# PRIMARY SCIENCE

## BOOK E

Animals Groups and
Food Chains
What Do You Eat?
Inside the Earth
Earth, Sun and Moon
Changes
Dissolving and
Separating
Investigating Sound

**R.I.C. Publications**

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# Foreword

***Primary Science E*** is one of series of seven blackline masters written for use in New Zealand primary schools. Each book presents eight units that cover the four strands of the New Zealand Curriculum: The Living World, Planet Earth and Beyond, The Physical World, The Material World.

Comprehensive teachers notes accompany each student activity. Concepts, knowledge and skills share an equal emphasis in each unit, along with developing positive attitudes to science.

***Primary Science*** gives students the opportunity to enhance their knowledge of the world around them and to engage in collaborative learning that makes science interesting and exciting.

Indicators and assessment pages have been designed to match the New Zealand curriculum.

Titles in this series are:

- **Primary Science – Book A**
- **Primary Science – Book B**
- **Primary Science – Book C**
- **Primary Science – Book D**
- **Primary Science – Book E**
- **Primary Science – Book F**
- **Primary Science – Book G**

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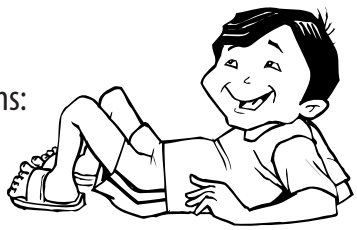
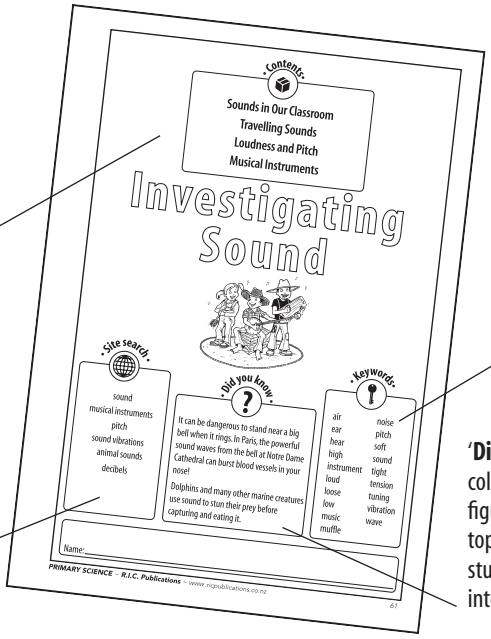
# Teacher Information



Each book contains eight science units. Each unit is made up of ten pages, and contains:

- *a cover page;*
- *four teacher pages;*
- *four student pages;*
- *an assessment page.*

The **first page** of each unit is a cover page designed for the students. Listed are the titles of the four activities included in the unit. The cover page can be glued into student workbooks at the beginning of a unit or copied and attached to the completed blacklines at the end of the unit. The students can colour the title of the unit on the page.



Contents

Sounds in Our Classroom
Travelling Sounds
Loudness and Pitch
Musical Instruments

Investigating Sound

Site search: sound, musical instruments, pitch, sound vibrations, animal sounds, decibels

Did you know: It can be dangerous to stand near a big bell when it rings. In Paris, the powerful sound waves from the bell at Notre Dame Cathedral can burst blood vessels in your nose! Dolphins and many other marine creatures use sound to stun their prey before capturing and eating it.

Keywords: air, ear, hear, high, instrument, loud, loose, low, music, muffle, noise, pitch, soft, sound, tight, tension, tuning, vibration, wave

Name:

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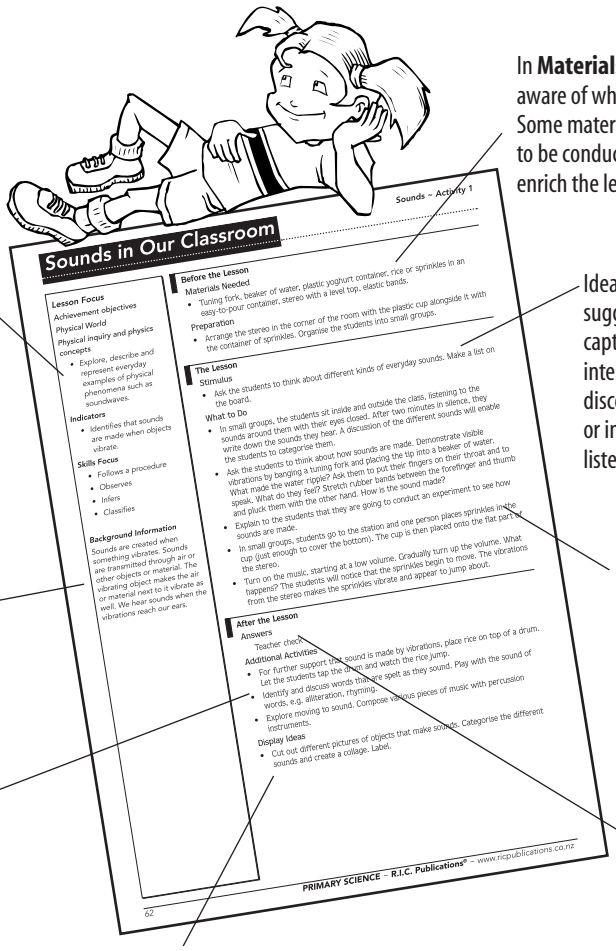
**Keywords** have been given for each unit, in alphabetical order. These words can be introduced and discussed at the beginning of a unit or they can be a focus as they appear throughout the activities. Introducing scientific terminology to meet the needs of individual students is discussed on page v.

