



MINISTRY OF EDUCATION MALAYSIA

Integrated Curriculum for Primary Schools

Curriculum Specifications

SCIENCE Year 3



Curriculum Development Centre
Ministry of Education Malaysia
2003



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Pesiaran Duta Off Jalan Duta
50604 Kuala Lumpur

First published 2003

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THE NATIONAL PHILOSOPHY

Our nation, Malaysia, is dedicated to achieving a greater unity of all her peoples; to maintaining a democratic way of life; to creating a just society in which the wealth of the nation shall be equitably shared; to ensuring a liberal approach to her rich and diverse cultural traditions; to building a progressive society which shall be oriented to modern science and technology;

WE, her peoples, pledge our united efforts to attain these ends guided by these principles:

BELIEF IN GOD

LOYALTY TO KING AND COUNTRY

UPHOLDING THE CONSTITUTION

RULE OF LAW

GOOD BEHAVIOUR AND MORALITY

NATIONAL PHILOSOPHY OF EDUCATION

Education in Malaysia is an on-going effort towards developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards and who are responsible and capable of achieving a high level of personal well being as well as being able to contribute to the harmony and betterment of the family, society and the nation at large.

NATIONAL SCIENCE EDUCATION PHILOSOPHY

In consonance with the National Education Philosophy,
science education in Malaysia nurtures a
science and technology culture by focusing
on the development of individuals who are competitive,
dynamic, robust and resilient and able to
master scientific knowledge and technological competency.

PREFACE

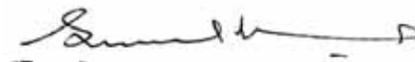
The aspiration of the nation to become an industrialised society depends on science and technology. It is envisaged that success in providing quality science education to Malaysians from an early age will serve to spearhead the nation into becoming a knowledge society and a competitive player in the global arena. Towards this end, the Malaysian education system is giving greater emphasis to science and mathematics education.

The Science curriculum has been designed not only to provide opportunities for students to acquire science knowledge and skills, develop thinking skills and thinking strategies, and to apply this knowledge and skills in everyday life, but also to inculcate in them noble values and the spirit of patriotism. It is hoped that the educational process en route to achieving these aims would produce well-balanced citizens capable of contributing to the harmony and prosperity of the nation and its people.

The Science curriculum aims at producing active learners. To this end, students are given ample opportunities to engage in scientific investigations through hands-on activities and experimentations. The inquiry approach, incorporating thinking skills, thinking strategies and thoughtful learning, should be emphasised throughout the teaching-learning process. The content and contexts suggested are chosen based on their relevance and appeal to students so that their interest in the subject is enhanced.

In a recent development, the Government has made a decision to introduce English as the medium of instruction in the teaching and learning of science and mathematics. This measure will enable students to keep abreast of developments in science and technology in contemporary society by enhancing their capability and know-how to tap the diverse sources of information on science written in the English language. At the same time, this move would also provide opportunities for students to use the English language and hence, increase their proficiency in the language. Thus, in implementing the science curriculum, attention is given to developing students' ability to use English for study and communication, especially in the early years of learning.

The development of this curriculum and the preparation of the corresponding Curriculum Specifications have been the work of many individuals over a period of time. To all those who have contributed in one way or another to this effort, may I, on behalf of the Ministry of Education, express my sincere gratitude and thanks for the time and labour expended.



(Dr. SHARIFAH MAIMUNAH SYED ZIN)
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INTRODUCTION

As articulated in the National Education Policy, education in Malaysia is an on-going effort towards developing the potential of individuals in a holistic and integrated manner to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious. The primary and secondary school science curriculum is developed with the aim of producing such individuals.

The Level One Primary Science curriculum is designed to stimulate pupils' curiosity and develop their interest as well as enabling pupils to learn more about themselves and the world around them through activities.

The curriculum is articulated in two documents: the syllabus and the curriculum specifications. The syllabus presents the aims, objectives and the outline of the curriculum content for a period of 3 years for level one primary science. The curriculum specifications provide the details of the curriculum, which includes the aims and objectives of the curriculum, brief descriptions on thinking skills and thinking strategies, scientific skills, scientific attitudes and noble values, teaching and learning strategies, and curriculum content. The curriculum content provides the learning objectives, suggested learning activities, the intended learning outcomes, and vocabulary.

