

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

I. 單選 (30 分，每題 3 分)

1. Some scientists argue that carbon compounds play such a central role in life on Earth because of the possibility of \_\_\_\_\_ resulting from the carbon atom's ability to form an unending series of different molecules.  
(A) diversity (B) deviation (C) reproduction (D) stability (E) invigoration.
2. Because they had expected the spacecraft Voyager 2 to be able to gather data only about the planets Jupiter and Saturn, scientists were \_\_\_\_\_ the wealth of information it sent back from Neptune twelve years after leaving Earth.  
(A) anxious for (B) confident in (C) thrilled about (D) keen on (E) eager for.
3. Congress is having great difficulty developing a consensus on energy policy, primarily because the policy objectives of various members of Congress rest on such \_\_\_\_\_ assumptions.  
(A) commonplace (B) disparate (C) fundamental (D) trite (E) trivial.
4. Some researchers worry that if there is a causal relationship between warming tropical sea surface temperatures and the marked increase in Atlantic hurricane activity since the early 1990s, this connection could \_\_\_\_\_ larger changes.  
(A) presage (B) exacerbate (C) obscure (D) avert (E) forestall.
5. If emissions of heat-trapping gases continue to accumulate in the atmosphere at the current rate, Earth could experience global transformations, and while some of these changes might be \_\_\_\_\_ many could be downright disruptive.  
(A) catastrophic (B) calamitous (C) intolerable (D) irremediable (E) modest.
6. As market forces penetrate firms and bid up the value of attributes of labor that are more measurable than is the knowledge born of experience, it can be expected that trends in wages will not \_\_\_\_\_ those whose main value lies in such experimental knowledge.  
(A) aid (B) affect (C) forsake (D) betray (E) differentiate.
7. From the outset, the concept of freedom of the seas from the proprietary claims of nations was challenged by a contrary notion—that of the \_\_\_\_\_ of the oceans for reasons of national security and profit.  
(A) promotion (B) exploration (C) surveying (D) conservation (E) appropriation.
8. The report's most significant weakness is its assumption that the phenomenon under study is \_\_\_\_\_, when in reality it is limited to a specific geographic area.  
(A) unusual (B) exceptional (C) ubiquitous (D) absolute (E) restricted.

(背面仍有題目，請繼續作答)

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9. Mechanisms develop whereby every successful species can \_\_\_\_\_ its innate capacity for population growth with the constraints that arise through its interactions with the natural environment.  
(A) enhance (B) replace (C) produce (D) surpass (E) reconcile.
10. Just as the authors' book on sampling theory is often a key text for courses in signal processing, their ideas on filter design \_\_\_\_\_ teaching in this area.  
(A) prevent (B) defy (C) replicate (D) inform (E) use.

## II. 閱讀 (30 分，每題 3 分)

文章一 (Source: The New York Times, by K. Chang, Sept. 2013)

This year (2013) is the height of the 11-year solar cycle, the so-called solar maximum. The face of the Sun should be pockmarked with sunspots, and cataclysmic explosions of X-rays and particles should be whizzing off every which way. Instead, the Sun has been tranquil, almost spotless.

One of the worries in our highly technological 21st-century civilization is that a direct hit on Earth by a gargantuan solar storm could disable satellites and overwhelm wide swaths of power grids. A quiet Sun makes that much less likely.

Scientists do have a basic understanding. Inside the Sun, flows of electrons and protons generate magnetic fields that undulate on roughly an 11-year schedule. The roiling of the fields create regions that are cooler and darker — sunspots. The twisting magnetic fields within sunspots periodically snap, releasing enormous amounts of energy in solar flares and coronal mass ejections. But some solar cycles are ferocious while others remain calm. Why the cycle is 11 years is another mystery.

How far back do have scientists have to look back to find a solar maximum quite as weak? Cycle 14 in the early 1900s was similarly quiet. This time, solar scientists have Sun-watching satellites providing reams of data for them to analyze.

Despite the minimal sunspots, the Sun is still going through the rest of its cycle as usual. Its magnetic field is on the cusp of flipping, as expected. At solar maximum, the magnetic fields at the poles essentially disappear for a brief time, and when they re-emerge, they are pointing in the opposite direction. If you had a compass on the Sun's north pole and it were pointing north before solar maximum, it would be pointing south after solar maximum.

11. Which of the following statement most properly serves as the title of this article?  
(A) The breakthrough of 21st-century technologies  
(B) The sun that did not roar  
(C) The mystery of solarism  
(D) The history of the universe

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12. The article mentions all of the following about the solar cycle EXCEPT:

- (A) the reason that the solar-cycle is 11 years
- (B) how much the scientists know about the solar cycle
- (C) the impact of irregular solar cycle to the earth
- (D) what would be observed when the solar cycle starts

13. Which solar cycle is the year of 2013?

- (A) 11
- (B) 14
- (C) 22
- (D) 24

14. How the magnetic field of the sun changes when the solar cycle reaches the maximum?

- (A) It breaks in some regions
- (B) It completely disappear permanently
- (C) Its direction reverses
- (D) It completely disappear for a while

文章二 (Source: the commencement addressed by Steve Jobs, June 12, 2005)

I am honored to be with you today at your commencement from one of the finest universities in the world. I never graduated from college. Truth be told, this is the closest I've ever gotten to a college graduation. Today I want to tell you three stories from my life. That's it. No big deal. Just three stories.

