



MINISTRY OF EDUCATION MALAYSIA

Integrated Curriculum For Secondary Schools

Curriculum Specifications

SCIENCE Year Four



Curriculum Development Centre
Ministry of Education Malaysia
2005

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THE NATIONAL PHILOSOPHY

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

The people of Malaysia pledge their united efforts to attain these ends guided by the following principles:

- BELIEF IN GOD
- LOYALTY TO KING AND COUNTRY
- SUPREMACY OF 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 pupils 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, pupils 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 pupils 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 pupils 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 pupils to use the English language and hence, increase their proficiency in the language. Thus, in implementing the science curriculum, attention is given to developing pupils' 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.

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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 Two Primary School Science curriculum is designed to stimulate pupils' curiosity and develop their interest as well to enable pupils to learn more about themselves and the world around them through pupil-centered 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 Two Primary School Science. The curriculum specifications provides 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 covers the learning objectives, suggested learning activities, learning outcomes, notes 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 Two Primary School 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. To provide learning opportunities for pupils to apply knowledge and skills in a creative, critical and analytical manner for problem solving and decision-making.
6. Inculcate scientific attitudes and positive values.
7. Foster the appreciation on the contributions of science and technology towards national development and well-being of mankind.
8. Be aware of 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 pupils 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 explain 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 variables, manipulated variable and responding variable in an investigation. The manipulated variable is changed to observe its relationship with the responding variable. At the same time, the fixed variables are kept constant.

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.

Experimenting (design a fair test)

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

Thinking skills can be categorised into critical 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 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 meanings 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 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 explain 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 on, or 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 general statements about the relationship between manipulated variable and responding variable to explain an observation or event. The statements can be tested to determine their validity.
Making Analogies	Understanding an abstract or complex concepts by relating it to simpler or concrete concepts with similar characteristics.
Inventing	Producing something new or adapting something already in existence to overcome problems in a systematic manner.

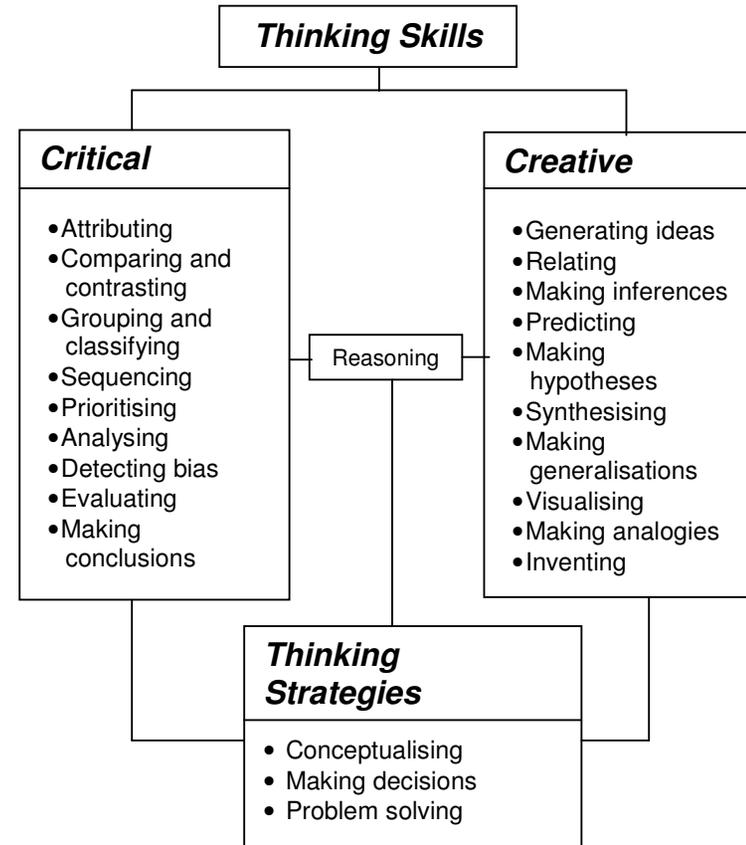
Thinking Strategy

Description of each thinking strategy is as follows:

- Conceptualising** Making generalisations based on inter-related and common characteristics in order to construct meaning, concept or model.
- Making Decisions** Selecting the best solution from various alternatives based on specific criteria to achieve a specific aim.
- Problem Solving** Finding solutions to challenging or unfamiliar situations or unanticipated difficulties in a systematic manner.

Besides the above thinking skills and thinking strategies, another skill emphasised is reasoning. Reasoning is a skill used in making logical, just and rational judgements. Mastering of critical and creative thinking skills and thinking strategies is made simpler if an individual is able to reason in an inductive and deductive manner. Figure 1 gives a general picture of thinking skills and thinking strategies.

Figure 1: TSTS Model in Science



Mastering of thinking skills and thinking strategies (TSTS) through the teaching and learning of science can be developed through the following phases:

1. Introducing TSTS.
2. Practising TSTS with teacher's guidance.
3. Practising TSTS without teacher's guidance.
4. Applying TSTS in new situations with teacher's guidance.
5. Applying TSTS together with other skills to accomplish thinking tasks.

Further information about phases of implementing TSTS can be found in the guidebook "*Buku Panduan Penerapan Kemahiran Berfikir dan Strategi Berfikir dalam Pengajaran dan Pembelajaran Sains*" (Curriculum Development Centre, 1999).

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 pupils 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
Predicting	Relating Visualising
Using Space-Time Relationship	Sequencing Prioritising
Interpreting data	Comparing and contrasting Analysing Detecting bias Making conclusions Generalising Evaluating

Science Process Skills	Thinking Skills
Defining operationally	Relating Making analogy Visualising Analysing
Controlling variables	Attributing Comparing and contrasting Relating Analysing
Making hypotheses	Attributing Relating Comparing and contrasting Generating ideas Making hypotheses Predicting Synthesising
Experimenting	All thinking skills
Communicating	All thinking skills

Teaching and Learning based on Thinking Skills and Scientific Skills

This Level II Science curriculum emphasises thoughtful learning based on thinking skills and scientific skills. Mastery of thinking skills and scientific skills are integrated with the

acquisition of knowledge in the intended learning outcomes. Thus, in teaching and learning, teachers need to emphasise the mastery of skills together with the acquisition of knowledge and the inculcation of noble values and scientific attitudes.

The following is an example and explanation of a learning outcome based on thinking skills and scientific skills.

Example:

Level	Year 4
Learning Outcome:	Differentiate the air that we inhale and the air that we exhale.
Thinking Skills:	Comparing and contrasting

Explanation:

To achieve the above learning outcome, knowledge on the composition of the air that we inhale and exhale is needed. The mastery of the skill of comparing and contrasting is as important as the acquisition of knowledge on humans and animal breathing. This would enable pupils to understand that breathing process in humans and animals

Example:

Level Year 5

Learning Outcome: Design a fair test to find out what cause the size of a shadow to change by deciding what to keep the same, what to change and what to observe.

