

Republic of the Philippines  
Department of Education  
DepEd Complex, Meralco Avenue  
Pasig City

# **K to 12 Curriculum Guide**

# **MATHEMATICS**

(Grade 1 to Grade 10)

January 31, 2012

## CONCEPTUAL FRAMEWORK

Mathematics is one subject that pervades life at any age, in any circumstance. Thus, its value goes beyond the classroom and the school. Mathematics as a school subject, therefore, must be learned comprehensively and with much depth.

The twin goals of mathematics in the basic education levels, K-10 are Critical Thinking and Problem Solving. We adopt the definition of critical thinking by Scriven and Paul (1987):

Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.

On the other hand, we define Problem Solving in mathematics using Polya's (1945 & 1962) definition:

Mathematical problem solving is finding a way around a difficulty, around an obstacle, and finding a solution to a problem that is unknown.

These two goals are to be achieved with an organized and rigorous curriculum content, a well-defined set of high-level skills and processes, desirable values and attitudes, and appropriate tools, recognizing as well the different contexts of Filipino learners.

There are five content areas in the curriculum, as adopted from the framework prepared by MATHTED & SEI (2010): Numbers and Number Sense, Measurement, Geometry, Patterns and Algebra, and Probability and Statistics.

The specific skills and processes to be developed are: Knowing and Understanding; Estimating, Computing and Solving; Visualizing and Modelling; Representing and Communicating; Conjecturing, Reasoning, Proving and Decision-making, and: Applying and Connecting.

The following values and attitudes are to be honed as well: Accuracy, Creativity, Objectivity, Perseverance, and Productivity.

We recognize that the use of appropriate tools is needed in teaching mathematics. These include: manipulative objects, measuring devices, calculators and computers, Smartphones and tablet PCs, and the Internet.

We define context as a locale, situation or set of conditions of Filipino learners that may influence their study and use of mathematics to develop critical thinking and problem solving skills. Contexts refer to beliefs, environment, language and culture that include traditions and practices, and learner's prior knowledge and experiences.

The framework is supported by the following underlying learning principles and theories: Experiential and Situated Learning, Reflective Learning, Constructivism, Cooperative Learning and Discovery and Inquiry-based Learning. The mathematics curriculum is grounded in these theories.

Experiential learning as advocated by David Kolb is learning that occurs by making sense of direct everyday experiences. Experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). Situated learning, theorized by Lave and Wenger, is learning in the same context on which concepts and theories are applied.

Reflective learning refers to learning that is facilitated by reflective thinking. It is not enough that learners encounter real-life situations. Deeper learning occurs when learners are able to think about their experiences and process these allowing them the opportunity to make sense and meaning of their experiences.

Constructivism is the theory that argues that knowledge is constructed when the learner is able to draw ideas from his own experiences and connects them to new ideas that are encountered.

Cooperative Learning puts premium on active learning achieved by working with fellow learners as they all engage in a shared task.

The mathematics curriculum allows for students to learn by asking relevant questions and discovering new ideas. Discovery and Inquiry-based learning (Bruner, 1961) support the idea that students learn when they make use of personal experiences to discover facts, relationships and concepts.

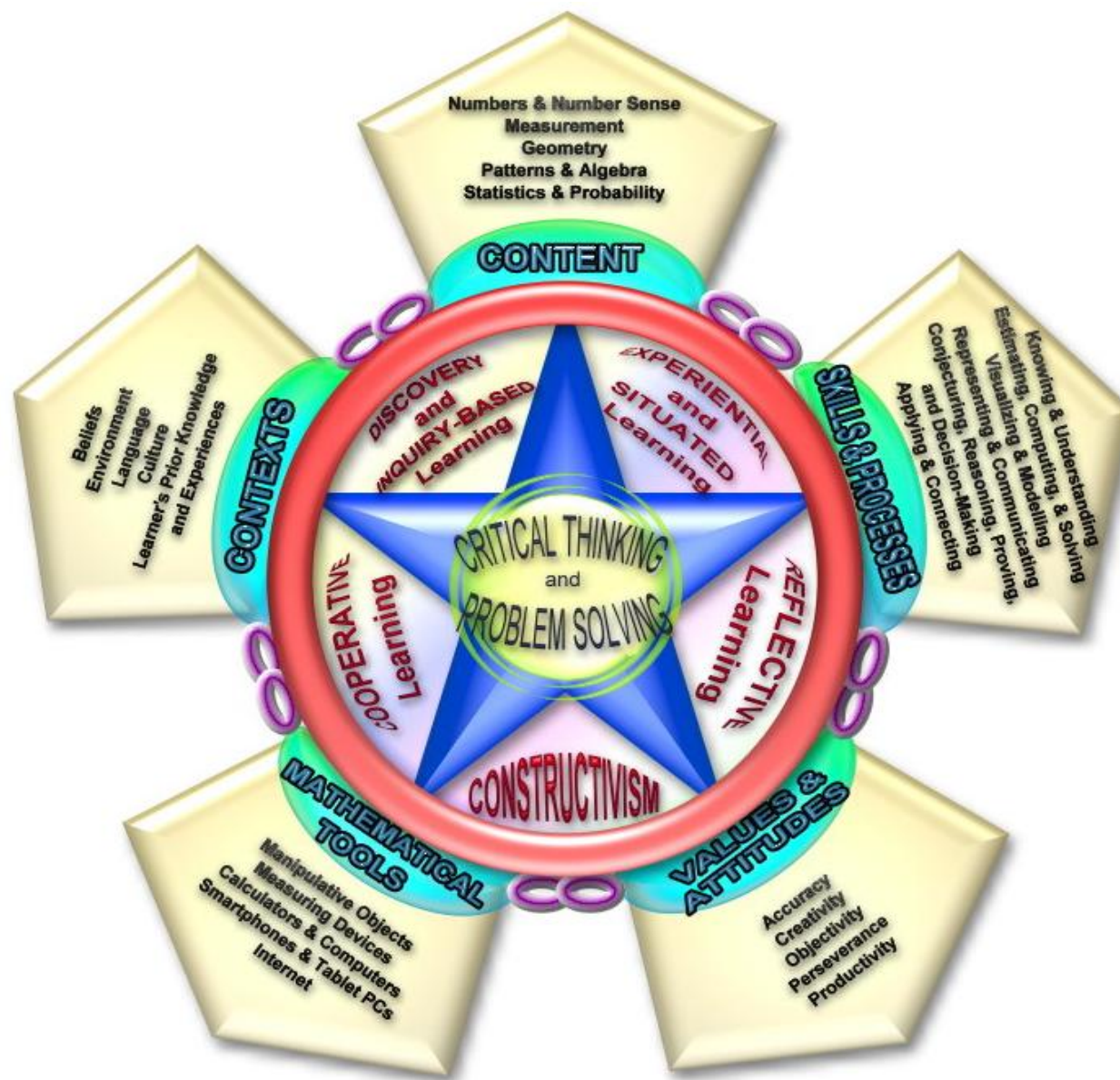


Figure 1. The Conceptual Framework of Mathematics Education

## BRIEF COURSE DESCRIPTION

Mathematics from K-10 is a skills subject. By itself, it is all about quantities, shapes and figures, functions, logic and reasoning. Mathematics is also a tool of science and a language complete with its own notations and symbols and “grammar” rules, with which concepts and ideas are effectively expressed.

The contents of mathematics include **Numbers and Number Sense**, **Measurement**, **Geometry**, **Patterns & Algebra** and **Statistics and Probability**.

**Numbers and Number Sense** as a strand includes concepts of numbers, properties, operations, estimation and their applications.

**Measurement** as a strand includes the use of numbers and measures to describe, understand and compare mathematical and concrete objects. It focuses on attributes such as length, mass and weight, capacity, time, money and temperature among others, as well as applications involving perimeter, area, surface area, volume and angle measure.

**Geometry** as a strand includes properties of two- and three-dimensional figures and their relationships, spatial visualization, reasoning and geometric modeling and proofs.

**Patterns and Algebra** as a strand studies patterns, relationships and changes among shapes and quantities and includes the use of algebraic notations and symbols, equations and most importantly, functions, to represent and analyze relationships.

**Statistics and Probability** as a strand is all about developing skills in collecting and organizing data using charts, tables and graphs, understanding, analyzing and interpreting data, dealing with uncertainty and making predictions and outcomes.

The K to 10 Mathematics Curriculum provides a solid foundation for Mathematics at Grades 11 to 12. More importantly, it provides necessary concepts and life skills needed by Filipino learners as they proceed to the next stage in their life as learners and as citizens of our beloved country, the Philippines.

**LEARNING AREA STANDARD:** The learner demonstrates understanding and appreciation of key concepts and principles of mathematics as applied, using appropriate technology, in problem solving, communicating, reasoning, making connections, representations, and decisions in real life.

**KEY STAGE STANDARDS:**

K – 3	4 – 6	7 – 10
<p>At the end of Grade 3, the learner demonstrates understanding and appreciation of key concepts and skills involving whole numbers up to ten thousand, fractions, measurement, simple geometric figures, pre-algebra concepts and data representation and analysis as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.</p>	<p>At the end of Grade 6, the learner demonstrates understanding and appreciation of key concepts and skills involving rational numbers, measurement, geometric figures, pre-algebra concepts, simple probability and data analysis as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.</p>	<p>At the end of grade 10, the learner demonstrates understanding and appreciation of key concepts and skills involving number sense, measurement, algebra, geometry, probability and statistics, and trigonometry as applied, using appropriate technology, in critical thinking, problem solving, communicating, reasoning, making connections, representations, and decisions in real life.</p>

**GRADE LEVEL STANDARDS:**

Grade Level	Grade Level Standards
<b>Grade 1</b>	The learner demonstrates understanding and appreciation of key concepts and skills involving whole numbers up to 100, fractions, measurement, simple geometric figures, pre-algebra concepts, data collection and representation as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decision in real life.
<b>Grade 2</b>	The learner demonstrates understanding and appreciation of key concepts and skills involving whole numbers up to 1 000, fractions, measurement and geometric figures, pre-algebra concepts, data collection, representation and analysis as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decision in real life.
<b>Grade 3</b>	The learner demonstrates understanding and appreciation of key concepts and skills involving whole numbers up to 10 000, fractions, measurement, geometric figures, pre-algebra concepts, data collection, representation and analysis as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decision in real life.
<b>Grade 4</b>	The learner demonstrates understanding and appreciation of key concepts and skills involving whole numbers up to 100 000, fractions, decimals including money, ratio, angles, plane figures like square, rectangle, and triangle, measurement (perimeter, area of triangle, parallelogram and trapezoids, volume of cubes and rectangular prisms, pre-algebra concepts, data collection, representation and analysis as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.
<b>Grade 5</b>	The learner demonstrates understanding and appreciation of key concepts and skills involving whole numbers up to 10 000 000, fractions, decimals including money, ratio, percent, geometry (circles and five or more-sided polygons), measurement (circumference, area of circle, volume of cubes and rectangular prisms, temperature) ,pre-algebra concepts, data collection, representation and analysis as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.
<b>Grade 6</b>	The learner is expected to have mastered the concepts and operations on whole numbers; demonstrates understanding and appreciation of the key concepts and skills involving fractions, decimals including money, ratio and proportion, percent, rate, integers, geometry (spatial figures), measurement (surface area, volume, meter reading), pre-algebra concepts, data collection, representation and analysis, probability, expressions and equations as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.

# K TO 12 MATHEMATICS

Grade Level	Grade Level Standards
<b>Grade 7</b>	The learner demonstrates understanding of key concepts and principles of number sense, measurement, algebra, geometry, probability and statistics as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.
<b>Grade 8</b>	The learner demonstrates understanding of key concepts and principles of algebra, geometry, probability and statistics as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.
<b>Grade 9</b>	The learner demonstrates understanding of key concepts and principles of algebra, geometry, and trigonometry as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.
<b>Grade10</b>	The learner demonstrates understanding of key concepts and principles of number sense, algebra, geometry, probability and statistics as applied, using appropriate technology, in critical thinking, problem solving, reasoning, communicating, making connections, representations and decisions in real life.



## GRADE 1

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Numbers and Number Sense</b>	<p><i>The learner demonstrates understanding of...</i></p> <ul style="list-style-type: none"> <li>number notation and place value, cardinal and ordinal numbers, and comparing and ordering numbers up to 100.</li> </ul>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>explore the concept of cardinal numbers up to 100 and compare these numbers in various contexts.</li> </ul>	<p><i>The learner...</i></p> <ul style="list-style-type: none"> <li>recognizes cardinal numbers from 0 to 100.</li> <li>counts and tells the number of objects in a given set by ones and tens.</li> <li>identifies the number that is one more or one less from a given number.</li> <li>composes and decomposes a given number.</li> <li>regroups sets of ones into sets of tens and sets of tens into hundred using objects.</li> <li>compares two sets using the expressions “fewer than,” “more than,” and “as many as.”</li> <li>orders sets from least to greatest and viceversa.</li> <li>counts by 2’s, 5’s and 10’s through 100.</li> <li>reads and writes numbers up to 100 in symbols and in words.</li> <li>identifies the place value and finds the value of a digit in a one- and two-digit numbers.</li> <li>renames numbers into tens and ones.</li> <li>compares numbers up to 100 using relation symbols.</li> </ul>

