



## 1. INTRODUCTION

This policy document is written after consultation with the teaching staff and the Governor with responsibility for Maths/Numeracy and is presented to the Local Authority and the Governing Body in the Summer Term 2010.

It is a working document, which reflects the ethos and practice within the school in relation to Mathematics. It has been written with due regard to the requirements of the Primary National Strategy and the National Curriculum; it will be monitored and evaluated according to changes within these documents as and when they arise.

The Numeracy coordinator: Mrs Andrea Tonks

The role of the co-ordinator: *See Appendix 1 Numeracy Co-ordinator Job Description*

## 2. FUNDAMENTAL PRINCIPLES

The whole ethos of Molescroft Primary School is to provide every child with a happy, caring, learning environment in which he or she can develop their full potential – whatever their needs and irrespective of ability, race or gender.

Molescroft Primary School believes that:

**Mathematics provides a way of viewing and making sense of the world; it equips pupils with a powerful set of tools to understand and change the world. These tools include logical reasoning, problem solving skills and the ability to think in abstract ways.**

**Mathematics encompasses many aspects of everyday life; therefore a good understanding of basic numeric concepts is essential for children in an ever changing, technologically advancing world. With this in mind, we endeavour to ensure at Molescroft Primary School that children develop the skills necessary to cope with mathematical situations and an enthusiastic attitude towards mathematics that will stay with them.**

### **AIMS**

**At Molescroft Primary School we aim to provide our pupils with a Mathematics curriculum which will produce individuals who are: literate, independent, creative, inquisitive, enquiring and confident. We also aim to provide a stimulating classroom environment with adequate resources, in which pupils can develop their mathematical skills to their full potential.**



## **SPECIFIC AIMS**

### **Our pupils should:**

- **have a sense of the size of a number and where it fits into the number system**
- **know by heart number facts such as number bonds, multiplication tables, doubles and halves**
- **use what they know by heart to calculate numbers mentally**
- **calculate accurately and efficiently, both mentally and with pencil and paper, drawing on a range of calculation strategies they have been taught**
- **recognise when it is appropriate to use a calculator and be able to do so effectively**
- **make sense of number problems, including non routine problems, and recognise the operations needed to solve them**
- **explain their methods and reasoning using the correct mathematical terms**
- **assess whether their answers are reasonable and have strategies for checking them if necessary**
- **suggest suitable units for measuring and make sensible estimates of measurements**
- **explain and make predictions from data found in graphs, diagrams, charts and tables**
- **develop spatial awareness and an understanding of the properties of 3D and 2D shapes**

## **3. ROLES AND RESPONSIBILITIES**

**The governing body** should, in cooperation with the Head teacher, determine the school's general policy and approach to Mathematics/Numeracy at Molescroft Primary School.

**The Numeracy co-ordinator** should advise the Head teacher, staff and governors of current practice in Numeracy and any new initiatives put forward by the government, PNS or the LA which may require amendments to this policy. For a more detailed explanation of the Co-ordinators Roles and Responsibilities see Appendix1.

### **The Class Teacher**

The role of the class teacher is to:

- ensure the progression in the acquisition of mathematical skills, with due regard to the PNS framework, Curriculum 2000 and the Early Learning Goals for the Foundation Stage Curriculum
- to develop and update skills, knowledge and understanding of mathematics
- to identify inset needs in mathematics and take advantage of training opportunities
- to keep appropriate on-going records in relation to school policy



## 4. PRACTICE

At Molescroft Primary School pupils are provided with a variety of opportunities to develop and extend their mathematical skills, in accordance with the school's policy on Accelerated Learning techniques.

Lessons follow a flexible format according to the concept/s being taught and the needs of the pupils. The teaching of Mathematics at Molescroft Primary School provides opportunities for:

- whole class work
- group work
- paired work
- individual work
- group/individual work with a teacher or teaching assistant

Pupils engage in:

- the development of mental strategies (not just confined to number)
- written methods
- practical work
- investigational work
- problem solving
- consolidation of basic skills and number facts
- mathematical discussion

At Molescroft Primary School we recognize the importance of establishing a secure foundation in mental calculation and recall of number facts before standard written methods are introduced. Teachers may make reference to the Teaching Mental Calculations book (QCA/99/380) and the Teaching Written Calculations book (QCA/99/486) and the Mathematical Vocabulary book (DfEE/99) when planning a unit of work. This is in order to ensure progression in mental and written strategies taught throughout the school (see Progression in written methods policy – appendix 4).

