KEMENTERIAN
PENDIDIKAN
MALAYSIA

KURIKULUM STANDARD SEKOLAH RENDAH

Matematik

Dokumen Standard Kurikulum dan Pentaksiran

Tahun 5

(EDISI BAHASA INGGERIS)

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Bahagian Pembangunan Kurikulum
APRIL 2019

Terbitan 2019

CONTENT

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 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 kokurikulum 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.]

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 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. MOHAMED BIN ABU BAKAR
Pengarah
Bahagian Pembangunan Kurikulum
Kementerian Pendidikan Malaysia

INTRODUCTION

Mathematics is a core subject in the Standard-Based Curriculum for Primary School that must be learnt by all pupils who are following the National Education System. Every pupil in Malaysia has the opportunity to pursue at least six years of basic education in primary school.

Mathematics at primary schools provides opportunities for pupils to carry out fun, meaningful, useful and challenging tasks as well as to increase their inquisitiveness in learning mathematics. Such experiences increase interest and motivate pupils to learn mathematics and apply the knowledge in their daily life.

Mathematics Standard-Based Curriculum for Primary School has been revised and reorganised taking into consideration the continuity to the next level. The steps taken are in line with the need to provide mathematical knowledge, skills and values for pupils from various backgrounds and abilities. Benchmarking of the mathematics curriculum was conducted with high achieving countries at the international assessment level to ensure that the Mathematics curriculum in Malaysia is relevant to and on par with other countries in the world.

Due to its natural properties that encourage logical and systematic thinking, Mathematics is the best medium to develop the potential and intellectual proficiency of individual and human development. Thus, other than the needs of developing our country, the development of the Mathematics Standard-Based Curriculum for primary school also takes into account the factors which enhance the development of individuals who are logical, critical, analytical, creative and innovative thinkers. This step is consistent with the need to provide adequate knowledge and mathematical skills to ensure the country is able to compete globally and meet the challenges of the 21st century. The various background and abilities of pupils are given specific attention in order to ensure the knowledge and skills learnt in this subject.

AIMS

The aim of the Mathematics Standard-Based Curriculum for Primary School is to develop pupils who are mathematically inclined with the understanding of the concept of numbers, basic calculation skills, simple mathematical ideas and competency in applying mathematical knowledge and skills effectively and responsibly, to solve problems and make decisions in compliance with attitudes and values to overcome challenges faced in daily life, conforming with development in science and technology and the 21st century challenges.

OBJECTIVES

The Mathematics Standard-Based Curriculum for Primary School aims to enable pupils to achieve the following objectives:

1. Develop mathematical thoughtful learning.
2. Develop understanding and apply the concepts and mathematical skills in various contexts.
3. Expand the use of basic operation skills; addition, subtraction, multiplication and division related to Numbers and Operations, Measurement and Geometry, Relationship and Algebra, and Statistics and Probability.
4. Identify and use relationships in mathematical ideas, between the field of mathematics and other fields and with daily life.
5. Communicate clearly using mathematical ideas and use symbols and terms correctly;
6. Use mathematical knowledge and skills in problem solving and make adjustments to various strategies in solving problems;
7. Develop higher order thinking, critical thinking, creative thinking, innovative thinking, reasoning and explore daily life mathematically.
8. Use various representations to present mathematical ideas and relationships.
9. Appreciate and value the beauty of mathematics.
10. Use various mathematical tools effectively including ICT to build conceptual understanding and apply mathematical knowledge.

THE FRAMEWORK OF STANDARD-BASED CURRICULUM FOR PRIMARY SCHOOL

KSSR Framework is built on the basis of six fundamental strands: Communication, Spirituality, Attitudes and Values, Humanities, Personal Competence, Physical Development and Aesthetics and Science and Technology. These six strands are the main domain that support one another and are integrated with critical, creative and innovative thinking.

The integration aims to produce human capital who appreciate values based on spirituality, knowledge, personal competence, critical and creative thinking as well as innovative thinking as shown in Figure 1. The Mathematics curriculum is developed based on the six strands of the KSSR Framework.

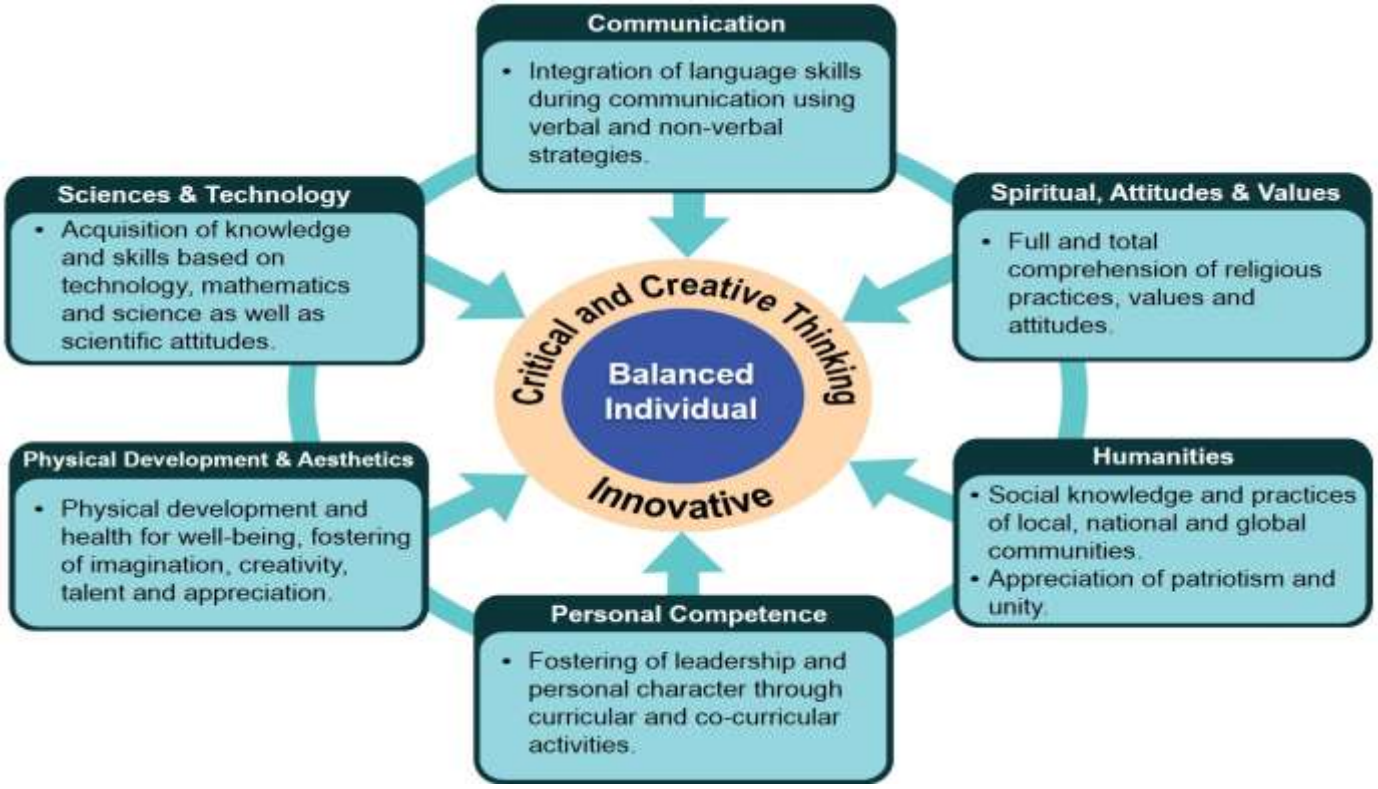

Figure 1: The Framework for Primary School Standard-Based Curriculum

FOCUS

The Mathematics Standard-Based Curriculum for Primary School focuses on the mastery of knowledge and understanding to enable pupils to apply concepts, principles and the mathematical processes learnt.

Emphasis on the development of pupils' mathematical thinking is constructed and developed through the teaching and learning in the classroom which is based on the principles of problem solving, communication, reasoning, relationship, making representations and using of technology in mathematics.

