Brahma Lodge Primary School
Numeracy Agreement

Numeracy Belief Statement

At Brahma Lodge Primary School we believe that a consistent whole school approach to the teaching and learning of mathematics is essential to improving the achievement outcomes of our learners.

Effective numeracy skills, knowledge and dispositions are a foundation of lifelong learning. Being Numerate enables our students to understand the world in which they live. Being Numerate enables our students to develop themselves and their community. Being Numerate enables our students to solve problems that impact on their lives.

We believe that student achievement in Numeracy improves when teachers and students share a common vocabulary to explain mathematical thinking and a common pedagogy for the teaching of mathematical ideas occurs across the school. This common vocabulary and pedagogical approach is continually developed through ongoing professional dialogue and learning.

At Brahma Lodge Primary School we want our students to become powerful learners of mathematics through the attainment of skills, knowledge and dispositions that develop mastery of problem solving, reasoning, fluency and understanding. We aim to develop mathematical thinking in rigorous problem solving contexts to enable our students to make connections between mathematics and the world that they live in.

The Teaching for Effective Learning Framework (TfEL) provides the basis for the ongoing development of our teaching and learning practices and is used to develop the quality of teaching to achieve sustainable improvement in student learning outcomes.

Teachers use the maths agreement to inform their planning and their teaching. It is the shared responsibility of all teachers in our school to implement the Numeracy Agreement.

What is a Powerful Learner?

A powerful learner is a person who has developed the temperament to cope confidently with the difficulty and uncertainty of real-life learning.

The Magnificent Eight of Powerful Learners is an idea developed by Professor Guy Claxton. There are eight qualities or dispositions of a powerful learner.

The qualities and dispositions of a powerful maths learner:

1. **Powerful learners are curious.** Curious people like to get below the surface of ideas: they want to attain a deeper understanding of ideas, skills and knowledge. Curious people ask pertinent and productive questions.

2. **Powerful learners have courage.** Courageous learners are not afraid of uncertainty and complexity. They have the confidence to say, "I don't know". They are willing to take risks in their learning and they like to be challenged as learners. They are determined and understand that mistakes are part of the learning process.

3. **Powerful learners are good at exploration and investigation.** They like to find things out. They are good at seeking and gathering information. They are enthusiastic researchers. They know how to concentrate and are unlikely to jump to conclusions. They have the ability to see and to take learning opportunities as they arise.

4. **Powerful learners understand that learning requires experimentation.** They like to try things out to see what happens. They enjoy tuning their skills and looking for small improvements. They know how to do good practice. They say, "let's try" and "what if". They are happy to make mistakes if they are informative.

5. **Powerful learners have imagination.** They understand the value of mental rehearsal and of running mental simulations. They enjoy finding links and making connections in their own mind. They can see other people's perspective. They are able to use reverie to let ideas come to them.

6. **Powerful Learners apply reason and discipline in their thinking.** They have the ability to think carefully, rigorously and methodically. They are able to analyse and to evaluate. They have the ability and disposition to spot the weaknesses in their own argument as well as other people's. They are organised and willing to change their plans if needed.

7. **Powerful learners have the virtue of sociability.** They are happy collaborating and good at sharing ideas and resources. They help groups of people become problem-solving teams. They are able to express their opinion whilst remaining open-minded. They can give and receive feedback graciously. They are keen to learn from others.

8. **Powerful Learners are reflective.** They think carefully about the object of their learning and are able to step back and take stock of the process. They are self-aware and routinely consider alternative strategies and possibilities. They are not over-reflective or too self-critical. They have a rich vocabulary for talking about the process of learning. They see themselves as continually growing as learners.

Mathematics - Australian Curriculum

Mathematics teaching, assessment and reporting will be conducted in line with the Australian Curriculum.

The Australian Curriculum: Mathematics is organised around the interaction of three content strands and four proficiency strands. The content strands are ***number and algebra***, ***measurement and geometry***, **and** ***statistics and probability***. They describe what is to be taught and learnt.

The proficiency strands, ***understanding***, ***fluency***, ***problem-solving*** **and** ***reasoning*** are an integral part of mathematics content across the three content strands.

The proficiencies describe how content is explored or developed; that is, the thinking and doing of mathematics. The proficiency strands provide a meaningful basis for the development of concepts in the learning of mathematics and have been incorporated into the content descriptions of the three content strands.

