



Mathematics Scope and Sequence

Last Modified: 13/12/2016

Aims (Australian Curriculum- see Appendix A)

- Students are confident, creative users and communicators of mathematics, **able to investigate, represent and interpret situations** in their personal and work lives and as active citizens
- Students develop an increasingly **sophisticated understanding of mathematical concepts and fluency with processes, and are able to pose and solve problems and reason in *Number and Algebra, Measurement and Geometry, and Statistics and Probability***
- Students **recognise connections** between the areas of mathematics and other disciplines and appreciate mathematics as an accessible and enjoyable discipline to study.

Our Beliefs

Students learn best when:

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| <ul style="list-style-type: none">• Their engagement is at a high level• Tasks are built on students' prior knowledge• Scaffolding takes place, making connections to concepts, procedures and understanding• High-level performance is modeled• They are expected to explain thinking and meaning• They self-monitor their progress• They feel safe and are in a risk taking environment• The teacher poses challenging and interesting questions.• They use manipulatives and other tools | <ul style="list-style-type: none">• They are accessing a curriculum that is standards-based• There is differentiated instruction through flexible grouping, varying question levels and the use of tiered assignments• They are taught the language of mathematics• Teachers provide 'real world' contexts for teaching mathematics• They reflect on their learning• They are involved in lessons which meet their individual needs and phase of development |
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Whole School Lesson Structure:

Math Energizers	5- 10 minutes	Review and Practice
Whole Group Lesson	10-15 minutes	Standards-based lesson
Guided Maths/ Learning Tasks	30 minutes	<ul style="list-style-type: none">- Whole class learning task, teacher works with small guided math group- Individual math interview or conferencing- Work stations- Independent work
Share	5-10 minutes	<ul style="list-style-type: none">- Discuss major learning points

St Thomas' Assessment Timetable

These assessment tools are to be used **in addition to regular checklisting and anecdotal records** to ensure achievement of the following outcomes.

Years 1-6: PAT Maths (Beginning and End of Year)

Years 1-3: MAI (Early Semester 1)

Pre Primary: Early Years Numeracy and Literacy

Year 4-6: MAI (At risk)

Year 1-6: Pre/Post testing on a termly basis

K-2 Mathematics Scope and Sequence

		Kindergarten Pre Primary	Year 1	Year 2
Number and Algebra	Number and Place Value	<p>Counting- naming numbers in sequence, initially to and from 20, moving from any starting point</p> <p>Connect number names, numerals and quantities, including zero, initially up to 10 (K) and then beyond (PP)</p> <p>Subitise small collections of objects</p> <p>Instantly recognise the number of objects in a small group without counting</p> <p>Compare and order collections, initially to 20, and explain reasoning (e.g. explains why he/she ordered collections as such)</p> <p>Use concrete objects to model and solve addition and sharing problems</p>	<p>Count to and from 100 by ones from any starting point.</p> <p>Skip count by twos, fives and tens starting from zero</p> <p>Recognise, read, write and order numbers to at least 100</p> <p>Locate numbers to 100 on a blank number line (number line should be marked only 0 and 100 at both extremities)</p> <p>Partition numbers to 100 using place value</p> <p>Solve two digit addition and subtraction sums with regrouping</p>	<p>Count to and from 100 in twos, threes, fives and tens from any starting number</p> <p>Recognise, read, write and order numbers to at least 1000</p> <p>Partition numbers to 1000 using place value</p> <p>Explore the connection between addition and subtraction</p> <p>Solve two digit addition and subtraction sums with regrouping using a range of efficient mental and written strategies</p> <p>Recognise and represent multiplication as repeated addition, groups and arrays</p> <p>Recognise and represent division as grouping into equal sets and solve simple problem using these representations</p>
	Fractions and Decimals		Recognise and describe one-half as one of two equal parts of a whole.	Recognise and interpret common uses of halves, quarters and eighths of shapes and collections

	Money and Financial Mathematics		Recognise, describe and order Australian coins according to their value	Count and order small collections of Australian coins and notes according to their value
	Patterns and Algebra	Sort and classify familiar objects and explain the basis for these classifications (e.g. when given a collection of living creature figurines sorts insects and animals) Copy, continue and create patterns with objects and drawings	Investigate and describe number patterns formed by skip counting (e.g. using a 100s chart) Investigate and describe patterns with objects	Describe patterns with numbers and identify missing elements Solve problems by using number sentences for addition or subtraction (e.g. when presented with a word problem, writes a number sentence to match it)
Measurement and Geometry	Using Units of Measurement	Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language Compare and order the duration of events using the everyday language of time (e.g. order pictures of a day at school, having a shower and eating dinner) Connect days of the week to familiar events and actions (e.g. on Monday we go to Library, on Tuesday we have Sport, etc)	Measure and compare the lengths and capacities of pairs of objects using uniform and informal units Tell time to the hour and half-hour Describe duration using months, weeks, days and hours	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform and informal units Compare masses of objects using balance scales Tell time to the quarter-hour, using the language of 'past' and 'to' Name and order months and seasons Use a calendar to identify the date and determine the number of days in each month

