H8−2024−

# 英　　語

## 学科（記述式）試験問題

注　意　事　項

1. 問題は **3 題**で、解答時間は **1 時間 20 分**です。

2. 答案用紙の記入について
   ㋐　答案は濃くはっきり書き、書き損じた場合は、解答の内容がはっきり分かるように訂正してください。また、答案用紙の表側だけで書ききれないときは、「**裏に続く**」と書いて裏側を使用してください。
   ㋑　答案用紙は、表紙を除き **6 枚つづり 1 冊**です。
   ㋒　答案用紙の表紙の各欄にそれぞれ必要事項を記入してください。
   〔　　〕−（　　）−［　　］の欄は〔H8〕−（2024）−［**英　語**］と記入してください。
   ㋓　答案用紙各枚の右上の（　ページ）欄に上から順にページ数を記入してください。
   ㋔　下記のとおり指定されたページを使って解答してください。

| 【問題番号】 | （ページ） |
|---|---|
| 【No.　**1**】 | （１～２） |
| 【No.　**2**】 | （３～４） |
| 【No.　**3**】 | （５～６） |

   ㋕　答案用紙各枚の左上にある（No.　　）の欄には問題番号を記入してください。
   ㋖　試験の公正を害するおそれがありますので、答案用紙の氏名欄以外に氏名その他解答と関係のない事項を記載しないでください。

3. この問題集は、本試験種目終了後に持ち帰りができます。

4. 本試験種目の途中で退室する場合は、退室時の問題集の持ち帰りはできませんが、希望する方には後ほど渡します。別途試験官の指示に従ってください。なお、試験時間中に、この問題集を切り取ったり、転記したりしないでください。

5. 下欄に受験番号等を記入してください。

| 第１次試験地 | 受験番号 | 氏　　名 |
|---|---|---|
| | | |

**指示があるまで中を開いてはいけません。**

**途中で退室する場合**……本試験種目終了後の問題集の持ち帰りを　　**希望しない**

【No. 1】 Read the following text and answer the questions (1)–(4) **in English**.

Brown and black carbon emissions from fossil fuels, biofuels and wood burning are major contributors to global warming. Black carbon emissions have a large effect on radiation transmission in the troposphere, both directly and indirectly via clouds, and also reduce the snow and ice albedo.

Black carbon is thought to be the second largest contributor to global warming, next to (1)brown carbon (the gases). Thus, reducing black carbon emission represents one of the most efficient ways for mitigating global warming that we know today.

(中 略)

Black carbon may be responsible for 25% of observed global warming over the past century. Black carbon tends to remain in the atmosphere for days-weeks whereas $CO_2$ remains in the atmosphere for approximately 100 years.

The total $CO_2$ emissions are estimated to be between 7,200 Tg C $yr^{-1}$, and 10,000 Tg C $yr^{-1}$, and the amount of carbon in the atmosphere is increasing by approximately 2,000 Tg C $yr^{-1}$.

Green carbon is carbon removed by (2)photosynthesis and stored in the plants and soil of natural ecosystems and is a vital part of the global carbon cycle. So far, however, it has mainly been considered in the climate debate in terrestrial ecosystems, though the issue of marine carbon sequestration has been known for at least 30 years.

A sink is any process, activity or mechanism that removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol from the atmosphere. Natural sinks for $CO_2$ are for example forests, soils and oceans.

Unlike many plants and most crops, which have short lives or release much of their carbon at the end of each season, forest biomass accumulates carbon over decades and centuries. Furthermore, forests can accumulate large amounts of $CO_2$ in relatively short periods, typically several decades. Afforestation and reforestation are measures that can be taken to enhance biological carbon sequestration. The IPCC calculated that a global program involving reduced deforestation, enhanced natural regeneration of tropical forests and worldwide re-afforestation could sequester 60–87 Gt of atmospheric carbon by 2050, equivalent to some 12–15% of projected $CO_2$ emissions from fossil fuel burning for that period.

(中 略)

But while the loss of green carbon ecosystems have attracted much interest, for example by combating the loss of tropical rainforests, the fact that near 55% of all green carbon is captured by living organisms not on land, but in oceans, has been widely

ignored, possibly our greatest deficit in mitigating climate change. The carbon captured by marine organisms is herein called “blue carbon”.

（中　略）

The carbon captured by living organisms in oceans is stored in the form of sediments from mangroves, salt marshes and seagrasses. It does not remain stored for decades or centuries (like for example rainforests), but rather for millennia.

（中　略）

Vegetated coastal habitats — mangrove forests, salt marshes and seagrass meadows — have much in common with rain forests: they are hot spots for biodiversity, they provide important and valuable ecosystem functions, including a large carbon sink capacity, and they are experiencing a steep global decline. Indeed, the world is losing its coastal habitats four times faster than its rain forests and the rate of loss is accelerating.

**Glossary and Acronym**

Aerosol: A suspension of fine solid or liquid particles in gas

Afforestation: Afforestation is defined under the Kyoto Protocol as the direct human-induced conversion of non-forest land to permanent forested land.

Albedo: The fraction of incident radiation (such as light) that is reflected by a surface or body (such as a cloud)

Carbon sequestration: The process of increasing the carbon content of a reservoir other than the atmosphere

Mitigation: A human intervention to reduce the sources of or enhance the sinks for greenhouse gases

Troposphere: The lowest densest part of the earth’s atmosphere in which most weather changes occur. It extends from the earth’s surface to the bottom of the stratosphere at about 11 kms high.