Scientific Skills: Experimenting

Explanation:

To achieve the above learning outcome, pupils plan and conduct investigation to test the hypothesis. This investigation should include collecting, analysing and interpreting data and making conclusion.

- 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.
- Dare 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.

When planning teaching and learning activities, teachers need to give due consideration to the above stages to ensure the continuous and effective inculcation of scientific attitudes and values. For example, during science practical work, the teacher should remind pupils and ensure that they carry out experiments in a careful, cooperative and honest manner.

Proper planning is required for effective inculcation of scientific attitudes and noble values during science lessons. Before the first lesson related to a learning objective, teachers should

SCIENTIFIC ATTITUDES AND NOBLE VALUES

Science learning experiences can be used as a means to inculcate scientific attitudes and noble values in pupils. 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.

examine all related learning outcomes and suggested teaching-learning activities that provide opportunities for the inculcation of scientific attitudes and noble values.

The following is an example of a learning outcome pertaining to the inculcation of scientific attitudes and values.

Example:

Level:	Year 4
Learning Area:	Properties of Materials
Learning Objective:	Knowing the importance of reuse, reduce and recycle of materials.
Learning Outcome:	Practise reusing, reducing and recycling to conserve materials.
Suggested Learning Activities	Pupils carry out activities about reusing, reducing and recycling of materials throughout the year.
Scientific attitudes and noble values	Being responsible about the safety of oneself, others and the environment. Having an interest and curiosity towards the environment. Appreciating the balance of nature. Being cooperative.

Inculcating Patriotism

The science curriculum provides an opportunity for the development and strengthening of patriotism among pupils. 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, pupils 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 pupils 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 pupils' critical and creative thinking skills and not be confined to routine or rote learning. Pupils 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 pupils 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 pupils themselves. Through activities such as experiments, pupils investigate a phenomenon and draw conclusions by themselves. Teachers then lead pupils 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 pupils.

The use of a variety of teaching and learning methods can enhance pupils' interest in science. Science lessons that are not interesting will not motivate pupils to learn and subsequently will affect their performances. The choice of teaching methods should be based on the curriculum content, pupils' abilities, pupils' repertoire of intelligences, and the availability of resources and infrastructure. Different teaching and learning activities should be planned to cater for pupils 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, pupils 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 pupils to carry out experiments, where appropriate, teachers should provide pupils with the opportunities to design

their own experiments. This involves pupils 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 pupils 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 pupils 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, pupils play out a particular role based on certain pre-determined conditions. Games require procedures that need to be followed. Pupils 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 pupils 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 pupils 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 pupils. 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. Pupils 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 pupils. Teachers are encouraged to design other innovative and effective learning activities to enhance the learning of science.

INVESTIGATING LIVING THINGS

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1. Living Things Have Basic Needs				
<p>1.1 Understanding that humans have basic needs</p>	<p>Pupils view video that shows various footage related to the basic needs of humans i.e.</p> <ol style="list-style-type: none"> a child/family taking drinks and a balanced diet, movement of the chest of a sleeping baby, different types of houses. <p>Based on the video pupils discuss the basic needs of humans i.e. food, water, air and shelter.</p> <p>Pupils discuss that:</p> <ol style="list-style-type: none"> humans need to eat/drink to help them grow and to stay healthy, humans need air to breathe, humans need to protect themselves from danger, sun and rain. <p>Pupils discuss and explain what will happen to humans if there is no food, water, air and shelter.</p>	<p>Pupils</p> <ul style="list-style-type: none"> identify the basic needs of humans. <ul style="list-style-type: none"> give reasons why humans need food, water, air and shelter. 	<p><i>Teacher guides pupils to conclude that the basic needs of humans are food, water, air and shelter.</i></p>	<p>basic needs- <i>keperluan asas</i> breath- <i>nafas</i> breathe- <i>bernafas</i> bungalow- <i>banglo</i> flat- <i>rumah pangsa</i> hut – <i>pondok</i> long house – <i>rumah panjang</i> movement – <i>pergerakan</i> terrace house- <i>rumah teres</i> shelter – <i>tempat perlindungan</i> balanced diet – <i>makanan seimbang</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.2 Understanding that animals have basic needs</p>	<p>Pupils keep pets such as hamsters or chicks.</p> <p>Pupils observe and record what they do to keep their pets alive and healthy.</p> <p>Pupils discuss why hamsters or chicks are kept in a cage and not in an airtight, covered container.</p> <p>Based on their records pupils discuss the basic needs of animals.</p> <p>Pupils discuss that:</p> <ol style="list-style-type: none"> animals need to eat/drink to help them grow and to stay healthy, animals need air to breathe, animals need to protect themselves from danger, sun and rain. <p>Pupils study pictures or video and describe different types of shelters for animals such as nests, caves and holes.</p>	<p>Pupils</p> <ul style="list-style-type: none"> identify the basic needs of animals. give reasons why animals need food, water, air and shelter. describe types of shelters for animals. 	<p>Remind pupils to handle animals with care.</p> <p>Guide pupils to conclude that animals' basic needs are food, water, air and shelter.</p>	<p>holes- <i>lubang</i> cage - <i>sangkar</i> container- <i>bekas</i> reference – <i>rujukan</i> air tight – <i>kedap udara</i> alive- <i>hidup</i> nest- <i>sarang</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.3 Understanding that plants have basic needs</p>	<p>Pupils carry out activities to show the basic needs of plants by comparing similar balsam plants kept in different conditions:</p> <p>a) 1 watered, 1 without water, b) 1 kept outdoor, 1 kept in a tight plastic bag, c) 1 kept outdoor and 1 kept in a dark cupboard.</p> <p>Pupils observe and record their daily observations.</p> <p>Based on their records pupils discuss to conclude that the basic needs of plants are water, air and sunlight.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • identify the basic needs of plants. 	<p>These activities will take about two weeks.</p>	<p>condition- <i>keadaan</i> similar - <i>serupa</i> watered - <i>disiram</i> sunlight - <i>cahaya matahari</i> outdoor-<i>di luar</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
2. Living Things Undergo Life Processes				
<p>2.1 Analysing life processes in humans</p>	<p>Pupils use their hands to feel the movement of their chests as they breathe.</p> <p>Pupils discuss to conclude that the movement of the chest is due to breathing.</p> <p>Pupils discuss that when they inhale they take in air and when they exhale they give out air.</p> <p>Pupils gather information and discuss that: a) inhaled air has more oxygen than exhaled air, b) exhaled air has more carbon dioxide than inhaled air.</p> <p>Pupils observe model or view video of human body to see that the lung is a breathing organ for human and to identify the passage of air movement when human breathes.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • explain that humans breathe. • describe what inhale is. • describe what exhale is. <ul style="list-style-type: none"> • differentiate the air that we inhale and the air that we exhale. <ul style="list-style-type: none"> • state that humans use lungs to breathe. • identify the passage of air during breathing. 	<p>Pupils just need to know the main organs involved in breathing i.e. nose, mouth, wind pipe and lungs.</p> <p>The rate of breathing means the number of chest movements in a period of time.</p>	<p>exhale – <i>hembus nafas</i> faeces- <i>najis/tinja</i> inhale – <i>tarik nafas</i> rate – <i>kadar</i> undergo – <i>menjalani</i> excretion – <i>perkumuhan</i> defecate – <i>nyahtinja</i> offspring – <i>anak</i> chest- <i>dada</i> reaction – <i>gerak balas</i> reproduce – <i>membang</i> windpipe- <i>salur pernafasan</i> lung- <i>peparu</i> sweat – <i>peluh</i> stimuli – <i>rangsangan</i> survival - <i>kemandirian</i> urine – <i>air kencing</i> waste product – <i>bahan buangan</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils carry out activity to count the number of chest movements in a minute when they are breathing and record their findings.</p> <p>Pupils compare their group findings and conclude that not everyone has the same rate of breathing.</p> <p>Pupils discuss to conclude that humans excrete and defecate.</p> <p>Pupils discuss that when humans:</p> <p>a) excrete they get rid of urine, carbon dioxide and sweat.</p> <p>b) defecate they get rid of faeces.</p> <p>Pupils discuss that humans excrete and defecate to get rid of waste materials from their bodies.</p> <p>Pupils discuss to infer the effect on health if humans do not excrete or defecate.</p>	<ul style="list-style-type: none"> • conclude that not all individuals have the same rate of breathing. • state that humans excrete and defecate. • state the products of human excretion. • state the products of human defecation. • give reasons why humans need to excrete and defecate. 	<p>Do not use boiling water.</p>	