The proficiencies reinforce the significance of working mathematically within the content and describe how the content is explored or developed. They provide the language to build in the developmental aspects of the learning of mathematics. The achievement standards of the Australian Curriculum reflect the content and encompass the proficiencies.

Key ideas of Australian Curriculum Mathematics – Proficiency Strands

In Mathematics, the key ideas are the proficiency strands of **understanding**, **fluency**, **problem-solving and reasoning**. The proficiency strands describe the actions in which students can engage when learning and using the content. While not all proficiency strands apply to every content descriptor, they indicate the breadth of mathematical actions that teachers can emphasise.

Understanding

Students build knowledge of adaptable and transferable mathematical concepts. They make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the 'why' and the 'how' of mathematics. Students build understanding when they connect related ideas, when they represent concepts in different ways, when they identify commonalities and differences between aspects of content, when they describe their thinking mathematically and when they interpret mathematical information.

Fluency

Students develop skills in choosing appropriate procedures; carrying out procedures flexibly, accurately, efficiently and appropriately; and recalling factual knowledge and concepts readily. Students are fluent when they calculate answers efficiently, when they recognise robust ways of answering questions, when they choose appropriate methods and approximations, when they recall definitions and regularly use facts, and when they can manipulate expressions and equations to find solutions.

Problem-solving

Students develop the ability to make choices, interpret, formulate, model and investigate problem situations, and communicate solutions effectively. Students formulate and solve problems when they use mathematics to represent unfamiliar or meaningful situations, when they design investigations and plan their approaches, when they apply their existing strategies to seek solutions, and when they verify that their answers are reasonable.

Reasoning

Students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising. Students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they adapt the known to the unknown, when they transfer learning from one context to another, when they prove that something is true or false, and when they compare and contrast related ideas and explain their choices.

Australian Curriculum - Content strands

Number and Algebra

Number and algebra are developed together, as each enriches the study of the other. Students apply number sense and strategies for counting and representing numbers. They explore the magnitude and properties of numbers. They apply a range of strategies for computation and understand the connections between operations. They recognise patterns and understand the concepts of variable and function. They build on their understanding of the number system to describe relationships and formulate generalisations. They recognise equivalence and solve equations and inequalities. They apply their number and algebra skills to conduct investigations, solve problems and communicate their reasoning.

Measurement and Geometry

Measurement and geometry are presented together to emphasise their relationship to each other, enhancing their practical relevance. Students develop an increasingly sophisticated understanding of size, shape, relative position and movement of two-dimensional figures in the plane and three-dimensional objects in space. They investigate properties and apply their understanding of them to define, compare and construct figures and objects. They learn to develop geometric arguments. They make meaningful measurements of quantities, choosing appropriate metric units of measurement. They build an understanding of the connections between units and calculate derived measures such as area, speed and density.

Statistics and Probability

Statistics and probability initially develop in parallel and the curriculum then progressively builds the links between them. Students recognise and analyse data and draw inferences. They represent, summarise and interpret data and undertake purposeful investigations involving the collection and interpretation of data. They assess likelihood and assign probabilities using experimental and theoretical approaches. They develop an increasingly sophisticated ability to critically evaluate chance and data concepts and make reasoned judgements and decisions, as well as building skills to critically evaluate statistical information and develop intuitions about data.

Sub-strands

Content descriptions are grouped into sub-strands to illustrate the clarity and sequence of development of concepts through and across the year levels. They support the ability to see the connections across strands and the sequential development of concepts from Foundation to Year 10.

Number and Algebra	**Measurement and Geometry**	**Statistics and Probability**
Number and place value (F–8)	Using units of measurement (F–10)	Chance (1–10)
Fractions and decimals (1–6)	Shape (F–7)	Data representation and interpretation (F–10)
Real numbers (7–10)	Geometric reasoning (3–10)	
Money and financial mathematics (1–10)	Location and transformation (F–7)	
Patterns and algebra (F–10)		
Linear and non-linear relationships (7–10)		

Mathematics / Numeracy Practices at Brahma Lodge Primary School

The Australian Curriculum is used to plan, and assess mathematics learning at BLPS.

Teachers produce a term overview of the mathematics / numeracy program occurring in their classroom in a week by week explanation of the planned learning. The overview includes Australian Curriculum Standards of Achievement to be attained, ACARA outcomes, Natural Maths strategies, Mental Routines, Problematized Situations, Natural Maths and Nelson Maths resources, games and investigations, and assessment information that will support and drive student learning.

