Republic of the Philippines
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# MATATAG CURRICULUM

## MATHEMATICS
## GRADES 1, 4 and 7

# THE SHAPE OF THE
# GRADES 1 TO 10 MATHEMATICS CURRICULUM

Mathematics is a powerful means of identification, description, and application of patterns and relationships; generalization; and communication. It provides opportunities for challenge, creativity, and users' recognition and appreciation of the nature, beauty and power of mathematical processes, strategies, and reasoning.

The successful study of mathematics in Grades 1 to 10 is a key component of Filipino learners' preparation for life in the 21st century. For full participation in society, learners need to develop sound mathematical knowledge, skills, and understanding for making informed decisions and for solving problems in a variety of contexts relevant to their daily lives.

Historically, mathematics arose from necessity of the human society, with real-world problems giving birth to its existence, emphasizing problem solving at its core. In schools, mathematics serves as an ideal training ground, fostering the problem-solving ability learners.

Additionally, in this age of scientific and technological innovations, being "numerate" is crucial for engaging in various endeavors. The Organisation for Economic Co-operation and Development (OECD) defines numeracy as "the ability to access, use, interpret, and communicate mathematical information and ideas, in order to engage in and manage the mathematics demands of a range of situations in adult life."

"Numeracy, a significant ancillary to problem solving, relates to a high proportion of the mathematics content of the Grades 1 to 10 Mathematics curriculum. Learners become increasingly 'numerate' as they develop the confidence and ability to:

- choose and use mathematics effectively in its application to situations that arise in their life at home, at work, and in the community; and
- apply, evaluate, and communicate their mathematical thinking.

# Development of the Curriculum

## Curriculum Goals

The main goal of the curriculum is for Filipino learners to become mathematically proficient and critical problem solvers.

The development of mathematical proficiency among learners involves the development of confidence and competence in different aspects of mathematics and includes becoming increasingly aware of the value and usefulness of mathematics.

According to Polya (1981), problem solving is "finding a way out of a difficulty, a way around an obstacle, attaining an aim which was not immediately attainable" (p. ix). Further, the National Council of Teachers of Mathematics (NCTM), (2000) asserts that "solving problems is not only a goal of learning mathematics but also a major means of doing so" (p. 52).

In mathematics education, problem solving has been considered as a goal, as a process, and as a basic skill. The processes involved in solving mathematical problems, from recognizing and understanding a problem, to modelling the problem through different representations, to planning a solution, to executing the solution, and to finally checking whether the problem has been solved, demonstrate that problem solving is a very important life skill for 21st-century citizens to possess.

## Theoretical and Philosophical Bases

Mathematics is a diverse discipline. With its universal applicability, it finds widespread use in various fields of endeavor, especially in solving real-world problems. It is essential that learners be mathematically proficient and critical thinkers to effectively tackle such problems.

Effective mathematics teaching requires understanding what students know and need to learn, and then challenging and supporting them to learn it well. It also requires knowing and understanding mathematics, students as learners, and pedagogical strategies (NCTM, 2000).

The teaching practices recommended by NCTM are grounded in views of knowledge, learning, and teaching informed by a constructivist perspective (e.g., Ball & Bass; Confrey, 1991; Gelman, 1994; Smith, diSessa & Roschelle, 1993). Teaching mathematics through constructivist methods allows students to deepen their knowledge beyond rote memorization, to develop meaningful contexts, and to take charge of the learning process as active participants rather than mere observers (WGU, 2020). These constructivist theories point to active learning, cognitive development in the context of social interaction, and conceptual understanding as critical in the teaching of mathematics.

Piaget's theory of cognitive development (1977) states that all knowledge is constructed, and the instrument of instruction includes cognitive structures that themselves are products of continued construction. In the preoperational stage, Piaget suggests that elementary school children need concrete objects, pictures, actions, and symbols to develop a deep understanding of mathematical concepts. In addition, Bruner concurs that conceptual learning begins from active engagement or experiences with concrete tasks ('enactive'), moves towards perceptual images ('iconic'), and then to abstract ('symbolic') representations (Bruner, 1966). For instance, when teaching addition with regrouping for obtaining, for example, 8 + 6, Grade 1 learners should move blocks in two groups to act out the idea of using part of one addend so that the other addend will become a complete "ten." This hands-on approach views numbers as quantities and not mere numerals, and progresses to pictorial representation of the same problem type. Learners' advancement leads to mental visualization and application of manipulations to abstract problems. Thus, the ultimate objective of mathematics education, as outlined in the Concrete-Representational-Abstract (CRA) Model, is to guide learners towards representations and operations that involve abstract symbols (Hui et al., 2017).

Vygotsky (1978), on the other hand, states that an individual cannot develop without interacting with the environment as emphasized in his zone of proximal development. By incorporating this theory into their teaching practices, teachers can tailor strategic instructional plans for groups or individual learners at various developmental stages. By effectively connecting complex material to familiar concepts, teachers can offer appropriate scaffolding such as strategic social interactions, tailored learning experiences, and instructions aligned with a learner's prior performance, intuition, and current thought processes. This improves the learner's ability to make sense of new situations, build on prior knowledge, and transfer learning. In teaching mathematics, these strategic instructional plans include the use of manipulatives, games, models, partial solutions, or making use of contextual problems based on the learner's interest.

Meanwhile, Glasersfeld (1987) claims that knowledge is not passively received but actively built up by the cognizing individual and thus, knowledge is the result of a self-organized cognitive process. This suggests that all knowledge is constructed rather than perceived through the senses. For instance, learning multiplication is not just about memorizing the multiplication facts, but it is also important for learners to understand the concepts underlying multiplication. Learners who lack understanding of fundamental concepts are more likely to struggle with higher-order thinking.

The use of representations in mathematics helps to demonstrate a learner's thinking. Whether these representations are concrete or abstract, they help them analyze the problem at hand, formulate an idea, and extend their reasoning. The NCTM Standards (2000) include that curriculum should emphasize that learners create and use representations to organize, record, and communicate mathematical ideas; select, apply, and translate mathematical representations to solve problems; and use representations to model and interpret physical, social, and mathematical phenomena (cited in Fennell & Rowan, 2001).

## Curriculum Framework

The framework designed for the revised Mathematics curriculum for Grades 1 to 10 guides teachers in their preparation of mathematically rich lessons and helps them in working towards the main curriculum goal.

To achieve the main goal, three facilitating facets have been developed: content, skills, and disposition.

The three facilitating facets are further reinforced by three supporting components: pedagogy, assessment, and resources, with each of these being relevant to the learning context, the curriculum content, and the learning phases of the learners.

Figure 1 shows the diagrammatic representation of the framework designed for the revised curriculum.

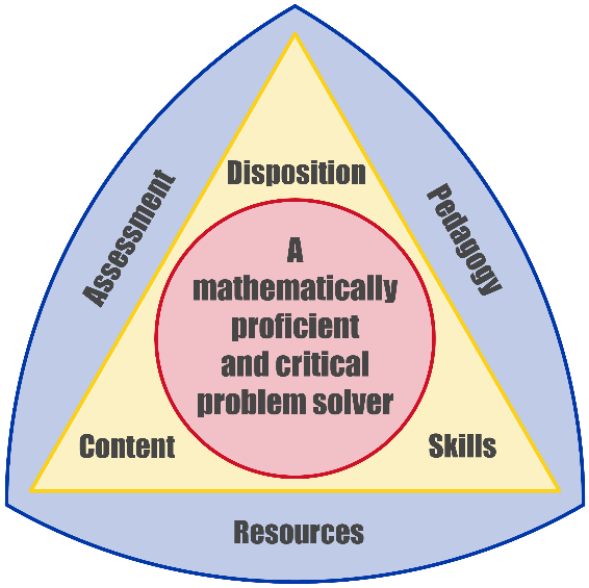


***Figure 1.*** *The Revised Grades 1 – 10 Mathematics Curriculum Framework*

Through the teaching and learning of the revised curriculum, it is also intended that learners exhibit the qualities emanating from the five intertwining strands of mathematical proficiency as defined by the National Research Council (NRC, 2001).

