Key Elements: Energy

Estimated Time: 14–16 hours

By the end of this course, students will recognize three main forms of energy and be able to perform calculations involving the law of conservation of energy.

Vocabulary

efficiency, energy, gravitational potential energy, kinetic energy, power, specific heat capacity, temperature, thermal energy, work

Knowledge

- work
- gravitational potential energy
- height above a reference point
- kinetic energy
- thermal energy
- specific heat capacity
- temperature
- work as change in energy
- total energy
- the law of conservation of energy
- power
- work (input and output)
- efficiency

Skills and Attitudes

- conduct appropriate experiments
- systematically gather and organize data from experiments
- produce and interpret graphs (e.g., slope and intercept)
- verify relationships (e.g., linear, inverse, square, and inverse square) between variables
- apply models (e.g., physics formulae, diagrams, graphs) to solve a variety of problems
- use appropriate units and metric prefixes

ENERGY

Prescribed Learning Outcomes	Suggested Achievement Indicators
It is expected that students will:	*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:*
G1　perform calculations involving work, force, and displacement	❑ define *work* in terms of force and displacement ❑ solve a variety of problems involving 　– work 　– force 　– displacement
G2　solve problems involving different forms of energy	❑ define *energy* ❑ define *gravitational potential energy* ❑ solve a variety of problems involving 　– gravitational potential energy 　– mass 　– acceleration due to gravity 　– height above a reference point ❑ define *kinetic energy* ❑ solve a variety of problems involving 　– kinetic energy 　– mass 　– velocity ❑ define *temperature*, *thermal energy*, and *specific heat capacity* ❑ solve a variety of problems involving 　– thermal energy 　– mass 　– specific heat capacity 　– change in temperature
G3　analyse the relationship between work and energy, with reference to the law of conservation of energy	❑ relate energy change to work done ❑ state the law of conservation of energy ❑ solve problems, using the law of conservation of energy to determine 　– gravitational potential energy 　– total energy 　– kinetic energy 　– thermal energy
G4　solve problems involving power and efficiency	❑ define *power* ❑ perform calculations involving relationships among 　– power 　– work 　– time 　– define *efficiency* ❑ perform calculations involving relationships among 　– work (input and output) 　– power (input and output) 　– efficiency