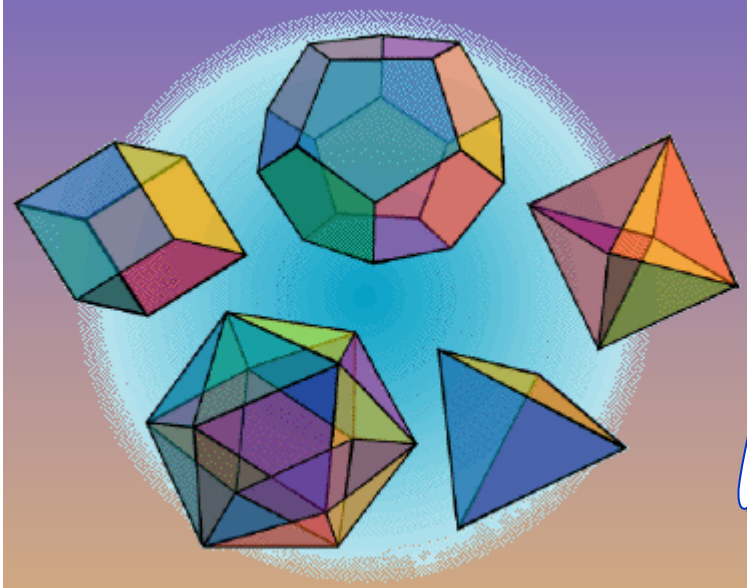
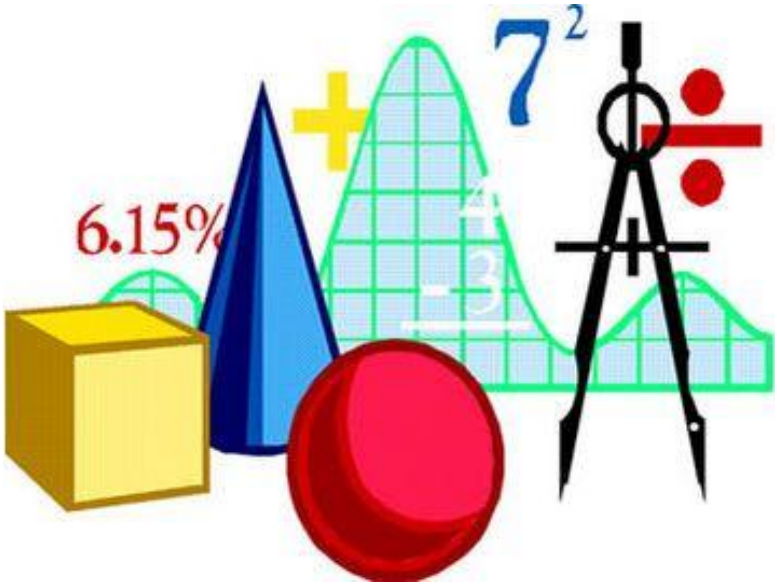
ST. MARY'S Primary School, Young



Mathematics

TABLE OF CONTENTS



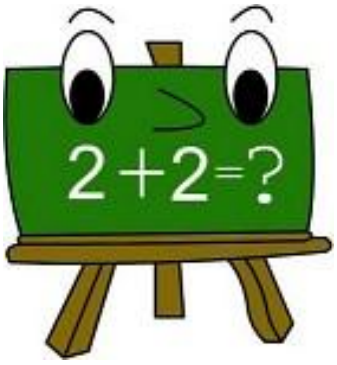
St Mary's Primary School, Young

MATHEMATICS POLICY

SCHOOL VISION

We the Christian staff of St. Mary's Primary School, Young, believe that our school is a place where:

- The whole school community should strive to live out Gospel values…
- It is recognised that parents are the prime educators of their children and therefore an environment is provided whereby parents can make a valuable contribution to school life…
- Teachers and parents have the opportunity to work together for the development of the children…
- A climate of prayer is encouraged and where Christian values such as love, trust, faith, truth and justice are integral parts of the lives of the children…
- The individuality of all children is recognised, valued and nurtured…
- We encourage the development of the children's talents and gifts by offering challenges which will help the children attain academic, spiritual, cultural and sporting goals appropriate to their ability…
- Opportunities are provided for children to develop self-discipline and respect for others…
- Realistic participation in worthwhile community activities is encouraged.



MISSION STATEMENT

"Following the example of Mary, our Mother we strive for the growth of each individual through excellence in Catholic Education and in a spirit of love and service."

In accordance with the St Mary's School Vision Statement, our Mathematics policy recognizes that:

Mathematics is the search for patterns and relationships, this leads to the development of concepts and generalisations which can be applied in finding solutions to problems, improving our understanding of the world around us and meeting the specific needs of people.

We aim to create in our students a willingness to utilise acquired mathematical knowledge and skills to empower them to improve society, just as Jesus did, by helping students to operate flexibly, autonomously and responsibly.

We seek to develop within our students positive feelings towards themselves, other people and the environment, by inspiring an awe of God's creation and an understanding of themselves as unique persons, with a responsibility to protect and nurture the environment.

SITUATIONAL ANALYSIS

St. Mary's Primary School is a Catholic School founded and originally staffed by the Presentation Sisters. The school is proud to continue in the traditions of the Presentation Order.

Our School motto *"To Love is To Serve"* sets the direction for all activity at St. Mary's. Through our planning, our policies and our procedures we encourage the students to follow the example of Mary our Mother, in particular her compassion for others and her love of God. St. Mary's has an enrolment of 370 students in fifteen class groupings from Kindergarten to Year 6.

The town of Young is mainly a rural community with a diversity of agricultural activities. The main activity being orchards with cherries and stone fruit. Young is known as the "Cherry Capital of Australia". Young celebrates its appreciation of the Cherry industry with the National Cherry Festival in November each year. St Mary's has always been well represented in these activities since 2004. In 2009 St Mary's won the prize for "Best School Float" and the award for "Best Overall Float".in the Cherry Festival Parade.

St. Mary's Primary School is first and foremost a Catholic school and has a special vision of education which supports the vision of the Catholic Church. Students, parents, teachers and the wider community work together to provide an atmosphere where all are valued.

'Religious Education is a lifelong process to which St. Mary's contributes.'

As a community we work together in all aspects of the child's learning. Team work is evident in all areas of schooling with teachers, parents, students and members of the parish community being involved in working bees, fundraisers, and helping out in the learning environment through sacramental programs as well as school, class and special Eucharistic celebrations. We are involved in support for the Presentation Sisters missions in PNG. We also support Caritas Australia, St. Vincent de Paul and other parish based fund raising activities. The Student Representative Council have been involved with supporting days such as Breast Cancer Day and Jeans for Genes Day etc.

In recent times we have gone a step further and have become involved with the wider community in an outreach programme with Mt St Joseph's and participate in cultural events such as Lambing Flat Festival, Wakakirri and even world community building events such as World Math's Day.

RATIONALE

At St. Mary's Primary School we believe that Mathematics is an integral part of our day to day life. Mathematics involves observing, representing and investigating patterns and relationships in social and physical phenomena and between mathematical objects themselves. It provides opportunities for development of reasoning abilities.

Mathematics is an integral part of our culture. It can enhance our understanding of our world and the quality of our participation in society. It is valuable to people individually and collectively, providing important tools, which can be used at the personal, civic and vocational levels.

Mathematical ideas about number, space & geometry, measurement, data, patterns and algebra are used in everyday life. Mathematics can also be a part of our leisure. Mathematics is a source of interesting and appealing puzzles and problems. When enjoyable, it encourages curiosity, exploration, discovery and invention as well as the development of a sound mathematical knowledge and skill.

St. Mary's Primary school strives to educate the whole person, mind, body and spirit with the awareness that all human values find their fulfilment and unity in Jesus Christ. Mathematics is a key contributor to the school's development of the whole person.

