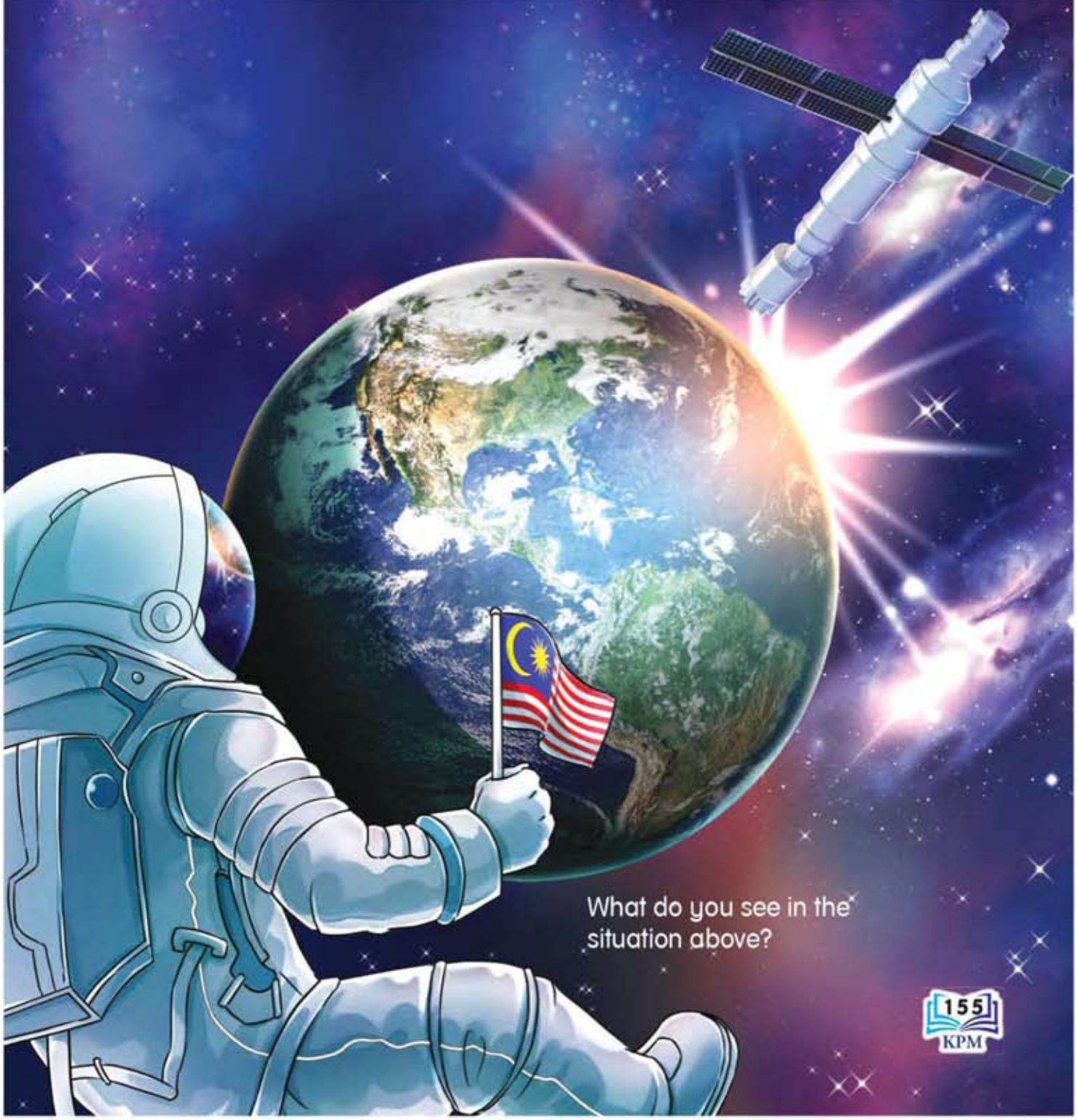
UNIT 9

EARTH

The rotation of Earth around the Sun has led to several phenomena.

