

Science lessons for Grade 6

Lessons in this section

Life science

- 1 Looking at onion skin
- 2 Body organs

Materials

- 3 Temporary and permanent changes

Earth and space

- 4 The phases of the Moon

Resource sheets for the lessons

Using these lesson plans

These sample lessons for Grade 6 are suitable for use with a whole class. The lessons are single examples to illustrate different teaching and learning activities. They are not intended to be taught as a sequence. They are drawn from different topics and points in the teaching year to show spread rather than sequence.

The objectives for the lessons are drawn from the standards for Grade 6. The relevant standards are shown in the lesson plans.

The lesson plans indicate any safety issues relevant to the lessons. They also provide equipment lists and any short- and long-term preparation required by the lessons. Some of the plans include notes that provide additional information relevant to the teaching of the lesson that may not be readily accessible elsewhere.

Most of the lessons are organised in three parts: an introduction to the lesson, a main activity, and a final phase to help students reflect on the lesson and consolidate their learning. As part of the introduction, you should outline the purpose of the lesson, drawing out for students what they will learn and how this builds on previous work. In the final part of the lesson, you will need to establish the key learning points, what students need to remember and what they will go on to learn next. There is no expectation that students should copy out the key learning points in their exercise books.

The lesson plans do not include homework tasks because the lessons are single examples taken out of sequence. You will need to provide this, since homework is an important part of a lesson.

Each lesson plan has enough material to support about 45 minutes of teaching. You may need to supplement the activities with simpler or more challenging tasks if the

students in your class have a range of attainment. You could choose from activities in textbooks or from your own resources. If you wish, different tasks can be given to different groups of students, according to their needs.

For some classes there may be too much material in the lesson plan for 45 minutes. In this case, you could designate one of the activities in the lesson as homework, or carry it forward to the next lesson. Be selective about which activity to cut – it does not have to be the last one merely because it comes at the end.

One of the lessons in this grade, lesson 6.3 ‘The phases of the Moon’, offers a particularly good opportunity to explore cross-curricular links related to Islamic history and culture as it illustrates the basis of the Hijri calendar. The same lesson also illustrates how the Internet can be used as a rich source of information.

6.1

Looking at onion skin

Objectives

- Know that living organisms are made up of cells.
- Know that cells have cytoplasm, a nucleus and a cell membrane and that plants cells have a cell wall.
- Use a simple microscope.

Preparation

You will have to ensure that the materials for the practical activity are available and that the microscopes are clean and operational.

Safety

In this lesson you will ask students to prepare microscope slides of plant tissues. This will involve the handling sharp instruments that, if not used properly and sensibly, can cause damage. You should stress the need to use microscopes only in the ways instructed and to be careful in bringing the stage and lens together so that the slide isn't cracked or broken and no damage is caused to the lens. You will use onions and should check that no students are allergic to them.

Introduction

Vocabulary

cytoplasm
eyepiece
lens
magnification
microscope
objective

Resources

per class

Magnifying lenses
Microscope

per pair

String
Scissors

The magnifying microscope

This lesson assumes that students have been introduced to and used a simple light microscope in a previous lesson. This introductory activity is designed to help students understand the degree of magnification of a microscope so that they can appreciate the scale of what they will be observing. It is also important that they understand that the microscope does not make things larger it just makes them appear larger.

Ask students to use a pencil to draw a circle of 1 cm diameter on a piece of paper. Now ask some questions to probe their understanding of magnification. You could ask:

Q If you looked at the circle through a magnifying glass, what would you see?

Most students should appreciate that the circle will look bigger. Put this to the test by issuing some magnifying lenses and ask students to look at their circles:

Q When you look at the circle through a magnifying glass, what do you see?

Some will now report that they can see more detail of the paper and the pencil line. You could make the point that a lens magnifies the image and improves the resolution of the detail of an object.

Q If the glass magnified $\times 2$, how big would the circle look?

Here you want to establish that a $\times 2$ lens magnifies by two.

Q If the glass magnified $\times 5$, how big would the circle look?

