



MINISTRY OF EDUCATION MALAYSIA

Integrated Curriculum For Secondary Schools

Curriculum Specifications

SCIENCE

Year 6



Curriculum Development Centre
Ministry of Education Malaysia

2006

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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 towards modern science and technology;

We, the people of Malaysia, pledge our united efforts to attain these ends guided by these principles:

BELIFE 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 further 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 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.

(MAHZAN BIN BAKAR AMP)
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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.

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

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 hypotheses	Attributing Relating Comparing and contrasting Generating ideas Making hypotheses 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 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.
- 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.

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.

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1. Interaction among living things				
1.1 Understanding that some animals live in groups and others live in solitary	<p>Pupils view a video on animals that live in groups and in solitary.</p> <p>Pupils gather information and give examples of animals that live in group and in solitary.</p> <p>Pupils discuss why animals live in groups, e.g. a) for safety, b) for food.</p> <p>Pupils observe how ants live together in a vivarium.</p> <p>Pupils discuss why animals live in solitary, e.g. a) to avoid competition for food, b) to avoid competition for space.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state that some animals live in groups. • state that some animals live in solitary. • give examples of animals that live in groups. • give examples of animals that live in solitary. • explain why animals live in groups. • explain why animals live in solitary. • state that cooperation is a form of interaction among animals. 	<p>Teacher can prepare a vivarium of an ant colony two weeks before the lesson.</p>	<p>solitary – <i>menyendiri</i> safety-<i>keselamatan</i> cooperation- <i>bekerjasama</i> competition- <i>persaingan</i></p>

Investigating Living Things

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Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1.2 Understanding that competition is a form of interaction among living things	<p>Pupils view video on interaction among living things in various habitats.</p> <p>Pupils discuss and give examples of interaction among living things.</p> <p>Pupils discuss that competition is a form of interaction.</p> <p>Pupils view video or computer simulation of competition among animals.</p> <p>Pupils discuss and list the factors that animals compete for: a) food, b) water, c) mate, d) shelter, e) territory/space.</p> <p>Pupils carry out activities to observe animals competing for food, e.g. fish or bird.</p> <p>Pupils discuss that animals compete because of:</p>	<p>Pupils</p> <ul style="list-style-type: none"> state that living things interact with one another in the environment state that competition is a form of interaction. list the factors that animals compete for. give reasons why animals compete. 	The video should include various types of interaction such as competition and cooperation.	<p>interaction-<i>interaksi</i></p> <p>competition-<i>persaingan</i></p> <p>limited resources-<i>sumber terhadap</i></p> <p>territory-<i>wilayah</i></p> <p>breeding-<i>pembiakan</i></p> <p>mate-<i>pasangan</i></p> <p>defend-<i>mempertahankan</i></p> <p>space-<i>ruang</i></p> <p>shelter-<i>tempat perlindungan</i></p>

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>a) limited food resources, b) limited water resources, c) trying to get a mate for breeding, d) defending or looking for territory, e) defending or looking for shelter.</p> <p>Pupils view a video or pictures of plants in the forest. Based on the video or pictures pupils discuss why plants in the forest have different heights.</p> <p>Pupils carry out activities to observe competition among plants.</p> <p>Pupils discuss that plants compete for: a) sunlight, b) water, c) space, d) nutrient.</p> <p>Pupils discuss and conclude that plants compete because of: a) limited sunlight that can</p>	<ul style="list-style-type: none"> list factors that plants compete for. give reasons why plants compete with each other. 	<p>These activities can be prepared earlier because they may take some time to show results. Suggestion: a) green beans, b) maize.</p>	