Statistics & Probability

<p>Location and Transformation</p>	<p>Describe position (e.g. under, on top of, next to/ beside, above, below) and movement</p>	<p>Give and follow directions (e.g. move three spaces to the right, move two spaces up, move 1 space to the left, etc).</p> <p>Give and follow directions to/ from familiar places</p>	<p>Interpret simple maps of familiar locations and identify the relative positions of key features (e.g. on an unlabelled map of the school, label where the oval/ office/ undercover area/ classroom is)</p> <p>Investigate the effect of one-step slides and flips with and without digital technologies</p> <p>Identify and describe half and quarter turns</p>
<p>Shape</p>	<p>Sort, describe and name familiar two-dimensional shapes and three-dimensional objects in the environment</p>	<p>Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features (e.g. curved sides, straight sides, 4 sides, 2D, 3D, etc)</p>	<p>Describe and draw two-dimensional shapes, with and without digital technologies</p> <p>Describe the features of three-dimensional objects (e.g. faces, edges, vertices)</p>
<p>Chance</p>		<p>Identify outcomes of familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or 'might happen'</p>	<p>Identify practical activities and everyday events that involve chance. Describe outcomes as 'likely' or 'unlikely' and identify some events as 'certain' or 'impossible'</p>

	<p>Data Representation and Interpretation</p>	<p>Answer yes/no questions to collect information (e.g. in a game of 'Guess Who', guess the shape, etc)</p>	<p>Choose simple questions (e.g. which is your favourite season? What colour eyes do you have?) and gather responses</p> <p>Represent data with objects and drawings (pictographs, tallies, shading in grids to create bar graph) where one object or drawing represents one data value. Describe the displays</p>	<p>Identify a question of interest that will only have a limited range of categorical answers (e.g. How many people are there in your family? In which month were you born? etc). Gather data relevant to the question</p> <p>Collect, check and classify data</p> <p>Create displays of data using lists, table and picture graphs and interpret them</p>
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3-6 Mathematics Scope and Sequence

	Year 3	Year 4	Year 5	Year 6
Number and Algebra	<p>Number and Place Value</p> <p>Investigate the conditions required for a number to be odd or even and identify odd and even numbers</p> <p>Read, write and order numbers to at least 10 000</p> <p>Apply place value to partition, rearrange and regroup numbers to at least 10 000</p> <p>Recognise and explain the connection between addition and subtraction</p> <p>Solve two digit addition and subtraction sums with regrouping using a range of efficient mental and written strategies</p> <p>Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation (e.g. knowing number bonds to 10)</p> <p>Recall multiplication facts of two, three, five and ten and related division facts</p>	<p>Recall multiplication facts up to 10 x 10 and related division facts</p> <p>Investigate and use the properties of odd and even numbers</p> <p>Read, write and order numbers to at least tens of thousands</p> <p>Apply place value to partition, rearrange and regroup numbers to at least tens of thousands</p> <p>Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9 (starting from any given point)</p> <p>Solve three digit addition and subtraction sums with regrouping using a range of efficient mental and written strategies</p> <p>Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder</p>	<p>Identify and describe factors and multiples of whole numbers and use them to solve problems</p> <p>Use estimation and rounding to check the reasonableness of answers to calculations</p> <p>Solve problems involving multiplication of three-digit numbers, (initially by one- then by two-digit numbers) using efficient mental, written strategies and appropriate digital technologies</p> <p>Solve three digit (including mixed numbers) addition and subtraction sums with regrouping using a range of efficient mental and written strategies</p> <p>Solve problems involving division by a one digit number, including those that result in a remainder</p> <p>Use efficient mental and written strategies and apply appropriate digital technologies to solve problems</p>	<p>Identify and describe properties of prime, composite, square and triangular numbers</p> <p>Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers</p> <p>Investigate everyday situations that use positive and negative whole numbers and zero. Locate and represent these numbers on a number line</p>

