外国語科目（英語）　　２１　大修

物質科学創造専攻
物質電子化学専攻
材料物理科学専攻

English Examination

Time: 14:00 – 15:00

Instructions

1. Please confirm that there are **three** answer sheets to be filled in.
2. Please write your **application number** on **each** of the three answer sheets.
3. Please answer each problem (**in English**) on a **separate** answer sheet on which you must write clearly the **problem number** (I, II or III).

Problem I.

Read the following and answer the questions below in English.

NASA's Phoenix spacecraft successfully touched down on the surface of Mars at 7:53 p.m. ET[(a)] on May 25, 2008, the first time in 32 years that the space agency has landed a probe on the Red Planet using retrorockets[(b)].

About two hours later, the mission controllers announced that (1) the craft's solar arrays had successfully deployed[(c)]. The twin 6-foot circular disks are the power source. If they hadn't deployed, Phoenix would only have had about three hours of battery power. Immediately after that, images began to arrive — (2) the scientists' best-case scenario. "What we're looking at is a surface of Mars that we've never seen before," said Dan McCleese, NASA's chief scientist. The crystal clear images showed a flat surface with very few rocks.

"This was just perfect. It didn't seem real," said Peter Smith, the planetary sciences professor at the University of Arizona who proposed and helped develop the mission. (3) "I'm on cloud 9[(d)]." "As (4) icing on the cake, we've found that the lander is tilted only one quarter of a degree, which means we've landed nearly perfectly level," wrote Brent Shockley, the mission's configuration and information management engineer, on NASA's Phoenix website.

Adding to the risk of failure is the fact that every successful Mars landing after 1976 has involved huge air bags that let the craft bounce to a soft landing. Yet the air bags don't allow for precise landings and NASA scientists wanted to hit the targeted landing site. So Phoenix was equipped with retrograde rockets, set to fire less than a minute before touchdown to decelerate the craft. The last mission to land this way was the Viking 2 lander, on Sept. 3, 1976. A later mission, Mars Polar Lander, was using retrorockets when it crashed in 1999.

The lander is beaming back images of a Martian landscape never before seen by humans — near the north polar cap, where scientists believe there is abundant water, if frozen and buried. Finding evidence of water has long been the goal of NASA's Mars program. Water is essential to all known life. The Mars missions are aimed at giving scientists more information about where, when and in what form water existed there. The Phoenix lander is designed to collect and examine ice and rock samples for evidence of microscopic life. NASA scientists hope that if a rudimentary[(e)] form of life existed there millions of years ago, traces of it might remain.

(excerpted and modified from an article by Susan Kelly in USA TODAY)

Notes

(a) ET: North America's Eastern Time

(b) retrorocket = retrograde rocket: a rocket engine used to provide thrust opposing the motion of a spacecraft, thereby causing it to decelerate.

(c) deploy: move into a position ready for use

(d) cloud 9: the cloud located extremely high in the sky

(e) rudimentary: undeveloped

1. Answer the following questions concerned with the portions underlined and numbered (1) – (4) in the text.

   (1) What is the shape of the craft's solar arrays?

   (2) What is the scientists' best-case scenario?

   (3) How was Peter Smith's feeling when he said, "I'm on cloud 9."?

   (4) Choose from phrases (i) – (v) the closest in meaning to "icing on the cake" in this context.

   (i) freezing the cake, (ii) coating over the cake, (iii) a second great thing on top of the first, (iv) a weak thing, (v) the lander sitting like a cake

2. The text starts with the following sentence. "NASA's Phoenix spacecraft successfully touched down on the surface of Mars at 7:53 p.m. ET on May 25, 2008, the first time in 32 years...." Give the reason from the text why the reporter used the phrase, "the first time in 32 years".

3. Explain in 30 words or less why Phoenix was equipped with retrograde rockets (or retrorockets).

4. Explain in 30 words or less what were the main aims for the craft's landing near the north polar cap of the planet.

Problem II.

Read and select the most appropriate word or words to insert in the brackets.

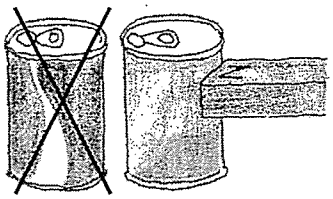
If you take a paper clip and bend it, it stays (**1**). On the other (**2**), if you try to bend a glass rod, it will simply break. In this respect, glass behaves quite differently (**3**) a metal. The differences must lie either in the particular atoms of which metals and glass are made up or (**4**) the way they are put together — probably both. There are of course many other differences (**5**) metals and glass. Metals conduct electricity and are used for electrical transmission lines: glass (**6**) conducts electricity at all and can serve as an insulator. Glass is transparent and is used in windows, whereas a sheet of metal more than (**7**) of an inch is quite opaque.

(1) bend, bending, bends, bent
(2) words , hand, side, way
(3) from, in, of, with
(4) at, by, in, on
(5) from, between, for, of
(6) often, slightly, little, hardly
(7) a million, a millionth, millions, the millions

Problem III.

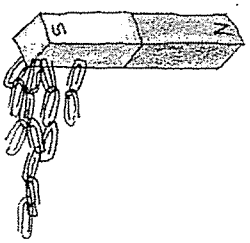
Describe briefly (in 15 words or less) the typical nature of magnets according to the pictures (1) – (4) shown below. (Note that the scientific accuracy of your description is less important than the general fluency and grammatical correctness of your English.)

(1)



Aluminum Steel

(2)



(3)

(4)