These strands are:

- Conceptual Understanding – comprehension of mathematical concepts, operations, and relations;
- Procedural Fluency – skill in carrying out procedures flexibly, accurately, efficiently, and appropriately;
- Strategic Competence – ability to formulate, represent, and solve mathematical problems;
- Adaptive Reasoning – capacity for logical thought, reflection, explanation, and justification; and
- Productive Disposition – habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy (p. 116).

These intertwining strands of mathematical proficiency are also covered in the SEAMEO Basic Education Standards (SEA-BES): Common Core Regional Learning Standards (CCRLS) in Mathematics and Science (2017). The SEA-BES CCRLS refers to: (1) cultivating basic human characters through mathematical values, attitudes and habits of mind; (2) developing creative human capital and process skills; and (3) the importance of knowledge of mathematics in cultivating well-qualified citizens.

Facione and Gittens (2016) define critical thinking as "the process of purposeful, reflective judgment" (p. 386). They further asserted that "the critical thinking process applies cognitive skills of interpretation, analysis, inference, evaluation, explanation, and self-regulation in an effort to judge what to believe or what to do" (p. 36).

The revised Mathematics curriculum will aim to develop among learners' proficiency in solving mathematical problems critically, grounded in strong conceptual knowledge, strategic use of mathematical skills and processes, and desirable values and disposition in mathematics, thus assisting them to become productive and successful 21st-century citizens.

## The Facilitating Facets

The three facilitating facets for achieving the curriculum goal of the Grades 1 to 10 Mathematics curriculum are content, skills, and disposition.

### Content

To become mathematically proficient and critical problem solvers, learners need to be equipped with strong mathematical knowledge and understanding. Lessons that are logically sequenced and interconnected enable students to learn deeply and flexibly.

The revised mathematics curriculum will have three content domains: (1) Number and Algebra; (2) Measurement and Geometry; and (3) Data and Probability.

**Skills**

As proficient problem solvers, learners need to possess a range of mathematical skills. Such skills enhance the ability to analyze and evaluate mathematical situations and obtain solutions to real-world problems.

In today's highly technological world, the teaching and learning of mathematics needs to include, and also go beyond, calculations and algorithmic procedures. This is because such calculations and procedures can be carried out by calculation devices and software applications.

**Disposition**

Disposition is closely related to "attitude" and "value." Values are the "guiding principles that underpin what people believe to be important when making decisions in private and public life … [while] attitudes are underpinned by values and beliefs and have an influence on behaviour" (Organization for Economic Co-operation and Development [OECD], 2019, p. 4). Mathematical disposition also incorporates appreciation of values intrinsic to mathematics such as its coherence and consistency, precision and clarity, and generality and extendibility.

A sound mathematical disposition facilitates genuine learning and the development of the mathematical proficiency needed for efficient and successful problem solving.

## The Supporting Components

The three components designed to support the facilitating facets for achieving the curriculum goal of the Grades 1 to 10 Mathematics curriculum are pedagogy, assessment, and resources.

**Pedagogy**

Pedagogy is concerned with the methods used to deliver a curriculum. The quality of mathematics learning depends on the quality of the various learning experiences employed to engage and instruct learners.

**Assessment**

Assessment complements pedagogical approaches and is a vital aspect of curriculum implementation in mathematics.

With the curriculum goal centered on developing mathematical proficiency, critical thinking, and problem solving, the assessment process should not only record learners' level of achievement in understanding concepts, reasoning, and the solution of mathematics problems, but should also result in the development of appropriate feedback for improving instruction.

Assessments, whether for formative or summative purposes, should be administered in various forms.

**Resources**

The learning of mathematics needs to be supported with a variety of teaching and learning resources. Electronic and print resources need to be carefully selected and judiciously used. Teachers and other instructional leaders are acknowledged as key resources in the implementation of the curriculum.

# Structure of the Learning Area

## Big Ideas

Charles (2005) defines a big idea as "a statement of an idea that is central to the learning of mathematics, one that links numerous mathematical understandings into a coherent whole" (p. 10).

The notion of Big Ideas lays the foundation for defining the context of the curriculum in terms of its mathematics content. The formulation of these Big Ideas illustrates the connections across the various mathematical concepts in the different stages of the learning process.

These Big Ideas are present in curriculum content domains and across the curriculum stages. They are interconnected and support and reinforce the integration of key concepts, while supporting and reinforcing each other. With the notion of Big Ideas, "mathematics is no longer seen as a set of disconnected concepts, skills, and facts. Rather, mathematics becomes a coherent set of ideas" (p. 10).

The revised curriculum identifies twelve Big Ideas:

1. Numbers – Real numbers can be paired one-to-one with the points on the number line, and so can quantify and describe a mathematical or real-world object and its attributes.

2. Measures – Some attributes of a mathematical or real-world object can be quantified by using measures, so that they can be studied further.

3. Shapes, Space, and Graphs – Mathematical objects such as geometric figures, solids, equations, inequalities, relations, and data can be visualized using shapes and graphs and in space.
4. Patterns, Relations, and Functions – Mathematical rule, graph, or table can be used to assign object(s) from one set to object(s) from another set to show specific relations between the two sets.
5. Data – Data can be collected and processed to obtain meaningful information.
6. Chance – The number 0 and 1 (inclusive) can be used to quantify and describe the chances for an event to occur.
7. Representations and Communications – Mathematical objects, properties, operations, and quantities (known or unknown) can be translated, represented, and communicated concretely or visually in a precise manner by using numbers, symbols, notations, variables, expressions, equations, geometric figures, flowcharts, tables, and graphs.
8. Relationships – The relationships that exists between mathematical concepts (e.g. objects, statements) can be used to generate more properties about them and to connect them to other concept in mathematics.
9. Operations and Transformations – Meaningful operations or transformations can be performed on a collection of mathematical objects or statements to obtain another mathematical object or statement that models a situation.
10. Properties and Applications – A mathematical object has properties that define the object or describe its attributes, and these properties and their logical consequences can be applied to mathematical and real-world problems.
11. Equivalence – Mathematical objects or statements can be represented or stated in different ways that have the same value, form, or logical meaning.
12. Reasoning and Proof – Mathematical reasoning and proofs establish and communicate the truth and falsity of a mathematical statement, computational and/or verbal procedure, and problem-solving process.

Through these Big Ideas, concepts and their competencies that are essential in the succeeding levels of the curriculum and that prepare the learners for higher-level mathematics are selected. A concept or a skill is “essential” if it is indispensable in building concepts and skills to equip learners for subsequent grade levels and, at the same time, for lifelong learning.

## Developmental Sequence of Concepts

“Any subject can be taught in some intellectually honest form to any child at any stage of development (Bruner, 1977, p.33).” Even the most complex mathematical concept can be learned at a young age if it is properly structured, suitably scaffolded, and progressively revisited over a span of time, gaining mastery and rigor along the way.

Harden and Stamper (1999) present the following features of a curriculum that incorporates a developmental sequence of concepts:

- topics are revisited;
- there are increasing levels of difficulty;
- new learning is related to previous learning;
- the competence of students increases as learning progresses (p. 141).

Developmental sequence of concepts is proposed in the structuring of the curriculum. Through this, mathematical knowledge and skills increase in depth and breadth as the grade level increases. Mathematical concepts are revisited in higher grade levels leading to increased complexity, increased conceptual understanding, and enhanced problem-solving skills.

**Vertical and Horizontal Articulation**

Vertical and horizontal articulation are used with the aim of ensuring that standards and competencies are logically sequenced within the mathematics curriculum and across learning areas.

**Vertical Articulation**

Vertical articulation is concerned with the development of mathematical knowledge, skills, and understanding across the grades in the curriculum. Key Stage 1 centers on foundational competencies in the three content domains. These competencies gradually progress to Key Stages 2 and 3, with an emphasis on analysis, reasoning, and communicating mathematically to confidently solve mathematical problems.