Investigating Living Things

Year 6-Science

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	reach them, b) limited water resources, c) limited space, d) limited nutrient.			
1.3 Understanding the responsibility of human beings in protecting endangered species	<p>Pupils view a video or pictures of animals that are extinct, e.g. dinosaurs.</p> <p>Pupils view a video or pictures of endangered animals and plants, e.g. tiger, turtle, orang utan, panda, rhinoceros and rafflesia and pitcher plant.</p> <p>Pupils discuss and conclude that certain animals and plants are facing the threat of extinction because of human activities such as illegal or excessive: a) logging, b) hunting, c) development.</p> <p>Discuss ways to prevent animals and plants from extinction, e.g. a) campaign against</p>	<p>Pupils</p> <ul style="list-style-type: none"> • give examples of extinct animal. • give examples of endangered animal. • give examples of endangered plant. • explain why certain animals or plants are facing the threat of extinction. • suggest ways to prevent animals and plants from extinction. 		<p>rafflesia- <i>bunga pakma</i> hornbill-<i>burung enggang</i> conservation-<i>pemuliharaan</i> protection-<i>pelindungan</i> endangered-<i>terancam</i> extinct-<i>pupus</i> excessive-<i>berleluasa</i> threat- <i>ancaman</i> logging-<i>pembalakan</i> consume-<i>menggunakan</i> enforcement-<i>penguatkuasaan</i></p>

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Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>excessive logging,</p> <p>b) educating the public about the importance of protecting and conserving animals and plants,</p> <p>c) avoid consuming or buying products made from endangered species,</p> <p>d) enforcing the law.</p>			
1.4 Knowing the impact of human activities on environment	<p>Pupils view video or see pictures of environmental destructions caused by human activities, e.g.</p> <p>a) erosion,</p> <p>b) landslide,</p> <p>c) flash-flood,</p> <p>d) water pollution,</p> <p>e) air pollution.</p> <p>Pupils view a video and discuss human activities that cause destruction to the environment, e.g.</p> <p>a) illegal and excessive logging,</p> <p>b) illegal and excessive hunting,</p> <p>c) improper management of development.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • give examples of environmental destruction caused by human. • explain how human activities cause environmental destruction. 		<p>balance of nature-<i>keseimbangan alam</i></p> <p>illegal logging-<i>pembalakan haram</i></p> <p>illegal hunting-<i>pemburuan haram</i></p> <p>landslide-<i>tanah runtuh</i></p> <p>flash-flood-<i>banjir kilat</i></p> <p>pollution-<i>pencemaran</i></p> <p>erosion-<i>hakisan</i></p> <p>disaster-<i>bencana</i></p> <p>destruction-<i>kemusnahan</i></p>

Investigating Living Things

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Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils discuss what will happen to the Earth if human activities that caused environmental destructions are not controlled.</p> <p>Pupils prepare a scrap book on environmental destruction caused by human activities and steps taken to reduce its effects.</p>	<ul style="list-style-type: none">• predict what will happen to the Earth if human activities are not controlled.		

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
1. Force				
1.1 Understanding that push and pull are forces	<p>Pupils push and pull each other's palms to feel the effect of forces.</p> <p>Pupils discuss and conclude that push and pull are forces.</p> <p>Based on the above activity pupils discuss and conclude that a force cannot be seen but its effects can be observed.</p>	<p>Pupils</p> <ul style="list-style-type: none"> state that push and pull are forces. state that force cannot be seen but its effects can be observed. 		<p>pull-<i>tarikan</i> push-<i>tolakan</i> force-<i>daya</i> palm-<i>tapak tangan</i></p>
1.2 Understanding the effects of a force	<p>Pupils carry out activities and discuss the effects of pushing</p> <p>a) a stationary ball, b) a moving ball.</p> <p>Pupils press, twist or squeeze objects such as plasticine, sponge and spring.</p> <p>Pupils observe and discuss the effects of forces.</p>	<p>Pupils</p> <ul style="list-style-type: none"> state that a force can move a stationary object. state that a force can change the motion of an object. state that a force can change the shape of an object. 		<p>speed – <i>kelajuan</i> stationary – <i>pegun</i> moving – <i>bergerak</i> twist-<i>pulas</i> press- <i>tekan</i></p>

Investigating Force and Energy

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Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils discuss and conclude that a force can:</p> <ol style="list-style-type: none"> move the stationary object, stop a moving object, change the direction of a moving object, make an object move faster or slower, change the shape of an object. 			
1.3 Analysing friction	<p>Pupils observe an object such as a book or a coin sliding on a surface.</p> <p>Pupils discuss that friction slows down a moving object and conclude that friction is a force.</p> <p>Pupils carry out activities that involve friction, e.g.</p> <ol style="list-style-type: none"> open the lid of a jar with dry hands, open the lid of a jar with oily hands. <p>Pupils discuss and conclude that it is easier to open the lid of a jar with dry hands</p>	<p>Pupils</p> <ul style="list-style-type: none"> state that friction is a type of force. 		<p>friction – <i>geseran</i></p> <p>aerodynamic- <i>aerodinamik</i></p> <p>oppose – <i>bertentangan</i></p> <p>effect – <i>kesan</i></p> <p>reduce – <i>kurangkan</i></p> <p>increase – <i>menambahkan</i></p> <p>surfaces in contact – <i>permukaan yang bersentuhan</i></p>

