

Summary of students' performance by the end of Grade 2

Scientific enquiry

Students draw conclusions from observations and evidence, make predictions about what might happen in an investigation and then test them. They know and use correct scientific terminology and communicate results in a variety of ways. They make picture graphs with simple scales representing data collected. They label pictures and make tables to record observations. They measure length and follow instructions to assemble simple circuits and apparatus.

Life science

Students give examples of how living things are suited to their habitats. They know that the natural environment must be cared for. They match external parts of their bodies to those of other organisms and relate structures to functions. They know their sense organs and their functions. They know that teeth and that they must be kept clean. They know that flowering plants grow from seeds and that they take in water through their roots and transport this to all parts of the plant.

Materials

Students use their senses to help describe some properties of materials and devise simple tests for these properties. They classify materials according to whether they occur naturally or not. They know that some flexible materials can be permanently changed by bending, twisting and stretching whereas others only change temporarily. They know that many materials can be changed temporarily or permanently by heating.

Physical processes

Students identify the effects of forces, such as squashing, twisting and stretching, and know how pushes and pulls are used to make familiar objects speed up and slow down. They name and use some common electrical devices and are aware of the dangers of mains electricity. They make connections to the positive and negative poles of a cell and make a bulb light. They know that a battery will discharge after it has been used for a while, and recognise that the chemicals inside batteries can be dangerous. They know that a battery-operated electrical device will not work if there is no battery or if the battery is discharged.

The balance between scientific enquiry and the subject content strands

The science standards for Grade 2 are grouped into four strands: three content strands – life science, materials and physical processes – and the scientific enquiry skills strand, which addresses the development of scientific practical and intellectual skills across all the content strands.

The teaching of the content standards in life science, materials and physical processes should take approximately 60% of the time allocated to science in Grade 2. It is intended that the remaining time is devoted to developing

further science enquiry skills and the language, mathematical and communication skills that are important for science. This may be done using *any* science content topics, not just the content topics prescribed in these standards.

Assessment weightings for Grade 2

There are three general assessment objectives for the science curriculum:

- knowledge and understanding;
- application of knowledge and understanding, analysis and evaluation of information;
- scientific enquiry skills and procedures.

The balance between these three general objectives will vary from grade to grade. As students' scientific proficiency and experience develops, there should be a greater emphasis on the application of knowledge to solve problems in new situations.

For Grade 2, the weightings of the subject content strands are as follows:

	Life science	Materials	Physical processes
Assessment weighting	30 to 40%	30 to 40%	30 to 40%

For Grade 2, the weightings of the assessment objectives to be applied to each content strand are as follows:

	Knowledge and understanding	Application, analysis and evaluation	Scientific enquiry skills and procedures
Assessment weighting	20 to 30%	0 to 10%	65 to 75%

Scientific enquiry

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Students should:

1 Use methods of scientific investigation

- 1.1 Collect data in a systematic manner.
- 1.2 Draw conclusions from observations and data.
- 1.3 Make predictions about the outcome of an investigation.
- 1.4 Look for simple patterns in observations made.
- 1.5 Devise fair ways of testing predictions.

2 Process and communicate information

- 2.1 Know and use the names of phenomena and objects they have observed.
- 2.2 Sort objects into groups, make simple comparisons and identify trends and patterns.
- 2.3 Use correct names of objects and processes when describing an investigation.
- 2.4 Make a display of data collected.

Display data classified numerically, such as data obtained from members of the class (e.g. height, shoe size, hand-span).

Collect objects made from paper and use paper to make a variety of objects (including papier-mâché) to show the versatility of the material. Display the objects and classify them according to their function.

- 2.5 Use project work on a specific topic as a means of collecting and recording information.

Study a patch of watered ground on which plants are growing over time. Keep a diary of observations made each week. Include measurements of the height of specific plants.

- 2.6 Make pictograms with simple scales to assist in data display.

Key standards

Key performance standards are shown in shaded rectangles, e.g. 1.3.

Examples of learning exercises

The examples of active learning exercises shown in italics are intended to be illustrative and do not represent the full range of possible exercises.

Cross-references to scientific enquiry skills

Some of the suggested learning exercises are cross-referenced where appropriate to scientific enquiry skills.

ICT opportunity

Use digital photography to record plant growth.

