

# NCERT Solutions for Class-XI Physics

## Chapter-1 NCERT Physics Class 11

1. Some of the most profound statements on the nature of science have come from Albert Einstein, one of the greatest scientists of all time. What do you think did Einstein mean when he said : “The most incomprehensible thing about the world is that it is comprehensible”?
1. Probably Einstein meant that science can marvelously explain through simple theories of the various natural phenomena which become comprehensible to us. In fact, it is unthinkable that complex natural phenomenon can be so comprehensible with scientific analysis which for an ordinary person is incomprehensible.
2. “Every great physical theory starts as a heresy and ends as a dogma”. Give some examples from the history of science d(f the validity of this incisive remark.
2. The statement above is true. Validity of this incisive remark can be validated from the example of moment of inertia. It states that the moment of inertia of a body depends on its energy. But according to Einstein's mass-energy relation ( $E = mc^2$ ), energy depends on the speed of the body.
3. “Politics is the art of the possible”. Similarly, “Science is the art of the soluble”. Explain this beautiful aphorism on the nature and practice of science.
3. Politicians would make anything possible by their sheer words. But the majority of things may not be possible in practice. Whereas science can make us understand the phenomena around us. e.g. total solar eclipse shows an interesting aspect of solar temperature. Its chromosphere temperature is about 6000 K. But as we go out towards the rim, it first falls and then suddenly rises to a million kelvin or higher. Science is concerned to provide an explanation or find a solution to this riddle. The repeated practice of science allows us to hypothesis, make calculations, experiment with these and then predict the possible solution.
4. Though India now has large base in science and technology, which is fast expanding, it is still a long way from i. realizing its potential of becoming a world leader in science. Name some important factors, which in your view hindered the advancement of science in India.
4. Some important factors in our view which have hindered the advancement of science in India are:
  - Proper funds are not arranged for the development of research work and laboratories. The labs and scientific instruments are very old and outdated.
  - Most of the people in India are uneducated and highly traditional. They don't understand the importance of Science.
  - There is no proper employment opportunity for the science educated person in India.

→ There are no proper facilities for science education in schools and colleges in India.

5. No physicist has ever “seen” an atom. Yet, all physicists believe in the existence of atoms. An intelligent but superstitious man advances this analogy to argue that ‘ghosts’ exist even though no one has ‘seen’ one. How will you refute his argument?
5. It is simply a superstition that ghosts exist. There is not even single authentic evidence that ghosts exist. There are many examples to prove this fact. Atomic power plants, atomic bombs, atomic clocks, etc. exist because atoms exist in nature. Thus there is no correlation between the two parts of the statement.
6. The shells of crabs found around a particular location in Japan seem mostly to resemble the legendary face of a Samurai. Given below are two explanations of this observed fact. Which of these strikes you as a scientific explanation?
  - (a) A tragic sea accident several centuries ago drowned a young Samurai. As a tribute to this bravery, nature through its inscrutable ways immortalized his face by imprinting it on the crab shells in that area.
  - (b) After the sea tragedy, fishermen in the area, in a gesture of honor to their dead hero, let free any crab shell caught by them which accidentally had a shape resembling the face of a Samurai. Consequently, the particular shape of the crab shell survived longer, and therefore in course of time the shape was genetically propagated. This is an example of evolution by artificial selection.
6. Explanation (b) is correct is a scientific explanation of the observed fact.
7. The industrial revolution in England and Western Europe more than two centuries ago was triggered by some key scientific and technological advances. What were their advances?
7. Prior to 1750 AD when the Industrial revolution happened, simple tools and machines were used. But industrial revolution brought new machinery. Some of the outstanding contributions of the industrial revolution were
  - (a) Steam engine
  - (b) Blast furnace which converts low-grade iron into steel
  - (c) Cotton gin separates the seed from cotton three hundred times faster than by hand etc.
8. It is often said that the world is witnessing now a second industrial revolution, which will transform society as radically as did the first. List some key contemporary areas of science and technology, which are responsible for this revolution.
8. Some key contemporary areas of science and technology, which are chiefly responsible for a new industrial revolution taking place now and likely to take place in near future are: (i) Design of super-fast computers.
  - Biotechnology.
  - Developments in the field of space sciences.
  - Development of super-conducting materials at room temperature.
  - Advancements in the field of electronics, information technology and nanotechnology.

9. Write in about 1000 words a fiction piece based on your speculation on the science and technology of the twenty-second century.
9. Let us imagine a spaceship moving towards a distant star, 500 light-years away. Suppose this is propelled by current fed into the electric motor consisting of superconducting wires. In space, suppose there is a particular region which has such a (the high temperature that destroys the superconducting property of the electric wires of the motor. At this stage, another spaceship filled with matter and anti-matter comes to the rescue of the first ship, and the first ship continues its onward journey.
10. Attempt to formulate your 'moral' views on the practice of science. Imagine yourself stumbling upon a discovery, which has great academic interest but is certain to have nothing but dangerous consequences for human society. How, if at all, will you resolve your dilemma?
10. A scientist aims at truth. A scientific discovery reveals a truth of nature. So, any discovery, good or bad for mankind, must be made public. A discovery which appears dangerous today may become useful to the mankind some time later. In order to prevent misuse of scientific technology, we must build up a strong public opinion. Scientists should in fact take up two roles – to discover truth and to prevent its misuse.
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 categorized.
- (a) Mass vaccination against smallpox to curb and finally eradicate this disease for the population. (This has already been successfully done in India).
  - (b) Television for the eradication of illiteracy and for mass communication of news and ideas.
  - (c) Prenatal sex determination
  - (d) Computers for an 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. Purification of water for drinking.
  - (h) Plastic surgery
  - (i) Cloning
11. (a) Good
- (b) Good
- (c) Bad
- (d) Good
- (e) Good
- (f) Bad
- (g) Good
- (h) Cannot clearly categorize
- (i) Cannot clearly categorize

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?
12. 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.
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.
13. The nutrition contents of pre-natal and post-natal diet contribute a lot towards the development of the human mind. If equal opportunities are afforded to both men and women then the female mind will be as efficient as the male mind.
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 the statement. Look out for some equations and results in this book which strike you as beautiful.
14. 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.
15. Though the statement quoted above may be 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. (See the Bibliography at the end of this book). Their writings are truly inspiring.
15. General books on Physics make interesting reading. Students are advised to consult a good Library. 'Surely you are joking, Mr. Feynman' by Feynman is one of the books that would amuse 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.
16. Textbooks on science may give you the 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 scientists is patently false. Scientists, like any other group of humans, have their share of humorists and may 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.

16. 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.



**Myclass24**  
Your Class. Your Pace.



**Myclass24**  
Your Class. Your Pace.