

The information provided here refers to advice given in "What Works for Children with Mathematical Difficulties?" Ann Dowker [2004] and the William's Interim Report "Review of Mathematics Teaching in Early Years Settings and Primary School" [2008]

Considerations:

Additional approaches / strategies can be seen on the updated DVD "Overcoming barriers -Level 2 to Level 3" going into Primary and 10+ schools this term [SENCo will be sent copy at High school]

There is a need to ensure that pupils with mathematical problems, but not literacy needs, are picked up by school and offered appropriate targeted support.

The current statutory National curriculum Inclusion Statement in Britain requires schools to set suitable learning challenges, respond to pupils' diverse needs and overcome potential barriers to learning and assessment for individuals and groups of pupils.

Given that mathematical difficulties need to be taken into account, how best can this be done?

<u>Common Approaches:</u>	<u>Advantages</u>	<u>Disadvantages</u>	<u>Research evidence</u>
Ability Grouping:	<ul style="list-style-type: none"> Reduces level of individual variations in any given class 	<ul style="list-style-type: none"> pupils may feel themselves/ be labelled "failures" -"no good at maths" pupils' behaviour may "live down" to expectations 	<ul style="list-style-type: none"> Several studies shows setting has deleterious effect specifically on performance of low achievers in mathematics, who perform less well than similar pupils in mixed ability groups [Ireson and Hallam 2001] Pupils in sets for mathematics, of all ability levels, expressed greater dissatisfaction.
Individualised work within a class:	<ul style="list-style-type: none"> Do not necessarily rely on additional support 	<ul style="list-style-type: none"> Might be heavily based on worksheets addressing individual needs 	<ul style="list-style-type: none">
Small-group work within a class:	<ul style="list-style-type: none"> Group activities linked to whole class work Differentiated tasks allows problem solving at many levels Capitalises on classroom / group discussions 	<ul style="list-style-type: none"> Need to plan activities at several levels Need to include activities addressing various learning styles - presenting materials in a variety of forms Need to provide pupils with concrete materials to support processing of information 	<ul style="list-style-type: none"> Within- class support had positive effect on performance of pupils [Lou, Abrami, Spence, Poulsen, Chambers and d'Appolonia 1996] <u>Approaches to be used - DfES materials</u> - "Guidance to Support Pupils with SEN in the Daily Mathematical Lesson" and "Including All Children in the Literacy Hour and Daily Mathematical lesson" Use of multi-sensory approaches, such as movement/ chants for learning tables + number bonds. [Poustie [2001]; Stewart [2003]] Use of <i>Rehearsal cards</i> for mathematical facts; <i>calculating games, number lines/ ladders</i> [Kay and Yeo (2003)]
Use of additional adult support within class	<ul style="list-style-type: none"> Support for class during individual/ group activities Helps staff with classroom organisation 	<ul style="list-style-type: none"> Pupil may develop reliance on support Pupil may resent being seen as different 	<ul style="list-style-type: none"> Research showed no significant difference between pupils supported in small groups within the classroom and those also given additional adult support at this time [Muji and Reynolds (2003)]
Use of additional adult support for Intervention	<ul style="list-style-type: none"> Support directly related to identified need 	<ul style="list-style-type: none"> Training needs for TA Good systems for feedback and communication between TAs and teachers are essential 	<ul style="list-style-type: none"> OFSTED 2002;
Peer tutoring	<ul style="list-style-type: none"> Co-operative support Motivating for pupils Builds self confidence to "have a go" Enables pupils to transmit ideas and knowledge to one another 	<ul style="list-style-type: none"> Success may depend on dynamics of particular group Dominant child may do most of the work, lower ability child may be "carried along" with decisions 	<ul style="list-style-type: none"> Davenport and Howe [1999] showed effectiveness of collaborative learning for pupils with low mathematical ability