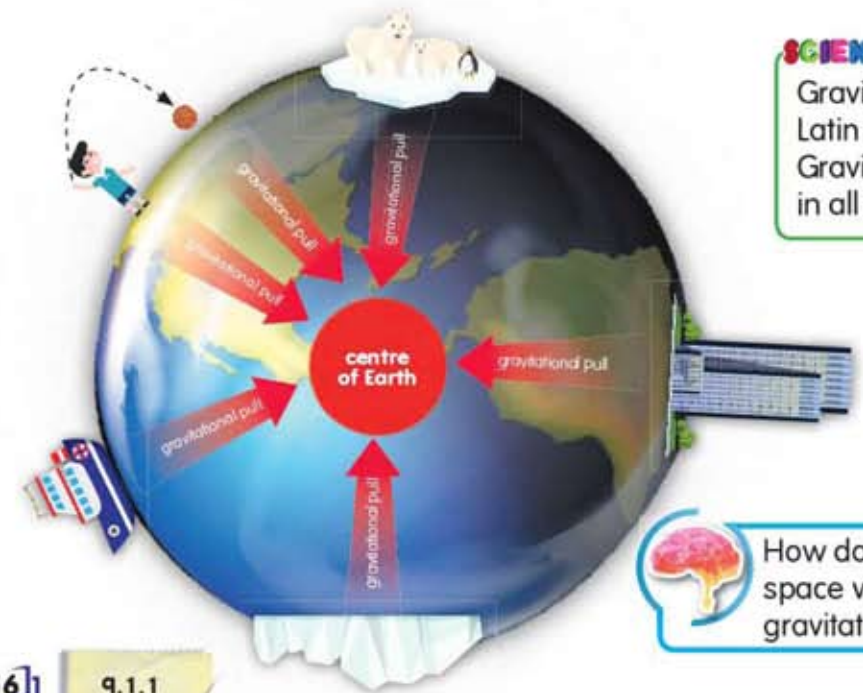


What do you see in the situation above?

Gravity of Earth

While Fariz is playing with Jimi and Mei Lan, he discovers that every object which is tossed up will fall to the ground. Why are these objects unable to float in the air?

All objects that are around us are pulled towards the centre of Earth by a force known as the **gravitational pull on Earth.**



SCIENCE-INFO

Gravity or *gravitas* in Latin means weight. Gravitational pull is present in all objects.

How does an astronaut live in space without the presence of gravitational pull? Explain.

LET'S TEST Gravitational Pull on Earth

GROUP ACTIVITY

Aim To investigate the gravitational pull on Earth.

Apparatus and Materials Plastic ball, chair

Steps

1. Release a plastic ball from different directions and heights as shown in the pictures below.


Drop from the top of a chair


Drop from the right side


Drop from the left side


Toss up


Throw to the back

2. Observe and record the directions of the movements of the plastic ball as shown in the table below.

Direction of ball released	Observation (upward/downward)
From the top of a chair	

Questions

1. State the directions of the movement of the plastic ball as you have observed.
2. Why was the ball moving in that direction?

9.1.1
9.1.3

TEACHER'S NOTES

The plastic ball can be replaced by other objects that are not dangerous such as bean bag.

Gravitational Pull on Earth

The gravity of Earth is the force that pulls objects towards the centre of Earth. Without the gravitational pull on Earth, all objects will float in the air.

LET'S TEST — Effects of the Gravitational Pull on Earth

GROUP ACTIVITY

Aim To investigate the effects of the gravitational pull on Earth on the position of objects.

Apparatus and Materials Adhesive clay, marker pen, models of objects, globe, scissors

Steps

1. Sketch an object on a white paper and cut it using scissors.

2. Paste the models of objects on the globe using the adhesive clay.
3. Rotate the globe slowly and observe what happens to the models of objects on the globe.
4. Record your observations.

Questions

1. Why are the models of objects able to remain in their position on the globe? Explain.
2. What is your conclusion for this activity?