**Site search** is a list of keywords and phrases for use by the students. They can be typed directly into the students' preferred Internet search engine to promote the most appropriate response to the topic.

'**Did you know?**' is an eclectic collection of interesting facts and figures relating to one or more of the topics. It is designed to engage the students' attention and stimulate their interest in the area being studied.

The **teacher pages** include information to assist the teacher with each lesson.



Sounds – Activity 1

Sounds in Our Classroom

Lesson Focus
Achievement objectives
Physical World
Physical inquiry and physics concepts
- Explore, describe and represent everyday examples of physical phenomena such as soundwaves.

Indicators
- Identifies that sounds are made when objects vibrate.

Skills Focus
- Follows a procedure
- Observes
- Infers
- Classifies

Background Information
Sounds are created when something vibrates. Sounds are transmitted through air or other objects or material. The vibrating object makes the air or material next to it vibrate as well. We hear sounds when the vibrations reach our ears.

Before the Lesson
Materials Needed
- Tuning fork, beaker of water, plastic yoghurt container, rice or sprinkles in an easy-to-pour container, stereo with a level top, elastic bands.

Preparation
- Arrange the stereo in the corner of the room with the plastic cup alongside it with the container of sprinkles. Organise the students into small groups.

The Lesson
Stimulus
- Ask the students to think about different kinds of everyday sounds. Make a list on the board.

What to Do
- In small groups, the students sit inside and outside the class, listening to the sounds around them with their eyes closed. After two minutes in silence, they write down the sounds they hear. A discussion of the different sounds will enable the students to categorise them.
- Ask the students to think about how sounds are made. Demonstrate visible vibrations by banging a tuning fork and placing the tip into a beaker of water. What made the water ripple? Ask them to put their fingers on their throat and to speak. What do they feel? Stretch rubber bands between the forefinger and thumb and pluck them with the other hand. How is the sound made?
- Explain to the students that they are going to conduct an experiment to see how sounds are made.
- In small groups, students go to the station and one person places sprinkles in the cup (just enough to cover the bottom). The cup is then placed onto the flat part of the stereo.
- Turn on the music, starting at a low volume. Gradually turn up the volume. What happens? The students will notice that the sprinkles begin to move. The vibrations from the stereo makes the sprinkles vibrate and appear to jump about.

After the Lesson
Answers
Teacher check.
Additional Activities
- For further support that sound is made by vibrations, place rice on top of a drum. Let the students tap the drum and watch the rice jump.
- Identify and discuss words that are spelt as they sound. Play with the sound of words, e.g. alliteration, rhyming.
- Explore moving to sound. Compose various pieces of music with percussion instruments.

Display Ideas
- Cut out different pictures of objects that make sounds. Categorise the different sounds and create a collage. Label.

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The activities in *Primary Science* have been written to the **New Zealand curriculum, Science strands.** The achievement objectives for the unit are listed and specific indicators that match each activity are included. These **Indicators** can be transferred to the assessment proforma on page ix.

In **Materials** and **Preparation**, the teacher is made aware of what needs to be done before the lesson. Some materials and tasks are required for the activity to be conducted; others are suggestions that will enrich the lesson.

Ideas under the **Stimulus** heading are suggested short activities or discussions to capture the students' attention and spark an interest in the topic. Teachers will also able to discover the existing knowledge of the class or individual students regarding the topic by listening to their responses and observations.

**What To Do** gives suggested step-by-step instructions for the activity. The accompanying blackline may be the focus of the activity or it may be where the students record their observations and ideas after completing the task.

**Background Information** for each activity is included for the teacher.

**Additional Activities** can be used to further develop the outcomes being assessed. These activities provide ideas to consolidate and clarify the concepts and skills taught in the unit.

**Display Ideas** for the classroom give the teacher suggestions for the students in the topic and ways of presenting work that has been completed during the unit.

The **Answers** for the activities on the blackline are included. Some answers will need a teacher check, while others may vary depending on the students' personal experiences or observations.

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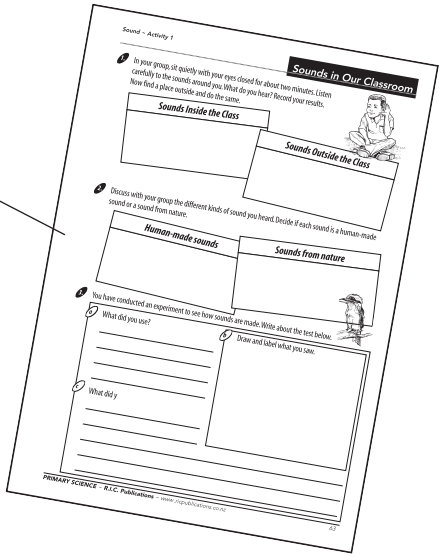
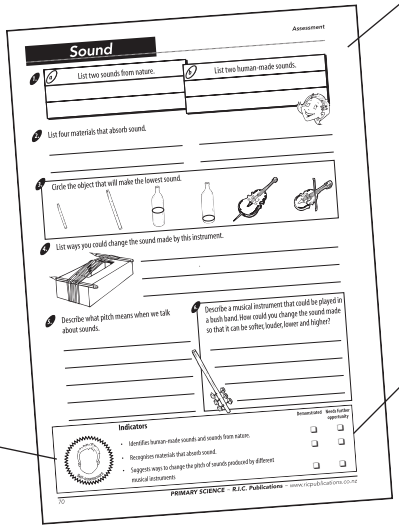
# Teacher Information

