THE SCIENTIFIC ATTITUDE

What is the nature of the scientific attitude, the attitude of the man or woman who studies and applies physics, biology, chemistry, geology, engineering, medicine or any other science ?

We all know that science plays an important role in the societies in which we live. Many people believe, however, that our progress depends on two different aspects of science. The first of these is the application of the machines, products and systems of applied knowledge that scientists and technologists develop. Through technology, science improves the structure of society and helps man to gain increasing control over his environment. New fibres and drugs, faster and safer means of transport, new systems of applied knowledge (psychiatry, operational research, etc.) are some examples of this aspect of science.

The second aspect is the application by all members of society, from the government official to the ordinaiy citizen, of the special methods of thought and action that scientists use in their work.

What are these special methods of thinking and acting? First of all, it seems that a successful scientist is full of curiosity- he wants to find out how and why the universe works. He usually directs his attention towards problems which he notices have no satisfactory explanation, and his curiosity makes him look for underlying relationships even if the data available seem to be unconnected. Moreover, he thinks he can improve the existing conditions, whether of pure or applied knowledge, and enjoys trying to solve the problems which this involves.

He is a good observer, accurate, patient and objective, and applies persistent and logical thought to the observations he makes. He utilizes the facts he observes to the fullest extent. For example, trained observers obtain a very large amount of information about a star (e.g. distance, mass, velocity, size, etc.) mainly from the accurate analysis of the simple lines that appear in a spectrum.

He is sceptical- he does not accept statements which are not based on the most complete evidence available and therefore rejects authority as the sole basis for truth. Scientists always check statements and make experiments carefully and objectively to verify them.

Furthermore, he is not only critical of the work of others, but also of his own, since he knows that man is the least reliable of scientific instruments and that a number of factors tend to disturb impartial and objective investigation.

Lastly, he is highly imaginative since he often has to look for relationships in data which are not only complex but also frequently incomplete. Furthermore, he needs imagination if he wants to make hypotheses of how processes work and how events take place.

These seem to be some of the ways in which a successful scientist or technologist thinks and acts.

Comprehension

1. Name some sciences.
2 . Name two ways in which science can help society to develop.
3. Give some examples of the ways in which science influences everyday life.
4. What elements of science can the ordinary citizen use in order to help his society to develop?
5. How can you describe a person who wants to find out how and why the universe works?
6. What is the role of curiosity in the work of a scientist?
7. Name some of the qualities of a good observer.
8. Give an example of how observed facts are utilized to the fullest.

9. How does a sceptical person act?
10. How does the scientist act towards (a) evidence presented by other people, (b) evidence which he presents in his own work?
11. What do you know about the data which the scientist often has to use? How does this affect his way of thinking?
12. For what other purposes does a scientist need imagination?

Comprehension:

1. What do you mean by scientific attitude?
2. What are the two arpects of science?
3. What does the science do through technology?
4. What are the examples of application of knowledge of science?
5. Who is a successful scientist?
6. To what does a scientist direct his attention?
7. What is the role of curiosity in science?
8. What does the term logical thought represent?
9. How do trsaineed obseevers get information?
10. what does 'spectrum' mean?
11. Who is sceptical?
12. Why does the scientist reject authority as the basis for truth?
13. Why do the scientists check statements?
14. What do you mean by abjective investigation?
15. Name two ways in which science can society to develop.
16. Give some examoples of the ways in which science influences everyday life?
17. What elements of science can the ordingary citizen use in order to help his society to develop?
18. How can you describe a person who wants to find out how and why the universe works?
19. Name some of the qualities of a good obserure?
20. Give an example of how obserued facts are utiliezed to the fullest?
21. How does the scientist act towards evidence presented by other people?
22. What do you about the data which the scientist often has to use?
23. How data affect the way of thinking of a scientist?
24. For what other purposes does a scientist need imagination?

Long- answer questions:

1. Describe the characteristics of a successful scientist.
2. Distinguish between the two aspects of science.

Discussion questions:

1. Do you there are other special ways of thinking and acting, used by scientists? If so, comment and explain.
2. Do you agree that it is important to train the non-scientists to think in a scientific way. Five good evidence for your point of view.
3. Do you agree that 'man is the least reliable of scientific instruments'? Give example.

4. Give a clear explanation of what you think the word 'authority' means.

Composition:

1. Describe in detail the role of curiosity, imagination and observation in scientific invention.
2. Write an essay on 'science and civilization'.