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils view video or carry out activities to show how human responds to stimuli e.g. by touching a glass of hot water.</p> <p>Pupils discuss to infer that humans respond to stimuli to protect themselves from danger or for survival.</p> <p>Pupils draw family trees of their families for three generations. Pupils compare each other's diagram and conclude that humans produce offspring from one generation to another.</p> <p>Pupils discuss what will happen if humans do not reproduce.</p>	<ul style="list-style-type: none"> • state that humans respond to stimuli. • give reasons why humans respond to stimuli. • state that humans reproduce. • predict what will happen if humans do not reproduce. 		

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>2.2 Being aware that certain behaviour can disturb life processes</p>	<p>Pupils discuss to identify bad habits in humans e.g. smoking, drinking alcohol, taking drugs.</p> <p>Pupils look at pictures or video of a smoker's and non-smoker's lungs and discuss the effects of smoking on lungs.</p> <p>Pupils watch demonstration by teacher to observe the harmful substances produced when a cigarette is being burned.</p> <p>Pupils listen to a talk on smoking and health given by a health officer.</p> <p>Pupils draw posters about the effects of smoking on health.</p> <p>Pupils view video to see the effects of drugs and alcohol on humans in terms of the effects of delaying a person's response to stimuli e.g.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • give examples of habits that bring harm to human life processes. • state the effects of smoking on lungs. <ul style="list-style-type: none"> • explain that taking drugs and alcohol can delay a person's response to stimuli. 	<p>Suggested topics for the talk: a) Smoking and Health. b) How Smoking Affects Health.</p>	<p>smoker-<i>perokok</i> affect – <i>memberi kesan</i> effect – <i>kesan/akibat</i> drunken – <i>mabuk</i> delay- <i>melambatkan</i> cause- <i>menyebabkan</i> drug- <i>dadah</i> alcohol- <i>minuman keras</i> peers – <i>rakan sebaya</i> harmful – <i>merbahaya</i> substances – <i>bahan</i> cigarette – <i>rokok</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>a) ability to walk in straight line. b) delayed reaction of a drunken driver or a driver high on drug can cause accident.</p> <p>Pupils carry out activities to discourage smoking, drugs taking and alcohol drinking among their peers.</p>	<ul style="list-style-type: none"> participate in a campaign to discourage smoking, drugs taking and alcohol drinking among their peers. 		
2.3 Analysing the life processes in animals	<p>Pupils observe animals in science garden to conclude that animals defecate and excrete.</p> <p>Pupils discuss that animals excrete and defecate to get rid of waste products from their bodies.</p> <p>Pupils discuss to infer the effects on health if animals do not excrete and defecate.</p> <p>Pupils look at models or live specimens to see the breathing organs of:</p>	<p>Pupils</p> <ul style="list-style-type: none"> state that animals excrete. state that animals defecate. give reasons why animals need to excrete and defecate. state that animals breathe. 	<p>The breathing organs involved are lungs (monkey and bird), spiracles (grasshopper), books- lung (crab), gills (fish) and moist skin (frog).</p>	<p>give birth – <i>beranak</i> grasshopper- <i>belalang</i> hatch- <i>menetas</i> lay eggs – <i>bertelur</i> life cycle – <i>kitar hidup</i> occur- <i>berlaku</i> stage- <i>peringkat</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>a) bird, b) fish, c) grasshopper, d) crab, e) frog, f) monkey.</p> <p>Based on the viewing of video/models/live specimens pupils conclude that breathing organs for animals may be different.</p> <p>Pupils view video showing animals giving birth and chicks hatching from eggs.</p> <p>Pupils discuss to conclude that animals reproduce.</p> <p>Pupils discuss to conclude that some animals give birth and some lay eggs.</p> <p>Pupils discuss to classify animals into those that lay eggs and those that give birth to their young.</p>	<ul style="list-style-type: none"> • identify the breathing organs for certain animals. • state that breathing organs for different types of animals may be different. • state that animals reproduce. • state that some animals give birth and some lay eggs. • classify animals according to the way they reproduce. 	<p>Pupils do not have to know the name of these breathing organs.</p> <p>Records can be in the form of drawings, measurements or descriptions etc.</p>	

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils observe animals such as butterfly, frog, hamster or chicken from birth/eggs to adult. Pupils record the changes in size/form at the different stages of the life cycles.</p> <p>Based on their observations and records pupils discuss to state that animals may have different life cycles.</p> <p>Pupils make a scrap book on real animals as imaginary pets e.g. tiger, whale, lizard, pangolin, bat, worm, snake etc. Pupils may write, draw or paste pictures on their scrap books to tell about their pets e.g.</p> <ol style="list-style-type: none"> a) what pupils have to do to keep their pets alive and healthy, b) suitable home for their pets, c) food for their pets, d) how their pets protect themselves from enemies, 	<ul style="list-style-type: none"> • describe the life cycles of different animals. • state that animals may have different life cycles. 	<p>This scrap book project can be introduced at the beginning of the topic. Pupils may add their findings into their scrap books as they learn about animals. This activity is to help pupils understand the life processes and the survival of animals. It also encourages pupils to find out more about animals that interest them.</p>	

