Level

F	1	2	3	4	5	6	B6

Changes to features of the Earth and sky

Strand
Earth and Beyond

Key concept
The Earth, solar system and universe are dynamic systems.

Purpose

Activities in this module are designed to help students understand that easily observable features of the Earth and sky are continually changing. Students have opportunities to:

- identify and observe features such as clouds, the sun, the moon and the stars, and discuss how the position and appearance of these change over time;
- identify and observe features such as hills, beaches, creeks and seas, and discuss how the appearance of these changes over time;
- create tables and presentations about their observations and understandings;
- clarify their ideas and concepts about features such as clouds, the sun, the moon, the stars, hills, beaches, creeks and seas.

Overview of activities

The following table shows the activities in this module and the way in which these are organised in **introductory**, **developmental** and **culminating** phases.

Introductory ►	Developmental ►	Culminating
Objects in the sky: Two paintings	Objects in the sky: Recording observations	What I have found out about the sky
	Camping out under the stars	
	Moon shapes	
	Changes in the moon's appearance	
	Modelling the moon's phases	
	Changes to the Earth's surface	

QUEENSLAND SCHOOL CURRICULUM COUNCIL

Core learning outcomes

This module focuses on the following core learning outcomes from the Years 1–10 Science Syllabus:

Earth and Beyond

1.1 Students identify and describe obvious features of the Earth and sky (including landforms and clouds).

2.1 Students identify and describe changes in the obvious features of the Earth and sky (including changes in the appearance of the moon).

Core content

This module incorporates the following core content from the syllabus:

Earth and Beyond

- the Earth as a system — features;
- the solar system as a system — components (sun, moon);
- the universe as a system — components;
- changes on Earth and beyond — phases of the moon, day/night.

Assessment strategy

Suggestions for gathering information about student learning are provided in each of the activities in this module. Once sufficient information has been collected, judgments can be made about students' demonstrations of outcomes. Typical demonstrations of this module's intended outcomes are provided here to indicate the pattern of behaviour to look for when making judgments.

Earth and Beyond

1.1 Students identify and describe obvious features of the Earth and sky (including landforms and clouds).

Students may:

- identify features of the sky such as clouds, rain, moon and sun, and Earth surface features such as mountains, cliffs, creeks, rivers, lakes and oceans;
- create drawings containing features they have observed;
- give oral descriptions of features they have identified.

Earth and Beyond

2.1 Students identify and describe changes in the obvious features of the Earth and sky (including changes in the appearance of the moon).

Students may:

- draw observable features such as clouds, fog, rain, moon, sun and stars, and suggest how the appearance or position of these may change;
- draw observable features such as mountains, hills, beaches, cliffs, creeks, rivers, lakes, dams and seas, and suggest how the appearance of these may change;
- discuss how the position or appearance of features they have observed, such as clouds, fog, rain, moon, sun and stars, may change over time;
- discuss how features of the Earth's surface such as mountains, hills, beaches, cliffs, creeks, rivers, lakes, dams and oceans may change;
- create drawings of the day and night sky showing differences between the two;
- record observations of the moon's appearance over time and discuss the changes.

Background information

Current scientific conceptions

Phases of the moon

The phases of the moon are visible because different portions of the illuminated and non-illuminated parts of the moon are facing towards Earth at different times.

The moon shines because it reflects light from the sun. At any one time, half the moon is illuminated by the sun. When the illuminated half is facing towards Earth, a full moon can be seen in any night sky around the Earth — for example, in Brisbane, in London, or in Beijing.

The moon takes approximately 29.5 days to complete its orbit around the Earth. Because the moon takes the same time to rotate on its axis as it does to revolve around the Earth, the same side always faces the Earth. From the Southern Hemisphere, the moon appears to move around the Earth in a clockwise direction, while from the Northern Hemisphere, the moon appears to move around the Earth in an anticlockwise direction.