The **student pages** contain a variety of activities. The written activities may be the focus of the lesson or they may be where the students record their observations, investigation results and discoveries.

The focus of each blackline master is given in the indicators on the accompanying teachers' page.




On the final page of each unit is the **assessment page**. Questions have been written that will assess individual student knowledge and understanding of the main ideas in the unit. The questions have been written from the specific indicators and overall outcomes of the unit. Each assessment page places an emphasis on content and understanding as well as skills.




After completing the unit, the students can assess themselves and provide feedback to the teacher and their parents by completing the **self-assessment face**. This face indicates how they felt about the topic. It is important that the self-assessment takes place prior to marking by a teacher.

**Indicators** have been written in language easily understood by parents, students and teachers and can be used as a point of reference in parent-teacher interviews or three-way conferences. These indicators can be transferred to the assessment proformas on pages ix and xi.

Assessment proformas have been included on pages ix and xi, with an explanation of how to use them on the preceding pages.

Each book of ***Primary Science*** has eight units. This gives teachers the opportunity to change topics every five weeks over one school year. However, there is no prescribed length of time for each unit. All units include some activities that can be completed in one lessons, others may go over two lessons, depending on a variety of factors, such as:

- *the stimulus suggesting learning about science outside the classroom;*
- *the students needing to make observations prior to the lesson;*
- *an experiment being conducted that needs to be observed over a number of days;*
- *the students being required to find information by researching, using the Internet, conducting surveys or interviews;*
- *a concept needing to be clarified further to ensure understanding.*

***Primary Science*** has been written to the New Zealand curriculum. The units and activities can be followed precisely or adapted to meet the needs of specific schools and to suit individual styles of teaching. Suggestions for setting up a science classroom and for teaching science can be found on page iv. Ideas for teaching science to meet the special needs of individual students are discussed on page v, along with exciting ideas for presenting scientific information.

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## Contents

Sun, Earth and Moon
Sunrises and Sunsets
Seasons
The Moon

# Sun, Earth and Moon

## Site search

space
sun, Earth and moon
solar system
phases of the moon
Earth's axis
ellipse
seasons

## Did you know

The Earth tilts at 23.5 degrees from the vertical!

## Keywords

axis
day
Earth
ellipse
globe
hemisphere
Moon
night
orbit
rotate
satellite
seasons
shadow
solstice
sphere
sun
tilt
vertical

Name: _____

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# Sun, Earth and Moon

***Lesson Focus***

*Achievement objectives*

*Planet Earth and Beyond*

*Astronomical systems*

- *Share ideas about the Sun and the Moon and their physical effects on the light available to Earth.*

***Indicators***

- *Recognises that the Earth, sun and moon are spheres.*
- *Records simulations of the passing of a day and a year through illustrations and explanations.*

***Skills Focus***

- *Records*
- *Observes*
- *Follows a procedure*

***Background Information***

*The Earth spinning on its axis gives us day and night. The Earth takes 24 hours to completely rotate on its axis – this equals one day. When the sun shines on a part of the Earth it is daytime. The side of the Earth that is facing away from the sun is in darkness and so it is night-time for that side.*

*The sun appears to move across the sky because of this rotation but it is the Earth that is moving, not the sun.*

*Throughout the day, shadows change from being long in the morning and evening and shorter during the middle part of the day. This is because the sun appears at its highest in the sky at midday.*

## Before the Lesson

Materials Needed

- Photographs and/or video of the Earth from space, photographs of the moon and sun from the Earth, a globe, torch, pea, small bead (1/4 the size of a pea), beach ball, netball, tennis ball, golf ball.

Preparation

- Rest the different-sized balls on a table for the students to view them. Use 'blu-tack' to fix the balls to the table.

## The Lesson

Stimulus

- Discuss past beliefs that the Earth was flat, and sayings such as 'falling off the edge of the Earth'. Talk about ships that sailed around the world and seemed to disappear and then reappear over the horizon. What evidence do we have now that the Earth is not flat but a sphere? Show the students a video or pictures of the Earth taken from space. Explain that we had not seen the Earth until about 40 years ago, when we received photographic evidence from space.

What to Do

- Ask the student what shape the Earth, sun and moon are. What other objects are this shape? (Planets, balls etc.) Show the students the beach ball. Tell them that this represents the sun. Ask students to come up and choose a ball to represent the Earth to scale. Ask another student to choose a ball to represent the moon. Let them continue to choose until the pea (Earth) and tiny bead (moon) are picked. Explain that the Earth and moon are very small relative to the size of the sun.