Mathematics contributes to many subjects and it is important that children are given the opportunity to apply and use Mathematics in real contexts.

'It is important that time is found in other subjects for pupils to develop their Numeracy skills, eg. There should be regular, carefully planned opportunities for measuring in science and technology, for the consideration of properties of shape and geometric patterns in technology and art, and for the collection and presentation of data in history and geography' (NNS).

We endeavor at all times to set work that is challenging, motivating and encourages the pupils to talk about what they have been doing.



### **Foundation Stage Curriculum**

See Curriculum Guidance for the Foundation Stage and early Learning Goals

### **Key Stage 1 Curriculum**

See Primary National Strategy KS1 teaching programme on the website:  
<http://nationalstrategies.standards.dcsf.gov.uk/primary/primaryframework>

### **Key Stage 2 Curriculum**

See PNS KS2 teaching programme on the above website

## **ASSESSMENT**

Assessment is regarded as an integral part of teaching and learning at Molescroft Primary School, and is a continuous process. We are constantly assessing our pupils and recording their progress, in line with the School's assessment policy. We strive to make our assessment purposeful, allowing us to match the correct level of work to the needs of the pupils, thus benefiting the children and ensuring progress.

Information for assessment will be gathered in various ways; by talking to the children, observing their work, marking their work, SATs/Optional SATs papers and Assess and Review lessons. These sources of evidence will enable teachers to complete the Assessing Pupils' Progress guidelines every term to award a level judgment in maths, in line with the Assessment for Learning Strategy. APP is used as a way of ensuring level judgments in maths are awarded against national criteria and give a clear and detailed picture of what a child can do in mathematics informed by other evidence than purely test data.

Information from these assessments will be used to: inform future planning, identify strengths and weaknesses, provide individual and group target setting, set children appropriately from Year 2 upwards and provide information for teachers, pupils, parents and future schooling.

## **PARENTAL INVOLVEMENT**

At Molescroft Primary School we encourage parents to be involved in the mathematics curriculum by:

- providing them with a parents' booklet when a child enters a new year group, detailing key objectives and activities to aid their understanding at home
- inviting them into school twice yearly to discuss the progress of their child
- reporting on mathematical progress in their child's/ren's report



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- inviting parents of Year 6 pupils to a meeting on supporting children with SATs
- encouraging parents to help in classrooms
- informing parents of significant changes in the Numeracy curriculum
- encouraging parents to be involved in homework activities and making the learning objectives and the task clear and achievable
- maths workshops for parents are held approximately every 2-3 years which focus on the progression in written methods in KS1 and KS2
- parents with children with IEPs are invited twice yearly to discuss specific maths targets from their IEP

## 5. A SUMMARY OF THE LEGISLATIVE FRAMEWORK

National Curriculum 2000	Early Learning Goals for the Foundation Stage Curriculum
Primary National Strategy for Mathematics	PNS Guidance to support SEN Children

## 6. DOCUMENTATION

Files kept: Numeracy Co-ordinator File kept in Co-ordinator’s classroom.  
APP Assessment Folders kept in each classroom.

## 7. SPECIAL EDUCATIONAL NEEDS

Children who have a difficulty with mathematics are identified and catered for in line with the school’s SEN Policy.

## 8. INSET

The Numeracy Co-ordinator will attend courses organised by the LA or other outside agency in line with the School Improvement Plan and training needs of the Co-Ordinator. The Numeracy Co-ordinator will deliver INSET on changes to National and East Riding policy.

## 9. LIAISON WITH OTHER SCHOOLS



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The Y6 teacher/s attend Y6/7 transition meetings for the Beverley cluster at which maths transition issues are discussed.

The Numeracy Co-ordinator and the Year 6 teaching team will provide information for the children's chosen Secondary School as to their attainment in maths.

The Foundation Stage teacher/s and/or KS1 Assistant Head meet with children's Preschool settings to discuss their progress in the area of Mathematical development and records are transferred in readiness for the new Reception Class.

## 10. FUTURE TARGETS TO BE MET

See Molescroft Primary School - School Improvement Plan.

## 11. LIST OF APPENDICES

- APPENDIX 1: Curriculum Co-ordinator Job Description.
- APPENDIX 2: Standardised Tests
- APPENDIX 3: Resources List
- APPENDIX 4: Progression towards a standard written method of calculation
- APPENDIX 5: A Skeleton Progression for the Teaching of the Standard Algorithm
- APPENDIX 6: The Role of the Governing Body

## I. CO-ORDINATOR'S JOB DESCRIPTION

The Numeracy Co-ordinator is responsible for co-ordinating mathematics throughout the school.