Phases of the moon, showing illuminated part of the moon visible from the Earth

Observing the moon

The moon rises about 50 minutes later each day. The table below gives:

- the approximate times of moonrise and moonset for the various phases;
- the approximate times during the day or night when the various phases can be viewed;
- where to look in the sky to see these phases.

Viewing the moon's phases: Times and positions in the sky

Phase	Rising time	Time when in the eastern sky	Time when highest in the sky	Time when in the western sky	Setting time
New moon	Sunrise	Morning	Noon	Afternoon	Sunset
Waxing crescent	Just after sunrise	Morning	Just after noon	Afternoon	Just after sunset
First quarter	Noon	Afternoon	Sunset	Evening	Midnight
Waxing gibbous	Afternoon	Sunset	Night (before midnight)	Midnight	Night (after midnight)
Full moon	Sunset	Night (before midnight)	Midnight	Night (after midnight)	Sunrise
Waning gibbous	Night (before midnight)	Midnight	Night (after midnight)	Sunrise	Morning
Third quarter	Midnight	Night (after midnight)	Sunrise	Morning	Noon
Waning crescent	Just before sunrise	Morning	Just before noon	Afternoon	Just before sunset

Daytime observations

From a few days after the new moon to a few days before the full moon, students will be able to observe the moon in the afternoon when they are at school. During this time, the moon appears to move clockwise from west to east (see table, p. 3). From a few days after the full moon to a few days before the new moon, students will be able to observe the moon in the morning when they are at school.

Night-time observations

From a few days after the new moon until just after the full moon, a good time to observe the moon is at 7.00 p.m. The waxing crescent moon will be visible low in the western sky, the first quarter will be visible high up in the northern sky, and the full moon will be visible low in the eastern sky (see table, p. 3).

Students' prior understandings

Students' prior understandings may differ from current scientific conceptions in a range of ways.

The moon

Some students may think that:

- when we have a full moon, other people in Australia will have a different phase of the moon that same night;
- the moon goes around the Earth in a single day;
- the moon shines because it is like a star, but bigger;
- the moon shines because it makes light like the sun;
- when the moon is 'old' it goes away to some unknown place, and the new moon that replaces it is actually a new object each time, that appears from some unknown place.

The sun

Some students may think that:

- the sun is a star that changes back into the sun in the daytime;
- the sun slides below the edge of the Earth at night and slides up again in the daytime.

Terminology

Terms associated with obvious features of the sky and with surface features of the Earth are essential to the activities in this module — for example:

Sky		Earth	
clouds	new moon	beach	lake
crescent moon	stars	cliff	mountain
full moon	sun	creek	river
moon		dam	sea
		hill	

Students may already be aware of some of this terminology. If so, the activities provide opportunities for them to evaluate current usage.

School authority policies

Teachers need to be aware of and observe school authority policies that may be relevant to this module.

Safety policies are of particular relevance to the activities that follow. It is essential that demonstrations and student activities are conducted according to procedures developed through appropriate risk assessments at the school.

In this module, teachers need to consider safety issues relating to:

- observing the sky without looking directly at the sun;
- adult supervision of students observing the night sky.

Support materials and references

Dawes, G., Northfield, P. & Wallace, K. 1998, *Astronomy 1999: A Practical Guide to the Night Sky*, eastern Australian edition, Quasar Publishing, Strathfield, NSW. (This book is updated annually. It contains sky charts.)

ACTIVITY

Objects in the sky: Two paintings

Introductory

Focus

This activity provides opportunities for students to discuss and demonstrate what they know about objects visible in the sky.

Students recall their observations of the day and night sky by making two paintings: one of the sky by night and one of the sky by day.

Materials

- art materials

Teaching considerations

Students may draw aerial objects such as planes, hot-air balloons, clouds, rain, sun, moon, stars, birds, bats, insects and leaves. They may also include objects on the ground, such as trees and buildings, as reference points in their paintings.

