Text 2. Quantum computers

1. Read and translate text 2.
2. Memorize the meaning of the following words from text 2:
   - feat — подвиг;
   - to trap — захватывать, задерживать, удерживать;
   - obstacle — препятствие;
   - mere — только;
   - to shrink — сжаться, уменьшиться в размерах;
   - crucial — ключевой; критический, решающий;
   - to factor — разлагать на множители;
   - prime — простое число;
   - stray — случайный;
   - decoherence — декогеренция, распад суперпозиционных состояний;
   - bane — бедствие, бич, проклятие;
   - to confine — заключать, ограничивать.

Give a short summary of text 2.

Quantum computers

Researchers are taking the first steps toward building ultrapowerful computers that use individual atoms to perform calculations:

- Quantum computers can store and process data using atoms, photons or fabricated microstructures. These machines may someday be able to perform feats of computing once thought to be impossible.
- The manipulation of trapped ions is at the forefront of the quantum computing effort. Researchers can store data on the ions and transfer information from one ion to another.
- Scientists see no fundamental obstacles to the development of trapped-ion computers.

Over the past several decades technological advances have dramatically boosted the speed and reliability of computers. Modern computer chips pack almost a billion transistors in a mere square inch of silicon, and in the future computer elements will shrink even more, approaching the size of individual molecules.

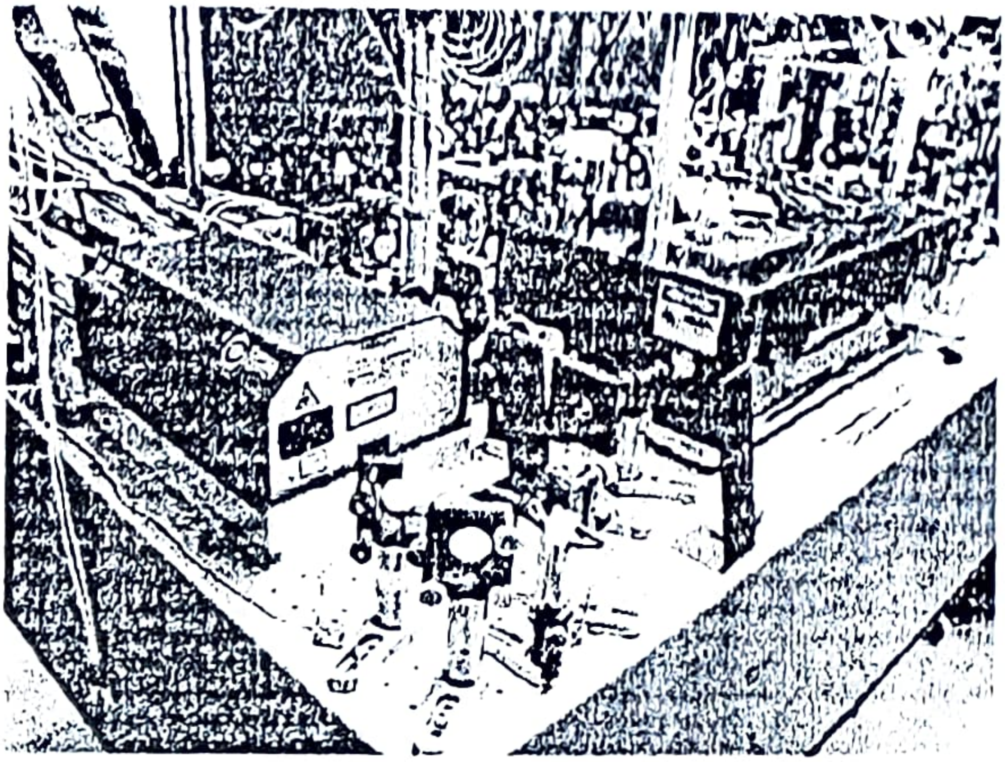

Fig. 1. Quantum computers

At this level and smaller, computers may begin to look fundamentally different because their workings will be governed by quantum mechanics, the physical laws that explain the behavior of atoms and subatomic particles. The great promise of quantum computers is that they may be able to perform certain crucial tasks considerably faster than conventional computers can.

Perhaps the best known of these tasks is factoring a large number that is the product of two primes. Multiplying two primes is a simple job for computers, even if the numbers are hundreds of digits long, but the reverse process — deriving the prime factors — is so extraordinarily difficult that it has become the basis for nearly all forms of data encryption in use today, from Internet commerce to the transmission of state secrets.

In 1994 Peter Shor, then at Bell Laboratories, showed that a quantum computer, in theory, could crack these encryption codes easily because it could factor numbers exponentially faster than any known classical algorithm could. And, in 1997, Lov K. Grover, also at Bell Labs, showed that a quantum computer could significantly increase the speed of searching an unsorted database — say, finding a name in a phone book when you have only the person's phone number. Actually building a quantum computer, however, will not be easy. The quantum hardware

— the atoms, photons or fabricated microstructures that store the data in quantum bits, or qubits — needs to satisfy conflicting requirements.

The qubits must be sufficiently isolated from their surroundings, otherwise stray external interactions will halt their computations. This destructive process, known as decoherence, is the bane of quantum computers. But the qubits also have to interact strongly with one another and must ultimately be measured accurately to display the results of their calculations. Scientists around the globe are pursuing several approaches to building the first prototype quantum computers. Our own research focuses on processing information with singly charged positive ions, atoms that have been stripped of one electron. We have trapped short strings of ions — confining the particles in a vacuum using electric fields produced by nearby electrodes — so that they can receive input signals from a laser and share data with one another. Our goal is to develop quantum computers that are scalable — that is, systems in which the number of qubits could be increased to the hundreds or thousands. Such systems would fulfill the promise of the technology by accomplishing complex processing tasks that no ordinary computer could match.

/From Scientific American. Christopher R. Monroe and David J. Wineland. August 2008, pages 64–65/

4. Make a list of scientific terms that are used in text 2, give their Russian equivalents and memorize them.
5. Fill each gap with a suitable word from the box:

	Atoms	representing	than	form
	Quantum	approach	among	known
Exist	option	actually	single	scientists

Circuit elements made of individual ..., electrons or even photons would be the smallest possible. At this dimension, the interactions among the elements are governed by ... mechanics — the laws that explain atomic behavior.

Quantum computers could be incredibly dense and fast, but ... fabricating them and managing the quantum effects that arise are daunting challenges.

Atoms and electrons have traits that can ... in different states ...