

# SCIENCE

IN EVERY DAY LIFE



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FOR DIFFERENT EXAMS / LEVELS**

*Quiz Book*  
**Science in Daily Life**

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# Prologue

As each year draws to a close, the editors of Time magazine review the year's newsmakers and select one as representative of the year just passing. This selected newsmaker is then featured in a cover story in the year's final issue. A politician, a chief of state, a scientist—perhaps these are the people you'd expect to see featured in the special issue. If so, you might have been as surprised as were millions of others a few years ago to find that Time's "Man of the Year" wasn't person at all. It was a machine: the computer.

We are living in the computer age. Most of our day-to-day jobs are being influenced by the use of computers. In some areas such as Science and Technology improvements cannot be achieved without the use of computers. Hence, it has become necessary for each and every one of us to have a basic knowledge about computers. Many people are aware that a computer is a machine that can perform arithmetic operations. But they fail to understand that it is also a machine that can choose, copy, move, compare, and perform other non-arithmetic operations on the many alphabetic, numeric, and other symbols that we use to represent things. The four characteristics of computers which make them very useful tools are their speed, storage capacity, consistency and accuracy.

Aided by computers modern science and technology have changed our lives in many dramatic ways. Airplanes, automobiles, communications satellites, computers, plastics, television, robots, drones and what are not only a few of the scientific and technological inventions that have transformed human life. Research by nuclear physicists has led to the development of nuclear energy as a source of power. Agricultural scientists have developed better varieties of plants and highly effective fertilizers. The development of antibiotics and other new drugs has helped to control many infectious diseases. Studies in anatomy and physiology have led to amazing new surgical operations and to the invention of lifesaving machines that can do the work of such organs as the lungs, kidneys, and heart.

So what are areas where science is important? The first is in everyday human life.

## WHY IS THE SEA BLUE?

On a sea voyage in 1921, **C.V Raman** became fascinated by the sea's stunning blue colour. In the 1870s the English physicist Rayleigh had reasoned that the colour of the sea was just the reflection of the blue sky. However, dissatisfied with this explanation, Raman decided to investigate on his own.

The scattering of sunlight by air molecules explains the blue colour of the sky. Through experiments, Raman proved that a similar phenomenon of light scattering by water molecules explains why the sea is blue.

When white light from the sun is incident on tiny particles, blue light gets scattered the most and red light the least. This makes both the sea and the sky appear blue. Raman questioned an existing explanation and extended the concept of light scattering in air to explain the colour of the sea. Today we also know that water selectively absorbs red light and reflects blue, thus adding to its blue appearance.

### Raman Effect

Raman became so interested in the phenomenon of light scattering that he continued to study light scattered by various liquids and solids. He found that when coloured light entered a liquid, some of the scattered light was of a different colour than the original light. The colour of the scattered light depended on the liquid. This discovery is known as the "*Raman effect*.' Although the scattering of light was perceived to be well-understood, Raman continued his explorations. His persistence revealed new aspects of the behaviour of light hitherto unknown. *Raman was awarded the 1930 Nobel Prize in physics for his discoveries.*



# Introduction

Science covers the broad field of knowledge that deals with observed facts and the relationships among those facts. The word science comes from the Latin word *scientia*, which means knowledge. Scientists study a wide variety of subjects. For example, some scientists search for clues to the origin of the universe. Other researchers examine the structure of molecules in the cells of living plants and animals. Still others investigate why we act the way we do, or try to solve complicated mathematical problems. But in whatever field they work, all scientists explore the workings of the world.

Scientists use systematic methods of study to make observations and collect facts. They then work to develop theories that help them order or unify related facts. Scientific theories consist of general principles or laws that attempt to explain how and why something happens or happened. Science advances as scientists accumulate more detailed facts and gain a better understanding of these fundamental principles and laws.