AIMS

The aim of the primary school science curriculum is to develop pupils' interest and creativity through everyday experiences and investigations that promote the acquisition of scientific and thinking skills as well as the inculcation of scientific attitudes and values.

OBJECTIVES

The level one science curriculum aims to:

1. Stimulate pupils' curiosity and develop their interest about the world around them.
2. Provide pupils with opportunities to develop science process skills and thinking skills.
3. Develop pupils' creativity.
4. Provide pupils with basic science knowledge and concepts.
5. Inculcate scientific attitudes and positive values.
6. Create an awareness on the need to love and care for the environment.

SCIENTIFIC SKILLS

Science emphasises inquiry and problem solving. In inquiry and problem solving processes, scientific and thinking skills are utilised. Scientific skills are important in any scientific investigation such as conducting experiments and carrying out projects.

Scientific skills encompass science process skills and manipulative skills.

Science Process Skills

Science process skills enable students to formulate their questions and find out the answers systematically.

Descriptions of the science process skills are as follows:

Observing Using the sense of hearing, touch, smell, taste and sight to find out about objects or events.

Classifying Using observations to group objects or events according to similarities or differences.

Measuring and Using Numbers Making quantitative observations by comparing to a conventional or non-conventional standard.

Making Inferences Using past experiences or previously collected data to draw conclusions and make explanations of events.

Predicting Making a forecast about what will happen in the future based on prior knowledge gained through experiences or collected data.

Communicating Using words or graphic symbols such as tables, graphs, figures or models to describe an action, object or event.

Using space-time relationship Describing changes in parameter with time. Examples of parameters are location, direction, shape, size, volume, weight and mass.

Interpreting data Giving rational explanations about an object, event or pattern derived from collected data.

Defining operationally Defining concepts by describing what must be done and what should be observed.

Controlling variables Naming the fixed variable, manipulated variable, and responding variable in an investigation.

Making Making a general statement

Hypotheses about the relationship between a manipulated variable and a responding variable to explain an observation or event. The statement can be tested to determine its validity.

Experimenting Planning and conducting activities to test a hypothesis. These activities include collecting, analysing and interpreting data and making conclusions.

Manipulative Skills

Manipulative skills in scientific investigation are psychomotor skills that enable students to:

- Use and handle science apparatus and substances.
- Handle specimens correctly and carefully.
- Draw specimens and apparatus.
- Clean science apparatus.
- Store science apparatus.

THINKING SKILLS

Thinking is a mental process that requires an individual to integrate knowledge, skills and attitude in an effort to understand the environment.

One of the objectives of the national education system is to enhance the thinking ability of students. This objective can be achieved through a curriculum that emphasises thoughtful learning. Teaching and learning that emphasises thinking skills is a foundation for thoughtful learning.

Thoughtful learning is achieved if students are actively involved in the teaching and learning process. Activities should be organised to provide opportunities for students to apply thinking skills in conceptualisation, problem solving and decision-making.

Thinking skills can be categorised into critical thinking skills and creative thinking skills. A person who thinks critically always evaluates an idea in a systematic manner before accepting it. A person who thinks creatively has a high level of imagination, is able to generate original and innovative ideas, and modify ideas and products.

Thinking strategies are higher order thinking processes that involve various steps. Each step involves various critical and creative thinking skills. The ability to formulate thinking strategies is the ultimate aim of introducing thinking activities in the teaching and learning process.

Critical Thinking Skills

A brief description of each critical thinking skill is as follows:

| | | | |
|----------------------------------|--|---------------------------|---|
| Attributing | Identifying criteria such as characteristics, features, qualities and elements of a concept or an object. | Analysing | Examining information in detail by breaking it down into smaller parts to find implicit meaning and relationships. |
| Comparing and Contrasting | Finding similarities and differences based on criteria such as characteristics, features, qualities and elements of a concept or event. | Detecting Bias | Identifying views or opinions that have the tendency to support or oppose something in an unfair or misleading way. |
| Grouping and Classifying | Separating and grouping objects or phenomena into categories based on certain criteria such as common characteristics or features. | Evaluating | Making judgements on the quality or value of something based on valid reasons or evidence. |
| Sequencing | Arranging objects and information in order based on the quality or quantity of common characteristics or features such as size, time, shape or number. | Making Conclusions | Making a statement about the outcome of an investigation that is based on a hypothesis. |
| Prioritising | Arranging objects and information in order based on their importance or priority. | | |

Creative Thinking Skills

A brief description of each creative thinking skill is as follows:

Generating Ideas Producing or giving ideas in a discussion.