K TO 12 MATHEMATICS

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• arranges numbers up to 100 in increasing order and vice versa.</li> <li>• recognizes coins and bills up to P100 (pesos and centavos).</li> </ul>
		<ul style="list-style-type: none"> <li>• explore the concept of ordinal numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• reads and writes ordinal numbers 1st, 2nd, 3rd up to 10th.</li> <li>• identifies the 1st, 2nd, 3rd up to the 10th object in a given set from a given point of reference.</li> <li>• determines the position of an object using 1st to 10th from a given point of reference.</li> </ul>
	<ul style="list-style-type: none"> <li>• addition and subtraction up to 100.</li> </ul>	<ul style="list-style-type: none"> <li>• illustrate addition and subtraction of whole numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• illustrates addition as putting together and subtraction as taking away, comparing and adding up.</li> <li>• illustrates the relationship of joining sets to addition of whole numbers.</li> <li>• illustrates that addition and subtraction are inverse operations.</li> <li>• identifies and constructs equivalent number expressions using addition and subtractions.</li> <li>• identifies and creates patterns to compose and decomposes numbers using addition.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• compute for sums and solve addition problems.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• adds two one-digit numbers with sums up to 18 using the order and zero properties of addition.</li> <li>• adds two to three one-digit numbers horizontally and vertically with sums up to 18.</li> <li>• adds three one-digit numbers having sums up to 18 using the order and grouping properties of addition.</li> <li>• uses expanded form to explain the meaning of addition with regrouping.</li> <li>• adds numbers with sums through 99 without or with regrouping.</li> <li>• mentally adds two to three 1-digit numbers with sums up to 18.</li> <li>• mentally adds a 2-digit number and 1-digit number with regrouping.</li> <li>• solves one-step word problems involving addition of whole numbers including money with sums up to 99 using appropriate problem solving strategy.</li> </ul>
		<ul style="list-style-type: none"> <li>• compute for differences and solve subtraction problems.</li> </ul>	<ul style="list-style-type: none"> <li>• subtracts one-digit numbers with minuends through 18 (basic facts).</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>subtracts one to two-digit numbers with minuends up to 99 without regrouping.</li> <li>uses the expanded form to explain subtraction with regrouping.</li> <li>subtracts one to two-digit numbers with minuends up to 99 with regrouping.</li> <li>mentally subtracts 1-digit numbers from minuends up to 18 without regrouping.</li> <li>mentally subtracts a 1-digit number from 2-digit minuends without regrouping.</li> <li>solves word problems involving subtraction of whole numbers including money with minuends up to 99 with and without regrouping using appropriate problem solving strategy.</li> </ul>
	<ul style="list-style-type: none"> <li>the concepts of halves and fourths and applies them in dividing a whole or set equally.</li> </ul>	<ul style="list-style-type: none"> <li>visualize, model and represent the concept of halves and fourths using whole objects and sets.</li> </ul>	<ul style="list-style-type: none"> <li>visualizes and identifies <math>\frac{1}{2}</math> and <math>\frac{1}{4}</math> of a whole object.</li> <li>divides a whole into halves and fourths.</li> <li>divides the elements of a set of objects into two groups of equal quantities to show halves of sets.</li> <li>divides the elements of a set of objects into four groups of equal quantities to show fourths of sets.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>given half of a region or a set, draws the whole region or set.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>2-D and 3-D shapes through identifying, classifying and constructing figures using cut-outs and concrete models.</li> </ul>	<ul style="list-style-type: none"> <li>explore the properties of 2- and 3-dimensional figures.</li> </ul>	<ul style="list-style-type: none"> <li>identifies, names and describes the four basic shapes in 2- and 3-dimensional objects: square, rectangle, triangle and circle.</li> <li>compares and classifies 2- and 3-dimensional figures according to common attributes.</li> </ul>
		<ul style="list-style-type: none"> <li>model and represent 2- and 3-dimensional objects.</li> </ul>	<ul style="list-style-type: none"> <li>draws the four basic shapes.</li> <li>constructs three-dimensional objects using manipulative materials.</li> </ul>
<b>Patterns and Algebra</b>	<ul style="list-style-type: none"> <li>simple patterns.</li> </ul>	<ul style="list-style-type: none"> <li>identify and create number and attribute patterns.</li> </ul>	<ul style="list-style-type: none"> <li>identifies and explains simple repeating patterns.</li> <li>makes patterns of shapes, colors and numbers.</li> </ul>
		<ul style="list-style-type: none"> <li>complete number and attribute patterns.</li> </ul>	<ul style="list-style-type: none"> <li>finds the missing number/digit in addition or subtraction problems.</li> <li>finds and completes patterns of one or two of the following attributes: Shape, Size, Color, Number, Orientation.</li> <li>determines the next term (figure/number) in a given sequence and give a reason.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Measurement</b>	<i>The learner demonstrates understanding of...</i> <ul style="list-style-type: none"> <li>the concepts of time and measures and compares objects using direct comparison and non-standard units of length, mass and capacity.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>give different measures of time.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>names and tells the number of days in a week; months in a year in the right order.</li> <li>uses a calendar to determine a day or month.</li> <li>tells the time by an hour, half-hour and quarter-hour.</li> </ul>
		<ul style="list-style-type: none"> <li>estimate and compute for measurements of length, mass and capacity.</li> </ul>	<ul style="list-style-type: none"> <li>compares objects using the comparative words: Short, shorter, shortest; Long, longer, longest; Tall, taller, tallest; High, higher, highest; Heavy, heavier, heaviest; Light, lighter, lightest.</li> <li>estimates and measures length using non-standard units of linear measures.</li> <li>estimates and measures mass using non-standard units of mass/weight measures.</li> <li>shows and finds capacity using non-standard unit.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>organizing, representing and comparing data using pictographs without scale representations and probability, and explores games and activities.</li> </ul>	<ul style="list-style-type: none"> <li>organize and interpret data.</li> </ul>	<ul style="list-style-type: none"> <li>collects and organizes data using tallies and tables.</li> <li>represents data using pictographs without using a scale.</li> <li>reads and interprets a pictograph.</li> </ul>

# K TO 12 MATHEMATICS

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
		<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• make conjectures about games and activities.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• identifies cause and effect relationships.</li> <li>• predicts and records outcome of experiments and chance games.</li> </ul>

## GRADE 2

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Numbers and Number Sense</b>	<p><i>The learner demonstrates understanding of...</i></p> <ul style="list-style-type: none"> <li>the relationships between numbers and place value of whole numbers up to 1000 and of ordinal numbers up to 20th.</li> </ul>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>explore the concepts of numbers up to 1000, read and write these numbers.</li> </ul>	<p><i>The learner...</i></p> <ul style="list-style-type: none"> <li>visualizes and identifies numbers from 101 through 1000.</li> <li>associates numbers with sets having 101 up to 500 objects and give the number of objects.</li> <li>associates numbers with sets having 501 up to 1000 objects and give the number of objects.</li> <li>counts and groups objects in ones, tens, and hundreds.</li> <li>reads and writes numbers from 101 through 1000 in symbols and in words.</li> <li>counts numbers by 10s, 50s and 100s.</li> <li>reads and writes numbers through 1000 in symbols and in words.</li> <li>gives the place value of each digit in a three-digit number.</li> <li>writes three-digit numbers in expanded form.</li> <li>compares numbers using <math>&gt;</math>, <math>&lt;</math> and <math>=</math>.</li> <li>orders numbers up to 1000 from least to greatest and vice versa.</li> </ul>



K TO 12 MATHEMATICS

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>identify ordinal numbers through 20th.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>visualizes and identifies the 1st through the 20th object of a given set from a given point of reference.</li> <li>reads and writes ordinal numbers from 1st through the 20th.</li> <li>identifies and uses the pattern of naming ordinal numbers from 1st to the 20th.</li> </ul>
	<ul style="list-style-type: none"> <li>the concept of the four operations of whole numbers and the identity and zero properties of multiplication.</li> </ul>	<ul style="list-style-type: none"> <li>compute sums and solve addition problems involving numbers of up to 1000.</li> </ul>	<ul style="list-style-type: none"> <li>adds numbers with sums up to 1000 without and with regrouping: 2 digit and 3-digit.</li> <li>adds numbers with sums up to 1000 without and with regrouping: 3 digit and 3-digit.</li> <li>uses the following properties of addition in computing for sums of up to 1000: zero/identity property of addition, commutative property of addition, associative property of addition.</li> <li>mentally adds 1- to 2-digit numbers with sums up to 50.</li> <li>mentally adds 3-digit numbers by ones (up to 9).</li> <li>mentally adds 3-digit numbers by tens (multiples of 10 up to 90).</li> <li>mentally adds 3-digit numbers by hundreds (multiples of 100 up to 900).</li> </ul>

K TO 12 MATHEMATICS

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>analyzes and solves word problems involving addition of whole numbers including money with sums up to 1000 without and with regrouping.</li> </ul>
		<ul style="list-style-type: none"> <li>compute differences and solve subtraction problems involving numbers of up to 1000.</li> </ul>	<ul style="list-style-type: none"> <li>subtracts 2- to 3-digit numbers with minuends up to 999 without and with regrouping.</li> <li>mentally subtracts 1-digit numbers from 1 to 2-digit numbers with minuends up to 50.</li> <li>mentally subtracts 3-digit by ones without regrouping.</li> <li>mentally subtracts 3-digit by tens without regrouping.</li> <li>mentally subtracts 3-digit by hundreds without regrouping.</li> <li>analyzes and solves one-step word problems involving subtraction of whole numbers including money with minuends up to 1000 without and with regrouping.</li> </ul>
		<ul style="list-style-type: none"> <li>compute for sums and differences and solve problems involving both addition and subtraction of numbers.</li> </ul>	<ul style="list-style-type: none"> <li>performs order of operations involving addition and subtraction of small numbers.</li> <li>solves two-step word problems involving addition and subtraction of 2- to 3-digit numbers including money using appropriate procedures.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• explore and illustrate the concept of multiplication of whole numbers.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• illustrates multiplication as repeated addition, arrays, counting by multiples, and equal jumps on the number line.</li> <li>• writes a related equation for each type of multiplication: repeated addition, array, counting by multiples, and equal jumps on the number line.</li> <li>• illustrates the property of multiplication that any number multiplied by one (1) is the same number.</li> <li>• illustrates the property of multiplication that zero multiplied by any number is zero.</li> <li>• illustrates the commutative property of multiplication.</li> </ul>
		<ul style="list-style-type: none"> <li>• compute products of numbers involving 2, 3, 4, 5 and 10 and solve problems involving multiplication of these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• constructs and fills up the multiplication tables of 2, 3, 4, 5 and 10.</li> <li>• multiplies mentally to fill up multiplication tables of 2, 3, 4, 5 and 10.</li> <li>• analyzes and solves one-step word problems involving multiplication of whole numbers including money.</li> <li>• analyzes and solves two-step word problems involving multiplication of whole numbers as well as addition and subtraction including money.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>explore and model the concept of division of whole numbers.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>models and describes division situations in which sets are separated into equal parts.</li> <li>represents division as equal sharing, repeated subtraction, equal jumps on the number line, and formation of equal groups of objects.</li> <li>writes a related equation for each type of situation: equal sharing, repeated subtraction, equal jumps on the number line, and formation of equal groups of objects.</li> </ul>
		<ul style="list-style-type: none"> <li>compute quotients of numbers found in the multiplication tables involving 2, 3, 4, 5 and 10 and solve problems involving division of these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>divides numbers found in the multiplication tables of 2, 3, 4, 5, and 10.</li> <li>mentally divides numbers found in the multiplication tables of 2, 3, 4, 5 and 10.</li> <li>analyzes and solves one-step word problems involving division of numbers found in the multiplication tables of 2, 3, 4, 5, and 10.</li> </ul>
	<ul style="list-style-type: none"> <li>unit fractions, proper fractions and similar fractions, and identification of money value through 100.</li> </ul>	<ul style="list-style-type: none"> <li>explore the concept of unit fractions and other fractions less than 1 and compare these fractions.</li> </ul>	<ul style="list-style-type: none"> <li>visualizes and identifies unit fractions with denominators 10 and below.</li> <li>reads and writes unit fractions.</li> <li>compares unit fractions using relation symbols.</li> <li>orders unit fractions.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>visualizes and identifies other fractions less than one with denominators 10 and below.</li> <li>visualizes and identifies similar fractions (using group of objects and number line).</li> <li>reads and writes similar fractions.</li> <li>compares similar fractions using relation symbols.</li> <li>orders similar fractions.</li> </ul>
		<ul style="list-style-type: none"> <li>apply number concepts on problem situations involving money.</li> </ul>	<ul style="list-style-type: none"> <li>reads and writes money with value through 100.</li> <li>counts and tells the value of a set of bills or a set of coins through 100 in peso ( coins only, bills only and coins and bills).</li> <li>counts and tells the value of a set of bills or a set of coins through 100 in centavo (coins).</li> <li>counts and tells the value of a set of bills or a set of coins through 100 in combinations of pesos and centavos (Peso and centavo coins only, bills and centavo coins, coins and bills).</li> <li>reads and writes money in symbols and in words through 100.</li> <li>compares values of different denominations of coins and paper bills through 100 using relation symbols <math>&gt;</math>, <math>&lt;</math> and <math>=</math>.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Geometry</b>	<i>The learner demonstrates understanding of...</i> <ul style="list-style-type: none"> <li>the basic properties of geometric shapes, simple tessellations and symmetry.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>visualize and model half-circles and quarter circles as well as other common shapes.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>visualizes, identifies, classifies and describes half-circles and quarter circles.</li> <li>constructs squares, rectangles, triangle, circles, half-circles and quarter circles using cut-outs and square grids.</li> </ul>
		<ul style="list-style-type: none"> <li>explore the concept of symmetry.</li> </ul>	<ul style="list-style-type: none"> <li>identifies shapes/figures that show symmetry in a line.</li> <li>creates figures that show symmetry in a line.</li> </ul>
		<ul style="list-style-type: none"> <li>visualize, model and represent tessellations.</li> </ul>	<ul style="list-style-type: none"> <li>recognizes shapes that can tessellate.</li> <li>tessellates a surface using triangles and squares.</li> </ul>
		<ul style="list-style-type: none"> <li>explore the concept of lines, curves and surface on 3-dimensional objects.</li> </ul>	<ul style="list-style-type: none"> <li>identifies straight lines and curves, flat and curved surfaces in a 3-dimensional object.</li> <li>explains the differences between straight lines and curved lines, flat surfaces and curved surfaces.</li> </ul>
<b>Patterns and Algebra</b>	<ul style="list-style-type: none"> <li>patterns on numbers and geometric objects.</li> </ul>	<ul style="list-style-type: none"> <li>argue and justify patterns.</li> </ul>	<ul style="list-style-type: none"> <li>identifies and explains simple repeating patterns.</li> <li>determines the next term (figure/number) in a given sequence and give a reason.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• apply their understanding and strategies in completing patterns.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• finds and completes patterns according to one or two of the following attributes: shape, size, color, orientation.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>• the concept and application of time and of using standard units in measuring length, mass, area and capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• compute for measures of time and solve problems involving time.</li> </ul>	<ul style="list-style-type: none"> <li>• tells and writes the time in minutes including a.m. and p.m. using analog and digital clocks.</li> <li>• finds the duration of time elapsed using calendar, analog and digital clocks.</li> <li>• solves simple word problems involving time.</li> </ul>
		<ul style="list-style-type: none"> <li>• identify and compare the standard units centimeter and meter.</li> </ul>	<ul style="list-style-type: none"> <li>• shows and uses the appropriate unit of length to measure a particular object and their abbreviations cm and m.</li> <li>• compares length in meters or centimeters.</li> </ul>
		<ul style="list-style-type: none"> <li>• estimate and compute for lengths of objects and solve problems involving lengths using centimeter and meter.</li> </ul>	<ul style="list-style-type: none"> <li>• measures objects using appropriate measuring tools in m or cm.</li> <li>• estimates and measures length using meter or centimeter.</li> <li>• solves simple word problems involving length.</li> </ul>
		<ul style="list-style-type: none"> <li>• identify, use and compare the standard units gram and kilogram.</li> </ul>	<ul style="list-style-type: none"> <li>• shows and uses the appropriate unit of mass to measure a particular object or situation and their abbreviations g and kg.</li> <li>• compares mass in grams or kilograms.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>estimate and compute for the mass/weight of an object and solve problems involving mass/weight.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>measures objects using appropriate measuring units in g or kg.</li> <li>estimates and measures mass using gram or kilogram.</li> <li>solves simple word problems involving mass.</li> </ul>
		<ul style="list-style-type: none"> <li>explore and illustrate the concept of area.</li> </ul>	<ul style="list-style-type: none"> <li>illustrates area as a measure of how much surface is covered or occupied by plane figure.</li> <li>shows the area of a given figure using square tile units, i.e. number of square tiles needed.</li> </ul>
		<ul style="list-style-type: none"> <li>estimate and compute for the area of a plane figure.</li> </ul>	<ul style="list-style-type: none"> <li>estimates the area of a given figure using any shape.</li> <li>finds the area of a given figure using square tile units i.e. number of square tiles needed.</li> </ul>
		<ul style="list-style-type: none"> <li>measure capacity.</li> </ul>	<ul style="list-style-type: none"> <li>shows and finds capacity using appropriate measuring tools, e.g. amount of liquid needed.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>pictographs with scale representations and the idea of likelihood.</li> </ul>	<ul style="list-style-type: none"> <li>organize and interpret data.</li> </ul>	<ul style="list-style-type: none"> <li>collects and organizes data using tables and pictures.</li> <li>reads and interprets data in a given pictograph.</li> </ul>



