

1 英文を読み、問題に答えなさい。

In a land swept by typhoons and shaken by earthquakes, how have Japan's tallest and seemingly flimsiest old buildings—500 or so wooden pagodas—remained standing for centuries? Records show that only two have collapsed during the past 1,400 years. Those that have disappeared—and many have—were destroyed by fire as a result of lightning or civil war. The disastrous Hanshin earthquake in 1995 killed 6,400 people, toppled elevated highways, flattened office blocks and devastated the port area of Kobe. Yet it left the magnificent five-story pagoda at the Toji Temple in Kyoto undamaged.

Japanese scholars have been mystified for ages about why these tall, slender buildings are so stable. In “earthquake country” Japan, it was only 30 years ago that the building industry felt confident enough to erect office blocks of steel and reinforced concrete that had more than a dozen floors. Yet in 826, with only pegs and wedges* to keep his wooden structure upright, the master builder Kobodaishi built Toji pagoda soaring 55 meters into the sky—nearly half as high as the Kasumigaseki skyscraper built some eleven centuries later. Though it burned down four times after being struck by lightning, the latest version of Kobodaishi's classic structure has stood its ground since 1644. Clearly, 1) Japanese carpenters of the day knew a few tricks about allowing a building to swing and settle itself rather than fight nature's forces and fall apart into pieces. But what sort of tricks?

The multi-story pagoda came to Japan from China in the sixth century as the stone-built watch towers or towers for worship, with the introduction of Buddhism. In Japan, however, the architecture was freely adapted to meet the local conditions. 2) The Japanese pagoda has evolved from an observation tower to a tower that is itself observed.

In addition to earthquakes, the Japanese islands get battered by a couple of dozen typhoons in the summer. Japanese builders have learned to extend the eaves** of pagodas much further out from the walls. This prevents rainwater from gushing down the walls and into the foundations, softening the soil and causing the building eventually to subside or even collapse. For centuries, many thought that, like a tall pine tree, the Japanese pagoda—with its massive trunk-like central pillar known as a *shinbashira*—simply flexes and swings when riding out a typhoon or an earthquake. But the answer is not so simple.

A number of things ensure that a pagoda works nothing like a pine tree. The most



startling one is that the trunk-like *shinbashira* carries no load at all. In some pagoda designs, it does not even rest on the ground, but is suspended from the top of the pagoda—hanging loosely in a well down (A) the middle of the building. Also, a five-story pagoda contains not even one pillar that travels right up (A) the building to carry the structural loads from the top to the bottom (under Japan's current building codes, wooden buildings with two or three stories must have pillars connecting the roof firmly to the foundations).

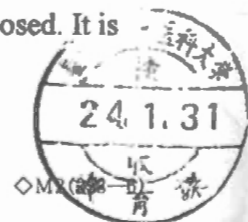
Second peculiarity is that the wide eaves that overhang their individual stories are deliberately loaded down with heavy roof tiles. Imagine the branches of a tree weighed down with snow. They would be torn from the trunk in the first breeze. So the (B) as well as the size of the eaves must be a clue to the pagoda's ability to survive.

Another feature that makes a pagoda unlike a tree is that its individual stories are not actually attached to one another. They are simply stacked one on top of another like a pile of hats. What joints there are between the floors are loosely fitting wooden brackets*** that allow each story to slide.

Now, let's solve the tricks of the pagoda's stability based on the above features. If the *shinbashira* plays no structural role, what on earth does it actually do? It is by far the largest piece of timber in the building, and *hinoki tree*—building material of *shinbashira*—is an incredibly expensive piece of wood. Furthermore, the *shinbashira* is strictly a Japanese invention. It is not found in pagodas elsewhere. What the early craftsmen had found by (C) was that a pagoda's loose stack of individual floors could be made to slide sideways to and fro independent of one another. In other words, viewed from the side, the pagoda appeared to be doing a snake dance—with each consecutive floor moving in the opposite direction to the ones immediately above and below. In short, the *shinbashira* was acting like an enormous stationary pendulum, such as seen in "old grandfather clock."

And what of the extra-wide eaves with their heavy tiles? Think of them as a tightrope walker's balancing pole. Because of inertial effects, the bigger the mass at each end of the pole, the easier it is for the tightrope walker to maintain his balance. 3) The same holds true for a pagoda. With the eaves extending out on all sides like balancing poles, the building responds to even the most powerful jolt of an earthquake with a graceful swaying.

• The secret of the Japanese pagoda's enduring strength and stability is exposed. It is



in effect 4) the sum of three mutually reinforcing factors. Together, the whole is a quite extraordinary feat of structural engineering, using poise and balance in place of brute strength.

