Science lessons for Grade 2

Lessons in this section

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Resource sheets for the lessons

Using these lesson plans

These sample lessons for Grade 2 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 2. 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 to 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. If your school's policy is to provide homework for Grade 2, 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.

2.1 Body parts

Objectives

- Recognise the visible body parts of animals that are similar to those of humans and relate structure to function.
- Know and use the names of phenomena and objects they have observed.

Preparation

If possible, try to have some live animals for students to look at and handle. You will also need a collection of photographs and/or drawings of a wide range of animals. These could be collected from magazines. In addition, it would help to have available a range of library books with illustrations of animals. If you have any videos about animals, these could be shown as part of the lesson.

Safety

If animals will be brought into the class, and in particular if students will handle animals, it is important that you know if any student is allergic to any of these animals and that you take appropriate action. If students are to handle animals, they should be instructed on the proper procedures. You should make sure that students wash their hands thoroughly after touching any animal.

Introduction

Vocabulary

arms
body
ears
eyes
feet
fingers
hair
hands
head
legs
mouth
nose
toes
tongue

Our body parts

A good way to start this lesson is to play a 'Simon says …' activity. In this the students must do the action after you say the words 'Simon says' but take no action if you do not use these words before a command. You can use any name that is appropriate to the class. Explain the rules of the game and then have commands such as:

Touch your nose.

Raise your hand.

Shake your head.

Point to the part of your body that hears sounds.

Lift a part that is used for movement.

Point to a part used for seeing.

Point to a part that is sensitive to touch.

Open the part used for eating.

These commands (and others) could be repeated (with and without being preceded by 'Simon says' until you are confident that students are familiar with the main external parts of their bodies and their function.

You should now explain to students that the main purpose of the lesson is to look at other animals (you may need to remind them that humans are animals) and try to identify parts that are similar to those of humans and/or have similar functions.

Main activity

Resources

Live or toy mammal or mammal poster

Range of portrayals of a variety of animals

Describing animals

Activity 1 Humans and other mammals

Whole-class activity.

A good way to start this part of the lesson is to have a live animal, such as a small pet mammal, for students to observe and handle. This acts as a stimulus. Where this is not possible, use a large poster or picture of an appropriate mammal or mammals. Another alternative would be a life-like toy mammal. You could even ask students to bring in appropriate toy animals.

Use the stimulus to ask questions such as:

Q What features does this animal have in common with us?

Q How does the animal move?

Q How does the animal eat?

Q How does the animal see?

Q How does the animal hear?

Q What features does the animal have that we do not have?

Q How would you compare the animal with humans?

Try to involve as many students as possible and ask individuals to come forward to point out the structures that they think are involved.

Once you are confident that students can recognise and compare parts of their own body with the example mammal(s) you should move on to the next part of the lesson.

Activity 2 Humans and other animals

Students should work in groups of about four.

Each group will need access to a selection of materials depicting a range of animals. Some of these could be live specimens (e.g. insects, fish, small pet mammals). Most will be pictures. Try to include animals common in Qatar.

Each group should study their resources and try to identify the structures that have similar functions to those of their own body. Move round the class and ask groups to tell you about their animals.

As you talk with students you should ask them to point out the structures and tell you their functions. Ask questions such as:

Q What structures help this animal to move?

Q What do you think that this part does? (pointing to a part)

Q What structures indicate that this animal can see?

Q What do we have that is similar to this? (pointing to a part)

Q How does the size of this part compare with the same part of your body? (pointing to a part)

Q How do the parts of this animal compare with that animal? (pointing to two animals)

Q Why do you think these animals have different parts to allow them move? (pointing to two animals)

Encourage students to talk about similarities and differences that they can see.

If time allows, students could exchange resources and study a wider range of animals.

Bring the activity to an end in a whole-class activity by asking a few groups to tell the class about one of the animals that they have studied. Ask groups to show their resource and to point to the various parts and functions that they have identified as common with themselves. Select groups able to report on different types of animals, such as a mammal, a bird, a fish and an insect.