<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>represent data using scales.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>forms scale representation of objects from the data collected.</li> <li>makes pictographs using scale representation.</li> </ul>
		<ul style="list-style-type: none"> <li>make conjectures and educated guesses about the likelihood of events.</li> </ul>	<ul style="list-style-type: none"> <li>makes a guess on whether an event is less likely, more likely, equally likely or unlikely to happen based on facts.</li> </ul>

## GRADE 3

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Numbers and Number Sense</b>	<i>The learner demonstrates understanding of...</i> <ul style="list-style-type: none"> <li>the concepts of whole numbers up to 10000, ordinal numbers up to 100th and Roman numerals up to M.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>explore the concepts of numbers up to 10 000, count, read and write these numbers and identify ordinal numbers of up to 100th.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>reads and writes the numbers through 10 000 in symbols and in words.</li> <li>identifies the place value and find the value of a digit in 4- to 5-digit numbers.</li> <li>compares 4- to 5-digit numbers using relation symbols.</li> <li>orders 4- to 5-digit numbers in increasing order and vice versa.</li> <li>rounds numbers to the nearest tens, hundreds and thousands.</li> <li>identifies ordinal numbers from 1st to 100th.</li> </ul>
		<ul style="list-style-type: none"> <li>read and write numbers using Roman numerals up to M.</li> </ul>	<ul style="list-style-type: none"> <li>reads and writes the value of roman numbers in Hindu-Arabic and vice versa I to L.</li> <li>reads and writes the value of roman numbers in Hindu-Arabic and vice versa L to C.</li> <li>reads and writes the value of Roman numbers in Hindu-Arabic and vice versa C to D.</li> <li>reads and writes the value of Roman</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
			numbers in Hindu-Arabic and vice versa D to M.
	<p><i>The learner demonstrates understanding of...</i></p> <ul style="list-style-type: none"> <li>the four operations of whole numbers and of the concept of identity, commutative, associative and distributive properties of addition and multiplication.</li> </ul>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>use properties of addition to estimate and compute for sums and solve addition problems involving numbers of up to 10 000.</li> </ul>	<p><i>The learner ...</i></p> <ul style="list-style-type: none"> <li>illustrates the properties of addition (commutative, associative, identity).</li> <li>adds 3- to 4 -digit numbers up to three addends with sums up to 10 000 without regrouping.</li> <li>adds 3- to 4 -digit numbers up to three addends with sums up to 10 000 with regrouping.</li> <li>estimates the sum of 3- to 4-digit addends by rounding.</li> <li>mentally adds without or with regrouping 2-digit and 1-digit numbers and explain the strategies used.</li> <li>mentally adds without or with regrouping two 2-digit numbers and explain the strategies used.</li> <li>mentally adds without or with regrouping 2-digit and 3-digit multiples of hundreds and explain the strategies used.</li> <li>solves word problems involving addition of whole numbers with sums up to 10 000 including money using appropriate problem solving strategy.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>estimate and compute for differences and solve subtraction problems involving numbers of up to 10 000.</li> </ul>	<p><i>The learner...</i></p> <ul style="list-style-type: none"> <li>subtracts 3-digit numbers from 3- to 4-digit numbers without and with regrouping and with and without zeros in the digits.</li> <li>subtracts 3- to 4-digit numbers from 4-digit numbers without and with regrouping and with and without zeros in the digits.</li> <li>estimates the difference of two numbers with three to four digits by rounding.</li> <li>mentally subtracts without and with regrouping 2-digit and 1-digit numbers and explain the strategies used.</li> <li>mentally subtracts without and with regrouping two 2-digit numbers and explain the strategies used.</li> <li>mentally subtracts without and with regrouping 2-digit to 3-digit numbers from multiples of hundreds and explain the strategies used.</li> <li>solves one-step word problems involving subtraction of whole numbers including money using appropriate problem solving strategies.</li> <li>solves two-step word problems involving addition and subtraction of whole numbers including money using appropriate problem solving strategies.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>estimate and multiply 2- and 3-digit numbers by 1-digit to 2-digit numbers and solve multiplication problems involving these numbers.</li> </ul>	<p><i>The learner ...</i></p> <ul style="list-style-type: none"> <li>constructs and completes the multiplication tables of 6, 7, 8 and 9.</li> <li>states basic multiplication facts for numbers up to 10.</li> <li>applies the commutative property of multiplication.</li> <li>multiplies 2-digit by 1-digit by using the distributive property of multiplication.</li> <li>multiplies three 1-digit numbers by using the associative property of multiplication.</li> <li>multiplies 2- to 3-digit numbers by 1-digit numbers without or with regrouping.</li> <li>multiplies 2-digit numbers by 2-digit numbers without regrouping.</li> <li>multiplies 2-digit numbers by 2-digit numbers with regrouping.</li> <li>multiplies 2- to 3-digit numbers by multiples of 10 and 100.</li> <li>multiplies 1- to 2-digit numbers by 1000.</li> <li>estimates the product of 2- to 3-digit numbers by 1- to 2-digit numbers by rounding.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>mentally multiplies 2-digit by 1-digit numbers without regrouping involving products of up to 100.</li> <li>solves one-step word problems involving multiplication of whole numbers including money using appropriate problem solving strategies.</li> <li>solves two-step word problems involving multiplication as well as addition and subtraction including money using appropriate problem solving strategies.</li> </ul>
		<ul style="list-style-type: none"> <li>explore the concepts of factors and multiples.</li> </ul>	<ul style="list-style-type: none"> <li>states multiples of 1- to 2-digit numbers.</li> <li>differentiates prime and composite numbers.</li> </ul>
		<ul style="list-style-type: none"> <li>estimate and divide 3-digit numbers by up to 2-digit numbers and solve division problems involving these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>divides numbers found in the multiplication tables of 6, 7, 8, 9.</li> <li>states basic division facts of numbers up to 10.</li> <li>divides 2- to 3-digit numbers by 1-digit numbers without remainder.</li> <li>divides 2- to 3-digit numbers by 1-digit numbers with remainder.</li> <li>divides 2-digit numbers by 2-digit numbers.</li> <li>divides numbers by 10 and 100.</li> </ul>

K TO 12 MATHEMATICS

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>estimates the quotient of 2- to 3-digit numbers by 1- to 2-digit numbers.</li> <li>mentally divides 2-digit numbers by 1-digit numbers without remainder.</li> <li>solves one-step word problem involving division of 2- to 4-digit numbers by 1- to 2-digit numbers including money using appropriate problem solving strategies.</li> <li>solves word problems involving division and other fundamental operations, including money, using appropriate problem solving strategies.</li> </ul>
	<ul style="list-style-type: none"> <li>the basic kinds of fractions, know how to simplify and order them, and to apply to problem solving money through 100.</li> </ul>	<ul style="list-style-type: none"> <li>explore the concepts of dissimilar fractions, improper fractions and mixed numbers.</li> </ul>	<ul style="list-style-type: none"> <li>visualizes and identifies fractions that are equal to one and greater than one.</li> <li>reads and writes fractions that are greater than one in symbols and in words.</li> <li>relates and changes improper fractions to mixed numbers and vice versa.</li> <li>visualizes and identifies dissimilar fractions.</li> <li>compares dissimilar fractions.</li> <li>arranges dissimilar fractions in increasing or decreasing order.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>recognizes and generates equivalent fractions of commonly used fractions.</li> <li>changes fractions to lowest forms.</li> </ul>
		<ul style="list-style-type: none"> <li>apply number concepts to solve problems involving money through 1000.</li> </ul>	<ul style="list-style-type: none"> <li>reads and writes money in symbols through 1000.</li> <li>compares values of the different denominations of coins and bills through 1000.</li> <li>solves real-life problems involving money through 1000.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>the basic elements of angles, lines and rays.</li> </ul>	<ul style="list-style-type: none"> <li>explore the concepts of point, line, line segment and ray.</li> </ul>	<ul style="list-style-type: none"> <li>recognizes and draws a point, line, line segment and ray.</li> <li>recognizes and draws perpendicular lines, parallel lines and intersecting lines.</li> <li>visualizes, identifies and draws congruent line segments.</li> </ul>
		<ul style="list-style-type: none"> <li>explore symmetry in plane figures and the environment.</li> </ul>	<ul style="list-style-type: none"> <li>identifies and draws the line of symmetry in a given symmetrical figure.</li> <li>identifies and visualizes symmetry in the environment and in design.</li> <li>completes a symmetric figure with respect to a given line of symmetry.</li> </ul>



<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i>
<b>Patterns and Algebra</b>	<ul style="list-style-type: none"> <li>patterns of numbers, operations, geometric objects and relationships.</li> </ul>	<ul style="list-style-type: none"> <li>explore the concept of odd and even numbers.</li> </ul>	<ul style="list-style-type: none"> <li>tessellates the plane using triangles, squares and other shapes that can tessellate.</li> <li>tells when a number is odd or even.</li> <li>finds the pattern using odd and even numbers with objects, pictures and words.</li> </ul>
		<ul style="list-style-type: none"> <li>identify the rule for a pattern and complete the number pattern.</li> </ul>	<ul style="list-style-type: none"> <li>determines the pattern of a given sequence and state the rule.</li> <li>finds the missing number or digit in a pattern.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>the concept and application of time (in minutes), length, mass, area and capacity.</li> </ul>	<ul style="list-style-type: none"> <li>convert time measures from one unit to another.</li> </ul>	<ul style="list-style-type: none"> <li>converts time measure from seconds to minutes, minutes to hours, hours to day.</li> <li>converts time measure from days to weeks and months, and convert weeks, months and years to days.</li> <li>finds the exact time between dates.</li> <li>solves word problems involving time measure.</li> </ul>
		<ul style="list-style-type: none"> <li>recognize, perform and use conversions of common units.</li> </ul>	<ul style="list-style-type: none"> <li>converts common units of measure from larger unit to smaller unit and vice versa: meter and centimeter, kilogram and gram, liter and milliliter.</li> <li>solves word problems involving conversions of common units of measure.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>explore the concept of area and find areas of squares and rectangles using <math>\text{cm}^2</math> and <math>\text{m}^2</math>.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>estimates the area of a square and rectangle using non-standard units.</li> <li>finds the area of a square in <math>\text{cm}^2</math> and <math>\text{m}^2</math>.</li> <li>finds the area of a rectangle in <math>\text{cm}^2</math> and <math>\text{m}^2</math>.</li> <li>solves word problems involving areas of squares and rectangles.</li> </ul>
		<ul style="list-style-type: none"> <li>measure capacity using milliliter and liter.</li> </ul>	<ul style="list-style-type: none"> <li>finds the capacity of a container using milliliter/liter.</li> <li>solves word problems involving capacity measure.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>tables, bar graphs and probability.</li> </ul>	<ul style="list-style-type: none"> <li>organize and interpret data presented in tables and bar graphs.</li> </ul>	<ul style="list-style-type: none"> <li>collects and organizes data in a table.</li> <li>reads and interprets a table.</li> <li>constructs a bar graph.</li> <li>reads and interprets a bar graph.</li> </ul>
		<ul style="list-style-type: none"> <li>make simple predictions of events.</li> </ul>	<ul style="list-style-type: none"> <li>tells whether an event is most likely to happen, equally likely to happen or unlikely to happen based on facts.</li> </ul>

## GRADE 4

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Numbers and Number Sense</b>	<i>The learner demonstrates understanding of...</i> <ul style="list-style-type: none"> <li>number notation and place value of numbers up to 100000, and of factors and multiples of numbers up to 100, and of the greatest common factor and least common multiple.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>read, write, compare and arrange numbers through 100 000 and round off numbers to the nearest thousands and ten thousands.</li> </ul>	<i>The learner...</i> <ul style="list-style-type: none"> <li>reads and writes numbers through hundred thousands in symbols and in words.</li> <li>identifies numbers up to 100 000.</li> <li>gives the place value of each digit in a six-digit number.</li> <li>reads and writes numbers up to hundred thousands in symbols and in words.</li> <li>compares numbers up to hundred thousands.</li> <li>arranges numbers up to hundred thousands.</li> </ul>
		<ul style="list-style-type: none"> <li>investigate the concepts of factors and multiples.</li> </ul>	<ul style="list-style-type: none"> <li>identifies factors of a given number up to 100.</li> <li>identifies the multiples of a given number up to 100.</li> <li>makes conjectures about common factors of numbers.</li> </ul>
		<ul style="list-style-type: none"> <li>find the greatest common factor and the least common multiple of given numbers.</li> </ul>	<ul style="list-style-type: none"> <li>differentiates prime numbers from composite numbers.</li> <li>finds the prime factors of a number.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• writes a given number as a product of its prime factors.</li> <li>• gives the common factors and the greatest common factor (GCF) of two numbers using the following methods: listing, factor tree.</li> <li>• gives the common multiples and least common multiple (LCM) of two numbers: listing, factor tree, continuous division.</li> <li>• finds the GCF and LCM of 2 given numbers.</li> </ul>
	<ul style="list-style-type: none"> <li>• multiplication, division and MDAS of whole numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• estimate and multiply 3-digit numbers and solve multiplication problems involving these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• multiplies numbers up to 3-digit numbers by up to 2-digit numbers without regrouping and with zero in any of the factors.</li> <li>• multiplies numbers up to 3-digit numbers by up to 2-digit numbers with regrouping and with zero in any of the factors.</li> <li>• estimates the products of three to four digits by two to three-digit numbers.</li> <li>• mentally multiplies two-digit numbers with products up to 200 and explain the strategies used.</li> <li>• analyzes and solves word problems involving multiplication of whole numbers including money using appropriate problem solving strategies.</li> </ul>

