

※ 注意：請於試卷內之「非選擇題作答區」依序作答，並應註明作答之大題及小題題號。

如果沒有限定，可以用中文或英文作答

(壹) 閱讀測驗一 (40%)

Editorial: Notes on screen

In its introductory handbook for physics students, the Cavendish Laboratory at the University of Cambridge, UK, says that lab notes “need not be particularly tidy, but they should be understandable by the writer or somebody else at a later date”. Written in 2008, the guidance adds: “Your notebook must be A4 in size and hard-bound. A suitable book can be bought from the laboratory technician.”

So far, no doubt, so familiar — but technology is marching on, and commuters are starting to abandon dog-eared paperbacks for e-books. For how much longer will the lab book prevail in its current form? And how many more notebooks will the Cavendish technicians sell?

Reports of the death of the standard lab book — in use for hundreds of years — are, of course, as premature as they are exaggerated. And *Nature* has been here before — in a feature in 2005, we reported that electronic notebooks were poised to become increasingly popular among researchers. The News Feature on page 430 of this issue, which takes a look at the rise of the digital lab, shows that we were right.

“Paper has nothing to offer me,” says Michelle James, an Alzheimer's disease researcher at Stanford University in California who is profiled in the feature, and who has moved her scientific notes to her iPad. James is far from alone — a generation of bench scientists is ditching paper and taking advantage of computer tablets and software that allow people to share protocols and swap notes. (If it cheers the old guard, who even now are vowing never to abandon their trusty notebooks and pencils, the digital-savvy researchers must place their fancy kit in plastic bags to protect it from spills.)

There is more to this than the migration of content from print to web. Just as newspapers have been able to exploit the Internet to reach readers and build communities in ways that they could not have imagined when they first started placing their copy online, so powerful processors and the digitization of data could let researchers analyze their results much earlier in the scientific process than is common now.

Such an approach is not completely new, but digitization makes it easier. The Cavendish introductory notes say: “Ideally you should plot graphs as you go along, not after completing the experiment, though in practice this is not always possible.” It is now.

Comment 1:

One aspect is still in favor of pen and paper — preservation. One does not need a compatible electronic device to leave through a person's paper notebook. Notes preserved in electronic format, let's say 20 years ago on a floppy disc, are harder to access in the long term.

Comment 2:

Another issue is legally valid record for patenting purposes. Custom designed e-notebooks have appropriate features, but consumer grade pads presumably not.

Comment 3:

This trend is likely to continue, especially given that so much data now is generated electronically. It would make obvious sense to organize it, store it, share it, and back it up electronically too. During grad school I tried using Microsoft OneNote as an electronic lab notebook. It worked out extremely well, and my PI encouraged others in the lab to use it too. Perhaps the best advantage is that an electronic lab notebook becomes a searchable database — a useful feature when you have acquired 5 years of lab notes and you want to write something up.

Q1: Write an one-sentence summary (in English) of the editorial (10%)

Q2: Give 3 reasons why the editorial and comment favor digitization of lab notes (15%)

