

# Mathematics

**Students with learning difficulties related to maths may frequently make errors when reading, writing and recalling numbers, experience difficulty with abstract concepts (e.g., time and direction), struggle to remember math facts, rules, formulas and sequences, have difficulty applying operational procedures accurately and consistently, and show limited strategic planning ability. These students will require explicit, understanding-based and carefully-structured instruction on basic number concepts in order to develop mathematical fluency. Mathematical fluency is the compilation of three foundation skills:**

- > *Efficiency* - the ability to carry out steps easily and in a reasonable amount of time
- > *Accuracy* - the method used yields a correct solution
- > *Flexibility* – the student is able to approach the problem through a variety of different means

Fluency in mathematics is only achieved when all three components are present.

## Useful Resources to Support Numeracy Development

There are a range of useful resources to assist in the development of maths skills across primary and secondary school.

- > *Elementary Maths Mastery (EMM)* - a comprehensive mental mathematics program designed for upper primary, lower secondary and remedial students. There is also a *Junior Elementary Maths Mastery (JEM)* program ideally suited for middle primary and upper primary remedial students, as well as a *Junior Elementary Maths Master Plus (JEMM+)* also suited for middle primary and upper primary remedial students.
- > Series of books developed by Ronit Bird (e.g. *The Dyscalculia Resource Book*, *Overcoming Difficulties with Numbers*) that provide resources, games and puzzles to help teach key aspects of numeracy to students between the ages of 7 to 16.
- > Books, board games and card games developed by Paul Swan designed to build maths skills in a fun and engaging manner (e.g., *Dice Dilemmas*, *Tackling Tables*, *Fraction Cover Up*, *Money Matters*). Several of these are available from educational supply stores.
- > *Magical games for Mathematics* – a book of 80 maths games, covering number recognition, place value, algorithms, decimals, fractions and more. Aimed at students from the ages of 5 – 12.
- > The computer-based *NumberShark* program utilises a games based approach to numeracy. It includes 45 games that cover addition, subtraction, multiplication and division in ways which add meaning and understanding to these operations.
- > There are a range of online games that provide opportunities for students with maths learning difficulties/disorders to consolidate and extend their foundation maths skills. These include:
  - *Numbersense* ([number-sense.co.uk](http://number-sense.co.uk))
  - *The Number Race* ([thenumberrace.com](http://thenumberrace.com))
  - *The Number Catcher* ([thenumbercatcher.com](http://thenumbercatcher.com)) - a sister program to The Number Race designed for older children.
- > There are also a range of iPad/iPod apps designed for primary and secondary school students to help support and reinforce target learning areas. For a list of relevant apps, please see the tip sheet *Recommended iPad/iPod apps for Maths*.

## Teaching Strategies to Support the Development of Basic Maths Skills

Teachers and parents should be aware of and cater for the students difficulties in the mathematics area, especially in regard to any gaps in procedural knowledge. This may include the involvement of a specialist teacher or tutor. There are a range of teaching strategies to assist the development of maths skills, including:

- Utilise a structured and multisensory approach to teaching maths concepts through the use of visual aides (e.g., diagrams and charts) and concrete apparatus (e.g., counters, MAB blocks, rods, number lines etc).
- Students might benefit from using mnemonic techniques to learn math algorithms (sets of procedures) in order to develop more consistent retrieval cues when problem solving.
- Introduce new skills beginning with concrete examples and later transitioning to more abstract applications.
- Teach numbers up to and beyond 100 using a vertical number line which corresponds to maths language, and allows the difference between numbers to be more meaningful than it is using a 100 square.
- Students should be taught how to skip count as well as receive further practice on forward number sequencing and backward number sequencing in order to develop more automatic retrieval of maths facts.
- Work on finding different ways to approach math facts; e.g., instead of just memorizing the multiplication tables, explain that  $8 \times 2 = 16$ , so if 16 is doubled,  $8 \times 4$  must = 32.
- Use graph paper for organizing ideas on paper and to help align numbers in columns.
- Practice estimating as a way to begin solving math problems.
- Create word walls, word banks, and other resources to help students with vocabulary terms.
- Students may need to learn the “language of math” by relearning quantitative concepts such as more, less, equal, sum, altogether, difference, etc in order to develop more consistency when solving word problems.
- For mathematical language difficulties, explain ideas and problems clearly and encourage students to ask questions as they work.
- Teach tables by using horizontal number lines to enable the children to learn to count in multiples – so that  $4 \times 6$  can be accessed by using four fingers as a reminder and count along 6, 12, 18, 24. It is just as quick as the traditional method and can be used for division just as easily
- Teach the lesson content by ‘hear it, see it, say it, write it’ and wherever possible ‘do it’ – e.g. understanding capacity and scales both need water and jugs!
- End every lesson by allowing children time to use both new and established vocabulary, explain their understanding of new concepts and most importantly reward them for saying what they still do not understand.