

一 般 科 目

# 英 語

## 注 意 事 項

- 1 試験開始の合図があるまで、この問題用紙を開いてはいけません。
- 2 問題用紙は4ページで、解答用紙は2ページあります。試験開始の合図があつてから確かめなさい。
- 3 監督者の指示に従い、解答用紙の各ページに受験番号を記入しなさい。氏名を書いてはいけません。
- 4 文字などの印刷に不鮮明なところがあつた場合は、手を挙げて監督者に知らせなさい。
- 5 解答はすべて解答用紙に記入しなさい。
- 6 問題用紙の余白は下書きとして利用してかまいません。
- 7 試験終了後、配付された問題用紙は持ち帰りなさい。

# 問題用紙

( 英語 )

問題 1 次の英文は腐食 (corrosion) によって発生するさび (rust) についての説明です。下線部 (1) から (5) について、文脈に適合するように、[ ] 内の要素を並べ替えなさい。文頭に來る要素であっても、小文字で表記されています。答えは、解答欄に記号で記入しなさい。

Example:

All of us can see [(a)nectar (b)bees (c)to gather (d)flying] in the garden.

Answer: All of us can see [( b ) - ( d ) - ( c ) - ( a )] in the garden.

All of us can see [bees flying to gather nectar] in the garden.

Rust is the product of the corrosion of iron. Iron reacts with water and oxygen in the air to form iron oxide and other iron compounds that make up the familiar red-brown substance known as rust. Rusting is a chemical reaction which can be represented by the following word equation:

iron + water + oxygen → rust

Even strong buildings and bridges that are made from steel, an alloy of iron, are weakened by rusting. The Sydney Harbour Bridge, for example, is continually painted to protect it from moisture and the air, which would cause its steel girders to rust. Ships and cars are also constructed largely of steel. Despite the strength of the steel, (1)[(a)to be (b)they (c)protected (d)need] from the corrosive effects of the environment.

Some substances in the environment (2)[(a)the rusting reaction (b)more quickly (c)make (d)much (e)happen]. The Commonwealth Scientific and Industrial Research Organization has conducted some research on the corrosion rates around Melbourne. They exposed metal plates at 300 different sites and measured the rate at which each plate corroded. A corrosion map of the Melbourne metropolitan area was produced, showing (3)[(a)was (b)to occur (c)corrosion (d)most likely (e)where]. Corrosion rates were highest near airports, industrial plants, sewage treatment works, and especially near Port Phillip Bay.

Some emissions from factories contain substances that increase the rate of rusting. Salt water also has this effect. You can investigate the effect of salt on the rate of the rusting reaction by designing your own experiment.

The layer of rust that forms on an iron object comes off the metal, allowing air and moisture to get through to the iron below. This causes more rusting to occur and eventually the iron becomes a heap of rust. (4)[(a)it is (b)to protect (c)iron and steel (d)important (e)from corrosion], especially if it is part of a bridge or the body of a ship.

There are several ways to protect iron and steel from rusting. One way is to prevent oxygen or moisture from contacting the metal. This is called surface protection. The metal can be protected by coating it with paint, plastic or oil. If the surface protection becomes scratched or worn off, the metal below can be attacked by moisture and oxygen and rusting will occur. Examine the painted surface of an old car. Wherever the paint has come off you will find that corrosion has occurred and the rust can be seen.

Another way to protect iron from rusting is to coat it with a layer of zinc. This is called galvanizing. Zinc is a metal that reacts more easily than iron, and in the presence of moisture and oxygen the zinc layer corrodes, (5)[(a)unaffected (b)leaving (c)the iron]. Many roofing materials and garden sheds are made from galvanized iron. You can also buy galvanized nails.

