



KEMENTERIAN PENDIDIKAN MALAYSIA

KURIKULUM STANDARD SEKOLAH RENDAH

Sains

Dokumen Standard Kurikulum dan Pentaksiran

TAHUN 3
(EDISI BAHASA INGGERIS)



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(Edisi Bahasa Inggeris)

Bahagian Pembangunan Kurikulum

April 2017

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RUKUN NEGARA

BAHAWASANYA Negara kita Malaysia mendukung cita-cita hendak:
Mencapai perpaduan yang lebih erat dalam kalangan seluruh masyarakatnya;
Memelihara satu cara hidup demokratik;
Mencipta satu masyarakat yang adil di mana kemakmuran negara
akan dapat dinikmati bersama secara adil dan saksama;
Menjamin satu cara hidup yang liberal terhadap tradisi-tradisi
kebudayaannya yang kaya dan berbagai corak;
Membina satu masyarakat progresif yang akan menggunakan
sains dan teknologi moden;

MAKA KAMI, rakyat Malaysia, berikrar akan menumpukan seluruh tenaga dan usaha kami untuk mencapai cita-cita tersebut berdasarkan atas prinsip-prinsip yang berikut:

**KEPERCAYAAN KEPADA TUHAN
KESETIAAN KEPADA RAJA DAN NEGARA
KELUHURAN PERLEMBAGAAN
KEDAULATAN UNDANG-UNDANG
KESOPANAN DAN KESUSILAAN**

FALSAFAH PENDIDIKAN KEBANGSAAN

“Pendidikan di Malaysia adalah suatu usaha berterusan ke arah lebih memperkembangkan potensi individu secara menyeluruh dan bersepadu untuk melahirkan insan yang seimbang dan harmonis dari segi intelek, rohani, emosi dan jasmani, berdasarkan kepercayaan dan kepatuhan kepada Tuhan. Usaha ini adalah bertujuan untuk melahirkan warganegara Malaysia yang berilmu pengetahuan, berketerampilan, berakhlak mulia, bertanggungjawab dan berkeupayaan mencapai kesejahteraan diri serta memberikan sumbangan terhadap keharmonian dan kemakmuran keluarga, masyarakat dan negara”

Sumber: Akta Pendidikan 1996 (Akta 550)

DEFINISI KURIKULUM KEBANGSAAN

3. Kurikulum Kebangsaan

(1) Kurikulum Kebangsaan ialah suatu program pendidikan yang termasuk kurikulum dan kegiatan kurikulum yang merangkumi semua pengetahuan, kemahiran, norma, nilai, unsur kebudayaan dan kepercayaan untuk membantu perkembangan seseorang murid dengan sepenuhnya dari segi jasmani, rohani, mental dan emosi serta untuk menanam dan mempertingkatkan nilai moral yang diingini dan untuk menyampaikan pengetahuan.

Sumber: Peraturan-Peraturan Pendidikan (Kurikulum Kebangsaan) 1997

[PU(A)531/97.]

FALSAFAH PENDIDIKAN SAINS KEBANGSAAN

Selaras dengan Falsafah Pendidikan Kebangsaan, pendidikan sains di Malaysia memupuk budaya Sains dan Teknologi dengan memberi tumpuan kepada perkembangan individu yang kompetitif, dinamik, tangkas dan berdaya tahan serta dapat menguasai ilmu sains dan keterampilan teknologi.

Sumber: Kementerian Sains, Teknologi dan Inovasi (MOSTI)

KATA PENGANTAR

Kurikulum Standard Sekolah Rendah (KSSR) yang dilaksanakan secara berperingkat mulai tahun 2011 telah disemak semula bagi memenuhi dasar baharu di bawah Pelan Pembangunan Pendidikan Malaysia (PPPM) 2013-2025 supaya kualiti kurikulum yang dilaksanakan di sekolah rendah setanding dengan standard antarabangsa. Kurikulum berasaskan standard yang menjadi amalan antarabangsa telah dijelmakan dalam KSSR menerusi penggubalan Dokumen Standard Kurikulum dan Pentaksiran (DSKP) untuk semua mata pelajaran yang mengandungi Standard Kandungan, Standard Pembelajaran dan Standard Prestasi.

Usaha memasukkan standard pentaksiran di dalam dokumen kurikulum telah mengubah lanskap sejarah sejak Kurikulum Kebangsaan dilaksanakan di bawah Sistem Pendidikan Kebangsaan. Menerusinya murid dapat ditaksir secara berterusan untuk mengenal pasti tahap penguasaannya dalam sesuatu mata pelajaran, serta membolehkan guru membuat tindakan susulan bagi mempertingkatkan pencapaian murid.

DSKP yang dihasilkan juga telah menyepadukan enam tunjang Kerangka KSSR, mengintegrasikan pengetahuan, kemahiran

dan nilai, serta memasukkan secara eksplisit Kemahiran Abad Ke-21 dan Kemahiran Berfikir Aras Tinggi (KBAT). Penyepaduan tersebut dilakukan untuk melahirkan insan seimbang dan harmonis dari segi intelek, rohani, emosi dan jasmani sebagaimana tuntutan Falsafah Pendidikan Kebangsaan.

Bagi menjayakan pelaksanaan KSSR, pengajaran dan pembelajaran guru perlu memberi penekanan kepada KBAT dengan memberi fokus kepada pendekatan Pembelajaran Berasaskan Inkuiri dan Pembelajaran Berasaskan Projek, supaya murid dapat menguasai kemahiran yang diperlukan dalam abad ke-21.

Kementerian Pendidikan Malaysia merakamkan setinggi-tinggi penghargaan dan ucapan terima kasih kepada semua pihak yang terlibat dalam penggubalan KSSR. Semoga pelaksanaan KSSR akan mencapai hasrat dan matlamat Sistem Pendidikan Kebangsaan.

Dr. SARIAH BINTI ABD. JALIL

Pengarah

Bahagian Pembangunan Kurikulum

INTRODUCTION

Science Standard-based Curriculum for Primary School (KSSR) is designed to develop science literacy by providing a basic knowledge of science for pupils to become science literate. It comprises understanding the basic science concepts revolving around the pupils with which they will be able to pursue Science education at secondary level.

The science curriculum for primary schools aims to produce individuals who are intellectually, spiritually, emotionally and physically balanced as articulated in the National Education Philosophy. Hence, Standard Curriculum and Assessment Document (DSKP) is designed by integrating 21st Century Skills to enable pupils to compete globally.

Knowledge, skill and values are inculcated in the primary school Science curriculum to create meaningful learning to the pupils. Pupils' cognitive level and surroundings are acknowledged so that the importance to learn Science can be nurtured since the immediate stage of schooling.

Science subject at secondary level is designed to produce pupils who are science literate, innovative, and able to apply scientific

knowledge, making decisions and solving problems in real life. The subject also provides opportunities to pupils who have a distinctive interest in Science to pursue their studies in the fields of Science, Technology, Engineering and Mathematics (STEM) at tertiary level.

The benchmarking of Science Curriculum has been done in line with high performing countries in international assessments to ascertain that the Science Curriculum is relevant and equivalent with other countries in the world.

In competing to be a developed country, Malaysia needs to establish a scientific, progressive, innovative, and prudent community that do not only benefit the latest technologies but can contribute to the future establishment of scientific and technological civilisation. To achieve this aspiration, we need to foster critical, creative and competent citizens who practise the culture of science and technology.

AIMS

Science Standard-based Curriculum for Primary Schools (KSSR) is designed to instil interest and develop pupils' creativity through experiences and investigations as to acquire science knowledge, scientific skills, thinking skills, scientific attitudes and noble values.

OBJECTIVES

KSSR Science aims to enable pupils to achieve the following objectives:

1. Using the inquiry approach to fulfil their curiosity about the world around them.
2. Applying scientific skills and thinking skills critically and creatively.
3. Acquiring knowledge on science facts and concepts.
4. Applying knowledge critically, creatively and analytically in making decisions, innovating and solving problems.
5. Practising scientific attitudes and noble values.
6. Playing a role in preserving the environment.

FRAMEWORK OF THE STANDARD-BASED CURRICULUM FOR PRIMARY SCHOOL

KSSR is designed based on six strands, which are Communication; Spiritual, Attitudes and Values; Humanity; Personal Development; Physical Development and Aesthetics; and Science and Technology. The six strands are the main domain which support each other and are integrated with critical, creative and innovative thinking. This integration aims to develop the human capital who treasures noble values based on religion, knowledgeable, competent, and enable to think in a critical, creative and innovative manner as illustrated in Figure 1. Science Curriculum is designed based on six strands of KSSR Framework.