Relating Making connections in a certain situation to determine a structure or pattern of relationship.

Making Inferences Using past experiences or previously collected data to draw conclusions and make explanations of events.

Predicting Making a forecast about what will happen in the future based on prior knowledge gained through experiences or collected data.

Making Generalisations Making a general conclusion about a group based on observations made on, or some information from, samples of the group.

Visualising Recalling or forming mental images about a particular idea, concept, situation or vision.

Synthesising Combining separate elements or parts to form a general picture in various forms such as writing, drawing or artefact.

Making Hypotheses Making a general statement about the relationship between a manipulated variable and a responding variable to explain an observation or event. The statement can be tested to determine its validity.

Making Analogies Understanding a certain abstract or complex concept by relating it to a simpler or concrete concept with similar characteristics.

Inventing Producing something new or adapting something already in existence to overcome problems in a systematic manner.

Relationship between Thinking Skills and Science Process Skills

Science process skills are skills that are required in the process of finding solutions to a problem or making decisions in a systematic manner. It is a mental process that promotes critical, creative, analytical and systematic thinking. Mastering of science process skills and the possession of suitable attitudes and knowledge enable students to think effectively.

The mastering of science process skills involves the mastering of the relevant thinking skills. The thinking skills that are related to a particular science process skill are as follows:

| Science Process Skills | Thinking Skills |
|-----------------------------|---|
| Observing | Attributing Comparing and contrasting Relating |
| Classifying | Attributing Comparing and contrasting Grouping and classifying |
| Measuring and Using Numbers | Relating Comparing and contrasting |
| Making Inferences | Relating Comparing and contrasting Analysing Making inferences |

| Science Process Skills | Thinking Skills |
|-------------------------------|---|
| Predicting | Relating Visualising |
| Using Space-Time Relationship | Sequencing Prioritising |
| Interpreting data | Comparing and contrasting Analysing Detecting bias Making conclusions Generalising Evaluating |
| Defining operationally | Relating Making analogy Visualising Analysing |
| Controlling variables | Attributing Comparing and contrasting Relating Analysing |
| Making hypothesis | Attributing Relating Comparing and contrasting Generating ideas Making hypothesis Predicting Synthesising |

| Science Process Skills | Thinking Skills |
|------------------------|---------------------|
| Experimenting | All thinking skills |
| Communicating | All thinking skills |

SCIENTIFIC ATTITUDES AND NOBLE VALUES

Science learning experiences can be used as a means to inculcate scientific attitudes and noble values in students. These attitudes and values encompass the following:

- Having an interest and curiosity towards the environment.
- Being honest and accurate in recording and validating data.
- Being diligent and persevering.
- Being responsible about the safety of oneself, others, and the environment.
- Realising that science is a means to understand nature.
- Appreciating and practising clean and healthy living.
- Appreciating the balance of nature.
- Being respectful and well-mannered.
- Appreciating the contribution of science and technology.
- Being thankful to God.
- Having critical and analytical thinking.
- Being flexible and open-minded.
- Being kind-hearted and caring.
- Being objective.
- Being systematic.
- Being cooperative.
- Being fair and just.

- Daring to try.
- Thinking rationally.
- Being confident and independent.

The inculcation of scientific attitudes and noble values generally occurs through the following stages:

- Being aware of the importance and the need for scientific attitudes and noble values.
- Giving emphasis to these attitudes and values.
- Practising and internalising these scientific attitudes and noble values.

Inculcating Patriotism

The science curriculum provides an opportunity for the development and strengthening of patriotism among students. For example, in learning about the earth's resources, the richness and variety of living things and the development of science and technology in the country, students will appreciate the diversity of natural and human resources of the country and deepen their love for the country.

