

1. 次の英文はIa型超新星について書かれたものである。これを読み、設問に答えなさい。

When Saul Perlmutter arrived at Berkeley as a graduate student in physics in the early 1980s, he hoped to do research that would ①address a deep philosophical question. His doctoral adviser was the physicist Richard A. Muller, who was planning to use robotic telescopes to look for supernovae and a hypothetical star called Nemesis, which Muller X (1. by 2. Earth 3. extinctions 4. mass 5. on 6. steering 7. suspected 8. triggered) comets toward the inner solar system every 26 million years. Perlmutter joined that project, where physicist Carl Pennypacker was developing a robotic telescopic search at Berkeley's Leuschner Observatory. Over the next few years, their hard-working robot observer detected 20 "nearby" supernovae. Although the mystery star was never found, the supernova investigations opened the long, winding road to a historic discovery.

Perlmutter and others began trying to map the distances to supernovae of a type known as "Ia," which occur when a white dwarf star* draws too much mass from its orbiting companion and explodes from the pressure. Type Ias are among the brightest supernovae, so they are visible from many billions of light years away. [A] Unlike other supernovae, nearly all type Ias generate roughly the same amount of light. In theory, that makes them ideal for measuring distances to faraway places in the cosmos, because the apparent brightness of an object declines over distance by a predictable amount and can therefore be calculated with a simple equation. [B]

There were problems, though, as Perlmutter and his associates quickly ②learned. Some questioned whether type Ias really behave consistently. [C] They pointed out that an astronomer who gazes upon the most distant type Ias is, in effect, gazing through a time machine—seeing the universe as it was billions of years ago. [D] But how can we know whether the universe behaved back then as it does today? If ③primordial type-Ia supernovae acted differently, perhaps they are not such trustworthy markers after all.

To answer the skeptics, Perlmutter set about finding and carefully comparing as many type Ias as possible. But they occur very rarely. None had been seen in our own galaxy for several centuries, and even in other galaxies the short-lived supernovae are hard to spot. Undaunted*, Perlmutter and Pennypacker established a collaboration with British and Australian astronomers at the Isaac Newton Telescope in the Canary Islands. By accessing the telescope's imagery via the Internet, Perlmutter was able to study new type-Ia supernovae from his office in Berkeley. In 1992 they discovered a type Ia at redshift* 0.46, from a time nearly halfway back to the Big Bang—a new record. Meanwhile, new scientists ④gravitated to his team, by then known as the Supernova Cosmology Project.

One was Gerson Goldhaber. Then in his late 60s, Goldhaber was already one of the grand old men of Berkeley and of world physics, the offspring of a distinguished family of three generations of researchers. In the 1950s, '60s, and '70s he had participated in discoveries of new subatomic particles. By adding Goldhaber to the team, Pennypacker says, they acquired a noted physicist who was extremely well respected by everybody and extremely reliable. (Y), Pennypacker reasoned that "it would be much harder for the Lab to shut us down because Gerson was involved".

(Adapted from K. Davidson, "Blown Apart"
in *The Best American Science and Nature Writing*, 2009)

*dwarf star: 矮星 (半径の小さい星)

*undaunted: ひるまない

*redshift: 赤方偏移 (地球からの距離に比例して光のスペクトル線が赤色の方に偏移すること)

[1] 下線部①～④の意味に最も近いものを選択肢1～4の中から選び、マークシートの解答欄 (1) から (4) にマークしなさい。

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|---------------------|--------------------|--------------|-----------------|
| ① 1. call up | 2. deal with | 3. make up | 4. search for |
| ② 1. discovered | 2. imagined | 3. memorized | 4. studied |
| ③ 1. authentic | 2. correct | 3. early | 4. reliable |
| ④ 1. were attracted | 2. were introduced | 3. were led | 4. were scouted |

[2] Xの()内にある語を文法的・内容的に最も適切な順序に並べかえたとき、2番目と7番目に来るものを選択肢1～8の中からそれぞれ選び、マークシートの解答欄 (5) と (6) に順にマークしなさい。

[3] 下記の【 】内の文が入る本文中の位置として最も適切なものを選択肢1～4の中から選び、マークシートの解答欄 (7) にマークしなさい。

【As a result, astronomers consider type Ias a “standard candle” for mapping the distribution of galaxies across the cosmos.】

1. [A] 2. [B] 3. [C] 4. [D]

[4] 空所(Y)に入る表現として最も適切なものを選択肢1～4の中から選び、マークシートの解答欄 (8) にマークしなさい。

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|--|---------------------------|
| 1. Because of Goldhaber's generous character | 2. Due to rosy prospects |
| 3. In spite of Goldhaber's reliability | 4. With funding uncertain |

[5] 次の文は英文全体の要旨を述べたものである。空所(1)～(5)に入る表現として最も適切なものを選択肢1～4の中から選び、マークシートの解答欄 (9) から (13) にマークしなさい。

Richard A. Muller's idea of using robotic telescopes to look for supernovae and a hypothetical star called Nemesis seems to have come to him (1) Saul Perlmutter arrived at Berkeley. When Saul Perlmutter joined the research project, Carl Pennypacker (2). Although Perlmutter and others faced difficulties, they were able to move forward by (3). The project they had worked on for so many years (4). The most important reason for adding Gerson Goldhaber to the team seems to have been that (5).