The Mathematics curriculum framework in Figure 2, is an important fundamental aspect in designing the Mathematics curriculum in the classroom. The four important elements that contribute to the mathematical thoughtful learning in human development are:

1. Learning Area;
2. Attitude and Value;
3. Mathematical Skills; and
4. Mathematical Process.

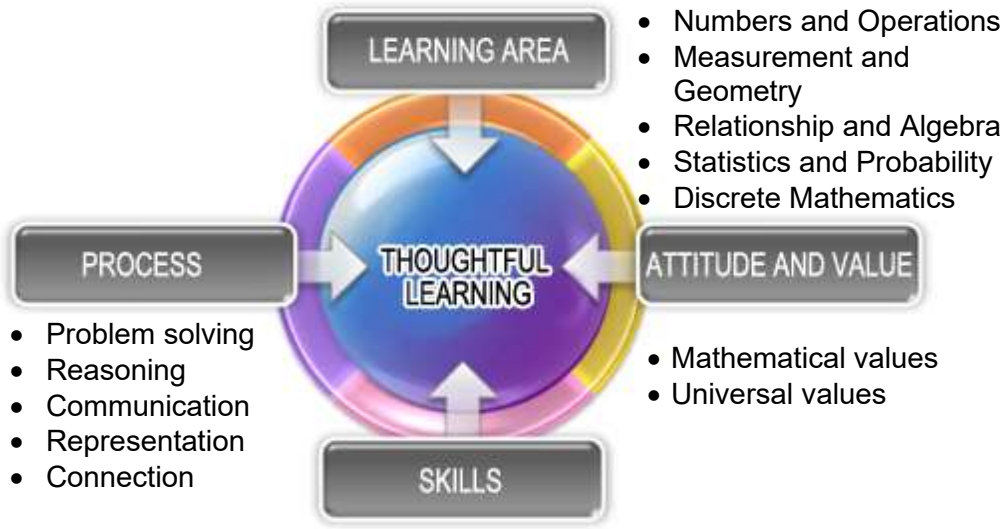

Figure 2 : The Mathematics Curriculum Framework for Primary School

Mathematical Thoughtful Learning

Thoughtful learning has the same meaning as the ability to think and create thoughts. In the context of mathematics education, thoughtful learning refers to the desired quality of pupils to be produced through the national mathematics education system. Pupils who are mathematically inclined are those who are capable of doing mathematics and understanding the mathematical ideas and responsibly applying the mathematical knowledge and skills in daily life based on attitudes and values of mathematics.

Mathematics thoughtful learning aims to produce creative and innovative individuals as well as fulfil the requirements of the 21st century as the nation's capability depends on human capital that is able to think and generate ideas.

Learning Area

The Mathematics Curriculum encompasses five learning areas:

- Numbers and Operations;
- Measurement and Geometry;
- Relationship and Algebra;
- Statistics and Probability; and
- Discrete Mathematics (Will be learnt in Secondary School)

Mathematical Process

Mathematical processes that support the effective and thoughtful learning of mathematics are:

- Problem Solving;
- Reasoning;
- Communication in mathematics;
- Connection; and
- Representation

These five mathematical processes are interrelated and need to be integratedly implemented across the curriculum.

Problem solving is the main focus in the teaching and learning of mathematics. Thus, teaching and learning need to involve problem solving skills comprehensively and across the whole curriculum. The development of problem solving skills needs to be given proper emphasis so that pupils are able to solve various problems effectively. These skills involve the following steps:

(i) Understand and interpret problems;

(ii) Plan solution strategies

(iii) Implement strategies; and

(iv) Review answers.

The various uses of general strategies in problem solving, including the steps in solving problems, need to be expanded. Some of the common strategies are drawing diagrams, identifying patterns, constructing charts and tables or listing systematically; using algebra, trying simpler cases, logical reasoning, trial and error, working backwards and using analogy.

Reviewing answers is an important step in problem solving. Pupils should be trained to review answers. By reviewing the answers, pupils see, understand and appreciate the perspective of mathematics from different angles as well as consolidate their understanding of a concept learnt.

Reasoning is fundamental to comprehending mathematics effectively and having meaningful understanding of mathematics. The development of mathematical reasoning is closely related to the intellectual development and communication of pupils. Reasoning is able to expand not only the capacity of logical thinking but also increase the capacity of critical thinking, which is the basis of understanding mathematics in depth and meaningfully. To achieve this objective, pupils should be trained and guided to make a conjecture, prove the conjecture, provide logical explanation, analyse, consider, evaluate, and justify all mathematics activities. In addition, teachers need to provide space and opportunities for discussion of mathematics which is not only engaging but also allow each pupil to involve actively.

Reasoning can be done inductively through mathematical activities that involve the identification of patterns and make conclusions based on the patterns.

The element of reasoning in teaching and learning prevents pupils from assuming mathematics as only a set of procedures or algorithms that need to be followed to get a solution, without actually understanding the true concepts of mathematics. Reasoning does not only change the pupils' paradigm from just learning to thinking, but also gives intellectual empowerment when pupils are trained and guided to make a conjecture, prove the conjecture, provide logical explanation, analyse, evaluate and give justification to all mathematics activities. This training will produce pupils who are self-confident and resilient in line with the aspiration to mould mathematical thinkers with high capabilities.

Mathematical Communication helps pupils to clarify and strengthen their mathematical understanding. By sharing understanding in written and oral mathematics with classmates, teachers and parents, pupils will be able to increase their self-confidence and simplify the teachers' work in monitoring their progress in mathematical skills.

Communication plays a vital role in ensuring meaningful learning of mathematics. Through communication, mathematical ideas can be expressed and understood better. Mathematical communication, whether oral, written, or with the use of symbols and visual representations (using charts, graphs, diagrams etc), enable pupils to understand and apply mathematics effectively.

Communicating among themselves or with peers, parents, adults and teachers can help pupils to visualize, clarify and strengthen their ideas and understanding of mathematics. To ensure that the process of generating, sharing and enhancement in understanding, pupils should be given the opportunity to debate their mathematical ideas analytically and systematically. Communication that involves various perspectives and opinions, could help pupils to improve their understanding of mathematics.

An important aspect of effective communication in mathematics is the ability to provide explanation effectively, understand and apply the correct mathematical notation. Pupils need to use mathematical language and symbols correctly to ensure that mathematical ideas can be explained accurately. Mathematical communication also involves the use of various aids such as charts, graphs, manipulatives, calculators, computers and others. Pupils should be able to use these aids to explain mathematical ideas and solve mathematical problems.

Effective communication requires an environment that enable the pupils to feel comfortable when talking, asking and answering questions and giving explanations to classmates and teachers. Pupils should be given opportunities to communicate actively in various situations, for example, communicating during activities in pairs, groups or providing explanation to the entire class.

Assessment of the ability of pupils to communicate effectively in mathematics should show the evidence that they are able to generate, explain and share their mathematical ideas through various forms of communication in various environments. Pupils, who are often given opportunities and encouragement to speak, read, write and listen during the teaching and learning of mathematics will be able to communicate to learn mathematics and learn to communicate mathematically.

Representation in mathematics is often used to represent the world that we live in. Therefore, there must be similarities between aspects of the represented world and aspects that are represented by the world. The abstract relationship between these two worlds can be depicted as follows:

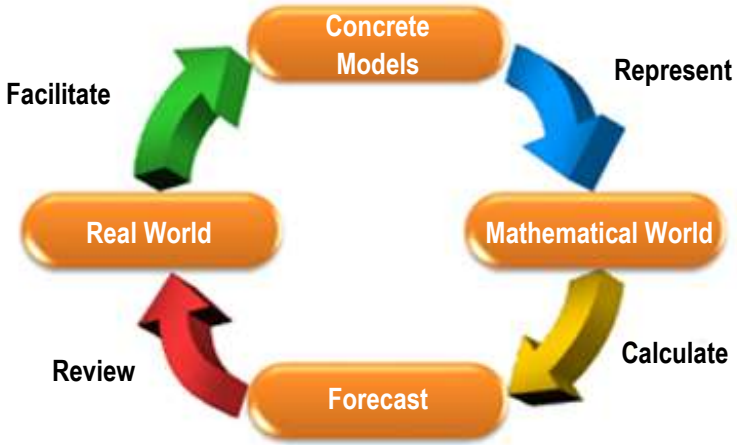

Figure 3: Representation Process

Representation can be regarded as a facilitator that enables the relationship between the real world and the world of mathematics. Formulas, tables, graphs, equations etc. are used to represent various notions and real world relationships.

Representation can be defined as any configuration of letters, images or concrete objects that can reflect or represent other things. The representation system is naturally divided into internal and external representation. The internal representation system exists in the thinking of the individual, whereas the external representation is easily shared and viewed by others.

