

# S 6 英 語

この冊子は、英語の問題で 1 ページより 8 ページまであります。

## 〔注 意〕

- (1) 試験開始の指示があるまで、この冊子を開いてはいけません。
- (2) 監督者から受験番号等記入の指示があったら、解答用マークシートに受験番号と氏名を記入し、さらに受験番号と志望学科をマークしてください。
- (3) 解答は、所定の解答用マークシートにマークしたものが採点されます。
- (4) 解答用マークシートについて
  - ① 解答用マークシートは、絶対に折り曲げてはいけません。
  - ② マークには黒鉛筆(HBまたはB)を使用してください。指定の黒鉛筆以外でマークした場合、採点できないことがあります。
  - ③ 誤ってマークした場合は、消しゴムで丁寧に消し、消しくずを完全に取り除いたうえ、新たにマークしてください。
  - ④ 解答欄のマークは、横 1 行について 1 箇所に限ります。2 箇所以上マークすると採点されません。あいまいなマークは無効となるので、はっきりマークしてください。
  - ⑤ 解答用マークシート上部に記載されている解答上の注意事項を、必ず読んでから解答してください。
- (5) 試験開始の指示があったら、初めに問題冊子のページ数を確認してください。  
ページの落丁・乱丁、印刷不鮮明等に気づいた場合は、手を挙げて監督者に知らせてください。
- (6) 問題冊子は、試験終了後、持ち帰ってください。

1

Read the following passage and answer the questions below. (64 points)

Many scientists believe the remarkable properties of graphene could lead to the development of technology such as super-fast computers, flexible mobile phones and even transparent planes among other things. But will the nano-\* material live up to the hype\*?

Over the past decade, many scientists have been hard at work breaking apart lumps of graphite\* in their labs. With meticulous care, they ground (1) crystals to ever finer powders, cutting, cleaving, polishing and inspecting, like expert jewellers coaxing gems from lumps of unappealing carbon. And just like those jewellers, the scientists' goal was a product far more valuable than the raw material. They were trying to produce graphene, a flake of graphite just one atom thick.

Two of the scientists, Andre Geim and Konstantin Novoselov, both professors at the University of Manchester, made history in 2004 ( ① ) they used adhesive tape to peel apart shavings of graphite until the pieces were just one atom thick, and were awarded the Nobel prize in physics for their groundbreaking experiments into graphene.

A number of companies are now working on this material, and mainstream consumer electronics companies, which have invested heavily in research and development, predict many graphene-based products will be on the market (2) within five years.

Why all the excitement? When graphite is broken down into graphene, the ultra-thin flakes take on unusual and exciting new properties. Three million of these sheets stacked on top of one another would stand just one millimetre high, and yet graphene is the strongest material ever measured, some 200 times stronger than steel. At the atomic level, it resembles a lattice of carbon (3) molecules that is so fine that not even a hydrogen molecule can pass through it.

“Graphene is a fascinating material,” says Joerg Heber, editor of the journal *Nature Materials*. “It is ultra-thin but mechanically very tough, ( a ) ( b ) ( c ) ( d ) ( e ) ( f ). These bonds can (4) also carry large electrical currents, which means that electronic devices, such as graphene transistors, can be miniaturised far beyond present silicon standards.”

By fixing plastics with just 1% graphene, they can become conductive ( ② ) remaining transparent. This is good news for manufacturers of devices such as mobile phones, as current touchscreen technology uses expensive and increasingly scarce rare-earth minerals. Graphene’s unique properties also offer the possibility of ultra-sensitive detectors that could (5) diagnose diseases like cancer far earlier than current tests.

The unpredictability of how materials behave at a nanoscale, however, presents a double-edged sword. Diamonds, coal, soot\*, graphite and graphene are all naturally occurring forms of carbon molecules, but each has distinct chemical and physical properties. As with any other new material, the question of human health impacts comes ( ③ ).

Professor Kenneth Dawson, director of the Centre for BioNano Interactions, says “graphene has a positive outlook.” However, this is not (6) cause for complacency, he adds. “It is all an ongoing study, with no final results.”