What can you summarise about the effect of gravitational pull and the position of objects on Earth?

All objects on Earth remain in their positions because of the presence of **gravitational pull on Earth**.

9.1.2
9.1.3

TEACHER'S NOTES

- Teacher helps pupils to build a simple analogy on the effects of gravitational pull on Earth without including the effects of other types of forces.
- All objects on Earth remain in their positions. A globe can be used to demonstrate how.

Importance of Gravitational Pull on Earth

The gravitational pull on Earth is important for the objects to remain in their positions. Observe the situation below.

Situation 1

What would happen if Earth does not have gravitational pull? Observe the situation below.

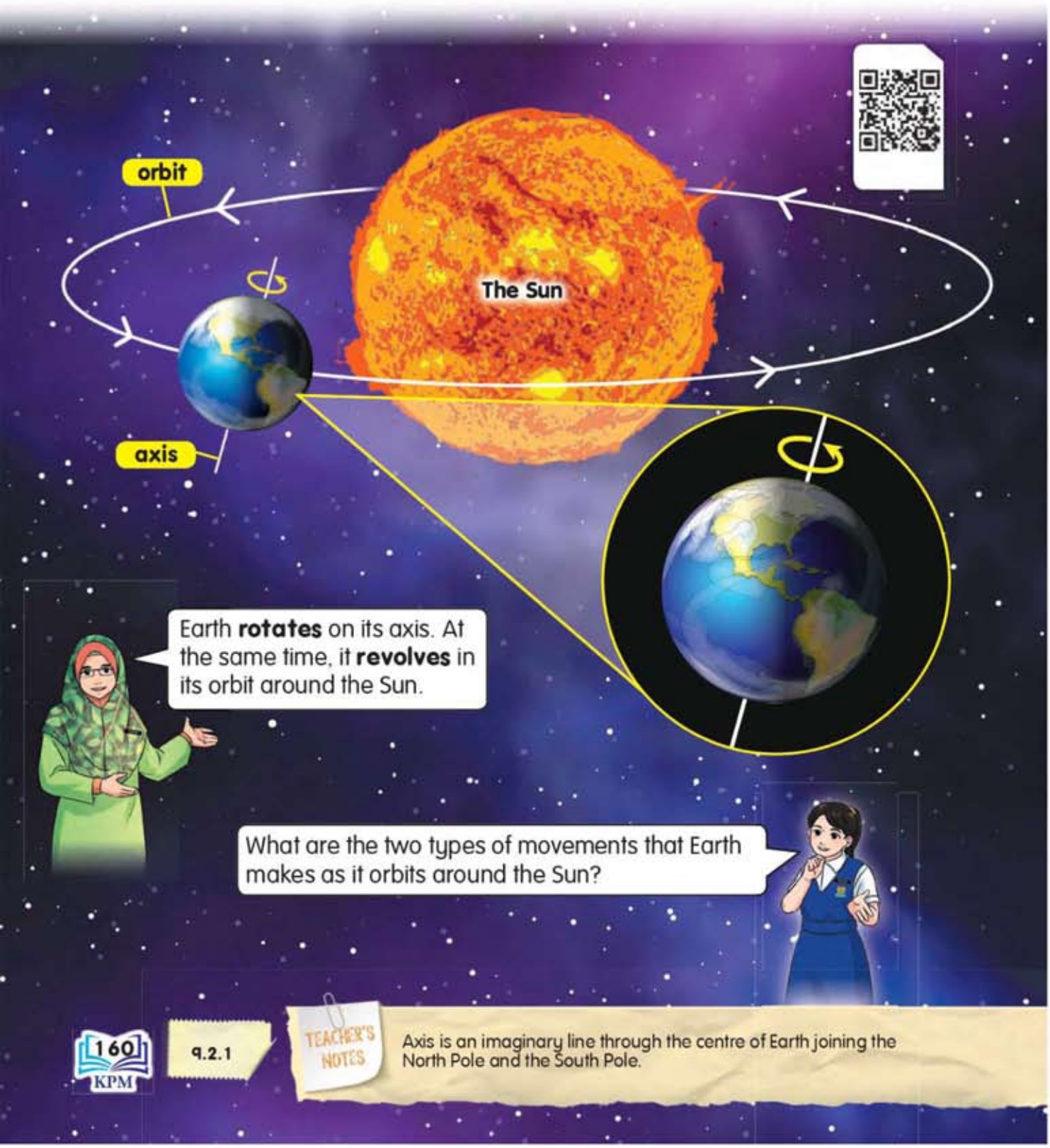
Situation 2

Why are the objects floating in the air?