Consolidation

In the final section of the lesson bring the class together round the board. Ask the class to tell you about the different structures that animals have for locomotion, eating, seeing, hearing, etc. Record these on the board in words, diagrams or pictures, as appropriate.

Other tasks

Students could be asked to make an imaginary animal with special structures to carry out various functions similar to those of their own external body parts.

Summary for students

- Some animals have body parts that are similar to those of humans and that perform the same function.
- Some animals have body parts that are different from those of humans but that perform the same function.

Notes

This lesson should help the development of students' communication skills.

2.2 Teeth

Objectives

- Know that teeth are important for eating and that they must be cleaned regularly.
- Make pictograms with simple scales to assist in data display.

Preparation

In this lesson students will brush their teeth. You will need to ask them to bring in their toothbrushes and some toothpaste. It would be a good idea to have new brushes and toothpaste available for those that forget or who do not have these resources. You will need toothpicks, dental floss and some small mirrors so that students can look at their teeth. You will also need some bread for pupils to bite and chew, containers for mouth rinsing water and receptacles to hold the rinsings. You should also find some drawings or pictures of toothbrushes (or other suitable items) and make copies of these so that they can be used as the icon for pictograms that will be produced. You will also need your own toothbrush and toothpaste.

Safety

In this lesson students will chew some bread and brush their teeth. It is important that these activities are carried out hygienically and that waste is disposed of appropriately. You should make sure that students wash their hands thoroughly before and after the activities.

Introduction

Vocabulary

false teeth
tooth decay

False teeth

A good way to start this lesson is by telling students that at one time many people would have all their teeth removed when they became adults. This was because tooth decay was so common and caused so much pain that it was seen to be sensible to try to avoid this. Ask the class about this by posing questions such as:

Q Why do you think that tooth decay was so common and so serious a disease? (poor dental care)

Q Why is it less common and less serious now? (better dental care)

Discuss students' responses and establish that while tooth decay still occurs we know more about what causes it and can take steps to try to prevent it. You may wish to ask whether any students have visited a dentist or dental hygienist and why. It is important that you portray such visits as positive and not painful experiences.

You should now explain to students that the main purpose of the lesson is for them to look at their teeth and to learn about keeping them clean.

Main activity

Resources

Mirror
Bread
Toothbrush
Toothpaste
Toothpicks
Access to water
Containers

Tooth care

Activity 1 Tooth watch

Students should work individually but may need to share equipment.

Students should wash their hands before the activity as it involves them counting their teeth. They may do this by placing a finger in their mouth and touching their teeth. Have some toothpicks to hand that students could use instead of their fingers. Ask students to use a mirror to look at their teeth and count the number of teeth they have. They should not put the mirror in their mouth.

Once students have examined and counted their teeth, ask questions to find out the range of numbers they found, the types of teeth and where they are located. Students may not be able to count all their teeth. Ask questions such as:

Q How many teeth do you have?

Q Do you have the same number on the top and bottom?

Q Are all your teeth the same shape?

Q How many different shapes have you found?

Q Do you all have similar shapes of teeth in the same place?

Q What shape are the teeth at the front of your mouth?

Q What shape are the teeth at the side of your mouth?

Q What shape are the teeth at the back of your mouth?

Try to involve as many students as possible in answering questions and discuss the answers with others. It is likely that students will have different numbers of teeth. Some will not yet have all their first teeth while others may have lost some of their first teeth. Some students may have had teeth removed and others may have had teeth filled. These facts might be explored but you need to do this with some sensitivity.

This activity should end by telling the class that the next activity they will do is to try to decide the function of each of the different types of tooth. You could ask the class:

Q How could we find out the function of the different types of tooth?

Discuss the various responses and then explain that you have decided to ask them to work in pairs. One member of the pair will eat some bread and the other will watch which teeth are used. They will then change roles. Ask students to wash their hands if you think it necessary.

Activity 2 Munching bread

Students should work in pairs.