This includes:

- championing the subject of maths across the school
- ensuring continuity and progression from year group to year group
- assisting and advising staff with the planning and implementation of the Maths curriculum
- advising on in-service training to staff where appropriate. This will be in line with the needs identified in the School Improvement Plan and within the confines of the school budget



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- advising and supporting colleagues in the assessment of Mathematics throughout the school
- monitoring the quality of teaching and learning in the subject alongside the SMT
- assisting with requisition and maintenance of resources required for the teaching of mathematics. Again within the confines of the school budget.

## II. STANDARDISED TESTS

The standardised tests used at Molescroft Primary School with relation to the Maths Curriculum are as follows:

Foundation Stage: Early Learning Goals and the Foundation Stage Profile

Year 1:

Year 2: Year 2 SATs

Year 3: Year 3 Optional SATs

Year 4: Year 4 Optional SATs

Year 5: Year 5 Optional SATs

Year 6: Year 6 SATS

SEN Children: Young Maths Test

## III. RESOURCE LIST

Each classroom has a basic stock of Maths equipment, which should include:

- Interactive Whiteboard & Projector
- Class set of individual whiteboards and pens
- Counting stick
- 100 square
- Times tables poster
- Vocabulary card laminates
- Selection of dice
- Selection of maths games (according to age of children)
- Class set of calculators (KS2) (selection of larger calculators for KS1)
- Class set of protractors and compasses (upper KS2)
- Class set of mirrors
- Arrow Cards – place value
- Multiplication squares
- Various number lines & counting equipment



- Appropriate age maths dictionaries

The school also has a stock of extraordinary equipment including:

- Metre sticks, trundle wheels and tape measures
- Teaching clocks, children's clocks and clock stamps
- Scales and weights
- Capacity equipment

#### **IV. PROGRESSION TOWARDS A STANDARD WRITTEN METHOD OF CALCULATION**

##### INTRODUCTION

The PNS provides a structured and systematic approach to teaching number, with a considerable emphasis on teaching mental calculation strategies. Up to the age of 9 (Year 4) informal written recording should take place regularly and is an important part of learning and understanding. More formal written methods should follow only when the child is able to use a wide range of mental calculation strategies.

At Molescroft Primary School we have developed a consistent approach to the teaching of written calculation methods. This will establish continuity and progression throughout the school.

We aim to establish mental methods based on a good understanding of place value in numbers.

Place value will be taught mentally first from Reception class where number tracks are used progressing to number lines (to 10 or 20 as appropriate) in Years 1 and 2.

The empty number line will be taught both forwards and backwards depending on the numbers.

Subtraction will be taught both forwards and backwards depending on the numbers. Numbers such as 10, 100, 1000 will be called Landmark numbers.

In all cases we aim to make sure that the children always look out for special cases that can be done entirely mentally eg.  $11+9$ , or  $15+5$  (number bonds to 20).

Children will learn to approximate/estimate first eg  $29+30$  (round up to nearest 20, the answer will be near to 60).

The progression in stages of Addition, Subtraction, Multiplication and Division will be taught according to the guidance in the National Numeracy Strategy. See Appendix 5 for the recommended progression of teaching the standard algorithm.



## **V. A SKELETON PROGRESSION FOR TEACHING THE STANDARD ALGORITHM**

### **TEACHING ADDITION AND SUBTRACTION AT KS1**

- In the early years of Primary Education the main emphasis should be on developing skills of mental calculation.
- The development of formal methods of recording and performing calculations should follow a firm grounding in learning, understanding and using a range of mental calculation strategies.
- There is strong evidence, particularly from countries where standards are higher than those in the UK, that the introduction of written methods too early can undermine children's fluency in number.
- That is not to say that written recording should not take place in KS1, recording of one form or another should take place regularly and is an essential part of learning and understanding.
- Parents need to understand that children will need to start with unstructured personal jottings that should be valued. These jottings are an essential step towards conceptual understanding. As children gain in understanding, their written methods will become more fluent and more efficient.
- At KS1, calculations are recorded in horizontal form, so that the written record closely resembles the way in which children calculate mentally and would describe their working.
- In KS1 teachers guide children through these important stages in written recording:
  - Developing the use of pictures and a mixture of words and symbols to represent numerical activities.
  - The use of standard symbols and conventions, such as numerals 0 to 9, the equals sign and the + and – signs to record mental calculations.
  - The use of jottings to aid a mental strategy.