Pre-School	What is the intervention provision called?	Who is the target group for this provision?	Key Skills Addressed	How is the support provided?	Length of Intervention in Weeks	Evidence of progress	How is progress assessed?
	Preschool Early Education Partnership	Works with parents of children from birth to school age.	Counting skills Conservation of number	Offers materials, group sessions and home visits, focusing on singing games, talk about maths in context of practical activities.			
	Family Numeracy DCSF	Socio - economic. Some evidence of language deficit	Counting skills Conservation of number	Family based activities Children also had 2 x 30 mins sessions a week	3-6 months		
Pupils with arithmetical difficulties	Every Child Counts	KS1	Focus on parental and pupil skills	Teacher led / TA led with teacher supervision 1:1 support	10 hours support over time		FSP NFER test
	Mathematics Recovery programme	KS1	Counting, reading numerals up to 100, number sequencing, addition and subtraction skills	1:1 30 mins per day	12-14 weeks	Significant progress in areas focused on Over 75% of pupils on programme achieved age appropriate levels [Wright et al (2002)]	Pre and post assessments linked to intervention
	Numeracy Recovery Hackney LA	Year 2	Counting, recognition of numbers, place values, word problem solving, estimation and addition and subtraction facts	1:1 1 x 30 mins per week Trained teacher led	12-15 weeks	Significant improvement shown Average Standard Scores = 100 2-3 sub-level progress over year Improvements maintained for up to 1 year	NFER British Abilities Scales Basic Number Skills subtests
	Catch-Up Numeracy	Years 2-6 Those working significantly below age appropriate levels	Pupils working on identified areas of difficulty Counting, recognition of numbers, place value, number operations, word problems, number facts	1:1 2 x 15 mins pw Led by Trained TA and teachers	4 months	Average Maths Age gains of 7.4 months	Pre- + post assessments linked to intervention

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	Numicon	Foundation, Stage 1 and Stage 2.	Multi-sensory maths teaching programme using visual images and practical activities currently comprising three stages - Foundation, Stage 1 and Stage 2. Addition, subtraction, place value, doubling and halving, estimation, division and multiplication covered	Class based approach Also used 1:1 with teacher for pupils with autism, Downs and Dyslexia/ Dyscalculia		Research information- South West Middlebrough Eic Action Zone Key Stage One 3% gain in achievement at level 2 or above at Key Stage One in mathematics. Key Stage Two 4% gain in Key Stage Two mathematics 73% of pupils achieve level 4 or above. Key Stage Three 60% of pupils achieving level 5 or above in mathematics Level 6 scores 4.7% gain. Overall the target groups showed on average an increase in attainment of 4.6 points for all age groups.	
	Making Maths Make Sense Richard Dunn	KS1,2,3	+ - × ÷ and =	Whole class teaching approach			
	Talking Maths	Years 1-3	Activity sheet based Problem Solving mathematic reasoning - generalisation - prediction - recognition of patterns and relationships	TA led 3 x 20 mins	10 weeks		
	Number Shark	6 -14 years	Suitable for pupils who need more practice to consolidate learning	30 different games covering addition, subtraction, multiplication and division 1:1 computer based			
Computer based programmes [NB Research shows computer based interventions tend to result in less progress than adult led interventions]	RM Maths Research Machines	KS1 + 2	Oral and visual questions given pupil Pupil self assessment on own understanding Covers all basic skills	1:1 3 x 15 mins pw		1.6 sublevel improvement <u>2005 research:</u> Of YEAR 5 pupils judged to be working at Level 2a/3c, 67% gained Level 4 or more [making 3 sublevel gains]	NFER Mathematics test
	Mental Maths Olympics Sherston Software	Year 4	Mental maths strategies	1:1 10-20 mins daily		Moved from getting 0%-20% correct on baseline to 85% - 100% correct Retention shown after 3 months - 65%-100% correct	
	Mathmania	7-14 years	Four rules, co-inc, angles, shape Geared towards NC Level 3	1:1			

