Addition Methods

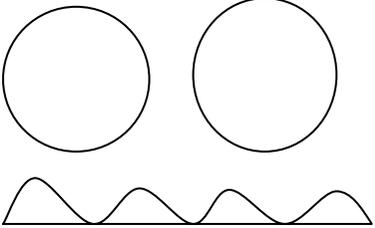| Methods	Jottings	Expanded	Compact
Examples	8 + 7 = 15 +2 +5 8 10 15 48 + 36 = 84 +30 +2 +4 48 78 80 84 or: +2 +34 48 50 84	Write the numbers in columns. Adding the tens first: $\begin{array}{r} 47 \\ +\ 76 \\ \hline 110 \\ 13 \\ \hline 123 \end{array}$ Adding the units first: $\begin{array}{r} 47 \\ +\ 76 \\ \hline 13 \\ 110 \\ \hline 123 \end{array}$ Discuss how adding the units first gives the same answer as adding the tens first. Refine over time to adding the units digits first consistently.	$\begin{array}{r} 47 \\ +\ 76 \\ \hline 123 \\ 1\ 1 \end{array}$ $\begin{array}{r} 258 \\ +\ 87 \\ \hline 345 \\ 1\ 1 \end{array}$ $\begin{array}{r} 366 \\ +458 \\ \hline 824 \\ 1\ 1 \end{array}$
Calculations to practise	62 + 36 =	84 + 58 =	651 + 287=

Subtraction Methods

Methods	Jottings	Expanded	Compact
Examples	Steps in subtraction can be recorded on a number line. The steps often bridge through a multiple of 10. $15 - 7 = 8$ *[number line: −2 from 10 to 8, −5 from 15 to 10; marks at 8, 10, 15]* $74 - 27 = 47$ worked by counting back: *[number line: −3 from 50 to 47, −4 from 54 to 50, −20 from 74 to 54; marks at 47, 50, 54, 74]* The steps may be recorded in a different order: *[number line: −20 from 67 to 47, −3 from 70 to 67, −4 from 74 to 70; marks at 47, 67, 70, 74]* or combined: *[number line: −23 from 70 to 47, −4 from 74 to 70; marks at 47, 70, 74]*	Partitioned numbers are then written under one another: Example: $74 - 27$ $\begin{array}{r} 70 + 4 \\ - \ 20 + 7 \\ \hline \end{array}$ $\quad$ $\begin{array}{r} {}^{60}\!\!\!\not{70} + {}^{14}\!\!\not{4} \\ - \ 20 + 7 \\ \hline 40 + 7 \end{array}$ $\quad$ $\begin{array}{r} {}^{6}\!\!\not{7}\ {}^{14}\!\!\not{4} \\ - \ 2\ 7 \\ \hline 4\ 7 \end{array}$ Example: $741 - 367$ $\begin{array}{r} 700 + 40 + 1 \\ - \ 300 + 60 + 7 \\ \hline \end{array}$ $\quad$ $\begin{array}{r} {}^{600}\!\!\not{700} + {}^{130}\!\!\not{40} + {}^{11}\!\!\not{1} \\ - \ 300 + 60 + 7 \\ \hline 300 + 70 + 4 \end{array}$ $\quad$ $\begin{array}{r} {}^{6}\!\!\not{7}\ {}^{13}\!\!\not{4}\ {}^{11}\!\!\not{1} \\ - \ 3\ 6\ 7 \\ \hline 3\ 7\ 4 \end{array}$	$\begin{array}{r} 563 \\ - \ 241 \\ \hline 322 \end{array}$ $\begin{array}{r} 4\!\!\not{5}2 \\ 367 \\ \hline 085 \end{array}$
Calculations to practise	$56 - 23 =$	$84 - 19 =$	$781 - 346 =$
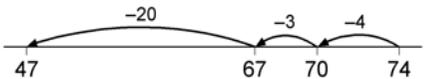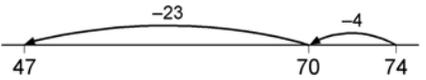
Multiplication Methods

Methods	Jottings	Expanded	Compact

Examples	Arrays – Look at representing multiplication as groups of….
	
