1 次の英文を読み、問題に答えなさい。

Elephants naturally understand when to lend a helping trunk much as people know when to lend a helping hand, and they display a complex level of cooperation which so far has only been confirmed in humans and our closest relatives.

Elephants are widely regarded as possessing advanced brains, displaying levels of intelligence seen only in humans, dolphins, chimpanzees and others capable of higher forms of thinking. For instance, elephants recognize themselves in mirrors, learning that such reflections are images of themselves and not others, behavior apparently unique to species that show complex empathy and sociality.

Still, there is remarkably little research to see just how smart elephants are, due in large part to their tremendous strength. Nevertheless, scientists have now adapted an experiment commonly used with chimpanzees and gorillas to test elephants' understanding of cooperation and found they passed with great success.

The task was originally designed for chimpanzees by a research group in Japan. Although it seems simple, it requires considerable understanding. The scientists worked with 12 Asian elephants, at the Thai Elephant Conservation Center in Thailand, in a task where the animals had to coordinate their efforts so that each could get a tasty bucket of corn.

These experiments aimed at figuring out what exactly animals understand about their partners and the requirements of cooperation. According to the lead researcher, cooperation itself is not very unique—species from honeybees to lions cooperate in various ways. However, what these animals 'understand' about how cooperation works is 1)questionable because cooperation probably doesn't require much cognition at all as much of 2)the behavior is 'pre-programmed' for many species.

For the experiment, the researchers placed a sliding table that held two buckets full of corn some distance away from a volleyball net. A rope was tied around the table such that the table would only move if two elephants working together pulled on each rope end. Both elephants were released together 10 meters away from the volleyball net by their handlers. When the pair of elephants approached the rope and pulled the two ends of the rope simultaneously, the table bearing the corn slid within reach. However, if one end of the rope was pulled before or without the other, the rope slipped from the table and the elephants got nothing.

To prepare for this experiment, the elephants first learned to pull the rope alone. Then, they were given some chances to pull it with a partner. The elephants quickly learned to coordinate their efforts and all pairs reached the criterion of at least eight 3)successful pulls in the final 10 trials.

After this, 4)the researchers proceeded to the next experiment. Using the same apparatus, the release times of the elephants were arranged so that each animal was released at a different time. Now, for the elephants to pull the table, the elephant released first had to learn to wait for the partner before pulling its own rope. The researchers found that elephants would wait at their rope end as long as 45 seconds. This was because the elephants understood that pulling without their partner wouldn't earn any reward. In fact, it is a very long time for an animal to inhibit their pulling when they know that good food is just out of reach. The researchers also found that elephants would not pull the rope if their partner could not grab the rope. Instead, they moved away from it.

Interestingly, two of the elephants devised different ways to solve this problem. One 5)5-year-old female elephant named Neua Un stepped on the rope to keep it from slipping away, forcing her partner to do all the work to retrieve the table. Another elephant, an 18-year-old male named JoJo, didn't even walk up to the rope unless his partner was released. He probably had learned that without his partner, he would fail to get food.

Since they are very social animals, this demonstration of complex cooperation fits well with what is already known about their natural lives. The experts say, in the wild, elephants are known for remarkable displays of helping, empathy and compassion as well as flexible behaviors. That is to say, the above two elephants didn't simply employ the strategy on which they had been trained. Intelligent species must learn to adapt to their changing environments, solve problems, cooperate—all of this requires great flexibility in behavior.

〔1〕どのような事が、下線部 1) なのか、日本語で説明しなさい

〔2〕下線部 2) はどのような事か、最も適切なものを選択肢から選びなさい。

(a) conscious behavior (b) instinctive behavior

(c) learned behavior (d) planned behavior (e) systematic behavior

〔3〕下線部 3) はどのような事を指すか、日本語で説明しなさい。

〔4〕下線部 4) について、

(a) どのような実験か、日本語で説明しなさい。

(b) どのような結果が出たか、日本語で２点挙げなさい。

〔5〕下線部 5)は、具体的にどのような事をしたのか、日本語で説明しなさい。

〔6〕以下の英文から、本文の内容に合っているものを2つ選び、記号で答えなさい。

(a) Only dolphins, chimpanzees, and elephants have intelligence similar to humans.
(b) The intelligence of elephants makes it difficult to do research on their physical strength.
(c) The adapted experiment used with the elephants had initially been designed for testing chimpanzees.
(d) As soon as JoJo walked up to the rope, his partner was released and they got food.
(e) Neua Un and JoJo probably used complex cooperation in the wild without training.

2 次の英文を読み、問題に答えなさい。

You probably know many of the things that you can do with the hundreds of different muscles in your body. But have you ever thought about how the muscles in an animal's body are different from yours? [あ: An animal's (a)muscles are made (b)do the things that are (c)most important for (d)its survival.]

1)Lions are hunters. They depend on their ability to hunt other animals to survive. Lions must be fast in order to catch their prey. The powerful muscles in their rear legs allow them to run at speeds of more than 30 miles per hour. They can also leap a distance of more than 35 feet. The strong muscles in their chests and front legs help them capture their prey.