- Revise why we have 'day and night' through a simulation using a globe and a torch. Place a sticker on the part of the globe that the students live in. Ask a student to either turn the globe or turn themselves. The student holding the torch is representing the sun. Explain that the Earth rotates in an anticlockwise direction. This is why the sun always appears to rise in the east and set in the west.
- Ask the students how long it takes the Earth to orbit the sun. Use two students to model the Earth orbiting the sun (slowly) and rotating anticlockwise on an axis at the same time.

## After the Lesson

Answers

1. (d) Sphere
2. Teacher check
3. (a) 24 hours (b) anticlockwise
   (c) year
4. See Background Information.

Additional Activities

- In small groups, students devise a role play demonstrating the Earth rotating while it revolves around the sun.
- Students create an information poster that explains the relationship between the Earth, sun and moon.

Display Ideas

- Display information posters.
- Display hanging models of the Earth, sun and moon. To make a model to scale, a beach ball can be used as the sun, a pea for the Earth and a small bead (one-quarter the size of the pea) can represent the moon.

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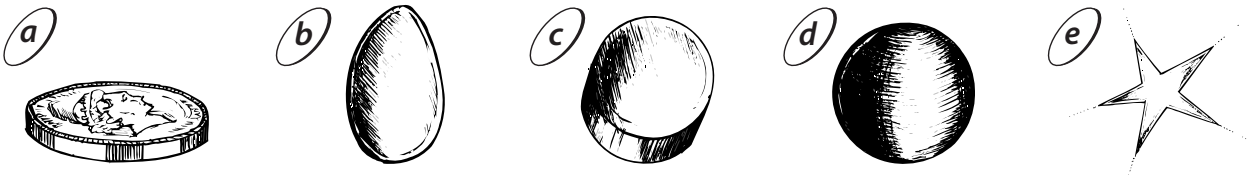
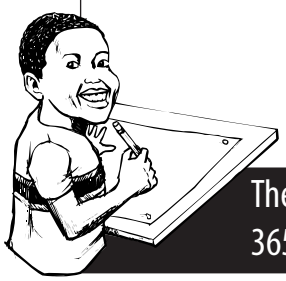
# Sun, Earth and Moon

**1.** Circle and name the shape that is the most similar to the sun, Earth and moon.




_____

**2.** Draw diagrams to demonstrate the sentences below. Remember to label your diagrams.



The Earth orbits the sun every $365^{1}/_{4}$ days, giving us one full year.

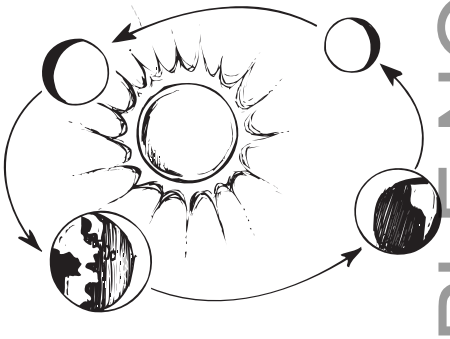
The Earth rotates on its axis, giving us day and night.

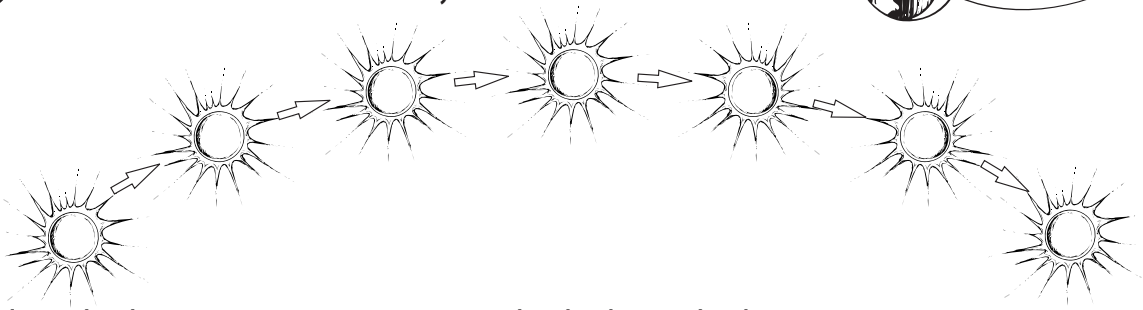
**3.** Colour the correct answer.

(a) The Earth rotates on its axis every | 12 | 24 | hours.

(b) The Earth rotates in | a clockwise | an anticlockwise | direction.

(c) The Earth orbits the sun once every | month | year |.