Give each pair two small pieces of hard bread. Ask one of each pair to use their teeth to tear or bite the bread and then chew it. Ask the other one to observe which teeth are used. Ask them to reverse roles and repeat the process. Now ask questions to identify which teeth were used for these functions. Useful questions are:

Q Which teeth were used for biting or cutting the bread? (those at the front)

Q What shape are these teeth? (broad with sharp edges)

Q Which teeth were used for tearing the bread? (those at the side)

Q What shape are these teeth? (long and pointed)

Q Which teeth were used for chewing the bread? (those at the back)

Q What shape are these teeth? (broad tops)

Discuss students' answers and try to involve as many students as possible. Establish that different areas of the jaw have different teeth and that different teeth have different functions. These functions are tearing, cutting and chewing. Bring this part of the lesson to an end by asking the question:

Q We have just been eating bread. What should we do now?

Students might have various answers but you should establish that after eating it is a good idea to brush your teeth.

Activity 3 Brushing teeth

Bring the class together and explain how to brush teeth with a toothbrush and toothpaste. You may wish to demonstrate by brushing your own teeth. Now ask individuals to brush their teeth with their toothbrush and toothpaste and to rinse out their mouth with water into a container. All students should have their own containers. Now ask:

Q What do you see in your containers of mouth rinsings?

Students should report seeing small pieces of bread (and possibly other food debris) in the water and toothpaste mixture.

Now ask the students to pour away their rinsing and to repeat the process of brushing their teeth and collecting the rinsings. Ask again:

Q What do you see in your containers of mouth rinsings?

Discuss students' answers. If students have brushed their teeth well, the rinsings should be free of food debris.

Make the point that eating leaves food debris on and around our teeth and that this can lead to tooth decay. If teeth are to remain healthy, then this debris needs to be removed regularly. Ideally teeth should be brushed after every meal. Show students a toothpick and some dental floss and explain how their use, along with regular brushing, can help to keep teeth clean and healthy.

Consolidation

In the final section of the lesson bring the class together round the board. Ask the class to tell you how often they plan to brush their teeth each day. Count how many say they will brush their teeth once a day, twice a day and more than twice a day. Use an icon, such as a picture of toothbrush, and construct a pictogram to show the numbers of students in each category. From time to time in future lessons draw attention to the pictogram and remind students of their intention to brush their teeth.

Other tasks

Students could be asked to draw the shapes of the different teeth, to research the shapes of teeth of different mammals or to keep a tooth diary in which they note when they get and lose teeth.

Summary for students

- Humans have teeth with different shapes.
- Differently shaped teeth have different functions while eating: tearing, cutting and chewing.
- Regular brushing with toothpaste helps to keep teeth clean and healthy.

Notes

A dental surgeon or dental hygienist may be able to provide resources to support this lesson and might be able to come to class to talk to students about tooth care and brushing technique.

2.3 Science in the kitchen

Objectives

- Know that some materials can be changed either temporarily or permanently by heating.
- Look for simple patterns in observations made.

Preparation

In this lesson dough is prepared and then cooked. Kitchen utensils, including washing-up bowls, mixing bowls, cutting boards and spoons, and a small oven will be needed. Part of the classroom should be designated as a clean area for preparing food. Surfaces should be cleaned with kitchen disinfectant. A supply of water will be required, preferably to a sink with a draining board in the classroom.

Purchase the following ingredients before the lesson:

- small tin of active dry yeast;
- jar of honey;
- cooking salt;
- 1 kg bag of flour;
- 250 g butter.

The lesson will come after a study of temporary changes brought about by heat, such as the melting of ice and the softening of butter and chocolate.

Safety

This lesson involves the preparation of food. If the food is to be eaten, regulations governing food preparation at school must be followed and all surfaces and implements must be properly cleaned. Students and teachers should wash their hands thoroughly before the lesson. Aprons should be supplied or brought to school.

Prepare the ingredients that are needed for each group before the lesson so they can be given out quickly.

The part of the lesson that involves the use of the oven and hot ingredients must be done by the teacher. The oven should be switched on at the beginning of the lesson to pre-heat.

