

Dyslexia and Maths

Although pupils with dyslexia are often better at coping with numbers than with reading, this is not always so. Some pupils have memory-related problems, which can create difficulties in relation to retaining number facts and tables, number order, sequencing and place value.

Reading & Maths

Barriers to Learning – some dyslexic pupils may:

- Have problems with reading may result in lack of confidence, even when maths skills are good
- Struggle with the flow of reading, which may not always be from left to right, as often includes tables and diagrams etc. May not identify tables & diagrams as part of question
- Have difficulty in decoding new or unfamiliar maths vocabulary, preventing mastery of the underlying mathematical concept
- Misread or omit vital words, changing the meaning of the maths question
- Be slow to process maths text and need repeated re-reading to comprehend, so may still be struggling with meaning when other pupils are completing calculations etc.
- Have difficulty understanding positional/directional vocabulary e.g. above, beside
- Have difficulty linking maths terms to abbreviations

Suggested Support Strategies:

- Be aware that even good readers may struggle with meaning of maths text
- Teach mathematical language as 'foreign' vocabulary
- Take the reading abilities of pupils into account when choosing texts
- Give support for reading and writing in number-related work
- Allow extra time and ensure that there is no pressure on the individual pupil to read and respond quickly
- Read questions aloud in chunks to help with meaning and development of short-term memory
- Check the language in a maths assignment as well as the number processes
- Highlight maths vocabulary and explain meaning in context
- Issue a marker (or reading ruler) to help the pupil focus along a line of text
- Use wall charts or pupil tables of maths topic vocabulary
- Highlight any tables/charts/diagrams to draw attention to them as part of the problem
- Do not ask the class for answers to set questions while some pupils are still struggling with reading these – allow enough time for all pupils to complete several examples
- Illustrate directional/positional vocabulary to support meaning by using arrows etc.

NUMBER

Barriers to learning – some dyslexic pupils may:

- Copy numbers incorrectly or reverse/invert numbers
- Start maths problems on the wrong side – from the left
- Want to carry a number the wrong way
- Be unable to estimate
- Have problems understanding place value
- Misalign columns, making calculations impossible
- Be unable to do complex sequential calculations like long division
- Will often know how to do every step in a sequence, but get the steps out of order
- Be inconsistent – correct one day, but unable to cope with same problem the next day

Suggested Support Strategies:

- Allow the use of calculators/number squares for all number work
- Provide training in the use of calculators/number squares
- Make addition and multiplication grids and ready-reckoners freely available
- Issue pupils with squared paper
- Make use of a variety of approaches to develop and reinforce number facts
- Teach strategies for developing a systematic approach to calculations, perhaps using flow charts

SYMBOLS AND SHAPES

While some pupils with dyslexia can have problems with the identification of shapes and symbols, pattern recognition skills of other dyslexics help them to "see" mathematical relationships and concepts more quickly and clearly than non-dyslexic pupils. However, not all dyslexic pupils have visual-spatial talents.

Strengths of some dyslexic pupils re symbols and shapes:

- 3-D visual-spatial and pattern recognition skills
- Ability to imagine how an image would appear from another perspective
- Ability to apprehend, encode, and mentally manipulate spatial forms
- Ability to recognise nets and rotated versions of shapes
- Figural flexibility (able to arrange shapes in different ways)
- Imagining completed images (fill in missing parts mentally to determine what a picture represents)
- The ability to recognise a figure as "impossible"

Barriers to learning – some dyslexic pupils may:

- Be significantly slower than peers to complete mathematical tasks, even those in which they show particular ability
- Have difficulty in discriminating between different symbols - mix up the signs + x % °
- Not understand mathematical language referring to symbols
- Have particular difficulties with algebra and formulae notation
- Be unable to relate the properties of a shape to its name
- Have difficulty making connections between shapes
- Have no idea of scale

Suggested Support Strategies:

- Always allow enough time for the dyslexic pupil to process the nature of a problem
- Teach the mathematical words that refer to symbols and issue reference cards
- Link multiplication to addition and subtraction to division
- Display symbols charts in the classroom so that pupils may check these unobtrusively
- Teach algebraic notation slowly and issue formulae prompts
- Provide ample opportunity for revision and reinforcement
- Issue templates or stencils to emphasise the different qualities of shapes
- Use colour to code lines and symbols that identify aspects of shapes
- Always use visual representations of shapes to illustrate properties and names
- Issue illustrated notes showing key words, diagrams and worked examples of e.g. area and volume

DIRECTIONALITY AND SEQUENCE

Dyslexic difficulties linked to orientation and direction may affect the understanding of patterns and sequences in number as well as make it difficult for the dyslexic pupil to cope with geometry, symmetry, time and co-ordinates.