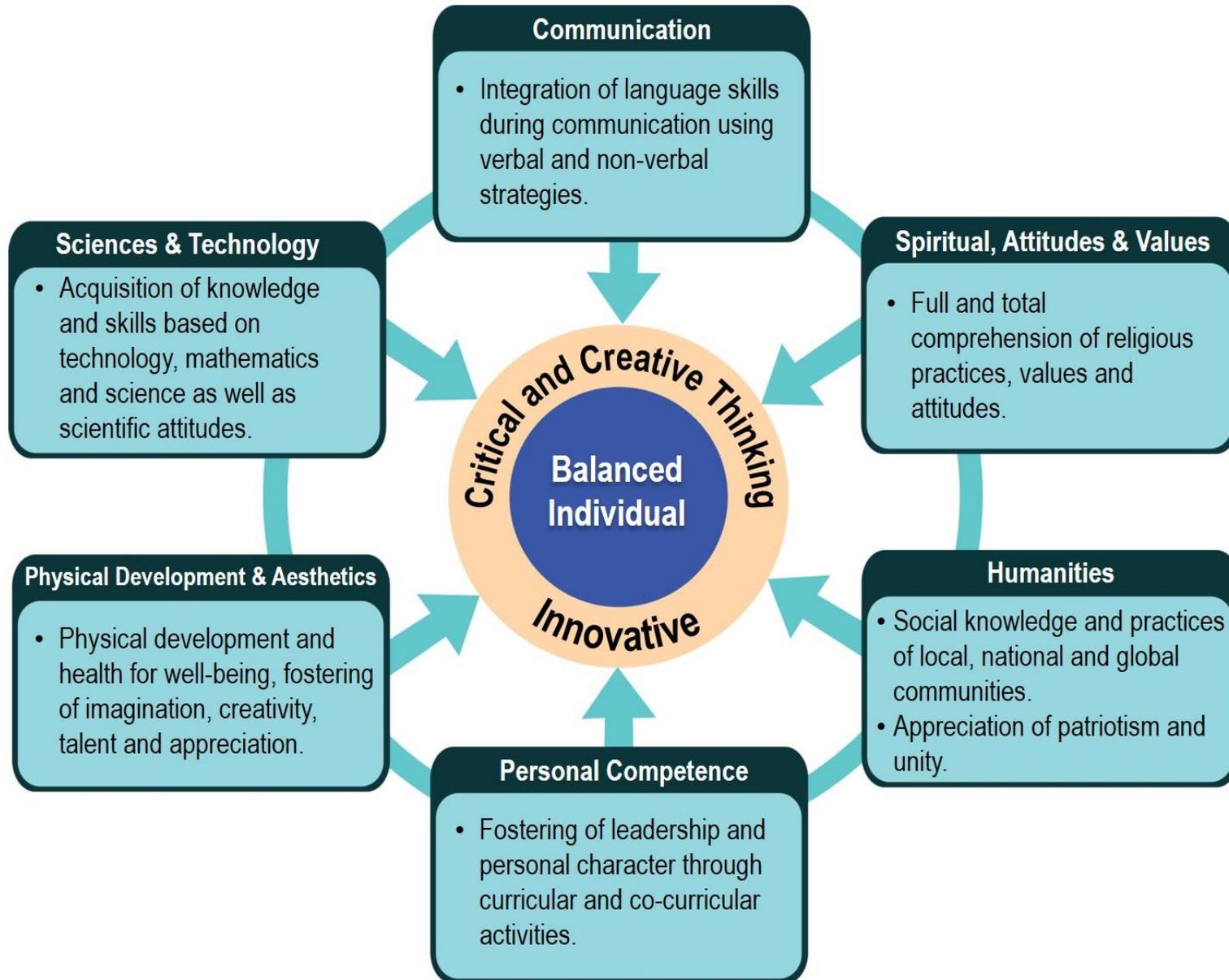


Figure 1: The Framework of Standard-based Curriculum for Primary School

FOCUS

Science subject for primary school focuses on thoughtful learning involving scientific and thinking skills for the acquisition of knowledge through inquiry as the main approach in science education. The science curriculum also aims to prepare pupils to face the rapid technological development and various challenges in the 21st century. This group of pupils that undergo this curriculum will become the human resources in the field of science and technology that will contribute towards national development.

KSSR Science is developed based on the three domains; knowledge, skills and values. These three domains are being experienced by pupils through inquiry method to produce thoughtful science individuals (Figure 2). The inquiry approach includes pupil-centred learning, constructivism, contextual learning, problem-based learning, mastery learning as well as related strategies and methods.

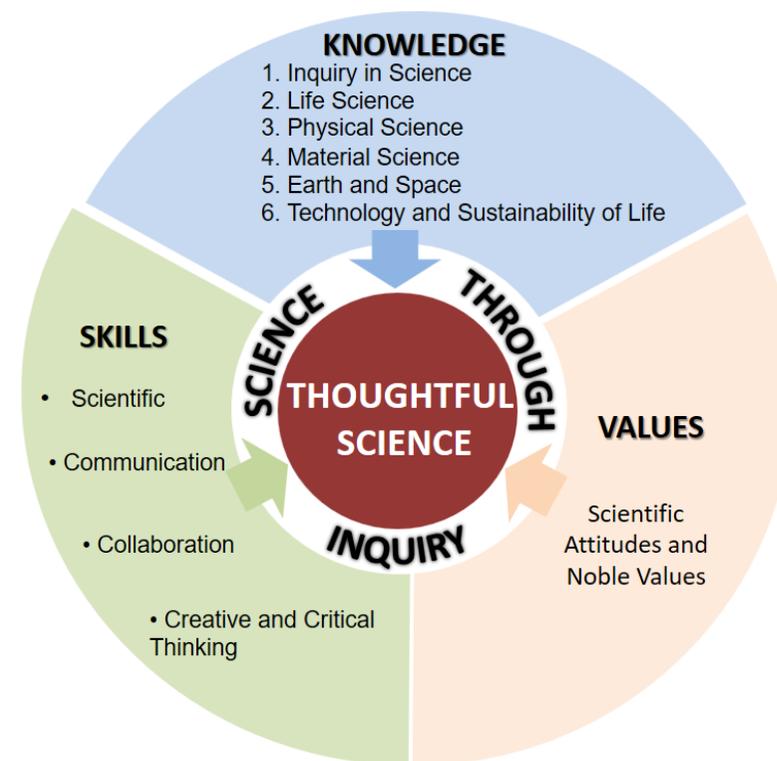


Figure 2: The Conceptual Framework for Science Curriculum

Thoughtful Science

Thoughtful science refers to the quality of pupils intended to be produced by the national science education system. Thoughtful science pupils can understand scientific ideas and are able to communicate using scientific language. Therefore, pupils will be

able to evaluate as well as to apply knowledge and scientific skills sensibly in daily life based on scientific attitudes and noble values. Thoughtful science also intends to produce creative and critical individuals to fulfil the 21st century needs, where the competency of the country is highly dependent on the ability of human capitals that can think critically and creatively, generate ideas and solve problems.

Thoughtful Learning

Thoughtful learning is achieved when pupils are actively involved in the teaching and learning process. In this process, the teaching and learning activities are planned to investigate and encourage pupils as to enable them to conceptualise, solve problems and make decisions. Thus, thinking skills are indirectly inculcated among pupils.

Thinking skills can be categorized into critical and creative thinking. A pupil who thinks critically always evaluates ideas systematically before accepting them. A pupil who thinks creatively is highly imaginative, able to generate genuine ideas, and innovate existing ideas and products.

Thinking strategy is a higher level thinking process that involves several steps and each step involves critical and creative thinking skills. Thinking strategy is the final aim of the thinking process.

Critical Thinking Skills

Critical thinking skills are the ability to evaluate an idea logically and rationally to make a fair consideration by using reasons and reliable evidences. A brief description of each critical thinking skill is shown in Table 1.

Table 1: Critical Thinking Skills

CRITICAL THINKING SKILLS	DESCRIPTION
Attributing	Identifying criterias such as characteristics, features, qualities and elements of a concept or an object.
Comparing and Contrasting	Finding similarities and differences based on criteria such as characteristics, features, qualities and elements of an object or event.

CRITICAL THINKING SKILLS	DESCRIPTION
Grouping and Classifying	Separating and grouping objects or phenomena into groups based on certain criteria such as characteristics, features. Grouping according to common characteristics or features.
Sequencing	Arranging objects and information in an orderly based on the quality or quantity of common characteristics or features such as size, time, shape or number.
Prioritising	Arranging objects or information in an orderly manner based on their importance or priority.
Analysing	Processing information in detail by breaking it down into smaller parts to understand concepts or events as well as to find the implicit meanings.
Detecting Bias	Detecting views or opinions that have the tendency to support or oppose something.

CRITICAL THINKING SKILLS	DESCRIPTION
Evaluating	Making considerations and decisions using knowledge, experiences, skills and values, and giving justifications.
Making Conclusions	Making a statement about the outcome of an investigation based on a hypothesis.

Creative Thinking Skills

Creative thinking skills are the ability to produce or create something new and valuable by using genuine imagination and unconventional thinking. A brief description of each creative thinking skill is as shown in Table 2.

Table 2: Creative Thinking Skills

CREATIVE THINKING SKILLS	DESCRIPTION
Generating Ideas	Producing ideas related to something.

CREATIVE THINKING SKILLS	DESCRIPTION
Relating	Making connections in certain situations or events to find a structure or pattern of a relationship.
Making Inferences	Using data collection and previous experience to conclude and explain events.
Predicting	Making forecast about events based on observations and previous experiences or reliable data.
Making Generalisations	Making general statement on certain matters for a group based on observations on samples or some information from the group.
Visualising	Forming perceptions or making mental images about a particular idea, concept, situation or vision.

CREATIVE THINKING SKILLS	DESCRIPTION
Synthesising	Combining separate elements to produce an overall picture in the form of writing, drawing and artefact.
Making Hypothesis	Making a general statement about the relationship between the manipulative and responding variables that is assumed to be true to explain an observation or event. The statement can be tested to determine its validity.
Making Analogies	Forming an understanding about a complex or an abstract concept by relating it to simple or concrete concepts with similar characteristics.
Inventing	Producing something new or modifying something already in existence to overcome problems in a systematic manner.

Thinking Strategies

Thinking strategies are ways of thinking that are structured and focused to solve problems. Description of each thinking strategy is as shown in Table 3.