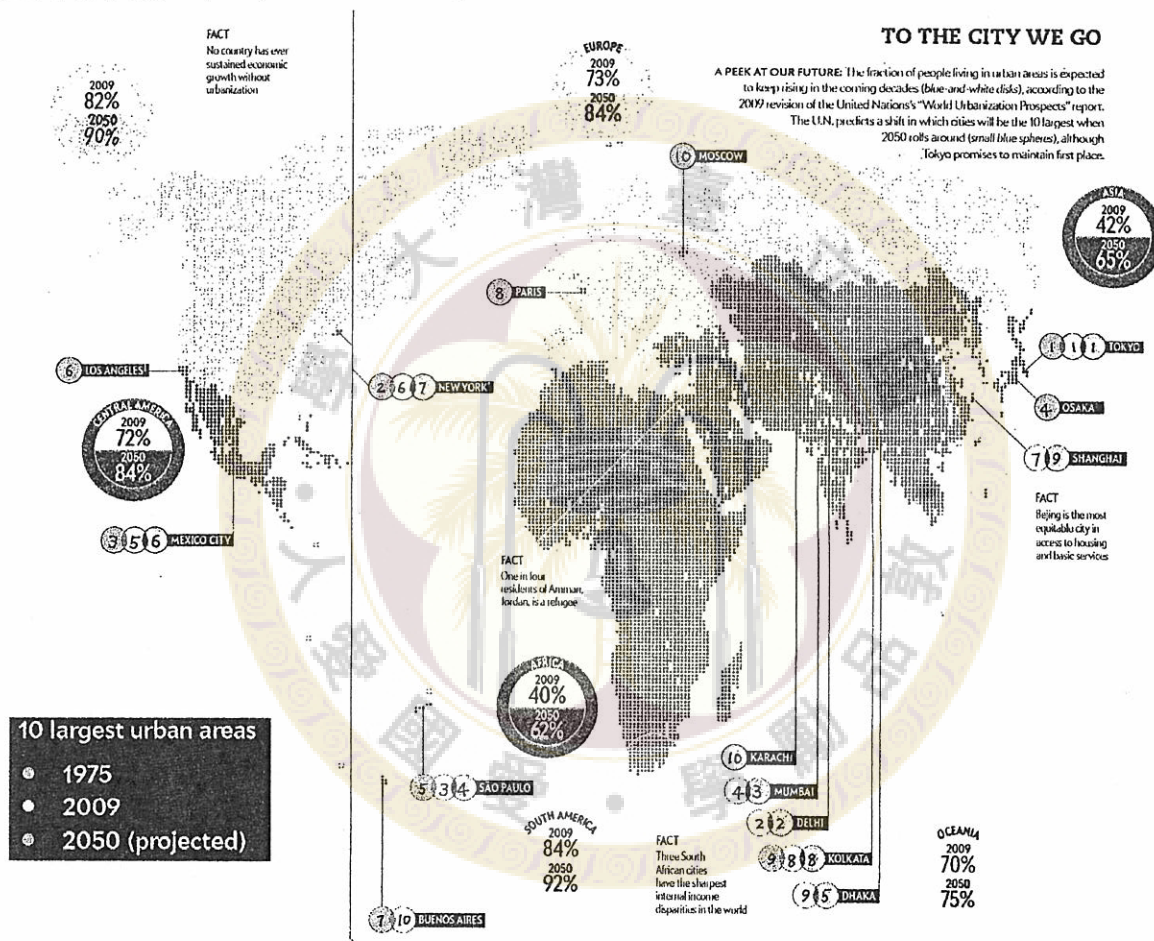
Q3: Give 3 reasons why the editorial and comments have reservations about digitization of lab notes (15%)

見背面

(貳) 中翻英 (20%)

動物學是研究動物體之生命現象的科學。這門科學主要是要瞭解生物體維持生命之法則，以及生物體與環境間和諧並存之道理。它包含的各分門學問有：分子生物學、細胞學、形態學、生理學、生態學、分類學、演化學、遺傳學、發育學及行為學等領域。現代的動物學不只是一門高度整合性的自然科學，也衍生至許多應用的科學領域。這些相關科學如生物技術、遺傳工程、生物資訊、環境保護及資源管理等等。

(叁) 閱讀測驗二 (20%)



**A PEEK AT OUR FUTURE:** The fraction of people living in urban areas is expected to keep rising in the coming decades (numbers in disks), according to the 2009 revision of the United Nations's "World Urbanization Prospects" report. The U.N. predicts a shift in which cities will be the 10 largest when 2050 rolls around (small spheres, with 1975 on the left, 2009 in the middle with the lightest grey scale and 2050 on the right), although Tokyo promises to maintain first place.

**Q1: Fill in the blanks (2 points each, total 10%):** ※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

- The largest city in Asia \_\_\_\_\_
- The 2<sup>nd</sup> largest city in the year of 1975 in the world: \_\_\_\_\_
- The continent that shows the rapidest urbanization from 2009 to 2050 by  $\Delta$ ratio: \_\_\_\_\_ and its  $\Delta$ ratio: \_\_\_\_\_
- \_\_\_\_\_
- The country whose cities have the sharpest internal income disparities: \_\_\_\_\_

Q2: List 5 of the urbanization trends which you observe in the figure from 2009 to 2050 in the world (10%)

(肆) 英翻中 (20%)

Consider that tests for this cancer are administered to one million people. Because the prevalence is two out of 500, approximately 4,000 ( $1,000,000 \times 2/500$ ) people will have it. By assumption, 99.5 percent of these 4,000 people will test positive. That is 3,980 ( $4,000 \times 0.995$ ) positive tests. But 996,000 ( $1,000,000 - 4,000$ ) of the people tested will be healthy. Yet by assumption, 1 percent of these 996,000 people will also test positive. That is, there will be about 9,960 ( $996,000 \times 0.01$ ) false positive tests. Thus, of the 13,940 positive tests ( $3,980 + 9,960$ ), only 3,980/13,940, or 28.6 percent, will be true positives.

If the 9,960 healthy people are subjected to harmful treatments ranging from surgery to chemotherapy to radiation, the net benefit of the tests might very well be negative.



試題隨卷繳回