Students should know that with a $\times 5$ lens the circle appears 5 times larger. To appreciate this difference, ask the students to draw a circle of 5 cm diameter beside their original circle.

Now move on to thinking about microscopes:

Q How much do you think a microscope magnifies things?

You may have covered this in a previous lesson and if so the question may just involve recall, but that is not the main reason for asking. The question is to probe the knowledge that students bring to their use of microscopes. You may get a wide variety of answers and you should write some of these on the board to establish the range of ideas within the class.

Now show the class a microscope and point out that it has more than one lens above the stage (the objective lenses). Get a volunteer to come out and look at a lens and report to the class what is written on the side. Get other volunteers to come out and report what is written on other lenses. Depending on the microscope, you should establish that the objective lenses magnify by $\times 5$, $\times 10$, $\times 15$, $\times 20$ or even $\times 40$ and that this is written on the side of the lens.

Ask students to get into pairs. Give each pair a piece of string about 50 cm long. Provide some scissors and ask students to cut a piece of string 1 cm long. Now ask the pairs to imagine looking at the 1 cm length of string with one of the lenses of the microscope and measure and cut another piece the length it would appear down the microscope. Get them to place the two pieces side by side to help them appreciate the difference.

Gain the attention of the class and show them the microscope again. Get another volunteer to come out and look at the eyepiece of the microscope and report if this too has a mark to indicate that it magnifies. Most eyepieces are $\times 8$ but some have other values such as $\times 5$ and $\times 10$. If the eyepiece can be detached, pass it round the class so that students can verify that it does magnify.

Explain to the class that the total magnification power of a microscope is the product of the magnification of the eyepiece and that of the objective lens.

Draw a table on the board as follows but use the values of magnification of the microscope studied.

Eyepiece lens	Objective lens	Total magnification
$\times 8$	$\times 5$	$\times 40$
$\times 8$	$\times 10$	$\times 80$
$\times 8$	$\times 15$	$\times 120$
$\times 8$	$\times 20$	$\times 160$

Get the previous pairs to join to form larger groups. Ask them to start with their 1 cm piece of string and to make lengths of string representative of the different magnification powers of the microscope.

End this part of the lesson by reinforcing that a microscope can make objects appear to be considerably larger than they actually are (magnification) and separate the images of small objects that are very close together (resolution). Both of these abilities are important in science. You should also stress that what they have been doing with the string is modelling the magnification of a microscope.

Main activity

Preparing a microscope slide

Vocabulary

cell
cell membrane
cell wall
cytoplasm
nucleus

Resources

per group

microscope
water
iodine solution
dropping tube

per student

slide
onion skin
mounted needle

Introduce the main section of the lesson by telling students that they are going to use a microscope to look inside part of a plant and report on what they see. To do this they will need to know how to prepare the plant material so that they can get a good view of what is inside it.

Gather the class round a table and demonstrate peeling off a piece of the thin transparent white skin (epidermis) of an onion. Use forceps to place a small piece of very thin skin in some water on a flat microscope slide. Demonstrate how to use a mounted needle to carefully lower a microscope cover slip onto the slide to avoid trapping air bubbles. Remind students how to set up a microscope and, if necessary, how to focus and adjust the light. Finally, make sure that they know where to place the slide and that they must check that the microscope is set to its lowest magnification power before placing a slide on the microscope stage.

Divide the class into groups so that each group has a microscope. Ask each student to prepare a slide of onion skin and look at it with the lowest magnification of the microscope. Get them to note the magnification and to draw what they see. Students should work at their own pace and look at and draw the onion skin at different powers of magnification. Each drawing should be done neatly in pencil; it should be an accurate portrayal of their observations and record the degree of magnification. During this activity you should check the progress of each group and offer assistance and guidance to individuals where necessary.

When everyone has completed this activity, you should ask questions about what they have seen:

Q Can someone describe what they saw at the lowest magnification?

Q How did what you saw change as you increased the magnification?

Q How much detail could you see?

Q How did this detail change as you increased the magnification?