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	e) how their pets take care of their young, f) life processes of their pets.			
2.4 Understanding the life processes in plants	<p>Pupils carry out activities to study how plants respond to stimuli i.e. water, sunlight, touch and gravity.</p> <p>Pupils observe and record their findings.</p> <p>Based on the above activities pupils discuss to identify the parts of plants that respond to stimuli:</p> <p>a) roots respond to water and gravity, b) shoots and leaves respond to sunlight, c) certain leaflets respond to touch.</p> <p>Pupils observe:</p> <p>a) begonia plants/ bryophyllum that have young plants growing from the leaves,</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state that plants respond to stimuli. • identify the part of plant that responds to water. • identify the part of plant that responds to gravity. • identify the part of plant that responds to sunlight. • identify the part of plant that responds to touch. • state that plants reproduce. 		<p>water lettuce – <i>kiambang</i> bryophyllum- <i>setawar</i> extinct- <i>pupus</i> shoot – <i>pucuk</i> young plant – <i>anak pokok</i> spores – <i>spora</i> sucker – <i>sulur/anak pokok</i> stem cutting – <i>keratan batang</i> underground stem – <i>batang bawah tanah</i> tapioca plant- <i>pokok ubi kayu</i> fern- <i>paku-pakis</i> various – <i>pelbagai</i> corn – <i>jagung</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>b) banana trees that have young plants growing around the parent plants, c) water lettuce that have young plants attached to parent plants.</p> <p>Pupils carry out discussion based on their observations that plants reproduce.</p> <p>Pupils watch pictures /view video and discuss that plants reproduce to ensure the survival of their species.</p> <p>Pupils discuss and predict what will happen to the world if plants do not reproduce e.g. no food supply for man and certain animals.</p> <p>Pupils study live specimens/ view video to find out the various ways plants reproduce i.e.</p> <p>a) through seeds e.g. balsam, corn and durian, b) through spores e.g. fern c) through suckers e.g. banana and pineapple,</p>	<ul style="list-style-type: none"> • explain why plants need to reproduce. • predict what will happen to the world if plants do not reproduce. • explain various ways plants reproduce. 		

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	d) through stem cutting e.g. hibiscus, rose and tapioca, e) through leaves e.g. bryophyllum and begonia, f) through underground stem e.g. potato, onion, ginger and lily.			
3. Animals and plants protect themselves				
3.1 Understanding that animals have specific characteristics and behaviour to protect themselves from danger	<p>Pupils touch animals such as garden snails or millipedes and observe how they react to danger.</p> <p>Pupils describe what they observe and give reasons for the animal's behaviour e.g. millipede curls up to protect itself from danger.</p> <p>Pupils look at live specimen or collect information by looking at pictures or viewing video of various animals to identify the characteristics and behaviour of animals that protect them from danger. e.g :</p>	<p>Pupils</p> <ul style="list-style-type: none"> • identify specific characteristics of animals that protect them from danger. • identify specific behaviour of animals that protect them from danger. • describe how the specific characteristics and behaviour of animals help to protect them from danger. 	<p>Remind pupils not to hurt animals and to put them back to where they were taken.</p>	<p>curl up- <i>menggulung</i> millipede- <i>ulat gonggok</i> centipede- <i>lipan</i> behaviour – <i>perlakuan</i> hurt- <i>cedera</i> pangolin- <i>tenggiling</i> scale- <i>sisik</i> bed bug- <i>pijat</i> chameleon- <i>sesumpah</i> sting – <i>sengat</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>a) pangolins have hard scales to protect themselves from enemies,</p> <p>b) bed bugs have bad smell to repel enemies,</p> <p>c) chameleons have the ability to change skin colour according to the surrounding,</p> <p>d) scorpions have stings to protect themselves from enemies.</p> <p>Pupils discuss and explain how the characteristics and behaviour of these animals protect them from danger.</p> <p>Pupils present their findings to the class.</p>			
<p>3.2 Understanding that animals have specific characteristics and behaviour to protect themselves from extreme weather</p>	<p>Pupils view video of animals that live in very hot or cold weather.</p> <p>Pupils list the special characteristics and behaviour of animals and describe how these characteristics and behaviour help to protect them from very hot or cold weather e.g.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • identify specific characteristics and behaviour of animals that protect them from very hot or cold weather. 		<p>rhinoceros- <i>badak sumbu</i> extreme weather- <i>cuaca melampau</i> thick fur- <i>bulu tebal</i> specific characteristic – <i>ciri khas</i> humps- <i>bonggol</i> wallowing- <i>berkubang</i> excessive- <i>berlebihan</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>a) rhinoceros keep their bodies cool by wallowing in mud holes,</p> <p>b) polar bears have thick fur to enable them to live in very cold weather,</p> <p>c) camels have humps on their backs to store food and water to enable them to survive in deserts.</p> <p>Pupils present their findings to the class.</p>	<ul style="list-style-type: none"> describe how specific characteristics and behaviour of animals help to protect them from very hot or cold weather. 		
<p>3.3 Understanding that animals have specific characteristics and behaviour to enable them to survive</p>	<p>Pupils discuss that animals need to protect themselves from enemies and extreme weather conditions to enable them to survive.</p> <p>Pupils design a model of an imaginary animal that can protect itself from its enemy and extreme weather conditions.</p> <p>Pupils build their models and justify why models are built with certain characteristics.</p>	<p>Pupils</p> <ul style="list-style-type: none"> recognise the need for animals to protect themselves from enemies and extreme weather. make a model of an imaginary animal that can survive both extreme weather and enemies. give reasons why models are built in such ways. 	<p>Teacher encourage pupils to use recycled materials/objects.</p>	

