

## Force, Work and Energy

### SPECIFIC OBJECTIVES

The students learn about

- force, its kinds and changes it can bring in an object
- work and energy, sources and forms of energy
- energy conversions and energy crisis
- simple machines

### TEACHING AIDS

**Pictures/animation** on muscular force, gravitational force, frictional force (as given in chapter); Pushing a table and almirah; Sources of energy (as given in chapter), solar cooker, solar heater, solar cell, windmill, or dam, a hydropower station; Process of photosynthesis, nonrenewable and renewable sources of energy (as given in chapter); Children playing, swimming, studying, running, etc.; **Pictures/samples** of some simple machines (those given in chapter)

### LESSON PLAN

- The teacher will start the chapter with 'Warm Up' section by giving a brief idea of energy and work, and help the students to fill in the blank.
- Now with the help of teaching aids, teacher will describe that for pulling or pushing an object, we apply force on it.
- Teacher will ask the students to fill in the blanks given with pictures and describe what more a force can do, i.e., make an object move, stop a moving object, change the direction of a moving object.
- With the help of teaching aids and examples, teacher will describe muscular force, gravitational force and force of friction.
- Now by giving some examples, teacher will define the concept of work that when we apply a force on an object, we do the work.
- Teacher will discuss the concept of energy and explain that energy is the ability to do work.
- Now with the help of teaching aids, teacher will explain the sources of energy:
  - Nonliving things (if required) get energy from petrol and electricity.
  - Among living things, plants get energy from the sun and make their food while animals get energy from the food taken directly or indirectly from plants.

- Teacher will explain that the sun is the ultimate source of energy on the earth and also will discuss that there are other sources of energy, i.e., wind, water, coal, petroleum, etc.
- Teacher will discuss different forms of energy and with the help of teaching aids, will explain solar energy, wind energy, hydroenergy, muscular energy and their uses (as given in chapter).
- To check the understanding of students about the chapter, teacher will ask them to solve 'Checkpoint 1'.
- Now, teacher will explain that one form of energy can be changed into another form. With the help of teaching aids, teacher will discuss different examples of energy conversions (as given in chapter).
- Teacher will discuss about energy crisis and need of saving energy.
- With the help of teaching aids, teacher will explain non-renewable sources of energy, need to save them, and renewable sources of energy and their benefits (as given in the chapter).
- Now, teacher will explain the term machine that an object which makes our work easier is called a machine. With the help of teaching aids, teacher will explain how machines make our work easier.
- Now, teacher will ask students to solve 'Checkpoint 2'.
- At last, the teacher will sum up the chapter by going through the points given under the head 'At One Go' and make student revise the new terms given under the head 'Remember These Terms'.
- Teacher will help students to answer the questions given under the head 'Check Your Study'.

## BOOST UP

- Teacher should explain the effects of force by performing some activities.
- While teaching the effect of force that changes the shape of an object, teacher can show the making of different shapes using coloured clay.
- To show the force of friction acting between the ball and the ground, teacher can demonstrate a ball rolling on the ground that stops moving after some time.
- While teaching simple machines, teacher should demonstrate how working without machine is difficult but the same work becomes easier when done with the help of some machine (as discussed in the chapter).
- Teacher can show the working of some simple machines.
- Teacher should show the picture/documentary film/video clip on a dam and if possible, arrange a tour to a dam.

## EXPECTED LEARNING OUTCOMES

The students

- understand about force and its kinds, changes it can bring in an object
- understand about work and energy
- know different sources and forms of energy
- understand energy conversions and energy crisis
- know about simple machines

## EVALUATIVE QUESTIONS

The teacher may ask the following questions for evaluating learning and understanding of students:

1. How can we make an object move?
2. What is muscular force?
3. What is gravitational force?
4. How does friction stop a moving ball?
5. What is work?
6. What is energy?
7. In which form do we get energy from the sun?
8. In photosynthesis, how does one form of energy change into another form?
9. What are the fossil fuels? Why should we use them carefully?
10. What are simple machines?