

EARLY CHILDHOOD MATHEMATICS

Mathematics in the primary years focuses on helping students develop their understanding of mathematical concepts and skills that can be applied in everyday life as well as for continued learning in mathematics.

Learners build a thorough base of computational fluency and expand their thinking, reasoning and communication skills through a mathematical approach to problem solving. Learners use real-life contexts to engage in mathematizing and modeling problems that they can then analyze, manipulate, solve and interpret.

Through creating and sharing their own mathematical ideas and arguments with each other, learners are supported in becoming more playful, reflective, resilient and open-minded mathematicians.

“Math is like going to the gym for your brain. It sharpens your mind.” Danica McKellar

Grade	Concepts	Competencies	Character
ECE (3 yrs. old)	Numbers Learners begin to understand: <ul style="list-style-type: none"> • that numbers are used to describe quantities 	Learners are able to: <ul style="list-style-type: none"> • count objects and recognize numerals to 5 	Integrity Resilience
	Patterns Learners begin to understand: <ul style="list-style-type: none"> • that attributes can be used to sort and group 	Learners are able to: <ul style="list-style-type: none"> • sort objects according to one attribute and to use these attributes to create simple alternating patterns 	Reflection
	Geometry Learners begin to understand: <ul style="list-style-type: none"> • that flat shapes can be observed all around us 	Learners are able to: <ul style="list-style-type: none"> • recognize and name some flat shapes 	Empathy
	Measurement Learners begin to understand: <ul style="list-style-type: none"> • that objects can be described and measured using comparative language 	Learners are able to: <ul style="list-style-type: none"> • use basic language to compare objects based on length, capacity, weight, temperature 	Playfulness

KINDERGARTEN 1

Numbers	Students understand: <ul style="list-style-type: none">• how numbers are used to describe quantities and how they are represented symbolically• how groups can be joined together to determine a total, or split to determine how many are left	Students are able to: <ul style="list-style-type: none">• count objects and recognize numerals to 9• join sets and count the total, and split sets and count the remainder to determine how many are left (within 9)	
Patterns	Students understand: <ul style="list-style-type: none">• that attributes can be used to sort and group	Students are able to: <ul style="list-style-type: none">• sort objects according to one attribute and to use these attributes to create simple alternating patterns	
Geometry	Students understand: <ul style="list-style-type: none">• some 2D shapes have names and can be observed all around us	Students are able to: <ul style="list-style-type: none">• recognize and name 2D shapes including square, circle, triangle and rectangle.	
Measurement	Students understand: <ul style="list-style-type: none">• that objects can be described and measured using comparative language	Students are able to: <ul style="list-style-type: none">• use the language for comparing objects based on length, height, capacity, weight and temperature	

KINDERGARTEN 2

<p>Numbers</p>	<p>Student understand:</p> <ul style="list-style-type: none"> • how numbers can be represented in multiple ways • the relationship between numbers and quantities; connect counting to cardinality. • the meaning of addition and subtraction and how they relate to one another 	<p>Students are able to:</p> <ul style="list-style-type: none"> • Count to 20 by ones and by tens • Count forward beginning from a given number (instead of 1) within the known sequence • Write numbers from 1 to 20. Represent a number of objects with a written numeral 1–20. • Solve simple addition problems within 10, and later within 20 	
<p>Patterns</p>	<p>Student understand:</p> <ul style="list-style-type: none"> • that a simple pattern is generated by a repeated element 	<p>Students are able to:</p> <ul style="list-style-type: none"> • represent and continue simple patterns 	
<p>Geometry</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • that flat shapes have characteristics and properties that can be used to describe them 	<p>Students are able to:</p> <ul style="list-style-type: none"> • describe, name and sort flat shapes, using everyday mathematical language 	
<p>Measurement</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • that measurement is the assignment of values to an object or event through comparisons to standard units 	<p>Students are able to:</p> <ul style="list-style-type: none"> • use comparison and comparative language as a way to establish the longest, heaviest, or which would contain the most 	
<p>Data</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • that we can gather and represent data in a simple manner that can be understood by other persons 	<p>Students are able to:</p> <ul style="list-style-type: none"> • collect simple data, represent this using basic graphs and tables, and interpret simple graphs for meaning 	