Internal representation consists of notions that help in visualizing the human process of learning and solving problems in mathematics, while external representation consists of items such as diagrams, the formal language and notational symbols. Using multiple representations to show a concept not only helps to develop better conceptual understanding but also strengthens pupils' ability in solving problems.

Representation is necessary for pupils' understanding of mathematical concepts and relationships. Representation allows pupils to communicate through approaches, debates and understanding of mathematics to themselves and others. It also allows pupils to recognize the relationships between related concepts and apply mathematics to realistic problems.

Representation is an important component in the development of mathematical understanding and quantitative thinking. As a whole, without representation, mathematics is abstract, mostly philosophical and probably unapproachable by most of the population. With representation, the notion of mathematics can be formed into a model, important relationship can be elaborated, understanding can be stimulated through constructing and sequencing of suitable experiences and observations.

Pupils should generate and explore mathematical ideas in depth through opportunities and various learning experiences. Awareness that mathematical ideas are interrelated and mathematics is comprehensive and not fragmented knowledge should be nurtured and developed among pupils. With that understanding and awareness, the mathematical ideas are more meaningful and thus, can enhance pupils' ability in applying mathematics.

Opportunities and various learning experiences provided should involve pupils actively in learning mathematics, help pupils to form in-depth understanding about mathematical concepts and create meaningful understanding of various mathematical ideas. Based on the understanding and meaning formed, pupils are able to relate and apply mathematical ideas, thus, enabling them to be more confident to explore and apply mathematics. The use of teaching aids, technological tools and implementation of task/practical/project work should be encompassed in learning experiences that are prepared for the pupils.

Connections need to be established so that pupils can relate conceptual and procedural knowledge as well as be able to connect topics in mathematics particularly and mathematics with other fields generally. This will enhance the pupils' understanding and make mathematics clearer, meaningful and interesting to them.

Mathematics curriculum generally consists of several discrete areas such as calculation, geometry, algebra, measurement and problem solving. Without relating these areas, pupils will have to learn and remember too many concepts and skills separately. Instead, by recognizing how the concepts or skills in different fields relate to each other, mathematics will be seen and studied as a holistic knowledge discipline and easily understood. When these mathematical ideas are related with everyday experiences inside and outside the school, pupils will be more aware of the usage, importance, strength and the beauty of mathematics.

Mathematical Process Standard

The standards of process that need to be achieved by the pupils throughout these implementations are as follows:

Table 1: Mathematical Process Standard

Problem Solving
• Understanding the problem. • Extracting relevant information in the given situation and arranging the information systematically. • Planning various strategies to solve the problem. • Implementing strategies according to the prescribed plan. • Producing solutions which fulfil the requirements of the problem. • Interpreting solutions. • Making reviews and reflections for the solution and strategy used.
Reasoning
• Recognizing reasoning and proof as the basis of mathematics. • Identifying pattern, structure and similarity in real world situation and symbolic representation. • Choosing and using various reasoning and proving methods. • Making, investigating and verifying mathematical conjectures. • Constructing and evaluating mathematical argument and evidence. • Making decisions and justifying them.

Mathematical Communication

- Organizing and combining mathematical thoughts through communication to clarify and strengthen mathematical understanding.
- Communicating mathematical thoughts and ideas clearly and confidently.
- Using mathematical language to state mathematical ideas accurately.
- Analysing and evaluating mathematical thoughts and strategies of others.

Representation

- Describing mathematical ideas using various representations.
- Making interpretation from given representations.
- Choosing suitable representations.
- Using various mathematical representations to:
  I. simplify complex mathematical ideas.
  II. help in solving problems.
  III. make a model and interpret mathematical phenomena.
  IV. create connection between various representations.

Connection

- Identifying and using connection between mathematical ideas.
- Understanding how mathematical ideas are interconnected and organised to produce a coherent whole.
- Relating mathematical ideas with daily life and other fields.

Skills

Mathematical skills should be developed and instilled in the pupils and these skills include numeration, measuring and constructing, handling and interpreting data, manipulating arithmetic, manipulating algebra, using algorithms, using mathematic tools and Information and Communications Technology (ICT).

Skills in mathematics that support effective and thoughtful learning of mathematics are:

- Mathematical skills
- Analysing skills
- Problem solving skills
- Research skills
- Communication skills
- Technology using skills

Mathematical skills refer to the following abilities:

(i) Using correct standard mathematical language and applying logical reasoning.
(ii) Stating mathematical ideas precisely.
(iii) Creating, testing, and proving conjecture.
(iv) Extracting meaning from a mathematical writing.
(v) Using mathematics to explain the physical world.

Analysing skills refer to the following abilities:
(i) Thinking clearly.
(ii) Giving attention and examining every aspect.
(iii) Manipulating precise and detailed ideas.
(iv) Understanding complex mathematical reasoning.
(v) Constructing and defending logical arguments.
(vi) Debating illogical arguments.

Problem solving skills refer to the following abilities:
(i) Constructing problem statements precisely and identifying the main issues.
(ii) Presenting solutions clearly and stating the assumptions made.
(iii) Solving complex problems by analysing simpler to specific problems.
(iv) Being open-minded and using different approaches in solving the same problem.
(v) Solving problems confidently even though the solution is not clear.
(vi) Asking for help, if needed.

Research skills refer to the following abilities:
(i) Referring to notes, textbooks and other sources.
(ii) Accessing books in the library.
(iii) Using database.
(iv) Getting information from various individuals.
(v) Thinking.

Communication skills refer to the following abilities:
(i) Listening effectively.
(ii) Writing mathematical ideas clearly and precisely.
(iii) Writing essays and reports; and
(iv) Doing presentations.

Technology using skills refer to the ability in using and handling mathematical tools such as abacuses, calculators, computers, educational software, websites and educational packages for:
(i) Developing and understanding mathematical concepts in depth.
(ii) Creating, testing and proving conjectures.
(iii) Exploring mathematical ideas.
(iv) Solving problems.

Attitudes and Values in Mathematics Education

Values are affective qualities instilled through the teaching and learning of mathematics using appropriate contexts. They are taught and learnt implicitly in learning sessions. Good values that are nurtured will eventually produce good attitudes. Inculcating values and attitudes in teaching and learning mathematics aim to produce competent individuals in the aspects of knowledge and skills coherent with virtuous attitudes. Inculcating good values moulds the young generations with noble and virtuous attitudes.

Attitudes and values that can be instilled in pupils through the teaching and learning of mathematics are:

1. Values of mathematics which refer to values in mathematical knowledge which encompasses the emphasis on the characteristics in mathematical knowledge.
2. Attitudes and global values which refer to the practice and global virtuous values which are instilled across all subjects.

The formation of values through teaching and learning mathematics also involves spirituality, beliefs, interests, appreciation, confidence, efficiency and endurance.

Basically, in the power and greatness of God can be nurtured through the contents in this curriculum. The relationship between the content learnt and the real world is to show and validate the greatness and power of the creator of the universe. Elements of history and patriotism should also be incorporated in appropriate topics to enable pupils to appreciate mathematics and stimulate pupils' interest and confidence in mathematics. These historical elements could be a particular event about a mathematician or a brief history about a concept or symbol are also emphasized in this curriculum.

21st CENTURY SKILLS

One of the aspirations in the Standard-Based Curriculum for Primary School is to produce pupils with the 21st century skills by focusing on thinking skills as well as living skills and careers that are based on practical moral values. 21st century skills aims to produce pupils with the characteristics as stated in the pupils' profile in Table 2, so that they are able to compete globally. The mastering of Content Standard (CS) and Learning Standard (LS) in the primary school mathematics curriculum contributes to the acquisition of 21st century skills among pupils.

Table 2: Pupils' Profile

PUPILS' PROFILE	DESCRIPTION
Resilient	They are able to face and overcome difficulties and challenges with wisdom, confidence, tolerance and empathy.
Communication skills	They express their thoughts, ideas and information confidently and creatively, verbally and in written form, using various media and technology.

PUPILS' PROFILE	DESCRIPTION
Thinker	They think critically, creatively and innovatively; able to overcome complex problems and make ethical decisions. They think about learning and themselves as pupils. They generate questions and are open to perspectives, values and individual's and societal traditions. They are confident and creative in handling new learning fields.
Teamwork	They can work effectively and harmoniously with others. They take responsibility while respecting and appreciating the contributions given by all team members. They obtain interpersonal skills through collaborative activities, and this makes them better leaders and team mates.
Curious	They develop natural curiosity to explore strategies and new ideas. They learn skills that are needed to carry out inquiry and research, as well as show independent attitudes in learning. They enjoy continuous lifelong learning experiences.
Principled	They are honest and have integrity, equality, are fair and respect individual, group and community dignity. They are responsible for their actions, consequences and decisions.
Informative	They gain knowledge and develop wide and balanced understanding across various knowledge disciplines. They explore knowledge effectively and efficiently in the context of local and global issues. They understand ethics/laws related to the information obtained.
Caring/ Attentive	They show empathy, compassion and respect towards the needs and feelings of others. They are committed to serve the society and ensure the sustainability of nature.
Patriotic	They show love, support and respect towards the country.