**4.** Explain why the sun appears to move across the sky during the day.

_____

_____

_____

_____

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# Sunrises and Sunsets

***Lesson Focus***

*Achievement objectives*

*Planet Earth and Beyond*

*Astronomical systems*

- *Share ideas about the Sun and the Moon and their physical effects on the light available to Earth.*

***Indicators***

- *Recognises that the length of days differs between seasons.*
- *Constructs simple graphs to show patterns regarding sunrise and sunset times throughout the year.*

***Skills Focus***

- *Records*
- *Observes*
- *Interprets data*

***Background Information***

*Because the Earth is constantly rotating in an anticlockwise direction while it is orbiting the sun, the sun appears to 'rise' each morning from the east and 'set' in the west.*

*During the summer, we experience sunrise earlier than in winter. The sun also sets later in the evening.*

*In winter, daylight hours are much shorter. This is due to the Earth's tilt on its axis at 23.5 degree from the vertical. The solstice denotes the longest (summer solstice) and shortest (winter solstice) days of the year.*

*Note: a common misconception is that summer days are longer than winter days. Days in summer and winter are of the same length of time – the number of daylight hours/minutes will vary.*

## Before the Lesson

### Materials Needed

- Current newspapers

### Preparation

- Ask the student to be aware of the times that the sun rises and sets over the next few weeks. Make records of setting times by observing the sky, newspapers and weather reports on television.

## The Lesson

### Stimulus

- Ask the students what time the sun set the previous night. What time did it rise in the morning? Compare the time the sun sets now to six months ago. What about the time the sun rises? Has that changed in the last six months?

### What to Do

- Discuss evening activities that the students are doing at the moment. What about evening activities from six months ago–could they play sport inside or outside then?
- Begin discussing in further detail the time that the sun is rising and setting currently. How will this change in the next two months? What about the next six months?
- Ask the students to predict the time the sun set the previous evening and rose that morning. Look at the weather page of a current newspaper. Check the exact time. Discuss who might need to know these times every day.
- Look at the data presented in Question 2. Go through the information with the students. Discuss how to plot the data onto a graph. The students will need to choose a different colour pencil to draw the lines or the points with.
- The students plot the data as a line graph. In pairs, they look at their graphs and discuss the trend.
- Students share their ideas with the class.
- Discuss with the students if they can tell from the graph whether the data have been taken from a place in the southern or northern hemisphere.

## After the Lesson

### Answers

1. (a) Answers will vary (b) Answers will vary (c) daylight
2. (a) Teacher check
   (b) Sunrise gets earlier heading towards summer and then starts getting later. Usually, when sunrise comes earlier, the sun sets later and there are more daylight hours.

### Additional Activities

- Search the Internet for sunrise and sunset times in your own country and then a country on the other side of the world. Is it evident from the data that the country is having days the opposite length to yours?
- Research countries that celebrate the solstice. What solstice festivities were there in the past?

### Display Ideas

- Display sunrise and sunset data with corresponding graphs.
- Paint pictures of summer and winter evening activities.

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# Sunrises and Sunsets

**1.** *Have you noticed that the height of the sun in the sky changes with the seasons? In summer the sun is much higher in the sky than in winter. You may have noticed that the length of shadows change as well. The higher the sun in the sky, the shorter the shadows are. How are the length of the days different throughout the year?*

**a**

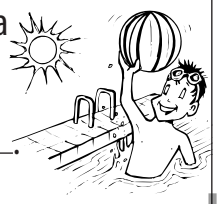
In summer, I wake up and it is _____

and I can play outside longer

because it is _____.

An activity that I do on a summer evening is

_____.



**b**

In winter, I wake up and it is _____

and I go inside earlier because it is _____.