Other Wave 3 Maths Interventions

Appendix 3

Resource		Purpose	Outcome
<p>Numbershark</p> <p>A computer program to help anyone improve basic numeracy</p>	6-14	<p>"It addresses many of the difficulties which lead students to dislike maths, including poor short term memory, attention span and sequencing skills. The program features 30 totally different games covering addition, subtraction, multiplication and division in ways which add meaning and understanding to these operations. The games are played with your chosen units of work (topics) from a list of over 400; each topic generates a new set of sums every time you play the game.</p> <p>Numbershark combines motivation and enjoyment within a structured learning process." (website)</p>	<p>Suitable for children who need more practise of learning objectives to consolidate learning experiences.</p>
<p>Mathmania</p> <p>A computer program to support pupils with SEN</p>	7-14	<p>Children have to escape mazes by answering questions and collecting points. There are four levels of difficulties and puzzles to solve along the way.</p> <p>Four rules Coins Angles Shape and Space Sliding blocks Magic squares Fill it Towers of Hanoi</p>	<p>Performance is tracked and High Score Tables are kept, so parents can see their child's progress.</p> <p>Games are geared towards National Curriculum Level 3 onwards.</p>
<p>Maths Recovery</p>	Yr 1 and 2 and older pupils with conceptual weaknesses in maths.	<p>Distinctive features of the programme are:</p> <ul style="list-style-type: none"> · early identification of low attainment, · intensive individualised teaching for the child, · training for the classroom teacher in specialised methods relating to early mathematics learning. · Maths Recovery Daily - total of 16 to 20 sessions 1:1 sessions need to be delivered by a trained instructor. 	<p>Allows teachers and parents to: understand the development of a child's number sense, enter into supportive dialogue with the child, help the child construct mathematics knowledge and have success in mathematics.</p>
<p>Number Box</p>	Yr 1 and 2 and older pupils with SEN	<p>A multisensory system for teaching early numeracy skills and supporting dyscalculic children. The system also contains resources for teaching time, money, shape and measurement.</p> <p>The Number Box provides TAs with a system to use with individuals for 1:1 teaching on a regular basis in order to establish basic concepts of number. It uses multi-sensory methods and comes complete with resources, record of achievement and instructions</p>	<p>It is designed to provide a progression of skills and a full record of work, showing successes and areas of difficulty.</p> <p>The system works in very small steps and can be used with pupils working at P levels up to level 2B.</p> <p>It can also be used with small groups from year 2 onwards for those pupils who need the continued support of practical resources.</p>
<p>Maths made Easy</p>	Keystage 2	Worksheets	<p>Clear presentation, useful for added practise and consolidation of skills</p>

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<p>WORD PROBLEMS: THE LANGUAGE OF MATHS by Leonie Ewing & Ian Ward QUED ISBN 1898873-08-09 WWW.QED.UT.COM</p>	<p>Useful for differentiated response in the classroom A progressive series of mathematics practise, activities and games for key stages 1 and 2. Progressive levels of ability in the same book from year 1 to year 4 work.</p>	<p>Develops understanding of mathematical concepts. It is clearly illustrated and photocopiable A4 book (131pages). It deals with the number concepts of addition, subtraction and multiplication with tens and units.</p>	<p>'Promotes pupils' knowledge of what is in effect an additional language and, by using a range of exercises, encourages fluency and confidence in translation.'</p>
<p>Target Maths is a £7 + VAT for a set of 120 double-sided cards</p>	<p>Designed to help and encourage children with SEN</p>	<p>Target Maths is an extremely useful tool in the teaching of addition, subtraction, multiplication and division.</p>	<p>It fulfils several needs at very different levels by providing small-step progress for the less able, by boosting the self-esteem of children who have emotional/behavioural difficulties, and by challenging the more able children, while at the same time encouraging improved group relationships and, very importantly, making learning fun!</p>
<p>Power of 2 (Plus 1 is due to be published and focuses on earlier skills)</p>	<p>Older primary and secondary.</p>	<p>The one-to-one coaching system for maths success With Power of 2, anyone can support students who are struggling to learn maths. Power of 2 is two people working together to develop maths skills. The student is someone who benefits from repeated practice and explanation. The coach is someone who works alongside the student and supports their learning. On each page there is a "script" for the coach to read, or this could be read by the student.</p>	<p>Power of 2 claims to show amazing results. It has increased the confidence of everyone who has used it. It has also increased their ability to use numbers. Power of 2 is so called because of the proven success of two people working together. It stems from the need of some people to have more reinforcement and practice than is often available.</p>
<p>Max's marvellous Maths group</p>	<p>Year 1</p>	<p>The daily sessions will each last for 20-25 minutes over a period of 12 weeks. There are four sessions written for each week.</p>	<p>It is designed to be delivered by a teaching assistant. The target group is children in Year 1 who have been identified as in need of some extra support to enable them to keep up with their peers.</p>