Emphasizing the key concepts identified, the Big Ideas reinforce the learning to achieve mathematical proficiency. Learners are equipped with skills and processes to carry out mathematical procedures and to solve problems. They are then able to communicate their reasoning and successfully complete tasks of higher cognitive demand.

**Horizontal Articulation**

Horizontal articulation is concerned with the role of mathematics across the curriculum. For instance, the concepts and skills in Key Stage 1 are indispensable in the development of foundational skills in other learning areas. Predominantly falling under languages learning areas, foundational skills in reading and writing are requisite to a fuller understanding of mathematical concepts and skills, including in reading and writing numbers expressed using numerals and in words, determining place value, and counting.

Meanwhile, concepts and skills in Mathematics are articulated vis-à-vis those in other learning areas. For example, describing the motion of an object in terms of distance, velocity, and acceleration in Science requires knowledge of formulating equations and finding solutions. Mensuration and calculation are core competencies in Edukasyon Pantahanan at Pangkabuhayan (EPP)/Technology Livelihood Education (TLE).

It is also clear that skills in data management and analysis are required by learners, especially for dealing with big data. Knowledge and skills in Number and in the use of money are fundamentally important in daily-life activities, including in budgeting, spending, saving, and earning, which are key to the development of strong financial literacy. Proficiency in Mathematics arguably facilitates better understanding in other learning areas, where it is used as a tool for learning the concepts and skills in those learning areas.

## Development of 21st Century Skills

The knowledge, skills, attitudes, and competencies that learners need to develop so that they can prepare for and succeed in work and life in the 21st century are referred to as "21st century skills." Through the facilitating facets and supporting components, the mathematics curriculum promotes and develops information, media and technology skills; learning and innovation skills; communication skills; and life and career skills (DepEd Order 21 S. 2019, p. 6).

To support learners in meeting the challenges of the 21st century, it is important to nurture their abilities to create innovative solutions to real-world problems. This gives further emphasis to the main curriculum goal.

Through the various mathematical tasks that they undertake, learners are engaged in cognitive processes to understand and solve problems using a variety of approaches, such as modelling, data analysis, and logical reasoning. Such approaches to solving problems encourage learners to pursue other Learning and Innovation Skills such as creativity, critical thinking, and reflective thinking. Presented with non-routine problems, learners can identify new connections between concepts and ideas, examine them from various perspectives, consider alternative ideas or solutions, and demonstrate willingness to try other methods or strategies in spite of previous unsuccessful attempts.

In developing skills in Information, Media and Technology, learners closely examine, interpret, and communicate understanding of various objects, shapes, symbols, and text types to stimulate and nurture visual literacy. By considering different objects, shapes and symbols, learners are able to bring their understanding of number, geometry, or data management to the interpretation of data sets presented in tables and graphs, and to the creation of engaging presentations and infographics.

The development of communication skills is critical for learners to be able to express their ideas, explain their solutions, and justify their reasoning in oral and/or written form. Learning tasks that involve activities that require teamwork and collaboration are also avenues for the development of interpersonal skills, intrapersonal skills, interactive communication, and non-verbal communication.

Life and career skills are evidenced in the curriculum through tasks that require skills for informed decision-making and collaboration that foster adaptive leadership. Self-discipline, resilience, and adversity management may be manifested through learners' perseverance in solving mathematical problems by using different approaches or strategies.

## Social Issues and Government Priorities

The learning competencies and performance standards of the curriculum are relevant in the address of some societal issues.

The curriculum equips learners with the mathematical concepts and skills that may be relevant to social justice, cultural diversity, sustainable development, and disaster risk reduction and management. Mathematical modelling, for example, could be utilized to address simple problems related to sustainable development and disaster risk reduction and management.

### STEM

Science, Technology, Engineering, and Mathematics (STEM) is a government priority and is significant in the development of problem solvers and innovative thinkers. As depicted in the STEM Framework, this is achieved through three learning areas in the K to 12 curriculum – Science, Mathematics, and Technology and Livelihood Education (TLE), which may collectively employ the Engineering Design Process (EDP) to attain curriculum goals. Though distinct and taught separately, these three learning areas are interrelated, and each contributes knowledge and skills for the solution of real-world problems. Figure 2 shows a diagrammatic representation of the STEM Framework.

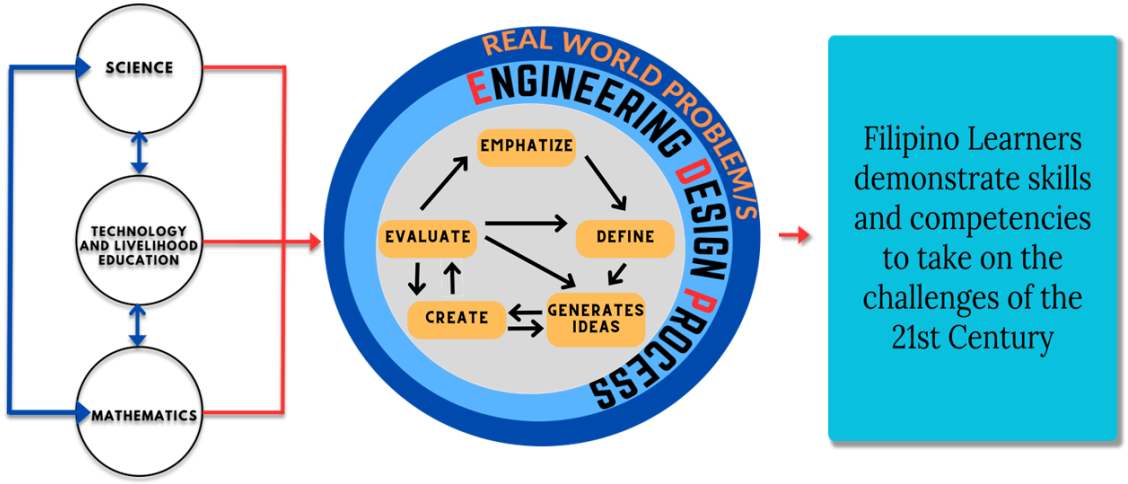


*Figure 2. The diagrammatic representation of the STEM Framework*

Utilizing the EDP in the instruction allows learners to repeat steps as many times as needed to make improvements, learn from unsuccessful attempts, and discover different or novel design possibilities to arrive at optimal solutions. In the curriculum, EDP is exhibited through problem solving and investigative approaches where learners apply their mathematical, scientific, and technological understanding to formulate, conjecture, reason, create and evaluate a solution to a real-world problem.

### Financial Literacy

Financial literacy is "the ability to use knowledge and skills to manage one's financial resources effectively for lifetime financial security" (Mandell, 2009).

The Financial Education Policy (DO 22, s. 2021) targets the financial literacy and capability of learners. The policy reiterates the need to integrate financial concepts across learning areas at different levels. In Mathematics, learners focus on concepts relating to the identification and value of money and use these concepts to solve specific problems on investment, saving, budgeting, and spending.

## Pedagogy, Assessment and Resources

The achievement of the Mathematics curriculum goals requires explicit guidance on instruction, on the role of assessment, on the use of resources for teaching and learning, and on the use of student context.

### Pedagogy

In broader terms, there are two types of knowledge at play in a mathematics classroom: the mathematical knowledge that the learners have gained from their everyday experiences and the mathematical knowledge articulated in the curriculum. Relating learners' informal knowledge of mathematical concepts and facilitating learners' internalization of school mathematics are major tasks of teaching. It necessitates teaching strategies that bring into the fore what learners already know, such as using in tasks situations that are familiar to the learners to draw out the mathematics that they already know in this context.

For achieving the Mathematics curriculum goal, a variety of pedagogical approaches can be used. Strategies that can be adopted include: guided discovery learning, inquiry-based learning, reflective learning, experiential learning, and the concrete-representational-abstract (CRA) instructional approach, among others. In addition, pedagogical approaches that include guided or direct instruction coupled with opportunities for learners' inquiry in generating their own solutions, collaborative learning with peers, and independent learning, may also be employed. Mastery learning is also emphasized to ensure that learners reach a certain level of proficiency to be able to engage in a new learning task successfully.