2.7 Label pictures correctly.

3 Handle equipment and make measurements

3.1 Use a tape measure and ruler correctly.

3.2 Connect simple electrical devices in a circuit so that they work.

3.3 Follow instructions to assemble simple equipment correctly and safely.

Life science

By the end of Grade 2, students give examples of how living things are suited to their habitats. They know that the natural environment must be cared for. They match external parts of their bodies to those of other organisms and relate structures to functions. They know their sense organs and their functions. They know that teeth and that they must be kept clean. They know that flowering plants grow from seeds and that they take in water through their roots and transport this to all parts of the plant.

Students should:

4 Know that living things are suited to their habitats and that the natural environment must be respected and cared for

4.1 Recognise that the characteristic features of an organism make it well suited to certain environments and less well suited to others.

Using pictures, models or specimens, examine the general characteristics of various mammals, birds, reptiles, amphibians and fish, and relate these to the environments in which they are found.

Enquiry skills 2.1, 2.2

From field-trip observations or a collection of pictures of plants growing in different habitats, make a list of places where plants grow and the key features of the plants growing there.

Enquiry skills 1.2, 2.4,

4.2 Know that the natural environment must be cared for and habitats protected.

Talk about local, national and international news stories on care for the environment.

Take part in environmental care projects.

4.3 Illustrate how local industry takes steps to care for the environment.

Collect and display information on how local industry helps to protect the environment.

Enquiry skill 2.5

5 Know that organisms have specialised structures for particular functions

5.1 Recognise the visible body parts of animals that are similar to those of humans and relate structure to function.

Using pictures, specimens or models of various mammals and other animals, identify the animals' main body (trunk), head, limbs, mouth, eyes, ears and nose.

Enquiry skills 1.2, 2.1

- 5.2** Identify that skin is sensitive to touch, the nose detects smells, eyes detect light and colour, ears detect sounds and the tongue detects tastes.

Place hands in cold and warm water, touch rough and smooth materials, smell various odours, observe lights of different brightness and colour, make and listen to sounds of different volume and pitch, and taste salty, sweet and sour flavours.

- 5.3** Know that teeth are important for eating and that they must be cleaned regularly.

Bite off and chew bread and discuss the use of the different teeth in the mouth.

Survey the number of times people brush their teeth each day.

Make a display of different types of toothbrush.

Examine a model of teeth and discuss areas that must be given special attention when brushing.

Ask a dental hygienist to demonstrate good teeth-brushing technique.

6 Know that seeds grow into flowering plants; know that plants take in water through their roots and transport this to all parts of the plant

- 6.1** Know that, given the right conditions, the seeds of flowering plants can sprout and grow into new plants.

Sow seeds of plants such as cress, peas, beans, oats or sunflowers on moist paper or cotton wool in glass containers and observe germination and growth over time.

Sow seeds of colourful flowers in a garden plot, water and observe or photograph regularly until they flower and set seed.

- 6.2** Know that flowering plants take in water through their roots and transport this to all parts of the plant.

Position Take a rooted plant with white or light-coloured petals and position it so that its roots hang into a container of water coloured with red ink. Observe the movement of the ink through the plant and into the petals.

Place a stick of celery with attached leaves into a glass of water coloured with red ink. Leave it until the red colour appears in the leaves. Cut transverse sections across the stem and observe the red colour in the vessels.

- 6.3** Recognise that many local plants can live with little water.

Make a record of the plants that can grow in dry places.

Enquiry skills 1.2, 2.1

Safety

The materials for tasting should be prepared in hygienic conditions and care taken to prevent cross-contamination.

Enquiry skill 1.2

Enquiry skill 1.2

Enquiry skill 1.2

Safety

Take care with cutting.

Enquiry skill 1.2

Materials

By the end of Grade 2, students use their senses to help describe some properties of materials and devise simple tests for these properties. They classify materials according to whether they occur naturally or not. They know that some flexible materials can be permanently changed by bending, twisting and stretching whereas others only change temporarily. They know that many materials can be changed temporarily or permanently by heating.

Students should:

7 Investigate simple properties of common materials

- 7.1** Describe the properties of materials in terms of how they look, feel and smell.

How many common materials can children identify correctly with their eyes closed? Use materials such as paper, plastics, leather, polished and unpolished wood, pottery, bricks and concrete.

- 7.2** Devise simple tests for some properties of materials.

Consider simple tests such as heavy/light, float/sink, rigid/flexible, how easily it breaks. Make up sentences that describe the materials using words related to the tests.

Enquiry skill 1.5

- 7.3** Classify materials according to whether they occur naturally or are synthetic.

Sort materials into the two groups. Distinguish between, for example, natural and synthetic fibres or stone and concrete.