A theory developed by a scientist cannot be accepted as part of scientific knowledge until it has been verified by the studies and experiments of other researchers. In fact, for any knowledge to be truly scientific, it must be repeatedly tested experimentally and found to be true. This characteristic of science sets it apart from other branches of knowledge. For example, the humanities, which include religion, philosophy, and the arts, deal with ideas about human nature and the meaning of life. Such ideas cannot be scientifically proved. There is no test that tells whether a philosophical system is “right.” No one can determine scientifically what feeling an artist tried to express in a painting. Nor can anyone perform an experiment to check for an error in a poem or a symphony. Science can and does do all these. Although science differs from other types of knowledge, it has valid applications in all areas, especially in our daily life.

Pretty much anything you do has some science underlying it. For instance, the computer, as well as the Internet, are products of science. Your television, gamebox, and telephone are as well.

Using many of these devices does not require a knowledge of much science any more, however. Although to use a telephone, for instance, you have to have an understanding of logic, numbers, and geography (area codes), and setting up a gamebox requires a basic understanding of some principles of electrical and mechanical engineering.

There are other so many areas in daily life where knowledge of science is applied directly:

## *Applied Mathematics:*

- \* Using a calculator
- \* Calculating a tip in a restaurant
- \* Measuring ingredients or dimensions

*Economics:*

- \* Banking
- \* Writing cheques
- \* Drawing up a budget/determining what you can afford
- \* Paying income tax or VAT

*Applied Physics:*

- \* Cooking
- \* Baking
- \* Working out

*Applied Cartography/Orienteering:*

- \* Choosing routes to drive, walk, or ride a bus
- \* Determining locations using addresses or milestones
- \* Hiking
- \* Using a map

*Applied Semiotics or Linguistics:*

- \* Deciphering signs and symbols everywhere in life
- \* Deciding how to punctuate or write human speech
- \* Reading books or magazines

*Nutritional Science:*

- \* Preparing food and making decisions on what is good or bad to eat

*Medical Science:*

- \* Self-medicating (e.g. taking an aspirin)
- \* Understanding potential interactions of over-the-counter products
- \* Bandaging and basic triage (treating pimples, cuts, burns, bruises)
- \* Taking a temperature
- \* Stretching and preparing muscles for exercise
- \* Knowledge and application of proper hygiene
- \* Knowledge of diseases and how they are transmitted (e.g. flu, cold, etc.)
- \* Knowledge of birth control and disease prevention

*Sociology:*

- \* Understanding how to behave in certain contexts
- \* Knowing what kinds of behaviour to expect from others
- \* Understanding rules of etiquette and politeness in different contexts
- \* Following and understanding political discussions or news reports
- \* An awareness of how the individual fits into larger and larger groups of people

*Psychology:*

- \* Taking measures to improve one's own or someone else's mental health (e.g. exercise, relaxation, stress management, etc.)

# 1 Science in Daily Life

Science has changed the very mode of our daily life. Science has stepped up the tempo of life; it has widened the range of our occupations, extended immensely the limits of our curiosity, it has increased the ways of utilising our leisure ; it has given us comforts and amenities undreamt of by our forefathers. Yet science is now the handmaiden of a privileged few who can purchase the service.

As regards our *food*, science has given us correct ideas of nutritive and calorie value of the food that we take. It has analysed and classified the various constituents of our diet according to vitamin content, caloric value, mineral basis etc. It has explained to us the factors that make a balanced diet. With the help of all this knowledge, the State can provide schoolchildren with cheap but nutritive food in order to build up the physique of future generations. This shows how much science can contribute to the improvement of national well-being. Science even has started producing synthetic food in the Laboratory, to supplement our food deficit.

Next item of our necessity is our *dress*. Modern science has taught us the utility of light dress in a tropical country. Our knowledge of science has helped up to manufacture dress materials more comfortable, more enduring and in the long run more economical and adjusted to the prevailing environment. Today we are certainly better clothed than ever before.

Also science has shown us how we can do a *greater volume of work in shorter time* and with less physical strain and sweat. It has placed at our disposal innumerable labour-saving devices, so that, life can become far less difficult than it is.