Gravitational pull on Earth causes the objects to remain in the positions and not float in air.

Rotation and Revolution of Earth

You have learned that Earth and all other planets **revolve** around the Sun in their own orbits. Besides revolving, does Earth have other types of movements? Observe the situation below.



TEACHER'S NOTES

Axis is an imaginary line through the centre of Earth joining the North Pole and the South Pole.

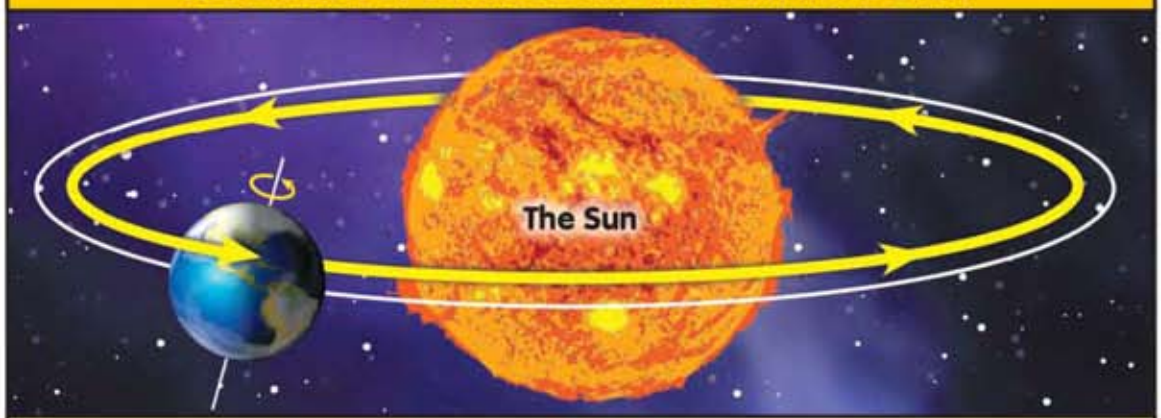
Direction and Duration of Rotation and Revolution of Earth

Observe the direction of rotation and revolution of Earth in the figures below.

Rotation of Earth on its axis

from **West to East**

Revolution of Earth around the Sun in its orbit



Anticlockwise direction

SCIENCE-INFO

Earth rotates on its axis in an anticlockwise direction.

anticlockwise

clockwise

Based on the information above, what can you state about the direction of the rotation and revolution of Earth?

