It is sometimes said that there is no such thing as the so-called `scientific method'; there are only the methods used in science. Nevertheless, it seems clear that there is often a special sequence of procedures, which is involved in the establishment of the working principles of science. This sequence is as follows: (1) a problem is recognized, and as much information as appears to be relevant is collected; (2) a solution (i.e. a hypothesis) is pro­posed and the consequences arising out of this solution are deduced; (3) there deductions are tested by experiment, and as a result the hypothesis is accepted, modified or discarded.

As an illustration of this, we can consider the discovery of air- pressure. Over two thousand years ago, men discovered a method of raising water from one level to another by means of the vacuum pump When, however, this machine passed into general use in the fifteenth and sixteenth centuries, it was dis­covered that, no matter how perfect the pump was, it was not possible to raise water vertically more than about 35 feet. Why? Galileo, amongst others, recognized the problem, but failed to solve it.

Torricelli then attacked the problem. Analogizing from the recently-discovered phenomenon of water-pressure (hydrostatic pressure), he postulated that a deep `sea of air' surrounded the earth; it was, he thought, the pressure of this sea of air which pushed on the surface of the water and caused it to rise in the vacuum tube of a pump. A hypothesis, then, was formed. The next step was to deduce the consequences of the hypothesis. Torricelli reasoned that this 'air pressure' would be unable to push a liquid heavier than water as high as 35 feet, and that a column of mercury, for example, which weighed about 14 times more than water, would rise to only a fourteenth of the height of water, i.e. approximately 2.5 feet. He then tested this deduction by means of the experiment we all know, and found that the mercury column measured the height predicted. The experiment therefore supported the hypothesis. A further inference was drawn by Pascal, who reasoned that if this `sea of air' existed, its pressure at the bottom (i.e. sea-level) would be greater than its pressure further up, and that therefore the height of the mercury column would decrease in proportion to the height above sea-level. He then carried the mercury tube to the top of a mountain and observed that the column fell steadily as the height increased, while another mercury column at the bottom of the mountain remained steady (an example of another of the methods of science, the controlled experiment). This further proof not only established Torricelli's hypothesis more securely, but also demonstrated that, in some aspects, air behaved like water; this of course, stimulated further enquiry;

**Questions:**

1. Give a title to the text
2. What does a scientist collect when he tries to establish a scientific law?
3. What is the next step in the process described above?
4. What does the scientist then deduce?
5. How does he proceed to verify these deductions?
6. What does he finally do with his original hypothesis?
7. Give an approxirnate date for the invention of the vacuum pump.
8. Is it possible to raise water from the bottom floor of a building w the roof 5o feet above, using a vacuum pump? Why ?
9. What was Torricelli's theory about the height of the water in a vacuum tube?