		Represent and solve problems involving multiplication (one by two digit sums) using efficient mental and written strategies and appropriate digital technologies			
	Fractions and Decimals	Model and represent unit fractions including $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$ and their multiples to a complete whole (e.g. knowing how many halves/ quarters/ thirds/ fifths are needed to make one whole)	Investigate equivalent fractions Count by quarters halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line Recognise that the place value system can be extended to tenths and hundredths Make connections between fractions and decimal notation	Compare and order common unit fractions and locate and represent them on a number line Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator Recognise that the number system can be extended beyond hundredths Compare, order and represent decimals (to hundredths)	Compare fractions with related denominators and locate and represent them on a number line Solve problems involving addition and subtraction of fractions with the same and related denominators (e.g. $\frac{2}{3} + \frac{1}{6}$) Find a simple fraction of a quantity where the result is a whole number (e.g. $\frac{1}{3}$ of 9 is 3), with and without digital technologies Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers Multiply decimals by whole numbers and perform divisions that result in terminating decimals (e.g. the decimal isn't recurring), with and without digital technologies

					<p>Multiply and divide decimals by powers of 10</p> <p>Make connections between equivalent fractions, decimals and percentages</p>
	Money and Financial Mathematics	Represent money values in multiple ways (e.g. how many ways can you make \$1.30?) and count the change required for simple transactions to the nearest five cents	Solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies	Create simple financial plans	Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies
	Patterns and Algebra	Describe, continue, and create number patterns resulting from performing addition or subtraction	<p>Explore and describe number patterns resulting from performing multiplication (e.g. 3, 9, 27- the rule is 'x by 3')</p> <p>Solve word problems by using number sentences involving multiplication or division where there is no remainder</p> <p>Use equivalent number sentences involving addition and subtraction to find unknown quantities (e.g. knowing that $12 + 25 = 37$ is the same as $37 - 25 = 12$ and therefore knowing that $5 + ? = 21$ is the same as $21 - 5 = ?$)</p>	<p>Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction</p> <p>Use equivalent number sentences involving multiplication and division to find unknown quantities (e.g. knowing that $10 \times 7 = 70$ is the same as $70 / 10 = 7$ and therefore knowing that $21 / ? = 3$ is the same as $21 / 3 = ?$)</p>	<p>Continue and create sequences involving whole numbers, fractions and decimals.</p> <p>Describe the rule used to create the sequence</p> <p>Explore the use of brackets and order of operations to write number sentences</p>

Measurement and Geometry

<p>Using Units of Measurement</p>	<p>Measure, order and compare objects using familiar metric units of length, mass and capacity</p> <p>Tell time to the minute and investigate the relationship between units of time</p>	<p>Use scaled instruments (e.g. ruler, kitchen scales, measuring jugs) to measure and compare lengths, masses, capacities and temperatures</p> <p>Convert between units of time (e.g. months, weeks, days, hours, minutes, seconds)</p> <p>Use am and pm notation and solve simple time problems</p> <p>Compare objects using familiar metric units of area and volume</p>	<p>Choose appropriate units of measurement for length, area, volume, capacity and mass (e.g. when given an object to measure, is able to identify best unit of measure to measure it with)</p> <p>Calculate the perimeter and area of rectangles using familiar metric units (e.g. centimetres and metres)</p> <p>Compare 12- and 24-hour time systems and convert between them</p> <p>Name, measure (excluding reflex angles) and compare angles using a protractor</p>	<p>Connect decimal representations to the metric system (e.g. knowing that 1.5 centimetres is the same as one and a half centimetres, 2.25 metres is the same as one and a quarter metres)</p> <p>Convert between common metric units of length, mass and capacity (e.g. 20 grams = ? milligrams)</p> <p>Solve problems involving the comparison of lengths and areas using appropriate units (e.g. Which is more- 10 grams or 12,000 milligrams?)</p> <p>Connect volume and capacity and their units of measurement (e.g. 1000 cubic centimetres = ? litres)</p> <p>Interpret and use timetables</p>
<p>Location and Transformation</p>	<p>Create and interpret simple grid maps to show position and pathways</p> <p>Identify symmetry in the Environment</p>	<p>Use simple scales (e.g. if one grid equals 2 kilometres, how far is it from x to y?), legends and directions to interpret information contained in basic maps</p> <p>Create symmetrical patterns, pictures and shapes with and without digital technologies</p>	<p>Use a grid reference system to describe locations</p> <p>Describe routes using landmarks and directional language</p> <p>Describe translations, reflections and rotations of two-dimensional shapes</p> <p>Identify line and rotational symmetries</p> <p>Apply the enlargement transformation to familiar two dimensional shapes and</p>	<p>Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies (e.g. when shown an object that has been translated then reflected, the student is able to describe the correct progression of transformations)</p> <p>Introduce the Cartesian coordinate system using all four quadrants</p>

