(7-戸)

111	=+
	==
ス	99

7

Ę

五日

# 問題冊子2

/注	意~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
「問題冊子 2」に印刷されている問題は、	<b>2</b> から <b>3</b> までで, 2ページから
14 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。)

Jun is a Japanese boy studying at a high school in California. He stays with an American family. On holiday, Jun is talking with his classmates, Tom and Ann, in his room.

*Jun:* I've brought a \*kaleidoscope from Japan. I often look into it when I want to relax.

Tom: Kaleidoscopes are popular in the U.S., too. A kaleidoscope is not just a toy, but art.

*Ann:* I hear some are very expensive.

- *Jun:* I know. (1)-a I built it by myself for summer homework when I was in elementary school.
- Ann: Let me look into it. Beautiful! (1)-b
- *Tom:* The \*objects \*reflect off the mirrors, right?
- *Jun:* Yes. I put three mirrors and the objects inside. The objects reflect off the mirrors many times and create a beautiful picture.
- *Tom:* I've heard the mirrors in kaleidoscopes are different from mirrors we usually use.
- Jun: Yes. So, when I made this kaleidoscope, my father repeated, "Never touch the \*surface!"
- Ann: Why did you use such special mirrors for your kaleidoscope?
- Jun: Well, I'm not sure. (2) Why don't we ask Bill? He studied \*optics at university.

Jun, Ann and Tom leave Jun's room. They find Bill, Jun's host father, in the living room.

- *Jun:* Bill, we were talking about the mirrors inside this kaleidoscope. Can you explain how they are different from many other mirrors used in daily life?
- Bill: Sure. (1)-c
- *Ann:* I just know we need glass and some kind of \*metal.
- *Bill:* Actually, there are so many different types of mirrors, but now let's just think about \*flat glass mirrors covered with the metal \*reflective coating. Mirrors for kaleidoscopes have the reflective coating on the front surface of the glass. They are called first surface mirrors.
- *Tom:* Then, what about mirrors with the reflective coating on the back of the glass? Second surface mirrors?
- *Bill:* That's right. Many mirrors around us, like the one on that wall, are second surface mirrors.
- Ann: How are the \*images in the two types of mirrors different?
- *Bill:* First, let's think about the \*thickness of the glass. If you touch the front surface of the (3)-a surface mirror with your finger, it looks like two fingers meeting each other. However, if you do the same thing on a (3)-b surface mirror, ...
- *Jun:* The fingers don't meet because of the thickness of the glass!

- *Bill:* That's right. Next, \*consider how light reflects off the mirrors. When we see an image in a (3)-c surface mirror, light passes through the glass, reflects off the reflective coating on the back, passes through the glass again, and then reaches our eyes. Usually, when the light reaches the glass, some of the light doesn't pass through the glass but reflects off the surface.
- Ann: Then, when the light finally reaches our eyes, it is a little darker. I see.
- *Tom:* Anything else?
- *Bill:* Because the light reflects off both the glass and the reflective coating, you may see two images, not just one. There is one more thing that makes images \*less clear. Light may change directions when it goes into and comes out of the glass.
- Jun: Oh, these things shouldn't happen inside the kaleidoscope.
- Bill: You're right. If we use second surface mirrors for a kaleidoscope, what will happen?
- *Tom:* The picture will become darker and darker, and less clear, because the objects (4).
- Ann: Then why are second surface mirrors more common for daily use?
- *Jun:* (1)-d Metal can be dirty or damaged more easily than glass.
- *Bill:* Yes. Second surface mirrors are friendlier to users. The glass covers the reflective coating but still allows enough light to pass through, so we can get images that are clear enough in daily use.
- Ann: Very interesting. Hey, let's study more about mirrors.
- *Tom:* Good idea.

A week later, Jun, Ann and Tom are talking in Jun's room again.