The complete process should be tried by the teacher before the lesson.

Introduction

Vocabulary

food
ingredients
(names of the food items you mention)

Question the class to find out what food they have cooked:

Q Have you ever helped your parents in the kitchen?
Q What kind of food have you made?
Q What was the food made out of?
Q What did you do to make the food?

Further questioning should lead to the idea of changes that take place during cooking:

Q Did the food look like the things you used to make it?
Q Did the food taste like the things you used to make it?

Question further about changes in specific cooking processes that the class mentions. This might, for example, involve the use of eggs. The questioning should lead to the idea that cooking causes changes that are permanent:

Q What does an uncooked egg look like?

Q What does an egg look like when it is cooked?

Q Can you turn a cooked egg back into an uncooked egg?

This introduction leads to the main activity in which the students make pretzels and look carefully at the changes in each part of the process.

Main activity

Science in the kitchen

Vocabulary

baking
bubbles
colour
hardness
shape
texture
yeast

Resources (per group)

Mixing bowl
Wooden spoon
Cutting board
Clean dishcloth
Greased paper
Ingredients listed in Resource 2.1
Resource 2.1

Students should work in groups so that there are about eight groups in the class. Time: 40 minutes.

The instructions for making pretzels are shown in **Resource 2.1**. Read out the instructions for each step and demonstrate it. Help students with any difficulties.

At the end of the first step the yeast must be left for about 5 minutes. During this time, ask students to watch closely what happens. Ask them what the mixture smells like. They will probably recognise the typical smell associated with baking. Make up sentences on the board to describe what happens. These could have gaps in them to allow students to copy and select the correct key word from the word board. Examples could be:

The yeast and water made _____.

The yeast and water made a smell like _____.

Give out all the equipment needed for preparing the dough (steps 2 to 5 on Resource 2.1). Give out the ingredients and demonstrate the process. Ask students to make the dough. This should be done in the part of the room that has been cleaned for food preparation. Circulate around the groups giving help where needed. It is important to kneed the dough for at least the full 5 minutes; this task can be shared among group members. The remaining members can start on the next part of the lesson. When this is complete, students should place the dough in the bowl, cover it with the cloth and then clean up their workplace. During the next 20 minutes the dough should be regularly inspected but not touched.

While the dough is rising students should draw pictures in their book showing how they made the dough. They should list the ingredients, which can be copied from the word board. They should also write sentences to describe what happened to the dough when it was left in the bowl. These can be put on the board with missing words as before.

After about 20 minutes students roll out the dough and make the shapes of letters and numbers on the greased paper. You must do the last steps of the process, not the students.

After about 12 minutes remove the pretzels from the oven. Ask the class to look at them and compare them with the ingredients. Ask questions such as these that draw attention to words that describe the pretzels, such as shape and texture:

Q What has happened to the colour of the pretzels?

Q What has happened to the shape of the pretzels?

Q What has happened to the texture of the pretzels?

Q Are the cooked pretzels harder or softer than the dough?

Consolidation

Show students how to construct a table that summarises the changes in a few words. The table could have four columns headed 'What we used', 'What these looked like', 'What we made' and 'What they looked like'. Ask students to write appropriate words in each column.

Discuss with the class whether the change is permanent:

Q What happened last lesson to the chocolate when we warmed it and then cooled it again?

Q If we cool the pretzels, will they turn back into flour and water?

Make a second table to illustrate the simple pattern in the kinds of changes they have observed in this lesson and in previous ones. This could be done as part of a display and students can add to it by writing changes on pieces of card and adding them to the appropriate columns of the table. The table should have two columns headed with phrases like 'Changes that can go back again' and 'Changes that cannot go back again' to indicate reversible and irreversible changes. Students will write phrases such 'melting butter', 'boiling water', 'making pretzels', 'cooking an egg', etc., on card and stick the card in the appropriate column.

Other tasks

If time allows, consider further explorations of the processes. Put some of the yeast and honey mix into an evacuated ziplock polythene bag and leave it for some time. This will suggest a reason why the dough rises. Try a control experiment without the yeast.