(Adapted from *Science Quest 2*)

注 oxide: 酸化物 alloy: 合金 girder: 橋桁(はしげた) corrosive: 腐食性の corrode: 腐食する zinc: 亜鉛

問題用紙  
( 英 語 )

問題2 次の英文は月についての記述です。下線部(1)から(5)に入れるのに最も適切な文を下の(a)から(e)の中から一つずつ選び、その記号で答えなさい。

About 239,000 miles (385,000 km) from Earth, the Moon is 2,160 miles (3,475 km) wide. It appears bright because it reflects light from the Sun. The Moon makes one orbit of Earth in a little more than 27 days. ( 1 ) Because the two times are alike, the same side of the Moon is always facing Earth.

( 2 ) The surface of the Moon visible from Earth has dark-colored and light-colored areas. The dark regions are covered with a rock called basalt, which formed when huge pools of lava cooled. The other regions have many different types of light-colored rock.

( 3 ) Moon soil can be anywhere from 3 to 65 feet (1 to 20 m) deep. On Earth, soil forms as wind and water wear away rock. On the Moon, where there is no atmosphere to burn up meteoroids, meteorites crashing into the surface and shattering rock created the soil. Large meteorites have blasted out craters in the Moon's surface.

( 4 ) One theory was that it used to be part of Earth. Another was that it formed near Earth. The third was that it formed somewhere in space and was captured by Earth's gravity. A recent new theory states that the Moon was formed when a giant asteroid struck Earth. ( 5 ) This material came together to form the Moon.  
(Adapted from *Science Discovery: Space*)

注 basalt: 玄武岩      lava: 溶岩      meteoroid: 流星体      meteorite: 隕石(いんせき)      asteroid: 小惑星

- (a) The impact sent material from Earth into space.
- (b) The Moon is made of rock very much like the types of rock found on Earth.
- (c) Before people explored the Moon, scientists had three theories about its origin.
- (d) It takes the same amount of time to rotate once on its axis.
- (e) Much of the Moon is covered with soil.

( 問題用紙 )  
( 英語 )

問題3 次のデータに基づいて、下の英文の下線部(1)から(7)に適切な語あるいは句を記入し、英文を完成させなさい。

(in Millions of U.S. Dollars)

Country	Technological Exports			Technological Imports		
	2009	2010	2011	2009	2010	2011
Japan	21,538.2	27,758.5	29,887.2	5,716.6	6,038.6	5,197.0
the United States	89,071.0	98,375.0	113,057.0	60,284.0	67,279.0	77,286.0
the United Kingdom	42,818.5	44,833.0	49,174.8	24,228.9	25,323.8	27,223.0
Italy	10,042.3	10,464.3	13,777.0	15,448.1	15,779.5	18,504.0
Sweden	16,731.3	17,807.9	20,922.8	10,259.3	9,852.4	11,547.7
Spain	10,112.1	9,125.5	9,870.8	10,024.8	8,630.4	9,023.4
Australia	3,619.6	4,522.3	5,051.3	5,513.2	7,299.8	8,581.0

(Adapted from *International Statistical Compendium 2014*)

The table above shows the technological trade balance for the years 2009-2011 for seven countries: Japan; the United States; the United Kingdom; Italy; Sweden; Spain; and Australia.

Comparing export and import figures, we can see that, while some countries' exports exceeded their imports, other countries' imports exceeded their exports. There is no clear trend. For example, ( 1 ) received more than three times more money from its exports than it paid for imports for all three years listed. On the other hand, ( 2 ) and ( 3 ) paid more for imported technology than they received for exported technology in all three years.

With respect to import and export trends, it appears that both import and export figures tended to rise over time. Here, too, however, there are exceptions. Export figures fell from 2009 to 2010 in ( 4 ), while import figures fell from 2009 to 2010 and then increased from 2010 to 2011 in Spain and ( 5 ).

Considering the data for all the countries listed, we can see that there is a very wide range. ( 6 ) had the highest figures for both imports and exports for all years, more than double the figures for the second-highest country. This wide variation can be seen even within geographic regions. For example, export figures in 2009 in ( 7 ) were about four times those of Italy and Spain.