Barriers to Learning: some dyslexic pupils may:

- Be confused about vocabulary of directionality words/prepositions and sequence
- Have problems reading figures in the correct direction or order
- Have difficulty counting backwards
- Be unable to sequence days of the week, months etc.
- Struggle with operational sequences in calculations
- Have great difficulty following a sequence of instructions
- Be unable to follow directions in the right order
- Have difficulty reading, understanding and extracting information from tables, charts and graphs
- Experience problems plotting co-ordinates and reading line graphs
- Have extreme difficulty telling time on an analogue clock
- Find time-arithmetic impossible and be unable to translate digital – analogue
- Be unable to extract information from timetables
- Have difficulty estimating the passage of time and be unable to work out when 'in 15 minutes' would be

Suggested Support Strategies:

- Help pupils to develop personal strategies for telling left from right
- Use visual and kinaesthetic activities to illustrate directionality words/prepositions
- Use number lines and movement to help with directions
- Teach flow diagrams to help pupils follow directions/instructions
- Highlight where to begin in operational sequences
- Colour code axes, column and row headings
- Use L shaped card to read from tables
- Put direction arrows on graph axes
- Colour code co-ordinates to match colours of axes
- Visual strategies to support use of analogue clock and 'experience' the passing of time
- Use a digital clock as possible more helpful alternative

PRACTICAL MATHEMATICAL TASKS

Barriers to Learning – some dyslexic pupils may:

- Have motor planning problems affecting the ability to predict or follow a series of steps in the right order
- Have difficulty aligning columns of figures correctly
- Have difficulty setting out their work in logical, sequenced steps
- Be unable to construct suitable tables etc for recording data
- Lack the fine motor skills required to draw/measure accurately
- Be unable to use a ruler to draw straight lines or measure accurately
- Have difficulty knowing where to begin to draw tables/graphs on the paper
- Get confused about appropriate measures for different tasks
- Have little or no understanding of scale
- Have difficulty matching pictorial representations to numerical values
- Be unable to complete practical activities when steps have directionality as part of them

Suggested Support Strategies:

- Use squared/isometric paper
- Provide tools and instruments with handling aids
- Provide left-handed scissors where appropriate
- Provide transparent rulers to help when reading scales, tables etc.
- Enlarge graphs to make details more accessible
- Issue flow charts for reference, showing sequences of steps for specific tasks
- Give a sample page layout, clearly showing location for working

MEMORY AND MATHS

Dyslexic difficulties in directionality, rote memorisation and sequencing can make some tasks very difficult. Short-term memory problems may result in pupils being unable to complete mental maths tasks, not because they are unable to solve a problem, but because they forget the numbers involved.

Barriers to Learning – some dyslexic pupils may:

- Be unable to memorise addition and subtraction facts or multiplication tables
- Be unable to hold numbers in their heads while carrying out calculations
- Have difficulty remembering the sequence of steps in number operations
- Have problems remembering formulae
- Be unable to copy an answer accurately from one place to another
- Start a maths problem at the wrong place or at an inappropriate place on the page
- Be unable to follow a sequence of verbal instructions
- Work very slowly, so forget instructions given before they begin
- Not show their working as they often just "see" maths in their head
- Have great difficulty in remembering details of homework
- Forget books and equipment

Suggested Support Strategies:

- Help the pupil to make a personal checklist of necessary equipment to aid memory
- Keep a spare set in class for forgotten equipment and give this out as required
- Issue only one instruction at a time, repeat instructions frequently
- Chunk information and include visual illustrations
- Teach 'table' gimmicks like 'finger tables, use of patterns, using colour coding, verbalising using rhythm and rhyme or music to aid recall
- Encourage the pupil to highlight each step in a written problem
- Issue highlighted or annotated class notes instead of dyslexic pupils having to copy examples
- Develop a sequence checklist for calculation procedures
- Teach visualisation and use highlighting/colour coding to aid recall of sequences
- Teach memory techniques such as mnemonics
- Issue exemplars that clearly indicate required layout
- Teach formulae in a 'fun' way using mnemonics, rhymes, colour coding and jingles
- Create wall displays in colour to show formulae
- Issue 'credit cards' of formulae for reference
- Check that pupils have clear unambiguous notes of homework set
- Remember that homework may take a dyslexic pupil much longer than others and set a time limit (parents can be asked to monitor and sign this)

Adapted from: No **2.6** in the series of

Supporting Dyslexic Pupils in the Secondary Curriculum by Moira Thomson

For full booklet see: www.supportingdyslexicpupils.org.uk