**THE DEVELOPMENT IN RECORDING ~ADDITION AND SUBTRACTION IN KS1**

Foundation Stage	Year 1	Year 2
<p><i>Jane has 3 bears. She was given 2 more. How many does she have now?</i></p> <p><b>(Pictorial representation of the question with a number sentence scribed by an adult underneath or the child – depending on ability)</b></p>	<p><i>There are 20 children in our class. Three are away today. How many are here?</i></p> <p><b>(Pictorial representation with a number sentence/ Simple number line used or Tally marks &amp; number sentence used – depending ability)</b></p>	<p><i>Choose two numbers to add on the number track:</i></p> <p><i>There are 32 sweets in the tube, and 23 children in the class. Everybody is given one sweet. How many are left over?</i></p> <p><i>This child has not only found the answer, but also checked that he thought it was a good answer.</i></p> <p><b>(Number sentence used with arrows and annotations. Answer checked using a similar calculation)</b></p>



## **MULTIPLICATION AND DIVISION AT KS1**

- The ideas of multiplication and division in KS1 begin with counting patterns and contexts involving equal groups.
- At first children's written work will be recorded using number patterns and phrases like 'lots of' or 'shared between'.
- By Year 2 children should be introduced to the  $\times$  and  $\div$  symbols.
- Rhymes and stories which involve counting in twos or fives, or counting forwards or backwards in different intervals from a given starting number, all help to develop children's familiarity with number patterns and sequences.
- Multiplication and division will at first be taught through practical activities and asking questions such as: 'How many pencils do I need if everyone has to have 2?' and 'I have 12 pencils to share equally among the three of you; how many will you each have?'
- Children will begin to record these activities using a mixture of pictures, tally marks and symbols.

### **The Expectations for Multiplication and Division in KS1 are as follows:**

#### Year 1

- count in twos 0 to 20
- count in tens from 0 to 50
- count in fives from 0 to 20 or more
- double and halve numbers up to 20

#### Year 2

- count in fives to at least 30
- recall the 2 times table up to  $2 \times 10$
- recall the 10 times table up to  $10 \times 10$
- recall division facts for the 2 and 10 times table
- to know and use halving as the inverse of doubling
- to understand the operation of multiplication as repeated addition or as describing an array

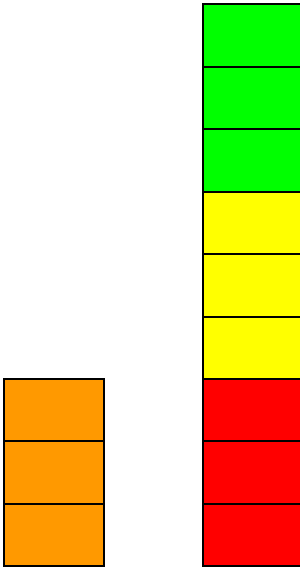


**EXAMPLES OF CHILDREN RECORDING MULTIPLICATION AND DIVISION ACTIVITIES**

The idea of a multiplying factor can be introduced by activities such as:

*Make a necklace with red and yellow beads using three red beads for every yellow bead.*

*Use the bricks to make a tower three times as high as this one:*



Young children should be familiar with the language of sharing and understand that six being shared equally among three people means everyone has two each and that if they were shared between two people, both would have three:

This is an example of partitioning sets into equal groups and is good preparation for the alternative interpretation of division as repeated subtraction that arises out of activities such as:

*How many cars can you make if you have eight wheels? How many motor bikes?*

Children can draw pictures to record the two groups of four wheels and talk about grouping eight into two groups of four.

Teachers can discuss the fact that eight can also be grouped as four groups of two, reinforcing the ideas that  $8 \div 2 = 4$  and  $8 \div 4 = 2$

**THE DEVELOPMENT OF ADDITION STRATEGIES IN YEARS 3 AND 4**



### **1. Partitioning**

In Year 3 children are normally adding tens and units or hundreds, tens and units added to tens and units.

In Year 4 this is extended to adding two 3-digit numbers together.

Partitioning is taught to be set out in horizontal format which closely resembles the mental processes involved.