Table 3: Thinking Strategies

THINKING STRATEGIES	DESCRIPTION
Conceptualizing	Making generalisations towards construction of meaning, concept or model based on inter-related specific common characteristics.
Making Decisions	Selecting the best solution from several alternatives based on specific criteria to achieve the intended aims.
Problem Solving	Finding the right solutions systematically for uncertain or challenging situations or unforeseen circumstances.

Besides thinking skills and thinking strategies, reasoning skill is also another priority. **Reasoning** is a skill used in making logical, rational and fair consideration. Mastery of critical and creative thinking skills and thinking strategies is easier if an individual is able to provide reasoning in inductive and deductive manners. Figure 3 gives an overall picture of the Thinking Skills and Thinking Strategies (TSTS).

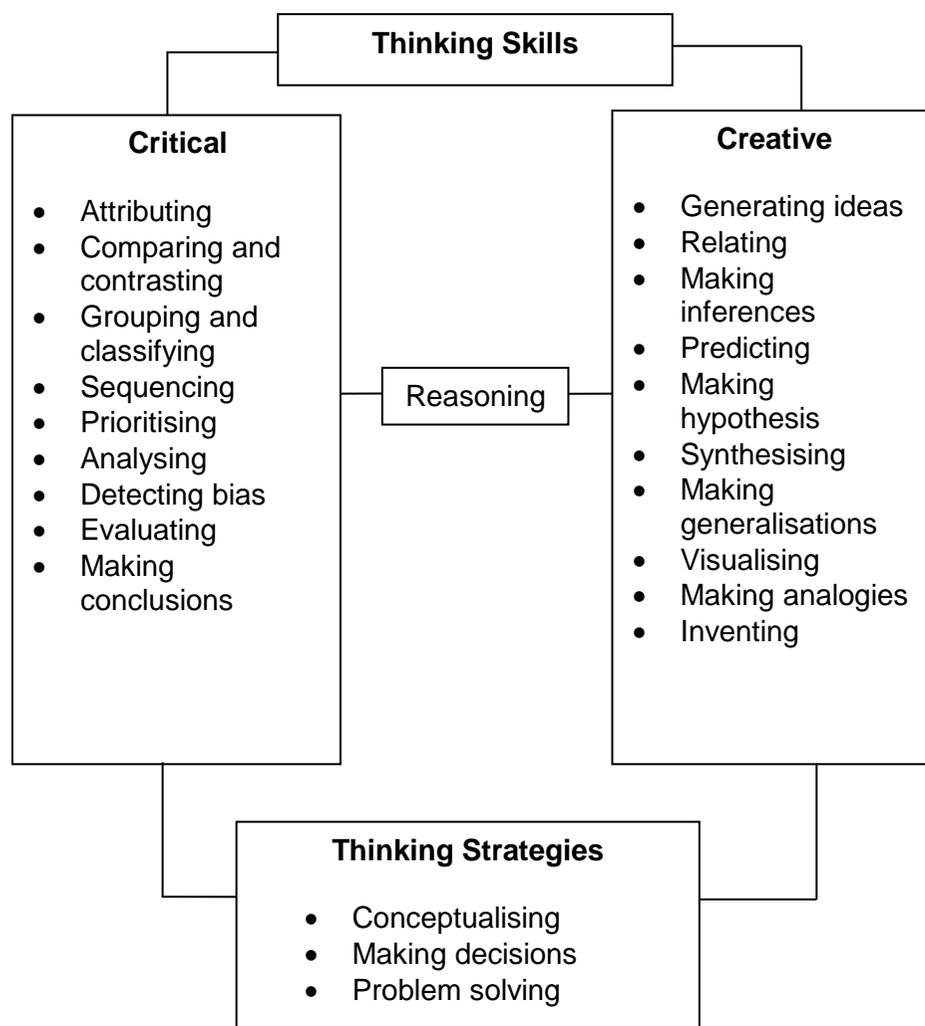


Figure 3: TSTS Model in Science

Mastery of TSTS through the teaching and learning of science can be developed through the following stages:

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

Further information about the stages of the implementation of TSTS can be referred in the guidebook "*Buku Panduan Penerapan Kemahiran Berfikir dan Strategi Berfikir dalam Pengajaran dan Pembelajaran Sains*" published by Curriculum Development Centre in 1999.

Scientific Skills

Science emphasises on inquiry method and problem solving. In the process of inquiry and solving problem, scientific skills and thinking skills are applied. Scientific skills are essential skills to carry out activities using scientific methods such as conducting experiments

and projects. Scientific skills consist of science process skills and manipulative skills.

Science Process Skills

Science Process Skills (SPS) are skills that are required to find solutions to problems or make decisions systematically. They are mental processes that enhance critical, creative, analytical and systematic thinking. Mastery of Science Process Skills together with suitable attitudes and knowledge ensure pupils to think effectively. Description of each SPS is as shown in Table 4.

Table 4: Science Process Skills

SCIENCE PROCESS SKILLS	DESCRIPTION
Observing	Using the sense of sight, hearing, touch, taste or smell to gather information about objects and phenomena.
Classifying	Using observations to group objects or phenomena according to similarities and differences.
Measuring and Using Numbers	Making quantitative observations using numbers and tools with standard units. Measurement makes observations more precise.

SCIENCE PROCESS SKILLS	DESCRIPTION
Making Inferences	Using data collection and previous experience to conclude and explain events.
Predicting	Making forecast about events based on observations and previous experiences or reliable data.
Communicating	Using word or graphic symbol such as tables, graphs, diagrams or models to describe an action, object or event.
Using Space-Time Relationship	Describing changes in parameters with time such as location, direction, shape, size, volume, weight and mass.
Interpreting Data	Giving rational explanations about an object, event or pattern from the collected data.
Defining Operationally	Defining concepts by describing what must be done and observed.

SCIENCE PROCESS SKILLS	DESCRIPTION
Controlling Variables	Identifying manipulated variables, responding variables and constant variables. In an investigation, a variable is manipulated to observe its relationship with the responding variable. At the same time, the other variables are constant.
Making Hypothesis	Making a general statement about the relationship between the manipulative and responding variables to explain an observation or event. The statement can be tested to determine its validity.
Experimenting	Planning and conducting an investigation to test a hypothesis, collecting and interpreting data until a conclusion can be obtained.

Manipulative Skills

In a scientific investigation, manipulative skills are psychomotor skills that enable pupils to:

- Use and handle science apparatus and substances correctly.
- Handle specimens correctly and carefully.
- Sketch specimens, apparatus and substances correctly.
- Clean science apparatus correctly.
- Store science apparatus and substances correctly and safely.

Relationship between Science Process Skills and Thinking Skills

The mastery of Science Process Skills requires pupils to master the relevant thinking skills. The thinking skills that are related to each science process skill is shown in Table 5.

Table 5: Relationship between Science Process Skills and Thinking Skills

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 Making Generalisations Evaluating

SCIENCE PROCESS SKILLS	THINKING SKILLS
Defining operationally	Relating Making analogies Visualising Analysing
Controlling variables	Attributing Comparing and contrasting Relating Analysing
Making hypothesis	Attributing Relating Comparing and contrasting Generating ideas Making hypothesis Predicting Synthesising
Experimenting	All thinking skills
Communication	All thinking skills

Teaching and Learning Based on Thinking Skills and Scientific Skills

This Science Curriculum emphasises on thoughtful learning based on thinking skills and scientific skills. In this curriculum, the learning standard is written by integrating acquisition of knowledge with mastery of thinking skills and scientific skills. Thus in teaching and learning, teachers need to integrate the mastery of skills together with acquisition of knowledge and the inculcation of scientific attitudes and noble values.

Implementation of SPS in science explicitly encompass intended skills in the 21st century and indirectly encourages and develops pupils' higher order thinking skills.

Science Process Skills Standards

Science process skills standards for each level of schooling are general suggestions that must be achieved by pupils. Each statement refers to the minimum standard that must be achieved according to their level of schooling and operational cognitive development. Science process skills at primary school level are stated explicitly as learning standards that should be mastered as a foundation before they further their studies at secondary level.

Performance standards for science process skills in primary schools are elaborated to ease teachers to determine the development of the mastered skills. The suggested science process standards from primary to secondary schools are as shown in Table 6.

Table 6 : Science Process Skills Standards

NO	SCIENCE PROCESS SKILLS	LEVEL 1 (YEAR 1 - 3)	LEVEL 2 (YEAR 4 - 6)	LEVEL 3 (FORM 1 - 3)	LEVEL 4 (FORM 4 - 5)
1	Observing	Use limbs and all the senses involved to make observations about the phenomena or changes that occur.	Use all the senses involved to make qualitative observations with the appropriate tools to explain phenomena or changes that occur.	<ul style="list-style-type: none"> • Make accurate and relevant qualitative and quantitative observations to identify patterns or sequences of objects or phenomena. • Use complex equipment suitable for making observations proficiently. 	<ul style="list-style-type: none"> • Make qualitative and quantitative observations to make generalisations based on a pattern or sequence of an object or phenomenon. • Present further findings based on observations of objects or phenomena analytically and specifically.
2	Classifying	Collect/ isolate evidences/ data/ objects/ phenomena based on the observed characteristics.	Compare/identify similarities and differences based on categories given on common characteristics.	Compare/ identify similarities and differences to determine the criteria of selection to categorise evidences/ data/ objects/the phenomenon being studied.	Identify characteristics used to differentiate, collect, select and explain the object or phenomenon being studied in further detail.
3	Measuring and using numbers	Measure with the correct tool and in the correct standard unit.	Measure with the correct tool and in the correct standard unit using the right technique.	<ul style="list-style-type: none"> • Measure with the correct tool and in the correct standard unit, using the right technique, and record in a complete and systematic way. • Change the basic units correctly • Use the correct derivative units. 	<ul style="list-style-type: none"> • Demonstrate how measurements are taken using the correct tool, correct standard unit, right technique and record in a table systematically and completely. • Use more complex derivative units in the right manner.