HIGHER ORDER THINKING SKILL

Higher Order Thinking Skills (HOTS) is stated explicitly in the curriculum so that the teachers can translate them in teaching and learning to stimulate structured and focused thinking among pupils. HOTS descriptions are focused on four levels of thinking as shown in **Table 3.**

Table 3: Thinking levels in HOTS

Thinking level	Description
Application	• Using knowledge, skills and values in different situations to accomplish a task.
Analysis	• Breaking down information into smaller parts for in-depth understanding and making connections between these parts.
Evaluation	• Considering and making decisions using knowledge, experience, skills, values and justifying decisions made.
Creation	• Producing ideas or products or methods creatively and innovatively.

HOTS is the ability to apply knowledge, skills and values in reasoning and reflecting to solve problems, make decisions, be innovative and capable of inventing something. HOTS include critical and creative thinking skills, reasoning and thinking strategies.

Critical thinking is the ability to evaluate ideas logically and rationally to make sensible judgements using logical reasons and evidence.

Creative thinking is the capacity to produce or create something new and valuable using genuine imagination and unconventional thinking.

Reasoning skill is the individual's capability to consider and evaluate logically and rationally.

Thinking strategy is a way of thinking that is structured and focused to solve problems.

HOTS can be applied in classrooms through reasoning based activities, inquiry learning, problem solving and projects. Teachers and pupils need to use thinking tools such as thinking maps and mind maps and higher level questions to encourage pupils to think.

STRATEGIES IN TEACHING AND LEARNING

Mathematics is a knowledge based on concepts, facts, attitudes, rules, patterns and processes. Effective teaching and learning Mathematics requires teachers to plan activities meticulously and integrate various strategies that not only allow pupils to understand the contents in-depth yet challenge them to think on a higher level.

Opportunities and a variety of learning experiences, integrating the use of ICT, and problem solving that involve a balance of both routine and non-routine questions are also emphasized in the teaching and learning of Mathematics. Non-routine questions that require higher order thinking is emphasized to achieve the aim of producing human capital that are thoughtful, creative and innovative, able to compete in the era of globalization and able to meet challenges of the 21st century. Thus, teachers need to design teaching and learning that provides opportunities for pupils to make conjectures, do reasoning, ask questions, reflect and then form concepts and self-knowledge. Hence, structured questioning techniques are needed to enable pupils to discover rules, patterns or the nature of mathematical concepts.

Therefore, the strategies used in teaching and learning mathematics require diversity and balance. The use of technologies such as dynamic software, graphic calculators, internet and so on needs to be integrated in the teaching and learning of mathematics to help pupils develop in depth understanding of the concept, which mainly involves abstract concepts. However, traditional strategies are sometimes required when teaching procedure based on contents.

In addition, teachers need to use various approaches in teaching and learning such as mastery learning, contextual learning, project-based learning, problem-based learning, simulation, inquiry-discovery, modular approach and STEM approach. These approaches provide fun learning experiences in mathematics, meaningful, useful and challenging which, in turn, will form in depth understanding of concepts. Therefore, teachers need to choose suitable strategies of teaching and learning to meet the needs of pupils with diverse abilities, interests and preferences in meaningful and challenging activities designed specifically based on their needs.

Mastery Learning

Mastery learning is learning that ensures all pupils master the learning objectives set. This learning adheres to the principle that each pupil is able to learn if given an opportunity. Opportunities should be given to the pupils to learn at their own pace. Enrichment and remedial action needs to be made as part of teaching and learning process.

Contextual Learning

Contextual learning is learning that requires pupils to make connections with their lives. In this context, pupils do not only learn in theory, but can apply their knowledge of mathematics in daily life situations. Pupils can apply their diverse skills, experiences and local culture, thereafter integrate all these into new learning experiences.

Project-based Learning

Project-based learning is learning that focuses on practical tasks in a systematic and well-planned time frame to investigate and explore a problem or produce a product. Normally, it involves tasks that require data collection and data analysis activities, reporting the results of the project and self-reflection. The focus of learning is on the process whereby the product or end result of the project is the completion of learning.

Problem-based Learning

Problem-based learning is learning that provides opportunities for pupils to learn through the exploration of daily life problems. Pupils will be able to develop resilience when they face and overcome challenges and difficulties through the process of interpreting problems, gathering information, identifying possible solutions, evaluating each problem solving and presenting the conclusions and decisions.

Simulation

Simulation is learning that provides opportunities for pupils to learn through activities that resemble real life situations. Examples of simulation are role-play, games and the use of models. In role-play, pupils play a role spontaneously based on rules given. Pupils play to learn a concept or understand the process and make decisions. Models can be used to represent real objects or situations.

Inquiry-Discovery

Inquiry-discovery is learning that uses the curiosity in pupils to explore a field of knowledge. This learning focuses on the expansion of skills and intellectuality to raise questions and find answers that arise from the curiosity of the pupils.

Modular Approach

Modular approach is teaching and learning that is based on the pupil-centred principle with focuses on personal development, integration of skills, absorption of knowledge and values in subjects, presenting content in a linear or non-linear sequence, selecting and presenting content, flexibility of skills and values. Operation time is flexible in the implementation of teaching and learning, such as, flipped classroom and so on.

STEM Approach (Science, Technology, Engineering and Mathematics)

STEM approach is teaching and learning that applies knowledge, skills and values of STEM through inquiry, problem solving or project in the context of daily life, environment and local as well as global community as shown in Figure 4.

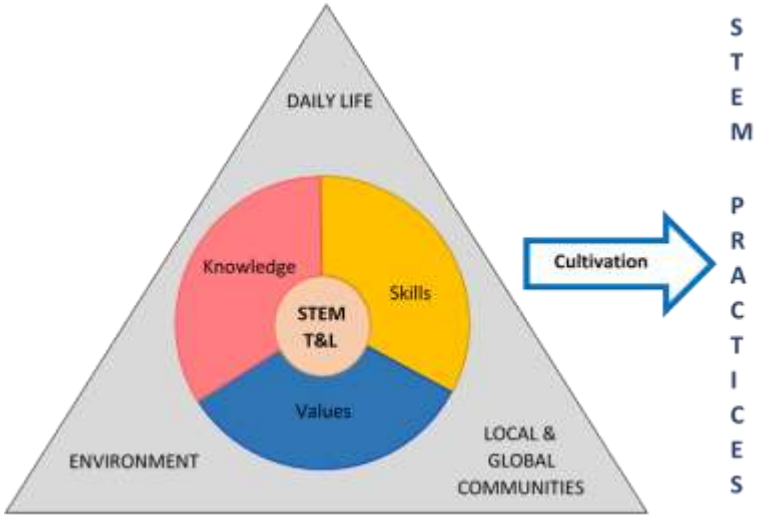

Figure 4: STEM Teaching and Learning Approach

STEM teaching and learning that is contextual and authentic is able to encourage in-depth learning among pupils. Pupils can work in groups or individually according to their abilities to acculturize the STEM approach 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 and computational thinking;
6. Developing explanation and designing solutions;
7. Engaging in debates and discussion based on evidence; and
8. Getting information, evaluating and communicating about the information.

CROSS CURRICULAR ELEMENTS

Cross Curricular Elements (CCE) are value-added elements 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 CCE are as follow:

1. Language

- The medium of language used should be emphasized in all subjects.
- During the teaching and learning of each subject, the pronunciation, sentence structure, grammar and the terminology and register of the language need to be emphasized to assist pupils in organising ideas as well as communicating effectively.

2. Environmental Sustainability

- Awareness of the love to the environment in the pupils' lives should be nurtured through the teaching and learning in all subjects.
- Knowledge and awareness for the environment to develop pupils' ethics in appreciating nature.

3. Values

- Values are emphasised in all subjects to ensure that pupils are aware of its importance and practise them.
- Values include spirituality, humanity and nationality which are the practices in daily life.