Working scientifically

Time: Part 1, 30–60 minutes; Part 2, 45 minutes

Collecting information
Exploring phenomena
Identifying
Creating presentations

Part 1

▶ Students either observe the sky when they are taken outside, or look through the classroom windows. They discuss what they see, and what they have seen in the sky on other occasions. Understandings to be developed include:

- some things are only ever found in the sky — for example, clouds, sun;
- some things may be found on land and in the sky — for example, birds;
- some things are attached to the Earth's surface — for example, trees.

▶ Students then paint the sky by day and the sky by night.

Part 2

▶ When the paintings have dried, students discuss them. (This could be done on another day.) In partnership with the teacher, they identify objects they have observed, discuss their understandings of these and consider differences between the night sky and the day sky. Discussion should provide opportunities for students to clarify and develop their understandings of Earth and Beyond. For example, they could classify objects as:

- belonging in the Earth's air — for example, clouds, planes;
- existing beyond Earth — for example, moon, sun, stars.

▶ Students each write an observational comment to attach to their paintings which are then displayed around the room. The teacher informs students that they will soon be working like scientists to make observations about the sky, and that their drawings may be useful for future reference.

Gathering information about student learning

Sources of information could include:

- students' paintings of the day and night skies;
- anecdotal records of students' contributions to discussions.

ACTIVITY

Objects in the sky: Recording observations

Developmental

Focus

This activity provides opportunities for students to observe objects in the sky and increase their understanding of objects that belong in the Earth's air and objects that exist beyond the Earth.

Students record their observations in a table, noting any changes in the objects.

Materials

- butcher's paper (several large sheets)
- poster pens
- Resource Sheet 1, 'Objects in the sky: Observation sheet' (for each student)

Teaching considerations

Making observations out of school hours

Part of this activity relies on the cooperation of parents/carers to take students outdoors on one night. Consider sending a letter home with students to enlist this cooperation.

Some students may be unable to make the out-of-school observations for a range of reasons — for example, not having an adult who will take them outdoors, or living in a neighbourhood where the night sky cannot be viewed. Arrange for students who are able to perform the observations to share their observations with those who cannot. Explain that many scientists work in teams and sometimes take turns at making observations.

Observing and recording

Because stars, planets and the moon change their positions throughout the night, it is best that observations are made at approximately the same time of day/night — for example, around 7.00 p.m., or later in western Queensland.

Model with students how to complete the table on Resource Sheet 1, and how to write about their findings. A reference list could also be provided with the names of objects students might wish to record — for example, planes, hot-air balloons, clouds, fog, rain, sun, moon, stars, planets, comets, birds, bats, insects, leaves, dust, paper.

The theme of change

Astronomical objects are too distant to appear to have changed shape during the short time students are making observations. Clouds, however, might change shape.

Most of the objects in the sky will not appear to have moved during the short time students are making observations. However, students might see others that do move — for example, meteor showers, communication satellites, aircraft and clouds.

Note that students may draw objects in the sky in various ways that are acceptable for this activity. For example, some students may draw the moon with a face, or they may draw a star as two overlapping triangles ✡.

Working scientifically

Time: Part 1, 30 minutes; Part 2, 30 minutes

Collecting information
Exploring phenomena
Identifying
Constructing meaning
Drawing conclusions
Inferring from data
Creating tables
Relating

Part 1

▶ Students refer briefly to their paintings of the day and night skies from the previous activity and recall the kinds of objects they have seen in the sky. The teacher informs students that, over the next day, they will be making and recording further observations of the sky and explains that one way of recording observations — whether you are a student or a scientist — is to use a data table.

▶ With teacher assistance, students practise using a data table to record observations made as they look out of the classroom windows at objects in the sky. The class then moves outside so that students can each record their set of observations of objects in the day sky.

▶ Students take data sheets home to record objects they see in the sky on that night (see Resource Sheet 1).

Part 2

▶ The day after they have made their night observations, students report their observations to the class. Observations are recorded and collated on butcher's paper and displayed for discussion. Questions to guide discussion could include:

- What are some of the objects that everyone saw?
- Did any of these objects seem to move or change position? Which ones?
- Were there any objects that seemed to move or change position over longer periods of time — for example, over a night, a month or a year? Which ones?
- Were there any objects that seemed to change shape or appearance while you were watching them? Which ones?
- Were there any objects that seemed to change shape or appearance over longer periods of time — for example, over a night, a month, or a year? Which ones?