K TO 12 MATHEMATICS

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
		<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>analyzes and solves two-step word problems involving multiplication and addition or subtraction using appropriate problem solving strategies.</li> <li>creates and solves word problems involving multiplication and any of the two operations involving whole numbers and money.</li> </ul>
		<ul style="list-style-type: none"> <li>estimate and divide 3- to 4-digit numbers by 1- to 2- digit numbers and solve division problems involving these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>divides 3- to 4-digit numbers by 1- to 2- digit numbers without remainder.</li> <li>divides 3- to 4-digit numbers by 1- to 2- digit numbers with remainder.</li> <li>divides 3- to 4-digit numbers by 1- to 2- digit numbers with zeros in the middle or continuous zeros in the dividend.</li> <li>divides 3- to 4-digit numbers by multiples of 10 and 100 or by 1000.</li> <li>estimates the quotient of 3- to 4-digit dividends by 1- to 2- digit divisors by rounding up or rounding down dividends or divisors.</li> <li>mentally divides 2- to 3-digit numbers by 1-digit numbers without remainder and explain the strategies used.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>analyzes and solves one-step word problems involving division of 3- to 4-digit numbers by 1- to 2- digit numbers including money using appropriate problem solving strategies.</li> <li>analyzes and solves 2- to 3-step word problems involving division and any one or two of the other fundamental operations including money using appropriate problem solving strategies.</li> <li>creates and solves 1- to 2- step word problems involving multiplication and any other operations involving whole numbers and money.</li> </ul>
		<ul style="list-style-type: none"> <li>perform series of operations following the MDAS rule.</li> </ul>	<ul style="list-style-type: none"> <li>interprets and explains MDAS correctly.</li> <li>performs a series of two or more operations.</li> </ul>
	<ul style="list-style-type: none"> <li>a fraction as part of a set of objects, as a number, as division, and of the different kinds of fractions and applies them in real-life situations.</li> </ul>	<ul style="list-style-type: none"> <li>identify fractions on a number line and investigate fractions as part of a set of objects.</li> </ul>	<ul style="list-style-type: none"> <li>illustrates fractions using regions, sets and the number line.</li> <li>divides sets of objects into smaller sets of equal amounts to recognize and identify fractional parts of a set.</li> </ul>
		<ul style="list-style-type: none"> <li>compare and arrange similar and dissimilar fractions.</li> </ul>	<ul style="list-style-type: none"> <li>identifies similar and dissimilar fractions from a given set of fractions.</li> <li>compares and arranges similar fractions from least to greatest and vice versa.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>compares and arranges dissimilar fractions from least to greatest and vice versa.</li> </ul>
		<ul style="list-style-type: none"> <li>convert improper fractions to mixed numbers and vice versa.</li> </ul>	<ul style="list-style-type: none"> <li>identifies proper fraction/ improper fraction/mixed numbers from a given set of fractions including those with denominators of 10 and 100.</li> <li>changes improper fraction to mixed numbers and vice versa.</li> <li>converts one (1) to a fraction and vice versa.</li> </ul>
	<ul style="list-style-type: none"> <li>operation of fractions.</li> </ul>	<ul style="list-style-type: none"> <li>add and subtract fractions and solve problems involving addition and subtraction of fractions.</li> </ul>	<ul style="list-style-type: none"> <li>visualizes and adds similar fractions.</li> <li>visualizes and subtracts similar fractions.</li> <li>visualizes and subtracts a fraction from a whole number.</li> <li>adds and subtracts dissimilar fractions.</li> <li>solves word problems involving addition and subtraction of fractions using appropriate problem solving strategies.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>parallel and perpendicular lines, measures of angles, symmetry, plane figures up to 4 sides, and 2-D representation of a 3-D solid.</li> </ul>	<ul style="list-style-type: none"> <li>investigate the concepts of parallel and perpendicular lines and angles.</li> </ul>	<ul style="list-style-type: none"> <li>describes and illustrates different angles (right, acute and obtuse) using models.</li> <li>draws perpendicular and parallel lines using a ruler and set squares.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>identifies parts of an angle and name angles using notation such as <math>\angle ABC</math>, <math>\angle x</math>, and <math>\angle 2</math> in plane figures.</li> <li>draws a given angle using a protractor.</li> <li>describes and illustrates parallel and perpendicular lines.</li> <li>identifies parallel and perpendicular lines and use these terms to describe geometric figures.</li> </ul>
		<ul style="list-style-type: none"> <li>describe various plane figures up to four sides and discuss their properties.</li> </ul>	<ul style="list-style-type: none"> <li>uses concrete objects/ models to explore/describe plane figures according to their attributes/properties of triangles and quadrilaterals.</li> <li>identifies and describes the different kinds of triangles: acute, right, obtuse, scalene, isosceles, equilateral, equiangular.</li> <li>identifies and describes the different kinds of quadrilaterals: square, rectangle, parallelogram, trapezoid, rhombus.</li> </ul>
		<ul style="list-style-type: none"> <li>explore symmetry in plane figures and the environment.</li> </ul>	<ul style="list-style-type: none"> <li>identifies and visualizes symmetry in the environment and in design.</li> <li>completes a symmetric figure with respect to a given line of symmetry.</li> </ul>



<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• explore different geometric solids.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• visualizes and describes geometric solids.</li> <li>• makes models of different geometric solids: cube, prism, cylinder.</li> </ul>
<b>Patterns and Algebra</b>	<ul style="list-style-type: none"> <li>• patterns and number sentences.</li> </ul>	<ul style="list-style-type: none"> <li>• describe the rule in a pattern in order to complete the pattern.</li> </ul>	<ul style="list-style-type: none"> <li>• searches for a pattern given a set of objects or figures.</li> <li>• determines the next object or term or figure from a given pattern.</li> </ul>
		<ul style="list-style-type: none"> <li>• complete number sentences.</li> </ul>	<ul style="list-style-type: none"> <li>• finds the missing value in a number sentence involving one of the four operations of whole numbers.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>• measures of perimeter and area of squares, rectangles, triangles, parallelograms and trapezoids, and their related figures, and volume of rectangular prism.</li> </ul>	<ul style="list-style-type: none"> <li>• find the perimeter of a plane figure and solve problems involving perimeter.</li> </ul>	<ul style="list-style-type: none"> <li>• describes and illustrates the perimeter of a given figure.</li> <li>• finds the perimeter of triangles, squares, rectangles, parallelograms and trapezoids.</li> <li>• solves word problems involving perimeter of squares and rectangles, triangles, parallelograms and trapezoids.</li> </ul>
		<ul style="list-style-type: none"> <li>• find the area of a plane figure and solve problems involving area.</li> </ul>	<ul style="list-style-type: none"> <li>• estimates the area of an irregular plane figure made up of squares and rectangles using non-standard units.</li> <li>• derives inductively the formulas for the area of squares and rectangles.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>finds the area of a figure made up of squares and rectangles using <math>\text{cm}^2</math> and <math>\text{m}^2</math>.</li> <li>estimates the area of triangles, parallelograms and trapezoids using non-standard units.</li> <li>derives inductively the formulas for the area of triangles, parallelograms and trapezoids.</li> <li>finds the area of triangles, parallelograms and trapezoids using <math>\text{cm}^2</math> and <math>\text{m}^2</math>.</li> <li>solves word problems involving the area of a figure made up of squares and rectangles.</li> <li>solves word problems involving the area of a triangle, parallelogram and trapezoid.</li> </ul>
		<ul style="list-style-type: none"> <li>explore the concept of volume of a solid and solve problems involving the volume of a solid.</li> </ul>	<ul style="list-style-type: none"> <li>visualizes and builds rectangular prisms using unit cubes.</li> <li>derives inductively the formula for the volume of rectangular prisms.</li> <li>finds the volume of a rectangular prism using cubic units.</li> <li>solves word problems involving the volume of a rectangular prism.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Statistics and Probability</b>	<i>The learner demonstrates understanding of...</i> <ul style="list-style-type: none"> <li>• tables, bar graphs and probability.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• solve problems involving data presented in bar graphs and tables.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• organizes data in tables.</li> <li>• constructs bar graphs and organize data using bar graphs.</li> <li>• reads and interprets data presented in tables and bar graphs.</li> <li>• solves problems using data presented in bar graphs and tables.</li> </ul>
		<ul style="list-style-type: none"> <li>• make simple predictions of events based on data records.</li> </ul>	<ul style="list-style-type: none"> <li>• gathers and records favorable outcomes from an activity with different results (e.g., rolling a die, drawing a card, tossing coins, etc.).</li> <li>• analyzes the chance of a result using spinners.</li> </ul>

## GRADE 5

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Numbers and Number Sense</b>	<i>The learner demonstrates...</i> <ul style="list-style-type: none"> <li>understanding of number notation and place value of numbers up to 10 million and of some number theory concepts.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>read and write large whole numbers and round off whole numbers to the nearest thousands and millions.</li> </ul>	<i>The learner...</i> <ul style="list-style-type: none"> <li>visualizes and represents whole numbers up to 10 000 000.</li> <li>reads and writes whole numbers up to 10 000 000.</li> <li>rounds off whole numbers to the nearest thousands and millions.</li> </ul>
		<ul style="list-style-type: none"> <li>find the greatest common factor and the least common multiple of given numbers.</li> </ul>	<ul style="list-style-type: none"> <li>writes a given number as a product of its prime factors.</li> <li>gives the common factors and the greatest common factor (GCF) of two numbers using the following methods: listing, factor tree, continuous division.</li> <li>gives the common multiples and least common multiple (LCM) of two numbers: listing, factor tree, continuous division.</li> <li>finds the GCF and LCM of 2 given numbers.</li> </ul>
		<ul style="list-style-type: none"> <li>apply divisibility rules for 2, 3, 4, 5, 6, 8, 9, 10, 11 and 12 on different contexts.</li> </ul>	<ul style="list-style-type: none"> <li>uses divisibility rules for 2, 5 and 10 to find common factors of numbers.</li> <li>uses divisibility rules for 3, 6 and 9 to find common factors.</li> <li>uses divisibility rules for 4, 8, 11 and 12 to find common factors.</li> </ul>

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<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>solves problems involving factors, multiples and divisibility rules for 2, 3, 4, 5, 6, 8, 9, 10, 11 and 12.</li> </ul>
	<ul style="list-style-type: none"> <li>mastery of concepts and operations/series of operations (PMDAS) of whole numbers.</li> </ul>	<ul style="list-style-type: none"> <li>simplify a series of operations on whole numbers and solve problems involving these.</li> </ul>	<ul style="list-style-type: none"> <li>states, explains and interprets the PMDAS or GMDAS rule.</li> <li>simplifies a series of operations on whole numbers involving more than two operations using the PMDAS or GMDAS rule.</li> <li>analyzes and solves problems involving series of operations.</li> </ul>
	<ul style="list-style-type: none"> <li>the ability to perform the four fundamental operations on similar and dissimilar fractions.</li> </ul>	<ul style="list-style-type: none"> <li>perform the four fundamental operations on fractions and mixed numbers and solve related problems.</li> </ul>	<ul style="list-style-type: none"> <li>represents the four operations on dissimilar fractions and mixed numbers using concrete and pictorial models.</li> <li>estimates sums, differences, products and quotients of fractions and mixed numbers.</li> <li>adds fractions and mixed numbers without and with regrouping.</li> <li>subtracts fractions and mixed numbers without and with regrouping.</li> <li>multiplies fractions and mixed numbers.</li> <li>finds a fractional part of a whole number or of a fraction.</li> <li>mentally multiplies fractional units.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>divides fractions and mixed numbers.</li> <li>simplifies fractions and mixed numbers to their lowest terms.</li> <li>solves problems involving addition, subtraction, multiplication and division of fractions and mixed numbers using the appropriate strategies.</li> </ul>
	<ul style="list-style-type: none"> <li>understanding of the concept of decimals, and addition and subtraction of decimals up to hundredths.</li> </ul>	<ul style="list-style-type: none"> <li>investigate the relationship between fractions and decimal numbers.</li> </ul>	<ul style="list-style-type: none"> <li>uses models to illustrate fractions as division of two numbers.</li> <li>visualizes decimal numbers using models like blocks, grid, number line and money.</li> <li>visualizes decimal numbers using models/pictures to show the relationship to fractions.</li> <li>reads and writes common fractions in decimal form through thousandths.</li> <li>renames decimal numbers to fractions with denominators of 10, 100, 1000, 10000.</li> </ul>
		<ul style="list-style-type: none"> <li>explore, know and understand the concept and value of a decimal number.</li> </ul>	<ul style="list-style-type: none"> <li>gives the place value of each digit of a given decimal through thousandths.</li> <li>reads and writes decimal numbers through thousandths.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• rounds decimals to the nearest tenths and hundredths.</li> <li>• compares and arranges decimal numbers from least to greatest and vice versa.</li> </ul>
		<ul style="list-style-type: none"> <li>• add and subtract decimal numbers with values through thousandths and solve problems involving these.</li> </ul>	<ul style="list-style-type: none"> <li>• estimates the sum or difference of decimal numbers.</li> <li>• adds and subtracts decimals through thousandths without and with regrouping.</li> <li>• adds and subtracts mixed decimals without and with regrouping.</li> <li>• analyzes and solves word problems, including money problems, involving addition and subtraction of decimal numbers.</li> </ul>
		<ul style="list-style-type: none"> <li>• multiply decimal numbers of values up to the hundredths and solve problems involving these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• represents multiplication of decimal numbers using pictorial models.</li> <li>• estimates the products of decimal numbers.</li> <li>• multiplies decimal numbers by multiples of 10 and 100.</li> <li>• multiplies decimal numbers of values up to hundredths.</li> <li>• multiplies mixed decimals with tenths and hundredths by whole numbers.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• multiplies mixed decimals by mixed decimals with tenths and hundredths.</li> <li>• multiplies decimals mentally by 0.1, 0.01, 10 and 100.</li> <li>• analyzes and solves word problems involving multiplication of decimals including money.</li> </ul>
		<ul style="list-style-type: none"> <li>• divide decimal numbers of values up to the hundredths and solve problems involving these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• represents division of decimal numbers using pictorial models.</li> <li>• estimates the quotients of decimal numbers.</li> <li>• divides decimal numbers of values up to the hundredths.</li> <li>• divides decimal numbers by whole numbers.</li> <li>• analyzes and solves problems of various types using whole numbers, fractions and decimals.</li> </ul>
	<ul style="list-style-type: none"> <li>• understanding on the use of ratio, proportion and percent.</li> </ul>	<ul style="list-style-type: none"> <li>• manipulate ratios and solve problems involving ratios and proportions</li> </ul>	<ul style="list-style-type: none"> <li>• visualizes the ratio of two given sets of objects.</li> <li>• expresses the ratio of two numbers using either the colon (:) or a fraction.</li> <li>• expresses one value as a fraction of another given their ratio and vice versa.</li> </ul>