CATHOLIC ETHOS

"Every curriculum area has a religious dimension, a capacity to assist students to examine the world of human culture and the world of religion, providing knowledge and skills, and fostering attitudes and values that are life giving and that assist young people to search for meaning and truth."
(Treasures New and Old Core Document pg25)

At St. Mary's, we seek truth through Gospel values and are faithful to the teachings of Christ in providing quality education. Mathematics assists students to become life long independent learners to achieve their potential. Students develop their spirituality, character, citizenship, global perspective, communication and critical thinking through a balanced formal and informal curriculum.

Teachers should:

- Reflect Gospel values through all facets of their classroom
- Expect that children respect the work of others
- Provide opportunities to develop skills such as reflection, critical thinking, problem solving, analysis and discernment

- Foster in the students a moral sensitivity and a heightened capacity to understand their place in the world
- Foster a generosity of spirit and an appreciation of the service of others
- Encourage students to reflect, judge and choose
- Encourage students to care for God-given resources
- Develop awareness that the child is made in the image of God with basic needs to be cherished and nurtured
- Recognise that parents, school and parish have a responsibility to mutually support each other in the education of our children
- Acknowledge the social and cultural contributions of individuals and respect their freedom
- Develop an appreciation of God given talents

CURRICULUM DEFINITION

Curriculum is planning and developing programs we use to achieve the learning outcomes. We draw on the rich detail provided in the NSW Mathematics Syllabuses and Support Documents. We do this by selecting and using the outcomes and content needed to enable students to develop the knowledge, skills and understanding encompassed in the Foundation Statements. Curriculum is the foundation on which learning is built, in order to develop the whole child- social, emotional, spiritual, physical and intellectual.

ACROSS CURRICULUM PERSPECTIVES

As a Catholic School, St. Mary's values all members of the community. We believe across curriculum perspectives encompass religious, educational and societal issues of such significance that they cross all curriculum boundaries. Teachers at St Mary's endeavour to address 'across curriculum perspectives' where pertinent, within their daily teaching program and integrate mathematics into all KLA's.
The presence of these perspectives across all learning areas assists all students to develop knowledge, skills attitudes and behaviours in areas that are important to their successful participation in society.

Quality Teaching Framework

The Quality Teaching Framework is implemented in all Mathematical lessons. Each week there is a focus and targeted learning outcome. The Quality teaching Framework focuses on :

- Pedagogy that is fundamentally based on promoting high levels of **intellectual quality.**
- Pedagogy that is soundly based on promoting a **quality learning environment.**
- Pedagogy that develops and makes explicit to students the **significance** of their work.

Information Technology and Mathematics

Technology shapes the world in which we live and the way we interact with it and each other. Accessing information has undergone a revolution in the past decade and has now become technologically advanced in the form of Information and Communication Technologies (ICTs). This current era requires learning and teaching to have a sense of ownership and initiative in order for participants to be resilient and entrepreneurial when working in number, text and symbol soaked environments.

There is a perpetual need for students to become competent with ICTs and the impetus is on creating a platform through which ICT learning is positively indentured into our school. What we aim to create are mathematical *thinkers* — students who can work collaboratively and who are good problem solvers. For this, access to collaborative partnerships and efficient use of technologies provides opportunities for our students to understand information technology concepts and analyse the social and ethical implications which will benefit them in their lifelong mathematical learning.

Replication, adaptation and simulation provide students with opportunities for exploration in a variety of mediums through which they can access and develop mathematical ICT schemas. These schemas serve as mechanisms for the social interactions of students and assist in the development of widely valued skills and abilities, while also developing higher order thinking skills and new ways of understanding. Thus, St. Mary's Mathematics Policy aims to introduce authentic and challenging ICT tasks as the catalyst for mathematical inquiry.
Above and beyond the obvious use of ICT devices, there are many concealed benefits involved with the pedagogy of ICTs that can instil in learners a willingness to interact with resources, expand individual skill development and consolidate their learning. Novice and expert learners are potentially able to work together to gain knowledge and understanding that encourages collaboration and cooperation as an alternative to competition.
At St. Mary's, the ability to use technology is seen as an integral part of Mathematics. Teachers program technology experiences for students that enhance all strands of the Mathematics curricula, which include sequences of activities that are planned across year levels so that there is continuity in conceptual development. It is intended that these mathematical experiences introduce concepts in an

interactive environment from an early age to produce an impact — and indeed change in the nature of — their later mathematical experiences.

We believe students;

- Require supportive access to technology in a range of contexts and need to develop the skills to use it.
- Are expected to use technology to explore problems in all strands, create spreadsheets to record, organise and manipulate numbers in Measurement, Number, Patterns and Algebra, and Data sub-strands.
- Use basic draw and paint programs to create shapes and designs in Space and Geometry and develop patterns and tessellations in Patterns and Algebra.
- Develop knowledge of the contribution of information technology to Mathematics.

The school is committed to the development of integrating ICT into all aspects of our learning environments. Every classroom has an Interactive Whiteboard which is used as a collaborative tool to enhance mathematical learning. Affording students opportunities to manipulate screen objects is possible in ways that facilitate students' thinking of them as mathematical objects representative of those found in the classroom.

We believe that participation in mathematical computing environments results in *transfer* — that is, learning that goes beyond simple retention of specific facts and procedures. For example, *drawing* on a computer program, and the code that creates the graphics, has meaning and interest for students; this then motivates the use and learning of geometric and other mathematical ideas. This *transfer*, followed by immersion allows students to further their knowledge in a supportive environment that aims to foster and encourage mathematical thinking for the future.

Literacy and Mathematics

At St. Mary's, students will be required to develop their literacy skills to read, use written information and to write appropriately through a wide variety of contexts, modes and mediums. While English has a particular role in developing literacy, all curriculum areas, including Mathematics, have a responsibility for the general literacy requirements of students, as well as for the literacy demands of their particular discipline.

Studies have shown that the causes of student errors on word problems may relate to the literacy components rather than the application of mathematical computations. Mathematics at times uses words from everyday language that have different meanings within a mathematical context. This can create confusion for some

students. Clear explanations and the use mathematical word walls will assist students in the acquisition and use of mathematical terminology.

The growth of technology and information, including visual information, demands that students be critically, visually and technologically literate and can compose, acquire, process, and evaluate text in a wide variety of contexts. They need to understand the full scope of a text's meaning, including the wide contextual factors that take meaning beyond the decoding process.

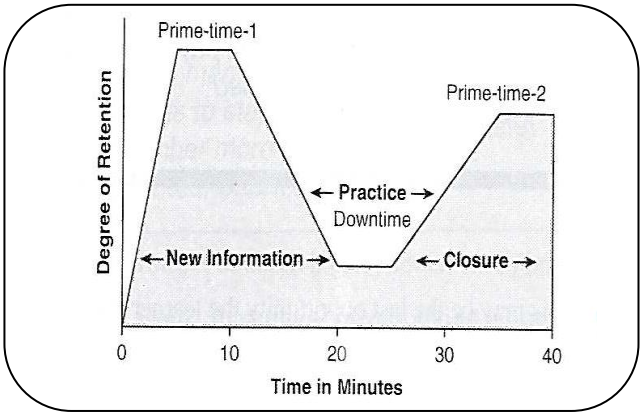
SPECIAL NEEDS EDUCATION

At St. Mary's, the outcomes of Special Needs perspective emphasise the ability of students with a wide range of individual differences to participate and succeed in many aspects of learning. When programming teaching and learning activities, selecting materials and content for Mathematics, teachers will ensure that the students with special needs are considered.
Students in Year 1 and Year 4 have the added support of the Numeracy Intervention Program. This program works with children on a one to one basis and focuses on building the foundations of Numeracy. During our Numeracy blocks children in this program also have the follow up of having Learning Support Assistance in their classrooms.