	Eg. 7 x 3 or 3 x 7 = 21
	
	OOOOOOO OOOOO...OO
	OOOOOOO OOOOO...OO
	OOOOOOO OOOOO...OO
	
	Informal recording in Year 4 might be:
	  14 x 3 =
	  10 x 3 = 30
	   4 x 3 = 12
	  30 + 12 = 42
		38 × 7 = (30 × 7) + (8 × 7) = 210 + 56 = 266
		
		| ×
			7

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30	210
8	56
	266 | 56 × 27 is approximately 60 × 30 = 1800. | ×	20	7	
50	1000	350	1350
6	120	42	162
			1512

			1		$30 + 8$
					$\times\ \ 7$
					210 $30 \times 7 = 210$
					 56 $8 \times 7 =\ 56$
					266
					
					  38
					x 7
					  56
					210
					266
					
					  56
					x 27
					392
					1120
					1512
					  1

Examples to practise	5 x 4 = 23 x 4 =	56 x 3 = 34 x 23 =	54 x 8 = 87 x 41 =

Division Methods

Methods	Jottings	Expanded	Compact
Examples	Grouping How many pairs of socks are there? How many socks for each child if there are two children? Share 24 between 2. 	$6\overline{)196}$ $-\ \underline{60}\quad 6\times10$ 136 $-\ \underline{60}\quad 6\times10$ 76 $-\ \underline{60}\quad 6\times10$ 16 $-\ \underline{12}\quad 6\times\ \underline{2}$ $4\qquad 32$ Answer: $32\,R\,4$ $6\overline{)196}$ $-\ \underline{180}\quad 6\times30$ 16 $-\ \underline{12}\quad 6\times\ \underline{2}$ $4\qquad 32$ Answer: $32\,R\,4$	$\begin{array}{r}9\,7\\ 3\overline{)2\ 9^{2}1}\end{array}$ $\begin{array}{r}23\\ 24\overline{)560}\\ -480\\ \overline{80}\\ -72\\ \overline{8}\end{array}$ Answer: 23 R 8
Calculations to practise	Share 12 socks between 3 children.	Chunking method – 236 divided by 8	Short division – 458 divided by 3

The overall aim is that when children leave primary school they:

- have a secure knowledge of number facts and a good understanding of the four operations;

- are able to use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers and particular strategies to special cases involving bigger numbers;

- make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;

- have an efficient, reliable, compact written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally;

- use a calculator effectively, using their mental skills to monitor the process, check the steps involved and decide if the numbers displayed make sense.

Secure mental calculation requires the ability to:

- recall key number facts instantly – for example, all addition and subtraction facts for each number to at least 10 (Year 2), sums and differences of multiples of 10 (Year 3) and multiplication facts up to 10 × 10 (Year 4);

- use taught strategies to work out the calculation – for example, recognise that addition can be done in any order and use this to add mentally a one-digit number or a multiple of 10 to a one-digit or two-digit number (Year 1), partition two-digit numbers in different ways including into multiples of ten and one and add the tens and ones separately and then recombine (Year 2), when applying mental methods in special cases (Year 5);

- understand how the rules and laws of arithmetic are used and applied – for example, to add or subtract mentally combinations of one-digit and two-digit numbers (Year 3), and to calculate mentally with whole numbers and decimals (Year 6).

Maths Calculation Information Meeting for Parents

February 5th 2013

New Proposed Expectations for Children (September 2013)

Year 2	Year 4	Year 6
Number and place value Pupils should be taught to: read and write numbers to at least 100 in numerals and in words [39] recognise the place value of each digit in a 2-digit number (tens, ones) [40] count in steps of 2, 3, 5 and 10, count in tens from any number, and give 10 more or less than a given number to 100 [41] compare and order numbers from 0 up to 100; use <, > and = signs [42] arrange, read and write numbers in increasing and decreasing order [43] solve word problems using place value and number facts with increasing precision. [44]	**Number, place value and rounding** Pupils should be taught to: read and write numbers to at least 10,000 [136] recognise the place value of each digit in a 4-digit number (thousands, hundreds, tens, and ones) [137] order and compare numbers up to 10,000 [138] count in multiples of 2, 3, 4, 5, 6, 7, 8, 9, 10, 25, 50, 100 and 1000 from any given number, and 10 or 100 more or less than a given number [139] round any number to the nearest 10 or 100 [140] read and write negative numbers; order, count forwards and backwards with positive and negative whole numbers through zero [141] read Roman numerals to 100 and understand how Hindu-Arabic numerals included the concept of zero and place value [142] solve word problems that involve negative and increasingly large positive numbers. [143]	**Number, place value and rounding** Pupils should be taught to: read, write, order and compare numbers up to 10 million and determine the value of each digit [244] round any number to a required degree of accuracy [245] recognise binary numerals to 15 (1111) and convert between binary and decimal numerals. [246]
Addition and subtraction Pupils should be taught to:	**Addition and subtraction** Pupils should be taught to:	**Addition, subtraction, multiplication and division** Pupils should be taught to:

rapidly recall and use addition and subtraction facts to 20 [48] add and subtract numbers with up to two 2-digits including using column addition without carrying and column subtraction without borrowing [49] add and subtract numbers mentally including: - a 2-digit number and ones - a 2-digit number and tens - two 2-digit numbers [50] use subtraction in 'take away' and 'find the difference' problems [51] recognise and show that addition can be done in any order (commutative) and subtraction cannot [52] recognise and use addition and subtraction as inverse operations including to check calculations [53] solve word problems with addition and subtraction of numbers with up to 2-digits. [54]	add and subtract numbers using formal written methods with up to 4 digits [148] accurately add and subtract numbers mentally including two 2-digit numbers [149] estimate, within a range, the answer to a calculation and use inverse operations to check answers. [150]	add and subtract negative integers [248] multiply numbers with at least 4-digits by a 2-digit whole number using long multiplication [249] divide numbers up to 4-digits by a 2-digit whole number using long division, and interpret remainders as whole number remainders, fractions, decimals or by rounding [250] perform mental calculations, including with mixed operations and large numbers [251] use estimation to check answers to calculations and determine, in the context of a problem, whether an answer should be rounded or written as a fraction or a decimal [252] carry out combined operations involving the four operations accurately and state the order of operations [253] solve word problems involving addition, subtraction, multiplication and division. [254]
Multiplication and division Pupils should be taught to: recall multiplication and division facts for the 2, 5 and 10 multiplication tables [59] use the multiplication (x), division (÷) and equals (=) signs to read and write mathematical statements [60] write and calculate mathematical statements for multiplication and division within the multiplication tables [61] recognise and use the inverse relationship between multiplication and division to check calculations [62]	**Multiplication and division** Pupils should be taught to: recall multiplication and division facts for multiplication tables up to 12 x 12 [153] mentally perform multiplication and division calculations quickly and accurately, including multiplying by 0 and dividing by 1 [154] multiply or divide 2-digit and 3-digit numbers by a 1-digit number using formal written methods; interpret remainders appropriately as integers [155]	

ensure pupils can recognise and show that multiplication can be done in any order (commutative) and division cannot [63] solve word problems involving multiplication and division. [64]	recognise and use factor pairs within 144 [156] solve word problems involving the four operations. [157]	
	Decimals Pupils should be taught to: compare numbers with the same number of decimal places up to 2 decimal places [165] find the effect of dividing a 2-digit number by 10 and 100, identifying the value of the digits in the answer as units, tenths and hundredths [166] recognise and write decimal equivalents to ¼, ½, ¾ and any number of tenths and hundredths. [167]	**Decimals** Pupils should be taught to: identify the value of each digit to three decimal places and multiply and divide numbers up to three decimal place by 10, 100 and 1000 [267] multiply and divide numbers with up to two decimal places by 1-digit and 2-digit whole numbers. [268]
		Percentages Pupils should be taught to: use percentages for comparison and calculate percentages of whole numbers or measures such as 15% of 360 [272] recall and use equivalences between fractions, decimals and percentages. [273]

Useful resources and links:

Check out the excellent resources on the BBC schools website.

There is now a Key Stage 1 Bitesize section:

http://www.bbc.co.uk/schools/ks1bitesize/numeracy/

as well as KS2:

http://www.bbc.co.uk/schools/ks2bitesize/maths/

There are lots more activities on these websites:

http://www.woodlands-junior.kent.sch.uk/maths/

http://nrich.maths.org/public/

http://www.crickweb.co.uk/ks1numeracy.html

http://www.crickweb.co.uk/ks2numeracy.html

http://www.amblesideprimary.com/ambleweb/numeracy.htm

http://www.ictgames.com/resources.html

A good knowledge of numbers or a 'feel' for

numbers is the product of structured practice and

repetition.