<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• finds how many times one value is as large as another given their ratio and vice versa.</li> <li>• identifies and writes equivalent ratios.</li> <li>• expresses ratios in their simplest forms.</li> <li>• finds the missing term in a pair of equivalent ratios.</li> <li>• defines and describes a proportion.</li> <li>• recognizes when two quantities are in direct proportion.</li> <li>• solves problems involving ratio and direct proportion.</li> </ul>
		<ul style="list-style-type: none"> <li>• know and understand the concept of percent and to solve problems involving percents.</li> </ul>	<ul style="list-style-type: none"> <li>• uses models to illustrate the concept of percent and its relationship to fractions, ratios and decimal numbers.</li> <li>• gives the relationship among fractions, ratios and percents, between percent and a decimal number, among fractions, ratios, decimal numbers and percents.</li> <li>• defines the following: percentage, rate or percent, base.</li> <li>• identifies the base percentage and rate in a problem.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
			<ul style="list-style-type: none"> <li>finds the percentage in a given problem.</li> <li>analyzes and solves problems involving percents.</li> </ul>
<b>Geometry</b>	<i>The learner demonstrates...</i> <ul style="list-style-type: none"> <li>understanding of polygons up to 10 sides, congruence and similarities of polygons and circle and its parts.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>explore polygons with up to 10 sides.</li> </ul>	<i>The learner...</i> <ul style="list-style-type: none"> <li>describes, models and draws polygons.</li> <li>names polygons with 5 or more sides.</li> <li>describes and compares properties of polygons.</li> <li>represents congruent polygons using models.</li> <li>identifies and describes congruent polygons.</li> <li>represents similar polygons using models.</li> <li>identifies and describes similar polygons.</li> <li>finds the missing dimension in a pair of similar polygons.</li> </ul>
		<ul style="list-style-type: none"> <li>explore circles.</li> </ul>	<ul style="list-style-type: none"> <li>visualizes and describes a circle.</li> <li>identifies and defines the terms related to a circle.</li> <li>draws circles with different radii using a compass.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Patterns and Algebra</b>	<i>The learner demonstrates...</i> <ul style="list-style-type: none"> <li>understanding of simple equations.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>solve for the unknown values in simple equations involving one or more operations on whole numbers and fractions.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>uses models to illustrate mathematical sentences.</li> <li>determines the patterns in completing mathematical sentences.</li> <li>uses patterns to solve for the unknown in simple equations involving one or more operation on whole numbers and fractions.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>understanding on measurement in metric units to approximate measure and to compute for the circumference, area, volume and temperature.</li> </ul>	<ul style="list-style-type: none"> <li>describe the circumference of a circle, measure and use it to solve problems. the measure of circumference, area of a circle, volume of a cube and a rectangular prism and temperature.</li> </ul>	<ul style="list-style-type: none"> <li>represents and describes the circumference of a circle.</li> <li>uses a model to estimate the circumference of a circle.</li> <li>derives a formula for finding the circumference of a circle.</li> <li>finds the circumference of the given circle using the formula/s derived.</li> <li>solves problems involving circumference.</li> </ul>
		<ul style="list-style-type: none"> <li>convert units of measure for area and volume and select appropriate units and tools for consistency and accuracy.</li> </ul>	<ul style="list-style-type: none"> <li>estimates and uses appropriate units of measure for area.</li> <li>converts sq cm to sq m and vice versa.</li> <li>names the appropriate unit of measure used for measuring area for accuracy.</li> <li>estimates and uses appropriate units of measure for volume.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>converts one cubic unit of measure to a larger or smaller unit.</li> <li>names the appropriate unit of measure used for measuring the volume of a cube and a rectangular prism for accuracy.</li> </ul>
		<ul style="list-style-type: none"> <li>describe the area of a circle, measure and use it to solve problems.</li> </ul>	<ul style="list-style-type: none"> <li>represents and describes the area of a circle.</li> <li>uses a model to find the area of a circle.</li> <li>derives a formula for finding the area of a circle.</li> <li>finds the area of a circle using the formula/s derived.</li> <li>solves problems involving area of circle using appropriate formulas and procedures.</li> </ul>
		<ul style="list-style-type: none"> <li>describe the volume of a cube and a rectangular prism, measure and use it to solve problems.</li> </ul>	<ul style="list-style-type: none"> <li>describes the volume of cube and a rectangular prism.</li> <li>derives a formula for finding the volume of cube and a rectangular prism.</li> <li>solves problems involving volume of a cube and rectangular prism using appropriate formulas and procedures.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>describe temperature, measure and use it to solve problems.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>describes and estimates the temperature inside and outside of the classroom.</li> <li>identifies the parts of a thermometer.</li> <li>reads a thermometer.</li> <li>measures temperature using the degree Celsius.</li> <li>solves problems involving temperature.</li> </ul>
<b>Probability and Data Analysis</b>	<ul style="list-style-type: none"> <li>understanding to record, arrange, present, and interpret data using tables, line graphs and probability.</li> </ul>	<ul style="list-style-type: none"> <li>construct, read and interpret a line graph and its corresponding table of data and solve problems involving data from a table and a line graph.</li> </ul>	<ul style="list-style-type: none"> <li>reads and interprets data presented in a line graph and in its corresponding table of data.</li> <li>constructs a line graph using the corresponding table of data.</li> <li>describes and estimates the average value of a set of data.</li> <li>finds the average value of a set of data that includes whole numbers, fractions and decimal numbers.</li> <li>solves problems involving line graphs and the average of a set of data.</li> </ul>
		<ul style="list-style-type: none"> <li>make simple predictions of events based on a probability experiment.</li> </ul>	<ul style="list-style-type: none"> <li>describes a probability experiment.</li> <li>performs a probability experiment and record results by listing.</li> </ul>

# K TO 12 MATHEMATICS

<b><i>Content</i></b>	<b><i>Content Standards</i></b>	<b><i>Performance Standards</i></b>	<b><i>Learning Competencies</i></b>
			<ul style="list-style-type: none"> <li>analyzes data obtained from chance using experiments involving letter cards (A to Z) and number cards (0 to 20).</li> </ul>

## GRADE 6

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Numbers and Number Sense</b>	<i>The learner demonstrates...</i> <ul style="list-style-type: none"> <li>understanding of the concept of integers, exponents, base and scientific notation.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>explore the concept of integers and compare integers with whole numbers, fractions and decimal numbers.</li> </ul>	<i>The learner...</i> <ul style="list-style-type: none"> <li>describes the set of integers.</li> <li>identifies real-life situations that make use of integers.</li> <li>represents integers on the number line.</li> <li>compares integers with other numbers such as whole numbers, fractions and decimals.</li> <li>compares and arranges integers from least to greatest and vice versa.</li> </ul>
		<ul style="list-style-type: none"> <li>use the notation and computation of positive whole number powers to find values of numbers.</li> </ul>	<ul style="list-style-type: none"> <li>defines and describes the exponent and the base in a number expressed in exponential notation.</li> <li>gives the value of numbers expressed in exponential notation.</li> <li>expresses positive whole numbers in expanded notation using exponential notation and vice versa.</li> <li>finds and compares the value of the numbers expressed in either the expanded or exponential notation.</li> <li>reads and writes numbers up to trillions in scientific notation.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<ul style="list-style-type: none"> <li>determines the value of a number expressed in scientific notation.</li> </ul>
		<ul style="list-style-type: none"> <li>perform the four basic operations on integers</li> </ul>	<ul style="list-style-type: none"> <li>describes and interprets the basic operations on integers using materials such as algebra tiles, counters, chips and cards.</li> <li>states the rules for addition, subtraction, multiplication and division of integers.</li> <li>performs the basic operations on integers.</li> <li>solves problems involving basic operations on integers.</li> </ul>
		<ul style="list-style-type: none"> <li>perform a series of operations following the GEMDAS rule and solve problems involving a series of operations on whole numbers.</li> </ul>	<ul style="list-style-type: none"> <li>interprets and explains the GEMDAS rule.</li> <li>performs two or more different operations on whole numbers with or without exponents and grouping symbols.</li> <li>solves problems involving a series of operations on whole numbers.</li> </ul>
	<ul style="list-style-type: none"> <li>mastery of the operations of fractions and decimals.</li> </ul>	<ul style="list-style-type: none"> <li>add and subtract fractions and decimal numbers and solve problems involving these numbers.</li> </ul>	<ul style="list-style-type: none"> <li>estimates sums and differences of fractions and decimals in simple or mixed forms.</li> <li>rounds decimals through thousandths.</li> <li>adds and subtracts fractions in simple mixed forms without or with regrouping.</li> </ul>



<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
		<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• adds and subtracts decimals and mixed decimals through ten thousandths without or with regrouping.</li> <li>• solves problems involving addition and subtraction of fractions and decimals in simple or mixed forms without and with regrouping.</li> </ul>
		<ul style="list-style-type: none"> <li>• multiply fractions and decimal numbers and solve problems involving multiplication of fractions and decimal numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• illustrates multiplication of fractions and decimals using models.</li> <li>• estimates products of whole numbers, fractions and decimals.</li> <li>• multiplies fractions in simple and mixed forms.</li> <li>• shows that multiplying a fraction by its reciprocal is equal to 1.</li> <li>• multiplies decimals and mixed decimals through thousandths without and with regrouping and with “0” difficulty.</li> <li>• solves problems involving addition, subtraction, and multiplication of numbers in mixed forms.</li> </ul>
		<ul style="list-style-type: none"> <li>• divide fractions and decimal numbers and solve problems involving division of fractions and decimal numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• illustrates division of fractions and decimals using models.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>estimates quotients of whole numbers, fractions and decimals and determine the reasonableness of results (add this to all other competencies involving estimation).</li> <li>divides fractions and decimal numbers in simple and mixed forms.</li> <li>divides whole numbers (two to five-digit dividends) by decimals (one to two-digit divisors).</li> <li>divides mixed decimals by whole numbers.</li> <li>divides whole numbers by decimals and mixed decimals.</li> <li>divides mixed decimals by mixed decimals.</li> <li>divides decimals by 10, 100, 1,000 mentally.</li> <li>divides decimals by 0.1, 0.01, 0.001 mentally.</li> <li>differentiates between terminating and repeating from non-terminating decimal quotients.</li> <li>solves problems involving division of fractions and decimals in mixed forms including money.</li> <li>solves word problems involving all operations on fractions.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>analyzes and solves problems of various types-mathematical tasks, word problems, contextual questions and real-world settings using whole numbers, fractions and decimals.</li> </ul>
	<ul style="list-style-type: none"> <li>understanding of ratio and proportion and percent.</li> </ul>	<ul style="list-style-type: none"> <li>use ratio and proportion in a variety of ways and solve problems in different contexts.</li> </ul>	<ul style="list-style-type: none"> <li>defines and illustrates the meaning of ratio and proportion using concrete or pictorial models.</li> <li>forms ratios and sets up proportions for groups of objects or numbers.</li> <li>tells whether two ratios make a proportion.</li> <li>finds a missing term in a proportion.</li> <li>sets up a proportion for a given situation.</li> <li>solves problems involving direct proportion, partitive proportion, inverse proportion in different contexts such as distance-rate-time.</li> </ul>
		<ul style="list-style-type: none"> <li>use percent in a variety of ways and solve problems in different contexts.</li> </ul>	<ul style="list-style-type: none"> <li>defines and illustrates percent.</li> <li>determines the percentage, rate and base in a given problem.</li> <li>computes common percentage problems mentally: percent of increase or decrease, discounts and sales, value-added tax and service charge.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>solves problems involving finding the percentage, rate and base: commission, sales, taxes and simple interest.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>understanding of angles in geometric figures using various properties, attributes of spatial figures, 2-D representation of a 3-D solid and identification of nets of cube, prism and pyramid.</li> </ul>	<ul style="list-style-type: none"> <li>find unknown angle measures in geometrical figures.</li> </ul>	<ul style="list-style-type: none"> <li>describes the properties of angles on a straight line, angles at a point and vertically opposite angles.</li> <li>determines the sum of the angles in a triangle and a quadrilateral.</li> <li>finds unknown angles using angle properties in geometrical figures such as a square, rectangle, parallelogram, rhombus, trapezoid and triangle.</li> </ul>
		<ul style="list-style-type: none"> <li>explore spatial figures.</li> </ul>	<ul style="list-style-type: none"> <li>identifies the different spatial figures.</li> <li>illustrates the different spatial figures using various concrete and pictorial models.</li> <li>visualizes and describes the different spatial figures: cube, prism, cylinder, sphere, pyramid, cone, etc.</li> <li>identifies the nets of the following spatial figures: cube, prism, cylinder, pyramid and cone.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>understanding of circumference and area of a circle, perimeter and area of figures related to square,</li> </ul>	<ul style="list-style-type: none"> <li>solve problems involving finding areas of composite figures.</li> </ul>	<ul style="list-style-type: none"> <li>finds the area of composite figures formed by any two or more of the following: triangle, square, rectangle, circle and semi-circle.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	rectangle, triangle and circle, surface area and volume of rectangular prisms and capacity.	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>solves word problem involving area of composite figures formed by any two or more of the following: triangle, square, rectangle, circle and semi-circle.</li> </ul>
		<ul style="list-style-type: none"> <li>explore the concept of surface area and find the surface area of geometric solids.</li> </ul>	<ul style="list-style-type: none"> <li>identifies the faces of a geometric solid.</li> <li>visualizes and describes surface area and name the unit of measure used for measuring the surface area of solids.</li> <li>derives a formula for finding the surface area of cubes, prisms and cylinders.</li> <li>finds the surface area of cubes, prisms and cylinders.</li> <li>solves word problems involving measurement of surface area.</li> </ul>
		<ul style="list-style-type: none"> <li>find the volume of solids and solve problems related to this.</li> </ul>	<ul style="list-style-type: none"> <li>describes the meaning of the volume of a solid.</li> <li>determines the relationship between the volume of a rectangular prism and of a pyramid and between a cylinder and a cone.</li> <li>obtains formulas for finding the volumes of cylinders, pyramids and cones.</li> <li>finds the volume of a cylinder, pyramid or a cone.</li> <li>solves problems involving volumes of solids.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates...</i> <ul style="list-style-type: none"> <li>understanding of electric and water consumption, time, rate and speed.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>read and interpret meter readings.</li> </ul>	<i>The learner...</i> <ul style="list-style-type: none"> <li>reads and interprets electric and water meter readings.</li> <li>solves problems involving electric and water consumptions.</li> </ul>
		<ul style="list-style-type: none"> <li>measure time in a variety of ways and solve problems involving time, rate and speed.</li> </ul>	<ul style="list-style-type: none"> <li>estimates the duration of time in seconds and minutes.</li> <li>measures time using a 12-hour and a 24-hour clock.</li> <li>converts measures of time from a 12-hour to a 24-hour clock and vice versa.</li> <li>calculates time in the different world time zones.</li> <li>calculates speed, distance and time.</li> <li>solves problems involving average rate and speed.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>understanding to record, arrange, present and interpret data using tables and circle graphs and understands the meaning of probability.</li> </ul>	<ul style="list-style-type: none"> <li>construct and interpret circle graphs.</li> </ul>	<ul style="list-style-type: none"> <li>reads and interprets data presented in a circle graph.</li> <li>constructs a circle graph based on a table of data.</li> <li>makes inferences and hypotheses on data presented in a circle graph.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>make simple predictions of events based on experiments.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>describes the meaning of probability such as “50% chance of rain” and “one in a million chance of winning.”</li> <li>quantifies the phrases “most likely to happen” and “unlikely to happen.”</li> <li>performs experiments and record outcomes.</li> <li>makes listings and diagrams of outcomes and tell the number of favorable outcomes and chances using these listings and diagrams.</li> <li>makes simple predictions of events based on the results of experiments.</li> </ul>
<b>Patterns and Algebra</b>	<ul style="list-style-type: none"> <li>understanding of constants, variables and algebraic expressions in one variable.</li> </ul>	<ul style="list-style-type: none"> <li>explore the meaning of numerical expressions and equations.</li> </ul>	<ul style="list-style-type: none"> <li>differentiates between an expression and an equation and differentiate the two.</li> <li>gives a verbal translation of an equation and an expression using real-life contexts and vice versa.</li> <li>solves problems involving different types of numerical expressions and equations such as <math>7 + 9 = \underline{\hspace{1cm}} + 6</math>.</li> </ul>
		<ul style="list-style-type: none"> <li>use a letter or symbol to represent a quantity in a simple algebraic expression and simplify an algebraic expression.</li> </ul>	<ul style="list-style-type: none"> <li>replaces a quantity in a numerical equation or expression with a letter or symbol and write the equation or expression in different forms.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
		<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• writes an algebraic expression involving only one letter or symbol.</li> <li>• describes the uses of a letter or symbol in an algebraic expression: placeholder, pattern generalizer, unknown, value (e.g. <math>\pi</math>) and label.</li> <li>• defines a variable in an algebraic expression.</li> <li>• simplifies algebraic expressions in one variable.</li> <li>• evaluates algebraic expressions involving one variable.</li> <li>• represents quantities in real-life situation using algebraic expressions.</li> </ul>
		<ul style="list-style-type: none"> <li>• use a variable to generate a pattern in a series.</li> </ul>	<ul style="list-style-type: none"> <li>• identifies the pattern in a given series of objects and numbers.</li> <li>• determines the quantity to be represented by a letter or a symbol in a pattern.</li> <li>• writes the algebraic expression that represents the pattern in a given series of objects or numbers.</li> <li>• determines the next object or number in a given series using the algebraic expression for the pattern.</li> </ul>