PRINCIPLES UNDERPINNING OUR CURRICULUM

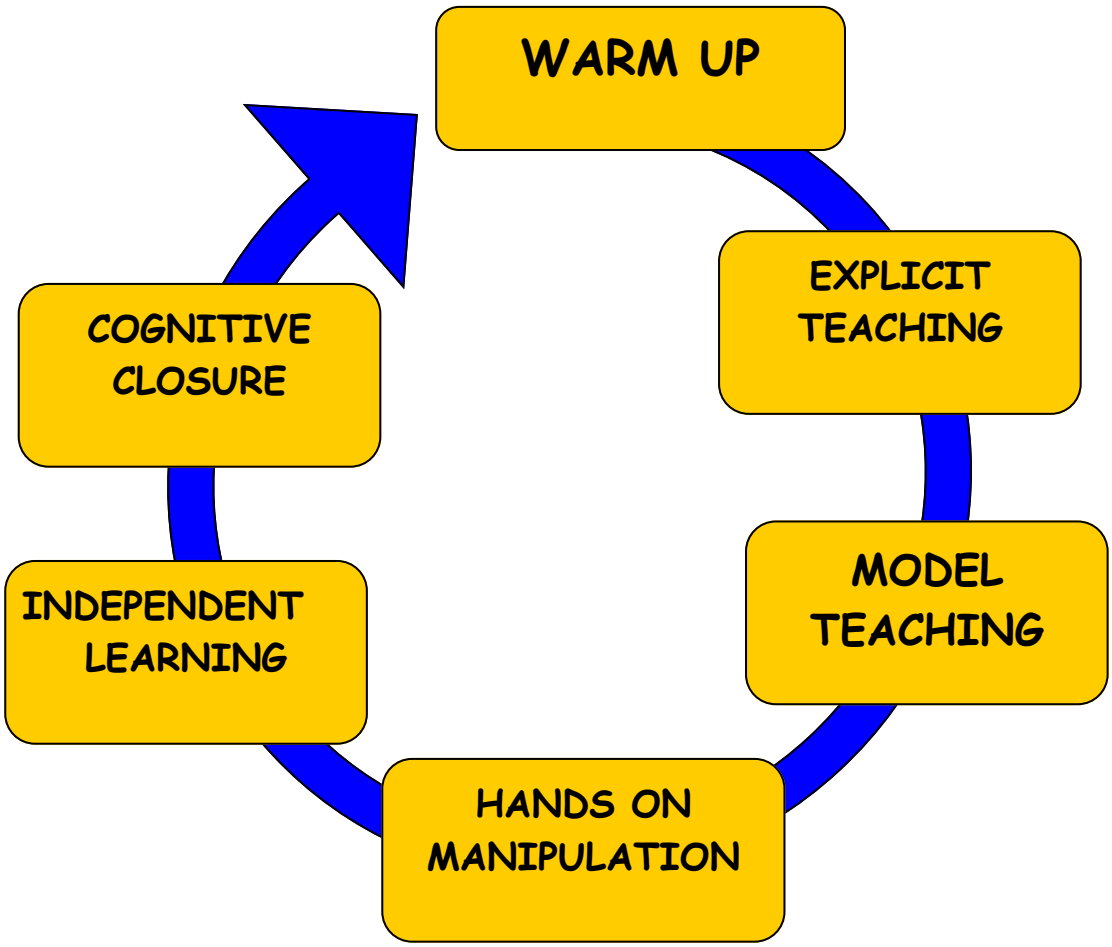
At St Mary's we have identified and agreed on implementing a whole school practice based on *"How the Brain Learns Mathematics"* by David A. Sousa.
Sousa believes that everyone can do Mathematics and we at St Mary's strongly agree. It is our job to stimulate the part of the brain so it becomes highly activated when counting and completing arithmetic equations. Language is an integral part of teaching mathematics well. We have based our teaching and learning around Sousa's "Primacy-Recency Effect" which is based on the retention of the student in a learning episode. Below is a diagram which outlines prime-time learning and how we implement this in the classroom each lesson.

Prime –Time 1 indicates that this is the optimum time to introduce a new concept to a learner. This is our explicit teaching time.
Down-Time is used for hands on manipulation and practice of the new information in group situations.



Prime-Time 2 is where the learner is using the new information independently.
Closure- is retaining the learnt knowledge and cementing it in the brain by finishing with a cognitive closure.

The diagram below demonstrates the flow of our lessons. This reflects best practice by implementing Sousa's Primacy- Recency" model of learning and includes all elements of the Quality Teaching Framework.
Our Mathematics pro-forma is modelled on this sequence of teaching and learning.



FOUNDATION STATEMENTS

Foundation Statements set out a clear picture of the knowledge, skills and understanding that each student should develop at each stage of primary school.

Prior-to-school Learning

Teachers need to acknowledge the learning that children bring to school, and plan appropriate learning experiences that make connections with existing mathematical understanding. Children start developing mathematical understanding well before they start school since mathematics is a part of everyday life. In addition, many children will have participated in playgroup, childcare or pre-school programs.

As children engage in daily life they construct mathematical understanding that is often enhanced by planned mathematical experiences in prior-to-school settings. Such understanding may include the development of number recognition, number representation and oral counting sequences, spatial awareness and shape recognition. In addition, vocabulary development is evident as students begin to acquire everyday language associated with length, area, volume, mass, time and position. Teachers need to become familiar with children's existing mathematical understanding as they commence school to ensure that programming is designed to meet the needs of individual students.

Early Stage 1 outcomes may not be the most appropriate starting point for all students. For some students, it will be appropriate to focus on these outcomes whereas others will benefit from a focus on more basic mathematical concepts. Still others may demonstrate understanding beyond Early Stage 1. The movement into Early Stage 1 should be seen as a continuum of mathematical learning. To ensure this continuum is maintained, teachers need to base their planning on the evaluation of current understanding related to all of the strands.

Early Stage 1

Working Mathematically • Number • Patterns and Algebra • Measurement and Data • Space and Geometry

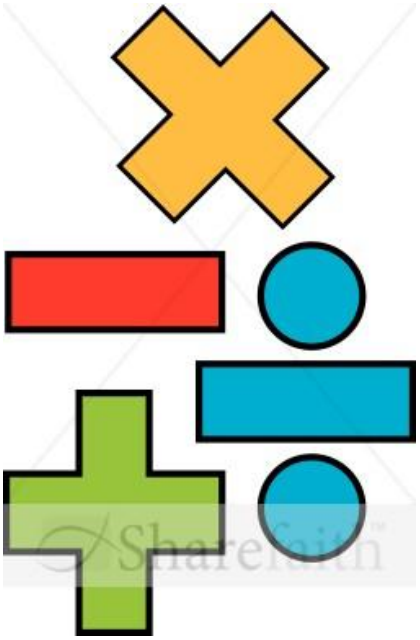
Students ask questions and explore mathematical problems. They use everyday language, materials and informal recordings to demonstrate understanding and link mathematical ideas.

Students count to 30 and represent numbers to 20 with objects, pictures, numerals and words and read and use ordinal numbers to at least 'tenth' place. They manipulate objects to model addition and subtraction, multiplication and division. Students divide objects into two equal parts and describe them as halves. They recognise coins and notes.

Students recognise, describe and continue patterns that increase or decrease.

Students identify length, area, volume, capacity and mass and compare and arrange objects according to these attributes. They name the days of the week and the seasons and they order events in a school day, telling the time on the hour. Students use objects and pictures to create a data display and interpret data.

Students manipulate, sort and describe 3D objects using everyday language. They manipulate, sort and describe 2D shapes, identifying circles, squares, triangles and rectangles. Students give and follow simple directions and describe position using everyday language.



