

## ORIGO Education Mathematics Core Programs

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### GO Maths

*GO Maths* is a print-based mathematics core program. There are two versions: one addressing the 2004 Queensland Years 1–10 Mathematics Syllabus and one addressing the 2002 New South Wales Mathematics K–6 Syllabus. Both programs have as their aim, the development of students' ability to think, reason and work mathematically. The development of students' number sense, their number fact strategies and mental computation abilities are central to the programs. Both programs are comprised of a number of similar components, but, for both, the key resource is the *GO Maths Teacher Sourcebook* for each year which promotes rich pedagogy and scaffolds teachers' instruction. A large selection of both print and digital support resources are available to assist instruction including: *The Box of Facts* (visual aids for modeling number fact strategies); *DecaCards* (cards, strips and charts of finger representations for developing place value); *Fundamentals* (games for reinforcing thinking strategies – available in both print and digital forms); *Staticware* (program illustrations and diagrams) and *Flare* (mathematics tools for interactive technologies such as IWBs).

### ORIGO Stepping Stones

*ORIGO Stepping Stones* is an online mathematics core program. In 2010 the first three years of the program will be available, with Years 3–6 of the program being released in 2011. The current scope and sequence of the program reflects the experienced authors' anticipation of the content of the forthcoming *Australian Curriculum: Mathematics* with adjustments to the program to be made upon release of the final documents. Philosophically and pedagogically *ORIGO Stepping Stones* is very similar to *GO Maths* and it utilises the same support resources. However, the online delivery of the program provides teachers with many additional benefits, including navigational tools to sequence forwards and backwards through the program in order to differentiate instruction to match students' individual instructional levels, and the integration of a collection of digital resources to support implementation. In addition to those previously mentioned (i.e. *Fundamentals* and *Flare*), these include *Big Books Teaching Tools*, *The ORIGO Glossary* (concept maps and definitions) and most significantly, *Mathedology* (a series of short professional development tutorials on contemporary primary school mathematics pedagogical practices).

### Recognition

The Queensland *GO Maths* program was the winner of the 2005 Australian Award for Excellence in Educational Publishing and the New South Wales version was shortlisted for the same award in 2007. Further evidence of the educational credentials of both *GO Maths* and *ORIGO Stepping Stones* can be found in the fact that the programs' United States sister program, *ORIGOMath*, is on the list of approved intervention programs in Montgomery County, Maryland, while both Fort Bend ISD in Texas and Denver Public Schools have approved the program for Tier II Intervention. Furthermore, key ORIGO print support resources, *The Box of Facts* and *The Book of Facts*, both of which are incorporated into *GO Maths* and *ORIGO Stepping Stones*, were ranked the highest for content quality in Washington state's OSPI Instructional Materials Review of over 40 supplemental programs. In fact, these resources were the only ones with an average score of over 80%.

## Writing Team

Both *GO Maths* and *ORIGO Stepping Stones* were written by the following team of internationally renowned primary school mathematics authors and educators:

### **Calvin Irons Ph D**

*Mathematics Author*  
*Senior Lecturer, QUT*

Dr Calvin Irons is a senior lecturer in mathematics at Queensland University of Technology (QUT) and has been involved in mathematics education for 40 years. Calvin has been a teacher, lecturer, researcher, writer, public speaker and workshop presenter. He has written over 500 books and articles, and speaks internationally on a regular basis. Calvin was a member of the Queensland Syllabus Advisory Committee and has advised other curriculum authorities on teaching mental computation.

### **James Burnett M Ed**

*Mathematics Education Consultant*  
*Mathematics Author*  
*Managing Director, ORIGO Education*

As Managing Director of ORIGO Education, James strives to lift the profile of mathematics through dynamic professional development; ORIGO Education's annual Groundworks conference; and the development of quality, research-based classroom materials. James frequently presents workshops and speaks at conferences throughout Australia, New Zealand and North America. James has written and co-written more than 150 mathematics books for teachers and children aged 6–12.

### **Rosemary Irons M Ed**

*Mathematics Author*  
*Lecturer, QUT*

Rosemary teaches mathematics curriculum subjects to primary and early childhood students in the School of Mathematics, Science and Technology at QUT. Rosemary also conducts professional development seminars for teachers around the world. Most recently, Rosemary worked in Singapore, and as an adviser for the Pre-K Mathematics Standards for the state of Missouri in the USA. Rosemary has written a wide range of innovative practical classroom resources to help young children build their mathematical understanding.