## GRADE 7

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Numbers and Number Sense</b>	<i>The learner demonstrates understanding of...</i> <ul style="list-style-type: none"> <li>the key concepts of sets, the real number system, estimation / approximation of a square of a number and the measures of quantities, and the applications of real numbers to measurements.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>explore set concepts and set operations.</li> </ul>	<i>The learner...</i> <ul style="list-style-type: none"> <li>describes and illustrates well-defined sets, subsets, universal set and the null set.</li> <li>defines and describes the union and intersection of sets and the complement of a set.</li> <li>uses Venn Diagrams to represent sets, subsets and set operations.</li> <li>solves problems involving sets.</li> </ul>
		<ul style="list-style-type: none"> <li>apply various procedures and manipulations on the different subsets of the set of real numbers.</li> </ul>	<ul style="list-style-type: none"> <li>describes and illustrates the absolute value of a number on a number line as the distance of the number from 0.</li> <li>performs fundamental operations on integers: addition, subtraction, multiplication, division.</li> <li>states and illustrates the different properties of the operations on integers (commutative, associative, distributive, identity, inverse).</li> <li>defines and illustrates rational numbers and arrange them on a number line.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<p><i>The learner ...</i></p> <ul style="list-style-type: none"> <li>expresses rational numbers (both repeating and terminating/non-repeating and non-terminating) from fraction form to decimal form and vice versa.</li> <li>performs operations on rational numbers and illustrate their properties.</li> <li>describes principal roots and tells whether they are rational or irrational.</li> <li>determines between what two integers the square root of a number is.</li> <li>estimates the square root of a number to the nearest tenth.</li> <li>illustrates and graphs irrational numbers (square roots) on a number line with and without appropriate technology.</li> <li>describes, represents and compares the different subsets of real numbers.</li> <li>finds the union, intersection and complement of the set of real numbers and its subsets.</li> <li>arranges real numbers in increasing or decreasing order.</li> <li>determines the significant digits in a given situation.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>writes very large or very small numbers in scientific notation.</li> <li>describes and represents real-life situations which involve integers, rational numbers, square roots of a rational numbers and irrational numbers.</li> <li>solves problems involving real numbers.</li> </ul>
<b>Measurement</b>	<ul style="list-style-type: none"> <li>the different types of measures.</li> </ul>	<ul style="list-style-type: none"> <li>extend concepts of measurements to include different types of measures and all the subsets of the set of real numbers to solve measurement problems.</li> </ul>	<ul style="list-style-type: none"> <li>describes what it means to measure.</li> <li>describes the development of measurement from the primitive to the present international system of units.</li> <li>estimates or approximates the measures of quantities particularly length, weight/mass, volume, time, angle and temperature.</li> <li>uses appropriate instruments to measure quantities such as length, weight/mass, volume, time, angle and temperature.</li> <li>converts measurements from one unit to another for each type of measurement including the English system.</li> <li>solves problems involving measurements such as perimeter, area, weight, time, speed, temperature, volume/capacity and utilities usage (meter reading).</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Algebra</b>	<p><i>The learner demonstrates understanding of...</i></p> <ul style="list-style-type: none"> <li>the key concepts of algebraic expressions as applied in solving problems.</li> </ul>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>simplify and evaluate algebraic expressions in one or more variables.</li> </ul>	<p><i>The learner ...</i></p> <ul style="list-style-type: none"> <li>translates verbal phrases to mathematical phrases and vice versa.</li> <li>differentiates between constants and variables in a given algebraic expression.</li> <li>evaluates algebraic expressions for given values of the variables.</li> </ul>
		<ul style="list-style-type: none"> <li>explore the concept of and manipulate polynomials.</li> </ul>	<ul style="list-style-type: none"> <li>gives examples of polynomials, monomial, binomial, trinomial.</li> <li>identifies the base, coefficient, terms and exponents in a given polynomial.</li> <li>defines and interprets the meaning of <math>a^n</math> where <math>n</math> is a positive integer.</li> <li>derives inductively the laws of exponents (Exponents restricted to positive integers).</li> <li>illustrates the laws of exponents.</li> <li>adds and subtracts polynomials.</li> <li>multiplies and divides polynomials.</li> <li>finds inductively using models the (a) product of two binomials; (b) product of a sum and difference of two terms; (c) square of a binomial; (d) cube of a binomial; (e) product of a binomial and a trinomial.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>finds algebraically the (a) product of two binomials; (b) product of a sum and difference of two terms; (c) square of a binomial; (d) cube of a binomial; (e) product of a binomial and a trinomial.</li> </ul>
		<ul style="list-style-type: none"> <li>solve equations and inequalities.</li> </ul>	<ul style="list-style-type: none"> <li>differentiates between mathematical expressions and mathematical equations.</li> <li>translates English sentences to mathematical sentences and vice versa.</li> <li>differentiates between equations and inequalities.</li> <li>defines and illustrates the meaning of absolute value.</li> <li>finds the solution of an equation or inequality involving one variable, including one that involves absolute value (a) from a given replacement; (b) intuitively by guess and check; (c) by algebraic procedures (applying the properties of equalities and inequalities); (d) graphing.</li> <li>solves problems that use equations and inequalities.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Geometry</b>	<p><i>The learner demonstrates understanding of...</i></p> <ul style="list-style-type: none"> <li>the key concepts of geometry of shapes and sizes, geometric construction and the application of measurements in geometric figures.</li> </ul>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>analyze and investigate in a more formal environment the basic concepts in geometry.</li> </ul>	<p><i>The learner ...</i></p> <ul style="list-style-type: none"> <li>represents a point, line and plane using concrete and pictorial models.</li> <li>defines, identifies and names the subsets of a line.</li> <li>illustrates, names, identifies and defines the different kinds of angles.</li> <li>derives relationships of geometric figures using measurements and by inductive reasoning: supplementary angles, complementary angles, equal angles, adjacent angles, linear pairs, perpendicular lines and parallel lines.</li> <li>derives relationships between vertical angles and among angles formed by parallel lines cut by a transversal using measurement and by inductive reasoning.</li> </ul>
		<ul style="list-style-type: none"> <li>analyze and investigate the different kinds of triangles, quadrilaterals, convex polygons and circles.</li> </ul>	<ul style="list-style-type: none"> <li>uses a compass and straightedge to bisect line segments and angles and construct perpendiculars and parallels.</li> <li>classifies triangles according to their angles and according to their sides.</li> <li>illustrates, names and identifies different kinds of triangles and define the terms associated with a triangle.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>derives relationships among the sides and angles of a triangle using measurement and inductive reasoning.</li> <li>illustrates, names and identifies the different kinds of quadrilaterals.</li> <li>derives relationships among the angles and among the sides of a quadrilateral using measurement and inductive reasoning.</li> <li>defines and illustrates convex polygons.</li> <li>derives the relationship of exterior and interior angles of any convex polygon using measurement and inductive reasoning.</li> <li>illustrates a circle and defines the terms related to it: radius, diameter, center, arc and central angle.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>the key concepts, uses and importance of statistics and probability, data collection/gathering and the different forms of data representation.</li> </ul>	<ul style="list-style-type: none"> <li>engage in statistical investigations.</li> </ul>	<ul style="list-style-type: none"> <li>explains the basic concepts, uses and importance of Statistics.</li> <li>poses questions and problems that may be answered using Statistics.</li> <li>collects or gathers statistical data and organizes the data in a frequency table according to some systematic considerations.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
		<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• uses appropriate graphs to represent organized data: pie chart, bar graph, line graph and a histogram.</li> <li>• finds the mean, median and mode of statistical data.</li> <li>• describes the data using information from the mean, median and mode.</li> <li>• analyzes, interprets accurately and draws conclusions from graphic and tabular presentations of statistical data.</li> </ul>



## GRADE 8

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Algebra</b>	<i>The learner demonstrates understanding of...</i> <ul style="list-style-type: none"> <li>special products and factors of polynomials and operations rational expressions.</li> </ul>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>recognize special products and factor polynomials.</li> </ul>	<i>The learner...</i> <ul style="list-style-type: none"> <li>identifies polynomials which are special products: polynomials with common monomial factors, trinomials that are products of two binomials, trinomials that are squares of a binomial, and products of the sum and difference of two terms (e.g. <math>x^2 - y^2</math>, <math>x^3 + y^3</math> ).</li> <li>finds special products and factors of certain polynomials: product of two binomials, product of sum and difference of two terms, square of a binomial, cube of a binomial, and product of the special case of multiplying a binomial and a trinomial.</li> <li>factors completely different types of polynomials (polynomials with common monomial factors, a difference of two squares, sum and difference of two cubes, perfect square trinomial, general trinomials) using special formulas, grouping and other techniques.</li> <li>solves problems involving polynomials and their products and factors.</li> </ul>
		<ul style="list-style-type: none"> <li>perform operations on rational expressions.</li> </ul>	<ul style="list-style-type: none"> <li>defines and illustrates rational expressions.</li> <li>simplifies rational expressions.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>• multiplies and divides rational expressions.</li> <li>• adds and subtracts rational expressions.</li> <li>• simplifies complex fractions.</li> <li>• solves problems involving rational expressions.</li> </ul>
		<ul style="list-style-type: none"> <li>• manipulate algebraic expressions with integral exponents.</li> </ul>	<ul style="list-style-type: none"> <li>• defines and interprets zero and negative exponents.</li> <li>• evaluates algebraic expressions involving integral exponents.</li> <li>• simplifies algebraic expressions involving integral exponents.</li> </ul>
	<ul style="list-style-type: none"> <li>• linear functions and their graphs.</li> </ul>	<ul style="list-style-type: none"> <li>• explore the rectangular coordinate system.</li> </ul>	<ul style="list-style-type: none"> <li>• describes the rectangular coordinate system and its uses.</li> <li>• defines and illustrates the coordinate axes, the origin and a point on the coordinate plane.</li> <li>• describes and plots positions on the coordinate plane using coordinate axes.</li> </ul>
		<ul style="list-style-type: none"> <li>• explore the concept of a relations and a function.</li> </ul>	<ul style="list-style-type: none"> <li>• defines and illustrates a relation and a function.</li> <li>• determines if a given relation is a function using a table of ordered pairs, graphs and equations.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>differentiates between dependent and independent variables.</li> <li>defines and describes the domain and range of a function.</li> </ul>
		<ul style="list-style-type: none"> <li>explore the linear function, its equation and graph.</li> </ul>	<ul style="list-style-type: none"> <li>defines and describes a linear function using its points, equation and graph.</li> <li>finds the domain and range of a linear function.</li> <li>defines and illustrates the meaning of slope of a line.</li> <li>finds the slope of a line given two points, a table of values or list of ordered pairs, its equation and graph.</li> <li>writes the linear equation <math>Ax + By = C</math> in the form <math>y = mx + b</math> and vice versa.</li> <li>graphs a linear equation given (a) any two points; (b) the x- and y-intercepts; (c) the slope and a point on the line.</li> <li>characterizes the graph of a linear equation in terms of its intercept and slope.</li> <li>finds the equation of a line given (a) two points; (b) the slope and a point; (c) the slope and its intercept.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>• solves problems involving linear functions and linear patterns.</li> </ul>
	<ul style="list-style-type: none"> <li>• linear equations and inequalities.</li> </ul>	<ul style="list-style-type: none"> <li>• graph linear inequalities in two variables.</li> </ul>	<ul style="list-style-type: none"> <li>• differentiates between mathematical expressions and mathematical equations.</li> <li>• differentiates between equations and inequalities.</li> <li>• defines and illustrates linear inequalities in two variables.</li> <li>• graphs linear inequalities in two variables on the coordinate plane.</li> </ul>
		<ul style="list-style-type: none"> <li>• explore and solve systems of linear equations and inequalities in two variables.</li> </ul>	<ul style="list-style-type: none"> <li>• defines and describes systems of linear equations and inequalities using practical situations and mathematical expressions.</li> <li>• identifies which given systems of linear equations have graphs that are parallel, that intersect and coincide.</li> <li>• graphs systems of linear equations.</li> <li>• solves systems of linear equations by (a) graphing; (b) elimination; (c) substitution.</li> <li>• graphs systems of linear inequalities in two variables.</li> <li>• solves a system of linear inequalities in two variables by graphing.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• solves problems involving systems of linear equations and inequalities.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>• axiomatic development of geometry, triangle congruence, inequalities in triangles and parallel and perpendicular lines.</li> </ul>	<ul style="list-style-type: none"> <li>• engage in formal arguments, reason and proof.</li> </ul>	<ul style="list-style-type: none"> <li>• identifies the hypothesis and conclusions of if-then and other types of statements.</li> <li>• formulates the inverse, converse and contrapositive of an implication.</li> <li>• distinguishes between inductive and deductive reasoning.</li> <li>• provides formal arguments that explain results of a phenomenon or a situation.</li> <li>• writes formal arguments as a series of statements that make up a proof (both direct and indirect).</li> <li>• gives and illustrates the undefined terms in geometry.</li> <li>• explains the need for defined terms and formally define all terms previously introduced.</li> <li>• differentiates between postulate and theorem and give the importance of each.</li> </ul>
		<ul style="list-style-type: none"> <li>• prove triangle congruence.</li> </ul>	<ul style="list-style-type: none"> <li>• defines and illustrates triangle congruence.</li> <li>• states and illustrates the SAS congruence postulate and the ASA and SSS congruence theorems.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>applies the postulate and theorems on triangle congruence to prove statements on congruence, including right triangles.</li> <li>applies triangle congruence to geometric constructions of perpendicular bisector and angle bisector.</li> </ul>
		<ul style="list-style-type: none"> <li>explore situations involving inequalities in triangles.</li> </ul>	<ul style="list-style-type: none"> <li>states and illustrates the theorems on triangle inequalities, e.g., exterior angle inequality theorem, triangle inequality theorem, hinge theorem.</li> <li>applies the theorems on triangle inequalities to: (a) determine possible measures for the angles and sides of triangles, and (b) justify claims about the unequal relationships between side and angle measures.</li> <li>applies the theorems on triangle inequalities to prove results involving triangle inequalities.</li> </ul>
		<ul style="list-style-type: none"> <li>prove results involving parallel and perpendicular lines.</li> </ul>	<ul style="list-style-type: none"> <li>defines parallel and perpendicular lines.</li> <li>illustrates and proves properties of parallel lines cut by a transversal.</li> <li>recalls the different kinds of quadrilaterals and identify those that are parallelograms.</li> <li>determines the conditions that make a quadrilateral a parallelogram.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>determines and proves the conditions under which lines and segments are parallel or perpendicular.</li> <li>uses properties to find measures of angles, sides and other quantities involving parallelograms.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>measures of variability of data and basic concepts of probability.</li> </ul>	<ul style="list-style-type: none"> <li>explore the concept of measure of variability.</li> </ul>	<ul style="list-style-type: none"> <li>recalls the meaning and interpretation of the mean, median and mode of ungrouped data and extend them to grouped data.</li> <li>discusses the meaning of variability.</li> <li>calculates the different measures of variability of a given set of data: (a) range; (b) average deviation; (c) standard deviation.</li> <li>describes a set of data using measures of central tendency and measures of variability.</li> </ul>
		<ul style="list-style-type: none"> <li>discuss the basic concepts of probability and solve simple problems involving probabilities of events.</li> </ul>	<ul style="list-style-type: none"> <li>defines an experiment, outcome, sample space and event.</li> <li>defines and discusses the probability of an event.</li> <li>interprets the meaning of the probability of an event.</li> <li>differentiates between an experimental probability and a theoretical probability.</li> </ul>

# K TO 12 MATHEMATICS

<b><i>Content</i></b>	<b><i>Content Standards</i></b>	<b><i>Performance Standards</i></b>	<b><i>Learning Competencies</i></b>
			<ul style="list-style-type: none"> <li>counts the number of occurrences of an outcome in an experiment and organize them using a table, tree diagram, systematic listing and the fundamental counting principle.</li> <li>solves simple problems involving probabilities of events.</li> </ul>