The curriculum views the attainment of its goals with all learners in mind. Through its standards and competencies, the curriculum acknowledges the different needs of learners, fosters their engagement with learning, and promotes the use of appropriate language and technologies to make learning accessible.

The curriculum is informed by reviews that have identified the different levels of performance of Filipino learners. At the same time, diversity, equity, and inclusion need to be continually considered throughout the teaching and learning of Mathematics.

**Assessment**

As a vital aspect of curriculum implementation in Mathematics, assessment plays a key role in shaping learners' thinking about their mathematical potential, moving away from performance and towards an emphasis on growth and learning (Boaler, Dance & Woodbury, 2018).

Regardless of whether assessment is formal or informal, assessment tools should be varied in order to understand the different dimensions of students' learning (SEI-DOST, 2011). While examinations and quizzes have a place in measuring skills learned, and knowledge development and acquisition, many aspects of mathematical learning could be effectively measured by other means such as interview tasks, analysis of student work samples, presentations by learners, and questioning by teachers.

Formative and summative assessment tasks that are appropriate to the grade level and relevant conceptual understanding and skills, should be developed in conjunction with other learning areas. For example, developing a healthy menu plan for a week may be primarily in Health or Science, may include Mathematics on the computation of a budget for the daily meal, English for the written presentation of the menu, and Arts for the visual presentation of the menu.

Together with data from international assessments, results from classroom assessments need to be analyzed and used to improve planning for further instruction and learning.

Formative and summative assessments provide opportunities for learners to demonstrate higher-order mathematical thinking, justify their solutions, communicate their understanding, and express their ideas well in written and/or oral form. For instance, portfolios of learner's mathematical work on meaningful tasks (e.g., drawing interconnections of mathematical concepts across various disciplines), as well as reports, including mathematical investigations, may be employed.

As envisioned for the revised curriculum, the continuous interaction of teaching and learning may be realized through assessment tasks that are information driven and are seamlessly designed to communicate the goals of successful learning.

**Resources**

Appropriate resources are fundamental to supporting the delivery of a quality curriculum. Such resources are developed and disseminated to schools for the various learning areas and grades.

Teaching and learning have been assisted and made more inclusive through the use of technology. From calculating devices, instructional manipulatives and software applications, to assistive and adaptive devices, the curriculum strongly recommends the use of these available technologies to facilitate the teaching and learning of concepts and skills, and to enhance problem solving.

In particular, the curriculum presupposes the use of instructional manipulatives and software applications in Key Stages 1, 2 and 3, calculating devices as additional technological support in Key Stage 3, and assistive and adaptive devices for learners with special needs.

The TIMSS 2019 results show that "there is a modest positive association between home educational resources and average mathematics achievement at the country level" (Mullis et al., 2020, p. 285). Relevant to the level of these home resources are the availability of Internet connection, books, and one's own room, as well as parents' level of education. The learners' home environment, together with the availability of technological resources, plays a significant role in supporting the implementation of the curriculum.

## The Role of Language

Mathematics has its own specialized terminology to name objects such as numbers, polygons and functions; its own specialized symbolic and representational system; and its own rules for working with these objects.

Foundational understanding of mathematics is contingent on the learner's ability to communicate in the language of mathematics. The use of particular mathematical terms and representations demonstrates how a learner's thinking processes evolve. For example, at an early stage of learning, a learner may describe a square as "a shape with four equal sides," then at a middle stage, "a rectangle with four equal sides," and, at a later stage, "a quadrilateral with four equal angles and four equal sides."

For mathematical terms in a multi-lingual classrooms, it is recommended that the English terms be adopted. Furthermore, the learner's language can be used as a tool in learning and understanding mathematics across all levels.

# Key Stage Curriculum and Standards

## Key Stage 1 Curriculum

Key Stage 1 (KS 1) of the Mathematics curriculum focuses on Grades 1 to 3 learners. At this stage, the curriculum addresses the development of early numeracy by focusing on the learners' understanding of 1-to-4-digit numbers, measures, basic shapes, and simple data. It also develops their fluency in carrying out procedures or operations involving these mathematical objects in their various representations (concrete, contextual, verbal, visual, and symbolic). Mastery of early numeracy concepts lays the groundwork for understanding more complex mathematical concepts and solving more complex problems.

Learning experiences include basic mathematical explorations of these objects and operations that will engage learners in a variety of thinking processes in real, in situated, and in purely mathematical contexts. The goal of learning experiences is to support and strengthen the young learners' interest and appreciation of mathematics as a tool for solving problems and for communicating ideas in everyday situations.

The learning standards of the Key Stage 1 Mathematics curriculum aim to ensure that learners:

- accurately understand and apply concepts, operations, procedures, and relationships in solving routine and non-routine problems related to their day-to-day lives.
- acquire high-level skills and fluency in the procedures and processes of mathematics through varied frequent practice and meaningful learning experiences.
- communicate and represent mathematical concepts and understanding using developmentally appropriate language.
- acquire problem-solving and critical thinking skills through real, situated or purely mathematical problems.
- develop appreciation, curiosity, interest, creativity, and other desirable values, attitudes and dispositions in mathematics.

## Key Stage 1 Standards

At the end of Grade 3, the learner demonstrates knowledge, skills, and understanding in relation to the curriculum content domain Number and Algebra (whole numbers up to 10 000; ordinal numbers up to 100$^{th}$; addition and subtraction of numbers of up to 4 digits, and money up to ₱10 000; multiplication and division using 6, 7, 8 and 9 multiplication tables; estimation of products of two numbers; determination of missing terms contained in patterns; generation of patterns; division of 2- to 4-digit numbers; estimation of quotients; addition and subtraction of similar fractions); Measurement and Geometry (areas of squares and rectangles; points, lines, line segments, and rays; parallel, perpendicular, and intersecting lines; measures of mass and capacity; line symmetry; resulting figure translation; duration of time, elapsed time, and telling and writing time in hours and minutes (using a.m. and p.m.); composite figures made up of squares, rectangles, triangles, circles, half-circles, and quarter-circles; perimeter of triangles, squares, and rectangles); Data and Probability (data presented in tables, pictographs, and single bar graphs; outcomes from experiments and

real-life situations). This knowledge, skills and understanding is applied, with the use of technology, to the processes within Mathematics of critical thinking, problem solving, communicating, reasoning, and making connections between topic areas.

**Key Stage 2 Curriculum**

Key Stage 2 (KS 2) of the Mathematics curriculum focuses on Grades 4 to 6 learners. At this stage, the curriculum extends numbers, algebra, measures, geometry, data and probability. The coverage includes more complex properties, operations, and problems in different contexts that demand efficient written and mental methods of calculation.

The learning standards of the KS 2 Mathematics curriculum aim to ensure that learners:

- use efficient mental and written mathematical concepts, operations, procedures, relationships, and tools to solve routine and non-routine real-world problems.
- reason and communicate using precise mathematical language to discuss ideas, investigate problems, and justify solutions.
- exhibit willingness and confidence to explore alternative solutions, and to take risks necessary to solve real-world problems.
- acquire problem-solving and critical thinking skills through real, situated, or purely mathematical problems; and
- enhance appreciation, curiosity, interest, creativity, and other desirable values, attitudes and dispositions in mathematics.