It is important that you allow students to describe their observations in their own words. You should not expect students to recognise cells or to know the names of cell structures. You should also allow several different students to provide descriptions. Pick out some of their best descriptive words and write these on the board.

You should now tell students that there is a way to make parts of the onion skin easier to see. Gather the class round the bench again and show them how to stain the onion skin with iodine solution. Make another slide with stained tissue and ask students to do likewise and to look at and draw this at low and high magnification. The cells should stain light brown and the cell nucleus a darker brown.

Once this has been completed you should gain the attention of the class and, if you have a projection microscope, show students a slide that you have prepared and point out the features. Alternatively, show them a transparency, a picture or a wall chart of a similar plant tissue. If need be, make a drawing of an observation from a microscope slide on the board. Discuss with the class what they have drawn and what you have shown them.

At this point you should introduce the terminology of a cell and point out that they have been looking at very many onion cells. You should also say that plants are made of cells and that they will be studying other cells in further lessons. You

should draw attention to the features of a plant cell, naming the cell wall, cytoplasm, cell membrane and nucleus. Then it is appropriate to present a stylised drawing of a layer of plant cells and label the parts. Students should copy this into their notebooks and compare it with their drawings of their slides.

You should end this section of the lesson by reminding students that the microscope is an important instrument and that its use has allowed us to study the fine detail of biological structures. The development of the microscope revealed that not only were plants made of cells but that the cells themselves had an internal structure.

Consolidation

Use two activities to conclude this lesson.

In the first activity, show the class a small ball, such as a golf ball or a table-tennis ball. Ask students to estimate how big the ball would be if magnified 10 times, 50 times and 100 times. Collect some answers on the board. Have prepared three pieces of string cut to the approximate diameters of the sizes of the magnified ball. Bring out students to hold the ends of the strings to reinforce the degree of magnification. Compare the students' estimates with your values. Use this activity to stress the magnification power of a microscope.

For the second activity give each student four pieces of paper. Ask them to write each of the following terms on a separate piece of paper: cell wall; cell membrane; cytoplasm; nucleus. Ask them to write large enough so that you can see what they have written from the front of the class. Now show the class a wall chart, projected slide or board drawing of a plant cell. The drawing should not have the parts labelled. Point to cell structures in turn and ask all students to raise the appropriate piece of paper with the correct label. Scan the papers to determine if all students give the correct names. Repeat as necessary and reinforce the correct responses. This activity can also be done with mini-whiteboards but in this case students would write the names of the structures on the boards, show these and then erase them in readiness for their next answer.

Other tasks

Have on hand some prepared slides, transparencies or pictures of other plant cells and make these available for study by students who complete their work quickly.

Summary for students

- The magnification of a microscope is the multiplication product of the magnification of the eyepiece and that of the objective lens.
- Magnification makes things appear larger; resolution helps to distinguish detail.
- Staining a slide of onion skin makes some structures coloured and easier to see.
- Onion cells are made of cytoplasm, have a nucleus and are surrounded by a cell membrane and a cell wall.

Notes

This lesson should be followed by one that asks students to look at animal cells.

6.2

Body organs

Objectives

- Know the names of the main organs of vertebrates that are responsible for circulation (heart, blood vessels), food processing (stomach, liver and intestines), gas exchange (lungs), reproduction (ovaries, testes), sensitivity (brain, nerves, sense organs) and waste removal (kidneys).
- Use a range of methods, such as description, diagrams, pictures, tables and charts, using ICT methods where appropriate, to communicate observations, data, results and conclusions.

Preparation

You will need a large wall chart of a human or other suitable illustration of the internal organs of a mammal. A model torso would be an excellent resource to use. Illustrations of the internal organs of other vertebrates should be made available in drawings, photographs, charts or books. Students will also need access to reference sources such as textbooks. The lesson could include observation of prepared specimens of vertebrates that show internal organs. These would have to be obtained. It is suggested that a fish is dissected by the teacher or, if considered appropriate, by groups of students. Appropriate specimens would need to be obtained. If you have not dissected a fish previously, then this should be practised and the internal organs identified. A judgement will have to be made on the desirability and acceptability of dissecting a mammal.

