I. *Think of some examples (at least one) of recent advancement in Physics. You should evaluate them by their contribution to everyday life and to science.*

II. *Read the following text and fill in the gaps.*

Scientists at the University of California, Santa Barbara, and at Google _____ (report) on Wednesday in the journal Nature that they _____ (made) a significant advance that brings them a step closer to developing a quantum computer.

Researches _____ (pursue) the development of computers that exploit quantum mechanical effects since the 1990s, because of their potential to vastly expand the performance of conventional computers. This goal has long remained out of reach, however, because the computers are composed of basic elements known as qubits that have remained, despite decades of engineering research, highly unstable.

In contrast to a bit, which is the basic element of a conventional computer and can represent either a zero or a one, a qubit can exist in a state known as superposition, in which it can represent both a zero and a one simultaneously.

If the qubits are then placed in an entangled state – physically separate but acting with many other qubits as if connected – they can represent a vast number of values simultaneously. To date, matrices of qubits that are simultaneously in superposition and entangled have eluded scientists because they are ephemeral, with the encoded information dissipating within microseconds.

The university and Google researchers _____ (report), however, that they _____(succeed) in creating an error-correction system that stabilized a fragile array of nine qubits. The researchers said that they _____ (accomplish) this by creating circuits in which additional qubits were used to observe the state of the computing qubits without altering their state. But an important asteriks remains, according to scientists who _____ (read) an early version of the paper. The Nature paper _____ (state) that researchers _____ (succeed) in preserving only the limited "classical" states, rather than the more complex quantum information that would be needed to create a system that outperforms today's computers.

The importance of advance is that the scientists _____ (develop) evidence that the system becomes more stable as they interconnect more qubits in the error-checking array. This _____ (suggest) that far longer arrays of qubits, composed of thousands or tens of thousands of qubits, might be able to control the errors that have until now bedeviled scientists. "We have for the first time in the long history of quantum computing an actual device, where we can test all our ideas about error detection", said Rami Barends, a quantum electronics engineer at Google and one of the authors of the paper. Julian Kelly, another Google quantum electronics engineer, said there _____ (remain) significant challenges in manufacturing materials for quantum computing.

In some cases, the scientists are able _____ (rely) on existing semiconductor technology, but there are many steps for which they _____ (have/invent) approaches. The research _____ (report) by scientists working in the laboratory of John M. Martinis, a physicist at

the university. In September, Google _____ (announce) it would join efforts to build a quantum computer as part of recently established Quantum Artificial Intelligence Laboratory. Under that agreement, Dr. Martinis joined Google while keeping his teaching role, and members of his laboratory became Google employees.

While the researchers _____ (describe) their new circuit as a significant advance, they _____ (acknowledge) that they _____(yet/not solve) all the problems that prevented the building of a working quantum computer. "While the basical physical processes behind quantum error corrections are feasible, many challenges remain, such as improving the logic operations behind error correction and testing protection from phase-flip errors", the scientists _____ (note) in a statement posted on the company's website.

In a discussion of the Nature paper on his website, the M.I.T. physicist Scott Aaronson _____ (suggest) that the achievement represented about half the progress required to build a fully functional quantum computer.

Google is not the only company _____ (collaborate) with academic researchers in advancing quantum computing. IBM is working with scientists at Yale and Microsoft is working separately with researchers at the University of California, Santa Barbara, _____ (support) the Station Q research laboratory it created there in 2006.

(source:http://www.nytimes.com/2015/03/05/science/quantum-computing-nature-google-uc-santa-barbara.html?module=ArrowsNav&contentCollection=Science&action=keypress&region=FixedLeft&pgtype=article, accessed on 26.04.2015)

III. *Discuss in pairs and answer following questions.*

1. What do you think about quantum computers?
2. Will there be possibilities for working quantum computer to be made and to resemble classical computers? What will be their main differences?
3. What is the main advantage of a quantum computer?