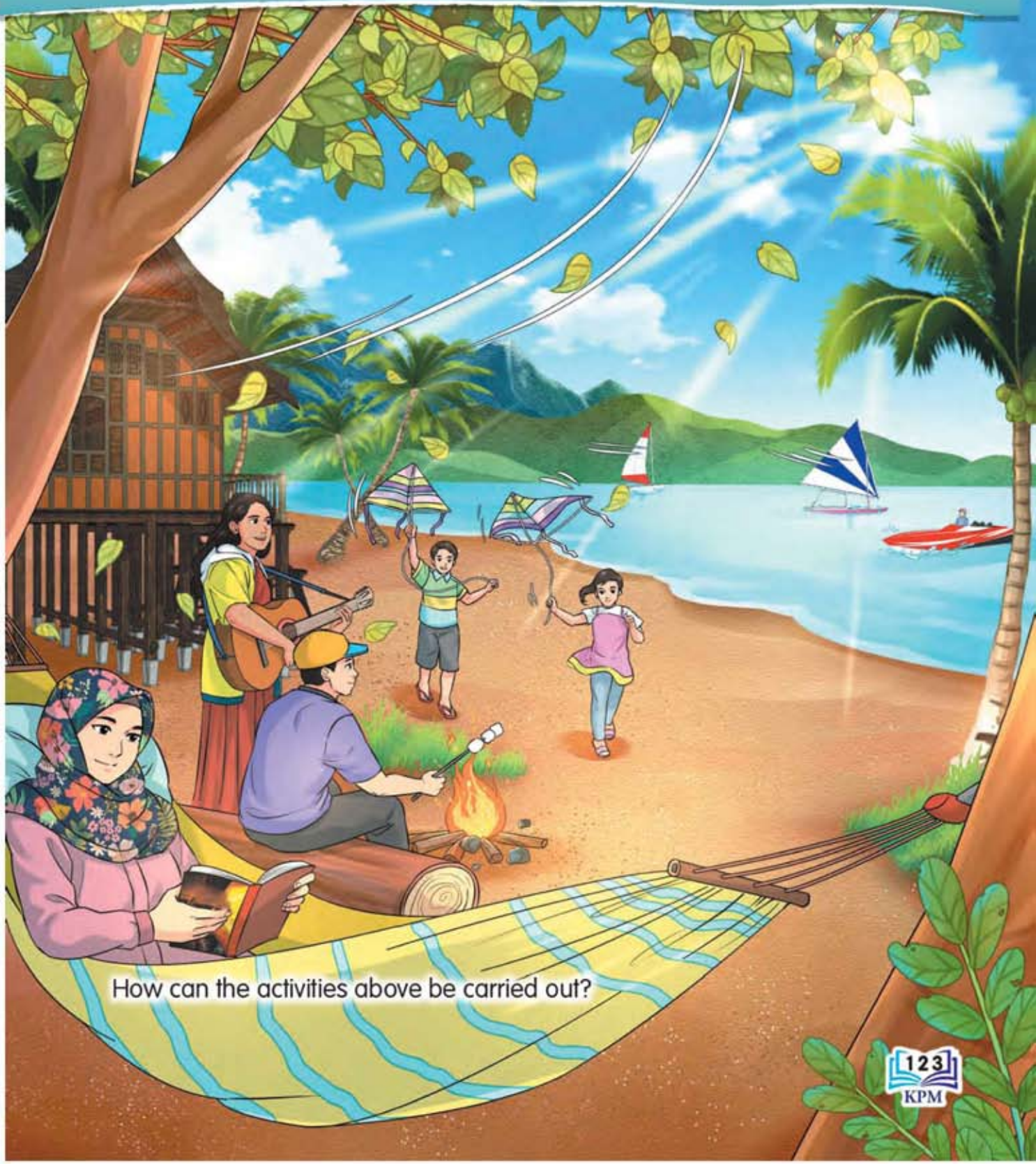
UNIT 7

ENERGY



How can the activities above be carried out?

Energy and Their Sources

Energy is the ability to do work. Energy can be obtained from a variety of sources. Let us find out the energy sources around us.

Sun

The **Sun** is the main source of energy. The energy from the Sun is used to generate electricity through the use of solar panels.

Water

Flowing **water** rotates the turbine in the dam to generate electricity.

Hydroelectric dam

Waste from firewood and plants

Animal faeces

Biomass

Biomass is a substance from plants or animal faeces used to produce fuel and generate electricity.