Safety

Some students may feel faint at the idea of a study of their internal organs and you need to be alert to this possibility. Students who participate in a dissection should wash their hands thoroughly afterwards. Dissection material should be obtained from approved sources and disposed of responsibly. Instruments must be washed thoroughly.

Introduction

What is inside your body?

Start this lesson by asking the class what is inside their bodies. Use questions such as:

Q What is inside your body?

Q What about the different parts of your body, such as your head? your legs? your trunk?

Q What do you think these parts are for?

It is likely that you will get a variety of answers. Organise these on the board by listing the main body organs in one column and other components in another column. This should establish the extent of students' existing knowledge. Explain to the class that the lesson will help them learn about some of the main organs in their body and what they do. This would be a good point to determine if any student would find this lesson distressing. If you are going to do a dissection, tell students now and find out if any of them do not wish to participate.

Main activity

Looking inside the body

Vocabulary

blood vessels
brain
heart
intestines
kidneys
liver
lungs
nerves
ovaries
stomach
testes

Resources

Models, charts and illustrations to show the internal organs of the human body

Activity 1 Locating your body organs

This is a whole-class activity in which you should use models, wall charts or appropriate illustrations to show the locations of the main organs of the human body. At this point in the lesson stress the names and location. Check on students' understanding by asking individuals to name organs as you point to them and/or to come out to the front of the class to point to organs that you (or another student) names. You could also check by asking questions such as:

- Q Which body organs are in pairs?
- Q Which is the largest internal organ?
- Q Which is the longest internal organ?
- Q Which important organ is not in the largest part of the body?
- Q What protects the body organs from external damage?
- Q Which organs are very well protected and which least well protected?

If you are going to do a dissection, or to get students to do one, introduce it here. Explain that looking inside another animal will help students to appreciate the organisation of their own bodies.

Activity 2 Inside other vertebrates

Here you may wish to do a demonstration dissection or take students step by step through a dissection. While the body structure of a small mammal would be more similar to that of humans than would a fish, a dissection of a fish will suffice and will be more readily obtainable and more acceptable. Some students may not wish to participate in a dissection and you should be sensitive to this. Students should not be made to do a dissection.

In the dissection, stress the internal organisation, size and location of the various organs. If you choose not to do a dissection, try to investigate the internal organs of vertebrates other than humans through models, specimens or illustrations. Again, stress the internal organisation, size and location of organs.

Round off this section of the lesson by pointing out that while vertebrates differ in form, they have the same range of organs, and that although these may vary in shape, size and position they carry out the same functions. The next section of the lesson will be concerned with these functions.

Activity 3 The functions of body organs

For this part of the lesson you should divide the class into six research teams. Allocate each team one of the following:

- heart and blood vessels;
- stomach, liver and intestines;
- lungs;
- ovaries and testes;
- brain, nerves and sense organs;
- kidneys.

Provide each team with appropriate resources and ask them to research the function of the organs allocated and be prepared to share the outcomes of their research with members of other teams. Once teams have completed their research, organise the class into a set of new groups so that each group has a member from each research team. Now ask each research team member to report to the other members of their group on the functions of the organs they have researched. In this way all students should have access to information on the functions of all the organs researched. They should be asked to record this information in an appropriate way, such as notes, diagrams, charts and tables.

After group reports have been exchanged and records made, the class should be brought together for a plenary to end the lesson.

Consolidation

To finish off this lesson, prepare a chart on the board as follows:

Body organs	Functions
Heart and blood vessels	
Stomach, liver and intestines	
Lungs	
Ovaries and testes	
Brain, nerves and sense organs	
Kidneys	

Ask students to tell you what you should write in the second column to indicate the functions of the organs. Discuss students' responses and clarify and correct their understanding if need be. Try to involve as many members of the class as possible and make sure that you include students from different research groups.

Other tasks

Students could be asked to investigate the functions of other organs, to make a chart ranking body organs by size or to construct a model to show body organs: plastic body model construction kits are available from a number of toy, model and educational suppliers.