TEACHING AND LEARNING STRATEGIES

Teaching and learning strategies in the science curriculum emphasise thoughtful learning. Thoughtful learning is a process that helps students acquire knowledge and master skills that will help them develop their minds to the optimum level. Thoughtful learning can occur through various learning approaches such as inquiry, constructivism, contextual learning, and mastery learning. Learning activities should

therefore be geared towards activating students' critical and creative thinking skills and not be confined to routine or rote learning. Students should be made aware of the thinking skills and thinking strategies that they use in their learning. They should be challenged with higher order questions and problems and be required to solve problems utilising their creativity and critical thinking. The teaching and learning process should enable students to acquire knowledge, master skills and develop scientific attitudes and noble values in an integrated manner.

Inquiry-discovery emphasises learning through experiences. Inquiry generally means to find information, to question and to investigate a phenomenon that occurs in the environment. Discovery is the main characteristic of inquiry. Learning through discovery occurs when the main concepts and principles of science are investigated and discovered by students themselves. Through activities such as experiments, students investigate a phenomenon and draw conclusions by themselves. Teachers then lead students to understand the science concepts through the results of the inquiry. Thinking skills and scientific skills are thus developed further during the inquiry process. However, the inquiry approach may not be suitable for all teaching and learning situations. Sometimes, it may be more appropriate for teachers to present concepts and principles directly to students.

The use of a variety of teaching and learning methods can enhance students' interest in science. Science lessons that are not interesting will not motivate students to learn and subsequently will affect their performance. The choice of teaching methods should be based on the curriculum content, students' abilities, students' repertoire of intelligences, and the availability of resources and infrastructure. Different teaching and learning activities

should be planned to cater for students with different learning styles and intelligences.

The following are brief descriptions of some teaching and learning methods.

Experiment

An experiment is a method commonly used in science lessons. In experiments, students test hypotheses through investigations to discover specific science concepts and principles. Conducting an experiment involves thinking skills, scientific skills, and manipulative skills.

In the implementation of this curriculum, besides guiding students to carry out experiments, where appropriate, teachers should provide students with the opportunities to design their own experiments. This involves students drawing up plans as to how to conduct experiments, how to measure and analyse data, and how to present the results of their experiment.

Discussion

A discussion is an activity in which students exchange questions and opinions based on valid reasons. Discussions can be conducted before, during or after an activity. Teachers should play the role of a facilitator and lead a discussion by asking questions that stimulate thinking and getting students to express themselves.

Simulation

In simulation, an activity that resembles the actual situation is carried out. Examples of simulation are role-play, games and the use of models. In role-play, students play out a particular role based on certain pre-determined conditions. Games

require procedures that need to be followed. Students play games in order to learn a particular principle or to understand the process of decision-making. Models are used to represent objects or actual situations so that students can visualise the said objects or situations and thus understand the concepts and principles to be learned.

Project

A project is a learning activity that is generally undertaken by an individual or a group of students to achieve a particular learning objective. A project generally requires several lessons to complete. The outcome of the project either in the form of a report, an artefact or in other forms needs to be presented to the teacher and other students. Project work promotes the development of problem-solving skills, time management skills, and independent learning.

Visits and Use of External Resources

The learning of science is not limited to activities carried out in the school compound. Learning of science can be enhanced through the use of external resources such as zoos, museums, science centres, research institutes, mangrove swamps, and factories. Visits to these places make the learning of science more interesting, meaningful and effective. To optimise learning opportunities, visits need to be carefully planned. Students may be involved in the planning process and specific educational tasks should be assigned during the visit. No educational visit is complete without a post-visit discussion.

Use of Technology

Technology is a powerful tool that has great potential in enhancing the learning of science. Through the use of

technology such as television, radio, video, computer, and Internet, the teaching and learning of science can be made more interesting and effective. Computer simulation and animation are effective tools for the teaching and learning of abstract or difficult science concepts. Computer simulation and animation can be presented through courseware or Web page. Application tools such, as word processors, graphic presentation software and electronic spreadsheets are valuable tools for the analysis and presentation of data.

CONTENT ORGANISATION

The science curriculum is organised around themes. Each theme consists of various learning areas, each of which consists of a number of learning objectives. A learning objective has one or more learning outcomes.

Learning outcomes are written in the form of measurable behavioural terms. In general, the learning outcomes for a particular learning objective are organised in order of complexity. However, in the process of teaching and learning, learning activities should be planned in a holistic and integrated manner that enables the achievement of multiple learning outcomes according to needs and context. Teachers should avoid employing a teaching strategy that tries to achieve each learning outcome separately according to the order stated in the curriculum specifications.