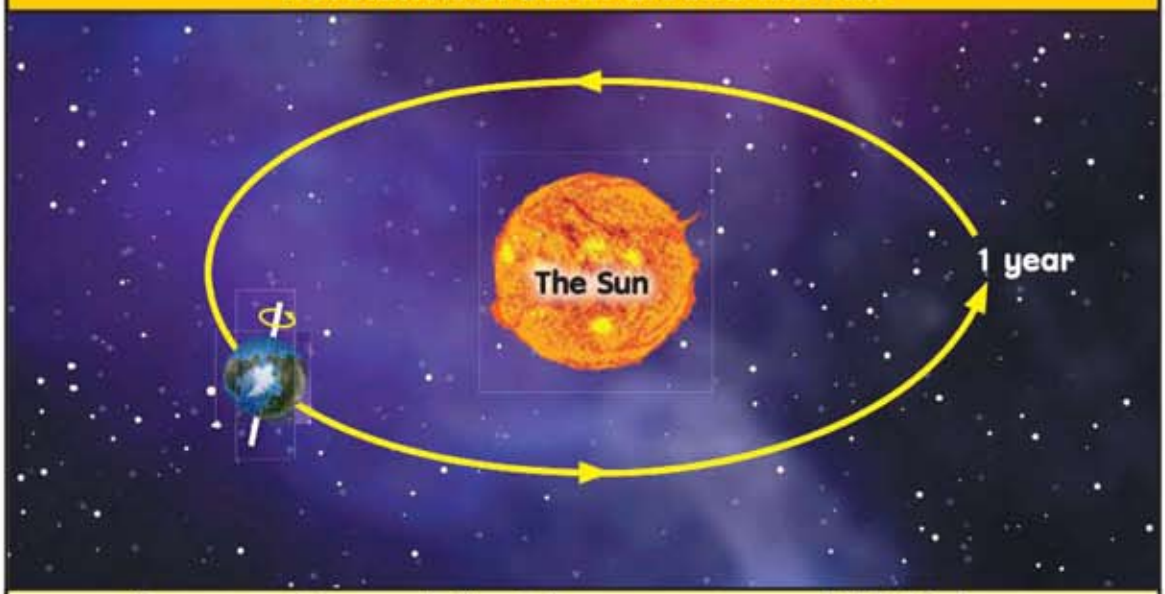
9.2.2
9.2.4

How about the duration for Earth to rotate and revolve? Observe the figures below.

Rotation of Earth on its axis

One complete rotation takes **24 hours** or **one day**.

Revolution of Earth around the Sun



One complete revolution takes **one year** or **365 ¼ days**.

Based on the information above, what can you state about the duration of the rotation and revolution of Earth?

Effects of the Rotation of Earth on Its Axis

The rotation of Earth causes several phenomena to happen. Look at the situations below.

1 Occurrence of day and night

The side of Earth that faces the Sun experiences day time. The side of Earth that faces away from the Sun experiences night time.

2 The Sun seems to change its position

3 Changes in length and direction of the shadow

Morning Noon Evening

How do you know that Earth rotates from West to East?

LET'S TEST **Effects of Rotation of Earth**

GROUP ACTIVITY

Activity 1

Aim To investigate the effects of rotation of Earth on its axis.

Apparatus and Materials Globe, torch, red and yellow modelling clay

Steps

1. 

   Mark the position of Malaysia on the globe using the red modelling clay and the position of Canada using the yellow modelling clay.

2. 

   Darken the science room. Then, direct the torch towards the globe.

3. 

   Rotate the globe in an anticlockwise direction. Then, observe and record your observation.

Questions

1. What is the difference between the side that is facing the torch and the side which is not facing the torch?
2. Based on your observations, what is a phenomenon on Earth that you can relate to?

Activity 2

Apparatus and Materials Paper plate, plastic plate, 5 cm-pencil, marker pen, ruler, adhesive tape

Steps

1. Stick the paper and plastic plates together using adhesive tape.

2. Make a hole in the centre of the paper plate and hold the pencil upright like a pole.

3. Place the plate on the floor in the sunlight.

4. Draw the direction and length of the shadow starting from 8:00 a.m. to 4:00 p.m. at two-hour intervals.

5. Record your observation as shown in the table below.

Time	Direction of the Sun (East/West)	Direction of shadow (East/West)	Length of shadow (cm)
8:00 a.m.			

Questions

1. What are the changes in the direction of the Sun throughout your observation?
2. What happens to the direction and length of the shadow?

Based on the activities above, what can you explain about the effects of the rotation of Earth on its axis?

What about the phenomena caused by the revolution of Earth? Gather information and discuss with your friends.

FUN SCIENCE Earth Simulation Model

Steps

Produce a simulation model of Earth using a used box, nuts and bolts, two polystyrene balls in different sizes, and adhesive tape. The model is produced based on your creativity.