- *Jun:* Let's share our research.
- *Ann:* Tom and I did research on the history of mirrors. I was surprised to learn that humans have used mirrors for a very long time.
- Jun: I've heard people used water, stones or metal for mirrors at first.
- *Tom:* Yes. Glass mirrors developed in Europe during \*the Renaissance. Later, from the 16th to the 17th century, an island which was famous for making fine glass was the center of glass mirror \*production.
- Jun: Ah, fine clear glass was used to create fine mirrors, right?
- *Ann:* Yes. The mirrors produced on the island were precious and very expensive because glass mirror workers protected the secrets of making fine glass mirrors by staying on the island.
- *Tom:* In the late 17th century, France worked very hard to learn their secrets and finally brought some mirror workers from the island to France. This influenced the production of mirrors in France, and the country quickly became good at producing mirrors.
- *Ann:* Have you ever visited \*the Palace of Versailles in France? You can see the Hall of Mirrors, a beautiful hall with a lot of mirrors facing the garden. That hall was built

around that time.

- *Tom:* When workers made mirrors at that time, they had to use metal which was very bad for health. But after a German scientist discovered a way to put silver on glass surfaces in the 19th century, mirror production became safer. This new way also made mirrors clearer and more common.
- Ann: (5) Now, it's your turn, Jun.
- *Jun:* Sure. First, I learned about various uses of mirrors. There are so many different types and shapes. Not only at home or on the streets, but also in medical use, we see mirrors everywhere.
- *Tom:* They are also used in \*microscopes and in \*reflecting telescopes.
- *Jun:* Yes. I became interested in reflecting telescopes, so I learned more about them. Do you know who created the first reflecting telescope in the world?
- Ann: No. Who?
- *Jun:* \*Isaac Newton. The most important and hardest part of producing a reflecting telescope is making fine mirrors to collect enough light and to create clear images. Newton made special metal mirrors by himself and created the first reflecting telescope in 1668.
- *Tom:* I knew he was really smart, but I can't believe it!
- *Jun:* The first reflecting telescope with first surface glass mirrors was invented by another scientist in the 19th century.
- Ann: What's good about reflecting telescopes?
- *Jun:* By using a huge mirror as the main mirror, they can collect a lot of light and provide very clear images of \*distant objects.
- *Tom:* So reflecting telescopes are very important in space research. I understand.
- *Ann:* By using mirrors, we can see many different objects, from our own faces to objects in distant space that are far away from the earth.
- Jun:
   We began with a kaleidoscope and learned a lot about mirrors.
   Something (1) by

   (2) influenced (3) may have (4) history (5) we (6) and creative (7) the efforts (8) a long
   (9) use every day (1) ideas of many people. How exciting!

〔**注**〕 kaleidoscope 万華鏡 object 対象物 reflect off ~ ~に反射する surface 表面 optics 光学 metal 金属 flat 平らな reflective coating 反射材 thickness 厚さ consider ~ ~を考える image 像 less clear より不鮮明な the Renaissance ルネッサンス期 production 製造 the Palace of Versailles ヴェルサイユ宮殿 microscope 顕微鏡 reflecting telescope 反射望遠鏡 distant 遠くにある

- [問1] 本文の流れに合うように, (1)-a (1)-d (1)-
  - $\mathcal{P}$  I can guess that.
  - **1** I don't agree with you.
  - ウ I wonder how it works.
  - **I** But this one is not.
  - オ Why do you believe so?
  - $\boldsymbol{\mathcal{D}}$  Do you know how to make a mirror?