NO	SCIENCE PROCESS SKILLS	LEVEL 1 (YEAR 1 - 3)	LEVEL 2 (YEAR 4 - 6)	LEVEL 3 (FORM 1 - 3)	LEVEL 4 (FORM 4 - 5)
4	Making inferences	Give a reasonable explanation for an observation.	Conclude the initial conclusion for an observation reasonably using the information obtained.	Create more than one initial conclusion that are reasonable for an event or observation using the information obtained.	<ul style="list-style-type: none"> • Generate a variety of possibilities to explain complex situations • Explain the relationship or pattern between observed variables using measurements made for an investigation.
5	Predicting	Describe a possible outcome for an event or data.	Make a reasonable assumption of an event based on observations, previous experiences or data.	Students can analyse trends/ flows/ simple developments based on the data obtained to predict the future state of an object or phenomenon.	<ul style="list-style-type: none"> • Students can analyse trends/ flows/ simple developments based on the data obtained to predict the future state of an object or phenomenon. • Prediction can be tested.
6	Communicating	Record information or ideas in any form.	Record information or ideas in a suitable form and present the information or the ideas systematically.	Able to present the results of an experiment or data observed in various forms such as simple graphics, pictures or tables.	Able to present the results of an experiment or data observed in various forms such as graphics, pictures or tables that are more complex to show how the patterns are related.
7	Using space-time relationships		Arrange occurrences of a phenomenon or an event in chronological order.	<ul style="list-style-type: none"> • Arrange occurrences of a phenomenon or an event in chronological order. • Interpret and explain the meaning of mathematical relationships. 	Use, analyse and interpret numbers and numerical relationships efficiently during problem solving and conducting investigations.

NO	SCIENCE PROCESS SKILLS	LEVEL 1 (YEAR 1 - 3)	LEVEL 2 (YEAR 4 - 6)	LEVEL 3 (FORM 1 - 3)	LEVEL 4 (FORM 4 - 5)
8	Interpreting data		Select relevant ideas about objects, events or patterns on the data to make an explanation.	Give explanations rationally by making an intrapolation or an extrapolation of the data collected.	<ul style="list-style-type: none"> Analyse data and suggest improvements. Identify and explain the anomalies in the set of data obtained.
9	Defining operationally		Describe an interpretation of what is carried out and observed in a situation according to a particular aspect.	Describe the most appropriate interpretation of a concept by stating what is carried out and observed for a situation.	Explain the interpretation made about the selection of instruments or methods on what is observed.
10	Controlling variables		Determine the responding and constant variable after the manipulated variable is determined in an investigation.	Determine all variables i.e. responding variable, manipulated variable and constant variable.	Change the constant variable to the manipulated variable and state the new responding variable.
11	Making hypothesis		Make a general statement that can be tested, on the relationship between the variables in an investigation.	Form a relationship between the manipulated variable and responding variable, to form a hypothesis that can be tested.	Describe an expected result of the scientific investigation designed.
12	Experimenting		Conduct an experiment, collect data, interpret the data and summarise to prove the hypothesis and make a report.	Conduct an experiment, make a hypothesis, select appropriate apparatus, design the method, collect data, carry out analysis, make a conclusion and write a report.	Create new problems and design an experiment to test the new hypothesis of these problems.

Scientific Attitudes and Noble Values

Positive attitudes and values can be nurtured in pupils through the science learning experience. Positive attitudes and values are as the following:

- Having interest and curiosity towards the environment;
- Being honest and accurate in recording and validating data;
- Being diligent and persevere
- Being responsible about the safety of themselves, others and the environment;
- Having critical and analytical thinking;
- Being flexible and open-minded;
- Being kind-hearted and caring;
- Being objective;
- Being systematic and ethical;
- Being cooperative;
- Being fair;
- Dare to try;
- Thinking rationally;
- Being confident and independent;
- Good in time management;
- Appreciating the balance of nature;
- Being respectful and well-mannered;
- Appreciating the contribution of science and technology;

- Realising that science is a mean to understand nature;
- Appreciating and practising clean and healthy living; and
- Being thankful to God.

In general, scientific attitudes and noble values are inculcated through the following stages:

- Understanding and being aware of the importance and needs of scientific attitudes and noble values;
- Giving attention to attitudes and noble values; and
- Internalising and practising scientific attitudes and noble values.

Proper planning is required to optimise the inculcation of scientific attitudes and noble values during science lessons. Before starting a lesson, a teacher should go through all learning outcomes in the related content standards (CS) including the learning standards (LS) which contain the inculcation of scientific attitudes and noble values.

21st CENTURY SKILLS

The KSSR also aims to produce pupils with 21st century skills, focusing on thinking and living skills as well as able to inculcate noble values in their careers. 21st century skills aim to produce globally competitive pupils with the characteristics stated in the pupils' profile as shown in Table 7. The 21st century skills among pupils can be acquired by mastering the CS and LS.

Table 7: Pupils' Profile

PUPIL PROFILE	DESCRIPTION
Resilient	Able to face and overcome difficulties and challenges with wisdom, confidence, tolerance and empathy.
Communicator	Able to voice out and express their thoughts, ideas and information confidently and creatively in verbal and written form, using a variety of media and technology.

PUPIL PROFILE	DESCRIPTION
Thinker	Able to think critically, creatively and innovatively; solve complex problems and make ethical decisions. Think about learning and about being learners themselves. Generate questions and are receptive towards perspective, values and individual traditions and society. Confident and creative in handling new learning areas.
Teamwork	Cooperate effectively and harmoniously with others. Share collective responsibility while respecting and appreciating the contributions of each member in the team. Acquire interpersonal skills through collaborative activities, which in turn mould them into better leaders and team members.
Curious	Develop natural curiosity to explore strategies and new ideas. Learn skills that are needed to carry out inquiry and research, as well as display independent traits in learning. Enjoy continuous life-long learning experiences.

PUPIL PROFILE	DESCRIPTION
Principled	Honest and have integrity, equality, fair and respect the dignity of individuals, group and community. Responsible for their actions, consequences and decisions.
Informative	Knowledgeable and form a wide understanding which is balanced across various disciplines. Explore knowledge on local and global issues effectively and efficiently. Understand ethical issues/laws related to the information gained.
Caring/ Concern	Show empathy, compassion and respect towards needs and feelings of others. Committed to serve the society and ensure sustainability of nature.
Patriotic	Portray love, support and respect towards the country.

HIGHER ORDER THINKING SKILLS

Higher Order Thinking Skills (HOTS) are explicitly stated in the curriculum to enable teachers to incorporate in teaching and

learning. These will stimulate structured and focused thinking among pupils. Description of HOTS focuses on four levels of thinking as shown in Table 8.

Table 8: Thinking levels in HOTS

THINKING LEVEL	DESCRIPTION
Applying	Using knowledge, skills and values to take actions in different situations.
Analysing	Breaking down information into smaller parts to enhance understanding and make relationship between the parts.
Evaluating	Using knowledge, experience, skills and values to consider, make decisions and give justifications.
Creating	Producing creative and innovative ideas, products or methods.

HOTS are the abilities to apply knowledge, skills and values in reasoning and reflecting to solve problems, make decisions and innovate and the abilities to create something. HOTS include critical thinking, creative thinking, reasoning and thinking strategy.

Critical thinking skills are the abilities to evaluate an idea logically and rationally to make a fair consideration using reasons and reliable evidences.

Creative thinking skills are the abilities to produce or create something new and valuable using genuine imagination and unconventional thinking.

Reasoning skills are the abilities of an individual to make consideration and evaluation and rationally.

Thinking strategies are ways of thinking that are structured and focused to solve problems.

HOTS can be applied in the classroom through activities such as reasoning, inquiry learning, problem solving and projects. Teachers and pupils need to use thinking tools such as thinking maps and

mind maps as well as high level questioning to encourage pupils to think.

TEACHING AND LEARNING STRATEGIES

Teaching and learning (T&L) strategies in the Science curriculum emphasise on thoughtful learning. Thoughtful learning is a process of acquisition and mastery of knowledge and skills that will help pupils to optimise development of their minds.

Thoughtful learning can initiate various learning approaches such as inquiry, constructivism, contextual learning and mastery learning. Activities in thoughtful learning should be able to initiate critical and creative thinking among pupils which are not routines. Pupils should be aware of the thinking skills and thinking strategies explicitly that are being applied in their learning.

T&L should be planned holistically using various strategies to achieve several LS depending on suitability and learning needs, in accordance with pupils' abilities and learning styles. A teacher should go through all LS and performance standards in the related cluster before starting a lesson.

Teachers are encouraged to plan activities by carrying out investigations and experiments to generate ideas critically, creatively and innovatively using technologies as a medium to achieve LS effectively. Pupils-centred teaching and learning requires active involvement of pupils which integrates the acquisition of knowledge, mastery of skills, inculcation of noble values and scientific attitudes to enhance their understanding.

Pupils should be challenged with higher order questions or problems and be required to solve problems critically and creatively.

Science curriculum should be able to nurture and strengthen patriotism elements among pupils. For instance, pupils will learn the diversity and uniqueness of country's natural resources and increase their love for the country in the topic on preservation and conservation of ecosystem.