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|---|---------------------------------------|-----------|---------|
| (1) 1. after | 2. because | 3. before | 4. when |
| (2) 1. decided to join the project | 2. was already working on the project | | |
| 3. was thinking about working on the project | 4. was working on a different project | | |
| (3) 1. collaborating with overseas astronomers | 2. developing new methods | | |
| 3. surfing the Internet | 4. working overtime | | |
| (4) 1. came to be known as the Supernova Cosmology Project | | | |
| 2. started off known as the Supernova Cosmology Project | | | |
| 3. was always known as the Supernova Cosmology Project | | | |
| 4. was unofficially known as the Supernova Cosmology Project | | | |
| (5) 1. he was from a distinguished family of researchers | | | |
| 2. he was an expert in subatomic particles | | | |
| 3. he was an old Berkeley man | | | |
| 4. he was a respected scholar whose reputation would help to secure financial support | | | |

2. 次の英文を読み、設問に答えなさい。

We approach new perceptions by measuring them against our past experiences. This is a necessary process that makes it possible for us to get through life without regarding each ^(a)incoming perception as brand-new. It works very well when the world we encounter is behaving as the world has done in the past but leads us astray when the world is new. And right now, we are all learning to deal with a world that is changing much faster than our expectations can keep up with.

A man was walking by a construction site in a large, busy city, absentmindedly surveying the scene, when his eyes met a surprise: The person sitting way up in the cab of a huge derrick*, calmly making the crane grab mouthfuls of dirt, was a woman. He cheerfully called out to her, "Hey Mama, what's for supper?" It seemed to him a clever (1), and of course it was fleeting and not particularly well thought out, but in a wink he had reminded her that she was out of her place—which was in the kitchen.

If someone walks into a hospital and expects the doctors to be men and the nurses to be women—which means, by implication, that the women in white coats will be nurses and the men in white coats will be doctors—it will still be true most of the time. But it is not *always* true, and that is a problem for the women who are doctors and the men who are nurses and the patients who need to know (2). When our expectations are not met, we call it sexism—responding to old ^(b)patterns of gender that no longer apply, or no longer apply in all instances.

We are no less likely to respond to others according to expectations that we ourselves do not fit. I recall meeting a journalist years ago who had taken an interest in an article I had written about New York Jewish ^(c)conversational style—an article in which I had identified myself as a native speaker of that style. As I waited for him outside the appointed restaurant, I saw him approach (I knew who he was because I had heard him give a talk) and saw his eyes run unseeing over me, as he looked for Deborah Tannen. When I identified myself, he said he didn't expect me to be blond, since he was looking for a fellow Jew—and then he laughed, because of all the times he himself had been told he didn't look like what people expected, because he too is a (3) Jew.

What I am getting at is that there is no point in blaming those who expect the world to continue as it has been in the past, but we should not let anyone off the hook either—including ourselves. We must continually remind ourselves that the world is changing, and women and men no longer can be depended upon to stay in the narrowly prescribed roles we were consigned to in the past. But we must also be on guard for signs that such expectations are (4) in our way. One of the major ways that expectations impede us is in the strong associations we have of how women and men should speak and behave. With women entering situations that were previously all male, where established norms for behavior are based on the ways men behaved in those roles, expectations must give way—either expectations for how someone in that role should behave, or expectations of the women who move into those roles. Which will it be? Will women change their ways of talking to fit existing norms, or will they change the norms—^(d)establish new expectations for the roles they come to fill? (Adapted from Deborah Tannen, *Talking from 9 to 5*, 1994)