4. Science and Technology

- The increased of the interest in science and technology can 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 includes four areas:
  i. The knowledge of science and technology (facts, principles, concepts related to science and technology);
  ii. Scientific skills (thinking process and specific manipulative skills);
  iii. Scientific attitudes (such as accuracy, honesty, security); and
  iv. Use of technology in teaching and learning activities.

5. Patriotism

- Patriotism can be nurtured through all subjects, co-curricular activities and community services.
- Patriotism can produce pupils with the spirit of love towards country and pride as Malaysians.

6. Creativity and Innovation

- Creativity is the ability to use imagination in gathering, extracting and generating ideas or creating new or original ideas through inspiration or a combination of existing ideas.
- Innovation is the application of creativity through the modification, improvement and practice of ideas.

- Creativity and innovation are inter-connected and is needed to ensure that human capital development can meet the challenges of the 21st century.
- Elements of creativity and innovation should be integrated in teaching and learning.

7. Entrepreneurship

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

8. Information and Communication Technology (ICT)

- The incorporation of Information and communication technology elements in the teaching and learning is to ensure pupils can apply and strengthen their basic knowledge and skills in ICT.
- The application of ICT will not only motivate pupils to be creative but also stimulate interest and enjoyment as well as improve the quality of teaching and learning.
- ICT should be integrated according to the appropriate topics to be taught in order to enhance pupils' understanding of subject content.
- Computational thinking is one of the aspects that are emphasized in ICT which can be applied in all the subjects. Computational thinking is a skill that uses the concept of logic, algorithm, resolution, pattern recognition, scaling and assessment in the process of problem solving with the aid of computers.

9. Global Sustainability

- Elements of Global Sustainability aim to develop pupils with sustainable thinking and responsive towards 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 Unity.
- 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. Finance Education

- The instillation of financial education elements aims to shape the future generation that is capable of making wise financial decisions, ethical financial management and the skills to manage the financial affairs responsibly.
- Elements of financial education can be instilled in teaching and learning directly or indirectly. Direct application is done through the topics that contain explicit financial elements such as the calculation of simple interest and compound interest. Indirect application is integrated through other topics 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.

CLASSROOM ASSESSMENT (CA)

Classroom Assessment (CA) is a process to obtain information on pupils' progress which is planned, carried out and reported by the teachers. This on-going process helps teachers to determine the level of pupils' achievement.

Classroom assessment can be carried out by teachers in form of formative and summative. Formative assessments are carried out in line with the process of teaching and learning, while summative assessment is carried out at the end of every learning unit, term, semester or year. Teachers need to plan, build items or instruments of assessment, administer, inspect, record and report the pupils' level of mastery based on Standard-Based Curriculum and Assessment Documents (DSKP).

In an effort to ensure that assessment helps to enhance pupils' ability and mastery, teachers should carry out assessment with the following characteristics:

- Use various methods of assessment such as observation, verbally and in writing.
- Use various strategies of assessment which can be carried out by teacher and pupils.
- Take into consideration various levels of knowledge and skills learnt.

- Enable pupils to show various learning abilities.
- Interpret the level of pupil's mastery on Learning Standard and Performance Standard
- Take follow up actions for remedial and enrichment.

Primary School Mathematics Assessment involves elements of content, process skills, as well as attitudes and values. Pupil's Assessment refers to Performance Standards criteria in the six performance levels that provide a specific interpretation. Assessment of Mathematics also can be reported using the reporting template designed and built to record pupil's achievement. At the end of each year, report of overall level of mastery achieved is recorded which includes the elements of content, skills and processes, as well as attitudes and values.

Content

The content assessment is generally assessed topically. This assessment aims to overview the extent of pupil's understanding on the specific standard content comprehensively and holistically. This curriculum outlines the content standard which is organized according to specific learning areas. The topics listed are hierarchically arranged and shows the development according to the learning areas. Teachers need to assess the pupils holistically. Performance Standard (*SPi*) for each topic is built based on General Performance Level as shown in Table 4.

Table 4: General Interpretation of Performace Level of Mathematical Contents.

PERFORMANCE LEVEL	DESCRIPTOR
1	Know basic knowledge of mathematics.
2	Know and understand the basic knowledge of mathematics.
3	Know and understand basic knowledge of mathematics to perform basic operations of mathematics and basic conversion.
4	Know and understand the basic knowledge of mathematics to perform calculation steps in solving daily routine problems.
5	Master and apply knowledge and skills of mathematics in solving daily routine problems using various strategies.
6	Master and apply knowledge and skills of mathematics in solving daily non-routine problems creatively and innovatively.

Mathematics Skills and Processes

Elements of mathematical skills and processes should be displayed and practised by the pupils are assessed on an ongoing basis through various methods such as observation, exercise, presentation, pupil's oral responses, group work and so on. Achievement reports of these elements can be done in the middle of the year and at the end of the year to see the development of pupils and help them increase their skills.

In the Teaching and Learning process, the teacher should assess the mathematical skills together with the learning practices that are shown through mathematical process, which are problem solving, mathematical reasoning, communication, connection and representation. Performance level for mathematical skills are as shown in Table 5.

Table 5 : Performance Level of Mathematics Skills Process

PERFORMANCE LEVEL	DESCRIPTOR
1	Pupils will be able to state activity or mathematical ideas using representation, make connection, reasoning and communicate, and state the steps to solve mechanical problems with guidance.
2	Pupils will be able to explain activity or mathematical ideas using representation, make connection, reasoning and communicate, and solve mechanical problems with guidance.
3	Pupils will be able to carry out activities and mathematical ideas using representation, make connection, reasoning and communicate, and solve mechanical problems.
4	Pupils will be able to carry out activities and mathematical ideas using representation, make connection, reasoning and communicate, and solve routine problems.
5	Pupils will be able to carry out activities and mathematical ideas using representation, make connection, reasoning and communicate, and solve complex routine problems using various strategies.
6	Pupils will be able to carry out activities and mathematical ideas using representation, make connection, reasoning and communicate, and solve non-routine problems creatively and innovatively.

Attitudes and values

Elements of attitudes and values that should be shown and practised by pupils are continuously assessed through various methods. Achievement reports of these elements can be done in the middle of the year and end of the year to see the development of the pupils and help them increase the good values as shown in Table 6.

Table 6: General Interpretation of Performance Level of Attitude and Values

PERFORMANCE LEVEL	DESCRIPTOR
1	State attitudes and values in mathematics with guidance.
2	Explain attitudes and values in mathematics by giving reasonable example.
3	Show attitude and values related to mathematics in a given situation.
4	Demonstrate attitude and values related to mathematics in various situation and become mentor to their peers.
5	Always practice attitude and values related to mathematics in teaching and learning process and become a mentor to their peers.
6	Always practice attitude and values related to mathematics in daily life and become a mentor and role model to their peers.

Overall Performance Level

At the end of the school term, teachers should determine the overall performance level of pupils. The Overall Assessment includes knowledge, process skills and values. Teachers should assess pupils collectively and holistically through the learning process. Teacher should use professional consideration in all assessment process, especially to determine the overall performance level. Professional consideration can be done based on teacher's knowledge and experiences, teacher-pupils interaction as well as discussion with colleague. Teachers can refer to the guide as shown in Table 7 to determine the Overall Performance levels of pupils.

Table 7: Overall Performance Level

PERFORMANCE LEVEL	DESCRIPTOR
1	• Review the basic knowledge of mathematics. • Use mathematical process skills to review the basic knowledge of mathematics with guidance. • State attitudes and values in mathematics with guidance.
2	• Explain basic knowledge of mathematics. • Use mathematical process skills to explain basic knowledge of mathematics. • Explain attitudes and values in mathematics by giving reasonable examples.
3	• Apply basic knowledge of mathematics. • Use mathematical process skills to apply basic knowledge of mathematics. • Show attitudes and values in mathematics for various situations.
4	• Solve routine problems in daily life. • Use mathematical process skills to solve routine problems. • Demonstrate attitudes and values related to mathematics in various situations and become a mentor to peers.
5	• Solve complex routine problems in daily life using various strategies of problem solving. • Use mathematical process skills to solve complex routine problems. • Always practise attitude and values related to mathematics in teaching and learning process and become a mentor to peers.
6	• Solve non-routine problems in daily life. • Use mathematical process skills to solve non-routine problems. • Always practise attitudes and values related to mathematics in daily life and become a mentor as well as role model to peers.

