Wilton and Barford Primary School

Progression in teaching written calculations.

January 2011

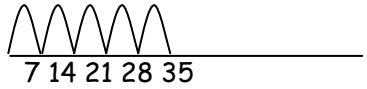
Progression in teaching written calculations

The following outlines the methods to be used for calculations involving the four rules and how they should be recorded. It is not an extensive list of mental calculation strategies, these can be found in the framework.

		+	-	X	÷
FS2	**Making a record of a calculation.**	Find 1 more than a number from 1-10. Begin to think of + as combining two groups. **Written recording** -using objects, marks, drawings, class/group recording. Begin to write and recognise simple number sentences To write numerals 1 -10	Find 1 less than a number from 1-10. Begin to relate subtraction to 'taking away' **Written recording** - using objects, marks, drawings, class/group recording.	Count in 2s and 10s	Begin to understand division as sharing through practical activities and play.
Year 1		Say a number 1 or10 more than a given number 0-30 Understand the operation of addition. Know all pairs of number to make 10, by heart. **Written recording** - using objects, marks, drawings, class/group recording. Begin to use simple number lines to record. **Write number sentences**	Say a number 1 or 10 less than a given number 0-30 **Written recording** - using objects, marks, drawings, class/group recording. Begin to use simple number lines to record.	Count in 2's 5's and 10s	Begin to understand divion as grouping by placing objects inot groups of 2, 5 and 10. Model number sentences (grouping) using the ÷ sign
		Year 1 children to use a 2cm squared maths book. Jottings related to mental work in the back.			

		+	-	X	÷
Year 2	**Jotting to support a new mental strategy.**	Adding three or more single digit numbers. Adding multiples and near multiples of 10. **Written recording** – using number lines – (blank and numbered), informal jottings, pictorial representation,	Subtracting a single digit number. Differences by counting on. Subtraction of single digit from a 2 digit number. **Written recording** - – using number lines (blank and numbered), informal jottings, pictorial representation,	Knows multiples of 2 5 and 10. Can understand multiplication as repeated addition and as an array. **Written recording** –using number lines (blank and numbered), informal jottings, pictorial representation such as arrays, begin to use repeated addition and x sign.	Introduced to division as sharing and grouping. Can identify groupings using arrays and introduced to subtracting/adding multiples. **Written recording** – using number lines (blank and numbered), informal jottings, pictorial representation, begin to use repeated addition and subtraction with the ÷ sign.
		Year 2 children to use 1 cm squared, maths book. Jottings related to mental work in the back.			

		+	-	X	÷
Year 3	Explaining a mental strategy.	Method - Mental addition of 2 digit numbers by partitioning. E.g. 36 + 73= 30 + 70 + 6+ 3= (30+70) + (6+3) = 100 + 9=109 Ensure children continue using number lines, e.g. 24+27 20 7 24 44 51 82 – 46 = 82 – 40 – 6 = 82 – 40 = 42 42 – 6 = 38 Written recording – Use of number lines, informal jottings such as above.	Method - Use the complementary method for subtraction. E.g. 'make up o the larger number' 85-53= +7 +20 +5 53 60 80 85 – 53 = 32 53 + 7 60 + 20 80 + 5 85 85-53 =32 **Decomposition** – begin partitioning of numbers. E.g. 82-46= 80 + 2 40 + 6 Written recording – Use of number lines, informal jottings such as in above examples. For decomposition begin to record calculations as shown above. Use Diennes, models and images and Cuisenaire	Method - Use knowledge of multiples of 2,5 and 10. Work out multiplication using repeated addition and arrays. E.g. 6x4= **repeated addition** 4 + 4 + 4 + 4 + 4 + 4 or **as an array** □ □ □ □ □ □ □ □ □ □ □ □ 4 □ □ □ □ □ □ □ □ □ □ □ □ × 6 4 + 4 + 4 + 4 + 4 + 4 can be use to derive… 4 +4 +4 + 4 + 4 + 4 = 8 + 8 + 8 which is 3 x 8 Written recording – **use pictures, jottings etc to show how known facts can be used to derive new ones.**	**Method -Use known multiple facts (up to 10x10) to help solve division. As well as using the link between x and ÷.** **Use the inverse multiplication to help solve division** E.g. 24 children to be put into teams of 3. 24 has factors of 3 and 8. 3x8=24 or 3x8=24 therefore 24 ÷ 3= 8 24 grouped into 3s equal 8 teams of 3. ☺☺☺ ☺☺☺ ☺☺☺ ☺☺☺ ☺☺☺ ☺☺☺ ☺☺☺ ☺☺☺ = 8 teams of 3 Written recording – Use of number lines, informal jottings such as above
		Year 3 children to use 1 cm squared, maths book. Jottings related to mental work in the back			