Year 6- Science

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>because of greater friction.</p> <p>Pupils carry out activities that involve friction, e.g.</p> <ol style="list-style-type: none"> rubbing their palms, pulling a heavy object, rubbing an eraser against a surface. <p>Based on the above activities pupils explain the effects of friction:</p> <ol style="list-style-type: none"> their palms become warmer because friction produces heat, it is difficult to move the object because friction opposes motion, the eraser becomes smaller because friction causes wear and tear. <p>Pupils list and discuss the effects of friction in everyday life.</p> <p>Pupils compare the effects of friction by rubbing their palms:</p> <ol style="list-style-type: none"> without oil, with oil. 	<ul style="list-style-type: none"> describe the effects of friction. describe ways to reduce friction. describe ways to increase friction. 	<p>Friction can be reduced by using:</p> <ol style="list-style-type: none"> using roller, marbles using talcum powder, oil, wax, grease, air cushion, smoothing the surfaces in contact. 	

Investigating Force and Energy

Year 6- Science

Learning Objectives	Suggested Learning Activities	Learning Outcomes	Notes	Vocabulary
	<p>Pupils discuss and conclude that oil reduces friction.</p> <p>Pupils suggest various ways to reduce friction.</p> <p>Pupils carry out activities to test their suggestions.</p> <p>Pupils gather information on the advantages and disadvantages of friction in everyday life.</p> <p>Pupils discuss various situations where friction occurs and conclude that friction is produced when surfaces are in contact with one another.</p> <p>Pupils plan and carry out an experiment to investigate how different types of surfaces affects the distance a trolley moves.</p>	<ul style="list-style-type: none"> state the advantages of friction. state the disadvantages of friction. conclude that friction occurs when two surfaces are in contact. design a fair test to find out how different types of surfaces affect the distance a trolley moves by deciding what to change, what to keep the same and what to measure. 		

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2. Movement				
2.1 Understanding speed	<p>Pupils carry out activities to:</p> <ul style="list-style-type: none"> a) compare the distances travelled in a given time by two moving objects, b) compare the time taken by two moving objects to travel a given distance. <p>Pupils discuss and conclude that:</p> <ul style="list-style-type: none"> a) an object which moves faster travels a longer distance in a given time, b) an object which moves faster takes a shorter time to travel a given distance. <p>Pupils conclude that:</p> <ul style="list-style-type: none"> a) speed is a measurement of how fast an object moves, b) speed can be calculated by using the formula $\text{speed} = \text{distance}/\text{time}$. <p>Pupils solve problems using the formula.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • state that an object which moves faster travels a longer distance in a given time. • state that an object which moves faster takes a shorter time to travel a given distance. • state what speed is. • solve problems using the formula. 		

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1. Food preservation				
1.1 Understanding food spoilage	<p>Pupils observe samples of spoilt food.</p> <p>Pupils discuss and conclude that spoilt food is unsafe to eat.</p> <p>Pupils conclude that spoilt food has one or more of the following characteristics:</p> <ol style="list-style-type: none"> unpleasant smell, unpleasant taste, changed colour, changed texture, mouldy. <p>Pupils carry out an activity to observe that food turns bad by leaving a slice of bread in the open for a few days.</p> <p>Pupils discuss and conclude that microorganisms can spoil food.</p> <p>Pupils gather information and conclude that microorganisms need certain conditions to grow:</p>	<p>Pupils</p> <ul style="list-style-type: none"> describe what spoilt food is. identify characteristics of spoilt food. state that microorganisms can spoil food. state the conditions for microorganisms to grow. 	Food used in the activity should not be tasted.	medium - keadaan