Classroom Assessment Report

Assessment is a process used to determine learning achievement. This achievement is recorded in a report template that can be downloaded from BPK website. The process of recording pupils' achievement is carried out based on Performance Level as described in the Standard-Based Curriculum and Assessment Documents (DSKP).

Classroom assessment template shows the process of delivering information on pupils learning and achievement from time to time. The report includes the progress and development of pupils from aspects of knowledge, skills and process as well as values as aspired in the curriculum.

CONTENT ORGANISATION

Mathematics Standard-Based Curriculum for Primary School is designed with the emphasis on Content Standard and Learning Standard that needs to be known and can be done by pupils. The standards are presented by the topics that are incorporated based on learning areas. The level of pupil's learning development is measured by the Performance Standard and is organized according to each topic.

The content of Standard-Based Curriculum and Assessment Documents for Primary School Mathematics is based on learning areas as shown in Table 8.

Table 8: List of Topics According to Learning Area in Primary School Mathematics

LEARNING AREA	TOPIC
Numbers and Operations	• Whole Numbers and Basic Operations • Fractions, Decimals and Percentage • Money
Measurement and Geometry	• Time • Measurement • Space
Relationship and Algebra	• Coordinate, ratio and proportion
Statistics and Probability	• Data Handling • Likelihood
Discrete Mathematics	• Not at primary level

Mathematics Standard-Based Curriculum for Primary School focuses on the mastery of knowledge, processing skills and values that are suitable with the pupil's abilities. The minimum time provision for mathematics level II is 96 hours per year. Mathematics Standard-Based Curriculum and Assessment Documents are organised through a statement of Content Standard, Learning Standard and Performance Standard, while the description column is attached with the suggested activities or notes as shown in Table 9.

The objective of each topic is explicated as a guide to prepare activities and learning environment which is appropriate and relevant to the ability and the needs of pupils. Teachers need to use creativity and their professional wisdom to achieve the objectives. The suggested activities are not absolute. Teachers are recommended to use a variety of resources such as modules, books and the internet to prepare suitable teaching and learning activities.

Table 9: Interpretation of Content Standard, Learning Standard and Performance Standard

CONTENT STANDARD	LEARNING STANDARD	PERFORMANCE STANDARD
Specific statements about what pupils should know and can do within a schooling period that include aspects of knowledge, skills and values.	A specification of criteria or indicators on the quality of learning and achievement that can be measured for each content standard.	A set of general criteria that shows the levels of performance that pupils need to show as an indicator to determine that they have mastered the aspects.

In the Organisation of Content, there is description column. The column consists of suggested activities and notes. Teacher can carry out additional activities apart from the suggested activities, based on their creativity and needs to achieve Learning Standard.

LEARNING AREA

NUMBERS AND OPERATIONS

TOPIC

1.0 WHOLE NUMBERS AND BASIC OPERATIONS

Objectives:

Enable pupils to:

- Know, understand and apply whole numbers, concepts and procedural skills for basic operations up to 1 000 000.
- Apply mathematical knowledge and skills to solve problems involving whole numbers and basic operations up to 1 000 000.
- Use the correct mathematical terms related to whole numbers while doing basic operations and mixed operations.
- Develop mathematical reasoning, make connection, make representation, communicate and use technology while learning whole numbers and basic operations up to 1 000 000.

1.0 WHOLE NUMBERS AND OPERATIONS

CONTENT STANDARD	LEARNING STANDARD	REMARKS
1.1 Number value	Pupils will be able to: 1.1.1 State numbers up to 1 000 000: (i) Read any number in words. (ii) Say any number in numerals. (iii) Write numbers in numerals and words. 1.1.2 Determine the value of numbers up to 1 000 000: (i) State the place value and digit value of any number. (ii) Write any numbers in extended notation based on place value and digit value. (iii) Compare the value of two numbers. (iv) Arrange numbers in ascending and descending order. (v) Complete any number sequence in ascending and descending order.	**Notes:** Say numbers correctly. 382 425 is read as 'three hundred eighty two thousand four hundred and twenty-five' and not 'three eight two four two five'. **Suggested Activities**: • Use various representations including concrete models, manipulative tools, square grids, pictures, number lines and symbols to represent numbers. • Use ICT to state and determine the number value.
1.2 Prime numbers	1.2.1 Identify prime numbers within 100.	**Notes:** A prime number is a number that can only be divided by 1 and itself. **Suggested Activities:** Use ICT to identify prime numbers.
1.3 Estimation	1.3.1 Estimate quantity based on given reference set and justify the answer.	**Notes:** Examples given should be related to pupils' knowledge and experiences. **Suggested Activities:** Use concrete and non-concrete materials.

CONTENT STANDARD	LEARNING STANDARD	REMARKS
1.4 Rounding off numbers	1.4.1 Round off whole numbers up to the nearest hundred thousand. 1.4.2 Identify numbers that can be represented by a rounded off number up to the nearest hundred thousand.	**Notes:** Rounding off numbers can involve decimals, percentages, money and measurement. **Suggested Activities:** Use number lines and various strategies.
1.5 Number patterns	1.5.1 Identify patterns in given number series in ascending and descending order by ones up to tens, hundreds, thousands, ten thousands and hundred thousands. 1.5.2 Complete various number patterns that are given in ascending and descending order.	**Notes:** Number series can involve up to six numbers. **Suggested Activities:** Various calculation tools can be used to calculate in constructing number patterns.
1.6 Basic operations	1.6.1 Solve addition number sentences up to five numbers involving numbers up to six digits with sum within 1 000 000. 1.6.2 Solve subtraction number sentences up to three numbers within 1 000 000. 1.6.3 Solve multiplication number sentences of any number up to six digits with a number up to two digits, 100 and 1000 with product up to 1 000 000. 1.6.4 Solve division number sentences of any number within 1 000 000 with a number up to two digits, 100 and 1000.	**Notes:** Begin subtraction involving two numbers. **Suggested Activities:** Use concrete materials, pictures, number lines and mental arithmetic calculation to represent calculation process.

CONTENT STANDARD	LEARNING STANDARD	REMARKS
1.7 Mixed operations	1.7.1 Calculate mixed operations within 1 000 000 with and without brackets: (i) Addition and multiplication, (ii) Subtraction and multiplication, (iii) Addition and division, (iv) Subtraction and division.	**Notes:** Begin mixed operations without regrouping. **Suggested Activities:** Mixed operations can involve money.
1.8 Using unknown	1.8.1 Determine the value of an unknown in multiplication number sentences involving one multiplication operation with the product up to 1 000 000. 1.8.2 Determine the value of an unknown in division number sentences involving any number with a number up to two digits, 100 and 1000 within 1 000 000.	**Notes:** • Unknown is represented by letters. • Unknown can be in three positions in a number sentence: i. a x 23 = 46 ii. 114 x b = 342 iii. 20 x 3 = c Begin with numbers of small values.
1.9 Problem solving	1.9.1 Solve problems involving whole numbers up to 1 000 000 in daily situations. 1.9.2 Solve daily problems involving basic operations and mixed operations within 1 000 000. 1.9.3 Solve multiplication and division problems in daily situations involving one unknown.	**Suggested Activities:** • Begin with numbers of small values. • Use Polya Model in problem solving: 1. Understand and interpret the problem; 2. Plan a solving strategy; 3. Carry out the strategy; and 4. Check the answer. • Use various problem solving strategies such as identifying patterns, constructing tables, working backwards, drawing diagrams and trying simpler situations. • Use various teaching and learning strategies such as STEM approach, mastery learning, contextual learning and modular approach.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	Read number sentences involving basic operations and mixed operations with and without brackets.
2	• Identify prime numbers. • Explain procedure of basic operations and mixed operations with and without brackets.
3	• Determine number values including estimation, round off and completion of number patterns up to 1 000 000. • Justify the answer and solve number sentences involving basic operations and mixed operations with and without brackets.
4	Solve daily routine problems involving whole numbers, basic operations and mixed operations with and without brackets up to 1 000 000.
5	Solve daily routine problems involving whole numbers, basic operations and mixed operations with and without brackets up to 1 000 000 using various strategies.
6	Solve daily non-routine problems involving whole numbers, basic operations and mixed operations with and without brackets up to 1 000 000 creatively and innovatively.

LEARNING AREA

NUMBERS AND OPERATIONS

TOPIC

2.0 FRACTIONS, DECIMALS AND PERCENTAGES

Objectives

Enable pupils to:

- Relate fractions, decimals and percentages to daily life.
- Apply mathematical knowledge and skills to solve problems involving fractions, decimals and percentages.
- Develop mathematical reasoning, make connection, make representation, explore, communicate and use technology to solve problems involving fractions, decimals and percentages.

