

Tip Sheet

Strategies and Accommodations to Support Mathematical Difficulties

When selecting appropriate supports or reasonable adjustments for a student struggling with maths, it is important to recognise their strengths (what they can do) and crucially understand where the point of breakdown is, as well as take into consideration any underlying processing weaknesses they may have (e.g., in visual processing speed, working memory, etc.). For example, accommodations would be different for a student who was experiencing difficulties related to poorly developed number sense when compared to a student who displayed reading difficulties which make it difficult to extract information from the question to know what to do.

Importantly, when developing a plan or selecting suitable strategies and accommodations for a student, remember to consider and include options for potential difficulties in the following areas:

- **The language of maths** and maths vocabulary.
- **Reading difficulties** or **disorders** (accuracy, fluency, or comprehension) – if a student is not able to read or understand a question easily and accurately, they will not be able to solve it successfully.
- **Processing weaknesses** impacting performance e.g., working memory, visual processing speed, retrieval speed and/or language processing.
- Socioemotional factors including **maths anxiety**, **self-esteem**, and productive disposition.
- The student's **specific knowledge** or **skill deficits**, such as a lack of fluency in basic number facts, maths reasoning difficulties or a lack of numerical procedural knowledge.

Options for accommodations and general strategies to support students with maths difficulties, but especially those with dyscalculia, within the classroom include:

- Provide **number fact charts** and **multiplication tables**, or for older students a **list of maths formulas**, to assist with recall. Also, graph paper can be used to assist with lining up written work appropriately.
- Allow the **ongoing use of manipulatives** (concrete materials such as blocks) and use **visual representations** (drawings or figures). These function as cognitive tools that assist students to see what numbers look like and **link to conceptual understanding**, making complex problems more easily solvable and transferable.
- **Create word walls, word banks, or maths dictionaries** to help students with vocabulary terms in maths.
- **Use a fraction wall to clarify confusions** (e.g. $\frac{1}{20}$ is smaller than) and illustrate equivalents.
- **Pre-teaching** of maths vocabulary (providing instruction at the beginning of a lesson) and when introducing new skills or concepts remember to review previous learning and **connect to prior knowledge**. Explicitly tie prior learning to new learning intentions by linking and embedding previous content in new content.
- **Create checklists** to help students keep track of the steps in a task and teach students to '**self-talk**' through solving maths problems.
- **Provide scaffolding** and **modelling tasks in a step-by-step manner** that clearly directs the problem-solving process is encouraged. Students with learning difficulties will benefit from tasks being broken into smaller steps.
- **Make problems easier** to understand by making sentences shorter and more direct or by making numbers friendlier. For example, $500 - 27$ can be difficult for students with dyscalculia to complete due to the requirement to work across place value. Encourage them to take away one from each number to make the calculation easier i.e., $499 - 26$.

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- When fluency is an issue, or processing weaknesses are evident, **students may benefit from additional time** to complete maths tasks (although not by keeping students in during break times). Alternatively, the number of questions students need to complete in class can be reduced.
- Provide opportunities for students to **apply their knowledge to real life situations**, as well as abstract number problems.
- If a student has **reading difficulties**, consider reading the question to them or utilising assistive technology (see below).
- **Limit memory demands** through the use of memory aids such as mnemonics and use of concrete materials.
- **Build up reasoning strategies** for when faced with tasks that require a long sequence of steps due to memory problems.
- Success in completing applied and more advanced maths problems requires the ability to follow multi-step procedures. For individuals with learning difficulties, it may be harder to visualise patterns, different parts of a maths problem, or identify critical information needed to solve equations and more complex problems. Students will benefit from **provision of frameworks and worked examples**, and **strategies to interpret maths questions**, as well as allowing for working memory inefficiencies.
- **Assistive Technology** to reduce the functional impact of maths learning difficulties:
 - **Allow use of calculators** to reduce the load of number facts and working memory. **Talking calculators** are also available.
 - If the student has reading difficulties, **use of a reading pen** or **text-to-speech software** can be considered (although be mindful of readability of equations).
 - **Software, electronic maths worksheets and online graphic organisers** that assist in aligning, organising or working through maths problems on a computer screen.

Maths Anxiety

Experiencing feelings of tension and apprehension in situations involving maths, or even in anticipation of a maths activity, is extremely common. Much research has been done on the effects of maths anxiety, and the closely linked fear of negative evaluation (being wrong) and how these not only greatly impact performance in this subject area, but also other social emotional factors, such as self-esteem.

Why is it important to know and consider this when planning for students experiencing maths anxiety?

During these times of stress, it is hard to focus because anxious thoughts distract and interrupt learning (rumination), often with students preoccupied with the fear of failure or that they will look stupid, which further drives these negative emotions. Additionally, being stressed or emotional can impact the efficiency of our working memory further limiting the ability to engage with the maths curriculum. Often a negative cycle of avoidance or learned helplessness begins (because maths is hard), with reduced practice and poor engagement within lessons and reduced opportunities for corrective feedback (making maths even harder), which further fuels avoidance and increases anxiety related to maths.

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Information and Guidance for Students with Maths Difficulties and Their Families

- *Can I Tell You About Dyscalculia? A Guide for Friends, Family and Professionals* by Jessica Kingsley
- *Dyslexia Pocketbook* by Judy Hornigold
- *It Just Doesn't Add Up: Explaining Dyscalculia and Overcoming Number Problems for Children and Adults* by Paul Moorcraft
- *Ronit Bird's Top Ten Tips for Parents* - www.ronitbird.com/wp-content/uploads/2013/09/toptentips.pdf
- *The Fear of Maths. How to Overcome it* by Steve Chinn