Day observations are recorded, collated and discussed in the same way as the night ones.

▶ Students then compare their day and night observations. Questions to guide discussion could include:

- What objects seem to be visible only by day?
- What objects seem to be visible only by night?
- Are there any objects that we can see both by day and by night?

▶ The teacher explains to students that scientists make and write conclusions about what they have found out from their observations. If necessary, the teacher models how to write a conclusion. Students discuss their findings and write about their conclusions.

▶ Students share their conclusions and either display them in the classroom or compile them into a class book.

Gathering information about student learning

Sources of information could include:

- students' records of observations;
- anecdotal records of students' contributions to discussions;
- students' written conclusions.

ACTIVITY

Camping out under the stars

Developmental

Focus

This activity provides opportunities for students to observe and discuss objects in the sky during an overnight excursion or school camp.

Materials

For the whole class:

- torches (ideally, one for each student)
- red cellophane
- rubber bands
- lightweight binoculars (optional)
- telescopes (optional)
- a planisphere or a sky chart (see 'Support materials and references', p. 5)

Teaching considerations

Supervision

An adult (a parent/carer/teacher/teacher aide) needs to supervise each small group of students.

If possible, conduct a briefing session for the adult assistants, providing each of them with a planisphere or sky chart. Give them the opportunity to use the telescopes and binoculars before the observation session with students.

Optimum conditions for observations

Observations should be made away from lights that make it difficult to see the stars — for example, lights at the camp and streetlights.

The best time to observe constellations and planets is around the time of a new moon or before the moon rises.

Binoculars or telescopes will enable students to see more stars and more details, such as the moon's craters. Binoculars should not be too heavy. Students need to be able to hold them steady, without any wobbling, for worthwhile viewing.

Using the planisphere or sky chart

Before students make their observations, refer to the planisphere or sky chart to determine the position of objects likely to be visible. The other adults assisting students need to do the same.

Adapting the activity

This activity could also be conducted as a night-time excursion on the school oval. It could also be modified for use in conjunction with a planetarium visit.

Safety

Throughout the excursion, students and adults should be aware of safety issues.

If the telescopes or binoculars are available during the preparation session (Part 1), ensure that students do not attempt to view the sun with them. Make students aware that they should never look directly at the sun.

Working scientifically

Time: Part 1, 45 minutes; Part 2, 45 minutes; Part 3, 30 minutes

Exploring phenomena
Identifying
Collecting information
Relating
Constructing meaning
Drawing conclusions

Part 1

▶ Before making observations at night, students prepare by:

- discussing safety considerations;
- discussing the kinds of things they might observe;
- taking turns at using available telescopes and binoculars to view objects such as trees and buildings.

Part 2

▶ Students cover the heads of the torches with red cellophane, secured with rubber bands, so that only red light is emitted. The red light enables students to see where they are walking without light from the torches obscuring details of the sky.

▶ Students work in pairs within small groups to observe and identify objects in the night sky. They discuss the objects they see and help other group members to see particular objects. Adults help students with their observations and identifications as necessary.

Part 3

▶ As a class, students share their night-time observations and experiences. As part of their discussion, students could classify objects into two groups:

- objects that belong in the Earth's air — for example, clouds;
- objects that exist beyond the Earth — for example, the moon, the sun and the stars.

Gathering information about student learning

Sources of information could include:

- anecdotal records of students' contributions to discussions.

ACTIVITY

Moon shapes

Developmental

Focus

This activity provides opportunities for students to discuss and demonstrate what they know about the appearance of the moon.

Students view pictures of the moon and observe the moon in the night sky.

Materials

- a painting or photograph showing the moon viewed from Earth with the naked eye

Teaching considerations

Choosing a time

It is recommended that this activity be carried out at full moon. Consult the section 'Background information' (see pp. 3–4) and use the suggested reference on p. 5 or the notices about moon phases in a local newspaper to determine an appropriate date and time to begin.