2.0 FRACTIONS, DECIMALS AND PERCENTAGES

CONTENT STANDARD	LEARNING STANDARD	REMARKS
	Pupils will be able to:	
2.1 Fractions	2.1.1 Multiply fractions of two numbers involving whole numbers, proper fractions and mixed numbers.	**Notes:** Fractions with denominators up to 10. **Suggested Activities:** Use concrete materials, diagrams and software.
2.2 Decimals	2.2.1 Round off decimals up to three decimal places. 2.2.2 Solve mixed operations number sentence involving addition and subtraction of decimals up to three decimal places. 2.2.3 Multiply decimals up to three decimal places with numbers up to two digits, 100 and 1000. 2.2.4 Divide decimals with numbers up to two digits, 100, 1000, with quotient up to three decimal places.	**Notes:** Rounding off can involve money and measurement. **Suggested Activities:** Use diagrams, number lines and software.
2.3 Percentages	2.3.1 Convert mixed numbers to percentages and vice versa. 2.3.2 Calculate quantity of percentage up to more than 100% and vice versa.	**Suggested Activities:** ● Use various strategies. ● Use hundred grid and folded paper.

CONTENT STANDARD	LEARNING STANDARD	REMARKS
2.4 Problem solving	2.4.1 Solve daily problems involving fractions, decimals and percentages.	**Suggested Activities:** • Use Polya Model in problem solving: 1. Understand and interpret the problem; 2. Plan solving strategy; 3. Carry out the strategy; and 4. Check the answers. • Use various problem solving strategies such as drawing diagrams, making tables or lists systematically. • Use various teaching and learning strategies such as modular approach, STEM approach and problem solving.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	Read number sentences involving fractions, decimals and percentages.
2	● Convert fractions and mixed numbers to percentages. ● Round off decimals.
3	● Multiply fractions involving whole numbers, proper fractions and mixed numbers. ● Justify the answer in solving basic operations and mixed operations number sentences involving decimals. ● Calculate quantity of a percentage and vice versa.
4	Solve daily routine problems involving fractions, decimals and percentages.
5	Solve daily routine problems involving fractions, decimals and percentages using various strategies.
6	Solve daily non-routine problems involving fractions, decimals and percentages creatively and innovatively.

LEARNING AREA
NUMBERS AND OPERATIONS

TOPIC
3.0 MONEY

Objectives
Enable pupils to:
- Relate usage of money to daily life.
- Apply financial-knowledge and skills in daily life.
- Make mathematical reasoning and explore situations in daily life for future benefits.
- Communicate, make connection and solve problems involving finance.
- Develop entrepreneurship characteristics and practices.

3.0 MONEY

CONTENT STANDARD	LEARNING STANDARD	REMARKS
3.1 Basic operations involving money	Pupils will be able to: 3.1.1 Solve addition number sentences up to three values of money with sum within RM1 000 000. 3.1.2 Solve subtraction number sentences up to two values of money from one value of money within RM1 000 000. 3.1.3 Solve multiplication number sentences involving value of money up to two digits, 100, 1000 and product within RM1 000 000. 3.1.4 Solve division number sentences involving value of money within RM1 000 000 divided by up to two-digit numbers, 100 and 1000.	**Suggested Activities:** • Use money model, pictures, number lines, software and mental calculation to represent calculation of any basic operation. • Use simulation and games in teaching and learning strategies.
3.2 Mixed operations involving money	3.2.1 Solve mixed operations number sentences involving money within RM1 000 000, with and without brackets: (i) Addition and multiplication, (ii) Subtraction and multiplication, (iii) Addition and division, (iv) Subtraction and division.	**Suggested Activities:** Use money model, pictures, number lines, software and mental calculation to represent calculation of mixed operations.
3.3 Savings and investment	3.3.1 Explain meaning of savings and investment. 3.3.2 Explain meaning of simple interest and compound interest in savings.	**Notes:** Introduce dividend and bonus in investment. Explain appreciation and depreciation of values of savings and investment.

CONTENT STANDARD	LEARNING STANDARD	REMARKS
3.4 Credit and debt management	3.4.1 Explain meaning of credit and debt. 3.4.2 Explain price difference in buying goods using credit and cash.	**Notes:** • Credit as a facility. • Explain role of interest on loan. • Explain why usage of credit card is debt incurring.
3.5 Problem solving	3.5.1 Solve problems involving money within RM1 000 000 in daily situations.	**Suggested Activities:** • Use Polya Model in problem solving: 1. Understand and interpret the problem; 2. Plan solving strategy; 3. Carry out the strategy; and 4. Check the answers. • Use various problem solving strategies such as trial and error and solving simpler case. • Use various teaching and learning strategies such as simulations, mastery learning, contextual learning and project-based learning.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	State the meaning of savings and investment.
2	Explain simple interest and compound interest in savings.
3	Justify the answer and solve basic operations and mixed operations number sentences involving money.
4	Solve daily routine problems involving money.
5	Solve daily routine problems involving money using various strategies.
6	Solve daily non-routine problems involving money creatively and innovatively.

LEARNING AREA
MEASUREMENT AND GEOMETRY

TOPIC
4.0 TIME

Objectives
Enable pupils to:

- Apply mathematical knowledge and skills to solve problems involving time.
- Develop mathematical reasoning, make connection, make representation and use technology to solve problems involving time.
- Manage time effectively in daily life.

4.0 TIME

CONTENT STANDARD	LEARNING STANDARD	REMARKS
4.1 Duration	Pupils will be able to: 4.1.1 Determine duration involving: (i) Days and hours (ii) Months and days (iii) Years, months and days	**Notes:** • Introduce leap year. • Duration involving (ii) and (iii) calculated in days only.
4.2 Relationship involving units of time	4.2.1 Convert time units involving fractions: (i) hours to minutes (ii) days to hours (iii) years to months (iv) decades to years (v) centuries to decades (vi) centuries to years 4.2.2 Convert time units involving decimals: (i) hours to minutes (ii) days to hours (iii) years to months (iv) decades to years (v) centuries to decades (vi) centuries to years	**Notes:** • Answers must be in whole numbers. • Fractions only involve bigger units.
4.3 Basic operations involving time	4.3.1 Solve addition and subtraction number sentences of time involving fractions: (i) hours and minutes (ii) days and hours (iii) years and months (iv) decades and years (v) centuries and decades (vi) centuries and years with and without conversion of unit.	**Notes:** Addition and subtraction involving fractions and decimals can involve fractions, decimals and percentages.

CONTENT STANDARD	LEARNING STANDARD	REMARKS
	4.3.2 Solve addition and subtraction number sentences of time involving decimals: (i) hours and minutes (ii) days and hours (iii) years and months (iv) decades and years (v) centuries and decades (vi) centuries and years with and without conversion of unit.	
4.4 Problem Solving	4.4.1 Solve problems involving time in daily situations.	**Suggested Activities:** • Use Polya Model in problem solving: 1. Understand and interpret the problem;. 2. Plan a solving strategy;. 3. Carry out the strategy; and 4. Check the answer. • Use various problem solving strategies such as trial and error and trying a simpler case. • Use various teaching and learning strategies such as simulations, mastery learning, contextual learning and project-based learning.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	State duration involving units of time.
2	Convert time units to fractions and decimals.
3	Justify the answer and solve addition and subtraction number sentences involving time in fractions and decimals.
4	Solve daily routine problems involving time.
5	Solve daily routine problems involving time using various strategies.
6	Solve daily non-routine problems involving time creatively and innovatively.

LEARNING AREA
MEASUREMENT AND GEOMETRY

TOPIC
5.0 MEASUREMENT

Objectives
Enable pupils to:

- Apply mathematical knowledge and skills to solve problems related to measurement.
- Develop mathematical reasoning, make connection, make representation, explore, communicate and use technology to solve problems involving measurement.

5.0 MEASUREMENT

CONTENT STANDARD	LEARNING STANDARD	REMARKS
5.1 Length	Pupils will be able to: 5.1.1 Convert units of length involving; (i) millimetre and centimetre, (ii) centimetre and metre, (iii) metre dan kilometre, in decimals up to three decimals places. 5.1.2 Convert units of length involving; (i) millimetre and centimetre, (ii) centimetre and metre, (iii) metre dan kilometre, in fractions. 5.1.3 Add up to three measurements of length involving decimals and fractions with and without unit conversion. 5.1.4 Subtract up to three measurements of length involving decimals and fractions with and without unit conversion. 5.1.5 Multiply measurements of length involving decimals and fractions with numbers up to two digits, 100 and 1000 with and without unit conversion. 5.1.6 Divide measurements of length involving decimals and fractions with numbers up to two digits, 100 and 1000 with and without unit conversion.	**Suggested Activities:** • Use realia and software in converting units of length. • Use various calculation strategies in solving number sentences.