Solar panel

SCIENCE INFO

Geothermal is also a source of energy derived from the heat of hot rocks beneath the surface of Earth. This heat is used to rotate the turbine to generate electricity.

What does energy mean?

KPM

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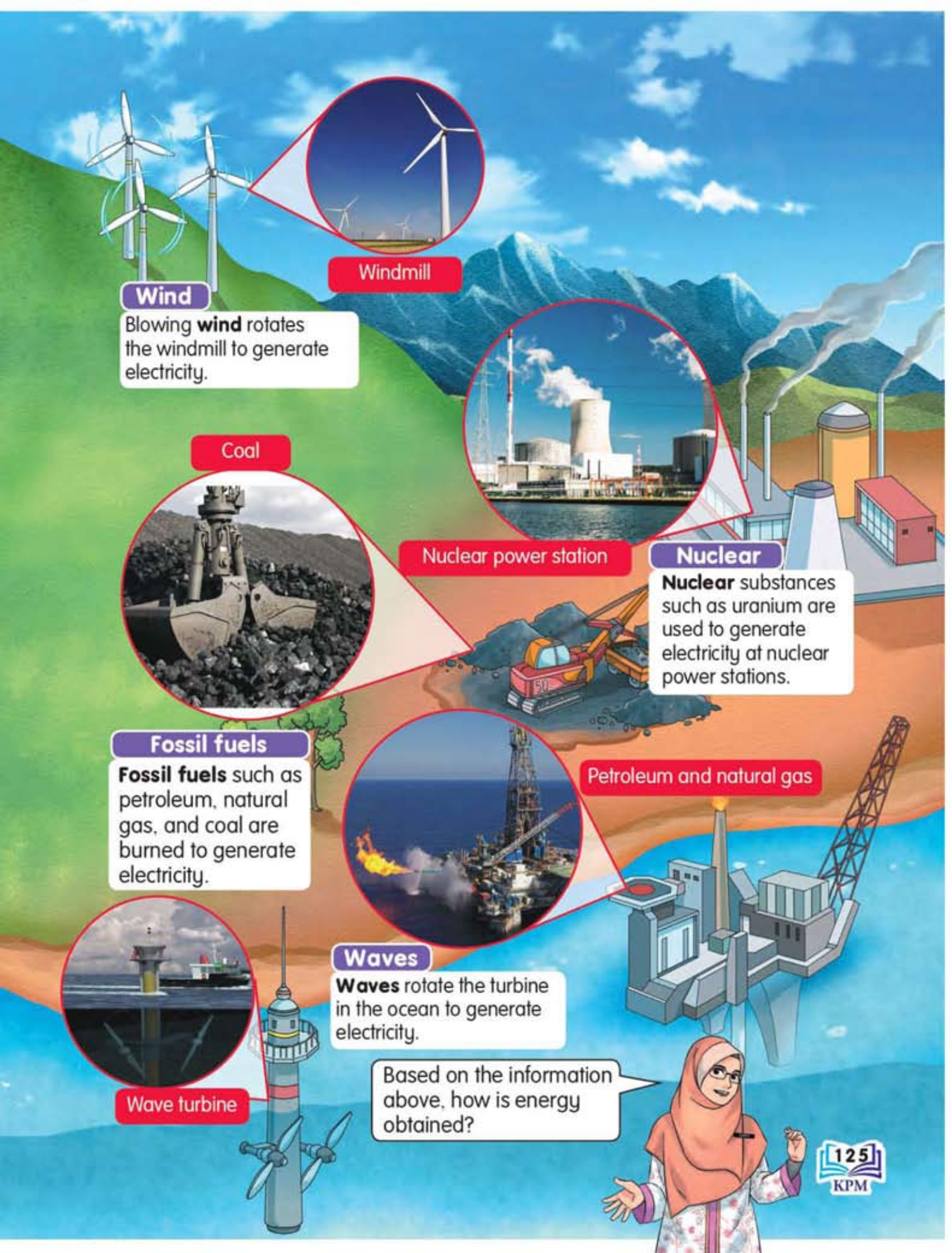
7.1.2


Windmill
Wind
Blowing **wind** rotates the windmill to generate electricity.
Coal
Nuclear power station
Nuclear
Nuclear substances such as uranium are used to generate electricity at nuclear power stations.
Fossil fuels
Fossil fuels such as petroleum, natural gas, and coal are burned to generate electricity.
Petroleum and natural gas
Waves
Waves rotate the turbine in the ocean to generate electricity.
Wave turbine
Based on the information above, how is energy obtained?