Stage 1

Working Mathematically • Number • Patterns and Algebra • Measurement and Data • Space and Geometry

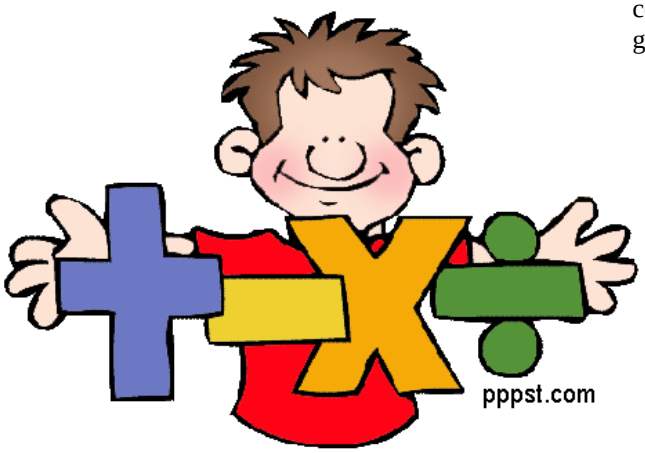
Students ask questions and use objects, diagrams and technology to explore mathematical problems. They link mathematical ideas and use everyday language, some mathematical language and diagrams to explain how answers were obtained.

Students count, order, read and write numbers up to 999 and use a range of mental strategies, informal recording methods and materials to add, subtract, multiply and divide. They model and describe objects and collections divided into halves and quarters. Students sort, order and count money and recognise and describe the element of chance in familiar activities.

Students describe, create and continue a variety of number patterns and relate addition and subtraction facts to at least 20.

Students estimate, measure, compare and record using informal units for length, area, volume, capacity and mass. They recognise the need for formal units of length and use the metre and centimetre to measure length and distance. Students use a calendar to identify the date and name and order the months and the seasons of the year. They use informal units to compare and order the duration of events and tell the time on the half-hour. Students gather, organise, display and interpret data using column and picture graphs.

Students identify, describe, sort and model particular 3D objects and 2D shapes. They represent and describe the position of objects.



Stage 2

Working Mathematically • Number • Patterns and Algebra • Measurement and Data • Space and Geometry

Students ask questions and use appropriate mental or written strategies, and technology, to solve problems. They use appropriate terminology to describe and link mathematical ideas, check statements for accuracy and explain reasoning.

Students count, order, read and record numbers up to 9999 and use mental and written strategies, including the formal written algorithm, to solve addition and subtraction problems involving numbers of up to four digits. They use mental strategies to recall multiplication facts up to 10 × 10 and related division facts and use informal written strategies for multiplication and division of two-digit numbers by one-digit numbers. Students model, compare and represent simple fractions and recognise percentages in everyday situations and they model, compare, represent, add and subtract decimals to two decimal places. Students perform simple calculations with money and conduct simple chance experiments.

Students generate, describe and record number patterns and relate multiplication and division facts to at least 10 × 10.

Students estimate, measure, compare and record length, area, volume, capacity and mass using some formal units. They read and record time in hours and minutes in digital and analogue notation and make comparisons between time units. Students gather and organise data to create and interpret tables and graphs.

Students name, describe and sketch particular 3D objects and 2D shapes. They compare angles using informal means and describe a ‘right angle’. Students use coordinates to describe position and compass points to give and follow directions.

Stage 3	Stage 4

Working Mathematically • Number • Patterns and Algebra • Measurement and Data • Space and Geometry

Students ask questions and undertake investigations, selecting appropriate technological applications and problem-solving strategies. They use mathematical terminology and some conventions and they give valid reasons when comparing and selecting from possible solutions, making connections with existing knowledge and understanding.

Students read, write and order numbers of any size, selecting and applying appropriate mental, written or calculator strategies for the four operations. They compare order and perform calculations with simple fractions, decimals and simple percentages and apply the four operations to money in real-life situations. Students place the likelihood of simple events in order on a number line from 0 to 1.

Students record and describe geometric and number patterns using tables and words. They construct, verify and complete number sentences involving the four operations.

Students select and use the appropriate unit to estimate measure and calculate length, area, volume, capacity and mass. They use 24-hour time in real-life situations and construct timelines. Students draw and interpret a variety of graphs using a scale.

Students construct and classify 3D objects and 2D shapes and compare and describe their properties. They measure, construct and classify angles and make simple calculations using scale.

(Stage 4 Cont...)

Their measures interpret and use tables and charts related to time, and apply their understanding of Australian and world time zones to solve problems.

Their knowledge of the properties of two- and three-dimensional geometrical figures, angles, parallel lines, perpendicular lines, congruent figures, similar figures and scale drawings enables them to solve numerical exercises on finding unknown lengths and angles in figures.

Students who have achieved Stage 4 outcomes use mathematical terminology, algebraic notation, diagrams, text and tables to communicate mathematical ideas, and link concepts and processes within and between mathematical contexts. They apply their mathematical skills and understanding in analysing real-life situations and in systematically formulating questions or problems that they then explore and solve, using technology where appropriate. In solving particular problems, they compare the strengths and weaknesses of different strategies and solutions.

Students have developed a range of mental strategies to enhance their computational skills. They operate competently with directed numbers, fractions, percentages, mixed numerals and decimals and apply these in a range of practical contexts, including problems related to discounts and profit and loss. They are familiar with the concepts of ratio, rates and the probability of simple and complementary events and apply these when solving problems. They use index notation for numbers with positive integral indices and explore prime factorisation, squares and related square roots, and cubes and related cube roots. Students investigate special groups of positive whole numbers, divisibility tests and other counting systems.

Extending and generalising number patterns leads students into an understanding of the use of pronumerals and the language of algebra, including the use of index notation. Students simplify algebraic expressions, substitute into algebraic expressions and formulae, and expand and factorise algebraic expressions. They solve simple linear equations, inequalities, and word problems. They develop tables of values from simple relationships and illustrate these relationships on the number plane.

Students construct and interpret line, sector, travel, step and conversion graphs, dot plots, stem-and-leaf plots, divided bar graphs, and frequency tables and histograms. In analysing data, they consider both discrete and continuous variables, sampling versus census, prediction and possible misrepresentation of data, and calculate the mean, mode, median and range.

Students find the area and perimeter of a variety of polygons, circles, and simple composite figures, the surface area and volume of rectangular and triangular prisms, and the volume of cylinders and right prisms. Pythagoras' theorem is used to calculate the distance between two points. They describe the limit of accuracy of

MATHEMATIC OUTCOMES

The following Outcomes, which are used within all programming in Mathematics, have been directly taken from the NSW Board of Studies – Mathematics Syllabus Document

