

- [I] A. 次の会話文の空所(1)~(5)に入れるのに最も適当なものをそれぞれA~Dから一つずつ選び、その記号をマークしなさい。

An exchange student, Seiji, is looking to buy a printer at a store near his university campus and approaches the shop assistant.

Joan: Hello. _____
(1)

Seiji: Hi. Do you carry printers?

Joan: We sure do! Do you have one in mind?

Seiji: _____ I'm not really sure what's available.
(2)

Joan: No worries! I'll help you find the one that best suits your needs.
Could you tell me what you plan to use it for?

Seiji: Mainly schoolwork, such as printing out notes or articles, but I also want to be able to print color photos on occasion.

Joan: I see. And do you tend to print a lot on a regular basis?

Seiji: _____ I go through printer ink like crazy!
(3)

Joan: Well, you will need to choose between a laser printer and an ink-based printer. The laser printer is more cost efficient in the long run if you print a lot. However, ink-based printers typically make higher-quality photos.

Seiji: The photos wouldn't need to be anything special. Also, I'm on a budget.

Joan: _____ That type is better for your situation,
(4)
I think.

Seiji: Okay. Could you show me your selection of those?

Joan: Of course! _____
(5)

- (1) A. I can hold that for you if you like.
B. Welcome to our printer store.
C. What seems to be the problem?
D. How may I help you today?
- (2) A. My mind is foggy.
B. Actually, I do rather mind.
C. One or two; it doesn't matter.
D. Well, nothing in particular.
- (3) A. It happens from time to time.
B. Well, not so much, really.
C. Hmm, you could say that.
D. I might be right about that.
- (4) A. In that case, I recommend a laser printer.
B. In that case, I recommend an ink-based printer.
C. In that case, I recommend you get both.
D. In that case, I recommend a 3D printer.
- (5) A. What else would I do?
B. Right this way.
C. Let me ask my manager.
D. Do you have a bag?

B. 下の英文A～Fは、一つのまとまった文章を、6つの部分に分け、順番をばらばらに入れ替えたものです。ただし、文章の最初にはAがきます。Aに続けてB～Fを正しく並べ替えなさい。その上で、次の(1)～(6)に当てはまるものの記号をマークしなさい。ただし、当てはまるものがないもの(それが文章の最後であるもの)については、Zをマークしなさい。

- (1) Aの次にくるもの
- (2) Bの次にくるもの
- (3) Cの次にくるもの
- (4) Dの次にくるもの
- (5) Eの次にくるもの
- (6) Fの次にくるもの

A. Most people have experienced staying at a hotel, but what about an ice hotel? These unique hotels are made of snow and blocks of ice. They don't last as long as a regular hotel, either.

B. Still, to be fair, guests of ice hotels typically sleep in thick furs or sleeping bags designed for very cold temperatures, so it's probably not as cold as one would expect. Aside from rooms to sleep in, ice hotels also have other services, such as bars, restaurants, and even hot tubs! If this sounds interesting to you, then you have a few options in terms of destinations.

C. Some countries that offer ice hotels include Finland, Norway, and Japan. So if you aren't afraid of a little cold, have some money to spend, and are up for something new, why not book a trip and try one out?

- D. All considered, it is a little surprising anyone would want to pay so much to stay somewhere so cold. But there are many adventurous people who find the idea of sleeping in a freezing room exciting.

- E. In fact, they usually need to be rebuilt every year. This is because even in the cold climates where they are built, the warmth of summer will cause them to melt.

- F. It is perhaps for this reason that most people cannot afford to stay in one. The cost can range from around 300 to 3,000 dollars per night, so be ready to spend a lot of money!

- 〔Ⅱ〕 A. 次の英文の空所(1)～(15)に入れるのに最も適当なものをそれぞれA～Dから一つずつ選び、その記号をマークしなさい。

It's hard to imagine what we would do without Velcro, the handy hook-and-loop fastener used in so many aspects of modern life—from disposable diapers to the space industry. Yet the ingenious invention came about almost by accident.

Velcro was the creation of Swiss engineer Georges de Mestral, who had been inspired by a walk in the woods with his dog in 1941. Upon their return home, de Mestral noticed that burrs—or sticky seed pods—had attached themselves to his pants and to his dog's fur. De Mestral, an amateur inventor and a curious man (1) nature, examined the burrs under a microscope. What he saw intrigued him. De Mestral (2) spend the next 14 years attempting to duplicate what he saw under that microscope before introducing Velcro to the world in 1955.

Most of us have had the experience of burrs clinging to our clothing (or our pets), and considered it a mere annoyance, (3) wondering why it actually happens. Mother Nature, however, never does anything without a specific reason. Burrs have long served the purpose of ensuring the survival of various plant species. When a burr attaches itself to an animal's fur, it is carried by the animal to another location, (4) it eventually falls off and grows into a new plant.

