

VARIANT 1

1. Translate the text and give an oral summary on it.

Physics is concerned with phenomena of nonliving matter. Using mathematics as a tool, it is an exact science of the material world and forms the basis of many other studies. The astronomer, the chemist, the geologist, the engineer, all need some knowledge of physics to progress better in their respective spheres of work.

Physics is generally divided into a number of branches. At an elementary level these are mechanics, heat, sound, optics, electricity and magnetism. As we go deeper and deeper into the structure of matter we have to introduce more divisions. But it must be remembered that this is a unity in nature and these divisions are man-made for his own convenience.

Although physics is an exact science it is also an activity exercising imagination. As we have progressed from mechanics to nuclear physics, physics has become more and more difficult to understand. The deeper we go into the subject, the more we have to use our imagination. Our ideas, however, are coloured by our experience in mechanics which has supplied us with the most fundamental concepts. Perhaps the most important one is energy as it is the concern of every physicist whatever his field may be. We should not be far from wrong in saying that physics is the science of matter and energy.

2. Develop the following statements.

1. There are four different ways in which the various particles that make up the Universe can interact with one another.
2. The constituents of the nucleus were not completely identified until the 1930s.
3. It is very difficult to realize the level of knowledge and the style of reasoning typical for the culture of antiquity.
4. Galileo Galilei developed a new understanding of physics and formulated the first truly substantiated foundations of science.

4. The discovery of the proton, the neutron and the electron was just the beginning of a great increase in the roster of so-called elementary particles.

3. Make up the questions in English.

1. Какие открытия 19 века привели к новому пониманию материи и оказали влияние на другие отрасли науки, технологии и способы нашего мышления?
2. Где обычно ученые представляют результаты своей работы?
3. Когда был открыт электрон?
4. Кем был открыт нейтрон?
5. Почему была предложена кварковая модель атома?

... charged particles can be used in
athode-ray tube electrons are first accelerated by an electric field
gh a known potential difference. Each electron thereby acquires an
y equal to the product of its charge e and the potential difference U :

$$\frac{1}{2} mv^2 = eU$$

Thomson, when he studied cathode rays in 1896, was aware of this
tion, but he knew neither the mass of the electron, m , nor its charge, e . In
r to learn something about these quantities, he subjected the cathode-ray
n to a known magnetic field β and measured the radius of curvature of the
n, which was deflected into a circular arc.

ome simple algebra, using other equations for the radius of a curvature
eliminating v , he obtained the following equation for the ratio e/m :

$$e/m = 2Uc^2/\beta^2 r^2$$

equation, first used by Thomson for determining the ratio of charge to
s of the electron, clearly separates the knowns from the unknowns. On the
appear the two unknown properties of the particle. On the right appear
knowns: the potential difference used to accelerate the electrons, the speed
ight, the magnetic field used to deflect the electrons, and the measured
ius of curvature of the deflected beam.

omson correctly guessed that his measured ratio of e/m was large not the
electron had an unusually large charge, but because it had an unusually small
ss. This conclusion was actually based on more than guesswork. It was
ted by evidence on the manner in which high-speed electrons penetrate
h gases. Subsequently Thomson's technique was greatly improved in
racy and also extended to the measurement of the charge to mass ratio of
er particles - protons and ions.

1913 Robert A. Milican was able to measure the charge of the electron
ne rather accurately (within 1 %). His measurement combined with the

e/m determination then led to an accurate value for the mass of the electron. Also, at about the same time, Bohr's theory of atomic structure made it clear that all ions possess a charge equal in magnitude to that of the electron or an integral multiple of it. Therefore the masses of all atoms could be determined from e/m measurements.

2. Develop the following statements.

1. Physics is a branch of science that deals with matter, energy and their interactions.
2. People with varied interests may find the study of physics interesting and useful.
3. Aristotle left a tremendous imprint on all later developments in science and philosophy.
4. The Copernican Revolution produced a dramatic transformation in people's view of the world.

3. Make up the questions in English.

1. Какова роль эксперимента в науке и как он помогает создавать законы?
2. За какие достижения в физике Резерфорд получил Нобелевскую премию в 1908 году?
3. В чем состоит учение Аристотеля о Вселенной?
4. Почему труды Коперника были запрещены более двух столетий?
5. Какой новый метод изучения природы был предложен Галилеем?

VARIANT 3

1. Translate the text and give an oral summary on it.

In the absence of friction all bodies, large and small, fall with the same acceleration. This law of falling bodies is a physical paradox for it contradicts the conclusion a person may come to from general observations. There is nothing to wonder at, for centuries ago the great philosopher Aristotle taught that heavy bodies fall proportionately faster than lighter bodies.

After nearly 2000 years, in the year 1590 Galileo was thinking over the question of falling bodies. He found apparent inconsistencies in Aristotle's teachings. At tests, he dropped various kinds of objects from different levels of the leaning tower of Pisa and timed their fall and measured their velocities. Once Galileo attracted a lot of people to the leaning tower. From the top of the tower he dropped two stones, one large and one small. These two bodies fell side by side and struck the ground together. That was the beginning of a new era in science. The importance of Galileo's many experiments is not in the fact that they demonstrated the mistakes in Aristotle's reasoning, but that they gave the world a new scientific method, the method of experimentation.

The next step that Galileo took in the study of falling bodies was to find a mathematical relation between the time which the fall takes and the distance which it covers. Since the free fall is too fast and the human eye cannot observe it in detail and since Galileo did not have such modern devices as fast movie cameras, he let the balls of different materials roll down an inclined plane instead of falling straight down.

2. Develop the following statements.

1. Since the interests of physicists evolve with time, the basic science called physics also changes with time.
2. Physics is fundamental to a true understanding of chemistry, biology and earth sciences.
3. Scientists have been unable to detect a fifth force or yet, to find any reason why a fifth should be required.