The Suggested Learning Activities provide information on the scope and dimension of learning outcomes. The learning activities stated under the column Suggested Learning Activities are given with the intention of providing some guidance as to how learning outcomes can be achieved. A suggested activity may cover one or more

learning outcomes. At the same time, more than one activity may be suggested for a particular learning outcome. Teachers may modify the suggested activity to suit the ability and style of learning of their students. Teachers are encouraged to design other innovative and effective learning activities to enhance the learning of science.

Learning about Living Things

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|---|--|--|---|--|
| 1. Animals | | | | |
| Pupils should learn | | | | |
| 1.1 to observe and recognise external features of animals. | <p>Pupils observe various animals and list the external features of each animal e.g. tail, fur, feathers, scales, beak, claw s and number of legs.</p> <p>Pupils discuss and construct a table based on the list of external features.</p> | <p>Pupils</p> <ul style="list-style-type: none"> • identify external features of an animal. • make a list of the external features of an animal. • record the external features of animals in a table. • explain similarities and differences between animals based on the table. | <p>Teachers may need to help pupils name some of the external features of animals.</p> <p>Discuss with pupils the features that they want to record in the table.</p> | beak claw s feathers fur horn legs scales tail wings |
| 1.2 that animals can be grouped according to external features. | <p>Pupils group the animals in different ways based on the table.</p> | <ul style="list-style-type: none"> • group animals according to similarities in external features. | <p>Allow pupils to group the animals according to any criteria that they choose based on their table.</p> | |
| 1.3 that animals can be grouped in many ways. | <p>Pupils present and compare each other's grouping of animals.</p> | <ul style="list-style-type: none"> • group animals in different ways. | | |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|--|---|--|---|--|
| 2. Plants | | | | |
| <p>Pupils should learn</p> <p>2.1 to observe and recognise external features of plants.</p> <p>2.2 that plants can be grouped according to external features.</p> <p>2.3 that plants can be grouped in many ways.</p> | <p>Pupils observe various plants and list the external features of each plant e.g. woody or soft stems, flowering or non-flowering, rough or smooth leaf surface, colour of leaf and shape of leaf.</p> <p>Pupils discuss and construct a table based on the list of external features.</p> <p>Pupils group the plants in different ways based on the table.</p> <p>Pupils present and compare each other's grouping of plants.</p> | <p>Pupils</p> <ul style="list-style-type: none"> • identify external features of a plant. • make a list of the external features of a plant. • record the external features of plants in a table. • to explain similarities and differences between plants based on the table. • group plants according to similarities in external features. • group plants in different ways. | <p>Teachers may need to help pupils name some of the external features of plants.</p> <p>Discuss with pupils the features that they want to record in the table.</p> <p>Allow pupils to group the plants according to any criteria that they choose based on their table.</p> | <p>dull green red rough shiny smooth soft woody yellow</p> |