Making observations out of school hours

Part of this activity relies on the cooperation of parents/carers to take students outdoors at night, preferably at around 7.00 p.m. (later for areas in western Queensland in summer). Consider sending a letter home with students to enlist this cooperation.

Some students may be unable to make the out-of-school observations for a range of reasons — for example, not having an adult who will take them outdoors, or living in a neighbourhood where the night sky cannot be viewed. Arrange for students who are able to perform the observations to share their observations with those who cannot. Explain that many scientists work in teams and sometimes take turns at making observations.

Working as a scientist

Throughout the activity, make use of any opportunities that arise to discuss how scientists work. Help students to make links between their activities and those of scientists. For example, scientists often draw or photograph what they observe.

Working scientifically

Time: Part 1, 30 minutes; Part 2, 20 minutes

Creating diagrams
Discussing thinking
Illustrating

Part 1

▶ As a class, students briefly discuss a painting or photograph showing the moon viewed from Earth with the naked eye. Discussion questions could include:

- Is this a picture of the moon by day or by night? How can you tell?
- Can the moon look any different from the way it looks in this picture?
- What are some of the 'different looks' the moon can have?
- What are some of the words people use to describe the different appearances of the moon?
- Is the moon visible by day?
- How often does a full moon come around?

▶ Students draw their recollections of some moon shapes and display these around the room. They then briefly consider ways they could check what different appearances the moon can have.

Part 2

▶ Throughout the next day and at night before they go to bed, students observe the moon. They record their observations by making drawings of what they see.

▶ The day after they have made their moon observations, students share their drawings and discuss their observations. Discussion questions could include:

- Do the drawings look the same? Are they different? If so, how are they different?
- When did you see the moon?
- Where was the moon in the sky? Did it seem to be high up or low down in the sky?

Gathering information about student learning

Sources of information could include:

- anecdotal records of students' contributions to discussions;
- students' drawings.

ACTIVITY

Changes in the moon's appearance

Developmental

Focus

This activity provides opportunities for students to develop an understanding of changes in the moon's appearance.

Students observe the moon during a full cycle, making and recording observations every 3 or 4 days.

Materials

- drawing materials

Teaching considerations

It is suggested that this activity follows the activity 'Moon shapes'.

Guidelines for viewing

It is recommended that students begin their observations a few days after the new moon, so that they can see the full sequence of phases of the moon, with the full moon in the middle of the cycle. Suitable viewing times and directions are included in the section 'Background information' (see pp. 3–4). Some viewing choices could be:

- from the new moon to a few days after the full moon, when the moon can be observed at the same time at night — for example, at 7.00 p.m.;
- from a few days after the new moon to a few days after the waxing crescent, when the moon can be observed from morning to afternoon;
- from the first quarter to the waxing gibbous phase, when the moon can be observed in the afternoon while students are still at school.

Making observations out of school hours

Part of this activity relies on the cooperation of parents/carers to take students outdoors at night, preferably at around 7.00 p.m. (later for areas in western Queensland in summer). Consider sending a letter home with students to enlist this cooperation.

Some students may be unable to make the out-of-school observations for a range of reasons — for example, not having an adult who will take them outdoors, or living in a neighbourhood where the night sky cannot be viewed. Arrange for students who are able to perform the observations to share their observations with those who cannot. Explain that many scientists work in teams and sometimes take turns at making observations.

Link to core learning outcome 2.2

This activity can be extended to provide opportunities for students to demonstrate core learning outcome 2.2 of Earth and Beyond by developing an understanding of longer-term patterns of events. Encourage students to continue their observations over a number of months or at various times throughout the whole year. They should look for patterns in their observations — for example, the clockwise movement of the moon across the sky from west to east as it changes from a new moon to a full moon (see pp. 3–4). For some of the investigations, observations would need to be made at the same time each day. Observations should be followed by class discussions.