注) * 杭とくさび

** (家の) 軒、ひさし

*** L字型の取り付け用具

[1] 下線部 1)を日本語に訳しなさい。

[2] 下線部 2)において、筆者はどのようなことを述べようとしているか、説明しなさい。

[3] 下線部 3)が示す内容を、説明しなさい。

[4] 下線部 4)は、具体的には何を指すのか、50～80 字以内で述べなさい。

[5] (A)に入る最も適切なものを、選択肢から選び記号で答えなさい。

(a) along (b) from (c) on (d) through (e) with

[6] (B)に入る英語一語を答えなさい。

[7] (C)に入る最も適切なものを、選択肢から選び記号で答えなさい。

(a) comparison and contrast (b) point and purpose
(c) question and answer (d) trial and error

2 英文を読み、問題に答えなさい。

Freshwater is the liquid of life. Without it the planet would be a 1) barren wasteland. 2) When water is plentiful, it's taken for granted and a great deal of it is wasted. However, water is a precious and often scarce resource in many parts of the world. The supply of water is finite, but demand is rising rapidly as population grows and as water use per person increases. In an effort to spur action to meet the 3) impending crisis, the UN General Assembly has proclaimed the period from 2005 to 2015 as the International Decade for Action, "Water for Life".



In theory, some 34,000 km³ of freshwater are available globally for human use every year. If evenly distributed this would provide each person with roughly 8,000 m³ of water per year (based on the population in 2000). This amount would be enough to 3)meet human needs, if freshwater were evenly distributed. But 2)available freshwater supplies are not distributed evenly around the globe, throughout the seasons, or from year to year. For instance, the Congo River and its tributaries account for about 30 % of the entire African continent's annual runoff, but the watershed contains only 10 % of Africa's population. Two-thirds of the world's population—around 4 billion people—live in areas receiving only one-quarter of the world's annual rainfall.

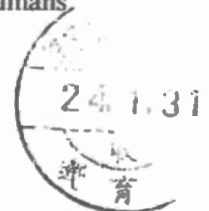
多くの開発途上国において、真水の供給は季節性の降雨により提供される。このような雨は、とても急激に流れ出るので、効率よく使用できない。 India, for example, gets 90% of its annual rainfall during the summer monsoon season, which lasts from June to September. For the other eight months the country gets barely a drop.

Pollution of rivers and lakes reduces accessible freshwater supplies. Each year roughly 450km³ of wastewater are discharged into rivers, streams and lakes. Having safe drinking water would 4)impact people's lives and health. More than 80% of diseases, including typhoid fever and cholera, are associated with 1)foul water and improper sanitation. Each year, more than 5 million people die from water pollution-related illnesses. This is the leading cause of death for children under five. To 5)clean and transport dirty water before it can be used again, another 6,000 km³ of clean water are needed—an amount equal to about two-thirds of the world's total annual useable fresh water runoff.

The amount of water that people use depends not only on basic needs and how much water is available but also on levels of urbanization and economic development. Withdrawals of water* have grown to meet demand for all types of use—or irrigated agriculture, industry, and other public purposes. As the world continues to urbanize at rapid rates, the demand for potable water for public use is expected to increase, outpacing the capacity of most cities to provide it.

注)

*The removal of water from some type of source, like groundwater, for some use by humans



◇M2(253—8)

[1] 下線部 1) ～ 5) に関して、本文に基づき、最も近い意味の語彙を選択肢から選び、記号で答えなさい。

- | | | | |
|--------------------|-----------------|----------------|------------------|
| 1) (a) destructive | (b) ineffective | (c) irregular | (d) unproductive |
| 2) (a) approaching | (b) preventing | (c) proceeding | (d) surprising |
| 3) (a) demand | (b) confront | (c) keep | (d) satisfy |
| 4) (a) act on | (b) affect | (c) depend on | (d) strike |
| 5) (a) collect | (b) dilute | (c) store | (d) weaken |

[2] 下線部 a) と b) に関して、最も近い意味の語彙を、本文から選び答えなさい。

[3] 下線部 a) を日本語に訳しなさい。

[4] 下線部の日本語を英語に訳しなさい。

3 次の英文において、下線部には 1 カ所間違いがある。間違いのある箇所を記号で答えなさい。

1) Hanako a) advised Betty b) joining a club or c) take a class, and she decided d) to become a member of the school's Japanese flower arrangement club.

2) Yesterday I went to a department store to buy a dress for my sister's wedding. I found one that looked really a) elegant and b) sophisticated, and the sales clerk told me that it c) suited me d) perfect.

3) The tourists are always a) amazing by the incredible beauty of this b) astonishing place, and they are so c) oblivious to the danger of d) getting closer to wildlife.

4) We had a big storm last week, and we lost the electricity for a) a few days. Once I got over b) scared, it was a lot of fun. We slept in our sleeping bags c) around the fireplace. We sure consumed d) a lot of wood.



5) Spine surgery is usually reserved a) for treatment of back pain b) that does not resolve c) with simple steps. However, there are some conditions d) which surgery may be necessary.

6) The house looked a) great. Mom and Dad had all the windows and floors b) clean c) professionally so everything d) sparkled.

4 次の()に、与えられた語句とほぼ同じ意味になるように、最も適切な一語を入れ、英文を完成させなさい。

1) When she didn't turn () on Sunday, we tried to get in touch with her.
appear

2) Could we talk it () before you turn the whole idea down at the meeting.
discuss

3) If you don't use () the eggs by Monday, please throw them away.
consume

4) At around two o'clock my instructor called to call () the lesson due to bad weather.
cancel

5) I had a big fight with my best friend yesterday. What should I do if I run () her on campus?
meet accidentally

6) What cultural and social changes were brought () by the printing press that changed modern history?
caused



◇M2(253-10)