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>3.4 Understanding that plants have specific characteristics to protect themselves from enemies</p>	<p>Pupils look at pictures/ view video of various plants to identify special characteristics that protect these plants from their enemies.</p> <p>Pupils list the specific characteristics of plants.</p> <p>Pupils describe how these characteristics of plants help to protect them from enemies. e.g.</p> <p>a) papaya leaves produce latex to prevent them from being eaten, b) pineapple plants have thorns to protect themselves, c) bamboos have very fine hairs that can cause itchiness.</p> <p>Pupils present their findings to the class.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • identify the specific characteristics of plants that protect them from enemies. • describe how the specific characteristics of plants help to protect them from enemies. 		<p>mimosa- <i>semalu</i> latex -<i>susu getah</i> fine hair – <i>bulu halus</i> itchiness-<i>kegatalan</i> thorn-<i>duri</i> leaflets-<i>dedaun</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>3.5 Understanding that plants have specific characteristics to protect themselves from dry region and strong wind</p>	<p>Pupils view video to identify plants that can be found in:</p> <p>a) dry region, b) area with strong winds.</p> <p>Pupils collect and interpret data to show how specific characteristics of plants help to protect them from:</p> <p>a) excessive loss of water, b) strong winds.</p> <p>Pupils carry out an activity to show which plant can survive in dry region. E.g. the following plants are kept without water for a week:</p> <p>a) a potted balsam plant, b) a potted chilly plant, c) a potted cactus plant.</p> <p>Based on their findings pupils make conclusion which plant can survive in dry region.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • give examples of plants found in very dry region. • identify specific characteristics of plants that protect them from excessive loss of water. • describe how specific characteristics of plants help them to survive in dry region. • give examples of plants found in strong wind area. • identify specific characteristics of plants that protect them from strong winds. • describe how specific characteristics of plants help them to survive in strong winds. 		

INVESTIGATING THE EARTH AND THE UNIVERSE

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1. The Solar System				
1.1 Understanding the Solar System	<p>Pupils study a model or view simulation of the Solar System.</p> <p>Pupils discuss the constituents of the Solar System.</p> <p>Pupils simulate to demonstrate the relative distance of the planets in the Solar System.</p> <p>Pupils discuss that all the planets in the Solar System move around the Sun.</p>	<p>Pupils</p> <ul style="list-style-type: none"> list the constituents of the Solar System. list the planets in the Solar System in a sequence. state that planets move around the Sun. 	<p>The constituents of the Solar System are Mercury, Venus, Earth, Mars, Saturn, Neptune, Uranus. Jupiter, Pluto, natural satellites, meteors, comets and asteroids,</p>	<p>Solar System – <i>Sistem Suria</i> Mercury – <i>Utarid</i> Venus – <i>Zuhrah</i> Earth – <i>Bumi</i> Mars – <i>Marikh</i> Jupiter – <i>Musytari</i> Saturn – <i>Zuhal</i> Uranus – <i>Uranus</i> Neptune – <i>Neptun</i> Pluto – <i>Pluto</i> constituent- <i>ahli</i></p>
1.2 Understanding the relative size and distance between the Earth, the Moon and the Sun	<p>Pupils compare the size of a sago, a glass marble and a basket ball to show the relative size of the Moon, Earth and Sun.</p> <p>Pupils discuss to estimate how many times the Sun is bigger than the Earth and how many times the Earth is bigger than the Moon.</p> <p>Pupils gather information to estimate how far the Sun is from the Earth relative to the distance of the Moon from the Earth.</p>	<p>Pupils</p> <ul style="list-style-type: none"> state the size of the Sun relative to the size of the Earth. state the size of the Earth relative to the size of the Moon. state the relative distance from the Earth to the Sun compared to the relative distance from the Earth to the Moon. 	<p>The ratio of size:</p> $\frac{\text{Moon}}{1} : \frac{\text{Earth}}{4} : \frac{\text{Sun}}{400}$	<p>sago – <i>sagu</i> support lives – <i>menyokong hidupan</i> absence of water – <i>ketiadaan air</i> absence of air – <i>ketiadaan udara</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils discuss and conclude that the distance from the Earth to the Sun is 400 time the distance from the Earth to the Moon.</p> <p>Pupils simulate/build model to show the relative size and distance of the Sun and the Moon from the Earth.</p>			
<p>1.3 Appreciating the perfect placement of the planet Earth in the Solar System</p>	<p>Pupils gather information about planets in the Solar System.</p> <p>Pupils discuss how the distance of a planet from the Sun affects how hot or cold it is.</p> <p>Pupils discuss to relate how hot or cold a planet is to its ability to support life.</p> <p>Pupils discuss to predict what will happen if the Earth is placed much nearer or farther from the Sun.</p> <p>Pupils discuss other factors that affect a planet's ability to support lives e.g. absence of water and absence of air.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state why certain planets are not conducive for living things. • predict what will happen if the Earth is placed much nearer or farther from the Sun. • conclude that the Earth is the only planet in the Solar System that has living things. 		<p>conducive-<i>sesuai</i> placement-<i>kedudukan</i></p>

INVESTIGATING MATERIALS

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary																												
1. Properties of materials																																
1.1 Understanding the properties of materials	<p>Pupils are given various objects made of wood, plastic, metal, glass or rubber and group them according to the materials they are made of.</p> <p>Pupils test objects made of wood, plastic, metal, glass or rubber to find out if they:</p> <p>a) conduct electricity, b) conduct heat, c) float on water, d) absorb water, e) can be stretched, f) allow light to pass through.</p> <p>Pupils record their findings in a graphic organiser.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • classify objects into groups according to the materials they are made of. • identify materials that conduct electricity. • identify materials that conduct heat. • identify materials that float on water. • identify materials that absorb water. • identify materials that can be stretched. • identify materials that allow light to pass through. • state what a conductor is. • state what an insulator is. 	<p>Teacher provides various objects such as wooden ruler, metal spoon, cloth, paper, coin, piece of leather, rubber band, glass plate, cork and marble.</p> <p>Activities can be carried out using station method.</p> <p>Graphic organiser in the form of a table is as shown below :</p> <table border="1"> <thead> <tr> <th></th> <th>wood</th> <th>metal</th> <th>....</th> </tr> </thead> <tbody> <tr> <td>Conduct electricity</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Conduct heat</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Float on water</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Absorb water</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Can be stretched</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Allow light to pass through</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		wood	metal	Conduct electricity				Conduct heat				Float on water				Absorb water				Can be stretched				Allow light to pass through				<p>material – <i>bahan</i> conductor – <i>pengalir</i> insulator- <i>penebat</i> metal – <i>logam</i> heat – <i>haba</i> float – <i>terapung</i> absorb – <i>menyerap</i> stretch – <i>regang</i> transparent- <i>lutsinar</i> translucent- <i>lutcahaya</i> opaque- <i>legap</i></p>
	wood	metal																													
Conduct electricity																																
Conduct heat																																
Float on water																																
Absorb water																																
Can be stretched																																
Allow light to pass through																																