Forms of Energy

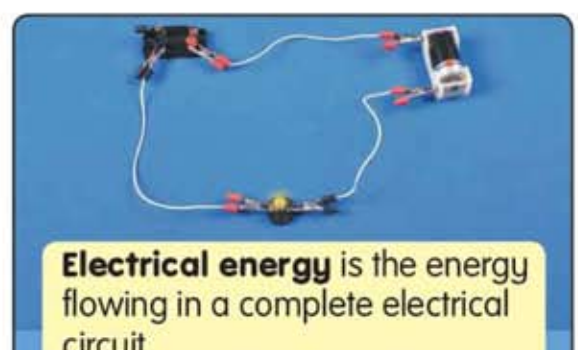
There are several forms of energy around us. Let us look at the forms of energy in the situations below.

Solar energy is the energy obtained from the Sun.

Heat energy is the energy stored in objects that are heated.

Light energy is the energy produced by objects that emit light.

Sound energy is the energy produced by vibrating objects.



Electrical energy is the energy flowing in a complete electrical circuit.

Chemical energy is the energy stored in substances such as food, fossil fuels, biomass or batteries.

Kinetic energy is the energy present in moving objects.

Potential energy is the energy stored in objects that are at a certain height, that are stretched or compressed.

Nuclear energy is the energy contained in nuclear substances such as uranium.

Give other situations which involve the forms of energy above. Explain these situations related to the forms of energy.

Transformations of Energy

Energy can be transformed from one form to another.
Let us look at the transformations of energy in our daily life.

Symbol → means **change to**.
Symbol + means **and**.

Riding a bicycle

While cycling, the chemical energy of food eaten transforms into kinetic energy.

Chemical energy → **Kinetic energy**

of food eaten

energy from food eaten is used in the movement of legs and bicycle.

Switching on a television

When switching on a television, the electrical energy transforms into light and sound energy.

Electrical energy → **Light energy** + **Sound energy**

in the electrical circuit

the television emits image

sound of the television

Lighting a fire

As the flame burns, the chemical energy stored in the fuel transforms into heat and light energy.

Chemical energy → **Heat energy** + **Light energy**

stored in fuel

the fire produces heat

the fire emits light

Plunging from a diving board

As the diver plunges from the diving board, the potential energy transforms into kinetic energy which then transforms into sound energy.

Potential energy → **Kinetic energy** → **Sound energy**

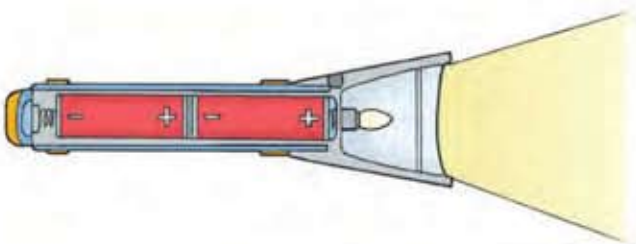
high position of the diver → movement of the diver → splashes of water

Switching on a torch

When you switch on the torch, the chemical energy in the battery transforms into electrical energy. Then, the electrical energy transforms into heat energy and light energy.

Chemical energy → **Electrical energy** → **Heat energy** + **Light energy**

stored in the battery → in the circuit of the torch → the bulb becomes hot + the bulb lights up



Using a solar calculator

Solar energy obtained from the Sun transforms into electrical energy. Then, the electrical energy which flows into the electrical circuit transforms into light energy.

Solar energy → **Electrical energy** → **Light energy**

from the Sun → in the circuit of the calculator → the screen emits light

A moving vehicle

As the vehicle moves, the car engine transforms the chemical energy into kinetic energy.