**Key Stage 2 Standards**

At the end of Grade 6, the learner demonstrates knowledge, skills, and understanding in relation to the curriculum content domain Number and Algebra (the four operations with decimals; the four operations with different combinations of fractions, whole numbers, and mixed numbers; ratio and proportion; percentages, and their relationships with fractions and decimals; exponential form, including calculation using the GEMDAS rules; greatest common factors, least common multiples); Measurement and Geometry (right, acute, and obtuse; tessellation of shapes; resulting figure after translation, reflection and rotation; units of volume and capacity; volume of cubes and rectangular prisms; properties of triangles and quadrilaterals; perimeter and area of triangles, parallelograms, trapezoids; parts of a circle, including circumference; area of a circle; composite figures composed of any two or more of: triangle, square, rectangle, circle, semi-circle; prisms and pyramids; surface area of solid figures; symmetric figures and designs; 12- and 24-hour time, and world time zones); Data and Probability (presentation and interpretation of data in tabular form and in a single line graph; double bar graphs and double line graphs; theoretical probability; pie graphs). This knowledge, skills and understanding is applied, with the use of technology, to the processes within Mathematics of critical thinking, problem solving, communicating, reasoning, and making connections between topic areas.

**Key Stage 3 Curriculum**

Key Stage 3 (KS 3) of the Mathematics curriculum focuses on Grades 7 to 10 learners. At this stage, the curriculum covers algebra, measurement, geometry, and data and probability with greater emphasis on cognitive development towards self-directed learning.

Dealing with more complex and abstract forms, Key Stage 3 concentrates on sets and real numbers, functions, equations, inequalities, sequences, axiomatic structure of geometry, triangle congruence and similarity, basic trigonometry, basic statistical measures, and probability.

The learning standards of the KS 3 Mathematics curriculum aim to ensure that learners:

- apply mathematical concepts, operations, procedures, facts, relationships, and tools to describe, explain, investigate, model, and predict phenomena.
- reason mathematically, construct plausible arguments, evaluate the reasoning of others, and ask useful questions to clarify or improve arguments.
- access, use, interpret and communicate mathematical information and ideas to engage in and manage the mathematical demands in various 21st-century contexts.
- utilize mathematical thinking in decision making and acquire problem-solving and critical thinking skills through real, situated, or purely mathematical problems; and
- strengthen appreciation, curiosity, interest, creativity, and other desirable values, attitudes, and dispositions in mathematics.

**Key Stage 3 Standards**

At the end of Grade 10, the learner demonstrates knowledge, skills, and understanding in relation to the curriculum content domain Number and Algebra (use of rates; sets and subsets, and the union and intersection of sets; Venn diagrams; operations using scientific notation; rules for obtaining terms in sequences; earning money, profit and loss, 'best buys', buying on terms; relations and functions; graphs of linear functions, and the identification of domain and range, slope, intercepts, and zeros; direct and inverse variation; quadratic inequalities in one variable and in two variables; absolute value equations and inequalities in one variable, and their graphs; radical expressions; the roots of a quadratic equation; quadratic functions; equations reducible to quadratic equations; equation of a circle and the graph of a circle; compound interest and depreciation); Measurement and Geometry (volume of square and rectangular pyramids, and cylinders; measures of length, area, surface area, volume, time, and temperature; volume of pyramids, cones, and spheres; the Pythagorean Theorem; triangle inequality theorems; perpendicular and parallel lines, and angles formed by parallel lines cut by a transversal; congruence of triangles; congruence proofs; similarity of polygons; special triangles; triangle theorems and triangle inequality theorems; the laws of sines and the laws of cosines; translations, reflections, and rotations in the

Cartesian plane; central angles, inscribed angles, and angles and lengths formed by intersecting chords, secants, and tangents of a circle; sectors and segments of a circle, and their areas); Data and Probability (Fundamental Counting Principle; probabilities of simple and compound events; box-and-whisker plots, and cumulative frequency histograms and polygons; quartiles, deciles, and percentiles; interquartile range, and outliers; evaluation of statistical reports; union and intersection of events, dependent and independent events, and complementary events). This knowledge, skills and understanding is applied, with the use of technology, to the processes within Mathematics of critical thinking, problem solving, communicating, reasoning, and making connections between topic areas.

**GRADE LEVEL STANDARDS**

| GRADE LEVEL | GRADE LEVEL STANDARDS |
|---|---|
| **GRADE 1** | The learner demonstrates knowledge, skills, and understanding in relation to the curriculum content domains Number and Algebra (whole numbers up to 100; ordinal numbers up to 10$^{th}$; addition of numbers with sums up to 20; place value in any 2-digit number; addition of numbers, with sums up to 100; subtraction of numbers where both numbers are less than 100; repeating patterns, fractions ½ and ¼; the denominations and values of Philippine coins and bills up to ₱100; addition of money where the sum is up to ₱100 and subtraction of money where both amounts are less than ₱100); Measurement and Geometry (simple 2-dimensional shapes; measurement of length and distance using non-standard units; the movement of objects in half turn or quarter turn, in clockwise or counter clockwise direction; time measured in hours, half-hours, quarter hours, days, weeks, months, years); and Data and Probability (pictographs without a scale for the representation of data). This knowledge, skills, and understanding is applied, with the use of technology, to the processes within Mathematics of critical thinking, problem solving, communicating, reasoning, and making connections between topic areas. |
| **GRADE 4** | The learner demonstrates knowledge, skills, and understanding in relation to the curriculum content domains Number and Algebra (whole numbers up to 1 000 000; addition of numbers with sums up to 1 000 000 and subtraction of numbers where both numbers are less than 1 000 000; multiplication of whole numbers with products-up to 1 000 000; division of up to 4-digit numbers by up to 2-digit numbers, and the MDAS rules; addition and subtraction of similar fractions, including mixed numbers; dissimilar and equivalent fractions; factors and multiples of numbers up to 100; addition and subtraction of dissimilar fractions; simple patterns; number sentences; decimal numbers and their relationship to fractions); Measurement and Geometry (right, acute, and obtuse angles; properties of triangles and quadrilaterals; perimeter of quadrilaterals, and composite figures composed of triangles and quadrilaterals; conversion of units of length, mass, capacity, and time; symmetric figures and designs; reflection with shapes); and Data and Probability (presentation and interpretation of data in tabular form and in a single line graph). This knowledge, skills, and understanding is applied, with the use of technology, to the processes within Mathematics of critical thinking, problem solving, communicating, reasoning, and making connections between topic areas. |

| | |
|---|---|
| **GRADE 7** | The learner demonstrates knowledge, skills, and understanding in relation to the curriculum content domains Number and Algebra (application of percentages; use of rates; rational numbers; square roots of perfect squares, cube roots of perfect cubes, and irrational numbers; sets and subsets, and the union and intersection of sets; Venn diagrams; the set of integers, and comparing and ordering integers; the four operations with integers; simplification of numerical expressions involving integers; absolute value of an integer; the solution of simple equations; the evaluation of algebraic expressions following substitution; the rearrangement of a formula to make a different variable the subject of the formula; operations using scientific notation); Measurement and Geometry (regular and irregular polygons and their features/properties; determination of measures of angles and number of sides of polygons; conversion of units of measure; volume of square and rectangular pyramids, and cylinders); and Data and Probability (data collection and sampling techniques, and the presentation of data in appropriate tables and graphs; interpretation of statistical graphs; outcomes from experiments). This knowledge, skills, and understanding is applied, with the use of technology, to the processes within Mathematics of critical thinking, problem solving, communicating, reasoning, and making connections between topic areas. |