Working scientifically

Time: Part 1, 15 minutes; Part 2, 9 × 10 minutes; Part 3, 30 minutes

Collecting information
Constructing meaning
Creating presentations
Describing

Part 1

▶ Students set the context for this activity by briefly referring to their observations and records from the activity 'Moon shapes' (pp. 11–12).

▶ The teacher explains that:

- scientists may observe something for many years, and that different scientists have been observing the moon for thousands of years;
- students are going to observe the moon for at least a month.

▶ Students negotiate with the teacher to observe the moon over a full cycle by making observations every third or fourth day or night. Students and the teacher then have a clear set of expectations regarding the observations students will make — for example, that each student will observe the moon's shape, or that each student will observe the moon's shape and position in the sky.

Part 2

▶ Students make their observations as negotiated and record their observations in the form of drawings. A brief class discussion and sharing of drawings should follow each observation session. Discussion questions could include:

- Do the drawings look the same?
- What parts of the drawings are the same?
- Why do you think these parts look the same?
- Are the drawings different?
- What parts of the drawings are different?
- Why do you think they are different?
- When did you see the moon?
- Where was it in the sky?
- Was the moon high up or low down in the sky?

▶ Students record their thoughts about the activity, including what they found out from their observations.

Part 3

▶ Students refer to the records of their month of observations and discuss the moon's changing appearance. They should discuss changes such as the increase in size and the change in shape up to the full moon, and the decrease in size and shape from the full moon to the next new moon.

Gathering information about student learning

Sources of information could include:

- students' records;
- anecdotal records of students' contributions to discussions.

ACTIVITY

Modelling the moon's phases

Developmental

Focus

This activity provides opportunities for students to further their understanding of the moon's phases by using models. Students also develop an understanding that scientists (and many other people) can use models to help them understand phenomena such as changes in the moon's appearance.

Materials

- Resource Sheet 2, 'Modelling the phases of the moon'
- materials listed on Resource Sheet 2

Teaching considerations

In this activity, students use a ball to represent the moon, and an overhead projector to represent the sun. They model the phases of the moon. It is not intended that students demonstrate the phases in sequence or a full understanding of the mechanism producing the phases of the moon as observed from Earth. The intent of the activity is that students enjoy exploring the possibilities for using a model of the moon.

Working scientifically

Time: 30 minutes

Constructing meaning
Using models

▶ The teacher explains to the students that they are going to use an overhead projector and a ball to make some moon shapes like the ones they have seen when observing the moon. The teacher also explains that using models is one of the ways in which scientists (and many other people) try to understand how things work.

Resource Sheet 2

▶ The teacher demonstrates how to use the projector and the ball to model the phases of the moon (see Resource Sheet 2). In pairs, students then take turns to use a ball and the overhead projector to model the moon's phases themselves. As in the demonstration, they pivot, holding the ball at arm's length, and observe how the shape of the 'bright' part of the ball changes as they move round. They then take turns to get their partner to make a particular moon shape — for example, a full moon or a new moon.

▶ Students conclude the activity with a class game:

1. One student pair looks at the drawings on the board of different phases of the moon and points to a particular moon shape. They say to the rest of the pairs: 'Make that shape.'
2. The pair then walks around the room and selects another pair whose ball is showing the requested shape.
3. The new pair goes to the front of the room and the game begins again.

Gathering information about student learning

Sources of information could include:

- observations of students' modelling.

ACTIVITY

Changes to the Earth's surface

Developmental

Focus

This activity provides opportunities for students to develop an understanding that the Earth's surface changes.

Students look at and discuss video recordings or pictures of changes to the Earth caused by natural disasters.

Materials

- video showing a natural disaster

or

- photographs of the effects of natural disasters on the Earth

Teaching considerations

Students' discussion of the video and other images provides a stimulus for them to consider natural disasters or other changes to Earth features in their local area. Some Earth features they might consider include mountains, lakes, dams, rivers, seas, beaches, cliffs, roadside cuttings.