Summary for students

- Vertebrates have specialised organs that carry out particular functions.
- Different vertebrates have a number of similar organs that perform the same function.
- For humans, the main organs responsible for various functions are as follows:
circulation – the heart and blood vessels;
food processing – the stomach, liver and intestines;
gas exchange – the lungs;
reproduction – the ovaries and testes;
sensitivity – the brain, nerves and sense organs;
waste removal – the kidneys.

Notes

If students have not worked in this way previously, you may need to provide very clear guidance on the tasks and manage the movement and grouping of students carefully. It is important that students accept that they are being given some responsibility for their own learning and for the learning of others.

6.3

Temporary and permanent changes

Objectives

- Know that heating can bring about temporary, physical, changes in some materials and permanent, chemical, changes in others.
- Distinguish between heating and burning.

Safety

In this lesson both teacher and students will be heating and burning a variety of materials. Safety spectacles should be worn. Fireproof mats should be used to protect the benches. Remind students of the basic rules for heating substances, such as where a test-tube should be pointing. Make sure that students know that steam can cause nasty burns.

Introduction

Vocabulary

irreversible
permanent
reversible
temporary

This lesson follows several others in which students learn about dissolving and recovering a solute and solvent from a solution. These processes involve temporary changes. Start the lesson by recalling some of these:

- Q What does seawater contain?
- Q How did we get salt from seawater?
- Q How do we make our drinking water from seawater?

Then lead on to whether the processes could easily be reversed. You could ask open or closed questions, such as:

- Q How can we we turn the drinking water back into seawater?
- Q If we put the salt back into the drinking water, would we get water like seawater?

This leads to the idea of a *temporary, reversible* change. Put these two words on the lesson word list.

Then ask about a permanent change, such as the burning of gas in a power station to make electricity and water.

- Q What fuel did the power station use?
- Q What happened to the gas when it was burnt?
- Q Could you make the gas again by mixing the exhaust gases from the gas turbine?

This lead to the idea of a *permanent, irreversible* change. Add these two words to the list.

This leads to the main activity in which the difference between temporary and permanent changes will be studied.

Main activity

Resources (per group)

Burner (gas or spirit)
Fireproof mat
Tongs
Test-tubes and racks
Safety spectacles for each member of the group
Small quantities of paper, bits of wood, salt, sugar, copper carbonate, copper sulfate, ice, a candle, candle wax, copper, steel wool, etc.

Resource 6.1

Temporary and permanent changes

Students should work in groups of up to four. Time: 20 minutes.

Give out the instructions on **Resource 6.1**. Ensure that students have set up everything safely and are all wearing safety spectacles before they light the burners. If they are not used to using burners, you should light them. Each burner should be on a fireproof mat.

Help the groups to follow the instructions in a safe manner before giving attention to the content of the lesson.

Help the groups to look carefully at what they are doing by asking them what they see as they heat the substances. Introduce the words that describe what they are seeing: for example *melting, burning, changing colour, making a smell, giving off a gas, giving off steam*.

Make sure that students are all writing down their observations in a table while they are making them.

Make sure they also look carefully at what happens to the substances as they cool down.

Encourage them to discuss what is happening as they carry out the experiments (in their home language if the lesson is being conducted in English).

Allow sufficient time to clear away the materials.

Consolidation

Vocabulary

boiling
chemical
condensing
freezing
melting
phase change
physical

Bring the class together around the demonstration bench. Be ready to repeat any of the activities during the consolidation session. Have a blank results table ready on the board.

Ask what happened when each of the substances was heated:

Q What did you see?

Q Can you think of a word that describes the change? (burning, melting, evaporating, etc.)

Q What happened when you stopped heating?

Q Was the change permanent?

Ask a different student to complete the blank table on the board for each example.

If there is disagreement over what was observed, or if some groups missed something, repeat the experiment as a demonstration. Take some of these demonstrations a little further than was done by the students to make them clearer; hold a glass tube briefly in a candle flame and note the soot; hold a beaker of cold water briefly in the steam from a kettle (take care) to note the condensation on the outside.

