2 Read the following text and answer questions 1 to 5 below.

In April 1965 Gordon Moore made one of the most famous statements in the modern history of technology and computing. He claimed that the number of parts on a silicon chip would double every two years. This means that computers can become faster and products using chips can become more powerful with more functions. Dr. Moore went on to be highly successful in the computing business: he is the co-founder of chip maker Intel and his statement became known as "Moore's Law." Chips have become cheaper as well as more powerful and this (1) has contributed to ever faster computers, networks and storage devices. Without chips which continually improve their performance and shrink in size, (a) (2).

When Dr. Moore wrote his 1965 article, ICs (integrated circuits) had only 30 components in them. "Integrated circuit" is the term used to describe the collection of electronic parts on a piece of semiconducting material (a substance that allows some electricity to pass through it). Over the past forty years his law has proven to be extremely accurate: between 1971 and 2001, the number of transistors on a chip doubled every 1.96 years.

Moore's Law may continue to be true for at least another decade, but at some point chips will get faster more slowly (3). Even now, the improvement of chips faces two serious technical problems. Firstly, the more densely transistors are packed onto chips the hotter they get. Intel's chips will soon reach the energy density of a nuclear reactor and most people do not want to have a small nuclear reactor on their desk at home or in the office. At the moment this simply means that modern laptops can get very hot, but in the future these devices could become dangerous. A second and more serious threat to Moore's Law comes from the manufacturing process. Circuit patterns are printed onto silicon chips by shining focused light onto them. If manufacturers want to continue to put more and more circuits on their chips,

they need to find a way of making the light beam they use narrower. The narrower the light, the smaller the circuit that is printed and hence, more circuits can be fitted onto a tiny piece of silicon. However, current technology cannot print lines narrower than 0.1 micron (one tenth of a millionth of a meter). In other words, when the limit of 0.1 micron is reached, chip technology will have come to its physical limit. In the semiconductor industry, this limit is known as "the wall."

So, what is the solution to these technological problems? Perhaps the most exciting alternative comes in the form of nanotechnology. Basically, nanotechnology will allow humans to control matter on a tiny scale. The smallest possible scale is the atomic level and if humans could control atoms we would be able to make incredibly small chips and computers. This is what nanotechnology is all about: the control of matter at the atomic level.

In 1981 IBM took the first practical step toward making nanotechnology a reality by making a new microscope. The microscope was so powerful it allowed researchers to see atoms and molecules for the first time. Scientists had talked and written about working at this atomic level before, but they had to wait until IBM's invention to make it possible. Now that scientists can see at this atomic level it may be possible to control atoms, move them around and build products from the atomic level. This would allow humans to make virtually perfect materials and products, atom by atom. Many scientists believe that nanotechnology will become as important as electricity, that it will allow the creation of new materials and products and great advances in electronics, energy and medicine. It would certainly allow chips to become smaller and more powerful than Gordon Moore ever imagined and get his law beyond "the wall."

Notes

nuclear reactor: 原子炉

molecule: 分子

Question 1

Translate into Japanese the part of the first paragraph which states "Moore's Law."
(1)

Question 2

Choose the TWO most appropriate statements for (a) to complete the underlined sentence (2).

(A) commonly used electronic products would be less advanced than they are today

(B) digital cameras would be more user-friendly than they are today

(C) laptop computers would be slower than they are today

(D) mobile phones would have more functions than they have today

(E) people would be more eager to prove "Moore's Law" than they are today

Question 3

Choose the sentence below which is closest in meaning to the underlined part (3).

(A) the average speed of chips will fall sooner or later

(B) chips will become slower in the end

(C) chips will have fewer transistors on them ultimately

(D) it will take longer to manufacture chips in about 10 years

(E) it will take more time to improve chip speed eventually

Question 4

Of the following statements, which one is NOT a problem mentioned in the text of putting more transistors onto a chip?

(A) Chip manufacturers will need to develop very narrow light beams.

(B) The chip manufacturing process will become more and more difficult.

(C) Chip technology will come up against "the wall" if things go on like this.

(D) The chips will become dangerously hot.

(E) Circuit patterns printed on chips will get more and more vivid.

Question 5

According to the text, what is likely to happen with the development of nanotechnology? Choose THREE of the responses below.

(A) Chip makers like Intel will be able to make considerable profits from it.

(B) IBM will have a virtual monopoly in the field of nanotechnology.

(C) It will be possible to make new materials which do not currently exist.

(D) The "law" Gordon Moore put forward in 1965 will be ignored as inaccurate.

(E) Less energy will be required to produce new medicine.

(F) Making chips which are much faster than they are now will be possible.

(G) Matter will be able to be controlled at the atomic level.

(H) The need for electricity will be reduced.