Learning Goals: Dynamics

Estimated Time: 8–10 hours

By the end of this course, students will be able to apply Newton's laws of motion to one- and two-dimensional situations.

Vocabulary

coefficient of friction, direction, dynamics, force as a vector quantity, force of friction, free-body diagrams, gravitational field strength, gravity, magnitude, net force, Newton's three laws of motion, normal force, orthogonal components, unbalanced forces

Knowledge

- Newton's three laws of motion
- net force
- gravitational field strength
- the force of gravity (weight)
- force of friction
- coefficient of friction
- normal force
- force as a vector quantity
- unbalanced forces

Skills and Attitudes

- conduct appropriate experiments
- systematically gather and organize data from experiments
- use graphical methods to analyse results of experiments
- construct vector and free-body diagrams
- verify relationships (e.g., linear, inverse, square, and inverse square) between variables
- use models (e.g., physics formulae, diagrams, graphs) to solve problems
- use appropriate units and metric prefixes

Dynamics

Prescribed Learning Outcomes *It is expected that students will:*	Suggested Achievement Indicators *The following set of indicators may be used to assess student achievement for each corresponding prescribed learning outcome.* *Students who have fully met the prescribed learning outcome are able to:*
D1 apply Newton's laws of motion to solve problems involving acceleration, gravitational field strength, and friction	• state Newton's three laws of motion • illustrate Newton's first and third laws with examples • solve problems involving Newton's second law, to determine – net force – mass – acceleration • define *gravitational field strength* • solve problems involving – the force of gravity (weight) – gravitational field strength – mass • solve problems involving – force of friction – coefficient of friction – normal force
D2 apply the concepts of dynamics to analyse one-dimensional or two-dimensional situations	• describe force as a vector quantity • resolve a force into two orthogonal components • determine the magnitude and direction of a force, given its two orthogonal components • determine the net force from two or more forces • construct free-body diagrams • solve a variety of problems related to unbalanced forces (e.g., sliding objects, Atwood's machine, inclined planes)