Inquiry Approach

Inquiry approach emphasises on learning through experiences. Generally, inquiry means to find information, to question and to investigate a phenomenon around them. 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.

Pupils are able to investigate a phenomenon and make conclusions by themselves through activities such as experiments. Pupils are guided to understand the science concepts through inquiry approach. Thinking and scientific skills are developed during the inquiry process. However, the inquiry-discovery approach may not be suitable for all teaching and learning situations.

Constructivism

Constructivism is an ideology that suggests pupils learn by building their own understanding that is meaningful to them. The important attributes of constructivism are:

- Teachers consider pupils' prior knowledge.
- Learning is the result of pupils' own effort.
- Learning occurs when pupils restructure their existing ideas by relating new ideas to old ones.
- Pupils have opportunities to cooperate, share ideas, experiences and reflect on their learning.

Contextual Learning

Contextual learning is an approach that associates learning with pupils' daily life. In this context, pupils do not only learn theoretically but learn to appreciate the relevance of science in their lives. This approach is used where pupils learn by investigating as in the inquiry-discovery approach.

Mastery learning

Mastery learning is an approach that ensures all pupils to master the intended learning objectives. This approach is based on the principle that pupils are able to learn if opportunities are given. Pupils should be allowed to learn at their own pace, with the incorporation of remedial and enrichment activities as part of the teaching-learning process.

STEM (Science, Technology, Engineering and Mathematics) Approach

STEM approach is the T&L method which applies integrated knowledge, skills and values of STEM through inquiry, problem solving or project in the context of daily life, environmental and local as well as global community, as shown in Figure 4.

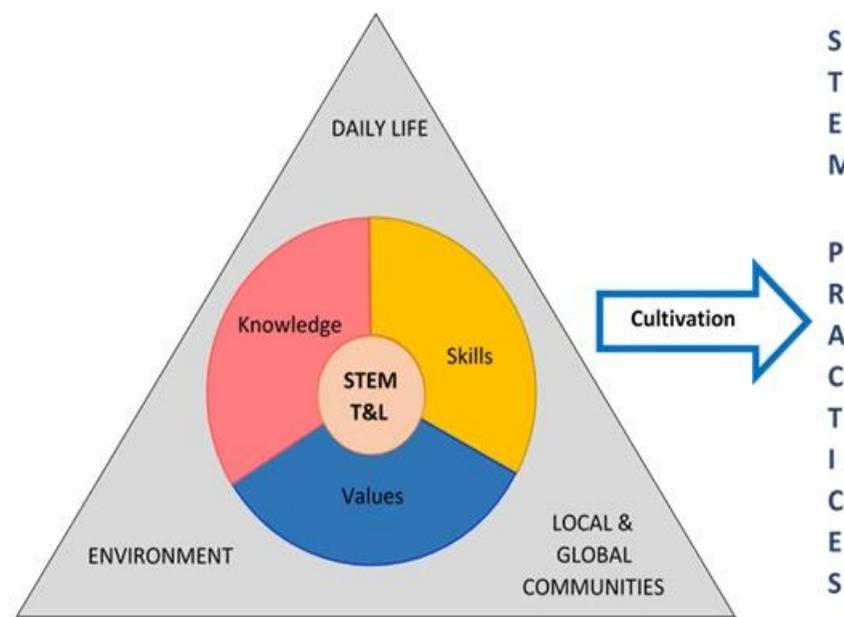


Figure 4: STEM Teaching and Learning Approach

STEM teaching and learning which is contextual and authentic is able to encourage in-depth learning among pupils. Pupils can work in groups or individually according to their ability to cultivate the STEM practices, as follows:

1. Questioning and identifying problems,
2. Developing and using models,
3. Planning and carrying out investigations,

4. Analyzing and interpreting data,
5. Using mathematical thinking and computational thinking,
6. Developing explanation and designing solutions,
7. Engaging in argument and discussions based on evidences, and
8. Acquiring information, evaluating and communicating about the information.

Various teaching and learning methods can increase pupils' interest in science. The less interesting lessons will not motivate pupils to learn, thus affecting their performance. The teaching and learning method should be based on the contents of the curriculum, pupils' abilities and multiple intelligences, availability of resources and infrastructure.

The following are brief descriptions of some T&L methods.

Scientific Investigation/Experiment

Scientific investigation/experiment is a method commonly used in science lessons. Pupils test hypothesis through investigations to discover specific science concepts and principles scientifically. They carry out scientific investigations/experiments using thinking skills, science process skills, and manipulative skills. Inquiry

approach must be used while conducting scientific investigations/experiments. Science laboratory/science room is necessary for all scientific investigation/experiment. In general, Figure 5 shows the procedure when conducting scientific investigations/experiments.

In the implementation of Science curriculum, pupils should be given the opportunities to design their own experiments besides being guided to carry them out. This involves drafting their own experimental method, identifying the data that can be measured, analysing data and presenting the results of their experiments.

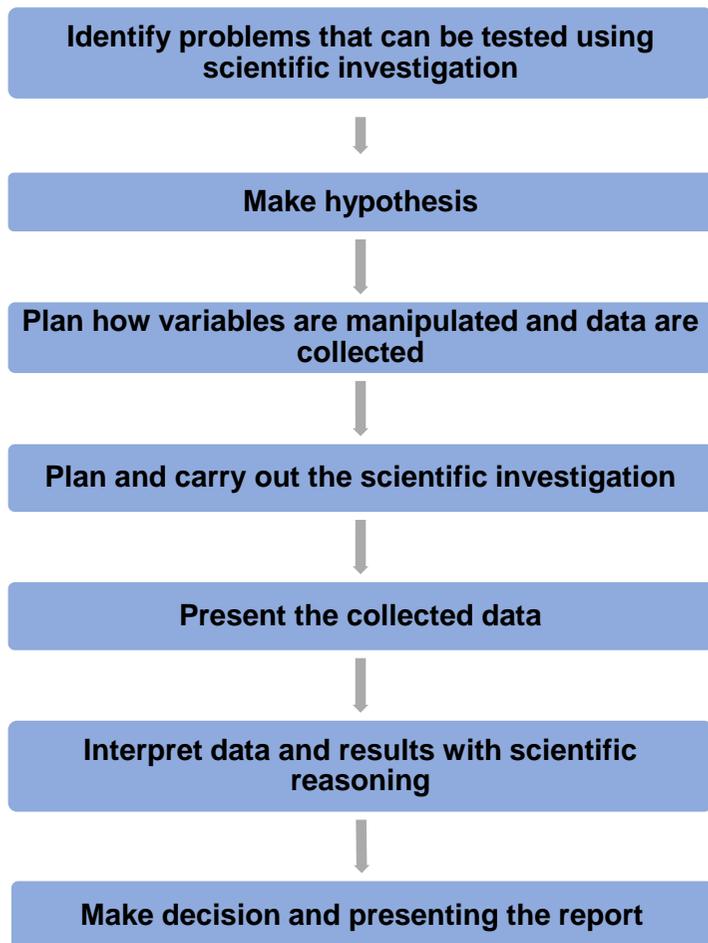


Figure 5: Steps in Carrying Out Scientific Investigations/ Experiments

Simulation

Simulation is an activity that resembles the actual situation. Simulations can be carried out through role-play, games or use of models. In role-play, pupils act out a particular role spontaneously based on a certain pre-determined conditions. When conducting games, pupils are required to follow certain procedures. Pupils play games in order to learn a particular principle or to understand the process of decision-making. Models are used to represent real objects or situations. Pupils will be able to visualise the real situation, thus understanding the concepts and principles learned.

Project-based Learning

An activity carried out by pupils to achieve a certain aim based on collaborative learning. A project takes a long time and exceeds formal teaching hours to be completed. The outcome of the project such as reports, artefacts and scrapbooks needs to be presented. Project work encourages the development of communication skills, problem solving, time management and application of knowledge.

Visits and Use of External Resources

Learning science is not only restricted in school. Visits to zoos, museums, science centres, research institutes, mangrove swamps and factories can make learning more effective, enjoyable and meaningful. A well planned visit is required to optimise learning.

Pupils have to carry out or perform tasks during the visit. Discussion after the visit should be held.

Application of Technology

Technology is a highly potential tool to enhance interest in learning science. The use of technology such as the television, radio, video, computer and internet makes the teaching and learning of science more interesting and effective. Technology eases teaching and learning of abstract or difficult science concepts. Application software such as word processors, graphic presentation software and electronic spreadsheets are valuable tools to analyse and present data. The use of other technologies such as data loggers and computerised interface in experiments and projects can assist teaching and learning science effectively.

ELEMENTS ACROSS THE CURRICULUM

Elements Across the Curriculum (EMK) is a value-added element applied in the teaching and learning process other than those specified in the content standard. These elements are applied to strengthen the skills and competency of the intended human capital, capable of dealing with the current and future challenges. The elements in the EMK are as follows:

1. Language

- The use of proper language of instruction should be emphasized in all subjects.
- During the teaching and learning of each subject, the pronunciation aspect, sentence structure, grammar and the terminology of the language need to be emphasized to assist pupils to organise ideas as well as communicate effectively.

2. Environmental Sustainability Awareness

- Awareness towards the love for the environment in the pupils' lives needs to be nurtured through the teaching and learning process in all subjects.

- Knowledge and awareness of the importance of the environment and global sustainability is important to shape pupils' ethics in appreciating nature.

3. Noble Values

- Noble values are emphasised in all subjects to ensure that pupils are aware of its importance and practise them.
- Noble values include the aspects of spirituality, humanity and national and global citizenship which will be practiced in pupils' daily life.