Selecting images

Pictures or videos of natural disasters may include distressing images of their effects on humans, other animals etc. For this reason, it is recommended that care is taken in selecting the pictures or videos for this activity.

The theme of change

The theme of change could be used to provide a link between this activity and either 'Objects in the sky: Two paintings' (p. 6) or 'Objects in the sky: Recording observations' (pp. 7–8). This could be done by drawing students' attention to either of the previous activities and asking them to briefly recall some changes to the sky that they observed. Then inform students that they are going to investigate some ways in which the Earth's surface can change.

Working scientifically

Time: Part 1, 30 minutes; Part 2, 30 minutes

Constructing meaning
Reflecting and considering
Creating presentations
Discussing thinking
Negotiating

Part 1

▶ Students look at photographs or a video showing the effects of natural disasters on the features of the Earth. Natural disasters include earthquakes, land or rock slippages, floods, cyclones or drought.

▶ Students discuss how the natural disasters have changed the Earth's surface. Discussion questions could include:

- What has happened to this place?
- What caused these changes? What information in the picture/video tells you the cause of the changes?
- Do you think the changes affected the people in the area? What information in the picture/video did you use to answer this question?
- How would people have been affected by these changes?
- Would the changes have affected the animals in the area? What information in the picture/video did you use to answer this question?

- How would the animals have been affected by these changes?
- Would the changes have affected the plants in the area? What information in the picture/video did you use to answer this question?
- How would the plants have been affected by these changes?

▶ Students consider changes due to natural disasters, or more gradual changes, to Earth features in their local area. Discussion questions could include:

- What kinds of changes to Earth features have you seen in your local area?
- What caused these changes? How did you work out what caused these changes?
- Did the changes affect people in your area? If so, what were the effects of the changes? How do you know what the effects were?
- Did the changes affect animals in your area? If so, what were the effects of the changes? How do you know what the effects were?
- Did the changes affect plants in your area? If so, what were the effects of the changes? How do you know what the effects were?

Students then discuss other kinds of changes that might occur in their local area and in other places.

▶ After negotiating with the teacher to decide what they will draw, students create 'before and after' drawings of a place where Earth features have changed.

Part 2

▶ Students share and discuss their drawings to further their understanding of the way diverse landforms and bodies of water change.

▶ Students write a 'before and after' observational comment on their drawings and display them around the room.

Gathering information about student learning

Sources of information could include:

- anecdotal records of students' contributions to discussions;
- students' drawings and observational comments.

ACTIVITY

What I have found out about the sky

Culminating

Focus

This activity provides opportunities for students to reflect on and create presentations about their observations of changes in features of the sky.

Materials

- butcher's paper
- art materials

Teaching considerations

This activity could be adapted to include, or focus on, changes to the Earth's surface.

Working scientifically

Time: Part 1, 60 minutes; Part 2, approximately 30 minutes

Creating presentations
Discussing thinking
Negotiating

Part 1

▶ To begin, students recall:

- the activities they have carried out during this unit;
- what they particularly enjoyed about these activities;
- the observations they made;
- what they learned or discovered as a result of their observations — that is, conclusions they have drawn.

▶ The teacher explains to students that scientists create presentations of their work to share with other scientists. In the same way, students are going to create presentations about their observations and understandings for other students to read.

▶ Students negotiate with the teacher on the form their presentations will take. Some possible forms include:

- a wall display for the school library explaining the phases of the moon and features of the day and night sky;
- a video presentation for another class, describing how to make and record observation of things in the sky;
- a big book for the school library about changes to objects that can be seen in the sky;
- a report of observations and understandings for the class or school newsletter.

Part 2

► Students share their presentations with the class. Presentations can then be displayed and/or circulated.

One way in which students could share their presentations would be during a number of show-and-tell sessions over several days. Students and the teacher would negotiate the scheduling of the presentations.

Students giving presentations on a particular day could each be allocated a particular location in the classroom. The other students could then move around the room to listen to and/or read the presentations. The students could ask the presenters questions and give feedback on what they particularly liked.