Electric light and fan have made *home-life more comfortable* today. The computer, washing machine, the telephone, the motor car, refrigerator, all these and many others show how much work we can do with minimum labour. They save us from the drudgery of manual work to recuperate and thus enable us to do much more work with greater output than our ancestors. At the same time, scientific process creates plenty of leisure, which we may devote to cultural pursuits. The modern man is thus able to live a fuller and many-sided life.

In our sickness, we feel more than ever the benefits of science. The physician and the surgeon are today much more sure in their diagnosis of diseases through clinical tests, brain scanning and supersonic devices. The physicians are now more confident in their ability to cure or to control them.

The microscope, the X-ray, the radium, ultra sonography—all these have come as real blessings to humanity. With the growth of chemical and bacteriological sciences, the treatment of diseases has been very much sophisticated and yet simplified. Wonder drugs like penicillin and streptomycin and other anti-biotics have proved specific medicines in the cure of diseases, which were formerly intractable.

Allied to this is the contribution that science has made to our ideas of sanitation and hygiene. Infectious diseases have been either completely eradicated, or brought under control, due to better sanitation and sewerage arrangements. Cholera, smallpox typhoids, aids and the like epidemic diseases have been largely tamed.

Other killing ailments like TB, Cancer, Coronary attacks are also considerably subdued, thanks to wonderful progress in medical research. Dysentery, typhoid etc. have ceased in countries, which believe in science and make its full use. Epidemic malaria has greatly been diminished. As a result of all these, the average expectation of human life has almost doubled in the last hundred years.

The services of science in providing us with cheap and innocent amusements are equally great. The radio, the television, the cinema have helped to soothe our overstrained nerves with music and with means of refreshment and recreation. Equally delightful are the gramophone and cassette players. Outside home, we can drop in at a cinema-house and escape for a time from the worries of life. Even the theatre is something infinitely superior to what is used to be in the days of yatra. With the help of scientific devices of light focusing and the revolving stage, it is able to imitate, more convincingly, the realities of life.

Thus in our daily life science has been of the greatest help and benefits us in a variety of ways. It is difficult to say how much we owe to science in the affairs of our daily life. *From morning to midnight we are served tirelessly by science and scientific devices.*

## UNIVERSE

All matter and energy in space is known as *universe*. It includes the Galaxies, Stars, solar system which includes the sun and its planets, Satellites and Asteroids etc. The branch of science dealing with the origin of universe is known as *Cosmology* and the study of position, composition and motion of heavenly bodies is known as *Astronomy*.

### Galaxy

A *galaxy* is an assembly of millions of stars, gas and dust. All the stars in a galaxy are kept together by gravity of all other stars and dark matter. *Milky Way* (Akash Ganga) is a galaxy that contains solar system and obviously the earth. Milky Way is a spiral shaped galaxy, it has a bright central core (which has the highest density of stars) and a flattened disk surrounding it. Milky Way contains more than 200 billion stars.

