



## **Maths Investigators**

### **Years 4, 5 and 6 - Term 3, 2019**

Fee \$105

People throughout the ages and around the globe have conducted mathematical investigations to increase their understanding of the world and solve the problems they find before them. The Eureka *Maths Investigators* workshops will allow students the opportunity to discover there is far more to maths than just numbers as they are challenged, inspired and enlightened!

#### **What's the Scoop? with Esther Cheung**

An ice-cream shop owner needs your help! She sells many fantastic flavours and a competition for the best ice-cream shop is coming up. She wants to display her signature 'Terrific Triple Tower' in all the possible orders that the scoops could be – that's sure to *wow* the crowd. However, she has declared it, 'Mission Im-popsicle' as there are just so many combinations and she doesn't know if she has enough window space to display them all. Surely, there must be a mathematical method to calculate this? In this workshop, you'll discover just how many ways objects in our world can be ordered and arranged. We'll investigate the patterns behind permutations and combinations, work with their equations and use them to solve real world problems. Join us as we explore how permutations and combinations can unveil the hidden world of counting and win the coveted prize for the best ice cream shop.

*Esther is an entrepreneur and an educator with over ten years teaching experience. She holds a PhD and is a Certified Practising Accountant. Esther's passion and understanding towards students' different learning styles has led her to develop many math programs, including Gifted and Talented programs for GERRIC.*

#### **The Magic of Matrices with Dimitri Douchin**

What are your favourite animated movies? Perhaps they include *Toy Story*, the *Lego Movie* or maybe even *Frozen*? Animated cartoons were first produced by hand-drawing thousands of transparent drawing sheets called cels. These cels would have the same background but very slight changes to the action or the main characters. When they were viewed together in rapid succession, the illusion of motion was created. Over the last twenty-five years, film studios and the video gaming industry have developed techniques for shaping the characters to create 3D effects and manipulating images to result in ever-more realistic motion. Now, though, what was formerly done laboriously by hand is done with ease, aided by computers and some clever mathematics. In this workshop we investigate matrices, the fascinating mathematical tool that facilitates all of this screen magic!

*Dimitri has travelled from France where he studied physics to Australia where he graduated with a PhD in Astronomy and Astrophysics. He then shared his passion for the wonders of space and the Universe with children and grown-ups as an educator at Sydney Observatory. Since then, Dimitri has devoted his time to helping children and adults understand themselves and the world around them in a fun and meaningful way.*

#### **Figurate it Out! with Katrina Sims**

Figurate numbers have fascinated mathematicians throughout history. Arrangements of these numbers as dot patterns have been found in Stone Age carvings, and ancient civilisations (including the Mayans and Babylonians), gave them mystical properties. Pythagoreans studied their arithmetic and relational properties by arranging them in polygonal configurations. In this workshop we will investigate five figurate numbers and will discover several intriguing number patterns, mathematical properties and the relationships between different figurate number sequences. These patterns can be analysed so that the mathematical relationships can be generalised and described using an algebraic formula. This formula can then be used to calculate any number within each figurate sequence. Oh! And what did Lagrange's investigations and the Pythagoreans have in common? Your investigations will also reveal this connection.

*Katrina has a Masters Degree in Gifted Education. She has taught enrichment mathematics classes for gifted students in the primary system as well as mathematics to students in Years 7 to 10. She is a member of the Australian Mathematics Trust Challenge Problem Solving committee and is the recipient of a National Excellence in Teaching Award and a BH Neumann Award for her contributions to Enrichment of Mathematics for Australian Students.*