- $\mathcal{P}$  We shouldn't ask Bill why mirrors are used in kaleidoscopes because I want to study by myself.
- 1 I want to ask Bill why I used special mirrors for this kaleidoscope because I made it for him.
- ウ We should ask Bill about mirrors used inside kaleidoscopes because he knows better than me.
- 〔問3〕 本文の流れに合うように, (3)-a ~ (3)-c 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。

	(3)-a	(3)-b	(3)-c
ア	first	second	first
イ	first	second	second
ウ	second	first	first
Т	second	first	second

- 〔問4〕本文の内容から判断して, (4) 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6語で答えなさい。
- 〔問5〕 <sub>(5)</sub><u>Now, it's your turn, Jun.</u> とあるが, このとき Ann 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。
  - $\mathcal{P}$  Learn more how mirrors have developed, Jun.
  - **1** Tell us about your research on mirrors, Jun.
  - $\dot{\mathcal{P}}$  Explain the secrets of producing mirrors, Jun.
  - **I** Discover a different way of producing mirrors, Jun.

 [問6] <u>Something</u> 【① by ② influenced ③ may have ④ history ⑤ we ⑥ and creative
 ⑦ the efforts ⑧ a long ⑨ use every day 】 ideas of many people. 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2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。

	2番目	5 番目	7番目
ア	1	3	5
イ	1	9	8
ウ	2	$\bigcirc$	5
エ	2	9	8
オ	9	4	1)
カ	9	8	$\overline{\mathcal{O}}$

〔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。

- $\mathcal{P}$  Jun used three first surface mirrors to build a kaleidoscope when he was an elementary school student.
- 1 Humans have used only water, stones, and metal for mirrors in history.
- ウ The first glass mirror was invented in Europe in the 17th century, but the skills were not developed for centuries after that.
- ⊥ Silver was used to produce the mirrors for the Hall of Mirrors because it was good for health.
- オ After doing research on reflecting telescopes, Jun learned how different types of mirrors are used in daily life.
- $\mathcal{D}$  Newton invented the first reflecting telescope in the world by using first surface glass mirrors in the 17th century.
- The huge main mirror of a reflecting telescope allows us to see things that are far away from the earth.

〔問8〕 次の英文は、ある日の Ann の日記の一部である。本文の内容に合うように、
 ( 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。

Tomorrow, we're going to meet in Jun's room again to share our research. Tom and I chose the  $(\mathbf{a})$  of mirrors as the main topic to learn how mirrors have developed over time during different periods of  $(\mathbf{a})$ . For a week, we have been studying it at the library and on the internet. I hope Jun enjoys it. I was especially excited to learn that  $(\mathbf{b})$  was able to improve its mirror making technology after bringing workers from an island. I want to visit the country and see the Hall of Mirrors someday! Mirror making technology improved a lot when people learned to make clear glass. To get a clear image, a lot of  $(\mathbf{c})$ needs to go through the glass, hit the reflective coating, and then come back through the glass to reach our eyes. Has Jun found any other interesting stories? I'm looking forward to his research.

## 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。)

3

Plants are everywhere. In spring, if you find fresh green leaves or pretty flowers along the street, you may want to start something new. On a hot summer day, you may be able to stay out of the sun under a big tree. Some plants give humans and animals their fruits or nuts in fall. Humans even use huge areas to grow plants that feed us.

Like animals, plants are living things, so they need to have \*offspring to survive. For plants, one of the greatest ways of producing children is to make seeds. A seed is a mysterious \*capsule that contains a plan of its future. A seed has a baby plant inside, and usually, also has energy and \*nutrition that are used when it starts to grow. One scientist says, "A seed is a baby plant, in a box, with its lunch."

A baby plant can wait in its capsule until environmental conditions are ready. If a baby plant started to grow in very cold weather, it would \*freeze. When it is too dry, a baby plant cannot continue to grow because it needs water. It cannot start to grow if it is too \*deep in the ground. A baby plant knows when it should start coming out. Its capsule usually plays an important part in protecting the baby plant while it is waiting.

Animals can move to get food, to run away from their \*enemies or to raise their children. Usually, plants cannot move, but they can move when they are seeds.

For many plants, \*spreading seeds into various environments is a clever way to (1)-a. If seeds stay near their parent plants, baby plants may not be able to grow well under their parents. They may not get enough light. Also, the baby plants may easily be eaten by \*bugs attracted by the plants although their parents are strong enough to survive. For these kinds of plants, it is important to spread their seeds to get more chances to leave their (2)-a. Then how do they do that?

