LESSON 1

Warm-Up

1 Begin the chapter by having students read the introductory text in the *Chapter Introduction* (p.25).

Ask: *Do you know where is Singapore? Have you been on a roller coaster ride before? If you have, how did you feel during the ride?*

2 *Physics Watch (p.25)*

21st Century Skills: *information literacy, communication*

Have students watch the clip, by projecting it on a screen [*via MCEduHub*].

Get students' participation for a class discussion using suitable prompt questions.

3 *Questions (p. 25)*

Have a class discussion using the questions posed.

Answer:
- A lot of energy is required to move the very heavy *Human* and *Cyclon* from a lower position to a much higher position. Only a powerful motor can provide the energy required.
- The roller coasters will be slow at the high points and very fast at the low points.
- Most people would feel the greatest adrenaline rush when the roller coasters begin to move down the high points of the tracks. At the high points, the roller coasters have a lot of gravitational potential energy available to convert into kinetic energy, resulting in high speeds when going down the tracks.

6.1 Energy (p.26)

Note: Have students read the Student Book, pp. 26-30. (This can take place as a pre-lesson activity, done outside of curriculum time, a day or two ahead of the lesson.)

4 Highlight to students the learning objectives of this section.

What is energy? (pp.26-27)

5 Explain to students what energy is in physics and the different forms of energy.
- Give the examples of a person dancing, waves crashing, machines moving and a person rowing a boat as showing energy at work.

Ask: *What other examples of energy at work can you give?*.

Answer: Other examples may include walking to school, riding a bicycle, playing badminton, playing on the swing and playing a guitar.

- Define the term *energy* for students.

Support the lower English-language-proficiency students using *Word Alert* (p.26) to highlight the term *capacity* to mean *ability* or *being able to*.
- Go through the different forms of energy using Figure 6.1. For each form, get students to give other examples than those already given.

Ask: *What other examples can you give?*

Answer: Other examples of forms of energy include a bouncing ball [KE], a moving cloud [KE], explosives [CPE], diving board [EE], rain drop in a cloud (GPE) and airplane in the sky [GPE].

- *Link (p. 27)*

When talking about electrical energy as mentioned in Figure 6.1,

Ask: *How is electrical energy related to electricity?*

Answer: Electricity or electric current is the flow of electrons and is measured in amperes. Electrical energy is measured in joules. They are not the same and are related by the equation $W = VIt$.

Student may give different answers. The right answer does not have to be presented now. Let them be curious to find out about electricity, which they will learn more later in Chapter 14.
- *Enrichment [Think] (p.27)*

21st Century Skills: *critical thinking, communication, decision making, social responsibility*

Ask: *Should we promote the use of nuclear energy?*

Discuss briefly with students.

Answer: Students should be able to compare the pros and cons of using nuclear energy and decide whether the use of nuclear energy should be promoted or discouraged. Pros include huge amount of energy resource. Cons include safety and health risks.

6 *Enrichment [Info] (p.27)*

21st Century Skills: *information literacy*

Have students read about the short write-up on solar wind. Get students to imagine what the world would be like if solar wind can be harnessed effectively.

Wrap-Up

7 Summarise the main learning points of the lesson. Write on the board using a concept map or graphic organiser.

LESSON 2

Go to the Practical Workbook
Practical 6.1 Energy conversions, pp.30-31
AO2: *Handling information and problem solving*
AO3: *Experimental skills and investigations*
Objective: To compare the drop height and rebound height when a ball is dropped from a height

Teacher's notes and answers to questions in the Practical Workbook are available at resource.marshallcavendish.com/teacher.

Warm-Up

1 Brief students about the objective of this experiment. Students need to work in groups of at least three persons. Divide students into their respective groups.

Doing the Practical

2 Instruct students to follow the procedure of the experiment and complete the tasks given.

Support less confident students by providing specific guidance as they perform the experiment.

Wrap-Up

3 Ask: *What difficulties do you encounter while doing the experiment? What other types of ball can you use in this experiment? Will this give the same conclusion?*

Get students to share their experience and ideas.

LESSON 3

Warm-Up

Note: Bring a pack of rubber bands for the *Enrichment* activity.

1 *Enrichment [Think] (p.28)*

21st Century Skills: *communication*

- Have each student stretch a piece of rubber band and quickly place it on his/her lip.

Ask: *What do you notice when you put the stretched rubber band on your lip?*

Have students share their answers with the class and explain their observation.

Answer: Students should notice that the stretched rubber band feels warm. This is because some elastic (strain) energy of the rubber band is converted into heat.

Support the less able students by demonstrating another example of energy conversion as given in the Student Book.

Bring a match to the class and give a live demonstration by striking the match to produce a flame. Explain that the chemical potential energy found in the substance on the match head is converted to heat and light.

What is the principle of conservation of energy? (pp.28-30)

2 Teach the concept of energy conservation.

- State the principle of conservation of energy for students.
- Go through the examples *burning fossil fuels* and *hammering a nail*.

Challenge the more able students to give other examples of simple energy conversion and explain.

Wrap-Up

Note: Wrap up the lesson and *Section 6.1 Energy*.

3 Summarise the main learning points of the lesson and *Section 6.1 Energy*. Write on the board using a concept map or graphic organiser. You may want to use the relevant part of the *Visual Summary* on p. 31.

4 Have a class discussion.

- Ask: *What happens to energy during events and processes and how can we benefit from this?*
- Ask students to reflect what they have learnt so far and briefly discuss the question in the class. Alternatively, ask students to write their answers in a journal. A summary of students' answers can then be shared with the class during another class period.

Answer: Students should be able to state that energy is transformed and converted from one form to another during events and processes. The different energy outputs at different conversion points can be harnessed to do various works. Students should cite examples, if possible interesting ones that are different from what they normally see in everyday life.

5 *Let's Practice (p.30)*

Discuss the answers to the questions in the class or get students to do as homework.

6 Get students to reflect on their learning for Section 6.1 on their own using the Workbook. Get them to do Exercises 6.1 to 6.2 as homework.

Go to the Theory Workbook
Exercises 6A-6B, pp.11-13

All answers to questions in the Workbook are available at resource.marshallcavendish.com/teacher. Students can check the answers to *Let's Practice* at resource.marshallcavendish.com/student.