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	a) air, b) water, c) nutrient, d) suitable temperature, e) suitable acidity.			
1.2 Synthesisg the concept of food preservation	<p>Pupils find information about ways to preserve food and examples of food for each type of preservation, i.e.</p> a) drying, b) boiling, c) cooling, d) vacuum packing, e) pickling, f) freezing, g) bottling/canning, h) pasteurising, i) salting, j) smoking, k) waxing.	<p>Pupils</p> <ul style="list-style-type: none"> describe ways to preserve food. give examples of food for each type of food preservation. <p>• give reasons why each way of food preservation is used.</p>		drying- <i>pengeringan</i> pickling- <i>penjerukan</i> heating - <i>pemanasan</i> vacuum packing- <i>pembungkusan</i> <i>vakum</i> cooling- <i>pendinginan</i> freezing- <i>penyejuk</i> <i>bekuan</i> bottling- <i>pembotolan</i> canning- <i>pengetinan</i> smoking- <i>salai</i> salting- <i>pengasinan</i>

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	<p>Pupils view a video or visit food factory to observe how food is processed and preserved.</p> <p>Pupils discuss that food preservation is a process of slowing down the food from becoming bad.</p> <p>Pupils carry out a project on food preservation to preserve a given food.</p>	<ul style="list-style-type: none"> state what food preservation is. design and carry out a project to preserve a given food. 	<p>Food given can be:</p> <ul style="list-style-type: none"> a) tapioca, b) banana, c) egg, d) mango, e) chili. 	
1.3 Realising the importance of preserving food	<p>Pupils discuss and give reasons why we need to preserve food, e.g.</p> <ul style="list-style-type: none"> a) the food will last longer, b) the food is easy to store, c) to reduce wastage of food. 	<p>Pupils</p> <ul style="list-style-type: none"> give reasons why we need to preserve food. 		

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2. Waste management				
2.1 Understanding the effects of improper disposal of waste on the environment	<p>Pupils observe various waste in a rubbish bin, e.g. plastic, glass, chemical waste, organic waste and metal.</p> <p>Pupils view a video on various waste from factories, food stalls and market.</p> <p>Pupils gather information on:</p> <ol style="list-style-type: none"> sources of waste, various ways of waste disposal. <p>Pupils discuss and classify the proper and improper ways of waste disposal.</p> <p>Pupils discuss the harmful effects of improper waste disposal, e.g.</p> <ol style="list-style-type: none"> air pollution, water pollution, sickness and diseases, acid rain, flash-flood. 	<p>Pupils</p> <ul style="list-style-type: none"> identify types of waste in the environment. identify sources of waste. state the improper ways of waste disposal. state the proper ways of waste disposal. describe the harmful effects of improper waste disposal. 		<p>harmful effects- <i>kesan buruk</i> waste disposal - <i>pembuangan</i> bahan buangan</p>

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	<p>Pupils gather information on how waste in a local area is disposed.</p> <p>Pupils discuss and suggest ways to improve waste disposal in a local area.</p> <p>Pupils visit a waste management centre or listen to a talk to gather information on how waste is treated.</p>	<ul style="list-style-type: none"> describe how waste is disposed in a local area. suggest ways to improve waste disposal. 		
2.2 Understanding that some waste can decay	<p>Pupils view videos and time-lapse clippings about waste that decay and waste that do not decay.</p> <p>Pupils separate waste in a rubbish bin according to the categories such as vegetables, paper, glass, plastics and wood.</p> <p>Put each type into separate thick plastic bags. Place these bags in the open and observe the changes over a period of time.</p>	<p>Pupils</p> <ul style="list-style-type: none"> state that certain waste can decay. give examples of waste that can decay. give examples of waste that do not decay. 	<p>Biodegradable materials are materials that can be decayed by microorganisms.</p> <p>Certain plastics are biodegradable.</p>	<p>decay-<i>reput</i> harmful-<i>merbahaya</i> separate- <i>asingkan</i></p>

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	<p>Pupils discuss and give examples of waste that: a) decay, b) do not decay.</p> <p>Pupils discuss and conclude a) some microorganisms caused waste to decay, b) during the decaying process nutrients are returned to the soil, in this way they can be used again.</p> <p>Pupils gather information and discuss the advantages and disadvantages of decay of waste.</p> <p>Pupils discuss and predict what will happen to human and the environment if waste do not decay.</p>	<ul style="list-style-type: none"> state that microorganisms can cause waste materials to decay. state the advantages of waste decaying. state the disadvantages of waste decaying. predict what will happen to human and the environment if waste do not decay. 		