### **Brian Tickle BA**

*Mathematics Education Consultant*  
*Mathematics Author*

Brian is a private mathematics consultant who held the position of Mathematics Consultant for the NSW Department of Education and Training. He has worked with teachers, students and parents across Australia, in Papua New Guinea, Indonesia and in the USA. He has special interests in mental computation, open-ended questions and rich tasks, and has written multiple books and resources.

### **Allan Turton B Ed**

*Mathematics Author*

Allan has been researching and writing for ORIGO Education since early 2003. In this time, he focused on the sequence for teaching geometry across the grades and developed the Geometry units and modules for the *GO Maths* and *ORIGO Stepping Stones* programs. Allan was also instrumental in the production of the *ORIGO Handbook of Mathematics Education* (a book listed text for student teachers at some universities), the *Book of Facts* series on basic number facts, and the *GEO* series of supplemental books for primary school geometry.

## Expected impact on student learning

*GO Maths* is a whole-class program suitable for all primary students. The Queensland version is structured around the outcomes of the Level 1–4B outcomes of the 2004 Years 1–10 Mathematics Syllabus, while the New South Wales program is structured around the Early Stage 1 to Stage 3B outcomes of the 2002 Mathematics K–6 Syllabus. Although the materials may be equated to year levels, they are labelled according to outcome levels or stages and teachers may choose to match students to the program according to individual instructional level rather than by year level. A detailed Scope and Sequence/Continuum chart is available for both programs.

Note: *GO Maths* materials extend to Levels 5 and 5/6 but these are structured differently and are not the focus of this paper.

*ORIGO Stepping Stones* is also a whole-class program, however it is currently only available for the first three years of schooling and is structured around no set curriculum. The program's teaching sequence represents the authors' informed approximation of the content of the forthcoming *Australian Curriculum: Mathematics*. Years 3–6 materials will be released in time for the 2011 school year, by which time adjustments will have been made to the Year K–2 materials to ensure that the program accurately reflects the content of the new Australian mathematics curriculum.

Both programs promote:

- a consistent and developmental whole-school approach to the teaching of mathematics;
- the development of students' understanding, fluency, problem solving and reasoning;
- the development of number sense, number fact strategies and mental computation strategies;
- the use of concrete materials (e.g. unifix cubes, MABs and counters), visual representations (e.g. dominoes, five and ten-frames, finger representations of number, number lines and number boards) and everyday and mathematical language prior to symbolic representation;
- the use of a range of assessment techniques for tracking student progression.

## Implementation in School

The extensive nature and rich pedagogy of the Teacher Sourcebooks of both *GO Maths* and *ORIGO Stepping Stones* themselves provide an enormous potential professional development opportunity for teachers. However ORIGO Education offers a wide range of targeted professional development options to teachers to support classroom implementation of both core programs. These include:

- ORIGO Education's *Groundworks* mathematics conferences (up to four annually offered across the nation);
- keynote lectures and workshops at a large number of mathematics and technology conferences around the nation by ORIGO Education authors, the company's full-time mathematics consultant, Anita Chin, and members of the company's team of Mathematics Resources Advisers (e.g. AAMT, MANSW, MAV, QAMT, MAWA, MAT, QSA Queensland State Conference and the National IWB Conference);
- advertised open mathematics professional development sessions (full-day and 2-hour after-school) conducted by ORIGO Education authors and Anita Chin;
- closed mathematics professional development sessions (including in-class demonstration lessons and parent sessions) conducted by ORIGO Education authors and Anita Chin;
- *Mathedology*, a series of professional development tutorials on contemporary primary school mathematics pedagogical practices delivered online (these are linked to modules within *Stepping Stones* so that teachers can access professional development at their point of need).