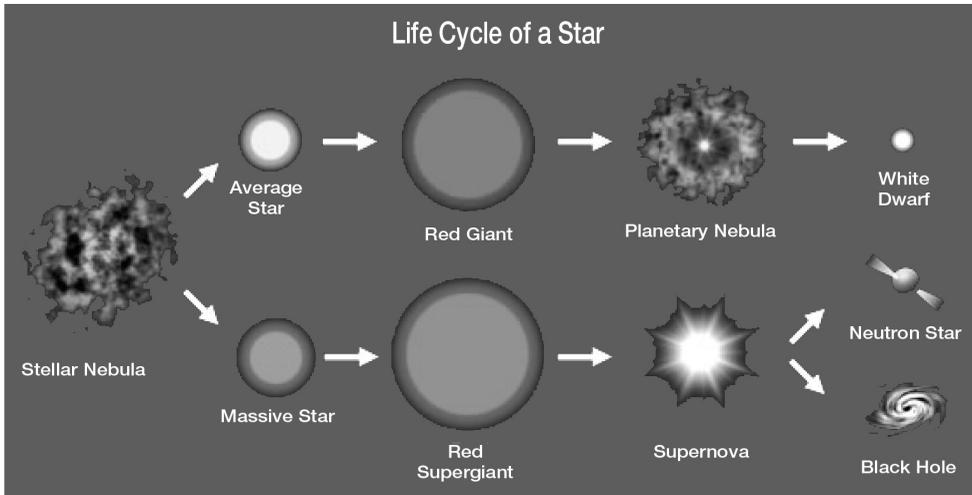
### Stars

*Stars* are formed by clouds of gas and dust, known as nebulae. Nuclear reactions at the center (or core) of stars provides enough energy to make them shine brightly for many years. The exact lifetime of a star depends on its size. Very large, massive stars burn their fuel much faster than smaller stars and may only last a few hundred thousand years. Smaller stars, however, last for several billion years, because they burn their fuel much more slowly.

Eventually, however, the hydrogen fuel that powers the nuclear reactions within stars will be run out, and then they will enter the final phase of their lifetime. Over a

period of time, the stars will expand, cool and change colour to become red giant stars. The path they follow beyond that depends on the mass of the star.

Small stars, like the Sun, will undergo a relatively peaceful and beautiful death that sees them pass through a planetary nebula phase to become a white dwarf. Massive stars, on the other hand, will experience a most energetic and violent end, which will see their remains scattered about the cosmos in an enormous explosion, called a supernova. Once the dust clears, the only thing remaining will be a rapidly spinning *neutron star*, or possibly even a *black hole*.



**FIGURE 1:** Lifecycle of a star (Source: <http://www.seasky.org/celestial-objects/stars.html>)

## Comets

Comets are celestial bodies of lumps of dust and ice which come into the solar system from outer space. These shine like stars and have a long tail of dust, which streams away from the Sun.. *Halley's comet* is one of the most famous comets.

## Dark Matter

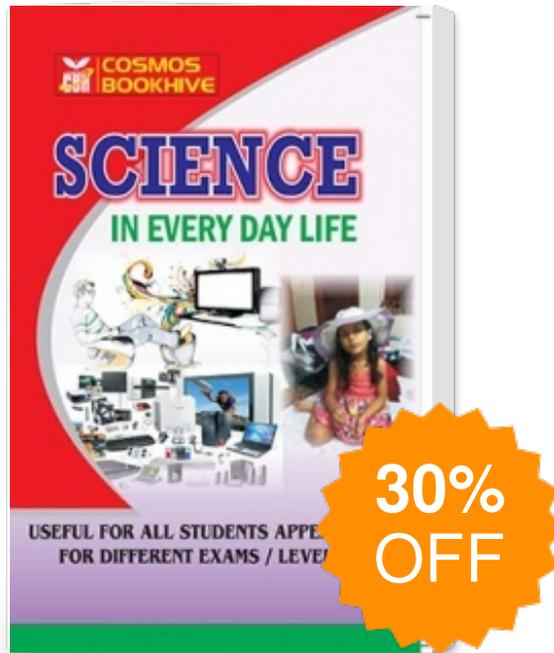
*Dark matter* is a type of matter which is hypothesized to account for a large part of the total mass of the universe. It cannot be seen because it neither absorbs or emits light.

## Solar System

*Solar system* consists of Sun (a star), the Planets (Mercury, Venus, Earth, Mars, Jupiter,

Saturn, Uranus, Neptune, Pluto ), satellites, comets, asteroids and meteoroids. Mercury, Venus, Earth and Mars are known as *terrestrial planets* because these have a rocky surface. Jupiter, Saturn, Uranus and Neptune are known as *Jovian planets* because they have a gaseous surface like Jupiter. Earth has one satellite (moon), other planets (except mercury and venus) also have *satellites* which orbit around them.

# Science In Everyday Life



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