外国語科目（英語）　　２２大修

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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

Instructions

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

Problem I.

Read the following text and answer the questions.

A competition between groups hoping to design a space telescope to investigate how the Universe is expanding over time has been scrapped by NASA [(1)] and the DoE [(2)]. Instead, the agencies are pursuing a government-built, government-led design for the JDEM [(3)], which may accommodate elements from all three of the teams. "It's a do-over for all of us," says Michael Levi, who is co-principal investigator for the SNAP [(4)]. NASA had been giving money to SNAP and two other groups, called the ADEPT [(5)] and the DESTINY [(6)]. Each team was pursuing a proprietary telescope design, emphasizing different methods for seeking constraints on the dark energy that is thought to be accelerating the expansion of the Universe. The mission is thought to launch in 2015.

However, on September 12, 2008, NASA and the DoE announced they will develop a common "reference design" that would not prevent any of the three methods. The design will be worked out by a new program office and a science coordination group of 12–20 people. The membership could be decided by October 3, according to NASA astrophysics division chief Jon Morse, who says that there were 50 applicants in total, some coming from all three teams.

The decision took many by surprise. "I'm concerned," says Chuck Bennett, principal investigator for the ADEPT team. "Three teams did a lot of work for a long time. I'm worried that hitting the reset button and starting again is going to set things back."

It's not necessarily a bad move by the agencies, says Robert Cahn of Lawrence Berkeley National Laboratory. The JDEM has become too big and costly to have been managed well by the relatively small teams, but now NASA can adopt the best ideas from each, he says. "In some sense NASA seems to have made up its mind that it wants to do all three methods," he says. "It's certainly not working the way we expected but it might work out well."

Although the decision eliminates tension between the competing teams — all three presume they will share aspects of their once-secret designs for the science coordination group — there is still tension how much NASA and the DoE say they can afford. A 2007 National Academies report estimated that the three designs would cost more than $1.2 billion in total. But Morse has said that he can afford only a $600-million mission, not including launch costs. The DoE has said it wants to pay about 25% of the overall costs. Eleven of the academy report's authors complained to NASA and the DoE that the science they envisioned the JDEM doing would not be possible at half the cost.

Cited and modified from “Teams merge for dark-energy mission”,
Nature 455, 577 (2008)

(1) NASA: National Aeronautics and Space Administration

(2) DoE: US Department of Energy

(3) JDEM: Joint Dark Energy Mission

(4) SNAP: Supernova Acceleration Probe mission

(5) ADEPT: Advanced Dark Energy Physics Telescope mission

(6) DESTINY: Dark Energy Space Telescope mission

Questions

I-1. Answer the following questions by writing short but complete sentences in English

(i) How is the dark energy explained to affect the Universe?

(ii) What is the similarity among the three teams?

(iii) What was the problem of the missions before "the common new reference design" was proposed?

(iv) What is the financial problem of the "new reference design"?

I-2. Indicate whether the following statements are true (T) or false (F)

(i) NASA does not value the achievements of the three teams at all.

(ii) NASA wants to choose one or two methods from the three teams.

(iii) Robert Cahn thinks "the common new reference design" would be a better way than the former one.

(iv) The three teams mind sharing their own technology.

(v) Jon Morse is considering launching two $600-million missions to pay the estimated total cost of $1.2 billion.

Problem II.

II-1. Read the following sentences and select one out of the four choices in the parentheses to make the sentences logical and grammatically correct.

1. It is well known that this wine (have / has / is / were) an intense ruby red color.
2. It is necessary to take (in / on / from / into) account the fact that she is ill.
3. The tests based on this method (takes / given / gave / taken) good results.
4. (Neither / Because / Not only / Either) the students but the teacher was laughing.

II-2. In the following, arrange all the words in the brackets to get a sentence which is logical and also grammatically correct.

Example: (f) The solubility of sugar in water [with, rise, increases, of, the] temperature.
(f) – increases with the rise of

(a) These samples [of, in, the, break, course, up] transportation.

(b) Water is [that, clear, as rain, the, falls, colorless liquid] and is necessary for life to exist.

(c) These methods [suited, be, are, to, time-consuming, too] to process control.

(d) Good movies are [of outstanding, by, accomplished, the collaboration] staff.

(e) A bicycle is [two wheels, vehicle, with, that, a, sit on, you] and move by pushing its pedals with your feet.

Problem III

Questions

Read the following text and explain the figures in English. Each answer should be composed of at least eight words. Do not use any mathematical expressions such as algebraic terms and equations in your answers. Note that scientific accuracy is less essential than general fluency and grammatical correctness.

III-1. A spring is an elastic body that recovers its shape after being compressed or stretched. Here, an ideal gravity spring shown in Fig.1 is considered without air resistance, friction or damping. Describe the change in shape of the spring from (a) to (b).

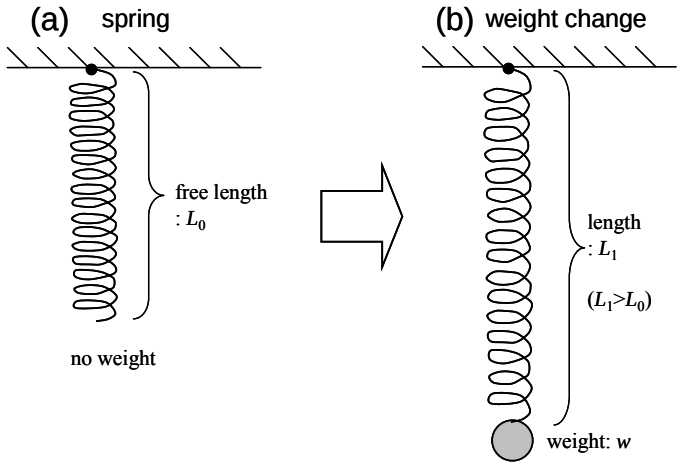

Fig.1

III-2. A simple pendulum is a weight suspended from a frictionless pivot and swings. Here, an ideal gravity pendulum shown as Fig.2 is considered without air resistance, friction or damping. Describe the change in motion of the pendulum from (a) to (b).

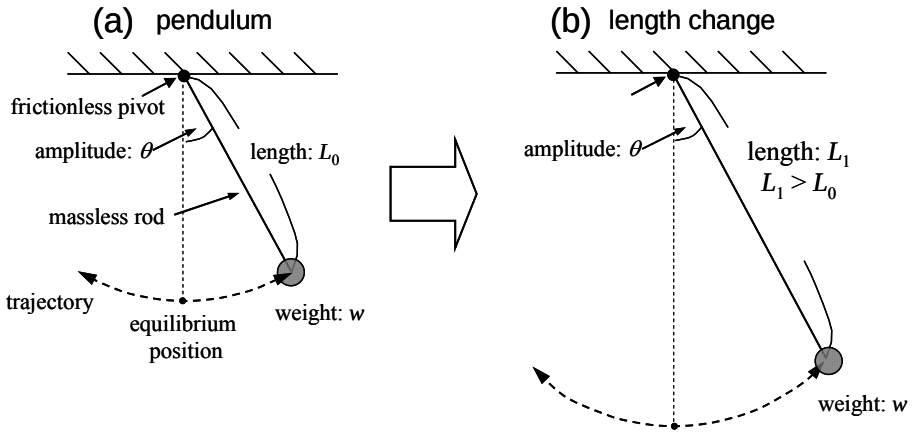

Fig.2