Enquiry skill 2.2

- 7.4** Know that both natural and synthetic materials are often changed further before they are used.

Classify common materials according to whether they have been changed further before they are used. Introduce words to describe the changes (e.g. polishing, shaping, spinning, weaving). Make a display of the materials with such words next to each material as appropriate.

Enquiry skill 2.2

Make a display showing the different stages of processing a material undergoes (e.g. raw wool from a sheep, spun wool, fabric, a garment).

Enquiry skill 2.4

- 7.5** Know that some flexible materials can be permanently changed by bending, twisting and stretching whereas others are changed temporarily.

Group some materials into the two classes. Note also that some materials may break more easily than others when they are bent or stretched.

Enquiry skill 2.2

Safety

Take adequate care when breaking materials.

- 7.6** Know that many materials can be changed either temporarily or permanently by heating.

Investigate changing materials such as Plasticine, clay, dough, with and without the final heating stage.

Safety

Children should not be allowed to eat food prepared in a classroom unless it is prepared in a clean environment, such as a home economics room.

Investigate the changes in familiar foods when they are cooked (e.g. dough, potatoes, eggs).

- 7.7** Know that solids such as ice and candle wax can turn into liquids when they are warmed.

Warm candle wax in water until it melts. When it is solid and soft as it cools, mould it into different shapes. Make new candles of different shapes using a string wick. Devise a fair test for comparing the new candles.

Safety

Burning of candles and heating water should be properly supervised by the teacher in a special place set aside for the work.

Devise a fair test to investigate how fast ice melts in different places in and near the classroom. Predict the results. Draw conclusions about which places are warmest.

- 7.8** Know that when water is heated in a kettle it boils and that the steam that is produced can be turned back to water.

Demonstrate condensation of steam on a cold surface near a boiling kettle.

Enquiry skill 1.3, 1.5

Safety

Steam can cause burns. This work should be demonstrated by the teacher.

Physical processes

By the end of Grade 2, students identify the effects of forces, such as squashing, twisting and stretching, and know how pushes and pulls are used to make familiar objects speed up and slow down. They name and use some common electrical devices and are aware of the dangers of mains electricity. They make connections to the positive and negative poles of a cell and make a bulb light. They know that a battery will discharge after it has been used for a while, and recognise that the chemicals inside batteries can be dangerous. They know that a battery-operated electrical device will not work if there is no battery or if the battery is discharged.

Students should:

8 Show how forces cause objects to change

8.1 Know that forces are pushes and pulls.

List all the ways they have used forces coming to the classroom.

Enquiry skill 1.1, 2.3

Draw pictures of objects that are commonly associated with the use of forces (e.g. door, football, school bag, bicycle). Write words near each picture that describe the force or what it does (e.g. close, open, kick, lift, pedal, push).

8.2 Identify different effects on objects of forces such as squashing, twisting and stretching.

Make different shapes out of Plasticine or dough. Describe the kinds of force they are using (e.g. squashing, pulling, twisting, stretching).

8.3 Show how forces can make familiar objects speed up and slow down.

Push toy cars and measure the distance they travel.

Compare the distances moved by different toy cars that are set off down ramps. Discuss how to make the test fair (e.g. standardise the length and steepness of the ramp). Use the results to draw a block graph or pictogram. Predict what might happen when the conditions are changed. Repeat the test under different conditions, and note and explain any different results.

Enquiry skills 1.3, 1.4, 1.5, 2.6, 3.1

9 Know how simple electrical devices work

9.1 Name and use some common devices that use electricity.

Name and draw some appliances around the school that use electricity.

Classify appliances according to whether they use mains electricity or batteries.

9.2 Know that common electrical devices can make light, sound, heat and movement.

Classify appliances according to what they do (e.g. make sound, produce light or heat, or move).

Enquiry skill 2.2

9.3 Know that connections with wires to the positive and negative poles of a cell can make a bulb light.

Make simple circuits from cells, wires, buzzers and bulbs.

Look at pictures of simple circuits and predict what will happen in the circuits (some will not work). Test these predictions.

Enquiry skill 1.3

Find out by experiment what is wrong with some simple battery-driven appliances that do not work.

9.4 Know that after some use a battery will discharge, and that a battery-operated electrical device will not work if there is no battery or if the battery is discharged.

9.5 Know that the chemicals inside batteries can be harmful and that batteries should be recycled when possible.

Set up a school collecting point for used batteries. Sort them and dispose of them correctly.

9.6 Know about the dangers of mains electricity.

Watch video clips showing the dangers of mains electricity.