DECD policy of a **minimum** of 300 minutes of maths / numeracy learning is implemented in all classrooms and is reflected in the timetable provided to a teacher's line manager each term. Computer Room time is not included in the 300 minutes of maths learning.

The Natural Maths lesson structure and teaching pedagogy occur in all classrooms. Our aim is to make students thinking visible to themselves, their teacher and their peers. The components of mathematics learning are mental computation, mental routines, solving problems, strategy learning, games, investigations and reflection.

Teachers provide students with authentic numeracy and mathematic learning tasks that are relevant to their lives.

Teachers provide differentiated mathematics learning experiences to their students based on their learning needs.

Pre-assessment and **formative assessment** is embedded in our practice.

Pre-assessment – Finding out what students know about a particular skill, concept or topic before planning for instruction.

Formative Assessment – checking for understanding during the learning process in order to modify instruction to improve understanding; this is an assessment of learning.

We use Learning Intentions and Success Criteria to inform our students about the purpose of their learning and to inform them of what success looks like.

All Teachers:

1. At the beginning of mathematics lessons the teacher informs the students of the learning intention of the lesson. (WALT – We are learning to)
2. At the beginning of mathematics lessons the teacher informs the students of the success criteria related to the learning. (WILF – What I'm looking for)

At the end of a unit of learning teachers and students have a discussion based on student pre and post work samples to reflect on the development of student thinking throughout the learning.

The R-7 Mental Computation Agreement is implemented across all classrooms. Mental Computation strategies are explicitly taught and practised.

Teachers provide students with daily opportunities to practice mathematical skills, and to engage in mental computation and fluency activities.

Teachers use anchor charts and word walls in their classrooms to develop mathematical vocabulary and thinking, and to reinforce the development of a growth mindset. We value effort, persistence and concentration in our learners and communicate this to our students on a daily basis.

Students use blank A3 or A4 books to record their thinking related to solving problems.

Teachers provide students with reflection time at the end of each lesson where students discuss their mathematical thinking ask and answer clarifying and probing questions and

refine their problem solving or strategy skills and knowledge. Reflection time can act as a piece of formative assessment on which the teachers shape future learning experiences. At a minimum all students are required to participate in a "story of the lesson" exercise that recounts the elements of the lesson.

All classroom teachers use the Natural Maths Resources available from the Resource Centre to program and to design learning tasks. Teachers are aware that the resources do not constitute a complete program. Teachers include student interests and cover gaps in the resources (in relation to the AC) by creating their own mental routines, problems and strategy lessons.

All teachers use the Nelson Maths resources available from the Resource Centre to program and to design tasks related to strategy learning.

Commercially produced black line masters are an anathema to our philosophy of producing powerful learners of mathematics through the development of skills, knowledge and dispositions that develop mastery of problem solving, reasoning, fluency and understanding and are used sparingly. (**Anathema** – something that one vehemently dislikes)

Numeracy and Mathematics assessment information is kept in an individual's Student Information Folder. Achievement and progression information is recorded on the Year Level Mathematics content strand and sub-strand descriptors in the Numeracy section of the folder. Each term a student work sample is collected that reflects student thinking and learning related to solving problems and the learnt strategies. The samples include evidence related to a problem and a strategy and have annotated notes relating to the achievement of the success criteria and include areas for growth. *The notes could reflect an interview that has occurred and could inform the reader if the learning occurred independently (I), With Prompting (WP) or was Scaffolded (NU – No Understanding).*

Families receive a written report at the end of term 2 and term 4 that informs them of the mathematics and numeracy achievements of their child. All parents will be requested to attend parent teacher interviews in term 1 to discuss the mathematics and numeracy learning of their child with a view to enabling the parents to support numeracy learning outside of school. In term 3 all parents of students below the learning benchmark in mathematics in the term 2 written reports will be asked to attend a parent teacher interview to discuss the mathematics and numeracy learning of their child with a view to enabling the parents to support numeracy learning outside of school.

We use the Instructional Rounds model to enable teachers to observe and to have dialogue on each other's pedagogy and practice.

We encourage teachers to plan and assess together and enable teachers to attain training and development hours through the production of evidence related to the improvement of student learning outcomes related to numeracy and mathematics learning.

We share mathematics / numeracy pedagogy, practice, resources and student learning through our staff meeting professional sharing sessions.

