英　　語

注　意

1. 問題は全部で12ページである。
2. 解答用紙に氏名・受験番号を忘れずに記入すること。(ただし，マーク・シートにはあらかじめ受験番号がプリントされている。)
3. 解答はすべて解答用紙に記入すること。
4. 問題冊子の余白等は適宜利用してよいが，どのページも切り離してはいけない。
5. 解答用紙は必ず提出のこと。この問題冊子は提出する必要はない。

マーク・シート記入上の注意

1. 解答用紙(その1)はマーク・シートになっている。HBの黒鉛筆またはシャープペンシルを用いて記入すること。
2. 解答用紙にあらかじめプリントされた受験番号を確認すること。
3. 解答する記号・番号の ○ を塗りつぶしなさい。○で囲んだり×をつけたりしてはいけない。

解答記入例(解答が 1 のとき)

1	●	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

4. 一度記入したマークを消す場合は，消しゴムでよく消すこと。×をつけても消したことにならない。
5. 解答用紙をよごしたり，折り曲げたりしないこと。

1 次の文を読み，以下の問いに答えなさい。

Astronomer Carl Sagan liked to say, "We are made of star stuff." He meant that everything we know — you and your dog, the Earth and moon — is made of the same kinds of atoms as glittering stars. These atoms form elements like carbon, hydrogen, nitrogen, oxygen and hundreds more.

In recent years, astronomers have shown that "star stuff" isn't the only stuff in the universe. There's something else moving galaxies around in unexpected ways. That something else includes dark matter and dark energy. Even though these two things are hidden from sight, or "dark," they're very different from each other. Because scientists cannot observe dark matter and dark energy directly, they have to study how dark energy and dark matter affect celestial objects we can see — visible stars and galaxies.

Gravity is an attractive force, which means it brings objects together. The more mass something has, the more gravity, or pull, there is. Because of gravity, the Earth repeatedly circles the sun instead of flying away. (A) And gravity allowed scientists to discover dark matter.

Swiss astronomer Fritz Zwicky stumbled across (11) dark matter in 1933. He was attempting to tally the total mass of a distant galaxy cluster, a family of galaxies held together by gravity. But his numbers just weren't adding up. To understand Zwicky's problem, imagine that you want to know the weight of 10 oranges, and each orange weighs one pound. You guess the weight should be 10 pounds, but when you pile the oranges on a scale, it tells you the weight is 100 pounds, not 10.

Over time, more evidence for dark matter would emerge. In the 1970s, for instance, astronomers observed galaxies spinning in unexpected ways. Their strange motions could be explained only by dark matter.

Astronomer Dan Coe studies dark matter at the Space Telescope Science Institute in Baltimore, Md. He recently led a study of a galaxy cluster called

Abell 1689. Both the visible galaxies and dark matter add to the gravitational pull in a cluster. These gravitational forces act like a lens, and when light passes through a cluster like Abell 1689, it bends. (Think of how light changes when it passes through an empty glass or a pool of water.) By studying these bending light rays, Coe and his team created a map of Abell 1689 that shows where the dark matter might be hiding in the cluster.

Accepting the existence of dark matter would solve many apparent problems related to the study of the universe. [B]

Scientists have come up with many ideas to explain dark matter, and then they come up with [12] ways to search for dark matter particles. As researchers conduct experiments and do tests, many of these ideas get ruled out.

One possible particle, for example, was called a neutrino. Even though scientists can find evidence for neutrinos, they quickly discovered that neutrinos can't form big enough clumps to be the missing mass. So neutrinos won't solve the mysteries of dark matter.

A particle that has not been ruled out is a neutralino. It is a WIMP, which stands for [13] weakly interacting massive particle. This means it has some mass, but it only rarely plays with other kinds of particles. Many scientists believe WIMPs are our best bet for a dark matter particle.

In the absence of proof of dark matter particles, some researchers have challenged the existence of dark matter. One alternate [14] theory, for example, suggests that at the scale of the universe, gravity may follow different rules than it does on Earth. In this case, maybe what scientists see as dark matter is really just gravity acting in a different way.

Dark matter holds things together. Dark energy, on the other hand, sends things flying apart. It's like the opposite of gravity.

Astronomers discovered dark energy by viewing the explosions that flare up when a star runs out of fuel and dies. That bright explosion, known as a supernova, helps scientists estimate the age of the universe.

