

Special Education Support Service: Down Syndrome

Possible Difficulties Associated with Mathematics

Note: The Special Education Support Service wishes to acknowledge and thank Fidelma Brady, former Education Officer with Down Syndrome Ireland, for permission to use this information.

- Difficulties may arise from visual-spatial impairment between numbers, e.g. 6 and 9, 2 and 5, 17 and 71, and between operation symbols e.g. + and x., - and =, < and >.
- The directional aspect of Maths may be problematic e.g. using a number line, vertical addition, left-right regrouping and alignment of numbers or writing across the paper in a straight line. The recognition and understanding of the associated vocabulary should be taught alongside each, to help reduce confusion.
- Some pupils encounter difficulties with fine and gross motor skills and may have problems in handling small objects. Opportunities need to be created in a structured and progressive way, encouraging pupils to manipulate, investigate and use concrete materials. Adult intervention may be necessary to explain what is being discovered and why. This should then be followed by sufficient practice to consolidate their learning.
- Other problems with Maths faced by some pupils with Down syndrome include counting past a given number, as the pupil may have forgotten the specific number or may not fully understand the cardinal principle of final tag representations.
- Providing a visual prompt to help pupil stop at the correct number can help in the early years. Ensure the pupil touches each item and says the number as they count. Teach that two items are called two and count “one, two” emphasising the ‘two’. Introduce three items and then four. If the pupil is confident, interrupt the count and ask the pupil to say what the last one will be.

Pupils may have difficulty with the following:

- assessing whether they have the necessary skills to solve a problem,
- identifying and select appropriate processes,
- organising information,
- examining the problem solving process they are using,
- making adaptations to the process when necessary,
- evaluating their answers and identify errors,
- generalising strategies to different situations.

- Pupils with Down syndrome often have good rote memorising capabilities. Rote learning enables retention of facts, reduces stress on short term memory and enables the development and use of mathematical processes and strategies. However, it is important to teach understanding prior to memorising basic facts.
- Teach pupil to count on and back from numbers other than 1. Use coins to teach pupils to count in 2s, 5s, 10s and 50s, far more useful in real life than learning their 3 or 4 times tables.

Additionally, it is important to consider whether or not concepts have been adequately covered in previous lessons and whether any component part has been omitted e.g. it would be inappropriate to teach long division to a pupil who has not yet understood the principle of division as sharing or made the connection between multiplication and division.

- Lack of significant thinking skills compounds problem solving difficulties. Pupils need to be given opportunities to undertake problem solving and other maths ‘thinking’ activities even before they have mastered computation. Encourage the pupil to:
 - read and understand the problem,
 - look for the key questions and recognise important words,
 - select the appropriate operation,
 - write the number sentence (the equation) and solve it,
 - check their answers,
 - correct any errors.
- Help pupils to solve problems by demonstrating and providing a permanent model i.e. a completed item or task. Verbalise the key words associated with each step with the permanent model in view. Instruct the pupil to complete each step while saying the key words out loud. Finally, allow the pupil to complete subsequent problems on their own, with the teacher’s model still available.
- Provide adequate experiences with real life materials, time for exploration and situations where the ‘right’ answer is irrelevant. Use careful, accurate and appropriate language. Provide helpful technologies and convey to the pupil that getting it wrong is a part of learning.