| Grade 1 | | |
|---|---|---|
| **CONTENT DOMAIN** | **CONTENT STANDARDS**<br>*The learners should have knowledge and understanding of …* | **LEARNING COMPETENCIES**<br>*The learners …* |
| **Quarter 1** | | |
| **Measurement and Geometry (MG)** | 1. simple 2-dimensional shapes and their features. | 1. identify simple 2-dimensional shapes (triangle, rectangle, square) of different size and in different orientation.<br>2. compare and distinguish 2-dimensional shapes according to features such as sides and corners.<br>3. compose and decompose triangles, squares, and rectangles. |
| **Number and Algebra (NA)** | 2. whole numbers up to 100.<br>3. ordinal numbers up to 10th.<br>4. addition of numbers with sums up to 20. | 4. count up to 100 (includes counting up or down from a given number and identifying a number that is 1 more or 1 less than a given number).<br>5. read and write numerals up to 100.<br>6. recognize and represent numbers up to 100 using a variety of concrete and pictorial models (e.g., number line, block or bar models, and numerals).<br>7. compare two numbers up to 20.<br>8. order numbers up to 20 from smallest to largest, and vice versa.<br>9. describe the position of objects using ordinal numbers: 1st, 2nd, 3rd, up to 10th.<br>10. compose and decompose numbers up to 10 using concrete materials (e.g., 5 is 5 and 0; 4 and 1; 3 and 2; 2 and 3; 1 and 4; 0 and 5).<br>11. illustrate addition of numbers with sums up to 20 using a variety of concrete and pictorial models and describes addition as “counting up,” and “putting together.”<br>12. illustrate by applying the following properties of addition, using sums up to 20:<br>a. the sum of zero and any number is equal to the number, and<br>b. changing the order of the addends does not change the sum.<br>13. solve problems (given orally or in pictures) involving addition with sums up to 20. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- identify and distinguish simple 2-dimensional shapes. (MG)
- count, recognize and represent whole numbers up to 100. (NA)
- use ordinal numbers up to $10^{th}$ to describe position. (NA)
- compare and order numbers up to 20 and perform addition of numbers with sums up to 20. (NA)

| **Grade 1** | | |
|---|---|---|
| **Quarter 2** | | |
| **Measurement and Geometry (MG)** | 1. measurement of length and distance using non-standard units. | 1. measure the length of an object and the distance between two objects using non-standard units.<br>2. compare lengths and distances using non-standard units.<br>3. solve problems involving lengths and distances using non-standard units. |
| **Number and Algebra (NA)** | 2. place value in any 2-digit number.<br>3. addition of numbers, with sums up to 100. | 4. order numbers up to 100 from smallest to largest, and vice versa.<br>5. counts by 2s, 5s and 10s up to 100.<br>6. determine<br>a. the place value of a digit in a 2-digit number,<br>b. the value of a digit, and<br>c. the digit of a number, given its place value<br>7. decompose any 2-digit number into tens and ones.<br>8. add numbers by expressing addends as tens and ones (expanded form).<br>9. add numbers with sums up to 100 without regrouping, using a variety of concrete and pictorial models for:<br>a. 2-digit and 1-digit numbers, and<br>b. 2-digit and 2-digit numbers.<br>10. solve problems (given orally or in pictures) involving addition with sums up to 100 without regrouping. |
| **Performance Standards**<br>*By the end of the quarter, the learners are able to …*<br>• use non-standard units to compare and measure length and distance. (MG)<br>• order and decompose (into tens and ones) numbers up to 100. (NA)<br>• perform addition of numbers with sums up to 100. (NA) | | |

| Grade 1 | | |
|---|---|---|
| **Quarter 3** | | |
| **Data and Probability (DP)** | 1. a pictograph without a scale for the representation of data. | 1. collect data in one variable through a simple interview.<br>2. present data in a pictograph without a scale.<br>3. interpret a pictograph without a scale.<br>4. organize data in a pictograph without a scale into a table. |
| **Number and Algebra (NA)** | 2. subtraction of numbers where both numbers are less than 100.<br>3. repeating patterns. | 5. illustrate subtraction involving numbers up to 20 using a variety of concrete and pictorial models, and describes subtraction as "taking away."<br>6. find the missing number in addition or subtraction sentences involving numbers up to 20.<br>7. write an equivalent expression to a given addition or subtraction expression (e.g., 2+3 = 1+4; 10-5 = 6-1).<br>8. solve subtraction problems (given orally or in pictures) where both numbers are less than 20.<br>9. subtract numbers where both numbers are less than 100 using concrete and pictorial models, without regrouping:<br>a. 2-digit minus 1-digit numbers, and<br>b. 2-digit minus 2-digit numbers.<br>10. subtract numbers by expressing minuends and subtrahends as tens and ones (expanded form), without regrouping.<br>11. determine the next term/s in a repeating pattern (patterns could use rhythmic properties, visual elements in the arts, …)<br>(e.g., numbers: 2, 4, 2, 4__, __; letters: a, b, c, a, b, c, a, __, __,).<br>12. create repeating patterns using objects, images, or numbers. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- represent and interpret data in a pictograph without a scale. (DP)
- perform subtraction of numbers where both numbers are less than 100. (NA)
- extend existing repeating patterns and create new repeating patterns. (NA)

| **Grade 1** | | |
|---|---|---|
| **Quarter 4** | | |
| **Number and Algebra (NA)** | 1. fractions $\frac{1}{2}$ and $\frac{1}{4}$.<br>2. the denominations and values of Philippine coins and bills up to ₱100.<br>3. addition of money where the sum is up to ₱100 and subtraction of money where both amounts are less than ₱100. | 1. illustrate $\frac{1}{2}$ and $\frac{1}{4}$ as parts of a whole.<br>2. compare $\frac{1}{2}$ and $\frac{1}{4}$ using models.<br>3. count halves and quarters<br>4. recognize coins (excluding centavo coins) and bills up to ₱100 and their notations.<br>5. determine the value of a number of bills and/or a number of coins (excluding centavo coins) up to ₱100.<br>6. compare different denominations of peso coins (excluding centavo coins) and bills up to ₱100.<br>7. solve 1-step problems (given orally or in pictures) involving addition of money where the sum is up to ₱100, or subtraction of money where both amounts are less than ₱100. |
| **Measurement and Geometry (MG)** | 4. the movement of objects in half turn or quarter turn, in clockwise or counter clockwise direction.<br>5. time measured in hours, half hours, quarter hours, days, weeks, months, and years. | 8. identify the position of objects moved in half turn or in quarter turn, in clockwise or in counter-clockwise direction, given an initial facing direction.<br>9. read and write time by the hour, half hour, and quarter hour using an analog clock.<br>10. give the days of the week and months of the year in the correct order.<br>11. determine the day and month of the year using a calendar.<br>12. solve problems involving time (hour, half hour, quarter hour, days in a week, and months in a year). |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- illustrate and compare the fractions $\frac{1}{2}$ and $\frac{1}{4}$. (NA)
- recognize, and determine the value of, Philippine coins and bills up to ₱100. (NA)
- add money where the sum is up to ₱100 and subtract money where both amounts are less than ₱100. (NA)
- identify the position of an object following a half turn or quarter turn, in clockwise or counter-clockwise direction. (MG)
- identify and work with time measured in hours, half hours, quarter hours, days, weeks, months, and years. (MG)

| Grade 4 | | |
|---|---|---|
| **CONTENT DOMAIN** | **CONTENT STANDARDS**<br>*The learners should have knowledge and understanding of …* | **LEARNING COMPETENCIES**<br>*The learners …* |
| **Quarter 1** | | |
| **Measurement and Geometry (MG)** | 1. measures of angles<br>2. properties of triangles and quadrilaterals.<br>3. perimeter of quadrilaterals, and composite figures composed of triangles and quadrilaterals. | 1. illustrate different angles (right, acute, and obtuse) using models.<br>2. measure and draw angles using a protractor.<br>3. draw and state the properties of triangles and quadrilaterals.<br>4. classify triangles and quadrilaterals according to sides and angles.<br>5. differentiate different quadrilaterals.<br>6. find the perimeter of quadrilaterals that are not squares or rectangles.<br>7. find the perimeter of composite figures composed of triangles and quadrilaterals. |
| **Number and Algebra (NA)** | 4. whole numbers up to 1 000 000.<br>5. addition of numbers with sums up to 1 000 000 and subtraction of numbers where both numbers are less than 1 000 000. | 8. read and write numbers up to 1 000 000 in numerals and in words.<br>9. determine<br>a. the place value of a digit in a 6-digit number,<br>b. the value of a digit, and<br>c. the digit of number, given its place value.<br>10. compare numbers up to 1 000 000 using =, < and >.<br>11. round numbers to the nearest hundred thousand.<br>12. estimate the sum and difference of two 5- to 6-digit numbers by rounding the addends to the nearest large place value of the numbers.<br>13. add numbers with sums up to 1 000 000 and subtracts numbers where both numbers are less than 1 000 000, with and without regrouping. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- illustrate and measure different angles (MG)
- classify triangles and quadrilateral, and differentiate quadrilaterals, by applying their properties. (MG)
- find the perimeter of quadrilaterals and composite figures composed of triangles and quadrilaterals. (MG)
- read, write, and compare whole numbers up to 1 000 000. (NA)
- performs addition of numbers with sums up to 1 000 000 and subtraction of numbers where both numbers are less than 1 000 000. (NA)