## GRADE 9

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Algebra</b>	<p><i>The learner demonstrates understanding of...</i></p> <ul style="list-style-type: none"> <li>quadratic functions and equations, and variation.</li> </ul>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>explore the concepts involving a quadratic function and its graph and solve problems involving quadratic functions and equations.</li> </ul>	<p><i>The learner...</i></p> <ul style="list-style-type: none"> <li>makes mathematical models to represent real-life situations using quadratic functions.</li> <li>recognizes quadratic functions and quadratic equations.</li> <li>differentiates between a quadratic function and a quadratic equation.</li> <li>represents and describes a quadratic function using its: (a) tables of values; (b) graph; (c) equation.</li> <li>finds the domain and range of a quadratic function.</li> <li>graphs quadratic functions and determines or describes its: (a) intercepts; (b) zeroes; (c) axis of symmetry; (d) maximum or minimum point; (e) shape.</li> <li>writes the equation of a quadratic function given: (a) a table of values; (b) graph; (c) zeroes.</li> <li>transforms the quadratic function <math>y = ax^2 + bx + c</math> into the form <math>y = a(x - h)^2 + k</math>.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>analyzes the effects of changing the values of <math>a</math>, <math>h</math> and <math>k</math> in the equation <math>y = a(x - h)^2 + k</math> of a quadratic function on its graph.</li> <li>solves quadratic equations by: (a) extracting square roots; (b) factoring; (c) completing the square; (d) the quadratic formula.</li> <li>characterizes the roots of a quadratic equation using the discriminant.</li> <li>describes the relationship between the coefficients and the roots of a quadratic equation.</li> <li>solves equations transformable to quadratic equations.</li> <li>solves problems involving quadratic functions and quadratic equations.</li> </ul>
		<ul style="list-style-type: none"> <li>solve equations involving rational expressions.</li> </ul>	<ul style="list-style-type: none"> <li>recognizes equations that involve rational expressions.</li> <li>solves equations involving rational expressions.</li> <li>identifies and solves equations involving rational expressions that are transformable to quadratic equations.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>solves problems that use equations involving rational expressions, including those in real-life situations.</li> </ul>
		<ul style="list-style-type: none"> <li>explore relationships of quantities that involve variation and solve problems involving direct, indirect and joint variation.</li> </ul>	<ul style="list-style-type: none"> <li>recognizes relationships between two quantities that involve the following variations: (a) direct; (b) inverse; (c) joint; (d) combination of any of these.</li> <li>translates statements that involve variations to: (a) a table of values; (b) a mathematical equation; (c) a graph and vice versa.</li> <li>identifies situations that involve quantities that vary (a) directly; (b) inversely; (c) jointly; (d) according to a combination of any of these.</li> <li>solves problems involving variation.</li> </ul>
	<ul style="list-style-type: none"> <li>expressions with rational exponents and involving radicals.</li> </ul>	<ul style="list-style-type: none"> <li>simplify expressions with rational exponents and solve problems involving them.</li> </ul>	<ul style="list-style-type: none"> <li>applies the concepts and laws involving positive integer exponents to zero, negative and rational exponents.</li> <li>simplifies expressions with rational exponents.</li> <li>solves problems involving expressions with different exponents (integers and rational).</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>perform fundamental operations on expressions involving radicals and solve problems involving expressions and equations with radicals.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>recognizes expressions with radicals.</li> <li>relates expressions with fractional exponents to expressions with radicals.</li> <li>writes expressions with rational exponent as radicals and viceversa.</li> <li>states and proves the laws of radicals.</li> <li>simplifies expressions with radicals using the laws of radicals.</li> <li>performs operations on expressions involving radicals.</li> <li>solves equations involving expressions with radicals.</li> <li>solves problems that involve equations with radicals.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>triangle similarity and of quadrilaterals.</li> </ul>	<ul style="list-style-type: none"> <li>use the fundamental theorems of proportionality.</li> </ul>	<ul style="list-style-type: none"> <li>defines a proportion.</li> <li>states and applies the different properties of proportion.</li> <li>applies the fundamental theorems of proportionality to solve problems involving proportions.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• prove and use concepts on triangle similarity, particularly on similarity of right triangles to solve problems.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• states, illustrates and explains the conditions for similarity of triangles.</li> <li>• proves the theorems on triangle similarity: (a) SAS similarity theorem; (b) SSS similarity theorem; (c) AA similarity theorem; (d) right triangle similarity theorem; (e) special right triangle theorems; (f) others involving area and perimeter ratios.</li> <li>• states and proves the Pythagorean theorem.</li> <li>• differentiates between triangle similarity and triangle congruence and relate one to the other.</li> <li>• applies the theorems to show that given triangles are similar.</li> <li>• solves problems that involve: (a) triangle similarity; (b) Pythagorean theorem; (c) special right triangles.</li> </ul>
		<ul style="list-style-type: none"> <li>• prove and use theorems involving quadrilaterals.</li> </ul>	<ul style="list-style-type: none"> <li>• defines the different quadrilaterals.</li> <li>• proves theorems on the properties of a parallelogram.</li> <li>• determines the conditions that make a quadrilateral a parallelogram.</li> <li>• proves theorems on the different kinds of parallelogram (rectangle, rhombus, square).</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>proves theorems on trapezoids and kites.</li> <li>proves the midline and intercept theorems.</li> <li>uses properties to find measures of angles, sides and other quantities involving quadrilaterals.</li> </ul>
<b>Patterns and Algebra (Trigonometry)</b>	<ul style="list-style-type: none"> <li>the basic concepts of trigonometry.</li> </ul>	<ul style="list-style-type: none"> <li>explore the concept of trigonometric ratios and use these to solve problems on angles of elevation and depression and navigation.</li> </ul>	<ul style="list-style-type: none"> <li>defines the six trigonometric ratios sine, cosine, tangent, secant, cosecant and cotangent.</li> <li>finds the trigonometric ratios of special angles.</li> <li>describes and illustrates angles of elevation and angles of depression.</li> <li>recognizes situations that involve angles of elevation and depression.</li> <li>solves problems that involve angles of elevation or depression.</li> <li>uses trigonometric ratios to solve problems involving right triangles (e.g., navigation, surveying).</li> </ul>

## GRADE 10

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
<b>Patterns and Algebra</b>	<p><i>The learner demonstrates understanding of...</i></p> <ul style="list-style-type: none"> <li>sequences and polynomial functions.</li> </ul>	<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>generate an arithmetic and a geometric sequence, find the sums of the terms in the sequence and solve problems involving these sequences.</li> </ul>	<p><i>The learner...</i></p> <ul style="list-style-type: none"> <li>observes and generalizes a pattern.</li> <li>define and illustrate a sequence and some types of sequences (e.g., harmonic, Fibonacci).</li> <li>defines, illustrates and graphs an arithmetic sequence.</li> <li>gives examples of an arithmetic sequence.</li> <li>finds the terms of an arithmetic sequence including the general <math>n</math>th term of the sequence.</li> <li>finds the sum of terms of a given arithmetic sequence.</li> <li>defines, illustrates and graphs a geometric sequence.</li> <li>gives examples of a geometric sequence.</li> <li>differentiates between a finite and an infinite geometric sequence.</li> <li>differentiates between an arithmetic and a geometric sequence.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner...</i> <ul style="list-style-type: none"> <li>finds the terms of a geometric sequence including the general <math>n</math>th term of the sequence.</li> <li>finds the sum of terms of a given geometric sequence, both finite and infinite.</li> <li>solves problems involving sequences and their sums.</li> </ul>
		<ul style="list-style-type: none"> <li>explore polynomial functions.</li> </ul>	<ul style="list-style-type: none"> <li>defines and describes polynomial functions.</li> <li>recognizes and gives examples of polynomial functions.</li> <li>recognizes that linear and quadratic functions are also polynomial functions.</li> <li>differentiates between polynomial functions and polynomial expressions.</li> <li>recalls how to perform operations on polynomial expressions.</li> <li>describes, illustrates and performs the synthetic division process for dividing polynomial expressions by a binomial.</li> <li>states the remainder theorem and provides a proof of the theorem.</li> <li>states the factor theorem and provides a proof of the theorem.</li> </ul>



<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• factors polynomial expressions using synthetic division, the remainder theorem and the factor theorem.</li> <li>• finds the zeroes of polynomial functions.</li> <li>• sketches graphs of polynomial functions.</li> <li>• solves problems involving factors and zeroes of polynomial functions.</li> </ul>
<b>Geometry</b>	<ul style="list-style-type: none"> <li>• concepts of circles.</li> </ul>	<ul style="list-style-type: none"> <li>• find parts of a circle and solve problems involving the circle and its parts.</li> </ul>	<ul style="list-style-type: none"> <li>• defines, identifies and illustrates the parts of a circle: the center, radius, diameter, interior and exterior, chord, arc, central angle, inscribed angle.</li> <li>• derives the relation among chords, arcs, central angles and inscribed angles.</li> <li>• states and proves the theorems relating chords, arcs, central angles and inscribed angles.</li> <li>• defines secant and tangent lines and segments, segment and sector of a circle.</li> <li>• states and proves the theorems on secant and tangent lines and segments.</li> <li>• solves problems that involve parts of circles.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i> <ul style="list-style-type: none"> <li>• explore geometric figures on the rectangular coordinate plane.</li> </ul>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• derives the distance formula between two points on the plane.</li> <li>• applies the distance formula to derive and prove some geometric properties.</li> <li>• derives and states the center-radius form of the equation of a circle.</li> <li>• finds the center and radius of a circle given its equation and vice versa.</li> <li>• sketches the graph of a circle on the coordinate plane.</li> <li>• solves problems involving geometric figures in the coordinate plane.</li> </ul>
<b>Statistics and Probability</b>	<ul style="list-style-type: none"> <li>• measures of Position.</li> </ul>	<ul style="list-style-type: none"> <li>• describe a set of data using measures of position.</li> </ul>	<ul style="list-style-type: none"> <li>• defines and describes the following measures of position: quartiles, deciles and percentiles.</li> <li>• explains and interprets quartiles, deciles and percentiles.</li> <li>• calculates specified percentiles (e.g. 90th percentile) of a set of data.</li> <li>• uses measures of position to describe a set of data and infer some information about the data.</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
	<i>The learner demonstrates understanding of...</i>	<i>The learner is able to...</i>	<i>The learner ...</i> <ul style="list-style-type: none"> <li>• solves problems involving quartiles, deciles and percentiles.</li> <li>• constructs box plot from a set of data.</li> </ul>
	<ul style="list-style-type: none"> <li>• basic combinational concepts and probability.</li> </ul>	<ul style="list-style-type: none"> <li>• count occurrences of an event and arrangements using the Fundamental Counting Principle, Permutations and Combinations.</li> </ul>	<ul style="list-style-type: none"> <li>• counts the number of occurrences of an event using: (a) a grid table; (b) a tree diagram; (c) systematic listing.</li> <li>• states and explains the fundamental counting principle.</li> <li>• uses the fundamental counting principle to count the number of arrangements or ways that a task can be carried out.</li> <li>• recognizes groupings that require order and groupings that do not require order.</li> <li>• defines a permutation of <math>n</math> objects taken <math>r</math> at a time.</li> <li>• derives and uses the formula for finding the permutation of <math>n</math> objects taken <math>r</math> at a time.</li> <li>• defines a combination of <math>n</math> objects taken <math>r</math> at a time as a subset.</li> <li>• derives and uses the formula for finding the number of combinations of <math>n</math> objects taken <math>r</math> at a time.</li> <li>• explains the relationship of a permutation to</li> </ul>

<b>Content</b>	<b>Content Standards</b>	<b>Performance Standards</b>	<b>Learning Competencies</b>
			<p>a combination of n objects taken r at a time.</p> <ul style="list-style-type: none"> <li>• solves problems involving permutations and combinations.</li> </ul>
		<p><i>The learner is able to...</i></p> <ul style="list-style-type: none"> <li>• find the probability of compound events.</li> </ul>	<p><i>The learner ...</i></p> <ul style="list-style-type: none"> <li>• recognizes events, union of events and intersection of events.</li> <li>• finds the cardinality of a union of two sets a and b.</li> <li>• defines the probability of a union of two events using the definition of the probability of an event e.</li> <li>• finds the probability <math>P(A \cup B)</math>.</li> <li>• defines events that are independent.</li> <li>• finds the probability <math>P(A \cap B)</math>.</li> <li>• solves problems involving probabilities of a union and intersection of events.</li> </ul>

## GLOSSARY

**Accuracy** – the quality of being correct and precise.

**Applying** – the skill of using concepts, procedures, algorithms and other mathematical constructs on practical situations and phenomena.

**Communicating** – the use of notations, symbols, figures, equations and functions to convey mathematical ideas.

**Computing** – the skill of calculating using correct algorithms, procedures and tools to arrive at a final exact result.

**Conjecturing** – the skill of formulating mathematical theories that still need to be proven.

**Connecting** – the skill of integrating mathematics to other school subjects and other areas in life.

**Constructivism** – the theory that knowledge is constructed when the learner is able to draw ideas from his/her own experiences and connects them to new ideas that are encountered.

**Context** - a locale, situation or set of conditions of students that may influence their study and use of mathematics to develop critical thinking and problem solving skills.

**Cooperative Learning** - learning that is achieved by working with fellow learners as they all engage in a shared task.

**Creativity** – the skill of using available procedures in Mathematics and non-conventional methods to solve a problem and produce answers.

**Critical Thinking** - the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (Scriven & Paul, 1987).

**Decision-making** – the skill of arriving at a choice or decision based on sound, logical procedures and mathematical analyses.

**Discovery Learning** – learning that is achieved by allowing students to discover new ideas using their experiences (Bruner, 1961).

**Estimating** – the skill of roughly calculating or judging a numerical value or quantity.

**Experiential Learning** – learning that occurs by making sense of direct everyday experiences (Kolb, 1984)

**Inquiry-based Learning** – learning that focuses on students asking questions and finding answers to their questions using their personal experiences.

**Knowing and Understanding** – meaningful acquisition of concepts that include memorizing and recalling of facts and procedures

**Mathematical Problem Solving** - finding a solution to a problem that is unknown (Polya, 1945 & 1962).

**Modeling** – the use of functions and graphs to represent relationships between and among quantities in a phenomenon.

**Objectivity** – the quality of judging, evaluating and making decisions based on mathematical facts and results without being influenced by subjective conditions.

**Perseverance** – firmness in finishing a task despite difficulties and obstacles.

**Productivity** – the quality of pursuing an activity to arrive at a meaningful and useful result or product.

**Proving** – the skill of demonstrating the truth or falsity of a theory using reasoning and arguments.

**Reasoning** – the process of explaining using sound analyses, following the rules of logic.

**Reflective Learning** – learning that is facilitated by deep thinking.

**Representing** – the use of figures and shapes, variables, equations and functions to concretize and illustrate quantities and their relationships.

**Situated Learning** – learning in the same context on which concepts and theories are applied.

**Solving** – to find the answer to an algebraic or mathematical problem using any procedures and tools available.

**Visualizing** - using one's creativity and imagination to produce images, pictures and other means to represent and understand mathematical concepts (MATHTED & SEI, 2010).