An activity that I do on a winter evening is

_____.

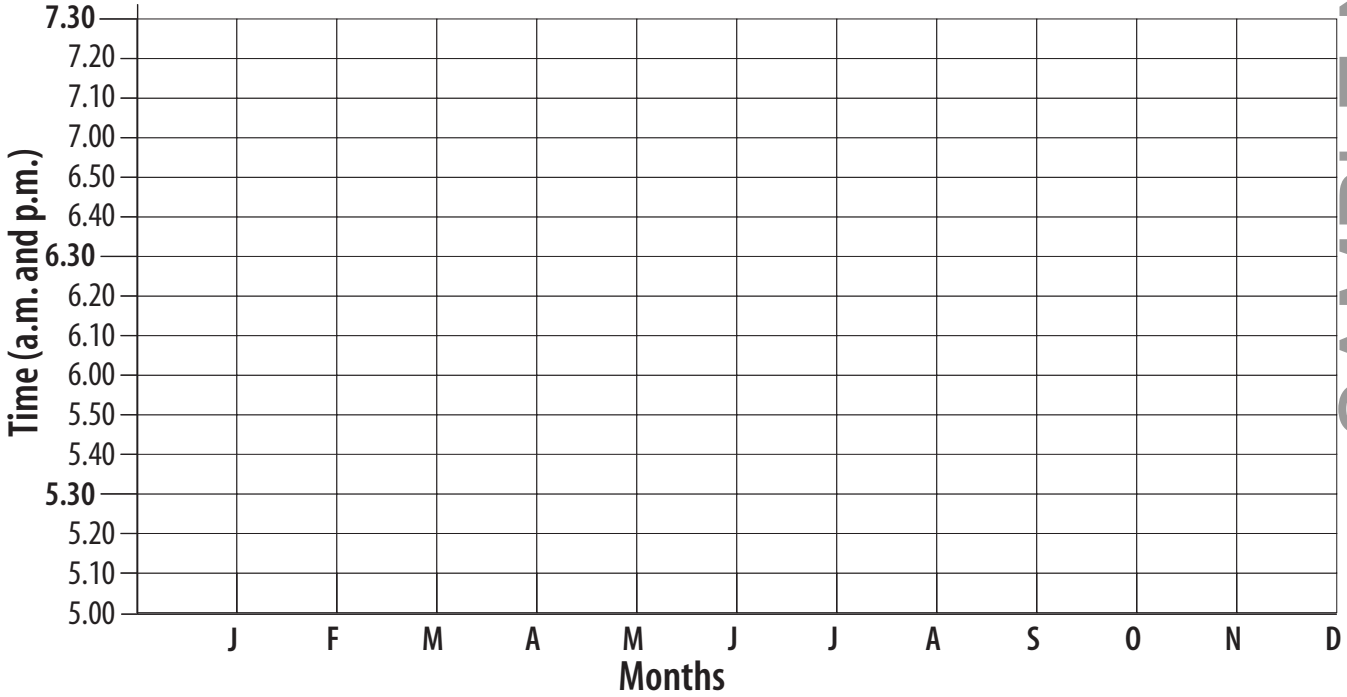
**c**

Summer days have more _____ than winter days.

**2.** Look at the information below. It gives the time the sun rose and set on the 28th of each month for one year.

| | *Jan.* | *Feb.* | *March* | *April* | *May* | *June* | *July* | *Aug.* | *Sept.* | *Oct.* | *Nov.* | *Dec.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sunrise a.m.* | 5.38 | 6.05 | 6.26 | 6.47 | 7.07 | 7.18 | 7.08 | 6.38 | 5.58 | 5.23 | 5.04 | 5.12 |
| *Sunset p.m.* | 7.21 | 6.53 | 6.18 | 5.42 | 5.21 | 5.22 | 5.38 | 5.58 | 6.17 | 6.39 | 7.06 | 7.25 |

**a** Present these sunrise and sunset times as a line graph. Use a different colour pencil for a.m. and p.m.




**b** Write a sentence explaining any patterns you can see in the graph. _____

_____

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# Seasons

### Lesson Focus

*Achievement objectives*

*Planet Earth and Beyond*

*Earth systems*

- *Explore and describe natural features, for example, seasons.*

*Astronomical systems*

- *Share ideas about the Sun and the Moon and their physical effects on the light available to Earth.*

***Indicators***

- *Recognises the link between the tilt of the Earth's axis and the seasons.*

***Skills Focus***

- *Measures*
- *Observes*
- *Interprets data*
- *Forms a hypotheses*

***Background Information***

*The Earth orbits the sun on its tilted axis of 23.5 degrees from the vertical, giving us seasons.*

*When the southern (bottom) part of the Earth is facing the sun, it is summer in the south. Approximately six months later, the southern part of the earth is facing away from the sun, giving that part of the Earth winter.*

*The tilt causes some part of the Earth to get slanting rays of sunlight for some of the year and more direct rays of sunlight at other times.*

*In summer, the sun appears higher in the sky. The length of the shadows changes throughout summer and winter because of the difference in height of the sun between the seasons.*

## Before the Lesson

Materials Needed

- Globe, two thermometers, black paper, two torches, a protractor

Preparation

- Organise the class into small groups. Each group needs two thermometers, two torches, a protractor and construction paper. Use trays to keep each set of materials together.

## The Lesson

Stimulus

- Write the word 'seasons' on the board. Ask the class to tell you about seasons. Once the four seasons have been discussed, ask the class why we have seasons. Listen to their responses and add relevant information to the board. Explain that they are going to be investigating the reason why we have seasons.

What to Do

- Students work in small groups to complete the experiment. Each thermometer is placed on a separate piece of black paper. The initial temperature of the thermometer is recorded in the table on the worksheet. One student shines the light directly over the experiment so that the light is hitting the thermometer vertically. The other student turns the torch at a angle of 23.5 degrees from the vertical. A third student can help by using the protractor to measure the angle. After five minutes, the temperature of the thermometers is measured.
- Discuss the results of each group's experiment. Record them as a table on the board. How does this relate to why we have seasons? Remind the students that the Earth's axis is on a tilt of 23.5 degrees from the vertical. Show them a globe to demonstrate.
- Ask a student to be the sun and hold the torch, and another to be the Earth and hold the globe. Place a sticker on the place the students live in. The Earth slowly walks around the globe showing that at some times of the year the hemispheres are either facing towards the sun or away from it. When it faces towards the sun, the rays are more direct and it is summer, and when a hemisphere points away from the sun, the rays are slanted and it is winter time.
- Students complete Question 1.
- In pairs, students look at each of the four hypotheses from Question 2. They discuss the validity of each, write 'true' or 'false' in the box and then explain their choice. The students discuss their answers and conclude that (ii) is the reason why we have seasons.

