

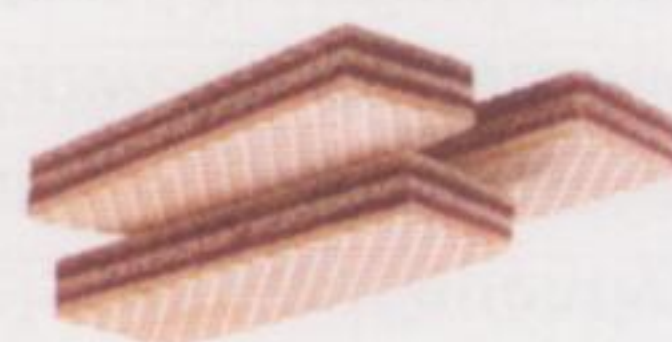
brief reference might be more than enough. Semiconductors, also known as *semis*, are unique materials that lie somewhere in between conductors and insulators functioning in essence as a hybrid of a conductor and an insulator. A semiconductor conducts electricity more than an insulator (e.g., glass), but less than a conductor (e.g., copper or aluminum). Semiconductors find widespread use in almost all industries, as they are able to display a broad range of useful properties: they can manipulate electric current, rectify, amplify, and switch electrical signals, and show variable resistance, allowing current to pass more easily in one direction than in the other. Thus, they are considered integral components of modern-day electronics. Although they can be made out of a variety of materials, the majority of semiconductors are made of pure silicon. As mentioned earlier, silicon has a diamond-like crystalline structure, which is called *silicon lattice*. This lattice is essentially an insulator, which can be turned into a semiconductor only when it is doped. Doping refers to a process by which impurities are introduced into ultra-pure silicon, with a view to changing its electrical properties and turning it into a semiconductor. Doping takes place by adding or removing a small number of electrons, thereby making silicon neither an insulator nor a conductor, but a semiconductor with limited conductivity. Subtle manipulation of pure silicon lattices via doping generates the wide variety of semiconductors that modern technology requires in order to meet the specific needs of the electronic components in which they will reside.

Chips

The word 'chip' is the general term for *semiconductor component products*. It is a complex device that forms the brains of a computer or other electronic equipment. Chips look flat, but in fact they are three-dimensional complex structures that may include as many as 30 layers of circuitry. Chips are fabricated in clean rooms resembling hospital operating rooms in fabrication facilities or 'fabs'. Silicon is commonly used as a substrate for chips. Silicon is purified, melted, pulled into a crystal column, and cooled to form an ingot, which is then sliced using a diamond knife into discs called *wafers*. Chips are built simultaneously in a grid formation on the wafer surfaces. The abundance of silicon makes it possible to create wafers of all sizes and shapes.



...and chips...



Wafers...

► Activity 2: Decide whether the following statements are True or False:

1. There are only five elements that exceed silicon in cosmic abundance.
2. Silicon will shatter if you strike it with a hammer.
3. It can be inferred from the text that natural silicon-based materials have been used for thousands of years.
4. Silicon is the rarest form of naturally occurring silicon.
5. Silicon is typically found compounded with other elements.
6. Silicon is combined with either oxygen as silicon dioxide, or without oxygen as silicates.
7. It's practically impossible to separate out the silicon from silicon dioxide.
8. Silicon is purified through a reaction with carbon.
9. Silicon's structure resembles that of a crystal.
10. A semiconductor alternately acts as an insulator and conductor where necessary.
11. Doping refers to the removal of impurities from silicon.
12. According to the text, chips are built on wafer surfaces in a grid formation called silicon lattice.