		+	-	X	÷
Year 4	**Developing written methods**	**Method – addition using partitioning** Introduce vertical format using partitioning e.g. 274+43= 200 + 70 + 4 + 40 + 3 200 + 110 +7 = 317 The equivalence of adding up left to right, as convention dictates, from right to left as here will be helped by children understanding the commutative of addition. **Written recording** – Move towards recording vertically as this will aid working out those calculations too difficult to do mentally. Still use informal methods as appropriate.	**Method - decomposition by partitioning** e.g. 764-286= 700 + 60 + 4 - 200 + 80 + 6 = 700 + 60 + 4 - 200 + 80 + 6 Adjusts from Tens to units = $^{6}\cancel{7}00 + {}^{1}\cancel{5}0 + {}^{1}4$ - 200 + 80 + 6 400 + 70 + 8 = 478 **Written recording - –** Move towards recording vertically as this will aid working out those calculations too difficult to do mentally. Still use informal methods as appropriate.	**Method - Chunking numbers.** Build upon Y3 work, record in different ways used previously, encourage children to use methods they can clearly explain. For larger numbers split numbers rather than using repeated addition. Chunk numbers rather than using repeated addition. E.g. 27 x 6 20 x 6 + 7 x 6 Which can be recorded using a grid 20 7 6 | 120 | 42 = 162 **Written Recording** –Move towards the children use chunking and record in grid method.	Method – **repeated addition and subtraction.** E.g. 36 ÷7 = 5 r1  7 14 21 28 35 And as repeated subtraction Introduce children to using multiples. **52 ÷ 4** **52** **-40** (10x4) **12** (3x4) **total** = 0 (13x4) Therefore 52 ÷4 = 13 Support children with chunks of multiples of 10. e.g. 10 x 4 = 40 20 -4 = 80 etc Consolidate this understanding by using word problems RUCSAC **Written recording** – Emphasise the relationship between x and □ and use this to record repeated addition, using chunking as above when children are ready for it.
	Year 4 children to use 1 cm squared, maths book. Jottings related to mental work in the back				

Year 5		+	-	X	÷
	Developing written methods	**Method** – **addition by partitioning, leading to expanded vertical recording.** **E.g.** 8462 + 753 8000 + 400 + 60 + 2 + 700 + 50 + 3 8000 + 100 + 110 + 5 = 9215 Or using the vertical recording…… 8462 + 753 = 8000 8000 400 + 700 = 1100 60 + 50 = 110 2 + 3 = + 5 = 9215 **Written recording** – as above.	**Method – Decomposition by partitioning** E.g. 764-286= 700 + 60 + 4 - 200 + 80 + 6 700 + 60 + 4 - 200 + 80 + 6 400 + 70 + 8 ***will lead to contracted format*** = $^{6}\not{7}\ ^{15}\not{6}\ ^{1}4$ - 2 8 6 4 7 8 **Written recording - –** Move towards recording vertically as this will aid working out those calculations too difficult to do mentally. Still use informal methods as appropriate. Use number lines for counting on leading to column methods of counting on.	**Method** – **use partitioning** Record partitioning using grid method E.g. 275 x 8 = 2200 | 200 70 5 8 | 1600 560 40= 2200 Leading onto expanded vertical recording. E.g. 270 x 6 1200 (200x6) 420 (70x6) 1620 **Written recording** - Use the grid method leading onto expanded vertical method	**Method** – **repeated subtraction with emphasis on estimating appropriate multiples to subtract.** Working with larger numbers E.g 461 ÷ 3 461 - 300 **100** 161 -150 **50** 11 - 9 **3** 2 **153r2** **Written recording** – introduce a move towards this vertical recording, encourage use of multiples, whether children can record just the factor or the whole sum each time.
	Year 5 children to use 1 cm squared, maths book. Jottings related to mental work in the back				

Year 6		+	-	X	÷
	Developing written methods	Method – **addition using the expanded vertical recording, leading to compacted form.** Use the expanded form and demonstrate how to compact it. E.g. 8462 + 753 8462 + 753 8000 1100 110 5 9215 E.g. 5673 +769 6442 Children then to use their chosen method to work with decimals. N.B. It is far better that children work using the expanded method and understand it rather than being pushed into using the contracted method. Written recording as above.	Method – **Decomposition by partitioning** but shown in standard contracted format. e.g. 754-286= Move from decomposition using expanded form to standard written method, gradually show condensed version alongside expanded version. E.g. 700 + 50 + 4 -200 + 80 + 6 $^{600}\cancel{7}00 + {}^{140}\cancel{5}0 + {}^{1}4$ - 200 + 80 + 6 $^{6}\cancel{7}\,{}^{14}\cancel{5}\,{}^{1}4$ - 2 8 6 4 6 8 Children then to use their chosen method to work with decimals. N.B. It is far better that children work using the expanded method and understand it rather than being pushed into using the contracted method. Written recording as above. Use number lines for counting on leading to column methods of counting on.	Method – **Multiplication by partitioning** introducing larger numbers using the grid method. Aim to move towards the use of the standardised method by end of year 6. E.g. 24 x 16 = 20 4 10 200 40 6 120 24 From this, begin to standardise. 24 x16 24 **(4x6)** 40 **(4x10)** 120 **(20x6)** 200 **(20x10)** 384 24 x16 240 **(24x10)** 144 **(24x6)**- 384 It is far better that children work using the expanded method and understand it rather than being pushed into using the contracted method. Written recording as above.	Method – **Repeated subtraction leading to more standard method. Introduce** E.g. 1256÷6= 209 6 | 1256 rem2 -600 **(x100)** 656 -600 **(x100)** 56 -54 **(x9)** 2 **rem2** 1256 ÷ 6 = 209 rem 2 From this, begin to standardise for higher ability confident children 609rem2 6 1256 It is far better that children work using the expanded method and understand it rather than being pushed into using the contracted method. Written recording as above.
	Year 6 children to use 1 cm squared, maths book. Jottings related to mental work in the back				