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<p>Primary National Strategy: Supporting Pupils with Gaps in Mathematical Understanding</p>	<p>A new Primary National Strategy publication, including extensive teaching materials, to support further development in working with children who have gaps in their mathematical understanding.</p>	<p>1 x 15min plus 5 x 5min Targeting support: implementing interventions for children with significant difficulties in mathematics (http://www.standards.dfes.gov.uk/primary/Publications/inclusion/wave3_leaflet/), giving further information about the new Primary National Strategy publication and the research background, is downloadable. The pack, Supporting children with gaps in their mathematical understanding (http://www.standards.dfes.gov.uk/primary/Publications/inclusion/wave3pack/), has evolved into a revised form with many additional features incorporated. The guidance book which is part of the pack, <i>Using the pack</i>, includes case study material from the pilot as well as an outline for a staff meeting to support schools in beginning the process of familiarising staff with these new resources, and planning for Wave 3 mathematics provision. The Wave 3 pilot website (http://www.wave3.org.uk/) has been updated to host the new materials referenced to the updated tracking children's learning charts in an interactive form.</p>	<p>Useful teaching resources included as a free download.</p>
<p>Using models and images to support mathematics teaching and learning in years 1 to 3. A CD Rom and charts.</p>	<p>years 1-3</p>	<p>A CD showing short video clips of teachers and support assistants using the materials showing different models, images and problem-solving strategies. Key messages for each video clip are also included. It also includes annotating a unit plan for classes and a teaching assistant using the materials in a support session. In addition to the interactive teaching programmes you are able to download unit plans, resource sheets and support sessions. There are also 6 models and images charts which are also available electronically on www.standards.dfes.gov.uk/primary</p>	<p>This resource covers 6 key areas of mathematics in years 13. Ordering numbers, counting on and back, partitioning and recombining, addition and subtraction facts within 20, understanding of the four operations and problem-solving.</p>
<p>Numicon</p>	<p>Foundation, keystage 1 and older pupils with special needs.</p>	<p>Numicon® teaching activities are cumulative progressing in small steps, each activity builds on previous learning, some activities are revisited with an enhanced teaching focus as pupils progress, pupils can self-correct and thus their self-esteem is nurtured. The activities are playful and multi-sensory, pupils' language acquisition is supported throughout by the meaningful visual context of the Numicon® images and display number line on which each number is illustrated with Numicon® shapes. For teaching older children we recommend the purchase of a Year One Kit and a set of Foundation or At Home work cards. For 'travelling support teachers' who move around the school to teach different groups we also recommend the zig zag number line as it can stand on a table top and can be moved easily from place to place.</p>	<p>Helpful for children with many different barriers to learning. SENCOs and Support Teachers are finding their own ways of using Numicon® to help children understand fractions and decimals; coin equivalence when learning about money; and multiplication and division.</p>