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Discuss what conductor and insulator are.</p> <p>Based on the graphic organiser, pupils make a generalisation that a good heat conductor is also a good electric conductor.</p> <p>Pupils carry out activities to test different materials such as glass, wood, rubber, metal and plastic to find out their abilities to allow light to pass through.</p> <p>Based on the above activities, pupils classify materials into 3 categories i.e.</p> <ol style="list-style-type: none"> a) transparent material that allows most light to pass through, b) translucent material that allows some light to pass through, c) opaque material that does not allow any light to pass through. 	<ul style="list-style-type: none"> • make a generalisation that a good conductor of heat is also a good conductor of electricity. • classify materials based on their abilities to allow light to pass through. • state what a transparent material is. • state what a translucent material is. • state what an opaque material is. • list uses of transparent, translucent and opaque materials. 	<p>Suggested objects are : glass, book, paper, window pane, towel, handkerchief, tissue paper, transparency sheet, tracing paper etc.</p>	

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils study and discuss the uses of transparent, translucent and opaque materials.</p>			
<p>1.2 Applying the knowledge of properties of materials in everyday life</p>	<p>Pupils observe models or view video to see the structure of a polystyrene container or thermos flask to understand how they work.</p> <p>Pupils discuss and suggest ways to keep things cold. e.g. keeping cold drinks for picnic.</p> <p>Pupils discuss and suggest ways to keep things hot e.g. keeping hot drinks or food for picnic.</p> <p>Pupils carry out activities to test their suggestions.</p> <p>Pupils discuss to conclude the best way to keep things hot or to keep things cool.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • suggest ways to keep things cold. • suggest ways to keep things hot. • design an effective way to keep things hot or to keep things cold. 	<p>Teacher encourage pupils to use recycled materials/objects.</p>	<p>cold – <i>sejuk</i> effective- <i>berkesan</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary									
<p>1.3 Synthesising the knowledge about uses of materials based on their properties</p>	<p>Pupils study objects and list the materials that these objects are made of.</p> <p>Pupils suggest reasons why the materials are used to make the objects.</p> <p>Pupils discuss that different materials have different properties which are taken into consideration when choosing materials to make an object e.g. metal and glass are used to make a pair of glasses.</p> <p>Pupils design an object for a specific purpose using the materials of their choice and justify why they choose the materials.</p>	<p>Pupils</p> <ul style="list-style-type: none"> list objects and the materials that they are made of. give reasons why particular materials are used to make an object. state that materials are chosen to make an object based on their properties. design an object for a specific purpose and give reasons why certain materials are used to make it. 	<p>Guide pupils to organise information in a table such as:</p> <table border="1" data-bbox="1119 354 1530 483"> <thead> <tr> <th>Object</th> <th>Material</th> <th>Properties</th> </tr> </thead> <tbody> <tr> <td>a pair of glasses</td> <td>metal</td> <td>hard, strong</td> </tr> <tr> <td></td> <td>glass</td> <td>transparent</td> </tr> </tbody> </table> <p>Teacher guides pupils to design an object e.g. use a tin lid and a wooden ruler to make a frying pan.</p>	Object	Material	Properties	a pair of glasses	metal	hard, strong		glass	transparent	
Object	Material	Properties											
a pair of glasses	metal	hard, strong											
	glass	transparent											

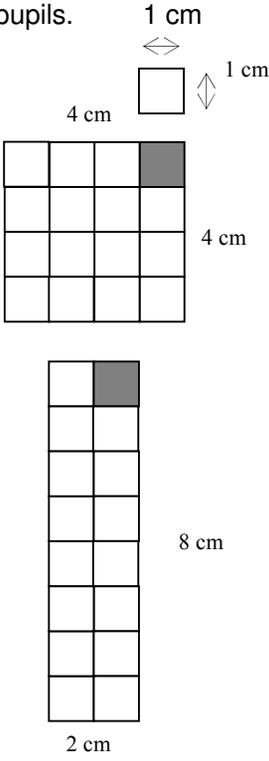
Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.4 Knowing the importance of reuse, reduce and recycle of materials</p>	<p>Pupils observe and classify objects around them into:</p> <p>a) objects made of natural materials i.e. wood, soil, metal, leather, cotton, fur, rubber and silk</p> <p>b) objects made of man-made materials e.g. plastic and synthetic cloth.</p> <p>Pupils discuss that man-made materials come from natural materials.</p> <p>Pupils conclude that we need to conserve materials because man-made materials and natural materials are limited and may be used up if there is no effort to conserve them.</p> <p>Pupils carry out activities about reusing, reducing and recycling of materials throughout the year.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • give examples of natural materials. • give examples of man-made materials. <ul style="list-style-type: none"> • state that man-made materials come from natural materials. <ul style="list-style-type: none"> • give reasons why materials need to be conserved. <ul style="list-style-type: none"> • practise reusing, reducing and recycling to conserve materials. 		<p>conserve –<i>memelihara</i> natural material- <i>bahan semula jadi</i> man- made- <i>bahan buatan</i> reuse-<i>guna semula</i> recycle-<i>kitar semula</i> reduce-<i>mengurangkan</i> wood-<i>kayu</i> metal-<i>logam</i> cotton-<i>kapas</i> rubber-<i>getah</i> silk-<i>sutera</i> leather-<i>kulit</i> limited-<i>terhad</i> synthetic cloth-<i>kain sintetik</i></p>

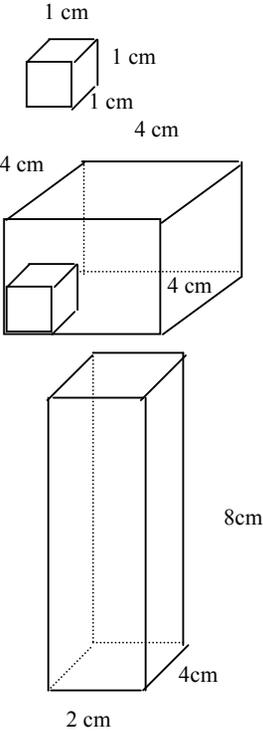
Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.5 Understanding that some materials can rust</p>	<p>Pupils observe a rusty nail and a nail without rust and tell the differences.</p> <p>Pupils observe objects around the school and classify objects as: a) rusty, b) non-rusty.</p> <p>Pupils discuss to conclude that objects made of iron can rust.</p> <p>Pupils carry out activities to investigate factors that cause rusting i.e. presence of air and water.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • differentiate between a rusty object and a non-rusty object. • identify objects that can rust. • conclude that objects made from iron can rust. • design a fair test to find out what factors cause rusting by deciding what to keep the same, what to change and what to observe. • carry out the test and record the observations. 		<p><i>rust-karat</i> <i>rusty-berkarat</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.6 Understanding that rusting can be prevented</p>	<p>Pupils observe objects around the school compound and suggest different ways to prevent rusting.</p> <p>Pupils discuss and conclude that rusting can be avoided by preventing iron from coming into contact with air and water by coating iron with paint, oil, grease or non-rusting materials.</p> <p>Pupils discuss the advantages of preventing rusting.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state the different ways to prevent objects from rusting. • explain how these ways can prevent rusting. • explain why it is necessary to prevent rusting. 		<p>grease-<i>gris</i> coating-<i>menyalut</i> paint-<i>cat</i></p>