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[http://www.criticalthinking.org/aboutct/define\\_critical\\_thinking.cfm](http://www.criticalthinking.org/aboutct/define_critical_thinking.cfm)

## CURRICULUM DEVELOPERS/WRITERS/REACTORS/REVIEWERS in the DEVELOPMENT of K to 12 CURRICULUM

## MATHEMATICS

**A. Workshop on the Finalization of Learning Competencies**

Venue: Development Academy of the Philippines, Tagaytay City

Date: August 8-12, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Remyllinda Soriano	Education Program Specialist I	DCS - Manila
2. Teresita Tagulao	Education Program Specialist I	DCS - Pasig
3. Robesa Hilario	Education Program Specialist	DepEd – BEE – CDD
4. Elizabeth Catao	Education Program Specialist	DepEd – BSE – CDD
5. Sonia Javier	Head Teacher III	JSHS
6. Melvin Callanta	Head Teacher VI	Mangaldan High School
7. Nicanor San Gabriel Jr.	Teacher I	Araullo High School
8. Dr. Maxima Acelajado	Professor	De La Salle University
9. Dr. Catherine Vistro – Yu	Professor I	Ateneo De Manila University
10. Lydia Landrito	Science Education Specialist	University of the Philippines - NISMED
11. Dr. Florante C. Marmeto	Principal IV	Sucat Elementary School

**B. Workshop on the Development of Learning Competencies and Teaching Guides**

Venue: Development Academy of the Philippines, Tagaytay City

Date: July 18-22, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Teresita P. Tagulao	Education Program Specialist I	DCS - Pasig
2. Remyllinda T. Soriano	Education Program Specialist I	D.O. Manila
3. Melvin Calanta	Head Teacher VI	Mangaldan High School
4. Nicanor M. San Gabriel Jr.	Teacher I	Araullo High School
5. Maxima J. Acelajado	Professor	De La Salle University



# K TO 12 MATHEMATICS

6. Elizabeth Catao	Education Program Specialist	DepEd – BSE – CDD
7. Sonia E. Javier	Head Teacher III	JSHS
8. Catherine P. Vistro - Yu	Professor I	Ateneo De Manila University
9. Robesa Hilario	Education Program Specialist	DepEd – BEE – CDD
10. Thomas Manuel L. Quiton		BEE

## C. Workshop on the Development of Learning Competencies Grades K to 3

Venue: Development Academy of the Philippines, Tagaytay City

Date: July 11-15, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Teresita P. Tagulao		D.O. Pasig City
2. Remy Linda T. Soriano		D.O. Manila
3. Robesa Hilario		BEE - CDD
4. Abelardo B. Medes		BEE – CDD
5. Thomas Manuel L. Quiton		BEE

## D. Experts' Review of the Curriculum Standards

Venue: Bulwagan ng Karunungan, DepEd Complex, Pasig City

Date: July 15, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Dr. Evangeline P. Bautista	Associate Professor	Ateneo de Manila University
2. Mr. Melvin M. Callanta		DepEd BSE
3. Ms. Elizabeth G. Catao		DepEd BSE
4. Sr. Iluminada C. Coronel	President	Mathematics Teachers Assoc. of the Phils.
5. Dr. Rosemarievic V. Diaz		Philippine Normal University
6. Ms. Janet D. Dionio		Manuel Roxas High School
7. Dr. Ruth G. de Lara	Retired Education Supervisor	DCS Manila
8. Mr. Emmanuel V. Dionisio	Head Teacher III	A.F.G. Bernardino Memorial Trade School
9. Dr. Juanita A. Ferido	Education Supervisor II	DepEd NCR
10. Dr. Flordeliza F. Francisco	Assistant Professor	Ateneo de Manila University
11. Dr. Ian June L. Garces	Associate Professor	Ateneo de Manila University

# K TO 12 MATHEMATICS

12. Dr. Milagros D. Ibe		UP Diliman and Miriam College
13. Dr. Sonia E. Javier		Juan Sumulong High School
14. Dr. Ma. Nympha B. Joaquin		UP Diliman
15. Ms. Lydia M. Landrito	Science Education Specialist	UP NISMED
16. Dr. Queena N. Lee-Chua	Professor	Ateneo de Manila University
17. Dr. Auxencia A. Limjap		De La Salle University
18. Dr. Gladys C. Nivera	Professor I	Philippine Normal University
19. Mr. Nicanor M. San Gabriel Jr.		DepEd BSE-CDD
20. Ms. Revie G. Santos	Master Teacher II	Rizal High School
21. Dr. Cornelia C. Soto		Ateneo de Manila University
22. Dr. Merle C. Tan	Director	UP NISMED
23. Dr. Soledad A. Ulep		UP NISMED
24. Dr. Catherine P. Vistro-Yu	Professor	Ateneo de Manila University
25. Dr. Aida A. Yap		UP NISMED

## E. Writeshop on the Finalization of the Curriculum Standards

Venue: Regional Education Learning Center, Region IV-A (CALABARZON), Malvar, Batangas

Date: May 19-21, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Dr. Ian June L. Garces	Associate Professor	Ateneo de Manila University
2. Dr. Gladys C. Nivera	Professor I	Philippine Normal University
3. Dr. Ruth G. de Lara	Retired Education Supervisor	DCS Manila
4. Lydia M. Landrito	Science Education Specialist	University of the Philippines
5. Remy Linda T. Soriano	Education Program Supervisor I	DCS Manila
6. Revie G. Santos	Master Teacher II	Rizal High School
7. Emmanuel V. Dionisio	Head Teacher III/ Documentor	A.F.G. Bernardino Memorial Trade School

**F. Workshop on the Review and Refinement of the K to 12 Curriculum Framework and Standards**

Venue: Development Academy of the Philippines, Tagaytay City

Date: May 10-13, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
6. Dr. Ian June L. Garces	Associate Professor	Ateneo de Manila University
7. Dr. Gladys C. Nivera	Professor I	Philippine Normal University
8. Dr. Ruth G. de Lara	Retired Education Supervisor	DCS Manila
9. Nicanor M. San Gabriel		BSE – CDD
10. Elizabeth Catao		BSE – CDD
11. Abelardo B. Medes		BEE – CDD
12. Robesa R. Hilario		BEE – CDD
13. Revie G. Santos	Master Teacher II	Rizal High School
14. Emmanuel V. Dionisio	Head Teacher III/ Documentor	A.F.G. Bernardino Memorial Trade School

**G. Consultative Workshops for the Validation of the K to 12 Curriculum Framework and Standards**

1. Regions IV-A, IV-B, V and NCR

Venue: Bulwagan ng Karunungan, DepEd Complex, Meralco Avenue, Pasig City

Date: April 27, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Maria Gregoria P. Malihan		St. Jude Catholic School
2. Loreto S. Sauz		UST – EHS
3. Arnold G. Gerance		Aurolio Arago, Oriental Mindoro
4. Cheryl G. Pauericio		Division of Legazpi City
5. Abella A. Amican		Niogan Elementary School
6. Arnulfo G. Mariano		Division of Valenzuela City
7. Sr. Iluminada C. Coronel		MTAP
8. Revie G. Santos		Rizal High School
9. Juanita A. Ferido		Dep. Ed. NCR
10. Larry Samala		Dep. Ed. R-IVB
11. Ian June L. Garces		Ateneo de Manila University

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## 2. Regions I,II,III and CAR

Venue: Teachers'Camp, Baguio City

Date: April 29, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Carmelita S. Domantay		Dagupan City NHS – Dagupan City
2. Rubielyn L. Babaran		Enrile North Central School – Enrile, Cagayan
3. Romel L. Ricardo		Regional Science High School, Tumauini, Isabela
4. Janette T. Fermin		St. Paul University Philippines, Tuguegarao City
5. Nestor A. Paat	ESP II	DepEdTuguegarao City
6. Nestor G. Villaflor	ESP I	DepEd – Div. Office, Ilocos Sur
7. Nestor P. Nuesca	ESP II	DepEd RO III
8. Janice Q. Nonog	Teacher II	Tabuk c/s, Dagupan West, Tabuk City, Kalinga
9. Ofelia A. Dolo	Master Teacher II	La Trinidad, Benquet, CAR
10. Jenny Jesusa J. Catubay	Master Teacher II	Sta. Maria Elem. School
11. Arnel R. Lumbo		University of the Cordilleras – Grade School Baguio City
12. Susana E. Vanhoutte		SLU – Lab. High School
13. Norma Maria P. Rutab		University of the Cordilleras, Baguio City
14. Daniel D. Peredo	Dept. Head	Benguet NHS, La Trinidad, Benquet
15. Lauro C. Cruz	Dept. Head	Sacred Heart Academy, Pob, Sta. Maria, Bulacan

## 3. Regions VI, VII and VIII

Venue: Ecotech Center, Lahug, Cebu City

Date: May 4, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Rosemary S. Achacoso	Education Program Supervisor	Maasin City Division – Region VIII
2. Feliciaro C. Buenate Jr.	Education Program Supervisor	RO VI – Western Visayas
3. Rufa T. Temblor		St. Francis of Assisi School Lahug, Cebu City. Region VII
4. Ma. Emilie S. Gepison		Leon Elem. School, Division of Iloilo, RO- VI
5. Jose Leover S. Illut		San Roque Child Dev't School Yatilliloan, Cebu – Region VII

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6. Ann Marie C. Bandola	EPS – I Math	City of Naga Division, Region VII
7. Jeremy M. Movilla		Ormoc City Central School Ormoc City Division, Region VIII
8. Romao D. Castante		Calbayog City NHS Calbayog City Division – RO VIII
9. Suzette C. Martinez		Inocencio V FerrerMem. School of Fisheries Talisay City, Neg. Occ., Div. of Neg. Occ.
10. Andreo G. Aba		Guihulangan National Agricultural School Plagatasanon, Guihulangan City, Neg. Or. Div. of Guih. City
11. Cesar L. Sanchez		University of San Jose Recoletos BasakPardo, Cebu City
12. Adonis A. Torres		Tanjay City Science High School Tanjay City Schools Division – Region VII
13. Lita B. Morales		Don Carlos Ledesma NHS San Carlos City, Neg. Occ. – Region VI

## 4. Regions IX,X and ARMM

Venue: Regional Education Learning Center, Cagayan de Oro City

Date: May 5, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Susan P. Kuyong		DepEd Sulu II
2. Arnel L. Agaug		DepEd
3. Rudilene D. Cael		DepEd
4. Evelyn T. Villa		DepEd
5. Ma. Theresa B. Miranda		DepEd
6. Noelli B. Yap		The Abba's Orchard School
7. Reymundo B. Gimena		DepEd – Dinagat Division
8. Gilda L. Taboclaon		Dep. Ed
9. Rogelio J. Bahian		Dep. Ed. R – X
10. Maria Conchita P. Bas		CUBED
11. Editha J. Amper		Corpus Christi School
12. Rhodora S. Amantorno		OLLES

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13. Reymundo B. Gimena		Dep. Ed. Dinagat Island
14. Rosalina V. Eviota		Dep. Ed. Dinagat Island
15. Arnold C. Solen		Dep. Ed. Agusan del Norte
16. Noelli B. Yap		The Abba's Orchard

5. Regions XI,XII, ARMM (ShariffKabunsuan,Maguindanao)  
 Venue: Regional Education Learning Center, Davao City and CARAGA  
 Date: May 6,2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Reynante A. Solitario		DepEd ROXI, EPS
2. Araceu J. Dinopol		DepEdSarangani Division Region XII
3. Junelo C. Fornolles		Samal NHS – Ibalos Region XI
4. Agnes B. Ortega, RN		Cotabato City Region XII
5. Aida M. Pescado		MAG. I
6. Nempha F. Gonzales		Davao Christian Learning Center, Davao City
7. Abdul – Aziz H. Iya		Bureau of Elementary Education DepEd – ARMM RO
8. Levi B. Butihen		Polomolok West District Division of South Cotobato
9. Eduard C. Amoguis		EPS – Math Division of Davao del Norte Region XI
10. Genelyn H. Morante		Sultan Kudarat Division
11. Glenn A. Bisnan		DepEd ROXII – EPS

## H. Workshop on the K to 12 Curriculum Mapping

Venue: Development Academy of the Philippines, Tagaytay City  
 Date: March 16-18, 2011

NAME	DESIGNATION	OFFICE/SCHOOL
1. Abelardo Medes		SDD – BEE
2. RobesaHilario		CDD – BEE

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3. ForcefinaFrias		CDD – BEE
4. RanteMamerto		Division of Muntinlupa
5. Elizabeth Catao		CDD – BSE
6. Melvin Callanta		Mangaldan NHS – Pangasinan
7. Sonia Javier		Division of Quezon City
8. Dr. Maxima Acelajado		Dela Salle University – Taft
9. Dr. Ruth Lara		World Bank Consultant – TUP Retired Professor
10. Ms. Lydia Ladrito		UP – NISMED
11. Dr. Carmela Oracion		Ateneo de Manila Univ
12. Dr. Ronald San Jose		UP College of Edu (UPIS)
13. Jannet Labu		CDD – BEE

## SECRETARIAT

NAME	DESIGNATION
1. Rachelle C. Fermin	DepEd
2. Prescy Ong	DepEd
3. Frederick G. Del Rosario	BAHS – DepEd Support Staff
4. Emmanuel V. Dionisio	AFGBMTS – DepEd Support Staff
5. Magdalena Mendoza	DAP
6. Tristan Suratos	DAP
7. Kimberly Pobre	DAP
8. Cristina Villasenor	DAP
9. Lani Garnace	DAP
10. Kidjie Saguin	DAP
11. Maria Boncan	Accountant, DepEd
12. Daylinda Guevarra	Accountant, DepEd
13. Fenerosa Maur	Accountant, DepEd
14. Divina Tomelden	Accountant, DepEd
15. Nilva Jimenez	Disbursing Officer, DepEd

**FACILITATORS/SUPPORT TEAM**

<b>NAME</b>	<b>DESIGNATION</b>
1. Irene C. De Robles	CDD – BEE
2. Jose Tuguinayo, Jr.	CDD – BSE
3. Marivic Abcede	CDD – BSE
4. Mirla Olores	SPED – BEE
5. Simeona Ebol	CDD – BEE
6. Fe Villalino	SDD – BEE

**ADVISORY TEAM**

<b>NAME</b>	<b>DESIGNATION</b>
1. Usec. Yolanda S. Quijano	Undersecretary, DepEd OSEC
2. Dr. Lolita Andrada	Director, BSE – DepEd, Pasig
3. Dr. Angelita Esdicol	Director, BEE – DepEd, Pasig
4. Dr. Ricardo de Lumen	OIC, Director III – Tech Voc, DepEd
5. Dr. Paraluman R. Giron	Chair, K – 10 TWG
6. Dr. Avelina T. Llagas	Consultant, TEC, DepEd
7. Dr. Dina Ocampo	Dean, COE, UP Diliman
8. Dr. Ester B. Ogena	President, PNU
9. Dr. Brenda B. Corpuz	Technical Adviser to the Office of USEC, Programs and Standards
10. Dr. Dennis Faustino	Headmaster, SMS Sagada, Mt. Prov.
11. Dr. Merle Tan	Director, UP – NISMED
12. Dr. Cristina Padolina	President, CEU
13. Mr. Napoleon Imperial	CHED
14. Diane Decker	Consultant, MTB – MLE
15. Dr. Nelia Benito	Director, NETRC
16. Dr. Socorro Pilor	Director, IMCS
17. Dr. Beatriz Torno	Executive Director, TEC
18. Dr. Carolina Guerrero	Director, BALS
19. Dr. Irene Isaac	Director, TESDA
20. Dr. Imelda Taganas	Director, TESDA