*derrick: 起重機

[1] 下線部 (a)～(d) の語と第1アクセントの位置が同じ語を選択肢1～4の中から選び、マークシートの解答欄 から にマークしなさい。

(a) in-com-ing

1. con-tra-dict

2. per-se-vere

3. rel-a-tive

4. tre-men-dous

(b) pat-tern

1. ad-vice

2. bal-ance

3. ca-nal

4. fa-tigue

(c) con-ver-sa-tion-al

1. in-stan-ta-ne-ous

2. ad-min-is-tra-tive

3. gram-mat-i-cal-ly

4. re-frig-er-a-tor

(d) es-tab-lish

1. com-pre-hend

2. mul-ti-ply

3. per-cent-age

4. sol-u-ble

[2] 空所(1)～(4)に入る最も適切な表現を選択肢1～4の中から選び、それぞれマークシートの解答欄(18)から(21)にマークしなさい。

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|----------------------|-------------------|-------------------|-----------------|
| (1) 1. humor | 2. joke | 3. nonsense | 4. trick |
| (2) 1. which is that | 2. which is where | 3. which is which | 4. which is why |
| (3) 1. blond | 2. fellow | 3. native | 4. New York |
| (4) 1. blocking | 2. coming | 3. getting | 4. heading |

[3] 次の文は英文全体の構成を述べたものである。空所①～⑤に入る表現として最も適切なものを選択肢1～4の中から選び、マークシートの解答欄(22)から(26)にマークしなさい。

The most important idea in the first paragraph as it relates to the remainder of the passage could be stated as follows: ①(). In the second paragraph, the writer then offers a concrete ②() to illustrate this general point. In the third paragraph, a/an ③() is added which further supports the author's main idea. In the fourth paragraph, the writer deals with a possible ④(), illustrating her point with an episode from her own life. The final paragraph, after restating the thesis and exploring some further possible ramifications that grow out of it, finally finishes with some ⑤().

- ① 1. Judging the present on the past can be misleading when the world is changing fast, as it is today
2. Judging the present on the past is a necessary life skill; otherwise, people would have to regard every new perception as brand-new
3. Judging the present on the past works well when the world is not changing fast
4. Judging present perceptions against past perceptions is an inefficient way to view the world
- ② 1. argument 2. case-study 3. example 4. explanation
- ③ 1. anecdote 2. example from the author's life 3. hypothetical scenario 4. true story
- ④ 1. dilemma 2. exception 3. false assumption 4. scenario
- ⑤ 1. obscure questions 2. thought-provoking questions
3. unanswerable questions 4. unrelated questions

[4] 英文の内容に一致するものを次の1～9の中から4つ選び、マークシートの解答欄(27)から(30)にマークしなさい。

1. Judging the present in terms of the past is never useful because it leads to stereotypes.
2. The man who walked by a construction site called out because he saw his mother.
3. Tannen does not believe the comment from the man who walked by a construction site was as smart as he thought it was.
4. Tannen acknowledges that most doctors are men and most nurses are women.
5. Tannen admits that we don't tend to fall for a stereotype that we ourselves break.
6. The Jewish man recognized the irony in his own stereotype about Jewish appearances.
7. Tannen does not believe we should take responsibility for the stereotypes we hold.
8. Tannen believes that women who enter traditionally male occupations must learn to speak in the same way that men have traditionally spoken in these roles.
9. Tannen is open to women changing the expectations and behavioral norms of the traditionally male occupations they enter.

3. 次の対話文を読み、設問に答えなさい。

Jun Suzuki (JS) : As the old saying goes, nothing in life is certain but death and taxes. Today we are speaking with economist Mary Potter about her thoughts on the proposed increase of Japan's consumption tax rate. So Mary, are you for or against the proposed tax hike?

Mary Potter (MP) : Well, it really (ア) to a question of austerity or stimulus [A]. We don't want Japan to become another Greece, of course, and yet we also don't want to smother the economy prematurely if a little (イ) can get the fires of industry and commerce burning again.

JS : (ウ), while we need to keep an eye on debt levels, we don't want to increase taxes if all we're really doing is depressing the economy and thus decreasing tax revenues in the long-term. We can't forget the question of growth.

MP : That's right. We can kill the family chicken and eat it for dinner tonight, but then where are we going to get our eggs from tomorrow?

JS : And of course we also have to think about the impact of a tax increase on individuals and families [B].

MP : That's right. (エ). They need the basic necessities of life. Is a consumption tax the fairest (オ) to go? As you probably know, many countries work (カ) this problem by taxing daily necessities at a lower rate than other commodities [C].

JS : (キ) what a daily necessity is?

MP : Exactly! I know my day doesn't start without a cup of coffee. So is that a necessity or a luxury?

JS : From one caffeine addict to another, I vote (ク) [D].