CONTENT STANDARD	LEARNING STANDARD	REMARKS
5.2 Mass	5.2.1 Convert units of mass involving gram and kilogram in fractions and decimals. 5.2.2 Add up to three units of mass in fractions and decimals with and without unit conversion. 5.2.3 Subtract up to three units of mass in fractions and decimals with and without unit conversion. 5.2.4 Multiply units of mass in decimals and fractions with numbers up to two digits, 100 and 1000 with and without unit conversion up to three decimal places. 5.2.5 Divide units of mass in decimals and fractions with numbers up to two digits, 100 and 1000 with and without unit conversion.	**Suggested Activities:** • Use realia and software in converting units of mass. • Use various calculation strategies in solving number sentences.
5.3 Volume of liquid	5.3.1 Convert units of volume involving millilitre and litre in fractions and decimals. 5.3.2 Add up to three volumes of liquid in fractions and decimals with and without unit conversion. 5.3.3 Subtract up to three volumes of liquid in fractions and decimals with and without unit conversion. 5.3.4 Multiply volume of liquid in decimals and fractions with numbers up to two digits, 100 and 1000 with and without unit conversion. 5.3.5 Divide volume of liquid in decimals and fractions with numbers up to two digits, 100 and 1000 with and without unit conversion.	**Suggested Activities:** • Use realia and software in converting units of volume of liquid. • Use various calculation strategies in solving number sentences.

CONTENT STANDARD	LEARNING STANDARD	REMARKS
5.4 Problem solving	5.4.1 Solve problems involving measurement in daily situations.	**Suggested Activities:** • Use Polya Model in problem solving: 1. Understand and interpret the problem;. 2. Plan a solving strategy;. 3. Carry out the strategy;.and 4. Check the answer. • Use various problem solving strategies such as logical reasoning and identifying patterns. • Use various teaching and learning strategies such as simulations and STEM approach.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	Convert units of measurement to fractions and decimals.
2	Explain steps in solving fractions and decimals number sentences involving measurement.
3	Justify the answer and solve fractions and decimals number sentences involving measurement.
4	Solve daily routine problems involving measurement.
5	Solve daily routine problems involving measurement using various strategies.
6	Solve daily non-routine problems involving measurement creatively and innovatively.

LEARNING AREA

MEASUREMENT AND GEOMETRY

TOPIC

6.0 SPACE

Objectives

Enable pupils to:

- Apply mathematical knowledge and skills in solving problems related to space.
- Appreciate and value aesthetics of mathematics in various shapes generated from prisms and non- prisms.
- Develop mathematical reasoning, make connection, make representation, communicate and use technology to solve problems involving space.

6.0 SPACE

CONTENT STANDARD	LEARNING STANDARD	REMARKS
6.1 Regular polygons	Pupils will be able to: 6.1.1 State characteristics of regular polygons with reference to sides, corners, symmetrical axes, angles and diagonals.	**Notes:** Introduce interior angles.
6.2 Angles	6.2.1 Measure angles of regular polygons up to eight sides.	**Notes:** Measure the interior angles only. Use protractor to measure.
6.3 Perimeter and area	6.3.1 Determine perimeter of two combined regular polygons up to eight sides including right-angled triangles, equilateral triangles and squares. 6.3.2 Determine area of two combined shapes involving squares, rectangles, equilateral triangles, isosceles triangles and right-angled triangles.	**Suggested Activities:** Use realia, models and diagrams to reinforce pupils' understanding.
6.4 Volume of solids	6.4.1 Determine volume of two combined shapes involving cubes and cuboids.	**Suggested Activities:** Use realia, models and diagrams to reinforce pupils' understanding.
6.5 Problem solving	6.5.1 Solve problems involving space.	**Suggested Activities:** • Use various problem solving strategies such as logical reasoning and identifying patterns. • Use various teaching and learning strategies such as simulations and STEM approach.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	Name shapes found in combination of two shapes.
2	Explain steps in measuring the angles in ~~a~~ regular polygons.
3	• Measure angles of regular polygons. • Calculate perimeter of combination of two regular polygons. • Calculate area of combination of two shapes involving quadrilaterals and triangles. • Calculate volume of combination of two shapes involving cubes and cuboids.
4	Solve routine problems involving space.
5	Solve routine problems involving space using various strategies.
6	Solve non-routine problems involving space creatively and innovatively.

LEARNING AREA

RELATIONSHIP AND ALGEBRA

TOPIC

7.0 COORDINATES, RATIO AND PROPORTION

Objectives

Enable pupils to:

- Apply mathematical knowledge and skills to solve problems related to coordinates, ratio and proportion.
- Appreciate and value aesthetics of mathematics.
- Develop mathematical reasoning, make connection, make representation, communicate and use technology to solve problems involving coordinates, ratio and proportion.

7.0 COORDINATES, RATIO AND PROPORTION

CONTENT STANDARD	LEARNING STANDARD	REMARKS
7.1 Coordinates in first quadrant	Pupils will be able to: 7.1.1 Determine horizontal distance and vertical distance between two coordinates.	**Notes:** Calculations involving horizontal distance and vertical distance.
7.2 Ratio	7.2.1 Represent ratio of two quantities in the form of a : b involving: (i) Parts to parts (ii) Parts to whole (iii) Whole to parts	**Notes:** Ratio units must be the same. **Suggested Activities:** Use concrete and non-concrete materials to represent ratio.
7.3 Proportion	7.3.1 Determine an unknown value using proportion.	**Notes:** Use various methods including unitary method. **Suggested Activities:** Use concrete materials and mental arithmetic.
7.4 Problem solving	7.4.1 Solve problems involving coordinates, ratio and proportions in daily situations.	**Suggested Activities:** Use various problem solving strategies such as analogy and drawing diagrams.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	• State position of ***x***-axis and ***y***-axis in first quadrant. • Say the given ratio.
2	• Explain steps in determining horizontal and vertical distance between two points. • Represent ratio of two quantities.
3	• Justify the answer for solutions involving horizontal and vertical distance between two points. • Justify the answer for ratio representations of two quantities.
4	Solve routine problems involving coordinates, ratio and proportion.
5	Solve routine problems involving coordinates, ratio and proportion using various strategies.
6	Solve non-routine problems involving coordinates, ratio and proportion creatively and innovatively.

LEARNING AREA
STATISTICS AND PROBABILITY

TOPIC
8.0 DATA HANDLING

Objectives
Enable pupils to:

- Acquire skills in obtaining information from given pie chart.
- Apply mathematical knowledge and skills in solving problems involving data handling.
- Make decisions and generate ideas to explain situations faced in daily life.
- Develop mathematical reasoning, make connection, make representation, communicate and use technology in solving problems involving data handling.

8.0 DATA HANDLING

CONTENT STANDARD	LEARNING STANDARD	REMARKS
8.1 Pie chart	Pupils will be able to: 8.1.1 Interpret pie chart.	**Suggested Activities:** Use pie chart obtained from various sources such as newspaper cuttings, magazines, journals and reports.
8.2 Mode, median, mean and range	8.2.1 Recognise and determine mode, median, mean and range from ungrouped data.	**Notes:** Involve pictograph, bar chart and pie chart.
8.3 Problem solving	8.3.1 Solve problems involving data handling in daily situation.	**Suggested Activities:** • Use Polya Model in problem solving: 1. Understand the problem; 2. Plan a solving strategy; 3. Carry out the strategy; and 4. Check the answer. • Use various problem solving strategies such as drawing diagrams, making tables/charts or listing systematically. • Use various teaching and learning strategies such as STEM approach and project-based learning.

PERFORMANCE STANDARD	
PERFORMANCE LEVEL	**DESCRIPTOR**
1	State meaning of mode, median, mean and range.
2	Explain necessary steps to interpret data.
3	Justify the answer for problem solving involving data interpretation.
4	Solve daily routine problems involving data handling.
5	Solve daily routine problems involving data handling using various strategies.
6	Solve daily non-routine problems involving data handling creatively and innovatively

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