Chemical energy → **Kinetic energy**

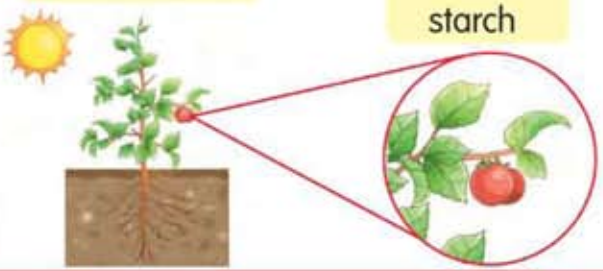
stored in the fossil fuel → car movement

During photosynthesis

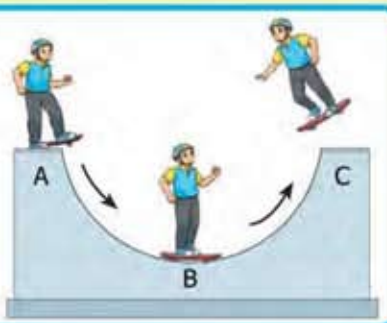
Plants make their own food. During photosynthesis, plants transform light energy into chemical energy that is stored as starch.

Light energy → **Chemical energy**

from the Sun → stored as starch



State the transformation of energy involved from A to C.



FUN ACTIVITY

Observing Energy Transformation

GROUP ACTIVITY

Apparatus and Materials

Pencil, A4 paper, ping-pong ball, kitchen lighter, bell, toaster

Steps

1. Form a group and carry out the following activities:

a

Drop the ping-pong ball from a high position.

b

Light up the kitchen lighter.

c

Ring the bell.

d

Toast the bread in the toaster.

2. Observe the transformation of energy in each activity and write it on a piece of paper in turns.
3. Discuss the findings of the group. Then, present them in front of the class.

Questions

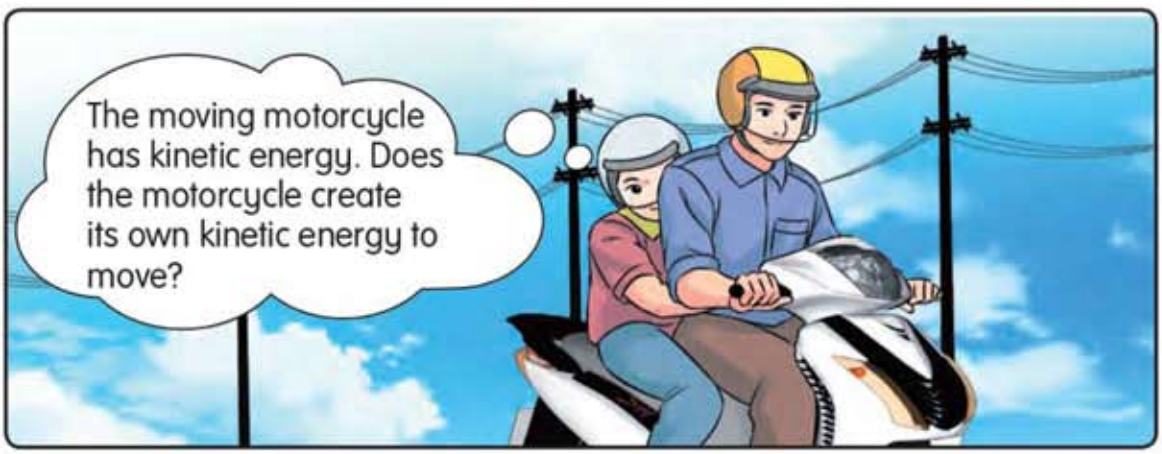
1. Explain the transformation of energy in each of the above activity.
2. Give another example of the transformation of energy that occurs in your daily life.