1

2

3

4

5

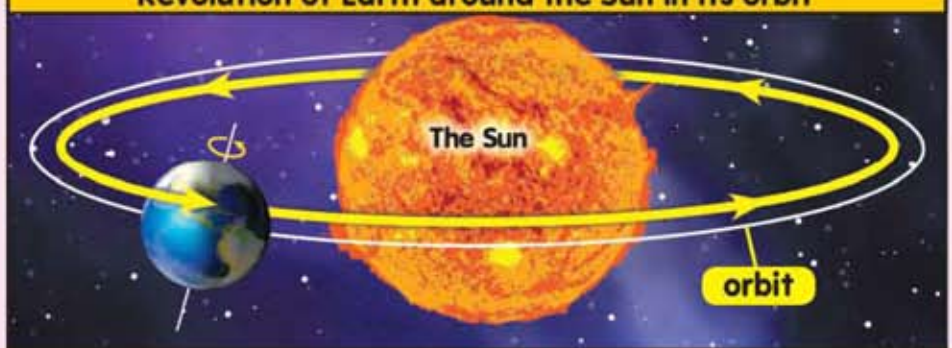
MIND REFLECTION

1. Gravity of Earth is a force that pulls objects towards the centre of Earth.
2. The effects of gravitational pull on Earth are:
   (a) objects fall freely.
   (b) objects remain in their positions.
3. Earth rotates on its axis and at the same time revolves around the Sun in its orbit.
4. The direction and duration of the rotation and revolution of Earth are as follows:

Rotation of Earth on its axis

Direction	**West to East**
Duration	**24 hours** or **1 day**

Revolution of Earth around the Sun in its orbit



Direction	**anticlockwise**
Duration	**1 year** or **365¼ days**

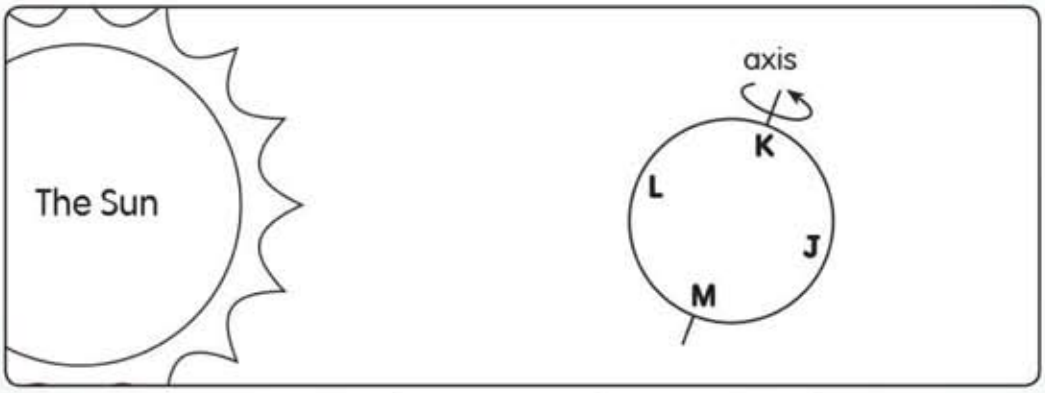
5. The effects of the rotation of Earth on its axis are:
   (a) occurrence of day and night.
   (b) the Sun seems to change its position.
   (c) changes in the length and direction of the shadow.

MIND TEST

Answer all questions in the Science exercise book.

1. What is gravitational pull on Earth?
2. State the effects of gravitational pull on Earth.
3. Which of the following is not the effects of the rotation of Earth?
   - A Occurrence of day and night.
   - B The objects remain in their position.
   - C Changes in length and direction of the shadow.
   - D The Sun seems to change its position.

4. (a) All objects on Earth remain in their positions because of _____
   (b) Earth _____ on _____ and at the same time _____ in _____ around the Sun.
   (c) The rotation of Earth on its axis in its revolution around the Sun is from _____ to _____.
5. What would happen if Earth has no gravitational pull?
6. The diagram below shows the rotation of Earth on its axis.



   (a) What is the duration for one complete rotation of Earth?
   (b) If it is day time at J, which part is night time?