2)Snakes also use their muscles for movement, as well as for hunting and digesting prey, but their muscles function in very different ways than lions' do. Because snakes do not have any limbs, they need a form of movement other than walking, crawling, or flying. Pound for pound, snakes have more muscles than most animals. They contract, or tighten, and then release their powerful muscles. This creates a wavelike motion down the length of the snake's body. These waves push against the ground or other objects to move the snake forward. This is just one of several ways snakes get from one place to another.

Snakes' muscles are also equipped to allow them to swallow things that seem much too large. For example, a snake may eat an egg that is larger than the width of its body. How does the snake accomplish this astonishing feat? Can you imagine eating an entire watermelon in a

single gulp? The snake's strong neck muscles tighten and release to push the egg along as the snake swallows. The pressure of the muscles is so strong that it cracks the shell and allows the snake to digest the egg's contents.

The specialized muscles of these animals seem pretty incredible. But [い: 体の筋肉は、必要とする通りに働くのだ。] After all, it might be fun to be able to leap a distance of 30 feet, but as a human being, there is just not much need for it.

〔1〕下線部 1)の裏付けとなることを、日本語で説明しなさい。

〔2〕下線部 2)に関して、その内容を 140 字以内の日本語で説明しなさい。

〔3〕[あ] の文の下線部 (a) ～ (d) には、一カ所間違いがある。間違いの箇所の記号を答え、正しい形に書き直しなさい。

〔4〕[い] の 日本語を表すように、(1) ～ (10)の語句を並び替え英文を完成させ、4番目と10番目にくるものを、記号で答えなさい。

(1) you	(2) your body	(3) the way	(4) the muscles	(5) need
(6) work	(7) in	(8) to	(9) them	(10) exactly

3 次の英文を読み、問題に答えなさい。

Without science, we wouldn't know why water freezes, where the sun goes at night, or how our bodies fight disease. We have the answers, though, because someone was curious. Science always begins with a question.

Scientists want to find answers, but a good scientist doesn't stop working until he or she has the only possible answer. This is because the best scientists are skeptics. They never say they've solved a scientific problem if other possible solutions can be found. Science is based on proof. A statement that doesn't have proof is [A] or [B].

The scientific method is a tool scientists use to prove things. It begins with a question. For example, [あ].

The next step is to answer the question. At this point, it's okay to make [A] or have [B]. You need something you can test. In the scientific method, your answer is called the hypothesis. A hypothesis is a simple statement that can be proven right or wrong. [い] is a good hypothesis.

Now, you can test the hypothesis using experiments and observation. The tests must be designed carefully, though. If too many parts can be changed, it will be hard to tell why you got one result and not another.

If a hypothesis is unable to be proven, the next step is to make a new hypothesis and test it. For example, maybe birds don't see color at all. [う]. If the experiments show that a hypothesis is proven, you'll still want to test it again.

After a scientist finishes experimenting, he or she writes a conclusion. Then, the scientist shares the results with other scientists. The scientific community looks closely at the results. This step is very important in the scientific method. Other scientists will try to get the same results. [え].

A hypothesis must be proven true many times before the scientific community accepts it as true. They're skeptics, remember? If a hypothesis makes it through lots and lots of testing, it will become a theory. A theory might still be proven wrong, but the chances are less. Theories that last for many, many years—and are never proven wrong—become scientific laws.

〔1〕空欄 [A] 及び [B] に入る最も適切な組み合わせを、選択肢 (1) ～ (4)から選び記号で答えなさい。

(1) A: a creation B: an imagination

(2) A: an error B: a mistake

(3) A: a fiction B: a story

(4) A: a guess B: an opinion

〔2〕空欄 [あ] ～ [え] に入る最も適切なものを、選択肢 (5) ～ (11)から選び記号で答えなさい。

(5) Nothing else could attract them

(6) Scientists double- and triple-check each other's work

(7) "Birds will eat more food from a red bird feeder than a blue one"