Gathering information about student learning

Sources of information could include:

- students' presentations;
- anecdotal records made throughout this activity.

Objects in the sky: Observation sheet

Note for parents/carers

At school, your child has started to fill in this table about objects visible in the sky. If possible, it would be appreciated if you could take your child outside after dark (at about 7.00 p.m. or later for areas in western Queensland in summer), preferably away from bright street lighting, to observe objects visible in the night sky and record observations in the table.

Objects in the sky

Draw what you see	Write its name	What else you observed
		When I saw it _____ Does it move? _____ Does it change shape? ____
		When I saw it _____ Does it move? _____ Does it change shape? ____
		When I saw it _____ Does it move? _____ Does it change shape? ____
		When I saw it _____ Does it move? _____ Does it change shape? ____
		When I saw it _____ Does it move? _____ Does it change shape? ____

Modelling the phases of the moon

Resource Sheet 2

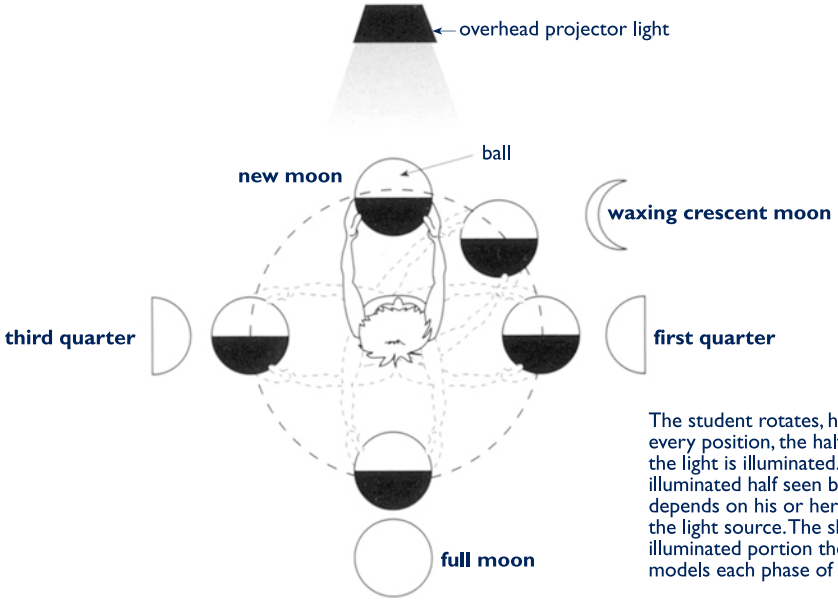
Materials

- an overhead projector
- a pale-coloured ball about 8–12 cm in diameter for each pair of students
- drawings on the board of different phases of the moon

Method

The student stands in front of the overhead projector light, holds the ball at arm's length, just above head height, and pivots about the same spot, preferably clockwise (see the diagram below).

1. When the ball is in a direct line between the projector and the student, there is no illumination of the ball visible to the student.
2. When the student rotates slightly clockwise from this point, the shape of the light shining on the ball is the shape of the young crescent moon.
3. When the student continues in a clockwise direction until there is a right angle between the projector, the student and the ball, a quarter-moon shape is visible.
4. When the student is in a direct line between the projector and the ball, the half of the ball facing the student is lit up, making it look like a full moon.
5. If the student continues in a clockwise direction until the ball is positioned so that there is a right angle between the projector, the student and the ball, a quarter-moon shape becomes visible again.
6. If the student continues to rotate clockwise, the cycle will be repeated.



The student rotates, holding the ball. In every position, the half of the ball facing the light is illuminated. The amount of the illuminated half seen by the student depends on his or her position relative to the light source. The shape of the illuminated portion the student can see models each phase of the moon.

This sourcebook module should be read in conjunction with the following Queensland School Curriculum Council materials:

Years 1 to 10 Science Syllabus

Years 1 to 10 Science Sourcebook: Guidelines

Science Initial In-service Materials

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