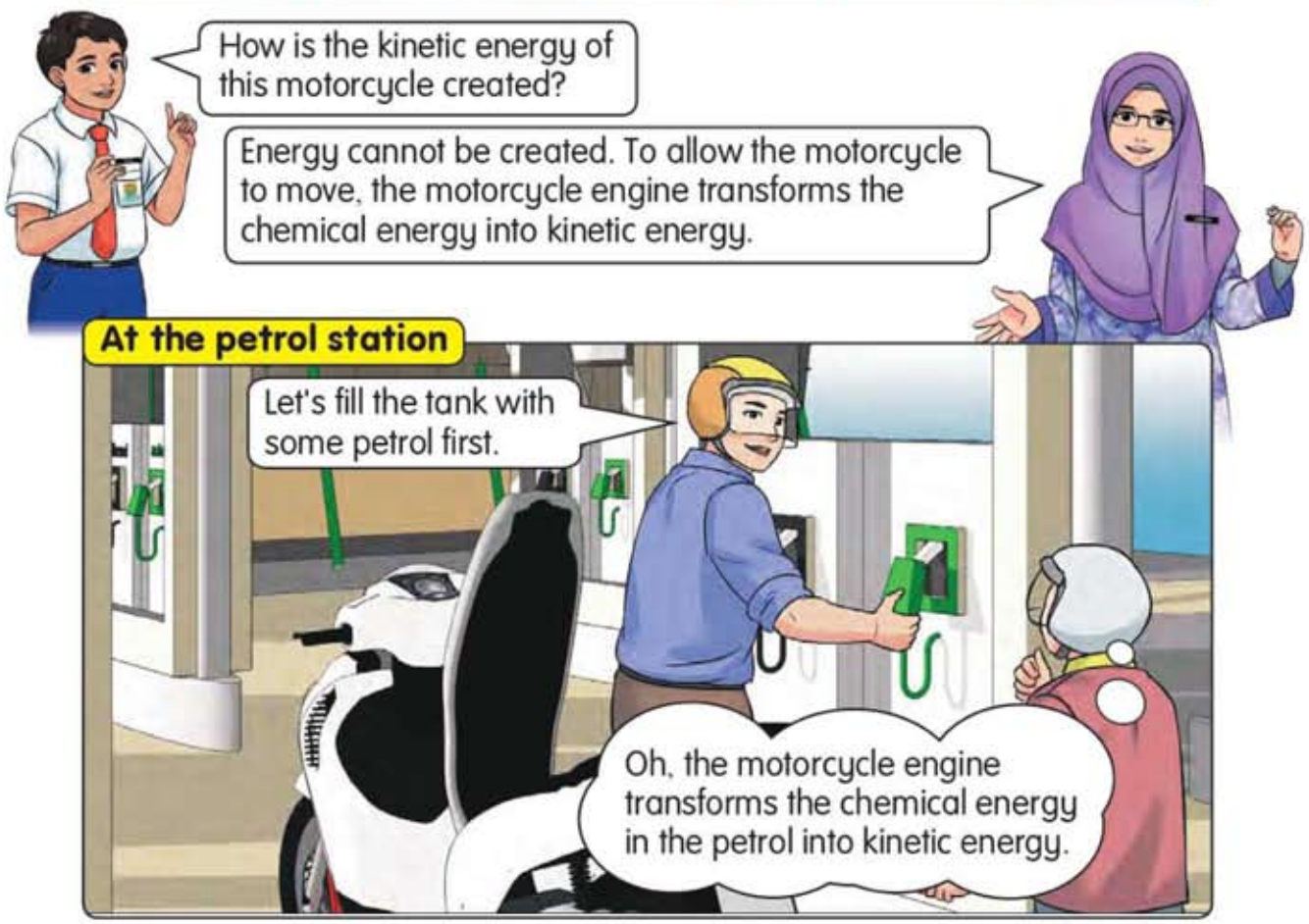
TEACHER'S NOTES

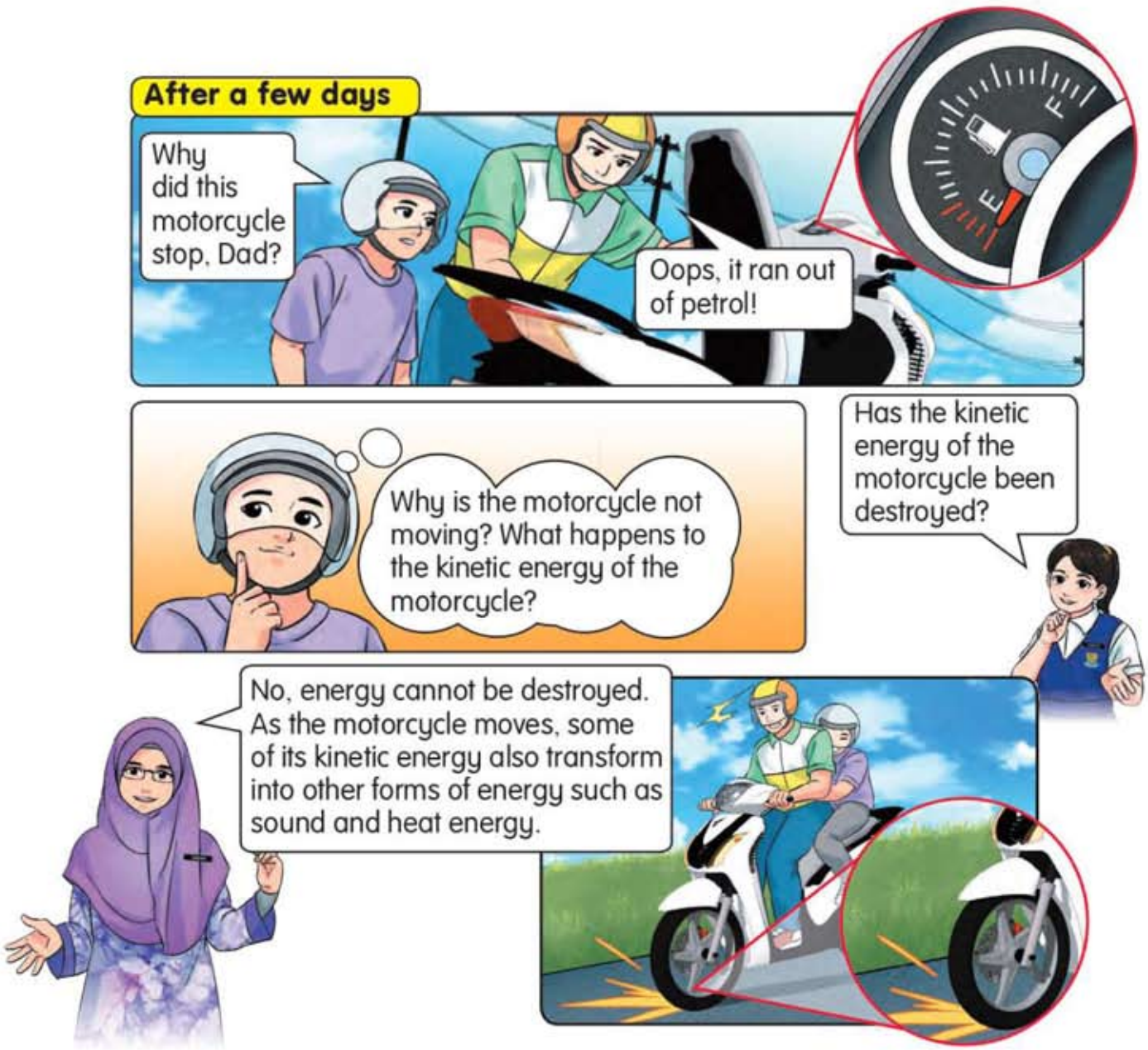
The above activities may be modified by using other appropriate objects or tools.

Energy Cannot Be Created or Destroyed

All the changes that occur in the world depend on energy. Do you know that energy can be transformed because it cannot be created or destroyed? Observe the situations below.







The motorcycle eventually stops moving when all the chemical energy from the petrol is completely transformed into other forms of energy.

Chemical energy → **Kinetic energy** → **Heat energy** + **Sound energy**

Chemical energy	Kinetic energy	Heat energy + Sound energy
from petrol	the movement of motorcycle	Produced from the movement of motorcycle

Based on the situations above, what can you conclude about energy?

Energy cannot be created or destroyed but can be transformed.

Renewable and Non-renewable Energy Sources

Energy sources can be classified into renewable and non-renewable energy sources. Observe the chart below.

Energy Sources

Renewable

A source of energy that can be generated continuously.

Sun

The Sun is a constant source of energy.

Waves

Waves exist naturally.

Water

Water is always available.

Wind

Wind is unlimited and is everywhere.

Biomass

Biomass is always available because it exists in natural substances.

Non-renewable

Energy sources that are limited and cannot be regenerated.

Fossil Fuel

Fossil fuels will run out in the future.

Coal

Natural gas

Petroleum

Nuclear Substance

Nuclear substance such as uranium is limited.

Uranium

Based on the information above, give examples of energy sources which are renewable and non-renewable. Why?