( 問題用紙 )  
( 英 語 )

問題 4 次の英文は光と電波などの電磁放射 (electromagnetic radiation) を利用した望遠鏡についての説明です。この英文を読み、下の問いに答えなさい。

A telescope is a device that gathers electromagnetic radiation. If you have ever looked through a telescope, it was probably one that gathers visible light. Such telescopes provide images that are much clearer than (1)( ) is seen with the naked eye. Images from other types of telescopes show radiation that your eyes cannot detect. Each form of radiation provides different information about objects in space.

Astronomers usually record images from telescopes electronically, which allows them to use computers to analyze images. Different colors or shades in an image reveal patterns of radiation.

Most types of telescopes gather radiation with a glass lens or a reflecting surface, such as a mirror. Larger lenses and reflecting surfaces produce brighter and more detailed images. You can magnify an image from a telescope to any size. However, enlarging an image will not bring out any more details of an object. If the image is fuzzy at a small size, it will remain fuzzy no matter how much it is enlarged. There are two types of visible-light telescopes: reflecting telescopes and refracting telescopes.

Most powerful visible-light telescopes are built on mountaintops in rural areas. Rural areas offer a much (2)( ) view of the night sky than cities do, because the many electric lights in cities make dim space objects hard to see. By locating telescopes on mountaintops, astronomers (3)( ) problems caused by Earth's atmosphere. The atmosphere interferes with light coming in from space. In fact, movements of the air are what make stars appear to twinkle. At high altitudes there is (4)( ) air above the ground to interfere with light.

Radio telescopes show (5)( ) radio waves are being emitted by objects in space. A radio telescope has a curved metal surface, called a dish, that gathers radio waves and focuses (6)them onto an antenna. The dish works in the same way as the main mirror of a reflecting telescope. Some radio telescopes have dishes made of metal mesh rather than solid metal.

Unlike visible-light telescopes, radio telescopes are not affected by clouds or bad weather. They even work well in daylight. In addition, radio telescopes can be located at low altitudes because most radio waves pass freely through Earth's atmosphere.

Many exciting images have come from the Hubble Space Telescope and other telescopes in space. The Hubble telescope is a reflecting telescope. It was placed in orbit around Earth in 1990. Astronomers operate it from the ground, although astronauts have visited it to make repairs and improvements. The telescope sends images and measurements back to Earth electronically.

Because the Hubble telescope is located in space, Earth's atmosphere does not interfere with light from (7)objects the telescope is aimed at. This lack of interference allows it to obtain clearer images than ground-based telescopes with much larger mirrors. In addition to collecting visible light, the Hubble telescope produces images of ultraviolet and infrared radiation. (Adapted from *Space Science*)

注 fuzzy: ぼやけた    refracting: 屈折式の    altitude: 高度    emit: 放射する    ultraviolet: 紫外線    infrared: 赤外線

問 1 (1)の( )について、文構成上最も適切な語(1語)を補いなさい。

問 2 (2)から(5)の( )について、それぞれ文構成上最も適切な語を以下の(a)から(d)の中から選び、その記号で答えなさい。

- |                |            |                |           |
|----------------|------------|----------------|-----------|
| (2) (a) good   | (b) bad    | (c) better     | (d) worse |
| (3) (a) reduce | (b) create | (c) understand | (d) leave |
| (4) (a) more   | (b) less   | (c) least      | (d) most  |
| (5) (a) when   | (b) where  | (c) how        | (d) why   |

問 3 下線部(6)の themは何を指すか。本文中からそのまま抜き出さない。

問 4 下線部(7)を日本語に訳しなさい。

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問題 1

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問題 2

Adapted from *Space Q&A Science Discovery*, by Edward Willett, AV2 by Weigl, 2015

問題 3

*International Statistical Compendium 2014*, 総務省統計局, 2014

問題 4

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