## After the Lesson

Answers

1. Teacher check
2. (a) (i) False (ii) True (iii) False (iv) False
   (b) (i) Clouds do not move around the earth causing the seasons. Clouds are formed when water evaporates from oceans, rivers and lakes.
   (ii) It is the tilt of the Earth on its axis that causes the seasons. This tilt causes some parts of the earth to get 'slanting' rays of sunlight for some of the year and more direct rays at other times.
   (iii) The 'swelling and shrinking of the sun' does not cause the seasons.
   (iv) The sun does not orbit the Earth. The earth orbits the sun every 365.25 days

Additional Activities

- Research the impact the seasons have on animal behaviour. Times of migration, hibernation and nesting are all dependent on the seasons.
- Investigate farming and the activities undertaken during different seasons. For example, harvesting occurs during summer when crops, such as wheat and barley, are dry.

Display Ideas

- Ask groups of students to create posters explaining why we have seasons. Information can be typed and attached to the poster.
- Gather and display posters, objects or keywords about each season. Add student explanations about why the seasons occur.

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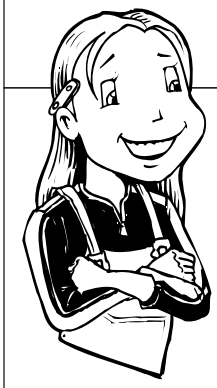
# Seasons

## 1. Seasons Experiment

What materials did you use?

| Results | Initial Temperature (°C) | Temperature after 5 mins. (°C) |
|---|---|---|
| Thermometer with direct light | | |
| Thermometer with light at an angle | | |



Explain how the results of this experiment help us to understand why we have seasons.

_____

_____

## 2. With a partner, discuss each hypothesis explaining why we have seasons.

(a) Decide if it is true or false. Write 'T' or 'F' in the box.

(b) Write a sentence explaining your choice.

**i**

In summer, the clouds move to one side of the Earth making it sunnier. In winter the clouds come back.

_____

_____

_____

**ii**

If the South Pole is pointed towards the sun, it is experiencing summer. In winter, it is pointed away from the sun.

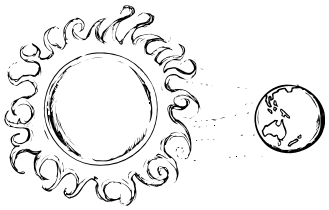
If the North Pole is pointed towards the sun, it is experiencing summer. In winter, it is pointed away from the sun.

_____

_____

_____

**iii**



In summer, the sun swells making the Earth warmer. It gets smaller in winter making the Earth colder.

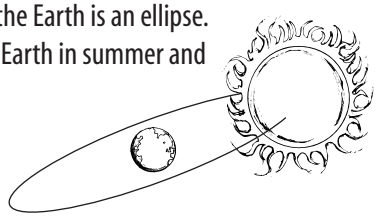
_____

_____

_____

**iv**

The sun's orbit around the Earth is an ellipse. The sun is closer to the Earth in summer and further away in winter.



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# The Moon

### *Lesson Focus*

*Achievement objectives*

*Planet Earth and Beyond*

*Astronomical systems*

- *Share ideas about the Moon and its physical effects on the light available to Earth over time.*

***Indicators***

- *Relates the phases of the moon to the relative position of the sun, Earth and moon.*

***Skills Focus***

- *Records*
- *Observes*
- *Infers*

***Background Information***

*The moon is a natural satellite of the Earth. We see the moon because light from the sun reflects off it. The moon does not give off light of its own. It takes approximately one month for the moon to move around the Earth. As it moves, its shape appears to change. These changes in shape occur because we can not always see the side of the moon that is in sunlight or we are seeing only part of the sunlit side.*

*The moon is held in orbit round the Earth by the Earth's gravitational pull.*

*The moon rotates on its axis once per orbit of the earth. It keeps the same side facing the Earth at all times. Half of the moon is always in darkness and the other side is always lit by the Sun. As the moon travels around the Earth, the amount of lit surface observable from the Earth changes. We see no moon (a new moon) when the moon is between the Earth and the sun. This is because we cannot see the lit side at all. As the moon moves in its orbit, we are able to see more of the lit side. At first we see a sliver (waxing crescent) then we see a half moon (first quarter). The moon continues its orbit and only a small part is in shadow (waxing gibbous). When the earth is between the moon and the sun, we see a full moon. This is because the whole of the lit side of the moon can be seen from the Earth. The moon now begins the 'waning' part of its journey. A sliver of the lit side disappears into shadow (waning gibbous) and then half of the moon is in shadow (last quarter). At the last stage only a slice of the moon can be seen (waxing crescent). The moon completes its cycle and begins a new cycle as a new moon.*

## Before the Lesson

### Materials Needed

- Poster or pictures or video showing the phases of the moon, a globe, tennis ball, torch.

### Preparation

- Ask the students to look for the moon the night before the lesson.

## The Lesson

### Stimulus

- Discuss the observations from the previous evening. Did everyone see the moon? Ask the students to explain what they saw. If the moon was not visible, ask for possible explanations. These may include too much cloud cover or, if the night was clear, the moon may have been a 'new moon' — this means that we could not see the sunlit side of the moon.