Summary for students

- Dough is made from yeast, flour and water.
- Yeast makes bubbles when it is mixed with sugar in water.
- Cooking the dough changes it.
- The changes that happen when dough is cooked cannot be undone.

2.4 Electricity challenge

Objectives

- Name and use some common devices that use electricity.
- Know that connections with wires to the positive and negative poles of a cell can make a bulb light.
- Draw conclusions from observations.
- Connect simple electrical devices in a circuit so that they work.

Preparation

A kit of components will be required for this lesson. This should include, for each group of students: one cell, one cell holder (desirable but not essential), one buzzer and one bulb holder with wires attached to them, and 1.5 to 3 V bulbs to fit the holders. Additional components can be a switch with wires attached and a second bulb and holder. Ideally you should have one set of equipment for every two students.

Cells that are to be stored for any length of time should be placed in a dry container in a refrigerator.

Test all equipment before the lesson.

Main activity

Vocabulary

bulb
cell
switch
wire

Resources (per group)

1 cell
1 cell holder
1 bulb and bulb holder
1 buzzer

Additional resources

1 switch
Second bulb and bulb holder (optional)

The electricity challenge

Students should work in groups of two or three. Time: 40–45 minutes.

This lesson is a challenge to students to find out as much as they can about how electrical circuits work. There is no introduction to the lesson.

Hand out the equipment to each group. Do not give them the additional resources at this stage. Allow groups to experiment without any guidance for 10–15 minutes.

It is likely that students will find out how to make the equipment work quite quickly and that groups will learn from each other.

Do not interfere for the first 10 minutes until most groups have made working circuits. Then circulate asking leading questions to encourage them to find out more about the characteristics of a working circuit. For example:

Q What happens if you connect the bulb (or buzzer) the other way round?

Q What happens if you connect the cell the other way round?

Q Can you make the bulb work without using a cell holder?

Q Can you make the bulb work without using the bulb holder?

Q Can you make the buzzer and the bulb work at the same time?

Some groups will discover how to make circuits work in different ways like this much faster than others. You can give additional items to the faster groups, such as a second bulb and a switch. You should eventually try to give a switch to all groups but you do not need to give the second bulb and holder to every group.

When you give out the switch, challenge students to make a circuit that switches on the bulb when the switch is on, not off. This is important, as one way to make the switch appear to work is to arrange it so that it short-circuits the bulb when it is on.

Faster groups given two bulbs can be challenged to make them come on (a) so that they are both as bright as a single bulb by itself and (b) so that they are both half as bright. Most students find the first arrangement (parallel) easily but the second (series) only after some time. You can discuss this with them but it is unwise to discuss this later with the whole class as it can create misunderstandings.

Consolidation

Bring the class to order and summarise what they have found out using the same questions as you asked the groups.

Ask students to draw diagrams in their books of the circuits they made *that work*. To do this, get them to draw their circuits with chalk on the desk underneath the circuits, using circles for bulbs, rectangles for cells and lines joining them for wires. They can then copy these chalk diagrams into their books. Ask them to label the different parts of the diagram using words from the word board. Draw some of the diagrams of successful circuits on the board

By asking questions, encourage them to reach three conclusions from the circuit diagrams:

- for a bulb to light there has to be a complete electrical circuit;
- wires must be connected to both poles of the cell (which can be introduced as the + and – poles);
- wires are connected to both terminals on the buzzer or bulb.

Ask open questions to start with; if appropriate conclusions are not forthcoming, ask closed ones:

Q What do you notice about all the successful circuits?

Q Are both terminals of the cell connected in the circuit?

Q Are both sides of the bulb connected?

An alternative approach would be to draw several circuits on the board, some that are complete and others that are not, and ask students which bulbs would light and which would not, and why.

Summary for students

- For a bulb to light, there has to be a complete electrical circuit.
- For a bulb to light, wires must be connected to both the + and – poles of the cell.
- Wires are connected to both terminals on the buzzer or bulb