TESTS FOR DYSCALCULIA
T1631 – SAMPLE PAGES

1. The six reasons for acute failure in mathematics

Almost all children who suffer from severe problems with maths do so for one of six reasons:

a) they have a failure of understanding mathematical concepts

b) they have a failure of understanding of the words used to express mathematical concepts

c) they have a short term memory problem which means that they cannot hold basic mathematical information in their heads while performing a mathematical calculation

d) they have a problem in writing numbers down

e) they have a problem in reading the information surrounding the mathematical problem

f) they have a problem in coping with sequences which most children of a similar age find easy to grasp.

2. The origins of the six reasons for failure

The origins of each of these problems can be multifarious and a number of academic volumes have been published in recent years which discuss the origins of these difficulties. While there is still some disagreement on the topic, generally speaking the origins of failure in mathematics come down to:

a) **Poor learning.** In this case the child has been taught basic mathematical concepts well, but has failed to learn, perhaps because of time off from school, severe behavioural problems or similar difficulties. In this scenario there is no underlying genetic reason why the child should not learn mathematical concepts.

b) **Poor teaching.** Here the child has not been taught in a manner that allows the child to learn the mathematical concepts dealt with in the lesson. Typically this results in a child who is asked to tackle more complex mathematical problems (such as multiplying fractions) without having a firm grasp of the underlying principle (such as what fractions are). Remedial teaching using the best methods of teaching can readily resolve such difficulties.

c) **Genetic disorders.** Genetic disorders are believed to account for the problems associated with dyslexia and attention deficit disorder. Although there is no agreement that there are specific genetic disorders related to the ability to learn maths, it is clear that a child that has the disorders associated with dyslexia (inability to read at the level expected, inability to learn and remember sequences, short term memory disorders etc) may well have difficulties with mathematics. However this is not a straightforward association, for there is evidence that about a quarter of all children who are diagnosed dyslexic actually have abilities in maths which one would expect given their age and IQ. With regards to attention deficit disorder, there is again considerable disagreement as to its origins. But if one accepts for a moment that this is a genetic disorder, then clearly a child with ADD or ADHD is likely to find maths a problematic area.

When one considers these three possible underlying reasons for observed failure in maths it is clear that in practical terms there is only one solution: high quality teaching which focuses on the difficulties that the child has. Clearly for the classroom teacher the belief or knowledge that a child is failing at maths because the child has a genetic disorder adds little to his or her ability to help the child. However knowing that the child is failing because the child has difficulty sequencing, or is confused over the basic terminology of maths, allows the teacher to construct a remedial programme which can overcome difficulties very quickly.

Therefore this book focuses totally on locating the nature of the child's problem so that the teacher can then work with the child on that particular area of difficulty.

The intention is that where the teacher is faced with a child who seems to have an unexpected difficulty with maths, the teacher can give the child a few tests from this book to see exactly where that problem lies.

3. Appropriate responses to the six reasons for acute failure

a) Children who have a failure of understanding mathematical concepts.

These children simply do not grasp the concept of (for example) addition or multiplication. In a group where virtually every child understands and can answer the question, "I have five beans in my hand, and now I pick up three more, so how many do I have?" the child is completely lost. These children can usually be helped by a multi-sensory approach in which all the problems are solved tactilely, visually and orally at the same time.

In more advanced work we see children who have grasped some concepts, such as addition, but cannot translate these into the addition of larger sums. It is quite possible that a child understands the notion of addition, but will fail with something as complex as 143 + 89 = ____ while the rest of the class is able to solve the sum.

Here the child understands one concept (simple addition) but not a subsequent concept (the adding tens and units within one sum). Again multi-sensory work can help.

Additionally in such a case the child can often be helped by having a teacher watch the child as the child calculates the sum. Where a repeated error (such as attempting to add the tens before the digits) can be spotted the problem can be resolved by working through a large number of the problems with the child until the correct procedure is secured.

b) Children who have a failure of understanding of the words used to express mathematical concepts

These children can grasp the mathematical principles when presented in everyday language and solved in a multi-sensory environment. However they get confused by the use of words such as "the sum of", "add", "plus" and so on. Usually a simple pattern of repetition of the relevant sums gradually introducing all the variant words that the child may experience can build up the knowledge that is missing.

Once again multi-sensory work can be beneficial here as in this type of routine:

- The child selects four counters from the table and says "four"
- The child selects the + symbol and says "plus" or "add"

- The child selects three counters from the table and says “three”
- The child selects the = symbol and says “equals” or “makes”
- The child moves the two groups of counters together, after the = symbol, and says “seven”.

c) Children who have a short term memory problem.