De Mestral was more concerned with the how than the why. How did so small an object exert such a strong hold? Under the microscope, de Mestral could see that the tips of the burr, which appeared to the naked eye as stiff and straight, actually contained tiny hooks that can attach themselves to fibers in clothing, (5) a hook-and-eye fastener—which

(2 ページ後に続く)

- (1) A. for
C. from
- B. in
D. by
- (2) A. will
C. can
- B. would
D. could
- (3) A. even
C. without
- B. also
D. still
- (4) A. where
C. while
- B. after
D. although
- (5) A. distinct from
C. separating from
- B. connecting to
D. similar to

consists of a small bent piece of metal into which a hook fits. De Mestral knew that if he could somehow recreate the simple hook system of the burr, he would be able to produce an incredibly strong fastener, (6) with many practical uses.

De Mestral's first challenge was finding a fabric he could use to create a strong bonding system. Enlisting the help of a weaver in Lyon, France (an important textile center), de Mestral first tried using cotton. The weaver produced a trial product with one cotton strip containing thousands of hooks and the other strip made up of thousands of loops. De Mestral found, (7), that the cotton was too soft—it could not stand up to repeated openings and closures.

For several years, de Mestral continued his research, looking for the best material for his product, (8) the ideal size of loops and hooks. After repeated testing, de Mestral eventually learned that synthetics worked best, and settled on heat-treated nylon, a strong and durable substance. In order to mass-produce his new product, de Mestral also needed to design a special type of loom that could weave the fibers in just the right size, shape, and density—this took him several more years.

By 1954, de Mestral had completed his improved version of the product. Each square inch of material contained 300 hooks, a density that had proven strong enough to stay fastened, yet was easy enough to (9) apart when needed. De Mestral christened his new product “Velcro,” from the French words *velours* (velvet) and *crochet* (hook).

In 1954, de Mestral received a patent for Velcro from the Swiss government. He took out a (10) to begin mass-producing Velcro, opening plants in Europe and eventually expanding into Canada and the United States. His US Velcro plant opened in Manchester, New Hampshire

(2 ページ後に続く)

- (6) A. one
C. some
- B. which
D. that
- (7) A. beforehand
C. however
- B. therefore
D. instead
- (8) A. in terms of
C. as long as
- B. in place of
D. as well as
- (9) A. pull
C. push
- B. tell
D. fall
- (10) A. plan
C. factory
- B. loan
D. field

in 1957 and is still there today.

De Mestral had originally intended Velcro to be used for clothing as a “zipper-less zipper,” but that idea was not initially successful. During a 1959 New York City fashion show that highlighted clothing with Velcro, critics deemed it ugly and cheap-looking. Velcro thus became associated more with athletic wear and equipment than with high-end fashion.

In the early 1960s, Velcro received a huge boost in popularity when NASA began using the product to keep objects from floating around under zero-gravity (11). NASA later added Velcro to astronauts’ space suits and helmets, finding it more convenient than the snap fasteners and zippers that were previously used.

In 1968, Velcro (12) shoelaces for the first time when athletic-shoe manufacturer Puma introduced the world’s first sneakers fastened with Velcro. Since then, Velcro fasteners have revolutionized footwear for children. Even the very young are able to independently fasten their own Velcro shoes well before they learn how to tie their laces.

Today, Velcro is in use seemingly everywhere, from the healthcare setting (blood-pressure cuffs and surgeons’ gowns) to clothing and footwear, sporting and camping equipment, toys and recreation, airline seat cushions, and more. Most (13), Velcro was used in the first human artificial heart transplantation to hold together parts of the device.

Over the (14), Velcro has evolved from a novelty item into a near-necessity in the developed world. De Mestral very likely never dreamed of how popular his product would become, nor the countless ways it could be used. The process de Mestral used to develop Velcro—examining an aspect of nature and using its properties for practical applications—has come to be known as “biomimicry.”

(2 ページ後に続く)

- (11) A. rockets
C. conditions
- B. air
D. space
- (12) A. produced
C. attached
- B. enabled
D. replaced
- (13) A. impressively
C. frequently
- B. obviously
D. unsuccessfully
- (14) A. days
C. time
- B. years
D. centuries

(15) Velcro's phenomenal success, de Mestral became a very wealthy man. After his patent expired in 1978, many other companies began producing hook-and-loop fasteners, but none are allowed to call their product "Velcro," a legally protected name. Most of us, however—just as we call tissues "Kleenex"—refer to all hook-and-loop fasteners as Velcro.