[1] 空所(ア)～(ク)に入る最も適切なものを選択肢1～4の中から選び、それぞれマークシートの解答欄 (31) から (38) にマークしなさい。

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|-----|---------------------------|-------------------|------------------------------|----------------------|
| (ア) | 1. comes down | 2. goes around | 3. goes up | 4. sits down |
| (イ) | 1. austerity | 2. fuel | 3. motivation | 4. taxing |
| (ウ) | 1. In contrast | 2. In other words | 3. Nevertheless | 4. On the other hand |
| (エ) | 1. People like to live | | 2. People like to live it up | |
| | 3. People have to live | | 4. People want to live | |
| (オ) | 1. place | 2. space | 3. spot | 4. way |
| (カ) | 1. around | 2. by | 3. hard | 4. over |
| (キ) | 1. But who gets to decide | | 2. Can you tell me | |
| | 3. Please explain | | 4. Will you explain | |
| (ク) | 1. coffee | 2. luxury | 3. necessity | 4. yes |

[2] 下記の【 】内の文が入る本文中の位置として最も適切なものを選択肢1～4の中から選び、マークシートの解答欄 (39) にマークしなさい。

【 : "To spend or not to spend, that is the question" 】

1. [A] 2. [B] 3. [C] 4. [D]

[3] 対話文において“eggs”にたとえられているものとして最も適切なものを選択肢1～4の中から選び、マークシートの解答欄 (40) にマークしなさい。

1. austerity 2. food 3. necessities 4. tax revenues

4. 次の(1)～(5)の文において下線部に文法上の誤りがある場合にはその箇所の番号を、また誤りがない場合には9を、それぞれマークシートの解答欄(41)から(45)にマークしなさい。

- (1) Many foreign electronics ① companies have learned ② to build machines at a lower cost by using ③ inexpensive produced ④ components.
- (2) Some members ① of the transport commission ② suggested that lowering the speed limit ③ on the road would not necessarily result in ④ less accidents.
- (3) ① Trained to tense her muscles and breathe from the chest, ② the dancer had the ③ most difficulty with ④ yoga's loose and full breathing methods.
- (4) Many musical pieces ① composed by nineteenth-century musicians ② in Europe, ③ in particular religious pieces, were ④ adaptations of hymns sung in church.
- (5) Not until the recent scandal ① has the magazines published ② anything even vaguely ③ negative about the company or ④ its executives.

5. 次の(1)～(5)の文の()内の語を最も適切な語形に書き直しなさい。ただし、語尾に“-ed”と“-ing”の付くものは不可とします。解答は解答用紙(記述式)に記入しなさい。判読が困難であったり、枠外にはみ出したりした場合は、採点されません。

- (1) Dr. Braun was the most (influence) scientist in the development of rockets.
- (2) These research groups are engaged in fierce (compete) to decode DNA.
- (3) The teacher spoke very (theory), so it was difficult for me to understand him.
- (4) Let me (emphasis) again that this is a very risky project.
- (5) The weapon will significantly (strong) the country's defenses against attack.

6. 和文の内容とほぼ同じ意味になるように、指定された文字から始まる適切な1語を空所①～③に入れて、英文を完成させなさい。解答は解答用紙(記述式)に記入しなさい。判読が困難であったり、枠外にはみ出したりした場合は、採点されません。

Sixty-five million years ago, a Manhattan-size meteorite ① (t) through space at about 11 kilometers per second punched through the sky before hitting the ground near what is now Mexico's Yucatán Peninsula. The energy ② (r) by the impact poured into the atmosphere, heating Earth's ③ (s). Then the dust lofted by this impact blocked out the sun, bringing years of wintry conditions everywhere, wiping out many terrestrial ④ (s), including the nonfeathered dinosaurs. Birds and mammals thus ⑤ (o) their ascendancy to the ⑥ (i) of two orbits: that of Earth and that of a devastating visitor from deep space.

We humans need not wait, like dinosaurs, for the next big rock to drop. We have an advanced understanding of the heavens and a spacefaring technology that could soon ⑦ (e) us to alter the orbits of any celestial object on a ⑧ (c) path with us.

(Adapted from G. L. Matloff, "Deflecting Asteroids" in *IEEE Spectrum*, 2012)

6500万年前、毎秒約11kmで宇宙を飛んで来たマンハッタン島ほどの大きさの隕石が、大気を突き抜けて、現在のユカタン半島(メキシコ)付近の地表に衝突した。その衝撃によって放出されたエネルギーは、大気圏へ流れ込み、地球表面を熱した。そして、この衝撃によって舞い上がった塵が太陽光を遮り、至る所で何年にもわたる冬のような気象条件をもたらし、羽毛を持たない恐竜を含む多くの陸生種を絶滅させた。こうして鳥類と哺乳類が優位に立ったのは、2つの軌道の交差、すなわち地球の軌道と深宇宙からの破壊的な訪問者の軌道の交差のおかげである。

われわれ人類は、恐竜と同じように、次の大きな隕石が落ちてくるのをただ待つ必要はない。われわれは宇宙に関する進んだ理解と宇宙航行技術を持っており、地球への衝突経路上に現れるいかなる天体の軌道も、近いうちに修正できるようになるだろう。