beautiful because we often see it in nature.

Another example is the \*National Diet Building in Tokyo. <sup>(5)</sup> The building has a tower in the middle, and the left and right sides look the same, like a mirror image. Not only outside but also inside, the structure is almost the same on both sides. There is an important reason for this. In Japan, there are two \*houses in the National Diet. Each house usually uses a different side of the building and discusses things without the other. This helps them make careful and good decisions. They work in their own way, but together they support the country. The line symmetry of the building shows both houses are important.

If we look around the world, we can find many other examples of effective use of geometry in our lives. One great example is one of the most famous churches in the world designed by a very famous European architect. The architect loved nature, studied its shapes very carefully, and used geometry in his designs. Inside the church, you can see many different shapes everywhere. They follow rules from geometry and show not only how much the architect loved nature but also how much geometry makes the church both beautiful and strong. For example, he used special curves to support the ceiling. Walking inside the church is like entering a mysterious forest. There are many tall stone \*columns that look like tree trunks.

The architect knew that straight, \*vertical columns may become weak \*at the point of contact with the ceiling. In the natural world, heavy things are usually not supported by thin, vertical poles. Instead of straight, vertical columns, the architect designed columns that spread branches in a curve near the ceiling. These branches support the ceiling and keep the building strong. The architect also used curves called catenary curves. A catenary curve is the shape made by a rope when it hangs between two points. When this curve is turned \*upside down in buildings, it can support heavy things in balance and create a strong structure. The architect used this idea to make the building of the church both beautiful and strong.

The architect's work is a clear example of geometry used in real life. <sup>(6)</sup>Geometry is more than paper and pencil. From ancient Egypt to today, from butterflies to big buildings, geometry is everywhere. By learning geometry, we can understand the world more deeply, find new ideas, solve real problems, and create beautiful and useful things.

|     |  |                  |             |
|-----|--|------------------|-------------|
| 〔注〕 | curve 曲線                               | shell 甲羅         | hexagon 六角形 |
|     | measure 測る                             | geometric 幾何学的な  | bump 突起     |
|     | surface 表面                             | structure 構造     | trunk 幹     |
|     | branch 枝                               | efficient 効率的な   | pattern 模様  |
|     | balance バランス                           | National Diet 国会 | house 院     |
|     | column 柱                               | vertical 垂直な     |             |
|     | at the point of contact with ~ ~と接する点で |                  |             |
|     | upside down 上下逆さまに                     |                  |             |

〔問1〕 <sup>(1)</sup> line symmetry ではないアルファベットは、次の中ではどれか。

- ア A
- イ E
- ウ O
- エ S

〔問2〕 <sup>(2)</sup> 【① any ② between ③ can ④ many ⑤ see ⑥ space ⑦ you ⑧ without ⑨ tiny hexagons】 them. 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、【           】内で3番目と6番目と8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ます。

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

〔問3〕 本文の流れに合うように、 と

の中に英語を入れるとき、その組み合わせとして最も適切なものは、次の中ではどれか。

|   | <input type="text" value="(3)-a"/> | <input type="text" value="(3)-b"/> |
|---|------------------------------------|------------------------------------|
| ア | walls                              | national flags                     |
| イ | clothes                            | the moon's surface                 |
| ウ | a butterfly's eyes                 | wrapping paper                     |
| エ | romanesco                          | a turtle's shell                   |

〔問4〕 (4) の中には、次のA～Dの文が入る。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 Let's take the main building of a temple in Kyoto as an example of those buildings.
- B Thanks to this design, this building has good balance and looks calm and beautiful.
- C Some buildings use line symmetry to show beauty or balance.
- D If it is seen from the front, it looks the same on both the left and right sides, and the pond in front of it also shows it like a mirror.

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

〔問5〕 <sup>(5)</sup>The building に関する説明として、本文の内容と合っているものは、次の中ではどれか。

- ア The importance of both houses is shown in the structure of the building.
- イ Each of the two houses has a tower in the same shape to show their balance.
- ウ Each side has a mirror in the middle to show both houses usually discuss together.
- エ The symmetry of the building shows the importance of humans and the natural world.

〔問6〕 <sup>(6)</sup>Geometry is more than paper and pencil. とあるが、ここで筆者の言いたい内容を最もよく表しているものは、次の中ではどれか。

- ア It is very difficult to explain what geometry is.
- イ Geometry is a tool to understand and improve the real world around us.
- ウ More research is necessary for humans to begin to use geometry in effective ways.
- エ If you take notes carefully in class, you will soon be better at geometry.

〔問7〕 本文の内容と合っているものを、次のア～キの中から二つ選びなさい。

- ア People in ancient Egypt had to measure the big river again and again because they didn't know geometry.
- イ Few natural things have symmetry, but people love it and use it for many things because it is calm and beautiful.
- ウ The structure of romanesco is called a fractal because the small bumps and bigger bumps of the vegetable all look like the whole vegetable.
- エ People believe kimonos with *kikkō* patterns bring them good luck because *kikkō* patterns are made of turtles' shells in the shape of hexagons.
- オ The famous European architect used tree trunks with branches to support the ceiling of the church instead of using straight, vertical columns.
- カ The famous European architect used geometric ideas in effective ways to make the church not only beautiful but also strong.
- キ By using catenary curves, you can build a strong building because heavy things can be supported on ropes hung between two points.

〔問8〕 次の指示にしたがってあなたの考えを、**40語以上50語程度の英語**で答えなさい。「.」「,」「!」「?」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書きなさい。

People have created many useful things by using one or more geometric shapes. Write about one of those useful things that uses one or more of the following shapes: circle, triangle, rectangle, or square. Explain how the geometric shapes make it useful to us.

8  
月

英

記