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1. Eclipses				
1.1 Understanding the eclipse of the moon	<p>Pupils use models to simulate the movement of the Earth, the Moon and the Sun.</p> <p>Pupils view a video or computer simulation about partial and total eclipse of the moon.</p> <p>Pupils discuss and conclude that eclipse of the moon occurs because:</p> <p>a) the Earth is between the Moon and the Sun, and</p> <p>b) the Earth, the Moon and the Sun are positioned in a straight line.</p> <p>Pupils draw diagrams to show the position of the Moon, the Earth and the Sun during the eclipse of the moon.</p>	<p>Pupils</p> <ul style="list-style-type: none"> state what eclipse of the moon is. state the position of the Moon, the Earth and the Sun during the eclipse of the moon. explain why eclipse of the moon occurs 		<p>eclipse-<i>gerhana</i></p> <p>position-<i>kedudukan</i></p> <p>partial eclipse-<i>gerhana separa</i></p> <p>total eclipse-<i>gerhana penuh</i></p>
1.2 Understanding the eclipse of the sun	Pupils use models to simulate the movement of the Earth, the Moon and the Sun.	<p>Pupils</p> <ul style="list-style-type: none"> state what eclipse of the sun is. 		

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	<p>Pupils discuss that the eclipse of the sun occurs during daytime.</p> <p>Pupils view videos or computer simulations about partial and total eclipse of the sun.</p> <p>Pupils discuss and conclude that eclipse of the sun occurs because:</p> <p>a) the Moon is between the Earth and the Sun,</p> <p>b) the Earth, the Moon and the Sun are positioned in a straight line.</p> <p>Pupils draw diagrams to show the position of the Moon, the Earth and the Sun during the eclipse of the sun.</p> <p>Pupils discuss and predict the scenario on the Earth during the eclipse of the sun.</p>	<ul style="list-style-type: none"> • state the position of the Moon, the Earth and the Sun during the eclipse of the sun. • explain why eclipse of the sun occurs. • predict the scenario on the Earth during the eclipse of the sun. 		

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1. Machine				
1.1 Understanding simple machines	<p>Pupils try to remove the lid of a tin using</p> <ol style="list-style-type: none"> bare hands, spoon. <p>Pupils compare the difficulty to complete the task and discuss the function of the tool.</p> <p>Pupils discuss that a simple machine is a device that allows us to use less force to make work easier or faster.</p> <p>Pupils examine and manipulate the following simple machines:</p> <ol style="list-style-type: none"> wheel and axle, lever, wedge, pulley, gear, inclined plane, screw. <p>Pupils discuss types and examples of simple machines.</p>	<p>Pupils</p> <ul style="list-style-type: none"> explain what simple machine is. state types of simple machines give an example for each type of simple machine. 		<p>lid- <i>penutup</i></p> <p>wheel and axle- <i>roda dan gandar</i></p> <p>lever- <i>tuas</i></p> <p>wedge- <i>baji</i></p> <p>pulley- <i>takal</i></p> <p>gear- <i>gear</i></p> <p>inclined plane- <i>satah condong</i></p> <p>screw- <i>skru</i></p>

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	Pupils walk around the school compound and identify various types of simple machines.			
1.2 Analysing a complex machine	<p>Pupils identify the simple machines in a bicycle or a wheel barrow.</p> <p>Pupils discuss and conclude that a complex machine is a machine made up of more than one simple machine.</p> <p>Pupils prepare scrap books on examples of complex machines.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • identify simple machines in a complex machine. • conclude that a complex machine is made up of more than one simple machine. • give examples of complex machines. 		wheel barrow- <i>kereta sorong</i>
1.3 Appreciating the invention of machines that make life easier	<p>Pupils carry out simulation to find out how life would be without machines.</p> <p>Pupils discuss and predict how life would be without machines.</p>	<p>Pupils</p> <ul style="list-style-type: none"> • predict how life is without machines. 	Encourage pupils to reuse materials and recycle materials.	

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	<p>Pupils discuss and explain how machines make our lives easier.</p> <p>Pupils identify a problem and design a machine to solve the problem.</p>	<ul style="list-style-type: none">• explain how machines can make our lives easier.• design a machine to solve a problem.		

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