				explore the properties of the resulting image compared with the original (e.g. is able to draw a triangle that is 2 grids wide and 3 high and is then able to make it 2/3/4 times larger)	
	Shape	Make models of three-dimensional objects and describe key features (e.g. faces, edges, vertices)	<p>Compare the areas of regular and irregular shapes by informal means (e.g. the number of grids it takes up on a piece of grid paper)</p> <p>Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies</p>	Connect three-dimensional objects with their nets and other two-dimensional representations	<p>Construct simple prisms and pyramids</p> <p>Investigate, with and without digital technologies, angles on a straight line, angles at a point and vertically opposite angles. Use results to find unknown angles</p>
Statistics & Probability	Chance	Conduct chance experiments (e.g. with dice, coins, spinners), identify and describe possible outcomes and recognise variation in results	<p>Describe possible everyday events and order their chances of occurring</p> <p>Identify everyday events where one cannot happen if the other happens</p> <p>Identify events where the chance of one will not be affected by the occurrence of the other</p>	<p>List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions</p> <p>Recognise that probabilities range from 0 to 1 (0= never, 0.5= possible/ 50/50 chance, 1= certain)</p>	<p>Describe probabilities using fractions, decimals and percentages (e.g. 'At Dairy Freeze, 4 of the last 20 sundaes sold had nuts. What is the experimental probability (as a fraction, decimal and percentage) that the next Sunday sold will have nuts?')</p> <p>Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies</p>

					Compare observed frequencies across experiments with expected frequencies (e.g. conduct a 'spinner' experiment 7 times. Compare results)
	Data Representation and Interpretation	<p>Identify questions or issues for categorical variables (e.g. a variable that has two or more categories such as crops: wheat, barley and peas). Identify data sources (e.g. from who or where the data can be obtained) and plan methods of data collection and recording</p> <p>Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital Technologies</p> <p>Interpret and compare data displays</p>	<p>Select and trial methods for data collection, including survey questions and recording sheets</p> <p>Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values</p> <p>Evaluate the effectiveness of different displays in illustrating data features</p>	<p>Pose questions and collect categorical (e.g. Eye colour: Blue, green, hazel, brown) or numerical (e.g. Number of people in your family) data by observation or survey</p> <p>Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies</p> <p>Describe and interpret different data sets in context</p>	<p>Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables</p> <p>Interpret secondary data (data collected by someone other than the student) presented in digital media and elsewhere</p>

Maths Energizers / Warm Ups

The numeracy block starts with the whole class working together. This is a warming up or tuning in experience where students work together on a strategy or skill that will be developed further in whole class activities.

Examples could include:

- Skip counting
- Chants
- Songs
- Big books
- Movement activities (make groups of 4, make a small shape)
- Counting with the 100's chart
- Flash cards
- Number games (guess my number)
- Mental computation
- Equipment from maths pencil case

Whole Group Lesson

The whole class focus builds a community of mathematics learners focused on a common aspect of numeracy. This may be a modelled approach where the teacher introduces or revisits a new concept. It could also be a shared approach where the teacher and students jointly work through the process. When using a shared approach the teacher prompts students, questioning and supporting them as they reinforce, modify and extend their skills and understandings. The children are told what the lesson is about and what is expected in language that is meaningful to the child. This helps tune in the children in to the mathematical vocabulary that will be used.

Guided Math / Learning Tasks

- Groupings occur with the approach determined by the needs of the students.
- Modelled maths is brief and dynamic. The teacher introduces the learning experience, demonstrates effective strategies and makes explicit the mathematics to be focused on in the session. The teacher 'thinks aloud'. The students observe, ask questions and directed by the teacher, model the strategies for themselves, explaining their working.
- Guided maths group (small) work with the teacher on a specific skill using the whole class activity as the base.
- Independent maths follows directly after a guided maths session where students work individually with the teacher prompting and helping at each student's point of need. Students engage in independent mathematics directly related to the work they were doing in their small teaching group

Share / Reflection Time

Reflection or whole class share time can be done in many ways. It may be recording the strategies they used in a maths journal, articulating to the group the process of problem solving technique they used in the session or the teacher might record the key concepts in a class big book. Teachers might also use a cooperative learning tool or structure to allow students to reflect their understanding.

- Links made to lesson objectives and success criteria stated in whole group lesson
- Articulate and share strategies used
- Journal key points and strategies used
- Reflect on what has been learnt
- Address any misconceptions
- Praise progress

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
MATHS ENERGIZER (5-10 MINUTES)					
MATHS ENERGISER					
WHOLE GROUP LESSON (10-15 MINUTES)					
WHOLE GROUP LESSON	LI:	LI:	LI:	LI:	LI:
GUIDED MATHS / LEARNING TASKS (30 MINUTES)					
SHARE (5-10 MINUTES)					
SHARE					