Experiment worksheet

9.1 The Earth, Sun and Moon interact with each other

Pages 156–157 and 211

Challenge 9.1: Modelling how the Earth moves in space

Night and day, the seasons and a year can be demonstrated using a simple model.

What you need:

Model of the Earth (this can be a globe, an Earth ball or a balloon with the continents drawn on it with a felt-tip pen), torch or projector, light bulb on stand

What to do:

Night and day

1 Make your classroom as dark as possible and shine a light from a torch or a projector onto the model of the Earth. This shows night and day on the model Earth. It is daytime on the part of the Earth with the light shining on it, and it is night-time on the part of the Earth in shadow.

2 Rotate the globe so that dawn, then dusk, then dawn appear.

• In which direction should the Earth spin? (Hint: In winter, it is dawn in Melbourne 2 hours before the Sun comes up in Perth.)

A year

1 Darken your classroom and set a single light bulb on a stand in the middle of the room. This is a model of the Sun, which shines light in all directions.

2 Hold your model of the Earth and walk in a circle around the lamp. This is the Earth going around the Sun. One circle, or orbit, is one year. To model the Earth accurately, you should spin the Earth as it orbits the Sun.

• How many times should the Earth spin in one orbit?

Modelling solar eclipses

Model a solar eclipse by positioning the Moon between the Sun and the Earth. You will need to suspend the Moon from a piece of string to avoid casting your own shadow onto the Earth. Observe the Earth as the Moon comes into position.

• During which phase of the Moon does a solar eclipse occur?

Experiment worksheet

9.2 The Moon reflects the Sun’s light

Pages 158–159 and 212

Challenge 9.2: Modelling the phases of the Moon

What you need:

Torch or lamp with exposed light bulb, globe or basketball, tennis ball, 1 small foam ball

What to do:

1 In small groups, use a torch or light bulb in a fixed position to represent the Sun. One person should then hold a globe or basketball to represent the Earth, and another should hold a tennis ball to represent the Moon.

2 Begin by rotating the Earth as it orbits the Sun. Try to work out how the Moon would orbit the Earth as the Earth orbits the Sun.

• Does this explain why we only see one side of the Moon?

• When people refer to the ‘dark side of the Moon’, are they always talking about exactly the same side?

3 Use a black permanent marker to colour half of the foam ball. Face the white side of the foam ball towards you. This represents the fully lit face of a full Moon. Slowly rotate the foam ball so that the Moon appears to be getting smaller. (You will gradually see more of the darkened side of the Moon.) Draw each phase of the moon as you see it on the foam ball in the space provided.

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Shine the light on the white section of the Moon. Pass the tennis ball between the light and the foam ball. What does this represent?

Experiment worksheet

9.3 Seasons are caused by the tilt of the Earth

Pages 88–89 and 212

Challenge 9.3: Modelling the seasons

What you need:

Torch or lamp with exposed light bulb, globe or basketball, tennis ball, 8 small foam balls

What to do:

1 Use a torch or light bulb in a fixed position to represent the Sun. One person should then hold the globe or basketball to represent the Earth.

2 The Earth is tilted as it orbits the Sun. Hold your model Earth so that it is tilted slightly. Imagine the axis is tilted to point towards the numbers 1 and 7 on a clock face. Do not change this tilt during the activity.

3 Walk slowly in a circle around the lamp, at the same time rotating the model Earth. Make sure the tilt always points in the same direction. When it is summer in Australia, the Sun is almost overhead. In winter, the sunlight arrives at an angle and is more spread out.

• When you have walked half a circle around your Sun, stop and look at the model Earth. How is it different? Which part of the Earth is having summer?

• How did the seasons change on one pint of the ball as it moved around the Sun?

• A student claimed it is hotter in summer because Australia is closer to the Sun. Are they correct? Provide evidence from your model to support your answer.