The first story is about connecting the dots. I dropped out of Reed College after the first 6 months, but then stayed around as a drop-in for another 18 months or so before I really quit. So why did I drop out?

When I was 17, I naively chose a college that was almost as expensive as Stanford, and all of my working-class parents' savings were being spent on my college tuition. After six months, I couldn't see the value in it. I had no idea what I wanted to do with my life and no idea how college was going to help me figure it out. So I decided to drop out and trust that it would all work out OK. It was pretty scary at the time, but looking back it was one of the best decisions I ever made. The minute I dropped out I could stop taking the required classes that didn't interest me, and begin dropping in on the ones that looked interesting.

(背面仍有題目，請繼續作答)

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Reed College at that time offered perhaps the best calligraphy instruction in the country. Throughout the campus every poster, every label on every drawer, was beautifully hand calligraphed. Because I had dropped out and didn't have to take the normal classes, I decided to take a calligraphy class to learn how to do this. I learned about serif and san serif typefaces, about varying the amount of space between different letter combinations, about what makes great typography great. It was beautiful, historical, artistically subtle in a way that science can't capture, and I found it fascinating.

None of this had even a hope of any practical application in my life. But ten years later, when we were designing the first Macintosh computer, it all came back to me. And we designed it all into the Mac. It was the first computer with beautiful typography. If I had never dropped in on that single course in college, the Mac would have never had multiple typefaces or proportionally spaced fonts. And since Windows just copied the Mac, it's likely that no personal computer would have them. If I had never dropped out, I would have never dropped in on this calligraphy class, and personal computers might not have the wonderful typography that they do. Of course it was impossible to connect the dots looking forward when I was in college. But it was very, very clear looking backwards ten years later.

Again, you can't connect the dots looking forward; you can only connect them looking backwards. So you have to trust that the dots will somehow connect in your future. You have to trust in something — your gut, destiny, life, karma, whatever. Because believing that the dots will connect down the road will give you the confidence to follow your heart. Even when it leads you off the well worn path, and that will make all the difference. This approach has never let me down, and it has made all the difference in my life.

15. What is most likely the place that this talk is delivered?

- (A) a church
- (B) an auditorium
- (C) a classroom
- (D) a computer center

16. It can be inferred from the passage that before Jobs dropped out, he considered the education in Reed College as

- (A) a wrong decision made by his parents
- (B) a good start of his career
- (C) an expensive service
- (D) nothing useful to his life

17. What is taught in the calligraphy class?

- (A) computer programming
- (B) handwriting
- (C) typewriting
- (D) painting

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18. The word “dot” used in the passage is NOT referred to which of the following?

- (A) adverse circumstance
- (B) contrite decision
- (C) milestones in life
- (D) hard decision

19. Which statement about Jobs is correct?

- (A) the calligraphy class was attractive to him
- (B) he is an alumnus of the university that this commencement was delivered
- (C) he was morose when he stayed with Reed College
- (D) he was clear that the courses he took in Reed College would be valuable to his career when he was 17

20. The statement that “you have to trust in something” is supported by which of the following claims in the passage?

- (A) No pains, no gains.
- (B) Pick yourself up from where you left off.
- (C) Self-confidence is of vital importance.
- (D) Seeing is believing.

### III. 英翻中 (40%)

The problem with the radio spectrum between 3 and 3000 megahertz is that it's crowded. So with nowhere to go but up, researchers have been working for decades to utilize the 3- to 3000-gigahertz span. In October, a team reported a hopeful sign—a record 100-gigabit-per-second wireless data transmission. To achieve such high data rates the researchers put together an experimental system that combined cutting-edge electronics and photonics. They elected to add photonic elements to the transmitter setup instead of just using electronics, because the photonics enabled a larger bandwidth and a larger dynamic range. The downside, however, was that the photonic scheme lowered the transmitter's output power. The team used a device, which combines and directs two lasers of different frequencies onto a photodiode. One laser is modulated to carry data; the other is not. Shining the lasers on the photodiode produces an electrical signal with a frequency that equals that of the difference between the lasers—237.5 GHz. That signal is then radiated by a horn-shaped antenna. On the receiver end, the team used a custom-built integrated circuit made up of high-electron-mobility transistors, compound semiconductor devices that can operate at millimeter-wave frequencies. At just a few square millimeters, the chip is a big step toward the ability to incorporate terahertz receiving technology in smartphones and tablets. The IC amplified the incoming radiation and mixed it with another frequency to extract the transmitted data. One feature of subterahertz transmission that the group find especially promising is that this type of radiation is less affected by local conditions like fog or rain when compared with free-space optical transmission, which uses lasers to carry data through the air.

(Source: “A New Record for Terahertz Transmission”, Lily H. Newman, IEEE Spectrum Magazine, November 2013.)