Some plants spread their seeds by using wind. Look at Picture 1. Some kinds of seeds have special wings or "\*parachutes" that help them fall slowly. If it takes more time for seeds to fall, they can travel longer in the air and go far away. Look at Picture 2. \*After flowering, the flower parts of this plant grow into groups of tiny seeds with "parachutes". Then, the plant grows taller and, as a result, the seeds with "parachutes" are raised to higher places. (3) For the seeds, (1) it (2) from ③ means (4) takes (5) flying (6) to reach  $\bigcirc$  more time (8) the ground (9) a higher place ]. Also, they can catch more wind because they are now in wide open air. Some other plants wait for strong winds. We sometimes see some plants left in winter fields that still have seeds with tiny "parachutes". They may be waiting for stronger winds that can carry their seeds far away. Usually, these seeds don't leave their (2)-buntil strong winds come.

(4) Some reach their goals soon, and

others travel for a long time. One example is a \*coconut. It carries its seed inside itself. According to some research, it sometimes travels thousands of kilometers in the ocean. A coconut is the biggest fruit that is carried to another place by water. Its seed is surrounded and protected by the thick part of the fruit. Because of this, a coconut can survive in the sea for a very long time. When it gets to its goal, it may be able to start growing even on the \*sand with little water and nutrition. The seed has enough "lunch" in it. Humans sometimes drink its "lunch" as coconut water, coconut milk, and so on.

Some plants have another plan to move. They use animals. Fruits of some trees attract animals in the forest with their colors or nice \*smell. Animals that have eaten the fruits can spread their seeds. Seeds inside the fruits may be broken by animal teeth, but plants have <sup>(5)</sup> some clever ways to escape from this danger. Look at the fruit in Picture 3. It has a lot of very small seeds, so there are some seeds that are not broken when they are eaten. Tomatoes have another good way. Their seeds are surrounded by a \*slimy substance. Animals fail to bite into them because of the slimy substance, and the seeds can enter animals' bodies without breaking. These seeds enter the animal's body and are carried to other places through the animal's movement. The seeds finally come out of the animal's body in its \*droppings. The droppings include lots of nutrition that helps seeds grow. This means that the seeds may have chances to find better environments.

Collecting \*acorns in a forest may be exciting for some small children. Acorns are also seeds. In fall, small animals like squirrels pick up acorns and keep them in many places under the ground as their food for winter. However, they don't eat all of them because they sometimes cannot get the food back for some reason or just forget where they put their food. The food for the animals left in the ground will then (6). This is another way of spreading seeds.

After seeds are spread, they sit on or under the ground. How do they know when they should stop sleeping and start growing?

Let's think about tree seeds. Many of them wake up after they are kept in a wet cold place for some weeks or more. When the temperature becomes warm enough, they start to grow. Why do they need to experience cold weather? If they (1)-b, they may start growing after some warm days even in fall, and those plants may not be able to survive cold winter.

In the forest, some baby plants get out of their capsules when the trees near them are cut down and an open area appears. They know they cannot grow well under big trees, so they wait. When trees are cut down in the forest, seeds lying under the ground near the trees stop sleeping. Some seeds (1)-c for about 100 years. How do they know that the conditions are right? According to some researchers, when the temperature difference between day and night becomes bigger, they realize that the ground gets enough sun because it is warm during the day.

Some seeds that are deep under the ground can also sleep for a long time. They may wake

up like the forest seeds when they feel the temperature difference. Even when you just \*dig up the ground without planting any seeds, you may be surprised to find new plants growing out of the ground after several days or weeks. These baby plants may be from seeds that have long been waiting to come out deep under the ground.

Seeds have lots of secrets to survive. They protect themselves, travel and wait. Most plants use seeds to survive. We can say that plants are very smart.