Tg C $yr^{-1}$: Tera ($10^{12}$) grams of carbon per year

**Questions**

(1) What are two brown carbons (underlined (1)) that have the biggest impact on global warming? Name them by chemical names, not by molecular formulae.

(2) Explain the word numbered (2) in 30 words or less.

(3) What is the importance of blue carbon on the carbon cycle?

(4) Explain in 30 words or less how global warming can be mitigated. Use these four words: “black”, “brown”, “green” and “blue”.

【No. **2**】 次の文章を読み、問い(1)～(4)に答えよ。

Linguistics is one of those subjects that not many people have heard of, so you might well be wondering exactly what it is. The simplest definition of linguistics is that it's the science of language.

This is a simple definition, but it contains some very important words. First, when we say that linguistics is a science, that doesn't mean you need a lab coat and safety goggles to do linguistics. (1)Instead, what it means is that the way we ask questions to learn about language uses a scientific approach.

The scientific way of thinking about language involves making systematic, empirical observations. There's another important word: *empirical* means that we observe data to find the evidence for our theories.

All scientists make empirical observations: botanists[*1] observe how plants grow and reproduce. Chemists observe how substances interact with other. Linguists observe how people use their language.

A crucial thing to keep in mind is that the observations we make about language use are NOT value judgments. Lots of people in the world — like your high school English teacher, various newspaper columnists, maybe your grandparents, and maybe even some of your friends — make judgments about how people use language. But linguists don't. A short-hand way of saying (2)this is that linguists have a descriptive approach to language, not a prescriptive approach. We describe what people do with their language, but we don't prescribe how they should or shouldn't do it.

This descriptive approach is consistent with a scientific way of thinking. (3)Think about an entomologist[*2] who studies beetles. Imagine that scientist observes that a species of beetle eats leaves. She's not going to judge that the beetles are eating wrong, and tell them that they'd be more successful in life if only they eat the same thing as ants. No — she observes what the beetle eats and tries to figure out why: she develops a theory of why the beetle eats this plant and not that one. In the same way, linguists observe what people say and how they say it, and come up with theories of why people say certain things or make certain sounds but not others.

（中　略）

In our simple definition of linguistics, there's another important word we need to focus on: linguistics is the science of human language. There are plenty of species that communicate with each other in an impressive variety of ways, but in linguistics, our job is to focus on the unique system that humans use. It turns out that humans have some important differences to all other species that make our language unique.

First, what we call the articulatory[*3] system: our lungs, larynx[*4] & vocal folds[*5], and the shape of our tongue, teeth, lips, nose, all enable us to produce speech. No other species can do this in the way we can, not even our closest genetic relatives the chimpanzees, bonobos, and orangutans.

Second, our auditory[*6] system is special: our ears are sensitive to exactly the frequencies that are most common in human speech. There are other species that have similar patterns of auditory sensitivity, but human newborns pay special attention to human speech, even more so than synthetic speech that is matched for acoustic[*7] characteristics.

And most important of all, our neural[*8] system is special: no other species has a brain as complex and densely connected as ours with so many connections dedicated to producing and understanding language.

Humans' language ability is different from all other species' communication systems, and linguistics is the science that studies (4)this unique ability.

[*1] botanist: someone whose job is to make scientific studies of wild plants

[*2] entomologist: a person who studies insects

[*3] articulatory: 調音の

[*4] larynx: 喉頭

[*5] vocal folds: 声帯

[*6] auditory: relating to the ability to hear

[*7] acoustic: relating to sound and the way people hear things

[*8] neural: relating to a nerve or the nervous system

(1) 下線部(1)を和訳せよ。

(2) 下線部(2)について、具体的な内容を 40 文字以内の日本語で説明せよ。

(3) 下線部(3)について、筆者が entomologist の例を用いて示そうとしていることは何か。80 文字以内の日本語で説明せよ。

(4) 下線部(4)について、どのような点で unique であるのかを 100 文字以内の日本語で説明せよ。

【No. **3**】 次の文章を読み、下線部(1)～(4)を英訳せよ。

Electricity is the movement of electrons through a circuit. To understand the flow of electricity, you also need to understand the concepts of voltage, current, and resistance.

(1)電圧とは、電子を流動させる電気的な力で、測定単位はボルト(V)である。ある回路上の任意の 2 点間に存在する電荷の差をいう。 If, for example, a circuit is powered by a 3-volt battery, the 3 volts represent the difference in charge between where the electrons leave the battery and where they flow back into the battery.

Current is a measure of how quickly electrons move through a circuit and is measured in Amperes (A), or Amps for short. (2)電荷あるいはアンペアが高ければ高いほど、電子はより高速に流れる。

Resistance is a measure of how easily electricity can pass through a conductor and is measured in Ohms (Ω). If something has a high resistance, only a small amount of electricity can pass through it, but if it has a low resistance, more electricity can flow through. (3)回路に特定量の電流を流す必要があれば、電流を制限するために抵抗器を回路に加えることができる。

(4)オームの法則とは、ある導体を流れる電流の量は、それに加えられた電圧に正比例する、という科学的法則である。 Whenever a voltage is applied to a conductor, electrical current flows through it. According to Ohm's law, if the voltage is higher, more current flows through and if the voltage is lower, less current flows through.

＜出典＞

・No.1
https://www.grida.no/publications/145
Nellemann, C., Corcoran, E., Duarte, C. M., Valdés, L., De Young, C., Fonseca, L., Grimsditch, G. (Eds). 2009. Blue Carbon. A Rapid Response Assessment. United Nations Environment Programme, GRID-Arendal, www.grida.no)
・No.2
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・No.3
STEM LEARNING: X-57 Maxwell: Ohm's Law from NASA WEB SITE