FUN ACTIVITY Future Energy Poster

GROUP ACTIVITY

Apparatus and Materials

Drawing paper, pen, scissors, glue, computer

Steps

1. Gather information on innovations for future energy from various sources.

2. Discuss the information gathered with group members.

3. Create a poster based on the group discussion.

4. Display your work in class. Group members can view other groups' work.

Question

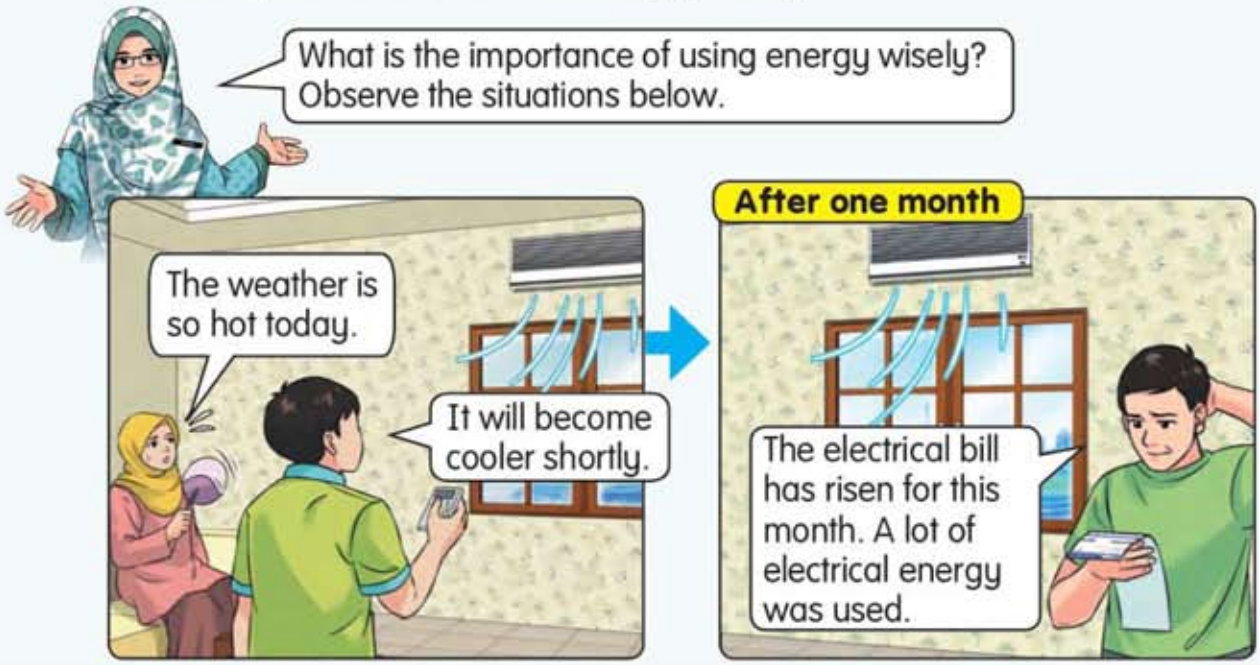
Give an example of renewable energy source that has the potential to be the future source of energy.