GRADE 1

<p>Numbers</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • how the position of the digits within a number affect their value • Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: <ol style="list-style-type: none"> a. 10 can be thought of as a bundle of ten ones—called a “ten.” b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). • the meaning of addition, subtraction and their effect on numbers 	<p>Students are able to:</p> <ul style="list-style-type: none"> • Count to 100, starting at any number other than 1. In this range, read and write numerals and represent a number of objects with a written numeral • represent and identify numbers and their place value to 3 digits • solve addition and subtraction problems to 100 mentally, modelling multiplication problems as equal groups and solving them by counting all objects or skip-counting, modelling division problems as equal sharing and solving by counting all objects 	
<p>Patterns</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • basic properties of patterns and how these can be used to predict elements 	<p>Students are able to:</p> <ul style="list-style-type: none"> • represent and continue sequential numerical patterns 	
<p>Geometry</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • that 2D shapes have characteristics and properties that can be used to describe and compare them 	<p>Students are able to:</p> <ul style="list-style-type: none"> • sort, name and describe 2D shapes, and identifying the symmetry within shapes using mathematical language 	
<p>Measurement</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • that objects have measurable attributes that can be measured and described using units 	<p>Students understand:</p> <ul style="list-style-type: none"> • accurately measure using a range of non-standard units, including telling the time to hour and half hour 	
<p>Data</p>	<p>Students understand:</p> <ul style="list-style-type: none"> • that we can gather and represent data so that it can be understood and interpreted 	<p>Students are able to:</p> <ul style="list-style-type: none"> • collect simple data, represent them using basic graphs and tables, and interpret simple graphs for meaning 	

GRADE 2

<p>Numbers</p>	<p>Students understand:</p> <ul style="list-style-type: none"> understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. understand the following as special cases: <ul style="list-style-type: none"> a- 100 can be thought of as a bundle of ten tens—called a “hundred.” b- The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). understand the relation of adding several equal numbers with the concept of multiplication, <i>(without studying the multiplication and divisions operations in grade 3.</i> 	<p>Learners are able to:</p> <ul style="list-style-type: none"> represent and identify numbers and their place value to 1000 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing (include how much more and how much less one number is than another), with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem Apply properties of operations as strategies to add and subtract (Students need not use formal terms for these properties). <i>Examples: If $8 + 3 = 11$ is known, then $3 + 8 = 11$ is also known. (Commutative property of addition.) To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$. (Associative property of addition).</i> Use addition to find the total number of objects arranged in rectangular arrays, write an equation to express the total as a sum of equal addends 	
<p>Geometry</p>	<p>Students understand:</p> <ul style="list-style-type: none"> that 2D and 3D shapes have various characteristics and properties that define and describe them 	<p>Learners are able to:</p> <ul style="list-style-type: none"> sort, name and describe 2D and 3D shapes, manipulate and describing the movement of shapes, locating and describing positions on maps 	
<p>Measurement</p>	<p>Students understand:</p> <ul style="list-style-type: none"> that formal methods of measurement involve standardized units the tools used for measurements depend on the object or event being measured 	<p>Students are able to:</p> <ul style="list-style-type: none"> accurately estimate and measure length (cm/m), capacities (liters), weights (Kg and g), temperature (degrees Celsius), duration of events (min) using whole-number scales, read the time on an analogue clock in 5 minute intervals, and use a calendar to identify the date and determine the number of days in each month 	
<p>Data</p>	<p>Students understand:</p> <ul style="list-style-type: none"> that we can gather and represent data so that it can be understood and interpreted by the audience 	<p>Learners are able to:</p> <ul style="list-style-type: none"> identify data sources and planning methods of data collection and recording including asking research questions, collect data and make choices about how this is best represented for the audience, and describe outcomes as 'likely' or 'unlikely' and identify some events as 'certain' or 'impossible' 	