Learning about the World Around Us

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|---|---|--|--|--|
| 1. Magnets | | | | |
| Pupils should learn | | | | |
| 1.1 that magnets can attract or repel each other. | Pupils explore a variety of magnets e.g. bar magnets, horseshoe magnets, cylindrical magnets, circular magnets. Pupils observe what happens when they put two magnets near each other. | <ul style="list-style-type: none"> demonstrate that magnets can attract or repel each other. state that magnets can attract or repel each other. | Teachers may introduce the words north pole and south pole of a magnet. | attract iron magnet plastic repel silver wooden steel |
| 1.2 to handle magnets properly. | <p>Pupils discuss the proper way to handle magnets during activities.</p> <p>Pupils discuss the need to handle magnets properly.</p> | <ul style="list-style-type: none"> demonstrate the proper way to handle magnets. | Remind pupils not to drop or knock a magnets as this will cause a magnet to lose its magnetism. | |
| 1.3 that magnets attract some materials. | <p>Pupils explore a variety of objects made from different materials and are asked to predict which objects will be attracted by a magnet.</p> <p>Pupils investigate to find out whether their predictions are correct.</p> | <ul style="list-style-type: none"> demonstrate that magnets attract some materials but not others. record their findings in a table. state the objects that are attracted by magnets. | Teachers may use the same type of object made of different materials for this activity e.g. wooden spoon, steel spoon, plastic spoon and silver spoon. | |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|---|---|--|---|------------|
| <p>1.4 that magnets have different strengths.</p> | <p>Pupils group the materials according to whether or not they are attracted by a magnet.</p> <p>Pupils design a fair test to compare the strengths of different magnets. Pupils have to decide how to measure the strength of a magnet e.g. how many paper clips the magnet can attract and hold or how close to a paper clip a magnet has to be to attract it.</p> <p>Pupils carry out their tests and record the findings in a table.</p> <p>Pupils form a conclusion based on the observations e.g. magnet A is the strongest because it can hold the most number of paper clips.</p> | <ul style="list-style-type: none"> • design a fair test to compare the strengths of different magnets by deciding what to keep the same, what to change and what to measure. • carry out the test and record the observations. • form a conclusion based on the observations. • explain how they arrive at the conclusion. | <p>Teachers explain that objects that are attracted by magnets are made of iron.</p> <p>Accept all plans. Allow pupils to modify their plans if they face difficulties when carrying out their tests.</p> | |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|---|---|--|---|------------|
| <p>1.5 the different uses of magnets.</p> | <p>Pupils bring things that make use of magnets, e.g. magnetic pencil box, toys, and fridge magnets.</p> <p>Pupils discuss about how magnets are used in the things they bring.</p> <p>Pupils make a toy, a game or a device using magnets e.g. fishing with a magnet, magnetic dancer and magnetic fastener.</p> | <ul style="list-style-type: none"> • state where magnets are used. • explain what a magnet is used for. • make a toy, a game or a device using magnets. | <p>Teachers can show examples of things that use magnets to help the pupils think of other things that use magnets.</p> | |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|--|---|---|--|----------------------------|
| 2. Electricity | | | | |
| <p>Pupils should learn</p> <p>2.1 how to make a bulb in a circuit brighter or dimmer.</p> | <p>Pupils are given batteries, battery holders, connecting wires, bulbs and bulb holders.</p> <p>Pupils build a circuit to make a bulb light up.</p> <p>Pupils discuss ways to make the bulb in the circuit brighter and dimmer.</p> <p>Pupils test their suggestions.</p> <p>Pupils draw the circuit that they made.</p> | <p>Pupils</p> <ul style="list-style-type: none"> • suggest ways to make a bulb in a circuit brighter. • design a circuit that makes the bulb light up brighter. • show perseverance in making a circuit that makes the bulb brighter. • explain the circuit. • draw the circuit. • design a circuit to make a bulb dimmer. | <p>Accept all pupils plans. Allow pupils to modify their plans if they face difficulties when carrying out the tests.</p> <p>Remind pupils to use only batteries and not electricity from the mains supply to carry out experiments as it is dangerous.</p> <p>Teachers guide pupils to conclude that the bulb is brighter when more electricity flows through it.</p> | <p>brighter dimmer</p> |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|---|--|--|--|-----------------------------------|
| <p>2.2 that some materials conduct electricity.</p> | <p>Pupils list materials that they think will conduct electricity.</p> <p>Pupils plan a circuit to investigate which materials conduct electricity.</p> <p>Pupils build the circuit to test which materials conduct electricity.</p> <p>Pupils record their findings in a table.</p> <p>Pupils discuss and form conclusions.</p> <p>Pupils share their findings.</p> | <ul style="list-style-type: none"> • predict which materials can conduct electricity. • build a circuit to test which materials conduct electricity. • record the findings in a table. • form conclusions based on the findings. | <p>Teachers guide pupils to understand that when a material that conducts electricity completes a circuit, the bulb will light up.</p> <p>To test whether a material conducts electricity, pupils may use objects made of different materials such as wooden rulers, metal rulers, plastic spoons etc.</p> | <p>metal plastic wood</p> |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|--|--|---|---|------------|
| <p>2.3 that a switch is used to complete or break a circuit.</p> | <p>Pupils make an incomplete circuit.</p> <p>Pupils discuss how to complete the circuit to allow the bulb to be turned on or off.</p> <p>Pupils build the circuit and test it.</p> <p>Pupils examine different types of simple switches and try to explain how each type of switch works.</p> <p>Pupils discuss different ways that a bulb can be turned on or off.</p> <p>Pupils create a simple switch using everyday objects e.g. spring and paper clips.</p> | <ul style="list-style-type: none"> • make a circuit which allows a bulb to be turned on or off. • explain how the bulb can be turned on or off. • state that a switch is used to complete or break a circuit. • create a simple switch. | <p>Teachers guide pupils to understand that a bulb will light up when a circuit is complete and will not light up when a circuit is incomplete.</p> | |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|--|--|--|---|--|
| 3. Springs | | | | |
| Pupils should learn | | | | |
| 3.1 that a spring returns to its original size and shape after being bent, twisted, stretched or squeezed. | Pupils bend, twist, stretch or squeeze springs of different lengths and diameters. | Pupils <ul style="list-style-type: none"> • state that a spring returns to its original size and shape after being bent, twisted, stretched or squeezed. • state that it is easier to bend, twist, stretch and squeeze some springs than others. | | bend shape size spring squeeze stretch twist |
| 3.2 that springs stretch differently. | Pupils discuss <ol style="list-style-type: none"> a) what type of springs they want to test e.g. springs of different lengths or springs of different diameters. b) how to test which spring stretches the most e.g. by hanging an object of the same weight at the end of the spring and measuring how much it stretches. c) how to record their findings. | Pupils <ul style="list-style-type: none"> • design a fair test to find out which spring stretches the most by deciding what to keep the same, what to change and what to measure. • carry out the test and record the observations. • form a conclusion based on the observations. • explain how they arrive at the conclusion. | Accept all plans. Allow pupils to modify their plans if they face difficulties when carrying out the tests. Pupils can use non-standard tools such as strips of paper to measure how much the spring stretches. The strips of paper can be used as a record of how much the spring stretches. | |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
|---------------------------------|--|---|-------|------------|
| <p>3.3 the uses of springs.</p> | <p>Pupils carry out their tests and record their findings.</p> <p>Pupils form a conclusion based on the findings e.g. the longest spring stretches the most.</p> <p>Pupils bring things that use springs e.g. mechanical pencils and hand ball-pens.</p> <p>Pupils discuss how springs are used in these things.</p> | <ul style="list-style-type: none"> • state where springs are used. • explain what the spring is used for. | | |