INVESTIGATING FORCE AND ENERGY

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1. Measurement				
<p>1.1 Understanding the measurement of length</p>	<p>Pupils discuss the different ways to measure length such as using straw, arm span, string, ruler and measuring tape.</p> <p>Pupils discuss the standard unit for length in metric system i.e. mm, cm, m and km.</p> <p>Pupils choose the appropriate tools and measure in standard units:</p> <ol style="list-style-type: none"> the length of objects such as eraser, pencil or book, the length and height of teacher's table, the length and width of the classroom, the heights of their friends, the circumference of any part of their bodies or round objects. <p>Record the measurements in a graphic organiser.</p>	<p>Pupils</p> <ul style="list-style-type: none"> state the different ways to measure length. state the standard unit for length in the metric system. choose the appropriate measuring tools to measure length. measure length using the correct technique. record lengths in standard units. 	<p>Suggested measuring tools: rulers of different lengths, measuring tape, string.</p>	<p>measurement – <i>ukuran</i> length – <i>panjang</i> width – <i>lebar</i> height – <i>tinggi</i> circumference – <i>lilitan</i> arm span – <i>depa</i> graphic organiser – <i>penyusun grafik</i> calculate – <i>hitung</i> standard unit – <i>unit piawai</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.2 Understanding how to calculate area</p>	<p>Pupils compare objects of different shapes such as a square and a rectangle and guess which object has a bigger area e.g.</p> <p>a) a square (4cm x 4cm), b) a rectangle (8cm x 2cm).</p> <p>Pupils confirm their guesses by filling the 4cm x 4cm square and 8cm x 2cm rectangle with 1cm x 1cm cards and count the number of 1cm x 1cm cards used.</p> <p>Pupils discuss to state the relationship between the number of 1cm x 1cm squares and the length and width of the above square and rectangle.</p> <p>Pupils discuss the standard unit for area in metric system i.e. square mm, square cm, square m and square km.</p> <p>Pupils calculate the area of any given square and rectangle in standard unit.</p>	<p>Pupils</p> <ul style="list-style-type: none"> compare a square and a rectangle and guess which object has a bigger area. carry out a test to confirm their guesses. state that area = length X width state the unit for area in the metric system. calculate the area of a given shape in standard unit. 	<p>Use 1cm X 1cm square cards.</p> <p>Teacher accepts any ideas given by the pupils.</p>  <p>The diagram illustrates the use of 1cm x 1cm square cards to measure area. It shows a single square card with dimensions 1 cm by 1 cm. Below this, a 4 cm by 4 cm square is shown, composed of 16 small squares, with the top-right square shaded. To its right, an 8 cm by 2 cm rectangle is shown, composed of 16 small squares, with the top-left square shaded. The dimensions of the larger shapes are labeled as 4 cm and 8 cm.</p>	

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.3 Understanding how to measure the volume of solid</p>	<p>Pupils compare 2 different objects such as a cube and a cuboid and guess which object has a bigger volume. e.g.</p> <p>a) a cube (4cm x 4cm x 4cm),</p> <p>b) a cuboid (8cm x 4cm x 2cm).</p> <p>Pupils confirm their guesses by filling the 4cm x 4cm x 4cm cube and 8cm x 4cm x 2cm cuboid with 1cm x 1cm x 1cm cubes and count the number of 1cm x 1cm x 1cm cubes used.</p> <p>Pupils discuss to state the relationship between the number of 1cm x 1cm x 1cm cubes and the length, width and height of the above cube and cuboid.</p> <p>Pupils discuss the standard system for volume of solid in metric system i.e. cubic mm, cubic cm, and cubic m. Pupils calculate the volumes of any given cubes and cuboids in standard unit.</p>	<p>Pupils</p> <ul style="list-style-type: none"> compare a cube and a cuboid and guess which one has a bigger volume. carry out a test to confirm their guesses. state that volume = length X width X height state the unit for volume of solids in the metric system. calculate the volumes of cubes and cuboids based on the measurements taken in standard unit. 	<p>Use a cube and a cuboid with the same volume</p>  <p>The diagrams show: 1. A small cube with side length 1 cm. 2. A larger cube with side length 4 cm, with a smaller 1 cm cube inside it. 3. A cuboid with dimensions 2 cm by 4 cm by 8 cm.</p>	<p>volume – <i>isipadu</i> solid – <i>pepejal</i> cube – <i>kiub</i> cuboid – <i>kuboid</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.4 Understanding how to measure volume of liquid</p>	<p>Pupils discuss the different ways that can be used to measure the volume of a liquid such as using cup, the cap of a bottle, beaker and measuring cylinder.</p> <p>Pupils discuss the standard unit for volume of liquid in metric unit i.e. ml, and l.</p> <p>Pupils choose the appropriate tool for measuring the volume of a liquid.</p> <p>Pupils discuss the correct techniques to take readings i.e.</p> <p>a) taking the reading at the lowest part of the meniscus, b) eyes must be at the same level as the lowest part of the meniscus.</p> <p>Pupils carry out activities to measure the volumes of liquids using the correct techniques. Pupils record measurement in a graphic organiser.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state the different ways to measure the volume of a liquid. • state the standard unit for volume of liquids in the metric system. • choose the appropriate measuring tools to measure the volume of a liquid. • measure the volume of a liquid using the correct technique. • record the volume measured in standard unit. 	<p>Give pupils different volumes of water and allow them to try to measure volumes using different tools e.g. beaker or measuring cylinders of different sizes.</p>	<p>liquids – <i>cecair</i> beaker – <i>bikar</i> measuring cylinder – <i>silinder penyukat</i> meniscus – <i>meniskus</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1.5 Understanding how to measure mass	<p>Pupils study lever balance and discuss that it can be used to measure mass of various objects.</p> <p>Pupils discuss that the standard unit for mass in metric unit i.e. mg, g and kg.</p> <p>Pupils use tools to measure the masses of various objects such as books, pencil cases or school bags.</p> <p>Pupils record the measurements in a graphic organiser.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state tools for measuring mass. • state the standard unit for mass in the metric system. • measure the mass of an object using the correct technique. • record the measurement using standard unit. 	<p>The mass of an object should not be confused with the weight. Mass is the amount of matter in an object and it does not change with location. Weight is the force of gravity on an object. Weight depends on the location of the object. Weight is measured in newton (N).</p>	<p>lever balance – <i>neraca tuas</i> compression balance – <i>neraca mampatan</i> mass – <i>jisim</i> matter-<i>jirim</i></p>
1.6 Understanding how to measure time	<p>Pupils gather information about different ways to measure time.</p> <p>Pupils discuss and conclude that a process that repeats uniformly can be used to measure time.</p> <p>Pupils observe the following processes:</p> <ol style="list-style-type: none"> a) the swinging of a pendulum, b) water dripping, c) pulse. 	<p>Pupils</p> <ul style="list-style-type: none"> • identify different ways to measure time. • state that processes that repeat uniformly can be used to measure time. 		<p>uniformly repeated – <i>berulang secara seragam</i> swing – <i>ayunan</i> pendulum – <i>bandul</i> water dripping – <i>air menitis</i> pulse rate – <i>kadar denyutan nadi</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils discuss why the above processes can be used to measure time.</p> <p>Pupils discuss the standard unit for time in metric system i.e. second, minute and hour.</p> <p>Pupils discuss to choose and use appropriate tools and units to measure time.</p> <p>Pupils measure the time taken to carry out certain activities using the correct tools and appropriate units.</p> <p>Pupils record the measurement in appropriate metric unit in a graphic organiser.</p> <p>Pupils carry out activity to design a device for measuring time e.g. hour glass or sundial.</p>	<ul style="list-style-type: none"> • state the standard unit for time in the metric system. • identify tools for measuring time. • measure time using appropriate tools. • record the time measured in standard unit. 		