Working Mathematically Outcomes

Process	EARLY STAGE 1	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Questioning Students ask questions in relation to mathematical situations and their mathematical experiences	WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content	WMS1.1 Asks questions that could be explored using mathematics in relation to Stage 1 content	WMS2.1 Asks questions that could be explored using mathematics in relation to Stage 2 content	WMS3.1 Asks questions that could be explored using mathematics in relation to Stage 3 content	WMS4.1 Asks questions that could be explored using mathematics in relation to Stage 4 content
Applying Strategies Students develop, select and use a range of strategies, including the selection and use of appropriate technology, to explore and solve problems	WMES1.2 Uses objects, actions, imagery, technology and/or trial and error to explore mathematical problems	WMS1.2 Uses objects, diagrams, imagery and technology to explore mathematical problems	WMS2.2 Selects and uses appropriate mental or written strategies, or technology, to solve problems	WMS3.2 Selects and applies appropriate problem-solving strategies, including technological applications, in undertaking investigations	WMS4.2 Analyses a mathematical or real-life situation, solving problems using technology where appropriate
Communicating Students develop and use appropriate language and representations to formulate and express mathematical ideas	WMES1.3 Describes mathematical situations using everyday language, actions, materials, and informal recordings	WMS1.3 Describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols	WMS2.3 Uses appropriate terminology to describe, and symbols to represent, mathematical ideas	WMS3.3 Describes and represents a mathematical situation in a variety of ways using mathematical terminology and some conventions	WMS4.3 Uses mathematical terminology and notation, algebraic symbols, diagrams, text and tables to communicate mathematical ideas
Reasoning Students develop and use processes for exploring relationships, checking solutions and giving reasons to support their conclusions	WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions	WMS1.4 Supports conclusions by explaining or demonstrating how answers were obtained	WMS2.4 Checks the accuracy of a statement and explains the reasoning used	WMS3.4 Gives a valid reason for supporting one possible solution over another	WMS4.4 Identifies relationships and the strengths and weaknesses of different strategies and solutions, giving reasons
Reflecting Students reflect on their experiences and critical understanding to make connections with, and generalisations about, existing knowledge and understanding	WMES1.5 Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Early Stage 1 content	WMS1.5 Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 1 content	WMS2.5 Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 2 content	WMS3.5 Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 3 content	WMS4.5 Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Stage 4 content

Number Outcomes

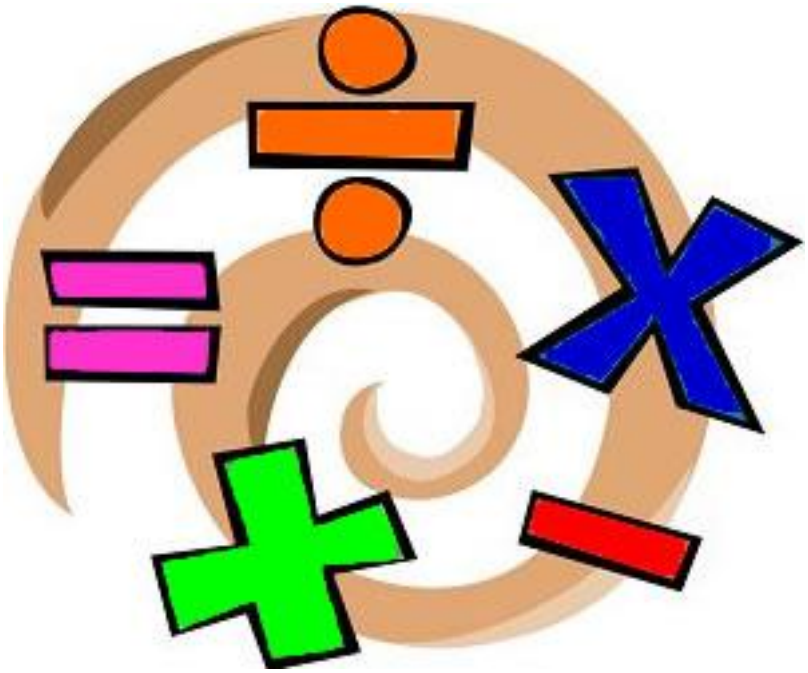
Substrand	EARLY STAGE 1	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Whole Numbers Students develop a sense of the relative size of whole numbers and the role of place value in their representation	NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20	NS1.1 Counts, orders, reads and represents two- and three-digit numbers	NS2.1 Counts, orders, reads and records numbers up to four digits	NS3.1 Orders, reads and writes numbers of any size	***Operations with Whole Numbers*** NS4.1 Recognises the properties of special groups of whole numbers and applies a range of strategies to aid computation ***Integers*** NS4.2 Compares, orders and calculates with integers
Addition and Subtraction Students develop facility with number facts and computation with progressively larger numbers in addition and subtraction and an appreciation of the relationship between those facts	NES1.2 Combines, separates and compares collections of objects, describes using everyday language and records using informal methods	NS1.2 Uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers	NS2.2 Uses mental and written strategies for addition and subtraction involving two-, three- and four-digit numbers	NS3.2 Selects and applies appropriate strategies for addition and subtraction with counting numbers of any size	
Multiplication and Division Students develop facility with number facts and computation with progressively larger numbers in multiplication and division and an appreciation of the relationship between those facts	NES1.3 Groups, shares and counts collections of objects, describes using everyday language and records using informal methods	NS1.3 Uses a range of mental strategies and concrete materials for multiplication and division	NS2.3 Uses mental and informal written strategies for multiplication and division	NS3.3 Selects and applies appropriate strategies for multiplication and division	
Fractions and Decimals Students develop an understanding of the parts of a whole, and the relationships between the different representations of fractions	NES1.4 Describes halves, encountered in everyday contexts, as two equal parts of an object	NS1.4 Describes and models halves and quarters, of objects and collections, occurring in everyday situations	NS2.4 **Models, compares and represents commonly used fractions and decimals, adds and subtracts decimals to two decimal places, and interprets everyday percentages**	NS3.4 Compares, orders and calculates with decimals, simple fractions and simple percentages	***Fractions, Decimals and Percentages*** NS4.3 Operates with fractions, decimals, percentages, ratios and rates
Chance Students develop an understanding of the application of chance in everyday situations and an appreciation of the difference between theoretical and experimental probabilities	No outcome at this Stage	NS1.5 Recognises and describes the element of chance in everyday events	NS2.5 Describes and compares chance events in social and experimental contexts	NS3.5 Orders the likelihood of simple events on a number line from zero to one	***Probability*** NS4.4 Solves probability problems involving simple events

Patterns and Algebra Outcomes

Substrand	EARLY STAGE 1	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Patterns and Algebra Students develop skills in creating, describing and recording number patterns as well as an understanding of the relationships between numbers					***Algebraic Techniques*** PAS4.1 Uses letters to represent numbers and translates between words and algebraic symbols
	PAES1.1 Recognises, describes, creates and continues repeating patterns and number patterns that increase or decrease	PAS1.1 Creates, represents and continues a variety of number patterns, supplies missing elements in a pattern and builds number relationships	PAS2.1 Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values	PAS3.1a Records, analyses and describes geometric and number patterns that involve one operation using tables and words	***Number Patterns*** PAS4.2 Creates, records, analyses and generalises number patterns using words and algebraic symbols in a variety of ways
				PAS3.1b Constructs, verifies and completes number sentences involving the four operations with a variety of numbers	***Algebraic Techniques*** PAS4.3 Uses the algebraic symbol system to simplify, expand and factorise simple algebraic expressions
					PAS4.4 Uses algebraic techniques to solve linear equations and simple inequalities
					Linear Relationships PAS4.5 Graphs and interprets linear relationships on the number plane

Data Outcomes

Substrand	EARLY STAGE 1	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Data Students inform their inquiries through gathering, organising, tabulating and graphing data	DES1.1 Represents and interprets data displays made from objects and pictures	DS1.1 Gathers and organises data, displays data using column and picture graphs, and interprets the results	DS2.1 Gathers and organises data, displays data using tables and graphs, and interprets the results	DS3.1 Displays and interprets data in graphs with scales of many-to-one correspondence	***Data Representation*** DS4.1 Constructs, reads and interprets graphs, tables, charts and statistical information
					Data Analysis and Evaluation DS4.2 Collects statistical data using either a census or a sample, and analyses data using measures of location and range