For example:

$$234 + 146 =$$

$$\begin{array}{r} 200 + 100 = 300 \\ 30 + 40 = 70 \\ 4 + 6 = \underline{10} \\ 380 \end{array}$$

### **2. Partial Sums**

Addition using partial sums helps to develop children's understanding of addition and introduces the idea of lining up the hundreds, tens and units in readiness for learning column addition.

For example:

$$287 + 145 =$$

$$\begin{array}{r} 200 + 80 + 7 \\ \underline{100 + 40 + 5} \\ 300 + 120 + 12 = 432 \end{array}$$

### **3. Compact Partitioning**

Children should be introduced first to expanded forms of vertical layout which build more naturally on mental strategies.

For example:

$$287 + 145$$

$$\begin{array}{r} 287 \\ + \quad \underline{145} \\ 300 \\ 120 \\ \underline{12} \\ 432 \end{array}$$

This then leads on to the standard written method of addition, which is introduced towards the end of Year 4.

### **4. Standard Written Column Addition**



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This is a condensed form of written recording and children using it can be prone to errors, usually because it encourages them to look only at the digits rather than think of the numbers as a whole.

For example:

$$287 + 145 =$$

$$\begin{array}{r} 287 \\ + 145 \\ \hline 432 \\ 11 \end{array}$$

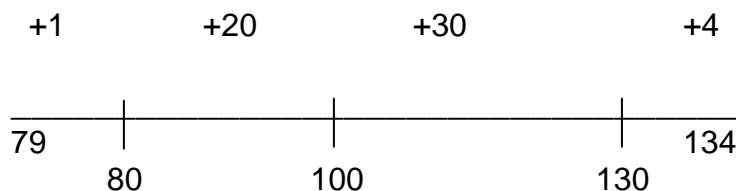
## THE DEVELOPMENT OF SUBTRACTION STRATEGIES IN YEARS 3 AND 4

### 1. Complimentary Addition Using a Number Line

In Years 3 and 4 the use of a number line is first used to 'find the difference' using 'complimentary addition'. This involves counting on from the smaller number up to the bigger number to find the difference.

For example:

$$134 - 79 =$$



$$20 + 30 + 4 + 1 = 55$$

### 2. Subtraction Using Partitioning

Where no exchange is necessary, children can get the idea of lining up the hundreds, tens and units by using this method.

For example:

$$567 - 243 =$$

$$\begin{array}{r} 500 + 60 + 7 \\ - 200 + 40 + 3 \\ \hline 300 + 20 + 4 = 324 \end{array}$$

### 3. Decomposition Subtraction

The standard decomposition layout of subtraction is a difficult concept for some children to grasp, which is why it should not be introduced too early.

The process is based on exchange, therefore it is important to develop this idea through plenty of preliminary work on partitioning into hundreds, tens and units.

For example:

$$567 - 378 =$$



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$$\begin{array}{r} 400 + 150 \\ 500 + 60 + 17 \\ - 300 + 70 + 8 \\ \hline 100 + 80 + 9 = 189 \end{array}$$

This would then be developed into the compact format.

For example:

$$567 - 378 =$$

$$\begin{array}{r} 4 \ 15 \\ 56 \ 17 \\ - 378 \\ \hline 189 \end{array}$$

## **MULTIPLICATION AND DIVISION IN YEARS 3 AND 4**

- Multiplication is usually associated with the idea of repeated addition. For example:  $2 \times 6$  is 2 multiplied by 6 or:  $2 + 2 + 2 + 2 + 2 + 2 = 12$ .
- Children are taught about the commutative rule of multiplication ( $a \times b = b \times a$ ). They are taught to appreciate that  $2 \times 6$  gives the same result as  $6 \times 2$ .
- Division is taught as either meaning 'grouping' or 'sharing'. It is also taught as repeated subtraction.
- Children are taught to understand that division does not follow the commutative rule and therefore  $12 \div 3$  is not the same as  $3 \div 12$ .
- Expressions such as '12 divided into 3' are confusing for children and should be avoided.
- In the same way the notation  $3 \overline{)12}$ , although standard for performing short or long division, is confusing because it reverses the order of the numbers compared to the notation  $12 \div 3$ . It is best to delay the introduction of this notation until late in Year 4 when it may be one of the ways to record division calculations.
- Children need to be confident in doubling and halving numbers, as this can help them greatly when working on multiplication and division questions.
- Knowledge of the times tables is essential; by the end of Year 4 children are expected to have a quick recall of the 2, 3, 4, 5 and 10 times tables and their associated division facts. The 6, 7 and 8 times tables are also studied in Year 4.
- The ability to multiply and divide by 10 and 100 is also extremely beneficial for children of this age.