| Grade 4 | | |
|---|---|---|
| **Quarter 2** | | |
| **Number and Algebra (NA)** | 1. multiplication of whole numbers with products-up to 1 000 000, division of up to 4-digit numbers by up to 2-digit numbers, and the MDAS rules. | 1. multiply two numbers with and without regrouping:<br>a. 3- to 4-digit numbers by a 1-digit number, and<br>b. 2- to 3-digit numbers by 2-digit numbers, with products up to 1 000 000.<br>2. estimate the result of multiplying two numbers where the product is less than 1 000 000.<br>3. solve multi-step problems involving one or more of the four operations with results of calculations up to 1 000 000, including problems involving money.<br>4. divide two numbers with and without regrouping<br>a. 3- to 4-digit numbers by 1-digit numbers<br>b. 2- to 3-digit numbers by 2-digit numbers<br>5. estimate the quotient when dividing 3- to 4-digit dividends by 1- to 2-digit divisors, by first estimating the dividends and divisors using multiples of 10.<br>6. represent situations involving one or more of the four operations using a number sentence.<br>7. perform two or more different operations by applying the MDAS rules. |
| **Measurement and Geometry (MG)** | 2. conversion of units of length, mass, capacity, and time. | 8. convert common units of measure from larger to smaller units, and vice versa:<br>a. meter and centimeter,<br>b. kilometer and meter,<br>c. kilogram and gram,<br>d. gram and milligram, and<br>e. liter and milliliter.<br>9. convert time measures from smaller to larger units, and vice versa:<br>a. seconds to minutes,<br>b. minutes to hours,<br>c. hours to days,<br>d. days to weeks<br>e. weeks to months, and<br>f. months to years.<br>10. solve problems involving conversion of units of length, mass, capacity, and time, including problems involving elapsed time in hours and minutes. |
| **Number and Algebra (NA)** | 3. addition and subtraction of similar fractions, including mixed numbers. | 11. identify proper fractions, improper fractions, and mixed numbers.<br>12. rewrite improper fractions into mixed numbers, and vice versa.<br>13. plot fraction (proper fractions, improper fractions, and mixed numbers) with denominators 2, 4, 5, and 10 on the number line.<br>14. add and subtract similar fractions:<br>a. two proper fractions,<br>b. two mixed numbers,<br>c. a mixed number and a proper fraction,<br>d. a whole number and a proper fraction, and<br>e. a whole number and a mixed number. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- perform multiplication of whole numbers with products up to 1 000 000. (NA)
- perform division of up to 4-digit numbers by up to 2-digit numbers. (NA)
- perform different operations by applying the MDAS rules. (NA)
- convert units of length, mass, capacity, and time. (MG)
- perform addition and subtraction of similar fractions, including mixed numbers. (NA)

| **Grade 4** | | |
|---|---|---|
| **Quarter 3** | | |
| **Number and Algebra (NA)** | 1. dissimilar and equivalent fractions.<br>2. factors and multiples of numbers up to 100.<br>3. addition and subtraction of dissimilar fractions. | 1. represent dissimilar fractions, with denominators up to 10, using models.<br>2. compare dissimilar fractions using the symbols =, >, and <.<br>3. order dissimilar fractions from smallest to largest, and vice versa.<br>4. generate equivalent fractions using models.<br>5. determine equivalent fractions.<br>6. identify the multiples of given numbers up to 100.<br>7. find all the factors of a given number up to 100.<br>8. reduce fractions to simplest form.<br>9. add and subtract dissimilar fractions using models.<br>10. add and subtract dissimilar fractions:<br>a. two proper fractions,<br>b. two mixed numbers,<br>c. a mixed number and a proper fraction,<br>d. a whole number and a proper fraction, and<br>e. a whole number and a mixed number.<br>11. solve multi-step problems involving addition and/or subtraction of fractions. |
| **Measurement and Geometry (MG)** | 4. symmetric figures with respect to a line<br>5. resulting images after applying reflection with respect to a line. | 12. identify symmetry with respect to a line.<br>13. complete a figure that is symmetric with respect to a line.<br>14. draws the image of an object after applying reflection with respect to a line, including glide reflection. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- represent, compare, and order dissimilar fractions. (NA)
- find factors and multiples of numbers up to 100. (NA)
- identify symmetry with respect to a line, and create figures that have line symmetry. (MG)
- perform reflection with respect to a line, including glide reflection, to obtain images of shapes. (MG)

| **Grade 4** | | |
|---|---|---|
| **Quarter 4** | | |
| **Data and Probability (DP)** | 1. presentation and interpretation of data in tabular form and in a single line graph. | 1. collect data with time element using appropriate sources.<br>2. present data in a tabular form, or in a single line graph.<br>3. interpret data presented in a tabular form, or in a single line graph.<br>4. solve problems using data for at most two variables in a tabular form, or in a single line graph. |
| **Number and Algebra (NA)** | 2. simple patterns.<br>3. number sentences.<br>4. decimal numbers and their relationship to fractions. | 5. describe the rule used to generate a given simple pattern.<br>6. complete a number sentence:<br>a. to represent a property of operations (e.g., 4 + 3 = 3 + __) (commutative property of addition)<br>b. to represent equivalent number facts (e.g., 4 + __ = 6 + 3)<br>7. represent decimal numbers using models and manipulatives to show the relationship to fractions.<br>8. read and write decimal numbers with decimal parts to hundredths.<br>9. determine<br>a. the place value to hundredths of a digit in a given decimal number,<br>b. the value of a digit, and<br>c. the digit of number, given its place value.<br>10. convert decimal numbers to fractions, and fractions with denominators 10 or 100 to decimals.<br>11. plot decimal numbers with tenth decimal part on the number line.<br>12. compare and order decimal numbers with decimal parts to hundredths.<br>13. round decimal numbers to the nearest whole number and to the nearest tenth. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- present and interpret data in tabular form and in a single line graph. (DP)
- generate a simple pattern and describe the rule used. (NA)
- complete number sentences to represent number properties and number facts. (NA)
- represent, compare, order, and round decimal numbers. (NA)
- convert decimal numbers to fractions and fractions (with denominators 10 or 100) to decimals. (NA)

| Grade 7 | | |
|---|---|---|
| **CONTENT DOMAIN** | **CONTENT STANDARDS**<br>*The learners should have knowledge and understanding of ...* | **LEARNING COMPETENCIES**<br>*The learners ...* |
| **Quarter 1** | | |
| **Measurement and Geometry (MG)** | 1. regular and irregular polygons and their features/properties.<br>2. determination of measures of angles and number of sides of polygons. | 1. draw and describe regular and irregular polygons with 5, 6, 8, or 10 sides, based on measurements of sides and angles, using a ruler and protractor.<br>2. draw triangles, quadrilaterals, and regular polygons (5, 6, 8, or 10 sides) with given angle measures.<br>3. describe and explain the relationships between angle pairs based on their measures.<br>4. classify polygons according to the number of sides, whether they are regular or irregular, and whether they are convex or non-convex.<br>5. deduce the relationship between the exterior angle and adjacent interior angle of a polygon.<br>6. determine the measures of angles and the number of sides of polygons. |
| **Number and Algebra (NA)** | 3. application of percentages.<br>4. use of rates.<br>5. rational numbers. | 7. solve problems involving:<br>a. percentage increase, and<br>b. percentage decrease.<br>8. solve money problems involving percentages (e. g., discount, commission, sales tax, simple interest).<br>9. create a financial plan.<br>10. identify and explain the uses of rates.<br>11. solve problems involving rates (e.g., speed).<br>12. describe given rational numbers as fractions, decimals, or percentages.<br>13. order rational numbers on a number line.<br>14. perform operations on rational numbers. |