4. Science and Technology

- The increase of interest in science and technology will help to improve scientific and technological literacy among pupils.
- The use of technology in teaching can help and contribute to efficient and effective learning.
- The integration of science and technology in the teaching and learning process covers four areas, namely:
 - i. The knowledge of science and technology (facts, principles, concepts related to science and technology);
 - ii. Scientific skills (process of thought and specific

manipulative skills);

- iii. Scientific attitudes (such as accuracy, honesty, security); and
- iv. The use of technology in classrooms.

5. Patriotism

- Patriotism can be nurtured through all subjects, co-curricular activities and community services.
- Patriotism can produce pupils who have the spirit of patriotism and pride as Malaysians.

6. Creativity and Innovation

- Creativity is the ability to use imagination in gathering, extracting and generating ideas, or creating something new or authentic using a combination existing ideas.
- Innovation is the application of creativity through the modification, rectification and practice of ideas.
- Creativity and innovation are always inter-connected. Therefore, there is a need to ensure that human capital development is able to meet the challenges of the 21st century.
- Elements of creativity and innovation should be integrated in the teaching and learning.

7. Entrepreneurship

- The incorporation of entrepreneurship elements aims to develop attributes and entrepreneurial habits that will become a culture among the pupils.
- Entrepreneurial attributes can be ingrained in teaching and learning through activities that could foster attitudes such as diligence, honesty, trustworthiness and responsibility as well as developing creative minds and innovative ideas to spur the market.

8. Information and Communication Technology Skills (ICT)

- Information and communication technology elements are incorporated in the lessons to ensure pupils are able to apply and strengthen their basic knowledge and skills in ICT.
- The application of ICT in the lesson does not only motivate pupils to be creative but stimulates interesting and fun teaching and learning as well as improve the quality of learning.
- ICT should be integrated in the lessons based on appropriate topics to be taught to further enhance pupils' understanding of the subject content.

9. Global Sustainability

- The element Elements of Global Sustainability aims to develop pupils with sustainable thinking highly responsive attitude to the environment in their daily lives with the application of knowledge, skills, and values acquired through the elements of the Sustainable Consumption and Production, Global Citizenship and Solidarity.
- Elements of Global Sustainability is important in preparing pupils to face challenges and current issues at the local, national and global levels.
- These elements are taught directly and indirectly in related subjects.

10. Financial education

- Application of financial education elements aims at shaping the future generation that is capable of making right financial decisions, ethical practice and financial management skills to manage the financial affairs responsibly.
- The Elements of financial education can be applied in teaching and learning directly or indirectly. Direct application is done through the titles that contain explicit financial elements such as the calculation of simple interest

and compound interest. Indirect application is integrated through other titles across the curriculum. Exposure to financial management in real life is important to provide pupils with the knowledge, skills and values that can be applied effectively and meaningfully.

SCHOOL ASSESSMENT

School Assessment is a part of assessment approach which is a process that is planned, executed and reported by the teacher to gather information on pupils' development. This is an ongoing process implemented by the teacher formally and informally to determine pupils' performance level. School assessment should be executed holistically based on inclusive, authentic and localised principles. School Assessment provides valuable feedback to administrators, teachers, parents and pupils to plan further actions towards increasing the pupils' learning development.

School assessment can be executed by the teacher formatively and summatively. Formative assessment is carried out during teaching and learning process while summative assessment is carried out at the end of a lesson unit, term, semester or year. Teacher needs to plan, construct items, administer, check, record

and report pupils' performance level of the subject taught based on the Standard Curriculum and Assessment Document (DSKP).

The main purpose of formative assessment is to monitor the pupil's learning. Therefore, it is important for teachers to design a valid, reliable and authentic assessment instruments. Information gathered through formative assessment should assist teachers to determine pupil's strengths and weaknesses in achieving the content standard for a subject and not to compare the achievement of one pupil to another. It should assist teachers in adapting teaching and learning based on the needs of their pupils.

A comprehensive assessment should be well planned and carried out continuously as part of the activities in classrooms. Teachers' effort in implementing a holistic assessment assists to improve pupils' weaknesses, forming a conducive and balanced learning ecosystem.

Summative assessment is to evaluate pupils' learning based on several content standards of a subject in a period of time.

In order to ensure the assessment could assist pupils to increase their potentials and performances, teachers should use assessment strategies that have these following characteristics:

- various forms
- fair to all pupils
- consider various cognitive levels
- enable pupils to exhibit a variety of learning abilities
- consider the knowledge and skills learnt by pupils and assess the level of their understanding.

Assessment of Content Standards for each cluster is carried out using the Performance Standard as the teacher's reference to determine pupils' achievement in mastering a particular Content Standard. Performance Standards are hierarchically arranged from Level 1 to Level 6 representing the lowest to the highest standards of achievement. Pupils' achievement must be recorded in the assessment form.

Science Performance Standards for Primary School

School assessment for science is executed based on three main domains which are knowledge, skills and values. Knowledge assessment of a certain theme includes the integration of science process skills, aimed to get information on the level of pupils' understanding in a specific content standard holistically. Assessment of science process skills can be carried out throughout the year. Hence, it is important for teachers to use their professional

judgement to determine pupils' performance level. Performance level of pupils is divided into six levels as shown in Table 9.

Table 9: General Statement to Interpret the Performance Level of Knowledge and Skills for Science Subject

PERFORMANCE LEVEL	DESCRIPTOR
1	Recall the basic knowledge and skills in Science.
2	Understand the science knowledge and skills as well as explain their understanding.
3	Apply science knowledge and skills to perform simple tasks.
4	Analyse science knowledge and skills in the context of problem solving .
5	Evaluate the science knowledge and skills in the context of problem solving and making decision to perform a task.
6	Inventing using science knowledge and skills in the context of problem solving and making decision or in performing the tasks in a new situation creatively and innovatively.

Scientific attitudes and noble values are also assessed throughout the year to give opportunities for the pupils to achieve a higher performance level, thus become a practice and culture in daily life. Assessment of scientific attitudes and noble values for primary school Science are carried out by referring to Table 10.

Table 10: Interpretation of Performance Levels for Scientific Attitude and Noble Values

PERFORMANCE LEVEL	DESCRIPTOR
1	Interest
2	Interest and curiosity
3	Interest, curiosity, honesty and accuracy in recording data
4	Interest, curiosity, honesty and accuracy in recording data, willing to try and systematic
5	Interest, curiosity, honesty and accuracy in recording data, willing to try, systematic, cooperation, diligence and perseverance in completing task
6	Interest, curiosity, honesty and accuracy in recording data, willing to try, systematic, cooperation, diligence and perseverance in completing task, courtesy and responsibility for oneself, peers and environment.

Overall Performance Level

The overall performance level must be determined in order to provide a value to the pupils' performance levels at the end of the primary schooling. The overall performance level includes the content, scientific skills, scientific attitudes and noble values. Therefore, teachers should assess pupils collectively and holistically on all aspects of the pupils' learning process on an ongoing basis through various methods such as their achievement in topical tests, observations, exercises, presentations, pupils' verbal responses, group projects etc. Teachers use their professional judgement through their experience with pupils, their wisdom and discussions with colleagues in order to provide a value of their pupils' overall performance levels by referring to Table 11.

Table 11: Description of Overall Performance Level

PERFORMANCE LEVEL	DESCRIPTOR
1	Recall the basic knowledge and skills in Science, and show interest.
2	Understand the science knowledge and skills, as well as explain their understanding and show curiosity.

PERFORMANCE LEVEL	DESCRIPTOR
3	Apply science knowledge and skills to perform simple tasks honestly and record data accurately.
4	Analyse science knowledge and skills in the context of problem solving systematically and willing to try.
5	Evaluate the science knowledge and skills in the context of problem solving and making decision to perform a task cooperatively, diligently and persistently.
6	Inventing using science knowledge and skills in the context of problem solving and making decision or in performing tasks in a new situation creatively and innovatively, and be responsible to oneself, peers and environment with a high integrity.

CONTENT ORGANISATION

KSSR Science emphasises on the mastery of knowledge, skills and values that are suitable to the pupils' abilities. Implementation science curriculum is based on present effective circular (SPI) The minimum time allocated for Science Level I is 48 hours per year.

This curriculum consists of three main columns which are Content Standards (CS), Learning Standards (LS) and Performance Standards (PS). The meaning of CS, LS and PS are in Table 12.

Table 12: Organisation of the DSKP

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD
Specific statements about what pupils should know and can do during the schooling period encompassing the knowledge, skills and values.	A predetermined criteria or indicator of the quality in learning and achievement that can be measured for each content standard.	A set of general criteria which reflects the levels of pupils' achievement that they should display as a sign that certain topic has been mastered by pupils.

There is a column for notes in the DSKP. This column consists suggested localised activities and notes as guidance. Additional activities also can be carried out according to creativity and needs to achieve the Learning Standards.

KSSR Science for Year 1 to Year 6 are arranged thematically in the learning field of Inquiry in Science, Life Science, Physical Science, Material Science, Earth and Space, and Technology and Sustainability of Life.

The scope for Level I science process skills focuses on six skills i.e. observing, classifying, measuring and using numbers, making inferences, predicting and communicating. Science process skills can be inculcated using the knowledge content in the learning standards or independently. It should be repeated throughout the year to provide opportunities to pupils to improve and enhance mastery of the intended skills. The scope of knowledge for Level I is shown in Table 13.

