

# Physics

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## (Chapter 4) (Laws of Motion) (Exercises) (Class 11)

### Question 4.1:

Give the magnitude and direction of the net force acting on

- (a) a drop of rain falling down with a constant speed,
- (b) a cork of mass 10 g floating on water,
- (c) a kite skillfully held stationary in the sky,
- (d) a car moving with a constant velocity of 30 km/h on a rough road,
- (e) a high-speed electron in space far from all material objects, and free of electric and magnetic fields.

### Answer 4.1:

- (a) Zero net force  
The rain drop is falling with a constant speed.  
Hence, its acceleration is zero. As per Newton's second law of motion, the net force acting on the rain drop is zero.
- (b) Zero net force  
The weight of the cork is acting downward. It is balanced by the buoyant force exerted by the water in the upward direction.  
Hence, no net force is acting on the floating cork.
- (c) Zero net force  
The kite is stationary in the sky, i.e., it is not moving at all.  
Hence, as per Newton's first law of motion, no net force is acting on the kite.
- (d) Zero net force  
The car is moving on a rough road with a constant velocity.  
Hence, its acceleration is zero. As per Newton's second law of motion, no net force is acting on the car.
- (e) Zero net force  
The high speed electron is free from the influence of all fields.  
Hence, no net force is acting on the electron.

### Question 4.2:

A pebble of mass 0.05 kg is thrown vertically upwards. Give the direction and magnitude of the net force on the pebble.

- (a) during its upward motion,
- (b) during its downward motion,
- (c) at the highest point where it is momentarily at rest. Do your answers change if the pebble was thrown at an angle of  $45^\circ$  with the horizontal direction?  
Ignore air resistance.

### Answer 4.2:

0.5 N, in vertically downward direction, in all cases.

Acceleration due to gravity, irrespective of the direction of motion of an object, always acts downward. The gravitational force is the only force that acts on the pebble in all three cases. Its magnitude is given by Newton's second law of motion as:  $F = m \times a$

Where,  $F$  = net force and  $m$  = Mass of the pebble = 0.05 kg

$$a = g = 10 \text{ m/s}^2$$

$$\therefore F = 0.05 \times 10 = 0.5 \text{ N}$$

The net force on the pebble in all three cases is 0.5 N and this force acts in the downward direction.

If the pebble is thrown at an angle of  $45^\circ$  with the horizontal, it will have both the horizontal and vertical components of velocity. At the highest point, only the vertical component of velocity becomes zero. However, the pebble will have the horizontal component of velocity throughout its motion. This component of velocity produces no effect on the net force acting on the pebble.

# Chapter 4 Physics

**SB Merriam**



## Chapter 4 Physics:

**An Introduction to Atmospheric Physics** Robert G. Fleagle, Joost A. Businger, 1981-01-09 This book is addressed to those who wish to understand the relationship between atmospheric phenomena and the nature of matter as expressed in the principles of physics The interesting atmospheric phenomena are more than applications of gravitation of thermodynamics of hydrodynamics or of electrodynamics and mastery of the results of controlled experiment and of the related theory alone does not imply an understanding of atmospheric phenomena This distinction arises because the extent and the complexity of the atmosphere permit effects and interactions that are entirely negligible in the laboratory or are deliberately excluded from it the objective of laboratory physics is by isolating the relevant variables to reveal the fundamental properties of matter whereas the objective of atmospheric physics or of any observational science is to understand those phenomena that are characteristic of the whole system For these reasons the exposition of atmospheric physics requires substantial extensions of classical physics It also requires that understanding be based on a coherent way of seeing the ensemble of atmospheric phenomena Only then is understanding likely to stimulate still more general insights

**Atmosphere, Ocean and Climate Dynamics** John Marshall, R. Alan Plumb, 1963-01-01 For advanced undergraduate and beginning graduate students in atmospheric oceanic and climate science Atmosphere Ocean and Climate Dynamics is an introductory textbook on the circulations of the atmosphere and ocean and their interaction with an emphasis on global scales It will give students a good grasp of what the atmosphere and oceans look like on the large scale and why they look that way The role of the oceans in climate and paleoclimate is also discussed The combination of observations theory and accompanying illustrative laboratory experiments sets this text apart by making it accessible to students with no prior training in meteorology or oceanography Written at a mathematical level that is appealing for undergraduates and beginning graduate students Provides a useful educational tool through a combination of observations and laboratory demonstrations which can be viewed over the web Contains instructions on how to reproduce the simple but informative laboratory experiments Includes copious problems with sample answers to help students learn the material

**Resources in Education**, 1970-07

**Thomas Aquinas** Christopher Martin, 2019-08-05 This path breaking approach to Thomas Aquinas interprets the Five Ways in the context of his theory of science Aquinas is the leading medieval philosopher and his work is of continuing contemporary relevance Addressing all the critical themes of authority and reason Christopher Martin examines the role of science and definitions in medieval thought and how to deal with the big question is there a God Rigorous and challenging Martin's clear exposition compares and contrasts Aquinas arguments with those of other philosophers Anselm Descartes and Kant

Research in Education, 1970-12

Aristotle's Metaphysics Aristotle, 1924

Engineering Journal, 1930 Vol 7 no 7 July 1924 contains papers prepared by Canadian engineers for the first World power conference July 1924

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**The Journal of the Engineering Institute of**

**Canada** Engineering Institute of Canada,1930     *Collected Works of V.I. Lenin: Materialism and empirio-criticism* Vladimir Il'ich Lenin,1927     **The Importance of the Use of Algebra to High School Students** Marjorie McLeod Miller,1918  
Statistical Mechanics, Fluctuations, and Noise Arnold Hugh William Beck,1976     **Gas Age** ,1899 Includes summaries of proceedings and addresses of annual meetings of various gas associations L C set includes an index to these proceedings 1884 1902 issued as a supplement to Progressive age Feb 15 1910     **Thought and Expression in the Sixteenth Century** Henry Osborn Taylor,1920     Bulletin of the American Mathematical Society American Mathematical Society,1928  
*Sigma Phi Epsilon Journal* Sigma Phi Epsilon,1930     **Great Books of the Western World: The great ideas** Robert Maynard Hutchins,1952 For contents see Title Catalog     The Theosophist ,1928     *Journal* New South Wales. Parliament. Legislative Council,1883     **Natural Philosophy in Some Early Seventeenth Century Scholastic Textbooks** M. Richard Reif,1980

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