Ask students to classify the change as temporary or permanent.

Students should now return to their books and complete their tables.

Ask the class what the main difference are between the temporary and the permanent changes:

Q Look at all the permanent changes. Is there something about all of them that is the same?

- Q Look at all the temporary changes. Is there something about all of them that is the same?**
- Q What are the main differences between the temporary and permanent changes?**
- Q In which changes were new substances formed?**

This line of questioning is difficult. The objective is to lead students to realise that in permanent changes new substances were formed; they may also notice that in many cases burning took place and heat was *given out*. In the temporary changes, heat was never *produced*. The physical changes usually involved a change of *state*.

The main conclusion of the lesson is that the temporary reversible changes are called *physical* changes and no new substances are formed. The permanent irreversible changes are called *chemical* changes and a new substance is formed.

Summary for students

- Physical changes are temporary and reversible and often involve a change of state.
- Chemical changes are permanent and irreversible and heat is often given out.
- Melting and boiling are examples of physical changes that happen on heating.
- Burning is an example of a chemical change that happens on heating.

Notes

Science room routines

This lesson should not be tried unless students are used to doing group work in the science room and are familiar with science room routines and expected behaviour. These include:

- rules for emergencies;
- how to get out equipment and clear away efficiently;
- how to perform simple operations (such as heating) safely;
- how to work quietly and efficiently in a group;
- wearing safety spectacles and protective clothing where necessary;
- responding immediately when the teacher calls the class to attention.

These routines require regular experience and continuous training. Potentially dangerous experiments, such as the one described in this lesson plan, should not be done unless the class has had experience of these routines and works well to them.

6.4

The phases of the Moon

Objectives

- Understand that we see the Moon at night because it is an illuminated object that reflects light from the Sun.
- Know that the Moon revolves around the Earth once every 28 days and show how this causes the phases of the Moon.
- Draw carefully labelled diagrams that show relationships, processes and observations.
- Make models from everyday materials to help explain scientific phenomena.

Preparation

This lesson will involve making a sequence of observations for about 30 days *before* the lesson, starting just before the beginning of a Hijri month.

Introduction

Ask students to keep a diary at home about the Moon each day for a month. This should start just before the new Moon when there is no visible Moon in the sky. They should write in their diary:

- the shape of the Moon (they could draw it);
- the time they made the observation;
- the position of the Moon in the sky; they should use general descriptive words such as ‘almost overhead’ and ‘low in the sky in the east’.

Ask students to look particularly carefully at the Moon when it is small in the sky.

If they have binoculars, encourage them to look at the Moon (warn them *never* to look at the Sun with binoculars).

Main activity

Resources

Diagram of the Moon in each quarter (new, half, full, half, old) on five separate sheets of paper.

Torch to simulate the Sun

Globe or large ball to simulate the Earth

Small orange or golf ball to simulate the Moon

Ask students to open their Moon diaries. Pin up the five diagrams in the wrong monthly order. Question students about the order of the phases of the Moon:

Q Is this the right order?

Q Which one comes first?

Rearrange the order according to instructions from the students and add a blank sheet representing no Moon. Ask questions leading to approximate dates when the Moon was in each quarter:

Q When did the Moon look like this?

Start a series of questions that lead to the conclusion that the Moon itself does not give off light but can be seen because light shines on it:

Q Does the Moon change its shape during the month?

Q Is the Moon the same brightness all over?

Some students will have observed, particularly near the new Moon, that it was circular in shape but only a small part of it was bright. Ask them for a possible explanation of this. They should begin to realise that the Moon may not change its shape but that the part that is bright changes.

Q Why does the bright part of the Moon change its shape during the month?

Q What causes only part of the Moon to be bright?

Follow this by a series of questions that leads to reasons why we cannot usually see the Moon during the day.

Q Can you only see the Moon at night?

Q What time of day can you see the Moon?

Q Did you see the Moon at mid-day? Why not? Was it there but you could not see it? How do you know it was there?