Table 13: Content of KSSR Science Level I

THEME	SCOPE
Inquiry in Science	Science process skills, manipulative skills and rules of the science room

THEME	SCOPE
Life Science	Living and non-living things Human: basic need of living things, senses, reproduction and growth, teeth, food classes, digestion. Animals: parts of body, reproduction and growth, eating habits. Plants: parts of plants, growth and reproduction.
Physical Science	Magnets, bright and dark, electrical circuits, area and volume measurements, object or materials which are more or less dense than water.
Materials Science	Ability of materials to absorb water, mixture, acid and alkaline.
Earth and Space	Surfaces of the Earth, soils, water, air, solar system.
Technology and Sustainability of Life	Construction of basic shape block, built up set, pulley.

THEME

INQUIRY IN SCIENCE

TOPIC

1.0 SCIENTIFIC SKILLS

2.0 SCIENCE ROOM RULES

1.0 SCIENTIFIC SKILLS				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
1.1 Science Process Skills	Pupils are able to: 1.1.1 Observe	1	State all the senses involved to make observations of phenomenon or changes that occur.	Suggested activities: Carry out activities that can lead to acquiring skills such as: (i) Observe video about food digestion. (ii) Observe objects that float or objects that sink.
		2	Describe the use of all the senses involved to make observations of phenomenon or changes that occur.	
		3	Use all the senses involved to make observations of phenomenon or changes that occur.	
		4	Use all the senses involved and tools if necessary to make qualitative observations to explain phenomenon or changes that occur.	

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
		5	Use all the senses involved and tools if necessary to make qualitative and quantitative observations to explain phenomenon or changes that occur.	
		6	Use all the senses involved and tools if necessary to make qualitative and quantitative observations systematically to explain phenomenon or changes that occur.	

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
	Pupils are able to: 1.1.2 Classify	1	State the characteristics of objects or phenomenon.	Suggested activities: Carry out activities that can lead to acquiring skills such as: (i) Classify animals based on eating habits. (ii) Classify plants based on the ways plants reproduce.
		2	Describe the characteristics of objects or phenomenon by stating the similarities and differences.	
		3	Separate and group objects or phenomenon based on common and different characteristics.	
		4	Separate and group objects or phenomenon based on common and different characteristics as well as state the common characteristics used.	
		5	Separate and group objects or phenomenon based on common and different characteristics as well as state the common characteristics used; and use other characteristics to separate and group.	
		6	Separate and group objects or phenomenon based on common and different characteristics until the final stage by stating the characteristics used.	

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
	Pupils are able to: 1.1.3 Measure and use numbers	1	Choose appropriate tools to measure a quantity.	Suggested activities: Carry out activities that can lead to acquiring skills such as: (i) Measure time for an activity. (ii) Measure length of a book, pencil and other objects.
2		Describe the use of tools and appropriate ways to measure a quantity.		
3		Measure by using appropriate tools and standard unit with correct techniques.		
4		Measure by using appropriate tools and standard unit with correct technique as well as record it in a table.		
5		Make justification on appropriate tools and standard units used in the activity.		
6		Demonstrate the way to measure by using tools and standard units with correct techniques, as well as record it systematically, creatively and innovatively in a table.		

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
	Pupils are able to: 1.1.4 Make inference	1	State the observation for a given situation.	Suggested activities: Carry out activities that can lead to acquiring skills such as: (i) Making inference about objects that float and objects that sink. (ii) Making inference about animal groupings based on eating habits.
2		State an explanation for observation.		
3		State more than one explanation for the same observation.		
4		Select the most reasonable explanation for an observation using the information obtained.		
5		Make an initial conclusion which is reasonable based on selected explanation using the information obtained.		
6		Support initial conclusion made using other information or other observation.		

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
	Pupils are able to: 1.1.5 Predict	1	State one expectation for observation of an event or phenomenon.	Suggested activities: Carry out activities that can lead to acquiring skills such as: (i) Predict the change in water temperature when heated. (ii) Predict the condition of the planet based on its sequence in the Solar System.
2		Make one expectation of an event or phenomenon based on observation, previous experiences, data or pattern.		
3		Make more than one expectation of an event or phenomenon based on observation, previous experiences, data or pattern.		
4		Describe the expectation of an event or phenomenon based on observation, previous experiences, data or pattern.		
5		Support the expectation made using additional information.		
6		Make expectation through intrapolation or extrapolation based on observation, previous experiences, data or pattern.		

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
	Pupils are able to: 1.1.6 Communicate	1	State the information obtained.	Suggested activities: Carry out activities that can lead to acquiring skills such as: (i) Draw and label the structure of the tooth. (ii) Make poster of a serving of a balanced meal.
2		Record information or ideas in any form.		
3		Record information or ideas in suitable form.		
4		Record information or ideas in suitable form and present it systematically.		

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
		5	Record information or ideas in more than one suitable form and present it systematically.	
		6	Produce a creative and innovative presentation based on the information or ideas recorded systematically as well as able to give feedback.	

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
1.2 Manipulative Skills	Pupils are able to:	1	Identify apparatus, science substances and specimens required for an activity.	Suggested activities: Assessment is carried out during teaching and learning activities such as: (i) Measure time for an activity. (ii) Carry out plant reproduction project for plants that reproduce through more than one way.
	1.2.1 Use and handle apparatus and science substances correctly.			
	1.2.2 Handle specimens correctly and carefully.	2	Describe the use of science apparatus, substances and specimens required for an activity.	
	1.2.3 Sketch specimens, apparatus and science substances correctly.	3	Use and handle science apparatus, substances and specimens required for an activity with the correct method.	
	1.2.4 Clean science apparatus correctly.			
1.2.5 Store science apparatus and substances correctly and safely.	4	Use, handle, sketch, clean and store science apparatus, substances and specimens used in an activity with the correct method and carefully.		

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
		5	Use, handle, sketch, clean and store science apparatus, substances and specimens used in an activity with the correct method, systematically and courteously.	
		6	Use, handle, sketch, clean and store science apparatus, substances and specimens used in an activity with the correct method, systematically, wisely. and be an example for others.	

2.0 SCIENCE ROOM RULES				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
2.1 Science room rules	Pupils are able to: 2.1.1 Adhere to science room rules	1	State science room rules.	Suggested activities: Assessment is carried out through observations before, during and after using the science room.
		2	Explain science room rules.	
		3	Adhere to science room rules.	
		4	Provide reasoning on the importance of adhering to science room rules.	
		5	Generate ideas of action that need to be taken if there is any situation violating the science room rules.	
		6	Practise the concept of compliance to science room rules as a culture in daily life.	

THEME

LIFE SCIENCE

TOPIC

3.0 HUMAN

4.0 ANIMALS

5.0 PLANTS

3.0 HUMAN				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
3.1 Teeth	Pupils are able to:			Suggested activities: Video or pictures to show the number and types of milk teeth and permanent teeth sets and their replacements. Notes: (i) Tooth structure that is enamel, dentine, nerve, blood vessel and gum. (ii) Consumption of certain food such as sweet food may damage the enamel and cause toothache. (iii) Examples of dental treatment are dental filling, braces, dentures and root canal treatment.
	3.1.1 Describe the types of teeth and their functions.	1	State the types of teeth.	
	3.1.2 Label the structure of the tooth.	2	Describe the function of each type of teeth.	
	3.1.3 Compare and contrast sets of milk teeth and permanent teeth.	3	Label the cross section of a tooth.	
	3.1.4 Relate dental care with the structure of the tooth.	4	Compare and contrast sets of milk teeth and permanent teeth.	
	3.1.5 Explain the result of observations about teeth through written or verbal forms, sketches or ICT in a creative way.	5	Give reasons on the importance of the practice of daily dental care.	
		6	Communicate about the use of technology in dental treatment creatively and innovatively.	

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
3.2 Classes of food	Pupils are able to: 3.2.1 Give examples of food for each class of food. 3.2.2 Make generalisation about the importance of food according to its class for the human body. 3.2.3 Explain with examples of a balanced diet based on the food pyramid. 3.2.4 Give reasons on the effects of imbalanced food intake. 3.2.5 Explain the result of observations about classes of food through written or verbal forms, sketches or ICT in a creative way.	1	State examples of food.	Suggested activities: Plan a diet using pictures, model or real food. Notes: Classes of food are carbohydrate, protein, fats, vitamins, minerals, fibre and water. Examples of the importance of classes of food: (i) Carbohydrate provides energy. (ii) Protein is essential for growth (iii) Fats warmth the body. (iv) Vitamins and minerals are essential for health. (v) Fibre prevents constipation. (vi) Water to regulate body temperature. Food pyramid must refer to the Malaysian food pyramid.
		2	List examples for each class of food.	
		3	Explain with examples the importance of each class of food.	
		4	Give reasons on the effects of food intake which does not follow the food pyramid.	
		5	Suggest a meal based on the food pyramid and give reasons.	
		6	Communicate about types of food that need to be avoided for someone with health problems and present it creatively and innovatively.	

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
3.3 Digestion	Pupils are able to: 3.3.1 Describe the digestion process. 3.3.2 Arrange in sequence the flow of food during digestion. 3.3.3 Conclude the digested food that is not required by the body. 3.3.4 Explain the result of observations about digestion through written or verbal forms, sketches or ICT in a creative way.	1	State that food is broken into pieces by teeth, tongue and saliva.	Suggested activities: Video/computer simulation/chart to observe the food digestion process. Explanation about food flow during digestion using various media. Notes: Digestion is the process of breaking down food into smaller pieces so that nutrients from food can be absorbed by the body starting from the mouth (teeth, tongue and saliva), oesophagus, stomach, intestines and anus.
		2	Label parts that involved in digestion.	
		3	Arrange in sequence the flow of food during digestion.	
		4	Make generalisation about digested food.	
		5	Conclude about digestion based on the sequence of the food flow.	

