Question 1. 11. Science, like any knowledge, can be put to good or bad use, depending on the user. Given below are some of the applications of science. Formulate your views on whether the particular application is good, bad or something that cannot be so clearly categorised:
(a) Mass vaccination against small pox to curb and finally eradicate this disease from the population. (This has already been successfully done in India.)
(b) Television for eradication of illiteracy and for mass communication of news and ideas.
(c) Prenatal sex determination.
(d) Computers for increase in work efficiency.
(e) Putting artificial satellites into orbits around the Earth.
(f) Development of nuclear weapons.
(g) Development of new and powerful techniques of chemical and biological warfare.
(h) Purification of water for drinking.
(i) Plastic surgery.
(j) Cloning.
Answer:
(a) Good, because it helped in eradicating a dreaded disease from the Earth.
(b) Good, because it helps in literacy campaign and is an effective method of mass communication and entertainment.
(c) Bad, because it leads to practice of abortion in case of female foetus.
(d) Good, because it increases work efficiency.
(e) Good, because it helped in worldwide communication process.
(f) Bad, because nuclear weapons may cause mass destruction of mankind.
(g) Bad, because these techniques may be used for destructive purposes.
(h) Good, because pure water supply will improve the health of people.
(i) Plastic surgery is something which cannot be classified as either good or bad. The technique helps to remove certain type of deformations in needy persons. But plastic surgery for cosmetic purposes is not good.
(j) Cloning is bad because it has the potential to destroy the normal family life of human society.

Question 1. 12. India has had a long and unbroken tradition of great scholarship in mathematics, astronomy, linguistics, logic and ethics. Yet, in parallel with this, several superstitious and obscurantistic attitudes and practices flourished in our society and unfortunately continue even today among many educated people too. How will you use your knowledge of science to develop strategies to counter these attitudes?
Answer: In order to popularise scientific explanations of everyday phenomena, mass media like radio, television and newspapers should be used. We shall use our knowledge of science to educate masses and shall try to tell them the real cause of an event so that their superstitious beliefs are rejected.

Question 1. 13. Though the law gives women equal status in India,

many people hold unscientific views on a woman's innate nature, capacity and intelligence; and in practice give them a secondary status and role. Demolish this view using scientific arguments, and by quoting examples of great women in science and other spheres; and persuade yourself and others that, given equal opportunity, women are on par with men.
Answer: There is no difference in the capacity of women and men as far as work, intelligence, decision making is concerned. The nature makes little difference in man and woman in their anatomy and feeling.
The nutrition content of prenatal and postnatal diet contributes a lot towards the development of human mind. If equal opportunities are afforded to both men and women, then the female mind will be as efficient as male mind.
The list of successful women from various fields is very large. Names of Kalpana Chawla, Sarojini Naidu, Madame Curie, Indira Gandhi, Margaret Thatcher, Mother Teresa, Florence Nightingale drawn from fields varying from science to sociology are very well-known to the world.

Question 1. 14. "It is more important to have beauty in the equations of physics than to have them agree with experiments." The great British physicist P.A.M. Dirac held this view. Criticize this statement. Look out for some equations and results in this book which strike you as beautiful.
Answer: Generally it is considered that physics is a dry subject and its main aim is to give qualitative and quantitative treatment i.e., any derived relation or equation must be verified through experimentation. It is felt that truth of an equation is more important than the simplicity, wonderfulness, symmetry or beauty of the equation. But frankly, if a relation is true to experimentation and simultaneously it is simple, interesting, symmetrical, wonderful or beautiful, it will certainly add to the charm of the relation.

Question 1.15. Though the statement quoted above may by disputed, most physicists do have a feeling that the great laws of physics are at once simple and beautiful. Some of the notable physicists, besides Dirac, who have articulated this feeling are: Einstein, Bohr, Heisenberg, Chandrasekhar and Feynman. You are urged to make special efforts to get access to the general books and writings by these and other great masters of physics. Their writings are truly inspiring.
Answer: General books on Physics make an interesting reading. Students should consult a good Library to go through some of these immortal works. 'Surely you are joking, Mr. Feynman' by Feynman is one of the books that would assume the students. Some other interesting books are: Physics for the Inquiring Mind by EM Rogers; Physics, Foundations and Frontiers by G. Gamow; Thirty Years That Shook Physics by G. Gamow; Physics Can Be Fun by Perelman.

Question 1.16. Textbooks on science may give you a wrong impression that studying science is dry and all too serious and that scientists are absent-minded introverts who never laugh or grin. This image of science and scientista is patently false. Scientists, like any other group of humans, have their share of humorists, and many have led their lives with a great sense of fun and adventure, even as they seriously pursued their scientific work. Two great physicists of this genre are Gamow and Feynman. You will enjoy reading their books listed in the Bibliography.
Answer: The statement "scientists, like any other group of humans, have their share of humorists" is true. We can cite the example of many scientists who were fun loving, adventurists, jovial. One can add the name of C.V. Raman who enjoyed music in addition to doing serious scientific works and so was Homi Jahagir Bhaba. Students should go through the listed books of bibliography to

visualise actual image of science and scientists.

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