## Program Costs (valid until 31 December 2009)

### GO Maths

- *Teacher Sourcebook* – \$79.95
  - *Student Journal* – \$15.95
  - *GO Figure* computation practice book – \$9.95
  - *GO Check* (assessment book) – \$12.95 for QLD (covers 2 years) and \$6.50 for NSW
  - *Half-Yearly Tests* – \$16.50 per pack of 10
  - *Staticware* (NSW only, 6 CDs including unlimited site licence) – \$215.76
  - *GO Chart* (NSW only, Assessment CD) – \$49.95
- Note: *GO Check* books and *Half-Yearly Tests* can be provided free as part of the *GO Maths* bonus offer (conditions apply)

### ORIGO Stepping Stones

- Online Teacher Sourcebook, premium subscription (includes all online support resources) – \$258.40 per annum for a single-user licence (Note: refer subscription calculator at [www.origoeducation.com/slate](http://www.origoeducation.com/slate) for subscriptions for multiple users)
- Online Teacher Sourcebook, standard subscription (excludes all online support resources) – \$140.00 per annum for a single-user licence (Note: refer subscription calculator at [www.origoeducation.com/slate](http://www.origoeducation.com/slate) for subscriptions for multiple users)
- Lesson Plans: Year K – \$19.95; Years 1–2 – \$29.95
- Student Journal: Year K – \$11.95; Years 1–2 – \$15.95
- Assessment Book – \$7.95 (Years 1–2 only)

An extensive range of **optional print support resources** are available to support both programs.

- *The Box of Facts: Addition and Subtraction* – \$189.95
- *The Box of Facts: Multiplication and Division* – \$189.95
- *DecaCards* – \$119.95
- *Five- and Ten-Frame Double-Nine Dominoes* – \$29.95
- *Double-Nine Dot Dominoes* – \$19.95
- *Fundamentals* – set of 6 books – \$194.16
- *Blank Cubes* – \$19.95
- *The Number Case* – \$377.87 (K–2 set of 3 cases)
- *ORIGO Big Books* – \$184.52 per set of 8 titles (24 titles in total)

### School-Based Relief Provisions

There are no requirements for schools to make provision for professional development days for either program.

### Program Support

ORIGO Education's team of Mathematics Resources Advisers provides introductory and on-going support to schools implementing either program free of charge.

## Research Base

Over the past two decades, significant research has taken place to identify the key content and teaching methods that facilitate the mastery of computation. The *GO Maths* and *ORIGO Stepping Stones* programs reflect current understandings about the content that helps students learn all the important skills in computation and how best to teach those skills. Key research findings were drawn upon to develop the overall sequence of the units, individual sessions, and specific activities.

Research shows that students need experiences with many different models of number and operations (National Council of Teachers of Mathematics, 2000). In *GO Maths and Stepping Stones*, discrete and continuous models are used to develop visual images that students use to work with numbers. Discrete models include connecting cubes placed on and off number frames, sticks, and later, base-ten materials. The hundreds chart is also used as an organiser for two-digit numbers. Number tracks and number lines are used to build a linear (or continuous) model for numbers. A progression from “numbered” number lines to “empty” number lines is used to gradually raise the sophistication of strategies that students use to add and subtract (Beishuizen, 1999).

Work with computation begins with number fact strategies. Students move from concrete materials to visual representations as each strategy is introduced. The development of each strategy follows a proven sequence of stages: introduce; reinforce; and practice (Thornton, 1990). During the introduction stage, pictorial materials are used to move students away from counting individual objects to add or subtract. The reinforcement stage connects the picture to the appropriate number sentence and encourages students to use each strategy without the visual aid. The skills of recall and recording are developed through meaningful practice that eventually leads to understanding. Practice is important and beneficial if planned and used frequently, and gradually introduces new skills to be learned as each new strategy is introduced.

Students move to multiplying numbers beyond the fact range by first extending each of the number fact strategies (a fourth stage in the overall development of facts). For example, students are encouraged to build down from a known fact involving tens to multiply by nine.

Mental and written methods are then developed for pairs of numbers that are not extensions of number facts. The number models described above are used to help students make the transition to work with greater numbers (Callingham & Watson, 2004). The use of a variety of models also caters for the range of learning styles that might be present in the class.

Aspects of algebra are included in *GO Maths and Stepping Stones* because key ideas such as equality and the relationship between addition and subtraction are fundamental to students’ success with computation (National Council of Teachers of Mathematics, 2000). Traditionally, algebra has been taught using nothing more than abstract notation. *GO Maths and Stepping Stones* promote algebraic thinking through the use of non-threatening hands-on resources, meaningful models, and real-life contexts (Schifter, 1999).

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