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
		6	Communicate about the actions that can disrupt food digestion and its effects in a creative and innovative way.	<p>Notes: Actions that disrupt digestion are: (i) Talk, run and jump while eating. (ii) Eating too fast.</p> <p>The actions that disrupt digestion cause effects such as hiccups, vomiting, choking and stomach ache.</p>

4.0 ANIMALS						
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES		
		PERFORMANCE LEVEL	DESCRIPTOR			
4.1 Eating Habits	Pupils are able to:			Suggested activities: Video / chart to observe animals' eating habits. Notes: Animals' natural eating habits are eating plants only, eating animals only or eating animals and plants.		
	4.1.1 Classify animals according to their eating habits.				1	State animals' eating habits.
	4.1.2 Explain with examples the eating habits of herbivore, carnivore and omnivore.				2	Classify animals based on their eating habits.
	4.1.3 Make inference about the animal groupings based on their eating habits.				3	Make generalisation about the eating habits of herbivore, carnivore and omnivore.
	4.1.4 Compare and contrast the dentition of herbivore, carnivore and omnivore.				4	Give reasons on the dentition of herbivore, carnivore and omnivore based on their eating habits.
4.1.5 Explain the result of observations about animals' eating habits through written or verbal forms, sketches or ICT in a creative way.	5	Explain the change of animals natural eating habits through examples.				

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
		6	Communicate and justify the change of animals' natural habits.	

5.0 PLANTS				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
5.1 Plant Reproduction	Pupils are able to:	1	State the ways plants reproduce.	Suggested activities: Plant reproduction projects such as: (i) Planting sweet potatoes through stem cutting and underground stem. (ii) Planting water spinach through stem cutting and seeds. Notes: Ways of plant reproduction are spores, seeds, stem cutting, leaves, suckers and underground stems. The use of technology in plant reproduction such as: (i) Tissue cultures (ii) Marcottage
	5.1.1 Give examples of plants for each way of reproduction.	2	Give examples of plants and their ways of reproduction.	
	5.1.2 Give reasons on the importance of plant reproduction to living things.	3	Generate ideas about the importance of plant reproduction to living things.	
	5.1.3 Make generalisation that a plant can reproduce through various ways by carrying out projects.	4	Make generalisation that certain plants are able to reproduce in more than one way.	
	5.1.4 Explain the result of observations about plant reproduction through written or verbal forms, sketches or ICT in a creative way.	5	Communicate creatively and innovatively about plant reproduction projects that have been carried out.	
		6	Explain through examples the use of technology in plant reproduction.	

THEME

PHYSICAL SCIENCE

TOPIC

6.0 MEASUREMENT

7.0 DENSITY

6.0 MEASUREMENT				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
6.1 Measurement of area and volume.	Pupils are able to:			<p>Suggested activities: Carry out activity such as measuring the area of surface using graph paper.</p> <p>Notes: Units used: (i) Area: square centimetre (cm^2), square metre (m^2), square kilometre (km^2). (ii) Volume: millilitre (m l), litre (ℓ), cubic centimetre (cm^3), cubic metre (m^3).</p> <p>The volume of liquids can be measured using graduated tools such as measuring cylinder by emphasizing on the correct meniscus reading.</p>
	6.1.1 State the units that are used to measure area and volume.	1	State the units that are used to measure area and volume.	
	6.1.2 Measure the area of regular surfaces using 1cm x 1cm square.	2	Describe the methods of measuring area and volume.	
	6.1.3 Solve problems to estimate the area of irregular surfaces.	3	Measure area and volume.	
	6.1.4 Measure the volume of hollow boxes using 1cm x 1cm x 1cm cubes.	4	Solve problems to estimate the area of irregular surfaces.	
	6.1.5 Measure the volume of liquid using correct tools and techniques.	5	Solve problems to determine the volume of irregular shaped solids.	
6.1.6 Solve problems to determine the volume of irregular shaped solids using water displacement method.				

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
	6.1.7 Explain the result of observations about the measurement of area and volume through written or verbal forms, sketches or ICT in a creative way.	6	Give reasons on the importance of measurement in daily life.	Solving problems in daily life to determine area and volume of irregular shaped solids.

7.0 DENSITY				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
7.1 Objects or materials which are more or less dense than water.	Pupils are able to: 7.1.1 Make inferences about objects or materials that float or sink by carrying out activities. 7.1.2 Relate objects or materials that float and objects or materials that sink with density. 7.1.3 Solve problems to identify methods to make water more dense. 7.1.4 Explain the result of observations about object or materials which are more or less dense through written or verbal forms, sketches or ICT in a creative way.	1	State the objects or materials that float and the objects or materials that sink.	Suggested activities: Carrying out activities such as: (i) Ice cubes are put into the water. (ii) Oil is poured into the water. (iii) Condensed milk is poured into the water. (iv) Dissolve sugar or salt to increase the density of water so that objects or materials that initially sink can float. Note: Objects or materials which are more dense than water will sink and objects or materials which are less dense than water will float. Suggested projects: (i) Produce layers of coloured liquid with different density. (ii) Observe the difference in density of oranges with peel and without peel in water.
		2	Make inferences about objects or materials that float and objects or materials that sink.	
		3	Make generalisation on objects or materials that are more or less dense than water	
		4	Conclude the ways to make water more dense.	
		5	Apply the knowledge on density by carrying out projects or activities.	
		6	Communicate about the applications of density in life in a creative and innovative way.	

THEME

MATERIAL SCIENCE

TOPIC

8.0 ACID AND ALKALI

8.0 ACID AND ALKALI				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
8.1 Acid and alkali	Pupils are able to: 8.1.1 Test acidic, alkaline and neutral substances through changes in colour of litmus paper by carrying out investigation. 8.1.2 Make generalisation on acidic, alkaline and neutral substances through taste and touch by testing a few substances. 8.1.3 Explore other materials to test acidic, alkaline and neutral substances. 8.1.4 Explain the result of observations about acid and alkali through written or verbal forms, sketches or ICT in a creative way.	1	State that litmus paper is used to test acidic, alkaline or neutral substances.	Notes: Acidic, alkaline and neutral substances are used in fields such as agriculture, medical, the manufacturing of household products, health and industry. Example of other materials such as purple cabbage juice and turmeric can be used to test acidic, alkaline and neutral substances.
		2	Give examples of acidic, alkaline and neutral substances based on the change in the colour of litmus paper.	
		3	Explain the properties of acidic, alkaline and neutral substances through the change in the colour of litmus paper, taste and touch.	
		4	Make generalisation that taste and touch are not scientific indicators of the properties of acidic, alkaline and neutral substances.	
		5	Explain through examples the use of acidic, alkaline and neutral substances in life.	
		6	Communicate about other methods to identify acidic, alkaline and neutral substances in a creative and innovative way.	

THEME

EARTH AND SPACE

TOPIC

9.0 SOLAR SYSTEM

9.0 SOLAR SYSTEM				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
9.1 Solar System	Pupils are able to:	1	State the center of the Solar System.	<p>Suggested activities: Carry out simulation to describe the revolution of the planets.</p> <p>Notes: The member of the Solar System are the Sun, planets, natural satellites, asteroids, meteoroids and comets.</p> <p>The position of planets refers to the sequence of the planets from the Sun. The further the distance of the planets from the Sun, the longer the time taken to make a complete revolution around the Sun.</p>
	9.1.1 List member of the Solar System using various media.	2	Name the member of the Solar System.	
	9.1.2 Make generalisation of the planets' temperature based on their sequence in the Solar System.	3	Arrange in sequence the planets in the Solar System.	
	9.1.3 Describe the planets that revolve around the Sun on their orbits.	4	Make generalisation that planets revolve around the Sun on their orbits.	
	9.1.4 Relate the positions of the planets from the Sun with the time taken for the planets to revolve around the Sun.	5	Summarize the relationship between the positions of the planets from the Sun with the time taken for the planets to revolve around the Sun.	
	9.1.5 Explain the result of observations about Solar System through written or verbal forms, sketches or ICT in a creative way.	6	Build and present a model of the Solar System creatively and innovatively.	

THEME

TECHNOLOGY AND SUSTAINABILITY OF LIFE

TOPIC

10.0 MACHINE

10.0 MACHINE				
CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD		NOTES
		PERFORMANCE LEVEL	DESCRIPTOR	
10.1 Pulley	Pupils are able to:			<p>Suggested activities: Problem solving in daily life by creating a model of a functional pulley.</p> <p>Notes: Pulley is an example of a simple machine which enables load to be lifted easily by using less force.</p> <p>A fixed pulley consists of a grooved wheel where a rope passes around it. Pulley is used in activities such as :</p> <ul style="list-style-type: none"> (i) Lifting construction materials using crane. (ii) Raising flags. (iii) Drawing water from wells. (iv) Lifting objects from a lower to an upper floor.
	10.1.1 State the meaning and the uses of pulleys.	1	State that pulley is an example of a machine.	
	10.1.2 Describe how a fixed pulley works using a model.	2	Give examples of the uses of pulleys in life.	
	10.1.3 Give examples of the application of pulleys in life.	3	Describe how a fixed pulley works.	
	10.1.4 Create a functional model of a pulley.	4	Build a model of a pulley and explain how it works.	
	10.1.5 Explain the result of observations about pulley through written or verbal forms, sketches or ICT in a creative way.	5	Give reasons on the importance of pulleys in daily life.	
		6	Communicate and present the type of pulley creatively and innovatively.	

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