Since the Big Bang, the universe has been expanding, which means most galaxies are moving farther away from each other. (Just as if you mark two dots very close together on a deflated balloon and start blowing it up, those two dots move apart.) Imagine you're on one dot, looking at another. That other dot gets farther and farther way. But if you can figure out[15] how far away it is and how fast it's moving, then you can figure out when your dot and the other dot were right next to each other. This calculation is like running a film in reverse.

Scientists use different kinds of bright spots in the universe, including supernovas, for this calculation. In the 1990s, scientists measuring the age of the universe through studies of supernovas became puzzled by their results. The locations and speeds of the supernovas showed that the universe was younger than the Milky Way, our galaxy. But that is impossible: You can't have a galaxy unless you have a universe to hold it.

The solution to the problem was stranger than anyone had imagined. Scientists worked on experiments that in 1998 showed that the pace of the universal expansion was speeding up. This acceleration explains why those supernovas appeared too far away. They had somehow gotten some boost.

"Dark energy is stretching the universe apart," says Wendy Freedman, who has been studying dark energy and supernovas for the last nine years. She says that with gravity, if you jump off a cliff, you know you're going down. "But with dark energy, when you get to the edge of that cliff, you go up."

Dark energy is believed to be very weak. It has a tiny effect on small things. But because dark energy is everywhere in the universe, these tiny bits of dark energy collectively add up to a powerful force that is strong enough to overcome the gravity from both dark matter and ordinary matter.

Notes:

glittering　きらきら輝く，celestial　天体の，tally　～を計算する，

neutrino　中性微子，clump(s)　固まり，flare up　ぱっと燃え上がる，

deflated　空気の抜けた

〔1〕 下線部A，Bを日本語にしなさい。(**解答用紙その2**)

〔2〕 1～15の質問に対して**英文の内容から判断し**，最も適切なものを一つ選び，その番号をマークしなさい。(**解答用紙その1**)

1. What is the best title for this passage?

(1) A short history of the universe

(2) All visible stars and galaxies

(3) The dark side of the universe

(4) How to catch a gravity wave

2. According to Sagan, star stuff

(1) includes dark matter and dark energy.

(2) moves galaxies around in unexpected ways.

(3) is not something like you and your dog, the Earth and moon.

(4) is formed by the same types of atoms which make up everything we know.

3. Which statement is true regarding dark matter and dark energy?

(1) Dark energy affects visible stars and galaxies but dark matter does not.

(2) Dark matter affects visible stars and galaxies but dark energy does not.

(3) Both bring objects together.

(4) Neither can be directly observed.

4. What was Zwicky's problem?

(1) The results were different from what he had expected.

(2) He lacked the math skills to make the calculations.

(3) He could not pile the 10 oranges on a scale.

(4) The weight of the 10 oranges was 10 pounds.

5. Which statement is true regarding dark matter?

(1) It causes galaxies to move away from each other.

(2) It may explain why galaxies spin in unexpected ways.

(3) Only dark matter is related to the gravitational pull in a galaxy cluster.

(4) A neutrino, one possible dark matter particle, has a large mass.

6. Abell 1689 is

(1) a map showing where dark matter might exist.

(2) one galaxy cluster which Coe studies.

(3) a gravitational pull in a cluster.

(4) one bent ray of light.

7. A supernova is

(1) dark energy when a star has a lot of fuel.

(2) the expansion of the universe since the Big Bang.

(3) an explosion when a star dies.

(4) technology used to estimate the age of the universe.

8. In the 1990s, scientists were confused regarding the age of the universe because

(1) scientists used different kinds of bright spots in the universe.

(2) most known galaxies were moving away from each other at slower speeds.

(3) the speeds and positions of the supernovas indicated that the universe was younger than the Milky Way.

(4) it was impossible to find the location and speed of the universe, contrary to what people had expected.

9. The experiments in 1998 showed that

(1) the universe was expanding faster than before.

(2) the universe was shrinking rapidly because of dark energy.

(3) you could not have a universe unless you had a galaxy to hold it.

(4) you went down from a cliff with gravity.

10. Which statement is true?

(1) Dark matter and dark energy are like the atoms in carbon, hydrogen, nitrogen, and oxygen.

(2) Although dark energy itself is seemingly weak, it becomes a powerful force when it collectively gathers together.

(3) A WIMP has some mass and always interacts with other kinds of particles.

(4) The only and reliable theory about dark matter is that it is gravity acting differently from that on Earth.

11. The term "stumbled across" means

(1) discovered by chance.