At the end of this, students should realise that the Moon is bright because the Sun is shining on it and that the dark part of the Moon is dark because the Sun is not shining on it. (The dark part can sometimes be seen very faintly because sunlight is reflected onto it by the Earth.)

Set up a Sun–Earth–Moon model using the torch, the globe and the orange or golf ball. If possible darken the room. Find and mark Qatar on the globe. Remind students how the Earth rotates to give night and day. Show them how the Moon revolves around the Sun.

Ask one group to try to arrange the Sun, the Earth and the Moon in the position when the Moon is full. Invite assistance from others if the group is unable to do it. Draw the positions of the Sun, the Moon and the Earth on the board.

Repeat the process with the remaining quarters and both positions of the crescent Moon.

Consolidation

Ask six groups to draw, on a sheet of paper each, the positions of the Sun, the Moon and the Earth for each quarter and waxing and waning positions of the crescent Moon. Place these diagrams on the wall next to the diagrams of the Moon in each quarter.

Other tasks

Resources

12 pieces of card, 56 cm by 10 cm, with markings for each day each 2 cm wide

12 pieces of card of a different colour, 62 cm by 10 cm, with markings for each day each 2 cm wide

12 marker pens

Discuss the Hijri calendar

Q What are the names of the months in the Hijri calendar?

Q How do we know when an Hijri month has started?

Q How long is a Hijri month?

At this point the difference between the traditional start of the months and the start of the months in the Saudi calendar could be introduced through a discussion of the problems associated with timekeeping in two geographically separated places using traditional methods of timekeeping.

Compare the Hijri calendar with the Gregorian calendar

The Gregorian calendar is accepted as the international calendar. It is now commonly used in most countries because of the need to adopt a worldwide system. Many countries also have their own, or regional, calendars and ways of noting the passage of time: the Hijri and Chinese calendars being the two most widely used ones (see the notes below).

Divide the class into 12 groups. Give each group a card of a different colour. Assign a different Hijri month and international month to each group. Ask the groups to:

- write the name of their months on the cards – the Hijri names should be on the shorter card;
- reduce the length of the international months to the appropriate number of days.

Make a year-long display showing both years, one above the other starting with the two current months, placing the current days in each month vertically in line. Add the other 11 months.

Ask students to compare the two calendars.

Q Which calendar has the shortest months?

Q How many days are there in the year in each calendar?

Q What day will 7 September (choose any date) be in the Hijri calendar?

Q On the international calendar, what date will be the fifth day of Jumad Al-Thani (choose any date)?

The two calendars can be reconsidered after students have studied the solar year later in this topic. At that time the reasons for increasing the lengths of the month beyond 28 days in the international calendar can be discussed.

Summary for students

- We can see the Moon because light from the Sun shines on it and is reflected into our eyes.
- The Moon revolves around the Earth once every 28 days.
- We see the part of the Moon that is illuminated by the Sun; the size of the part that is illuminated changes throughout the month and this causes the phases of the Moon.

Notes

Information on calendars

The English word ‘month’ comes from the word ‘Moon’, showing that the international calendar was once a *lunar calendar*, like the Hijri calendar. Many centuries ago, it was changed into a *solar calendar*, in which the year was the period of one revolution of the Earth around the Sun and not 12 lunar months. The main reason for this change was that in those times most people using calendars were farmers and a solar calendar was more useful to them than a lunar calendar.

The change meant that each month had to be made a bit longer. Because the solar year is not a whole number of days, corrections have to be made every four years by adding one day (29 February). This, however, makes average year length slightly too long and so an additional correction is made once a century when this fourth year is not a leap year (as in 1900). However, even this does not make things quite right, so every 400 years the first year of the century is again a leap year (as in 2000). This calendar was worked out by astronomers in Italy in 1582. They were working for Pope Gregory XIII and so the calendar has become known as the Gregorian calendar. Even finer corrections, of a few seconds, agreed internationally, are made each year at the end of 31 December.

More information on the World's calendars can be found on a very useful website,
<http://webexhibits.org/calendars/index.html>.