“For a material to present new health risks it must be able to get into the body, and once there cause harm in unanticipated ways,” says Professor Andrew Maynard, director of the Risk Science Centre at the University of Michigan School of Public Health. “It is hard to imagine how graphene in its pure form could gain entry to the body in significant quantities, given the size of the sheets being used and the circumstances ( ④ ) which they are utilised. However, if somehow it could get into the body, it may cause harm in ways that are currently hard to predict. On the other hand, it may be

relatively benign — it's hard to tell without the relevant research.”

(7)

The issue of safety of graphene is more relevant to workers handling this nanomaterial than consumers using the end product. Waste management of products containing graphene is also an issue, and special disposal policies, like those for batteries and fridges, may need to be put in place.

As new products are ( (a) ), the nanotech industry is looking to regulators to provide clear instructions on how to ( (b) ) those products approved for market. If no tests exist with which to prove their products safe, wondrous devices such as transparent touch screens will be stuck on the shelf.

*Adapted from The Guardian*

(Notes)

**nano-** : At the scale of  $10^{-9}$  or 0.000000001 of a metre

**hype** : A piece of information which has a tendency to over-excite people

**graphite** : The substance that is commonly used as the filling in a pencil

**soot** : The black powder that is formed when coal is burned

(1) Which of the items below is closest in meaning to the underlined part (1) in the passage? Consider the context, choose one from the choices, and mark the number on your **Answer Sheet**.

1 confident      2 great      3 humble      4 protective

(2) Who or what performs the action of the underlined verb predict in the passage? Choose one item from the following answer choices, and mark the number on your **Answer Sheet**.

1 a number of companies  
2 graphene-based products  
3 mainstream consumer electronics companies  
4 research and development

- (3) Which of the items below is the closest in meaning to the underlined part (3) in the passage? Consider the context, choose one from the choices, and mark the number on your **Answer Sheet**.

1 hard bond      2 hard mesh      3 tight bond      4 tight mesh

- (4) Choose one item from the answer choices below to fill in each blank in the underlined part (4) in the passage and complete the phrase in the best possible way. Mark the numbers from top to bottom on your **Answer Sheet**.

1 as                      2 atoms are strong      3 between  
4 carbon              5 the                      6 the bonds

- (5) Which of the items below is closest in meaning to the underlined part (5) in the passage? Consider the context, choose one from the choices, and mark the number on your **Answer Sheet**.

1 cure              2 identify              3 infect              4 portray

- (6) Which of the items below is closest in meaning to the underlined part (6) in the passage? Consider the context, choose one from the choices, and mark the number on your **Answer Sheet**.

1 a reason to feel concerned  
2 a reason to feel satisfied  
3 a source of alarm  
4 a source of arrogance

- (7) Which of the items below is closest in meaning to the underlined part (7) in the passage? Consider the context, choose one from the choices, and mark the number on your **Answer Sheet**.

1 groundless                      2 hazardous  
3 nonthreatening              4 surprising

(8) Which of the items below correctly fills in each of the blanks ( ① ), ( ② ), ( ③ ) and ( ④ ) in the passage. Choose one from the following answer choices, and mark the number on your **Answer Sheet**.

- |   |            |          |         |           |
|---|------------|----------|---------|-----------|
| ① | 1 likewise | 2 namely | 3 when  | 4 whereas |
| ② | 1 after    | 2 that   | 3 until | 4 while   |
| ③ | 1 by       | 2 for    | 3 up    | 4 with    |
| ④ | 1 almost   | 2 near   | 3 over  | 4 under   |

(9) Which of the items below shows the pair of words that correctly fill the blanks ( (a) ) and ( (b) ) in the underlined part (8) in the passage? Consider the context, choose one from the choices, and mark the number on your **Answer Sheet**.