These children cannot hold basic mathematical information in their heads while performing a mathematical calculation. Thus when attempting to say a times table they can get lost in the progression – having got to seven times six they can simply lose track of the fact that eight times six is next.

Children with this type of problem need practice in sequencing activities of all types, and an understanding from teachers that their problem is primarily one of sequencing and not of maths. These children are very likely to have literacy problems and be described as dyslexic, for much the same reason.

However although the problem is not primarily a mathematical one, mathematical sequences are ideal practice for these pupils. The child needs practice in putting numerical sequences in order and should then write them and say them simultaneously.

d) Children who have a problem in writing numbers down

These children simply do not link the concept of (for example) six as in six buttons on a table, or six tables in a room, with the symbols “6” and “six”. Such children are best helped through a multi-sensory approach which links the concept with the symbol with the child actively counting the six items, saying the word “six” and then writing down both “six” and “6”.

There can also be a sequencing issue here, as with the child who writes eighty-one as “18” or who looks at “81” and says “eighteen”.

e) Children who have a problem in reading the information related to maths.

These children may well be dyslexic, and may have combined their dyslexia with any of the problems above. As a result they simply cannot read the words they are given. This can lead to quite a confusing situation. A child who fails to answer the written question 6 x 3 = ___ may fully understand the concept of six times three equalling 18, but may get it wrong because when the concept has been taught it has been taught in relation to written words that the child does not understand.

Alternatively the child may grasp the concept but get an answer wrong because the test being used is one that includes words that the child cannot decipher. Once it is established that the child’s difficulty is with the words and not with the maths, then a series of sessions using standard dyslexia related techniques will ensure that the child learns the specific words as required.

6.5 Ask the child to look at the numbers and put them in order going up. Answers should be written in the spaces provided.

1. 55, 24, 100, 10, 17, 85, 66, 45, 99, 36

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

2. 67, 42, 19, 3, 76, 98, 28, 99, 16, 45

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

3. 66, 34, 19, 99, 55, 76, 18, 5, 26, 44

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

4. 34, 19, 24, 55, 97, 64, 83, 18, 45, 16

____ ____ ____ ____ ____ ____ ____ ____ ____ ____

5. *64, 19, 27, 39, 47, 25, 87, 19, 54, 9*

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

6. 36, 98, 17, 29, 66, 87, 99, 18, 4, 45

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

7. **63, 98, 17, 55, 34, 76, 29, 25, 96, 13**

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

8. 23, 98, 64, 37, 14, 67, 55, 49, 23, 41

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

8.11 Written arithmetic tests. Ask the child to write down the answers to the following questions in the spaces provided.

1.
$$\begin{array}{r} 232 \\ +\ 49 \\ \hline \\ \hline \end{array}$$

$$\begin{array}{r} 57 \\ +\ 138 \\ \hline \\ \hline \end{array}$$

3.
$$\begin{array}{r} 617 \\ +\ 333 \\ \hline \\ \hline \end{array}$$

4.
$$\begin{array}{r} 446 \\ +\ 97 \\ \hline \\ \hline \end{array}$$

5.
$$\begin{array}{r} 828 \\ +\ 99 \\ \hline \\ \hline \end{array}$$

6.
$$\begin{array}{r} 563 \\ +\ 217 \\ \hline \\ \hline \end{array}$$

7.
$$\begin{array}{r} 135 \\ +\ 444 \\ \hline \\ \hline \end{array}$$

8.
$$\begin{array}{r} 612 \\ +\ 147 \\ \hline \\ \hline \end{array}$$

9.
$$\begin{array}{r} 165 \\ +\ 696 \\ \hline \\ \hline \end{array}$$

10.
$$\begin{array}{r} 522 \\ +\ 297 \\ \hline \\ \hline \end{array}$$

11.
$$\begin{array}{r} 143 \\ +\ 357 \\ \hline \\ \hline \end{array}$$

12.
$$\begin{array}{r} 219 \\ +\ 197 \\ \hline \\ \hline \end{array}$$

13.
$$\begin{array}{r} 265 \\ +\ 324 \\ \hline \\ \hline \end{array}$$

14.
$$\begin{array}{r} 352 \\ +\ 147 \\ \hline \\ \hline \end{array}$$

15.
$$\begin{array}{r} 528 \\ +\ 159 \\ \hline \\ \hline \end{array}$$

16.
$$\begin{array}{r} 693 \\ +\ 125 \\ \hline \\ \hline \end{array}$$