Brahma Lodge Primary School uses ACER's Pattern and Structural Assessment (PASA) to investigate what Reception to Year 2 students understand of mathematics. The assessment seeks to understand how children think about underlying mathematical ideas, rather than focusing on what mathematics children can and cannot do. By knowing how students use structure in solving tasks, teachers can plan and scaffold individual learning experiences more effectively.

Brahma Lodge Primary School uses the PAT-M assessment from Year 3 to year 7 to assess student learning and to identify areas for development. Teachers access and analyse the OARS student reports to review and to plan learning. Teachers use the OARS teacher resources to design learning tasks that target identified gaps in student knowledge.

Intervention programs linked to mathematics occur at the classroom level. Teachers create and oversee the program which is usually delivered by an SSO. Students are explicitly taught how to breakdown problems, strategy learning and mental computation skills to enable them to engage in the mainstream learning program.

Numeracy Learning Targets

Standard of Educational Achievement Targets (SEA)

90% of all students attain at a satisfactory level of achievement or above in teacher assessment of mathematics learning in the mid-year and end of year school reports to parents and caregivers.

NAPLAN Targets

Proficiency Bands

Year 3: Band 3 or above Year 5: band 5 or above Year 7: Band 6 or above

Year 3	Year 5	Year 7
40% of students achieve in NAPLAN Band 4 or above	40% of students achieve in NAPLAN Band 5 or above	40% of students achieve in NAPLAN Band 6 or above
15% of students achieve in Band 5 or above	15% of students achieve in Band 7 or above	15% of students achieve in Band 8 or above

PAT-M Targets

Year Level	Target Score
Year 3	101 or above
Year 4	110 or above
Year 5	112 or above
Year 6	118 or above
Year 7	120 or above

R-7 Agreement for Mental Computation at Brahma Lodge Primary School

Mental Computation is the process of drawing on known strategies so solve an arithmetical problem. The end purpose of learning mental computation strategies is to be able to solve arithmetical problems mentally. To reach this abstract stage of development requires significant time spent using concrete materials, scaffolds, and pencil and paper to show and understand thinking. Teachers need to clearly understand that we are enabling students to develop mental objects that allow them to understand and manipulate numbers to solve problems and to understand the world in which they live.

The Mental Computation Strategies will be explicitly taught according to year level in our school. It is an expectation that teachers will follow this scope and sequence document when planning and implementing learning. The attainment of Mental Computation skills is not an end in itself. The purpose of knowing the skills is to enable students to solve problems drawn from the Australian Curriculum. We expect students to look for and use an effective strategy when solving number problems and to be able to communicate what the strategy is.

The Natural Maths Resources that support this Agreement will be provided to classroom teachers. The Mental Computation Using Natural Maths Strategies, Lower Primary and Upper Primary are particularly useful. The posters can be useful guides for students if they are carefully linked to the explicit teaching and students are encouraged to use them as a prompt during learning.

The Secret Code posters have been placed in Year 2 and Year 4; however, the thinking behind them should have an impact from Reception to year 7. The Secret Code is a useful tool for students to explain their thinking. Initially in Reception students will verbally explain the mental computation strategies that they used to solve problems. As they get older they will begin to use the code within their paper and pencil work to explain their thinking. Ideally students are constantly using the names of the strategies in oral and written form (the code) from Reception to Year 7 within their learning program.

R-7 Scope and Sequence for Mental Computation at Brahma Lodge Primary

It is an expectation that teachers in Year 6 and 7 will constantly require their students to be using the mental computation strategies within their learning program and to be explicitly teaching the strategies that the students do not have the required knowledge of.

Reception	**Year 1**	**Year 2**
Subitise Count On Double Rainbow Facts Turnarounds Adding Zero	Fact Families Near Double Skip Counting Friendly Numbers Count Back Rainbow Fact Subtraction	Halve Change the Order Subtraction undoes Addition Number Splitting Open Number Line Secret Code
Year 3	**Year 4**	**Year 5**
Bridge Through Ten	Open Number Line for Addition	Chunking for Multiplication
Bridge Back Through Ten	Chunking for Subtraction 1	Chunking for Division
Rainbow Facts	Chunking for Subtraction 2	Compensation
Landmark Numbers	Zigzag for Subtraction	
Number splitting	Open Number Line for Subtraction	
Chunking for Addition	Estimating	
Zigzag for Addition	Secret Code	

At Brahma Lodge Primary School we use the structure from the Natural Maths model to organise the learning for our students. Below is a model of the structure that we expect mathematics lessons to follow at our school.