Measurement Outcomes

Substrand	EARLY STAGE 1	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Length Students distinguish the attribute of length and use informal and metric units for measurement	MES1.1 Describes length and distance using everyday language and compares lengths using direct comparison	MS1.1 Estimates, measures, compares and records lengths and distances using informal units, metres and centimetres	MS2.1 Estimates, measures, compares and records lengths, distances and perimeters in metres, centimetres and millimetres	MS3.1 Selects and uses the appropriate unit and device to measure lengths, distances and perimeters	***Perimeter and Area*** MS4.1 Uses formulae and Pythagoras' theorem in calculating perimeter and area of circles and figures composed of rectangles and triangles ***Surface Area and Volume*** MS4.2 Calculates surface area of rectangular and triangular prisms and volume of right prisms and cylinders
Area Students distinguish the attribute of area and use informal and metric units for measurement	MES1.2 Describes area using everyday language and compares areas using direct comparison	MS1.2 Estimates, measures, compares and records areas using informal units	MS2.2 Estimates, measures, compares and records the areas of surfaces in square centimetres and square metres	MS3.2 Selects and uses the appropriate unit to calculate area, including the area of squares, rectangles and triangles	
Volume and Capacity Students recognise the attribute of volume and use informal and metric units for measuring capacity or volume	MES1.3 Compares the capacities of containers and the volumes of objects or substances using direct comparison	MS1.3 Estimates, measures, compares and records volumes and capacities using informal units	MS2.3 Estimates, measures, compares and records volumes and capacities using litres, millilitres and cubic centimetres	MS3.3 Selects and uses the appropriate unit to estimate and measure volume and capacity, including the volume of rectangular prisms	
Mass Students recognise the attribute of mass through indirect and direct comparisons, and use informal and metric units for measurement	MES1.4 Compares the masses of two objects and describes mass using everyday language	MS1.4 Estimates, measures, compares and records the masses of two or more objects using informal units	MS2.4 Estimates, measures, compares and records masses using kilograms and grams	MS3.4 Selects and uses the appropriate unit and measuring device to find the mass of objects	
Time Students develop an understanding of the passage of time, its measurement and representations, through the use of everyday language and experiences	MES1.5 Sequences events and uses everyday language to describe the duration of activities	MS1.5 Compares the duration of events using informal methods and reads clocks on the half-hour	MS2.5 Reads and records time in one-minute intervals and makes comparisons between time units	MS3.5 Uses twenty-four hour time and am and pm notation in real-life situations and constructs timelines	***Time*** MS4.3 Performs calculations of time that involve mixed units

Space and Geometry Outcomes

Substrand	EARLY STAGE 1	STAGE 1	STAGE 2	STAGE 3	STAGE 4
Three-dimensional Space Students develop verbal, visual and mental representations of three-dimensional objects, their parts and properties, and different orientations	SGES1.1 Manipulates, sorts and represents three-dimensional objects and describes them using everyday language	SGS1.1 Sorts, describes and represents three-dimensional objects including cones, cubes, cylinders, spheres and prisms, and recognises them in pictures and the environment	SGS2.1 Makes, compares, describes and names three-dimensional objects including pyramids, and represents them in drawings	SGS3.1 Identifies three-dimensional objects, including particular prisms and pyramids, on the basis of their properties, and visualises, sketches and constructs them given drawings of different views	***Properties of Solids*** SGS4.1 Describes and sketches three-dimensional solids including polyhedra, and classifies them in terms of their properties
Two-dimensional Space Students develop verbal, visual and mental representations of lines, angles and two-dimensional shapes, their parts and properties, and different orientations	SGES1.2 Manipulates, sorts and describes representations of two-dimensional shapes using everyday language	SGS1.2 Manipulates, sorts, represents, describes and explores various two-dimensional shapes	SGS2.2a Manipulates, compares, sketches and names two-dimensional shapes and describes their features	SGS3.2a Manipulates, classifies and draws two-dimensional shapes and describes side and angle properties	***Properties of Geometrical Figures*** SGS4.3 Classifies, constructs, and determines the properties of triangles and quadrilaterals SGS4.4 Identifies congruent and similar two-dimensional figures stating the relevant conditions
			SGS2.2b Identifies, compares and describes angles in practical situations	SGS3.2b Measures, constructs and classifies angles	***Angles*** SGS4.2 Identifies and names angles formed by the intersection of straight lines, including those related to transversals on sets of parallel lines, and makes use of the relationships between them
Position Students develop their representation of position through precise language and the use of grids and compass directions	SGES1.3 Uses everyday language to describe position and give and follow simple directions	SGS1.3 Represents the position of objects using models and drawings and describes using everyday language	SGS2.3 Uses simple maps and grids to represent position and follow routes	SGS3.3 Uses a variety of mapping skills	

TEACHING AND LEARNING CYCLE

Our agreed teaching and Learning Cycle includes the following elements.

Assessment- based on backward design we assess the students and gauge where they are at before we program so that we know where we need to take the students on their learning journey.

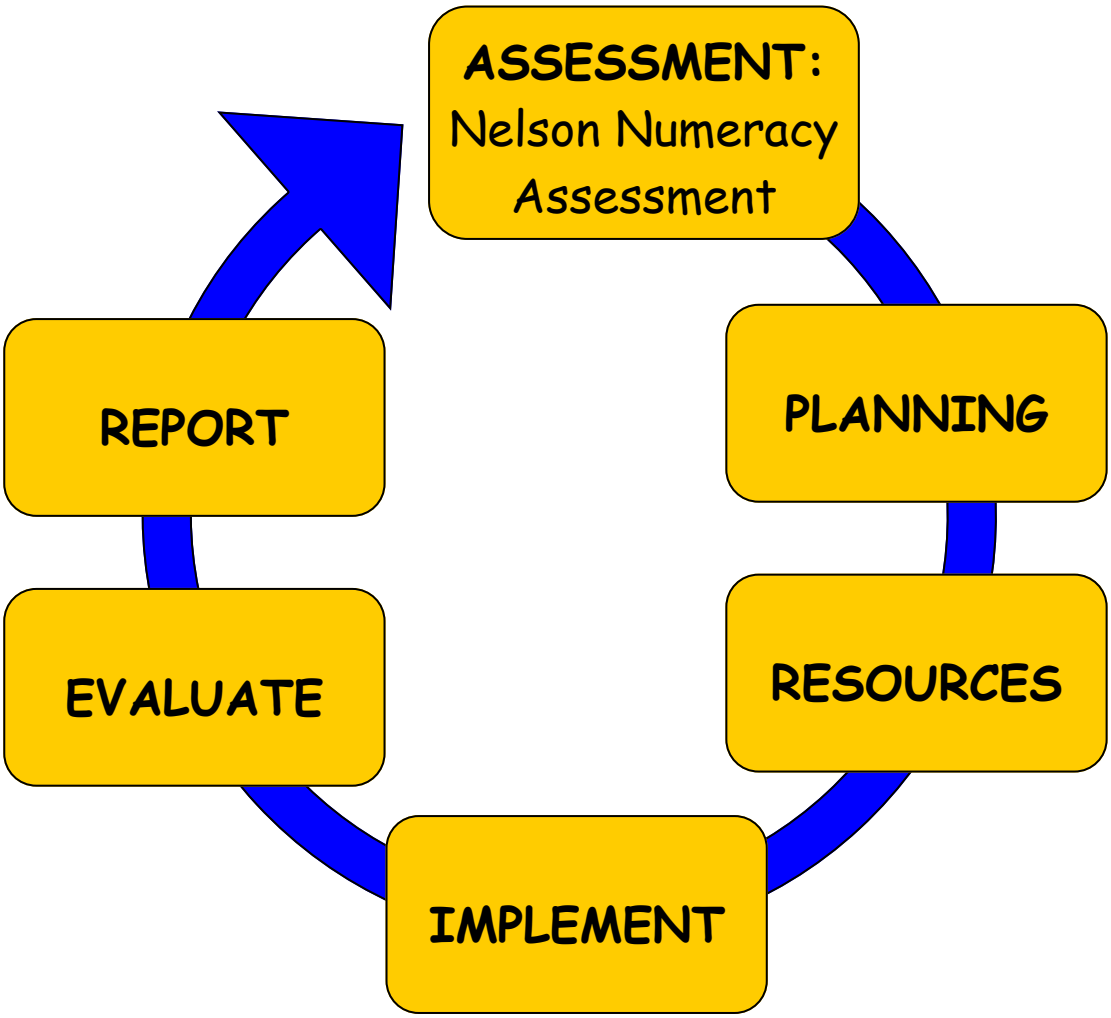
Planning- programming reflects an understanding of the students prior knowledge and what goals they are attaining using the school Mathematics proforma

Resources- Gather resources to support programme.