**Performance Standards**

*By the end of the quarter, the learners are able to ...*

- draw, and describe the features/properties of, regular and irregular polygons. (MG)
- use percentages in different contexts. (NA)
- identify and use rates. (NA)
- create a financial plan. (NA)
- describe, order, and perform operations on, rational numbers. (NA)

| **Grade 7** | | |
|---|---|---|
| **Quarter 2** | | |
| **Number and Algebra (NA)** | 1. square roots of perfect squares, cube roots of perfect cubes, and irrational numbers. | 1. determine the square roots of perfect squares and the cube roots of perfect cubes.<br>2. identify irrational numbers involving square roots and cube roots, and their locations on the number line. |
| **Measurement and Geometry (MG)** | 2. conversion of units of measure.<br>3. volume of square and rectangular pyramids, and cylinders. | 3. convert units of measure within the International System of Units (SI) and across different systems of measure.<br>4. explain inductively the volume of a cylinder using the area of a circle, leading to the identification of the formula.<br>5. find the volume of a cylinder.<br>6. solve problems involving the volumes of cylinders.<br>7. explore inductively the volume of square and rectangular pyramids using rectangular prisms, leading to the identification of the formula.<br>8. estimate volumes of square and rectangular pyramids.<br>9. solve problems involving volumes of square or rectangular pyramids. |
| **Number and Algebra (NA)** | 4. sets and subsets, and the union and intersection of sets using Venn diagrams<br>5. subset of real numbers. | 10. describe sets and their subsets, the union of sets, and the intersection of sets<br>11. illustrate sets and their subsets, the union of sets, and the intersection of sets, through the use of Venn diagrams.<br>12. illustrate the different subsets of real numbers. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- determine square roots of perfect squares and cube roots of perfect cubes, and identify irrational numbers. (NA)
- convert units of measure from different systems of measure. (MG)
- find the volume of square and rectangular pyramids, and the volume of cylinders. (MG)
- describe sets and their subsets, and the union and intersection of sets. (NA)
- illustrates sets and subsets, and union and intersection of sets, using Venn diagrams. (NA)

| Grade 7 | | |
|---|---|---|
| **Quarter 3** | | |
| **Data and Probability (DP)** | 1. data collection and sampling techniques, and the presentation of data in appropriate tables and graphs.<br>2. interpretation of statistical graphs. | 1. investigate different data collection and sampling techniques.<br>2. organize statistical data in a frequency distribution table.<br>3. use appropriate graphs to represent organized data: pie graph, bar graph, line graph, and stem-and-leaf plot.<br>4. interpret statistical graphs. |
| **Number and Algebra (NA)** | 3. the set of integers, and comparing and ordering integers.<br>4. the four operations with integers.<br>5. simplification of numerical expressions involving integers.<br>6. absolute value of an integer. | 5. describe the set of integers.<br>6. use positive and negative numbers to describe directions or opposites in real-life situations.<br>7. locate integers on the number line.<br>8. compare and order integers.<br>9. add and subtract integers; using concrete models (e.g., counters, integer chips), pictorial models (e.g., bar models, number lines), and with integers written as numerals.<br>10. multiply and divide integers.<br>11. simplify numerical expressions involving integers using number properties and the order of operations (GEMDAS).<br>12. identify the absolute value of an integer, and its meaning on the number line. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- collect data, and organize data in a frequency distribution table. (DP)
- represent and interpret data in different types of graphs. (DP)
- compare and order integers, including through the use of the number line. (NA)
- perform the four operations with integers. (NA)
- simplify numerical expressions involving integers. (NA)
- identify the absolute value of an integer. (NA)

| **Grade 7** | | |
|---|---|---|
| **Quarter 4** | | |
| **Number and Algebra (NA)** | 1. the solution of simple equations.<br>2. the evaluation of algebraic expressions following substitution.<br>3. the rearrangement of a formula to make a different variable the subject of the formula. | 1. solve simple equations represented by bar models to find unknowns.<br>2. distinguish a variable from a constant in an algebraic expression.<br>3. evaluate algebraic expressions given the value/s of the variable/s.<br>4. translate verbal phrases into algebraic expressions.<br>5. illustrate the properties of equality.<br>6. solve one variable in terms of the other variables in a formula.<br>7. write equations in algebraic form.<br>8. find the value of an unknown in an equation where the unknown is non-negative.<br>9. solve problems involving algebraic expressions and formulas |
| **Data and Probability (DP)** | 4. outcomes from experiments. | 10. collect data from experiments (e.g., number of heads obtained when tossing a coin, a number of times, number of prime numbers obtained when rolling a die a number of times).<br>11. express outcomes in words and/or symbols, and represents outcomes in tables and/or graphs.<br>12. solve problems using the outcomes of experiments. |
| **Number and Algebra (NA)** | 5. operations using scientific notation. | 11. write numbers in scientific notation to represent very large or very small numbers, and vice versa.<br>12. perform operations on numbers expressed in scientific notation. |

**Performance Standards**

*By the end of the quarter, the learners are able to …*

- solve simple equations. (NA)
- substitute into an algebraic expression to evaluate the expression. (NA)
- rearrange a formula to make a different variable the subject of the formula. (NA)
- gather data from experiments and represent the data in different forms. (DP)
- write numbers in scientific notation and perform operations on numbers written in scientific notation. (NA)

## Curriculum Organization

It is proposed that the curriculum organizers described below are used together to form the curriculum description in the Grades 1 to 10 Mathematics Curriculum Guide. The definitions (in italics) within this section are drawn from DepEd Order No. 8, s. 2015 and DepEd Order No. 21, s. 2019.

1) **Standard** – *In its broadest sense, it is something against which other things can be compared to for the purpose of determining accuracy, estimating quantity or judging quality. It is a stated expectation of what one should know and be able to do.*

2) **Key Stage** – *This refers to stages in the K to 12 Program reflecting distinct developmental milestones. These are Key Stage 1 (Kindergarten – Grade 3), Key Stage 2 (Grades 4 – 6), Key Stage 3 (Grades 7 – 10), and Key Stage 4 (Grades 11 and 12).*

3) **Key Stage Standard*** – *This shows the degree or quality of proficiency that the learner is able to demonstrate in each key stage after learning a particular learning area in relation to the core learning area standard.*

4) **Grade Level Standard** – *This shows the degree or quality of proficiency that the learner is able to demonstrate in each Grade after learning a particular learning area in relation to the core learning area standard.*

5) **Content Domain**** – *This is a particular strand (or 'domain') of the curriculum in which the scope and sequence of a set of related topics and skills are covered.*

6) **Content Standard** – *The content standards identify and set the essential knowledge and understanding that should be learned. They cover a specified scope of sequential topics within each learning strand, domain, theme, or component. Content standards answer the question, "What should the learners know?"*

7) **Learning Competency** – *This refers to a specific skill performed with varying degrees of independence. It has different degrees of difficulty and performance levels. It also refers to the ability to perform activities according to the standards expected by drawing from one's knowledge, skills, and attitudes.*

*8)* **Performance Standard** – *The performance standards describe the abilities and skills that learners are expected to demonstrate in relation to the content standards and integration of 21st century skills. The integration of knowledge, understanding, and skills is expressed through creation, innovation, and adding value to products/performance during independent work or in collaboration with others.*

* To ensure that the components of mathematical proficiency focused on problem solving are articulated in the revised curriculum, the key stage standards presented provide guidance in the writing of the content standards, learning competencies and performance standards.

** The content domains proposed for the K to 10 Mathematics curriculum are Number and Algebra, Measurement and Geometry, and Data and Probability.

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