## **WRITTEN METHODS OF MULTIPLICATION TAUGHT IN YEARS 3 AND 4**

### **1. Partitioning**

This method follows the same idea as the addition method of partitioning, whereby the number being multiplied is split up into its hundreds, tens and units and then multiplied separately.

For example

$$23 \times 8 =$$



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$$\begin{array}{r} 20 \times 8 = 160 \\ 3 \times 8 = \underline{24} \\ 184 \end{array}$$

### 2. The Rectangle or Grid Method

This method is an extension of the partitioning method and can be used for short multiplication or for long multiplication (which it is in Y5/6). It is a clear way of organising a calculation and children are able to see exactly what they have done at each stage in the calculation and pick up on any errors made quite easily.

For example:

$$234 \times 6 =$$

X	200	30	4
6	1200	180	24

$$\begin{array}{r} 1200 \\ 180 \\ + \underline{24} \\ 1404 \\ 1 \end{array} \qquad \begin{array}{r} 1000 + 0 = 1000 \\ 200 + 100 = 300 \\ 80 + 20 = 100 \\ 0 + 4 = \underline{4} \\ 1404 \end{array}$$

### 3. Expanded Vertical Reading

This is the next step before children are introduced to the standard written method of short multiplication.

For example:

$$38 \times 7 =$$

$$\begin{array}{r} 38 \\ X \underline{7} \\ 210 \\ \underline{56} \\ 266 \end{array}$$

This then leads to the standard written method which is usually not introduced until Year 5 and 6.

### 4. The Standard Written Method of Short Multiplication

This is a compact method of recording and children using it can be prone to errors if they haven't had enough experience of the expanded methods first, which is why it is not usually introduced until Year 5 or 6.

For example:

$$38 \times 7 =$$



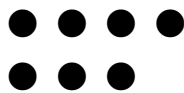
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$$\begin{array}{r} 38 \\ \times \quad 7 \\ \hline 266 \\ 5 \end{array}$$

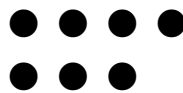
## THE WRITTEN METHODS OF DIVISION TAUGHT IN YEARS 3 AND 4

### 1. Pictorial Grouping

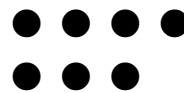
$$36 \div 7 = 5r1$$



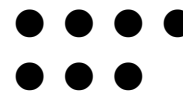
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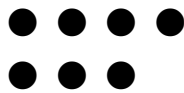
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1 left over – remainder 1

I can make 5 groups of 7 with 1 left over out of 36.

### 2. The 'Chunking' Method or Multiples of the Divisor Method

This method involves chunking lots of the number you are dividing by (the divisor) and subtracting them from the number you are dividing (the dividend). This method is essential for children to grasp as it provides the basis for the standard written method of long division which is introduced in Year 6.

For example:

$$96 \div 4 = 24$$

$$\begin{array}{r} 96 \\ - \underline{40} \quad (10 \times 4) \\ 56 \\ - \underline{40} \quad (10 \times 4) \\ 16 \\ - \underline{16} \quad (4 \times 4) \\ 0 \end{array}$$

$$10 + 10 + 4 = 24$$

### 3. The Standard Written Method of Short Division



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As with all the standard methods, this is a compact method and children need to have a good understanding of the expanded methods before they are introduced to it, towards the end of Year 4.

For example:

$$96 \div 4 = 24$$

$$\begin{array}{r} 24 \\ 4 \overline{) 96} \end{array}$$

$$99 \div 4 = 24r3$$

$$\begin{array}{r} 24 \text{ r}3 \\ 4 \overline{) 99} \end{array}$$

## **THE DEVELOPMENT OF ADDITION STRATEGIES IN YEARS 5 AND 6**

### **1. Partitioning Using Larger Numbers**

In Years 5 and 6 partitioning may still be used to deal with larger numbers but making sure that the numbers are lined up vertically in columns.

For example:

$$8642 + 753 =$$

$$\begin{array}{r} 8000 \\ 1300 \\ 90 \\ + \underline{5} \\ 9395 \end{array}$$

Or:

$$\begin{array}{r} 8000 + 600 + 40 + 2 \\ + 700 + 50 + 3 \\ \hline 8000 + 1300 + 90 + 5 = 9395 \end{array}$$

### **2. Standard Written Column Addition**

Some children will still need to make written records of additions in an expanded form, but those who understand and can use the standard algorithm should do so.