<Picture 1>







<Picture 3>



「たね」(技術評論社)より

〔注〕 offspring 子孫 capsule カプセル nutrition 栄養 freeze 凍る deep 深く enemy 敵 spread ~ ~を散布する bug 虫 parachute パラシュート after flowering 花が終わった後 coconut ココヤシの実 sand 砂 smell におい dropping (鳥獣の)ふん slimy substance ぬるぬるしたもの acorn どんぐり dig up ~ ~を掘り返す

## 〔問1〕本文の流れに合うように、(1)-a ~ (1)-c の中に次の①~④の英語を入れるとき、その組み合わせとして最も適切なもの は、下のア~コの中ではどれか。

- ① miss this first step
- 2 wait for a long time
- $\bigcirc$  survive in the natural world
- (4) keep waiting for this chance

	(1)-a	(1)-b	(1)-c
ア	2	1	3
イ	2	1	4
ウ	2	3	1)
Т	2	3	4
オ	2	4	3
カ	3	1	4
+	3	2	1)
ク	3	2	4
ケ	3	4	1)
	3	4	2

〔問2〕 本文の流れに合うように, (2)-a と (2)-b 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。

	(2)-a	(2)-b
ア	offspring	offspring
イ	offspring	parent plants
ウ	parent plants	offspring
Т	parent plants	parent plants

[問3] (3) For the seeds, 【① it ② from ③ means ④ takes ⑤ flying ⑥ to reach
 ⑦ more time ⑧ the ground ⑨ a higher place ]. 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2番目と5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。

	2 番目	5番目	8番目
ア	2	1	6
イ	2	(7)	3
ウ	3	4	5
Т	3	(7)	6
オ	(4)	3	5
カ	(4)	8	2

- 〔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 These seeds can travel on or in water.
  - **B** Another way of sending their offspring to other places is to use water.
  - **C** Many of the plants that use water to spread their offspring produce special seeds.
  - **D** The water can be a river, a lake or the sea.

ア	$A\!\rightarrow\!C\!\rightarrow\!B\!\rightarrow\!D$	$\textbf{1}  \textbf{A} \!\rightarrow\! \textbf{D} \!\rightarrow\! \textbf{B} \!\rightarrow\! \textbf{C}$	ウ	$B\!\rightarrow\!A\!\rightarrow\!D\!\rightarrow\!C$
т	$B\!\rightarrow\! D\!\rightarrow\! C\!\rightarrow\! A$	才 $C \rightarrow A \rightarrow D \rightarrow B$	カ	$C\!\rightarrow\!B\!\rightarrow\!D\!\rightarrow\!A$

〔問5〕 (5) some clever ways to escape from this danger に当てはまるものとして最も適切 なものは、次の中ではどれか。

- $\mathcal{P}$  to have fruits with a lot of tiny seeds
- 1 to have seeds with a lot of nutrition
- $\dot{\nu}$  to have seeds with a smell that most animals like
- **I** to have fruits with a slimy substance around them

#### 〔問6〕 本文の流れに合うように, (6) 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。

- $\overline{\mathbf{\mathcal{P}}}$  attract small children
- **1** give it nutrition
- ウ act as baby plant capsules
- **I** change into droppings with nutrition

#### 〔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。

- $\mathcal{P}$  Not only humans but also animals can feed plants by giving them fruits or nuts in fall.
- A baby plant can come out of the ground even in cold weather because its capsule protects it.
- $\dot{\mathcal{D}}$  Baby plants grow well when they are near their parent plants that protect them.
- ⊥ Some seeds can start to grow far away from their parent plants because they can travel in the air.

- + Even when there are no seeds in the ground, baby plants sometimes come out.

# 〔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。

There are a lot of interesting things in the natural world. Choose one of them and write about it. Explain why it is interesting to you. **Don't write about seeds.** 

7 || || || || ||

ヺ