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| 4. Absorption | | | | |
| <p>Pupils should learn</p> <p>4.1 that some materials can absorb water.</p> <p>4.2 that some materials can absorb more water than others.</p> | <p>Pupils carry out an activity to find out which materials absorb water.</p> <p>Pupils discuss</p> <p>a) what materials they want to test e.g. different types of tissue paper.</p> <p>b) how to find out which materials absorb the most water.</p> <p>c) how to record their findings.</p> <p>Pupils carry out the test and record their results in a table.</p> | <p>Pupils</p> <ul style="list-style-type: none"> • identify materials that absorb water. • design a fair test to test the ability of different materials in absorbing water by deciding what to keep the same, what to change and what to measure. • carry out the test and record the observations. • form a conclusion based on the observations. • explain how they arrive at the conclusion. | <p>Pupils can use everyday objects made of different materials for this activity, e.g. coins, cloth, pebbles, paper and tissue paper.</p> <p>Accept all plans. Allow pupils to modify their plans if they face difficulties when carrying out their tests.</p> | <p>absorb cloth coins pebbles tissue paper</p> |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
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| <p>4.3 the uses of the ability of materials to absorb water.</p> | <p>Pupils form conclusions based on their findings e.g. tissue paper A is the most absorbent because it absorbed the most amount of water.</p> <p>Pupils discuss why the ability of materials to absorb water is useful for certain jobs e.g. a mop needs to be absorbent to mop up water.</p> | <ul style="list-style-type: none"> explain the uses of the ability of materials to absorb water. | | |