- |                  |            |
|------------------|------------|
| 1 (a) advanced   | (b) attain |
| 2 (a) decided    | (b) obtain |
| 3 (a) developed  | (b) get    |
| 4 (a) structured | (b) find   |

(10) Decide which of the following sentences best summarises the content of the whole passage. Choose one from the choices, and mark the number on your **Answer Sheet**.

- 1 Before graphene can be widely used, institutions and industry need to carry out experiments to discover the potential harm it may cause to people.
- 2 Graphene would have had the potential to become a very useful substance, if scientists could have reduced the health risks.
- 3 No one can be sure whether graphene will be widely used or not because institutions and industry have yet to discover all the potential applications it has.
- 4 Thanks to all the research on it that has taken place, it is well known that graphene, even in small amounts, is a dangerous molecule.

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2

Read the conversation and answer the questions below.

(20 points)

The following is an adapted version of a presidential meeting about the intention of sending the Apollo spacecraft to the Moon that took place on November 21, 1962. It is a conversation between the following four people:

- 1 US President John F. Kennedy
- 2 James (Jim) Webb, the administrator of the National Aeronautics and Space Administration (NASA)
- 3 Robert Seamans, an associate administrator at NASA
- 4 An unknown speaker

**President Kennedy:** Jim, I think it is the top priority. I think we ought to have that very clear. But this is important for political reasons, international political reasons. This is, whether we like it or not, in a sense, a race. If we get second to <sup>(1)</sup>the Moon, it would be nice, but it would be like being second any time. So if we were second by six months because we didn't give it priority, then of course that would be very serious. So I think we have to take the <sup>(2)</sup>view that this is the top priority with us.

**James Webb:** But the environment of space is where you are going to operate the Apollo and where you are going to do the landing.

**President Kennedy:** Look, I know all these other things and the satellite and the communications and weather and all, they're all desirable, but they can wait.

**James Webb:** <sup>(3)</sup>I am talking now about the scientific program to understand the space environment within which you have

to fly Apollo and make a landing on the Moon.

President Kennedy: Wait a minute — is that saying that the lunar program to land the man on the Moon is the top priority of the Agency, is it?

Unknown speaker: And the science that goes with it . . . .

Robert Seamans: Well, yes, if you add that, the science that is necessary. . . .

President Kennedy: Going to the Moon is the top-priority project. Now, there are a lot of related scientific information and developments that will come from that which are important. But the whole thrust of the Agency, in my opinion, is the lunar program. The rest of it can wait six or nine months.

Which of the items below is closest in meaning to each of the underlined parts (1)~(5) in the passage? Consider the context, choose one from the choices, and mark the number on your **Answer Sheet**.

- |     |                   |             |                     |            |
|-----|-------------------|-------------|---------------------|------------|
| (1) | 1 in a guess      | 2 in a mood | 3 in a pinch        | 4 in a way |
| (2) | 1 form the habit  |             | 2 form the opinion  |            |
|     | 3 make the appeal |             | 4 make the plan     |            |
| (3) | 1 advantageous    |             | 2 basic             |            |
|     | 3 efficient       |             | 4 essential         |            |
| (4) | 1 allows for      |             | 2 balances          |            |
|     | 3 complements     |             | 4 pays attention to |            |
| (5) | 1 degree          | 2 power     | 3 purpose           | 4 stretch  |



**3**

Rearrange the parts of the sentences in each of (1), (2), (3) and (4) into the correct order. Mark the numbers correctly, from top to bottom, on your Answer Sheet. Beginning of sentences are not indicated by capital letters.

(16 points)

- |     |                   |                  |                   |
|-----|-------------------|------------------|-------------------|
| (1) | 1 Ann and Jean    | 2 became         | 3 before          |
|     | 4 best friends    | 5 it was         | 6 not long        |
| (2) | 1 a need to       | 2 action         | 3 into            |
|     | 4 put             | 5 the plan       | 6 there is        |
| (3) | 1 is              | 2 made           | 3 of              |
|     | 4 the human spine | 5 three segments | 6 up              |
| (4) | 1 are             | 2 bats           | 3 changes in      |
|     | 4 known to be     | 5 sensitive to   | 6 the environment |