平成9年度入学試験問題

英語

〔注意事項〕

1．試験開始の合図があるまで、この問題冊子を開いてはならない。
2．解答には、必ず黒色鉛筆（または黒色シャープペンシル）を使用すること。
3．問題は全部で3問ある。3問のすべてに解答せよ。
4．答案用紙は、各問につき1枚、合計3枚配付してあるから、確実に配付されていることを確かめること。
5．各答案用紙の所定欄に、受験番号および氏名を必ず記入すること。
6．解答は、各問ごとに所定の答案用紙を使用すること。
7．答案用紙には、解答に関係ない文字、記号、符号などを記入してはならない。
8．解答できない場合でも、答案用紙に受験番号および氏名を記入して提出すること。
9．答案用紙を草稿用紙に絶対使用しないこと（草稿用紙は問題より後の頁にある）。

英　語　　(平成8年8月)

1　以下の文章を読み，下の設問に答えなさい。

Modern computers have greatly extended the scope of glacier modeling. (a) A model is a means of reducing a complex real situation to a simple closed system that represents the essential features and to which the laws of physics can be applied. Modeling can serve three purposes: experimentation, explanation, and prediction. Experimentation, discovering the effect of changing the values of the controlling variables, is often the most useful; it can never be done in the real world. An explanation may sometimes be an illusion; the fact that a model with adjustable parameters produces plausible numerical values does not prove that the underlying assumptions are correct. Most models can be used for prediction, but first they must be tested against data. Unambiguous testing is difficult and the temptation to use all the data to "tune" the model by adjusting parameters must be resisted. Although these (b) pitfalls have not always been avoided, the scope of some recent ice-sheet models is impressive.

The approach here emphasizes the physics, combined where necessary with mathematics. No apology is made for introducing mathematics. (c) In the author's opinion, a mere handful of mathematical physicists, who may seldom set foot on a glacier, have contributed far more to the understanding of the subject than have a hundred measurers of ablation stakes or recorders of advances and retreats of glacier termini. This is not to say that the latter are unimportant; in glaciology, as in other branches of science, there is a place for both the theoretical and the experimental approach. But the two should be coordinated, and the experiments should be designed to solve specific problems. (d) Too often in the past, glaciological measurements have been made on the premise that the mere acquisition of data is a useful contribution in itself. This is seldom the case.

glacier　：氷河
stake：杭
termini：終端

(1)　下線部(a)および(d)を内容がわかるように和訳せよ。

(2)　下線部(b) pitfallsは何を指しているか。日本語で説明せよ。

(3)　下線部(c) the author's opinion に反対の立場で，英語で意見を述べよ。50-100wordsで，問題文を引用するのではなく自分のことばで書きなさい。

2　　以下の文章を読み，文中の内容に沿って，下の問いに日本語で答えなさい。

The important thing about Newton's theory of colours is not just that he was right, but the way in which he arrived at his conclusions. Before Newton, the way philosophers developed their ideas about the natural world was largely through pure thought. Descartes, for example, thought about the way in which light might be transmitted from a bright object to the eye, but he did not carry out experiments to test his ideas. Of course, Newton was not the first experimenter - Galileo, in particular, pointed the way with his studies of the way in which balls rolled down inclined planes, and with his work on pendulums. But Newton was the first person to express clearly the basis of what became the scientific method - the combination of ideas (hypotheses), observation and experiment on which modern science rests.

Newton's theory of colours emerged from experiments he carried out during his enforced sabbatical from Cambridge. By 1665, the fact that a ray of sunlight could be turned into a rainbow-like spectrum of colours by passing it through a triangular glass prism was well known. The standard explanation of the effect was based on the Aristotelian idea that white light represented a pure, unadulterated form, and that it became corrupted by passing through the glass. When the light enters the prism, it is bent, and then follows a straight line to the other side of the triangle, where it bends again as it emerges into the air. At the same time, the light is spread out, from a single spot of white light into a bar of colours. Working downwards from the point of the triangle, the light at the top is bent least, and travels the shortest distance through the glass, emerging as red. Lower down, where the triangular wedge of glass is wider, light which has been bent slightly more as it enters the prism travels further through the glass, and emerges into the air on the other side as violet. In between, there are all the colours of the rainbow - red, orange, yellow, green, blue, indigo and violet. Using a prism held up to the ray of light entering a darkened room through a small hole in the curtain (rather like the camera obscura set-up), the spectrum of colours can be displayed on the wall opposite the window.

On the Aristotelian view, white light that had travelled the shortest distance through the glass was modified least, and became red light. White light that had travelled a little further through the glass was modified more, and became yellow - and so on all the way down to violet.

Newton actually tested these ideas, using both prisms and lenses which he ground himself, trying to minimize the colour change by making lenses in different shapes. He was the first person to distinguish the rays of different colours, and he named the seven colours of the spectrum.

But the most important experiment Newton carried out at this time simply consisted of placing a second triangular wedge of glass behind the first prism but the other way up. The first prism, point uppermost, spread a spot of white light into a rainbow spectrum. The second prism, point downwards, combined the spread-out colours of the spectrum back into a spot of white light. Even though the light had passed through a further thickness of glass, it had not become more corrupted, but had returned to its former purity.

As Newton realized, this shows that white light is not 'pure' at all, but is a mixture of all the colours of the rainbow. Different colours of light bend by different amounts when they are refracted, but all the colours are present in the original white spot of light. It was a revolutionary idea, both because it overturned a basic tenet of Aristotelian philosophy and because it rested upon the secure foundation of experiment.

"The best and safest method of philosophizing seems to be, first to enquire diligently into the properties of things, and to establish those properties by experiment and then to proceed more slowly to hypotheses for the explanation of them. For hypotheses should be employed only in explaining the properties of things, but not assumed in determining them; unless so far as they may furnish experiments."

John Gribbin (1995) : Schrödinger's kittens and the search for reality

unadulterated：まぜ物のない
camera obscura：（カメラの）暗箱
refract：屈折させる
tenet：教義
enquire = inquire

(1)　白色光がガラスの三角プリズムを通過すると虹色に分かれること（分光）についてアリストテレス学派とニュートンの考え方の違いを述べよ（200字以内）。

(2)　下線部のニュートンの言葉を和訳せよ。

3　次の文章を英訳せよ。解答は解答用紙の所定欄に記せ。

私たちの太陽以外の星のまわりにも惑星があるかもしれないという考えは，長い間人々の想像をかきたててきました。けれども，これまで科学者はこの好奇心を満足させるほどの精度で惑星を検出することができませんでした。たとえ，近くの星に私たちの太陽系にあるような惑星があったとしても，暗くて小さすぎるので見わけるのが難しかったからです。しかし，もし木星のような巨大惑星を持つ星がたくさんあるならば，今日あるさまざまな探索方法によって惑星が見つかってもよい時期になりました。いろいろな技術を使っての検出のための感度と時間は惑星の軌道半径によって異なります。すなわち，問題は星と惑星の間の距離がいくらかということです。

太陽系＝Solar System
木星　＝Jupiter
軌道半径＝orbital radius