Implement- teaches new knowledge and build on prior knowledge according to programme.

Evaluate- evaluate programme and goals and reflect on own practice, best practice and where you need to go from here.

Report- record results and inform students of progress.



SCOPE AND SEQUENCE

See Appendix A

The K–6 Mathematics Scope and Sequence is an overview of the main outcomes and indicators in each of the strands: Number, Patterns and Algebra, Data, Measurement, and Space and Geometry for Early Stage 1 to Stage 3.

The indicators in each of these strands are developed across the Stages to show how understanding in the early years needs to precede understanding in later years. In this way, the Scope and Sequence provides an overview of the sequence of learning for particular concepts in Mathematics and links content typically taught in Primary Mathematics classrooms.

The essential content presented in any particular Stage represents the knowledge, skills and understanding that are to be achieved by a typical student by the end of that Stage. It needs to be acknowledged that students learn at different rates and in different ways, so that there will be students who have not achieved the outcomes for the Stage/s prior to that identified with their chronological age.

Students may be at different Stages for different strands of the Scope and Sequence. For example, a student may be working on Stage 3 content in the Number strand but be working on Stage 2 content in the Space and Geometry strand.

Please Note:

- Working mathematically strand does not appear in the Scope and Sequence, as it does not have content and key ideas.
- A Scope and Sequence of Indicators are generally sequential. (Located at Appendix A)
- Teachers are to ensure that they continue to meet individual needs of students. Students are not to be prevented from working with outcomes in other stages if they have or

AGREED TEACHING AND LEARNING STRATEGIES

At St. Mary's School Young, the current practices used in the teaching of Mathematics are:

- Programming teaching and learning outcomes and indicators from the NSW Board of Studies Mathematics K-6 Syllabus and Support Documents
- Addressing the specific topics in the scope and sequence for each Year level
- Presenting units in a variety of ways, Integrating with all other KLA's using the elements of the Quality teaching Framework.
- Using a variety of concrete materials to foster student learning;
- Incorporate the strategies and ideas that come from 'Count Me in too' Maths programme
- Incorporating visual / media presentations
- Utilising a variety of assessment tasks, which identify student's strengths, and areas of need
- Conduct Nelson Testing K-6 and Sens 1 &2 in Infants
- Using specified learning tasks for assessment of Mathematics
- Making use of local resources to enhance learning
- School Proforma
- Quality Teaching Framework Dimensions and Elements

It is expected at St Mary's Primary School, that Mathematics be taught in all stages for approximately:

Time Allocation	Early stage 1	Stage 1	Stage 2	Stage 3
Per week	4-5 hours	4.5- 5 hours	5 hours	5 hours

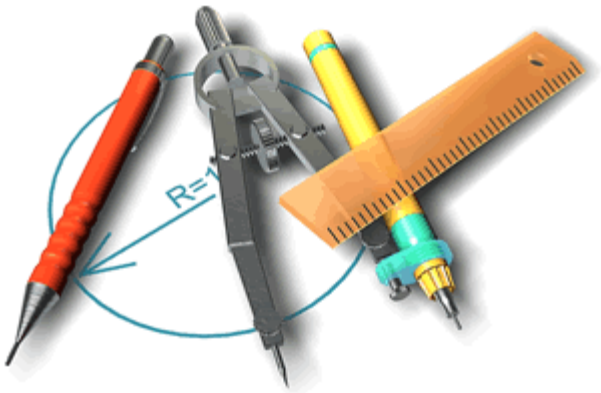
At St. Mary's, students:

- Are engaged in a range of activities that are appropriate to their level of development and related to every day life.
- receive positive feedback and experience success.
- are involved in trying out of new ways and taking risks is encouraged.
- are encouraged to work cooperatively on tasks and manipulate materials in a wide variety of learning situations.
- are given opportunities to discover and create patterns and to describe and record relationships contained in those patterns.
- are encouraged to make sense of mathematical learning experiences by talking and writing about them.
- are involved in classroom displays to motivate and encourage mathematical thinking.
- have the opportunity to participate in Mathematical competitions. These include:

- University of NSW Mathematics Competition (Yrs 3-6 only).
- Math's Olympiad (mainly for students in years 5/6, however, years 3/4 are eligible to participate).

At St. Mary's teachers are encouraged to use the following strategies:

- Ensure that questions, instructions and activities lead to positive outcomes.
- Provide a variety of experiences and learning situations to cater for students' individual and cultural learning styles.
- Recognise that students learn at different rates and in different ways.
- Ensure that activities are at the child's level of development, including language development.
- Use concrete materials for exploration, concept building and problem investigation.
- Use the everyday experiences of students as a basis for meaningful mathematical investigations.
- Consider the practical uses of mathematics in everyday life outside the school, e.g. shopping, cooking, budgeting, reading and drawing maps
- Find mathematics in everyday school experiences:
  - using the school canteen (money) and counting money on Mission Days,
  - planning posters and displays (measurement & area concepts)
  - distributing materials (e.g. How many paint brushes do we need?)
  - visiting local shops, pricing & selling cakes for a 'cake day'.
  - rearranging furniture in the classroom (space concepts)
- Introduce problems which are challenging. Problems should extend students to their full potential. There is pleasure to be gained from solving a problem.
- Show that you like mathematics.
- Use praise so as to develop the students' positive perceptions of mathematics and their ability to "do" mathematics, therefore encouraging risk taking.
- Accept students' own language as a vital step in the process of developing formal mathematical language.
- Ensure that students experience success in mathematics.
- Encourage students to initiate their own mathematical investigations and pursue individual approaches to problem solving.



STRATEGIES USED

The following section provides some useful strategies for teaching Mathematics at St. Mary's. These strategies support learning in this key learning area. It is important that teachers model and demonstrate the use of these strategies and provide opportunities for students to practise them before expecting their students to independently demonstrate them.

Open ended questions	Visual material	Inference
Discussing	Concrete material	Investigating
Communicating: orally in written form and diagrammatically	Kinaesthetic	Personal experiences
Group work	Intra and inter personal skills	Exploration
Reasoning to explore relationships and check solutions	Pen and paper	Using mathematical language
Modelling; guided; independent	Recording	Scaffolding
Reflecting on experiences and critical understanding	Questioning	De Bono's six thinking hats
Positive affirmation	Higher order thinking/ lateral thinking	Langford's learning tools
Pictorial representation	Estimating	Multiple intelligence
Symbolising	Mental computing	Decision making
ICT	Extension activities	One on one
Collaborative	Ability groups and mixed ability groups	Peer tutoring
Assimilation	Role modelling	Brain gym
Verifying	Classroom displays	Processes
Classifying	Interpreting	Sorting
Evaluating	Justifying	Trial and error
Comparing	Instructing	Making
Working backwards	Translating	Critical thinking
Appreciating	Drawing	Building
Sharing	Observing	

Nelson Numeracy Assessment Kit- is used by all teachers from K-6 to assist with our whole school practice and focus on the fundamentals of mathematics.