For example:

$$8642 + 753 =$$

$$\begin{array}{r} 8642 \\ + 753 \\ \hline 9395 \\ 1 \end{array}$$

### **3. Addition with Decimal Notation**



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Children in Years 5 and 6 will extend their experience of addition and subtraction into a range of contexts, including calculations with money and measurement. These contexts provide practical opportunities to extend confidence in calculating with numbers written in decimal notation.

For example:

$$£12.46 + £15.60 + £34.78 =$$

$$\begin{array}{r} £12.46 \\ £15.60 \\ + £34.78 \\ \hline £62.84 \\ 11 \quad 1 \end{array}$$

Children are taught to change quantities into the same units so that it is easier to add or subtract them.

For example:

$$455\text{g} + 1.5 \text{ kg}$$

$$\begin{array}{r} 0.455 \\ +1.500 \\ \hline 1.955 \text{ kg} \end{array}$$

### THE DEVELOPMENT OF SUBTRACTION STRATEGIES IN YEARS 5 AND 6

Number line subtraction may still be used by some children but most should be able to work with an expanded form of decomposition subtraction and then the standard condensed format.

For example:

$$2410 - 482 =$$

$$\begin{array}{r} 1000 \quad 1300 \quad 100 \quad 1 \\ 2000 + -400 + 40 + 0 \\ \hline \quad + 400 + 80 + 2 \\ 1000 + 900 + 20 + 8 = 1928 \end{array}$$

Leading to

### Standard Written Decomposition Subtraction

Children need to have a good understanding of the mathematical principles behind this method before they should be introduced to it.

For example:

$$2410 - 482 =$$



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$$\begin{array}{r} 1\ 13\ 10\ 1 \\ 2\ 4\ 4\ 0 \\ - \quad 4\ 8\ 2 \\ \hline 1\ 9\ 2\ 8 \end{array}$$

### **Subtraction with Decimal Notation**

For example:

$$2.56\text{m} - 89\ \text{cm}$$

$$\begin{array}{r} 1\ 14\ 1 \\ 2.56\ \text{m} \\ - \quad 0.89\ \text{m} \\ \hline 1.67\ \text{m} \end{array}$$

## **THE DEVELOPMENT OF MULTIPLICATION STRATEGIES IN YEARS 5&6**

### **1. The grid method for short multiplication**

This method is first introduced in Years 3&4 and is continued into Y5 & Y6 using larger numbers.

For example:

$$875 \times 6 = 5250$$

6	x	800	70	5
		4800	420	30

$$\begin{array}{r} 4800 \\ 420 \\ \underline{30} \\ 5250 \\ 1 \end{array}$$

### **2. Expanded vertical recording for short multiplication**

This is the next step before the standard written method of short multiplication is introduced for larger numbers in Y5 & 6.

For example:

$$572 \times 7 = 4004$$

$$\begin{array}{r} 572 \\ X \quad 7 \\ \hline 3500 \\ 490 \end{array}$$



$$\begin{array}{r} \underline{14} \\ 4004 \\ 11 \end{array}$$

### 3. The standard written method of short multiplication

This traditional method is a highly efficient way to calculate, but it has a very condensed form and needs to be introduced carefully. It is important that this method is seen as the ultimate objective however children will have to use the expanded forms if they do not have the understanding to cope with this method.

For example:

$$572 \times 7 = 4004$$

$$\begin{array}{r} 572 \\ \times \quad 7 \\ \hline 4004 \\ 51 \end{array}$$

### 4. Using the grid method for long multiplication

Children should progress to long multiplication (2-digit or more multiplier) using the same recording methods that they have used for short multiplication (1-digit multiplier).

For example:

$$34 \times 16 = 544$$

X	30	4
	300	40
	180	24

$$\begin{array}{r} 340 \\ + \underline{204} \\ 544 \end{array}$$

### 5. Using expanded vertical recording for long multiplication

When multiplying a 3-digit number by a 2-digit number, the different stages of the calculation need to be recorded in an organised way and a vertical arrangement is appropriate, although some pupils may still find the grid method easier to understand.