- (15) A. Despite B. Regarding
C. Thanks to D. Accounting for

B. 本文の内容に照らして最も適切なものをそれぞれA～Cから一つずつ選び、その記号をマークしなさい。

- (1) According to the second paragraph, Georges de Mestral originally worked as
- A. an inventor.
 - B. a scientist.
 - C. an engineer.
- (2) According to the third paragraph, starting with “Most of us,” burrs exist in nature
- A. to offer plants protection from animals that want to eat them.
 - B. to help plants to spread themselves far and wide.
 - C. to provide tools for humans to preserve plants.
- (3) De Mestral’s most important discovery about the hooks was probably
- A. the way the hooks worked.
 - B. the reason for the hooks’ existence.
 - C. the place where the hooks were found.
- (4) In order to develop his idea into an actual product, de Mestral had to
- A. move the laboratory to another part of France.
 - B. test manufacturing methods on many occasions.
 - C. identify what it could be made from.

- (5) In the seventh paragraph, starting with “By 1954,” the density of hooks is said to correspond to
- A. the thickness of hooks in general use.
 - B. the number of hooks for a given area.
 - C. the weight of hooks in total.
- (6) Some people found Velcro unsuitable for fashion items because
- A. it didn’t look very high quality.
 - B. it was worn only by athletes at the time.
 - C. it wasn’t as effective as zippers were.
- (7) In the second-to-last paragraph, the term “biomimicry” can be best applied to how de Mestral
- A. observed nature for academic purposes.
 - B. copied nature to solve problems.
 - C. stole from nature in his financial interests.

- 〔Ⅲ〕 A. 次の英文の下線部①～⑩について、後の設問に対する答えとして最も適当なものをそれぞれA～Cから一つずつ選び、その記号をマークしなさい。

When Nisar Ahmad Wani succeeded in carrying out the world's first camel cloning in 2009, it was hailed as a great achievement. Today, Wani is a scientific director at the Reproductive Biotechnology Center, in Dubai.

Wani and his team research and develop new cloning techniques and maintain cell banks, allowing them to make copies of animals including buffalo and sheep. But the center's focus is on cloning camels. Each year, it produces dozens of cloned baby Arabian camels that have a single hump. Among the most popular are copies of camel "beauty queens," with the right combination of drooping lips and long necks.

Camel beauty contests are popular in the Gulf states, and prize money runs into the tens of millions of dollars at some events. Owners have been ^①disqualified in the past for using banned techniques such as injecting camels with silicone and fillers to enhance their appearance. But as far as these competitions are concerned, cloned camels are perfectly legitimate.

Though the Reproductive Biotechnology Center declined to share its ^②prices, according to reports in the local press, making an exact copy of your prettiest camel could cost you a little over \$50,000.

Other than beauty queens, Wani and his team have also been reproducing elite racing champions to compete in the United Arab Emirates' many camel races. They have also been able to present bereaved camel owners with a replica of their deceased pet—cell samples can even ^③be taken shortly after the death of the animal.

Wani works with a process that uses DNA from "somatic" (or non-reproductive) cells taken from the donor animal being cloned. The nucleus, the central part containing the genetic material, from these donor cells is introduced into an egg and stimulated by chemicals.

“The DNA from the somatic cell starts behaving like the DNA of an embryo,” Wani tells CNN. “The eggs are cultured in a lab for seven to eight days before being transferred to the womb of a surrogate mother, who carries and gives birth to the baby.

“The baby produced has all the genes from a donor animal.” According to Wani, the process is delicate and temperamental, with success rates for cloned pregnancies at just 10%, compared to 60% of natural camel pregnancies.

It might seem a lot of trouble to go to for a camel, but the animals are an important part of life in Dubai. In addition to featuring in contests and races, historically these single-hump Arabian camels have been used for transport across the harsh deserts of the Arabian Peninsula, as well as a source of meat and milk. But they are also a cultural symbol of the traditional Emirati way of life.

Camels were an essential element in ensuring that life was possible in the Arabian Peninsula prior to the era of oil and gas,” says Obaid Al Falasi, the co-founder of the Arabian Desert Camel Riding Center, Dubai’s first camel riding school. “Traveling and trade between countries and settlements was facilitated by camels, who had the ability to endure the rough climate and survive on very little feed and water.”

The camels, he adds, were the people’s treasure and companion, and that is still the case today for certain Emirati tribes and families. For many, they hold spiritual significance as well. Despite their status, he says that camel cloning isn’t considered to conflict with religious faith. “Cloning is a significant scientific achievement and should be considered as such,” he explains.

