

Student Excellence: Mathematics extension program 2023

This year we are excited to be able to offer a mathematics extension program to students in Years Three to Six. The scope of this program is to provide enhancement opportunities to students who display high abilities in the curriculum strands of Mathematics (Number & Algebra, Measurement & Geometry and Statistics & Probability), as well as aptitude, lateral thinking and perseverance in relation to problem solving.

Boroondara Park PS has a high achieving student mathematical demographic, and as such, and in line with the aims and objectives of our Annual Implementation Plan, we wish to be able to fully extend and support the progress of these students. This program supports both the work of our differentiated classroom mathematics programs and the work of the Tutor Learning Initiative; this enables us to ensure all of our students are consistently met at their academic point of need.

The opportunities and activities delivered within this program will align with the Victorian Curriculum. Relevant data will be shared with classroom teaching staff to both enhance the classroom mathematical planning and learning of the individual student and to help inform student assessment.

The program will expose students to the four key competencies of the Department of Education and Training mathematical/numeracy development pathway:

- understanding
- fluency
- problem solving
- reasoning

Understanding refers to students building a robust knowledge of adaptable and transferable mathematical concepts and structures. Students 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
- represent concepts in different ways
- identify commonalities and differences between aspects of content
- describe their thinking mathematically
- interpret mathematical information.

Fluency describes students developing 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:

- make reasonable estimates
- calculate answers efficiently
- recognise robust ways of answering questions
- choose appropriate methods and approximations
- recall definitions and regularly use facts,
- can manipulate expressions and equations to find solutions.

Problem-solving is the ability of students to make choices, interpret, formulate, model and investigate problem situations, select and use technological functions and communicate solutions effectively. Students pose and solve problems when they:

- use mathematics to represent unfamiliar or meaningful situations
- design investigations and plan their approaches
- apply their existing strategies to seek solutions
- verify that their answers are reasonable.

Reasoning refers to students developing an increasingly sophisticated capacity for logical, statistical and probabilistic thinking and actions, such as conjecturing, hypothesising, analysing, proving, evaluating, explaining, inferring, justifying, refuting, abstracting and generalising. Students are reasoning mathematically when they:

- explain their thinking
- deduce and justify strategies used and conclusions reached
- adapt the known to the unknown
- transfer learning from one context to another
- prove that something is true or false
- make inferences about data or the likelihood of events
- compare and contrast related ideas and explain their choices.

Students will be taking part in a varied range of mathematical challenges and competitions across both Australia and Asia/Pacific. This includes generalised problem solving competitions as well as opportunities in algorithmic and computational processes and group tasks that focus upon collaborative projects in problem solving.

The program will run each week from the middle of Term 1 with students attending a 50 to 100 minute session during classroom mathematical teaching time.

Current research and best practice in the teaching of Mathematical extension tells us that in order to successfully access this program students should be working at least 18 to 24 months ahead of expected outcomes, be in the top 2 NAPLAN bands for their age as well as scoring 70% in assigned pre-selection testing. As such there is no defined number of students admitted to the program, but rather a defined achievement standard.

Pre-selection testing will occur in Weeks 3 and 4 of this term. Students who meet the above criteria will automatically sit the tests. Should you believe that this opportunity may align with your child's academic needs then please contact your child's classroom teacher to arrange for them to sit the assessment tests.

The primary aims of this program relate to the aim of maintaining academic growth patterns for our high achieving mathematicians - avoiding their learning hitting a plateau.

The 'challenge' nature of this program aims to engage and motivate high achievers and to create a supportive, like minded environment.

Additional skills including collaboration, metacognition, presentation of findings, flexibility in thinking and resilience in learning will all be targeted.

Some of the competitions students will be competing in include:

Australasian Maths Olympiad and Maths Games Competitions

Students in years 5 and 6 have the opportunity to participate in the APSMO Maths Olympiads competition. This is aimed at challenging participants' maths problem solving abilities. Students compete against schools in Australia, New Zealand and Singapore. We have been very successful in this competition, coming third and second on a number of occasions and winning the competition in 2016.

Students in years 4, 5 and 6 also have the opportunity to participate in the Maths Games Competition also run by APSMO. This competition has been specifically designed to provide mainstream students in years 4, 5 and 6 with an opportunity to learn and develop valuable maths problem solving skills. The Maths Games focuses on encouraging students to challenge themselves and develop their own abilities whilst working with teachers and fellow students to enhance their skills in this area.

Australian Maths Trust – Computational and Algorithmic Thinking competition

Students in Year 5 and 6 had the opportunity to participate in a one hour Computational and Algorithmic Thinking (CAT) competition. This is a problem-solving competition designed to encourage student curiosity and promote multiple modes of thinking.

The competition has a mixture of multiple-choice and integer answers and incorporates unique 'three-stage tasks' that encourage students to develop informal algorithms and apply them to test data of increasing size or complexity. The original problems are designed to be quick to solve and highly approachable, and range in difficulty from very easy to challenging. Some questions test the ability to perform procedures, others require logical thought, while the more challenging problems require the identification and application of algorithms.