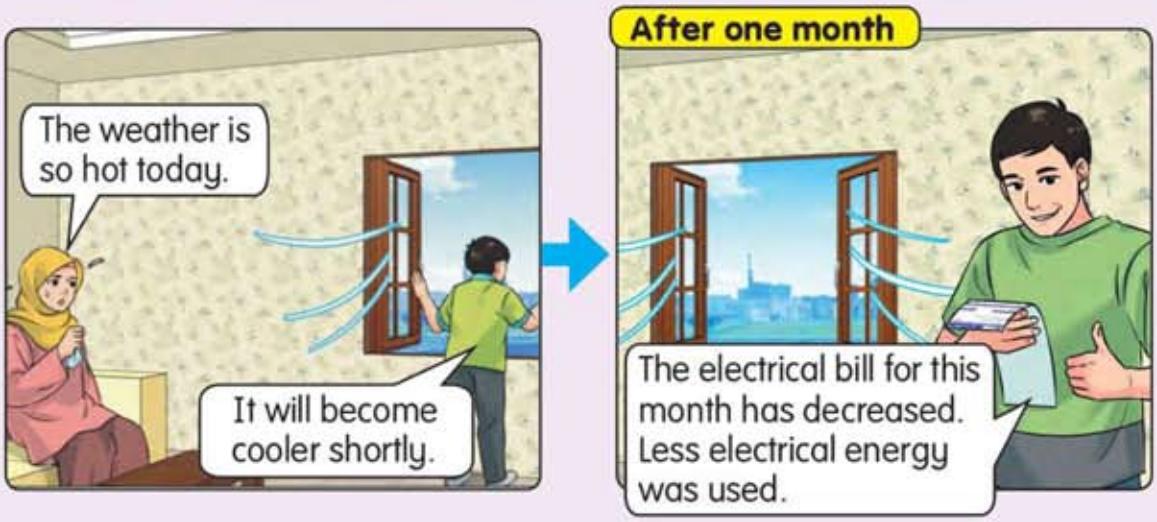
SCIENCE-INFO

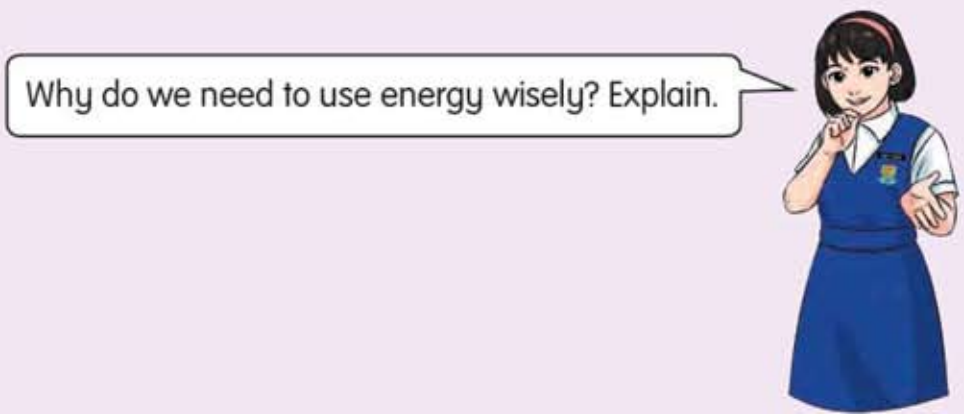
Biodiesel is a fuel made from vegetable oil or animal fat. From February 2019, all petrol stations in Malaysia supply diesel that is mixed with palm oil biodiesel.

Using Energy Wisely

Most of the energy we use today comes from non-renewable energy sources. In order to ensure that we have sufficient energy sources in the future, we need to use the energy wisely.







Situation 1

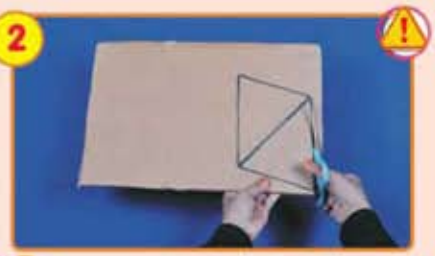
Situation 2

FUN SCIENCE Solar Oven

Steps

Produce a solar oven using used materials such as a shoe box, polystyrene, aluminium foil, black sugar paper, plastic sheet, adhesive tape, glue, scissors, ruler, marker pen, and an egg.

1 

2 

3 

4 

5 

6 

7 

8 

9 

MIND REFLECTION

1. Energy is the ability to do work.
2. Energy sources can be classified into 2 types:

Energy Sources

Renewable

A source of energy that can be generated continuously.

Sun


Waves


Water


Wind

Biomass


Non-renewable

Energy sources that are limited and cannot be regenerated.

Fossil Fuels


Coal


Natural gas


Petroleum

Nuclear Substance


Uranium

3. Forms of energy are solar energy, potential energy, kinetic energy, light energy, heat energy, nuclear energy, electrical energy, sound energy, and chemical energy.
4. Energy cannot be created or destroyed but it can be transformed. For example, transformation of energy while cycling:
   Chemical energy → kinetic energy.
5. The importance of using energy wisely are:
   (i) to prevent wastage of energy.
   (ii) to reduce the environmental pollution.

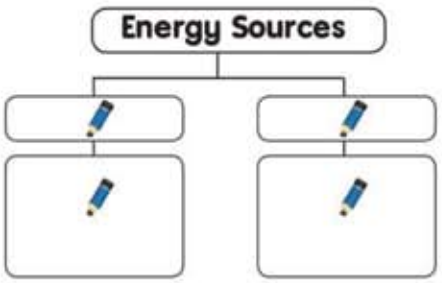
MIND TEST

Answer all questions in the Science exercise book.

1. Energy is _____ to do work.
2. State the transformation of energy which are involved in the situations below.

(a)  (b)  (c)  (d) 

3. Complete the following classification table.



4. The diagram below shows the transformation of energy when using the mobile phone.

(a) What happens to the electrical energy when the phone is being charged?
(b) Why does the battery of the phone need to be recharged?
(c) What can you conclude about energy in the situation above?

5. Read the statement below.

> We are constantly using non-renewable energy sources such as petroleum and natural gas, while those energy sources are decreasing.

Based on the statement above, describe how and why it is important to use these sources wisely.