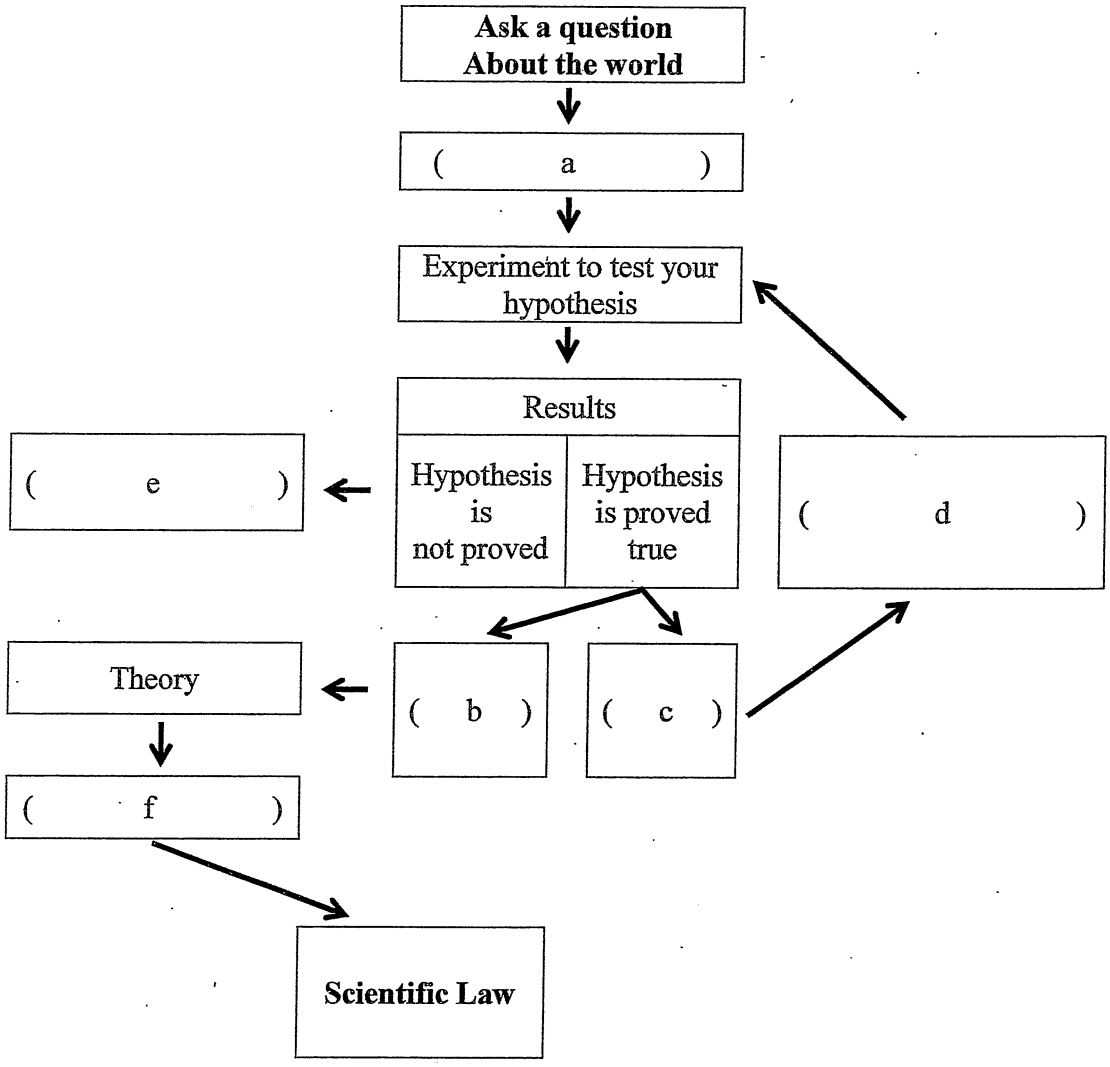
(8) "Do birds like one color more than another?"

(9) "A red bird feeder or a blue one?"

(10) "Birds can identify multiple colors, can't they?"

(11) Something else might have been attracting them to the feeders

〔3〕以下の空欄 (a) ～ (f) に入る最も適切なものを、選択肢 (12) ～ (17) から選び記号で答えなさい。



<選択肢>

(12) Share results

(13) Hypothesis is proven many times

(14) Never proven wrong

(15) Make another hypothesis

(16) Other scientists test your hypothesis

(17) Make a hypothesis

4 次の〔1〕～〔5〕の空欄に入る最も適切な語を、選択肢から選び記号で答えなさい。

〔1〕 The full moon (1) brightly when we arrived at the beach.

(a) shines (b) shone (c) was shining (d) has been shining

〔2〕 We'd prefer to stay (2). There's just not enough going on in this area.

(a) in lively place (b) lively somewhere (c) somewhere lively (d) with lively place

〔3〕 Sakura didn't have (3) money to buy the new iPhone.

(a) so enough (b) rather enough (c) wholly enough (d) quite enough

〔4〕 I (4) Paul while we were on holiday in Okinawa.

(a) married (b) was marrying (c) used to marry (d) have married

〔5〕 I wish the train (5) on time. It would have been so much easier to find a hotel room.

(a) has arrived (b) had arrived (c) would've arrived (d) should be arrived

5 次の〔1〕～〔5〕に対する答えとして最も適切なものを、下の(a)～(h)から選び記号で答えなさい。

〔1〕 Is there any milk left?

〔2〕 What shall I do about this letter asking for money?

〔3〕 How long do you think the dispute will last?

〔4〕 Why is John so irritable these days?

〔5〕 What do you think of Tom's pink and yellow T-shirt?

(a) Don't worry! I won't let him down.
(b) Don't be silly. It'll never stay on in this situation.
(c) I'd tear it up if I were you.
(d) If neither side backs down, it could go on for ages.
(e) I know it's hard, but you must keep at it.
(f) I'm afraid not. I've used it all up.
(g) I think the constant noise is beginning to wear him down.
(h) Well, he certainly stands out.