(2) searched carefully.

(3) moved by force.

(4) operated correctly.

12. The term "come up with" means to

(1) discuss.

(2) suggest.

(3) adopt.

(4) find.

13. The term "stands for" means to

(1) include.

(2) measure.

(3) represent.

(4) observe.

14. The word "alternate" means

(1) substitute.

(2) negative.

(3) exclusive.

(4) mysterious.

15. The term "figure out" means to

(1) form.

(2) solve.

(3) imagine.

(4) organize.

2 以下のそれぞれの定義に従って，最初と最後の文字が与えられた最も適切な単語を書きなさい。ただし，１下線に１文字が入る。（**解答用紙その２**）

（解答例）

someone who is trained in science, especially someone whose job is to do scientific research

⇒(s＿＿＿＿＿＿t)　　正解(s c i e n t i s t)

1. a substance from which something is made or can be made

⇒(m＿＿＿＿＿＿l)

2. the act or process of growing or causing something to grow or become larger or more advanced

⇒(d＿＿＿＿＿＿＿＿t)

3. not natural or real: made, produced, or done to seem like something natural

⇒(a＿＿＿＿＿＿＿＿l)

4. a body tissue that can contract and produce movement

⇒(m＿＿＿＿e)

5. the art or science of designing and creating buildings

⇒(a＿＿＿＿＿＿＿＿＿＿e)

3 次の会話文を読んで，以下の問いに答えなさい。

Student: May I come in, sir?

Teacher: Yes, but (16) on a second. Why are you always late?

Student: Sir, the bus is always late. I can't (17) it.

Teacher: What time do you leave home?

Student: I always leave home at a quarter to eight.

Teacher: How far is your home from campus?

Student: I would say about three kilometers from here.

Teacher: That's why. You leave too late. What time do you (18) up?

Student: I wake up at around 7:00 a.m.

Teacher: Do you eat breakfast?

Student: Not regularly.

Teacher: You've got to. It's too important to (19).

Student: Sir, I know. I just don't want to be late.

Teacher: I would suggest that you wake up a little earlier from tomorrow.

Student: I'll try, sir. You can (20) on me.

Teacher: Good. The key is to have a routine.

Student: Thank you very much for your advice. Can I sit now, sir?

Teacher: Oh, yes, of course.

〔1〕 次の選択肢1～0の中から，前の空欄16～20に最も適切なものを一つ選び，その番号をマークしなさい。ただし，同じ語句を複数回選択してはならない。(**解答用紙その1**)

1. help	6. arrive
2. live	7. wait
3. talk	8. skip
4. get	9. count
5. hang	0. give

〔2〕 次の文で，会話文の内容と一致するものは1を，一致しないものは2をマークしなさい。(**解答用紙その1**)

21. The student arrives after the teacher.
22. The student leaves home at 8:15.
23. The student doesn't know how far he lives from campus.
24. The teacher wants the student to eat breakfast.
25. The teacher says that he has the key to open the door.

4 次の日本語の文を表す英文を，与えられた語句を用いて完成させた場合，２番目と４番目になる語句の組み合わせを一つ選び，その番号をマークしなさい。**（解答用紙その１）**

26. 言うまでもないが，我々は間違いから学ぶことが多い。

Needless [ ] [ ]（2番目） , [ ] [ ]（4番目） [ ] [ ] mistakes.

A．from　　B．say　　C．learn
D．to　　E．making　　F．we often

1）E－C　　2）B－E　　3）B－C　　4）C－E

27. 一流の会社に就職できるなんて，夢にも思わなかった。

Little [ ] [ ]（2番目） [ ] [ ]（4番目） [ ] [ ] company.

A．I would　　B．dreamed that　　C．I
D．get a job　　E．with a leading　　F．had

1）C－A　　2）F－D　　3）C－E　　4）F－E

28. 君の決心を変えさせたのは何だったの。

What [ ] [ ]（2番目） [ ] [ ]（4番目） [ ] [ ] your mind?

A．to　　B．you　　C．change
D．it　　E．was　　F．that caused

1）B－F　　2）E－B　　3）C－F　　4）D－B

29. 重大な事故のためイベントは実施されなかった。

The serious [ ] [ ] [ ] [ ] [ ] [ ] .
2番目　4番目

A. place　　B. from　　C. accident

D. taking　　E. the event　　F. prevented

1) F—D　　2) F—B　　3) F—E　　4) D—B