For example:

$$34 \times 16 = 544$$



$$\begin{array}{r} 34 \\ \times 16 \\ \hline 24 \\ \underline{180} \\ 40 \\ \underline{300} \\ 544 \\ 1 \end{array}$$

### **6. The standard written method of long multiplication**

The use of coloured pencils can be beneficial when teaching children how to use this method successfully as they can colour code multiplying the units and tens separately.

For example:

$$34 \times 16 = 544$$

$$\begin{array}{r} 34 \\ \times 16 \\ \hline 204 \\ \underline{2} \\ 340 \\ \underline{544} \end{array}$$

## **THE DEVELOPMENT OF DIVISION METHODS TAUGHT IN YEARS 5 & 6**

### **1. The chunking method/ multiples of the divisor method**

This method is introduced in Years 3 & 4 and is developed in Years 5 & 6 with larger numbers. It is important that children are confident in this method as it provides the basis for long division.

For example:

$$458 \div 6 = 76 \text{ r}2$$

$$\begin{array}{r} 458 \\ - \underline{120} \text{ (20x6)} \end{array}$$



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$$- \quad \underline{120} \quad (20 \times 6)$$

$$- \quad \begin{array}{r} 218 \\ \underline{120} \end{array} \quad (20 \times 6)$$

$$- \quad \begin{array}{r} 98 \\ \underline{60} \end{array} \quad (10 \times 6)$$

$$- \quad \begin{array}{r} 38 \\ \underline{30} \end{array} \quad (5 \times 6)$$

$$- \quad \begin{array}{r} 8 \\ \underline{6} \end{array} \quad (1 \times 6)$$

$$20+20+20+10+5+1= 76 \text{ r}2$$

## 2. The standard written method of short division

This method is introduced towards the end of Y4 and is developed in Y5 & 6 with larger numbers.

For example:

$$962 \div 4 = 240 \text{ r} 2$$

$$\begin{array}{r} 240 \text{ r} 2 \\ \underline{4 \overline{)962}} \end{array}$$

## 3. Using the chunking method for long division

This is the first step in introducing pupils to long division, again using familiar methods of recording.

For example:

$$435 \div 15 = 28 \text{ r}12$$

$$- \quad \begin{array}{r} 432 \\ \underline{150} \end{array} \quad (10 \times 15)$$

$$- \quad \begin{array}{r} 282 \\ \underline{150} \end{array} \quad (10 \times 15)$$

$$- \quad \begin{array}{r} 132 \\ \underline{75} \end{array} \quad (5 \times 15)$$

$$10+10+5+3 = 28 \text{ r}12$$



$$- \frac{45}{12} (3 \times 15)$$

#### **4. The standard written method of long division**

Providing the children have a good understanding of the chunking method, they should be able to progress to the standard written method quite smoothly.

For example:

$$432 \div 15 = 28 \text{ r}12$$

$$\begin{array}{r} 028 \text{ r}12 \\ 15 \overline{) 432} \\ \underline{-30} \phantom{0} \\ 132 \\ \underline{-120} \\ 12 \end{array}$$

## **VI. USEFUL WEBSITES**

<http://nationalstrategies.standards.dcsf.gov.uk/primary/primaryframework>  
[www.beam.co.uk](http://www.beam.co.uk)  
[www.learningclip.co.uk](http://www.learningclip.co.uk)  
[www.amblesideprimary.com](http://www.amblesideprimary.com)  
[www.primaryresources.co.uk](http://www.primaryresources.co.uk)  
[www.ncetm.org.uk](http://www.ncetm.org.uk)  
<http://nrich.maths.org>  
[www.murderousmaths.co.uk](http://www.murderousmaths.co.uk)  
[www.counton.org](http://www.counton.org)  
[www.teachers.tv](http://www.teachers.tv)  
[www.sgfl.org.uk/mathematics](http://www.sgfl.org.uk/mathematics)

## **VII. ROLE OF GOVERNING BODY**

At Molescroft Primary School we have an identified governor for Numeracy, who is invited to attend relevant Staff training sessions.

The Numeracy governor is informed of progress in the subject by the Head Teacher and Numeracy Co-ordinator.



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## FURTHER READING

The materials listed below may provide further support for teaching pupils in mathematics:

Securing Levels 1 – 5 in Maths (available on PNS website to download)

Overcoming Barriers in Maths materials (as above)

Pitch and Expectations Questions YFS – Y6/7 (as above)

APP Guidelines for Maths (as above)

The above mentioned documents are also available on the 'Steps to Success in Maths' DVD compendium which is in the staff resources folder on the school system.