Dubai’s Camel Breeding Center and its Camel Reproduction Center also produce elite camels, but rather than cloning, those two labs focus on embryo transfer, where an embryo is harvested from one female and

inserted into another to improve the chances and rate of reproduction. Al Falasi says that cloning is too expensive for most people and that embryo transfer is more common, “to ensure that a good camel can produce more offspring than just every year or two.”

⑨ Now, Wani and his team are looking to use the technology to help endangered species. The two-humped wild Bactrian camel is among the most endangered large mammals on the planet, threatened by habitat loss and interbreeding with domestic camels. ⑩ To help preserve wild Bactrian camels, Wani and his team are working on techniques that involve interspecies somatic cell transfer, where a closely related domestic animal species is used as the egg donor as well as surrogate mother to carry the cloned embryos.

In 2017 the first cloned Bactrian camel was born at the center using this method, after an embryo was put into an Arabian camel. In the future, Wani hopes to employ the cloning technique to preserve other critically endangered animal species and even help to restore extinct species.

“Our center is focused on developing and applying the latest reproductive biotechnology techniques like cloning and embryo transfer to enhance the multiplication of different animal species in the region and also for the conservation of endangered species,” says Wani.

(1) Which of the following has a meaning closest to Underline ⑩?

- A. succeeds
- B. reaches
- C. exceeds

- (2) What does Underline ② actually mean?
- A. The price is not available to the public.
 - B. The center's share price has fallen.
 - C. There is more than one price available.
- (3) What does Underline ③ imply?
- A. Wani and his team can revive the dead animals.
 - B. People who have pets are asked to take DNA samples.
 - C. The DNA in the cells of dead animals can still be used.
- (4) What does Underline ④ actually mean?
- A. Camel cloning is an unreliable technique.
 - B. Cloned camel babies are more sensitive.
 - C. Wani's cloning has little room for improvement.
- (5) What does Underline ⑤ actually mean?
- A. The effort involved in cloning may appear excessive.
 - B. Cloners could charge more money for other animals.
 - C. Cloning camels is illegal in this part of the world.
- (6) What does Underline ⑥ refer to?
- A. meat and milk
 - B. harsh deserts
 - C. Arabian camels

- (7) What does Underline ⑦ imply?
- A. The role of camels has changed in recent years.
 - B. Fossil fuels never really replaced camels.
 - C. The camel cloning industry was nonessential in the past.
- (8) What does Underline ⑧ refer to?
- A. the fact that camels are very tough animals yet friendly to people
 - B. the fact that people consider camels as important for their way of life
 - C. the fact that the Arabian history can be described without camels
- (9) Which of the following has a meaning closest to Underline ⑨?
- A. cells
 - B. DNA
 - C. children
- (10) What does Underline ⑩ actually mean?
- A. Camels have lost their habitats to larger mammals.
 - B. Two-humped camels are endangered for more than one reason.
 - C. Wild camels refuse to mate with domestic camels.

B. 本文の内容に照らして最も適当なものをそれぞれA～Cから一つずつ選び、その記号をマークしなさい。

- (1) According to the second paragraph, the Reproductive Biotechnology Center mainly works on
- A. removing unwanted humps from two-humped camels.
 - B. reproducing one-humped camels from cell banks.
 - C. reconstruction of one-humped camels' faces.
- (2) According to the fifth paragraph, starting with "Other than," in addition to creating "beauty queens," Wani and his team
- A. organize camel-racing championships.
 - B. replicate champion racing camels.
 - C. sell thousands of cloned camels locally.
- (3) In Wani's cloning method,
- A. the entire process makes use of cells that do not reproduce.
 - B. the deceased can be reanimated if the process is started early.
 - C. the chance of giving birth to twins is greatly increased.
- (4) According to the ninth paragraph, starting with "It might seem," one reason why camels play an important role in Dubai is because
- A. the number of Arabian camels is decreasing.
 - B. they are traditionally treated as sacred creatures.
 - C. people have coexisted with camels for a long time.

- (5) According to the 12th paragraph, starting with “Dubai’s Camel Breeding,” the main purpose of embryo transfer is
- A. to increase the domestic birthrate of camels.
 - B. to establish a global method of cloning camels.
 - C. to reduce the number of wild camels.
- (6) In the third-to-last paragraph, starting with “Now, Wani,” one newly attempted application of the cloning techniques is
- A. bringing extinct animal species back to life.
 - B. crossbreeding Bactrian camels with Arabian ones.
 - C. protecting animal species in danger of extinction.
- (7) The main idea of this passage is that
- A. the success of camel cloning has opened the door to the application of biotechnology techniques.
 - B. biotechnology techniques have benefited society, although caution is needed for their general use.
 - C. cloning and embryo transfer are two biotechnology techniques that have allowed Dubai to develop.

(以上)