GRADE 3

<p>Numbers & Algebraic Thinking</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • in the base ten number system a digit's value increases by a multiple of ten when moved one place to the left • groups of ten can be regrouped to make a larger unit • addition and subtraction patterns relate to the associative and commutative properties of addition • fractions are formed by partitioning a whole into parts of equal measure 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • name the value of a digit in a number up to 1000 • Use place value understanding to round whole numbers to the nearest 10 or 100 • Represent the place value for whole numbers with up to five digits using models and expanded form • solve problems that require creating and reasoning about fair shares • Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations • Represent a fraction a/b (include the terms numerator and denominator) on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. • Determine the unknown whole number in a multiplication or division equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations</i> $8 \times ? = 48$, $5 = ? \div 3$, $6 \times 6 = ?$ 	
<p>Geometry & Measurement</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • that shapes in different categories may share attributes and that the shared attributes can define a larger category • objects have a variety of attributes that can be measured based on purpose • concepts of area and perimeter and how these relate to multiplication and to addition 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • recognize, draw and classify 2D figures • measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l) • solve one-step word problems involving masses or volumes that are given in the same units • measure area by counting unit squares 	
<p>Data</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • that we can gather and represent data so that it can be understood and interpreted by others 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • draw a scaled picture graph and a scaled bar graph to represent a data set with several categories • solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs 	

GRADE 4

<p>Numbers & Algebraic Thinking</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. <i>For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division</i> • they can apply their understanding of place value relations and the properties of operations to develop efficient strategies for addition, subtraction, multiplication and division • addition and subtraction of fractions as joining and separating parts referring to the same whole • pieces don't need to be to be congruent to be equivalent 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • read and write multi-digit whole numbers using base ten numerals, number names and expanded form • fluently add and subtract multi-digit whole numbers using the standard algorithm and other strategies appropriate for the context • multiply up to two-digit by two-digit whole numbers using efficient written strategies • find whole number quotients and remainders with up to two digit dividends and one-digit divisors using efficient written strategies • compare two fractions with different numerators and different denominators and justify the conclusions • write, model and interpret numerical expressions which represent real world situations • read, write, and compare decimals to hundredths. <ul style="list-style-type: none"> a. Read and write decimals to hundredths (decimal with two places) using base-ten numerals, number names, and expanded form, e.g., $347.39 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100)$. b. Compare two decimals to hundredths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons. 	
<p>Geometry & Measurement</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • points, lines, line segments, rays and angles are the basic "building blocks" of geometry • we can group shapes according to these properties • measurement is the process of quantifying the attributes of an object by expressing them in terms of a standard unit 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • use a ruler to draw line segments, rays, intersecting and parallel lines, and plane figures with precision • use a protractor to measure and draw an angle • use an appropriate measuring tool with the required degree of precision to measure distance, mass, capacity and elapsed time • express units from a large unit in terms of units of a smaller unit (e.g. meters to centimeters) 	
<p>Data</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • that we can gather and represent data so that it can be understood and interpreted by the audience 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$) 	

GRADE 5

<p>Numbers & Algebraic Thinking</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left • they can apply their understanding of place value relations and the properties of operations to develop efficient strategies for adding, subtracting, multiplying and dividing decimals • their understanding of multiplication and division with whole numbers is applicable to these operations with fractions and decimal numbers • the meaning of percentage and the relationship between fraction, decimals and percentages 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • compare, order and round decimals to thousandths • use whole-number exponents to denote powers of 10 • fluently multiply multi-digit whole numbers using the standard algorithm and other appropriate strategies • find quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value • add, subtract, multiply, and divide decimals to hundredths • fluently add and subtract fractions and make reasonable estimates of these calculations • fluently multiply fractions, and divide unit fractions by whole numbers, and whole numbers by unit fractions • use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbol 	
<p>Geometry & Measurement</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • the coordinate plane is a system created to precisely communicate location, movement and relationships • their earlier understanding of patterns within measurement systems informs conversions of greater complexity within these systems • volume is an attribute of 3D shapes, the calculation of which is related to addition and multiplication 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • graph points on the coordinate plane to solve real-world and mathematical problems • be able to name a given location precisely using coordinates • convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems • measure volumes by counting unit cubes, using cubic cm, cubic meter, and improvised units. 	
<p>Data</p>	<p>Learners understand:</p> <ul style="list-style-type: none"> • that we can gather and represent data so that it can be understood and interpreted by the audience 	<p>Learners are able to:</p> <ul style="list-style-type: none"> • make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$) • use operations on fractions to solve problems involving information presented in line plots 	