Count Me In Too

Count me in too "*is designed to assist teachers broaden their knowledge of how children learn Mathematics by focusing on strategies students apply when solving arithmetic and counting tasks".* (Count Me in Too Professional Development Package)

Growing Together… in Numeracy

This program identifies the development of strategies students use in Numeral Identification, forward number word sequence, backward number word sequence, Subitising and early Arithmetic strategies. The resource book "Developing efficient Numeracy strategies' contains activities that assist in developing identified skills. This book is divided into four sections:

- Emergent
- Perceptual
- Figurative
- Counting On

In each section, the activities are based on the student's present knowledge and identify the next step on the number framework.

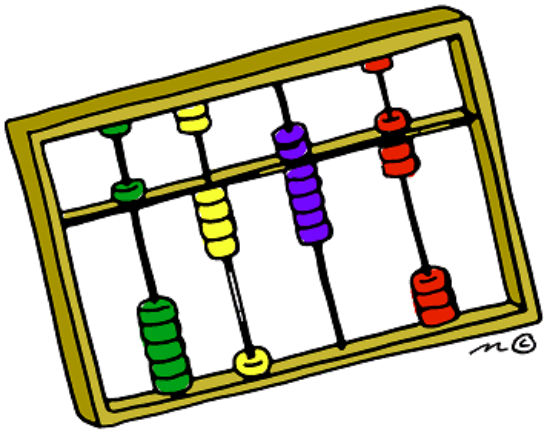
Teachers assess students individually using a diagnostic interview (SENA), which inform them of student's current level of thinking in number. Once assessed this information can be used to provide guidance for instruction by outlining how students progress from simple to more sophisticated strategies.

AGREED PRACTICE FOR PROGRAMMING

It is a whole school agreed practice to present well planned and thoughtful programmes that will enhance the learning environment and opportunities for our students. There is an emphasise on Sousa's Brain Based theory and the elements of the Quality Teaching Framework.

It is agreed that the following pedagogies will be in our programmes:

- Use the school proforma
- Outcomes and indicators
- Warm up activities that stimulate the learner
- Explicit teaching time
- Hands on manipulation and group work to reinforce explicit teaching
- Independent work
- Cognitive closure and reflection time on what has been learnt
- Use of a range of appropriate resources
- Challenging and open rich tasks
- References to mathematical metalanguage
- A variety of assessment opportunities
- Reflection opportunities for students to discuss, record and respond
- Evaluation of learning experiences



ASSESSMENT

See Appendix B

At St. Mary's School Young we believe that assessment is an integral part of teaching and learning, forming the basis for all further action by both teacher and student. Our assessment is based on collecting, analysing and recording information about students toward achievement of outcomes. An important purpose of assessment is to design appropriate learning programs for all students. The following principles underpin effective assessment:

- Assessment is integral to teaching and learning. It should be based on the learning outcomes in Mathematics that specify what students know and understand.
- Assessment procedures should relate to the knowledge and skills that are taught within the school program and to the syllabus outcomes;
- Assessment must be reliable in that it consistently produces results that accurately reflect the students' capabilities. It must be valid in that it actually measures what it is intended to measure. The focus of assessment should be clear to the assessor.

Assessment processes should:

- Be consistent with overall school goals and general policies;
- Arise from the everyday classroom learning experiences of students;
- Enhance the self-esteem and motivation of the individual student;
- Recognise and value the diverse abilities, backgrounds and experiences of students;
- Be closely related to the syllabus content and be based on the syllabus outcomes.

Our key beliefs about the assessment process are that it should:

- Be outcome and indicator based;
- Be a part of the teaching/learning program, relevant and purposeful;
- Be continuous
- Be designed to enable all students to demonstrate values, skills and knowledge to the best of their ability;
- Be based on reflection by student and teacher;
- Offer students a variety of ways to demonstrate their learning;
- Include student self-assessment;
- Provide a basis for communication about the student's progress with teacher, student and parent;
- Lead students and teachers to suggest paths for future learning;
- Involve systematically observing students during activities;
- Involve interacting with students to gain a deeper knowledge of what they know, understand and can do;

- Include analysing work samples by using indicators;
- Employ a diverse range of strategies suited to the activity of process involved.
- Nelson Testing Years 1 to 6
- Sena Testing Kinder, One and Two

At St. Mary's School Young, we record assessment using a variety of strategies such as:

Anecdotal records	Annotated work samples	Written tests
Pre-tests	Demonstrations	Checklists
Audio and visual tapes	Group reports	Peer assessment
Photographs	Interaction with others	Self-Assessment
Practical Applications and tasks	Observation	Conferences
Multi Media	Listening and Questioning	Questions posed by students

REPORTING

Reporting at St. Mary's reflects the spirit of the school's mission statement. As such, it should be undertaken in the ways that:

- Acknowledge parents rights to be adequately informed of their child's progress.
- are meaningful, appropriate and understandable to the audience;
- are appropriate to the stage of student development;
- seek to build on achievements;
- demonstrate links to stage outcomes;
- Foster productive school/home understanding and interaction.
- should provide a diagnosis of areas of strength and need, including those in which the students might be given additional support;
- information needs to be clear and appropriate to the audience;

As a result of ongoing assessment and discussion with students, parents will be informed of their children's progress in the following ways:

- Student Lead conferences are held in Term 1 and Term 3. This provides students with the opportunity to share all of their bookwork and set future learning goals.
- Formal written reports at the end of Term 2 and Term 4. Written reports are designed to provide an overview of the child's achievement and efforts across all curriculum areas. The written report form is regularly evaluated to ensure that it is relevant to curriculum development.

- An interview between parents/guardians and the teacher can be made at a mutually convenient time at any time throughout the year.
- NAPLAN results (Years 3 and 5).

EVALUATION- REFLECTION

Evaluation is an ongoing process of reflecting on curriculum documents, units of work, programmes, assessment, recording and reporting. Students and parents as well as Teachers, Executive Teachers and the Principal are involved in this process. Evaluation focuses on the teaching and learning of outcomes and processes. It is used to enhance the teaching programmes and procedures. Information for use in evaluation may be gathered through a range of sources including:

- Student assessment
- Teachers' own reflections on their teaching practices
- Written records such as questionnaires, diaries, submissions or records of meetings
- Discussions with staff members, teaching staff, parents and community members.

Teachers need to gather, organise and interpret information in order to make judgments about the effectiveness and appropriateness of:

- Plans for the teaching of specific units
- Teaching programmes
- Teaching strategies and practices
- Assessment strategies
- Resources
- Staff development programmes.

Teacher programme evaluation is an important process used to give insights into future planning and to provide a basis for decisions about:

- modification of existing school policies
- the adequacy of implementation strategies
- staff development needs
- allocation of funds and other resources
- School community links.

Curriculum Document

- Does it meet syllabus requirements?
- Does it link with school mission and exit outcomes?
- Does it inspire learning and cater for individual needs?
- Does it integrate with other KLA's?

Units of work and Programs

- Do they stimulate students to learn?
- Are they relevant to stage of development and cater for individual needs?
- Do they offer a wide range of teaching and learning strategies?
- Do they integrate across KLA's?
- Do they incorporate suitable resources?

Assessment, recording and reporting

- Were outcomes achieved?
- How can assessment be used to aid future planning?
- Evaluations are recorded in programs covering units of work. Strategies and assessment procedures are evaluated regularly.
- Curriculum and Development Plan, and Management Plan guide future curriculum development.
- Do reports reflect teaching, learning and assessment?

RESOURCES

- Board of Studies NSW. Mathematics K-6. Syllabus Document. 2001
- 'What, When, How to Teach Mathematics K – 6' (2004 Revised Edition)
- How the Brain Learns Mathematics- David A. Sousa
- Newman's Prompts

All classrooms have a class Mathematics box which has essential 'hands-on' equipment like, cards, dice, blocks MAB material, counters etc… Further resources are located either in the Mathematics cupboard in the staffroom or the Maths resource room near the library.