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| 5. Soil | | | | |
| Pupils should learn | | | | |
| <p>5.1 what soil is made up of.</p> | <p>Pupils mix some soil with water in a tall container.</p> <p>Pupils shake the mixture and allow it to settle.</p> <p>Pupils observe the layers that are formed.</p> <p>Pupils draw, label and describe what they observe.</p> <p>Pupils repeat the process using soil samples from different places.</p> | <p>Pupils</p> <ul style="list-style-type: none"> • describe what soil is made up of. • state the differences between soil samples from different places. | <p>Teachers guide pupils to understand that soil contains living things and non-living things.</p> | <p>clay garden soil sand soil</p> |
| <p>5.2 the flow of water through different types of soil.</p> | <p>Pupils discuss</p> <ol style="list-style-type: none"> a) what type of soils they want to test. b) how to compare how well water moves through different types of soil. c) how to record their findings. | <ul style="list-style-type: none"> • design a fair test to compare how well water moves through sand, clay and garden soil by deciding what to keep the same, what to change and what to measure. • carry out the test and record the observations. | <p>Accept all plans. Allow pupils to modify their plans if they face difficulties when carrying out the tests.</p> <p>Pupils should get the same amount of sand, clay and garden soil.</p> | |

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| <p>5.3 that certain soils are more suitable for plant growth.</p> | <p>Pupils carry out the test and record their findings.</p> <p>Pupils form a conclusion based on their findings.</p> <p>Pupils discuss</p> <p>a) how to compare the growth of a green bean in clay, garden soil and sand.</p> <p>b) how to record their findings.</p> <p>Pupils carry out the test and record their findings.</p> <p>Pupils form a conclusion based on their findings.</p> | <ul style="list-style-type: none"> • form a conclusion based on the observations. • explain how they arrive at the conclusion. • design a fair test to compare the growth of green beans in clay, garden soil and sand by deciding what to keep the same, what to change and what to measure. • carry out the test and record the observations. • form a conclusion based on the observations. • explain how they arrive at the conclusion. | <p>Accept all pupils plans. Allow pupils to modify their plans if they face difficulties when carrying out their tests.</p> | |

| Learning Objectives | Suggested Learning Activities | Learning Outcomes | Notes | Vocabulary |
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| 6. Mixing Substances | | | | |
| <p>Pupils should learn</p> <p>6.1 that different substances have different properties.</p> <p>6.2 that some substances are unsafe and should be handled with care.</p> | <p>Pupils are given different substances such as wheat flour, tapioca flour, sugar, salt, baking powder and milk powder.</p> <p>Pupils observe and record the appearance, smell, feel and colour of the substances.</p> <p>Pupils test the substances with water and vinegar and record their observations.</p> <p>Pupils are shown labels for some unsafe substances.</p> <p>Pupils discuss the danger of touching, smelling or tasting these unsafe substances.</p> | <p>Pupils</p> <ul style="list-style-type: none"> • state the properties of different substances in terms of appearance, smell, feel and colour. • describe the results of mixing different substances with water. • describe the results of mixing different substances with vinegar. • state that different substances have different properties. • identify labels for unsafe substances. • explain the meaning of the labels. • list unsafe substances. | <p>Pupils should not touch, taste or mix substances unless the teacher tells them it is safe to do so.</p> <p>Pupils should test only a small amount of each substance.</p> <p>Pupils may find that their findings might not be enough to form a conclusion.</p> <p>Teachers need only to discuss labels on household substances such as detergent, bleaching agent and medicine.</p> | <p>baking powder milk powder salt tapioca flour vinegar water wheat flour</p> |

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| <p>6.3 that a mixture of substances can be separated.</p> | <p>Pupils watch a video on how unsafe substances cause harm and how these unsafe substances should be handled.</p> <p>Pupils list unsafe substances and tell what harm they can cause.</p> <p>Pupils are given a mixture of substances e.g. fine sand, small stones, small polystyrene balls, salt and paper clips.</p> <p>Pupils are challenged to separate the mixture in the shortest possible time.</p> <p>Pupils discuss in groups on how mixtures can be separated.</p> <p>Pupils carry out their plans to separate the mixture.</p> <p>Pupils evaluate methods of separating the mixture presented by others.</p> | <ul style="list-style-type: none"> • state the need to look at labels or ask an adult before touching or tasting any substance. • list the harm caused by unsafe substances. • plan how to separate a mixture of substances. • present their processes of separating the mixture in words or diagrams. • give reasons why the methods are able to separate the mixtures. • compare different methods of separating the mixtures • explain why one method of separating mixtures may be better than another. | <p>Teachers discuss possible methods of separating mixtures e.g. using filter paper, magnets, sieve etc.</p> | |

ACKNOWLEDGEMENTS

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Curriculum Development Centre
Ministry of Education
2003