### What to Do

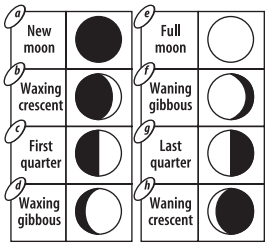
- Explain to the students that they will be looking at the moon each night for one month. They will need to record the moon they see by drawing it into the box. If they do not see a moon but the sky is clear, they draw a faint circle. If they can't see the moon due to cloud cover, they write 'cloud cover' or colour in the box.
- Explain to the students that we see the moon when the sun shines on it. Read Question 2 of the worksheet.
- Demonstrate the sun shining on the moon as it is orbiting the Earth by using the globe, tennis ball and a torch. Remind the students that while this is happening, the Earth and the moon are also revolving around the sun.
- Explain each phase of the moon using the terminology from Question 3.

## After the Lesson

### Answers

1. Answers will vary
2. (a) About every month

(b)




### Additional Activities

- Use the Internet and newspapers to find the dates of the phases of the moon over the next few months. Record and display these so the students will know when to look out for the different types of moons.
- Make a miniature telescope. Use it to observe the moon.
- Research myths and legends about the moon. What is a blue moon? (When a month has two full moons, the second moon is often referred to as a 'blue moon'.)
- Write poems and creative stories about the moon.

### Display Ideas

- Paint the moon at its different phases. Construct a 2-D model that includes the Earth, the sun and the different phases of the moon.

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# The Moon

**1.** Look at the moon each night for four weeks.

**a** Draw what you see in the chart below. Write a 'short' date in each smaller box, e.g. 4/6 is 4 June.

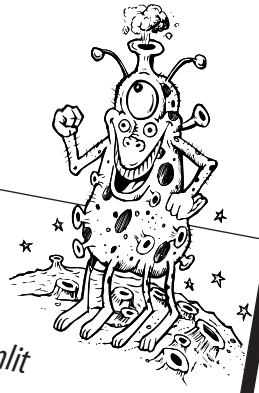
| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**b** Did you see a full moon? Colour the square with a full moon yellow.

**c** Did you see a half moon? Colour the square with a half moon green.

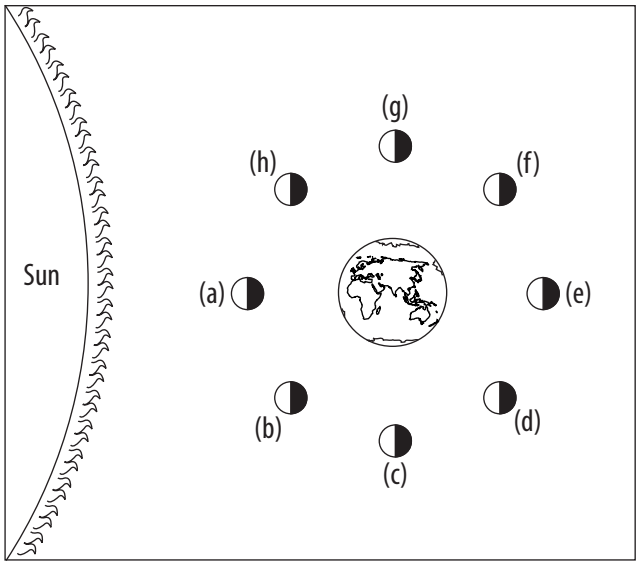
**2.** **a** We know that the Earth orbits the sun every 365 $^{1}/_{4}$ days, but how often does the moon orbit the Earth?

- About every week
- About every month
- About every school term



*The sun shines on the moon allowing us to see it. Sometimes we are able to see a whole sunlit side of the moon. This is when we can see a full moon. Sometime, we can only see half of the sunlit side of the moon. This is when we see a half moon. Each month, there is a time when we can not see the sunlit side of the moon at all. This is when there is a 'new moon'.*

**b** Look at the moon orbiting the Earth in the diagram. In the boxes, draw the moon as we would see it from Earth.




| | | | |
|---|---|---|---|
| **a** New moon | | **e** Full moon | |
| **b** Waxing crescent | | **f** Waning gibbous | |
| **c** First quarter | | **g** Last quarter | |
| **d** Waxing gibbous | | **h** Waning crescent | |

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# Sun, Earth and Moon

**1.** Emma and Daniel are doing an experiment. What do you think they are investigating?

_____

_____

_____

**2.** Colour the answers to these questions.

a) In summer, the daylight hours are **shorter** | **longer**.

b) The Earth rotates on its axis every **12 hours** | **24 hours**.

c) The Earth orbits the **sun** | **moon** and takes **one month** | **one year** to complete the journey.

d) The moon orbits the **sun** | **Earth** and takes **about one week** | **about one month** to do so.

e) The Earth moves in **a clockwise** | **an anticlockwise** direction.

**3.** Emma was explaining to the class that the reason we have seasons was because the sun swells in summer and shrinks in winter. Help explain to Emma the real reason we have seasons.

_____

_____

_____

_____

**4.** Explain why the moon appears to change throughout the month. You can use the box on the right for a diagram.

_____

_____

_____

_____

Draw your diagram here.

**Indicators**

| | Demonstrated | Needs further opportunity |
|---|---|---|
| • Explains findings from an investigation in writing. | ❑ | ❑ |
| • Recognises that the length of days differs between seasons. | ❑ | ❑ |
| • Recognises the link between the tilt of the Earth's axis and the seasons. | ❑ | ❑ |
| • Relates the phases of the moon to the relative position of sun, Earth and moon. | ❑ | ❑ |

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