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.7 Realising the importance of using standard units</p>	<p>Pupils are shown a piece of playdough made earlier by teacher and ask to prepare their own playdough using the given recipe.</p> <p>Based on the given recipe pupils discuss what tools to use for measuring the ingredients and how to measure.</p> <p>Pupils make the playdough by measuring the ingredients using the measuring tools and units that they have chosen.</p> <p>Pupils feel the texture of the dough and give reasons for any difference in their dough as compared to the playdough prepared by the teacher.</p> <p>Pupils conclude that standard units are needed for accuracy and consistency.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • choose and use the appropriate tools to measure the volumes of liquids and masses of the ingredients in a recipe. • give reasons for any differences in the dough prepared by pupils using the given recipe. • conclude the need for using standard unit. 	<p>Teacher use the following recipe to make the playdough.</p> <p>400 g flour 400 g fine salt 150 ml water 100 ml cooking oil ½ teaspoon food colouring</p> <p>Method: 1. Dissolve salt in water. 2. Mix all ingredients in a bowl. 3. Knead the mixture into a dough.</p> <p>Give the following recipe to pupils for them to make some playdough.</p> <p>1 bowl of flour 2 cups of fine salt ½ glass of water ¼ cup of cooking oil a pinch of food colouring</p>	<p>dough – <i>adunan</i> texture – <i>tekstur</i> accuracy – <i>ketepatan</i> knead – <i>uli</i> ingredient – <i>bahan</i> mixture - <i>campuran</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
			<p>Teacher prepares a few cups and bowls of various sizes. Let the pupils choose the cup and bowl that they are going to use for measuring the ingredients.</p> <p>Method:</p> <ol style="list-style-type: none"> 1. Dissolve salt in water. 2. Mix all ingredients in a bowl. 3. Knead the mixture into a dough. 	

INVESTIGATING TECHNOLOGY

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1. Technology				
<p>1.1 Understanding the importance of technology in everyday life</p>	<p>Pupils test their abilities e.g.</p> <ol style="list-style-type: none"> try to memorise a telephone number and then try to memorise another 5 telephone numbers without writing them down, try to jump as high as possible and touch the ceiling, try to read the same writing from different distances. <p>Pupils discuss the limit of their abilities.</p> <p>Pupils view video to see how technology are used to overcome human's limitations.</p> <p>Pupils discuss and give other examples of human's limitations and ways to overcome them e.g.</p>	<p>Pupils</p> <ul style="list-style-type: none"> state that there are limitations to human's abilities to do things. identify devices used to overcome human's limitations. relate how certain devices are used to overcome human's limitations. 	<p>Teacher can use video that shows the use of various technologies such as:</p> <ol style="list-style-type: none"> microsurgery, hearing aids, metal detector, night vision goggle, x-ray. 	<p>memorise – <i>mengingat</i> device – <i>alat</i> abilities – <i>keupayaan</i> limitation – <i>had keupayaan</i> magnifying glass – <i>kanta pembesar</i> overcome - <i>mengatasi</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	a) unable to see the fine details on an object. This can be overcome by using magnifying glass or microscope, b) unable to speak loud enough for someone far away to hear. This can be overcome by using microphone, megaphone or telephone, c) unable to walk for long distance. This can be overcome by riding a bicycle or traveling by car, train, ship or aeroplane.			
1.2 Understanding the development of technology	Pupils gather information and create folio about the development of technology in the fields of: a) communication, b) transportation, c) agriculture, d) construction. E.g. in communication the development of technology from smoke signal to drum, telephone, walkie-talkie, cell phone and teleconferencing.	Pupils <ul style="list-style-type: none"> • give examples of development of technology. 		communication – <i>komunikasi</i> transportation – <i>pengangkutan</i> agriculture – <i>pertanian</i> construction – <i>pembinaan</i> innovate – <i>mencipta</i> betterment – <i>kebaikan</i> mankind- <i>manusia sejagat</i>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils give reasons on the needs to innovate or invent devices for the betterment of mankind.</p>	<ul style="list-style-type: none"> • recognise the needs to innovate or invent devices for the betterment of mankind. 		
<p>1.3 Synthesising how technology can be used to solve problems</p>	<p>Pupils discuss and list the problems that they encounter in everyday life.</p> <p>Pupils carry out brainstorming session on how to solve the problems identified.</p> <p>Pupils design and make devices to solve the problems identified.</p> <p>Pupils present their innovations to the class.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • identify problems they encounter in their daily life. • generate ideas to solve the problems identified. • design a device to solve the problem identified. • demonstrate how the device invented can be used to solve the problem identified. 	<p>Problems suggested may be simple such as:</p> <ul style="list-style-type: none"> a) losing pencil or pen from time to time, b) dust flying around while cleaning the blackboard. <p>Teacher advises pupils to design devices that are easy to make.</p> <p>Encourage pupils to use recycled materials when making devices.</p>	<p>encounter - <i>hadapi</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
<p>1.4 Analysing that technology can benefit mankind if used wisely</p>	<p>Pupils discuss and list the advantages and disadvantages of technology to mankind.</p> <p>Pupils hold debates on topics related to technology.</p> <p>Pupils make a conclusion from the debate that technology can benefit mankind if used wisely.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state that technology has advantages and disadvantages. • conclude that technology can benefit mankind if used wisely. 	<p>Suggested topics for debate :</p> <p>a) Technology can be harmful to mankind.</p> <p>b) Technology improves quality of life.</p>	<p>benefit – <i>manfaat</i> wisely – <i>secara bijaksana</i></p>

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