

Scotforth St. Paul's Church of England Primary and Nursery School



Progression in Mental Calculations

A guide for Year 2 parents

This policy aims to summarise the number facts, mental calculation strategies and the stage(s) of the progression towards the written methods for each of the four operations. The strategies used within this document are taken from the Lancashire Mathematics Team Progression in Mental Calculation Strategies Policies and the Progression Towards Written Methods Policies.

Arithmetic Expectations – Year 2

Skills	Examples
Counting	
Count in multiples of 2, 3 and 5 from 0. <i>(Counting in 2s and 5s from 0 is continuation of Year 1 expectations).</i>	Count from 0 in: twos; fives; threes. Complete these counting sequences: 0, 5, 10, 15, 20, __, __, __ 0, 2, 4, 6, 8, __, __, __ 0, 3, 6, 9, __, __, __ What number is missing from this counting sequence? 0, 3, 6, 9, 12, 15, 18, 24, 27
Count forwards or backwards in steps of 1 or 10 from any one- or two-digit number	Count forwards in ones from 75 to 92 Count back in ones from 54 to 38 Continue these sequences: 24, 34, 44, __, __, __ 89, 79, 69, __, __, __ 44, 34, 24, __, __
Count on and back in steps of $\frac{1}{2}$ and $\frac{1}{4}$	Count from 0 in steps of $\frac{1}{2}$ When counting from 0 in steps of $\frac{1}{4}$ what comes immediately after $\frac{3}{4}$? <i>Answer could be $\frac{4}{4}$ or 1</i> Count back in steps of $\frac{1}{2}$ from $\frac{6}{2}$ Count back in steps of $\frac{1}{2}$ from $2\frac{1}{2}$
Number Facts	
Recall number bonds and related subtraction facts for all numbers to 20	$16 + 4 = \underline{\quad}$ $2 + \underline{\quad} = 20$ $20 = \underline{\quad} + 5$ $20 - 13 = \underline{\quad}$ $20 - \underline{\quad} = 1$ $6 = 20 - \underline{\quad}$ $3 + 14 = \underline{\quad}$ $5 + \underline{\quad} = 14$ $14 = \underline{\quad} + 6$ $14 - 2 = \underline{\quad}$ $14 - \underline{\quad} = 3$ $5 = 14 - \underline{\quad}$
Derive and use related facts to 100	$60 + 40 = \underline{\quad}$ $70 + \underline{\quad} = 100$ $100 = 20 + \underline{\quad}$ $100 - 40 = \underline{\quad}$ $100 - \underline{\quad} = 70$ $20 = 100 - \underline{\quad}$
Partition numbers into tens and ones.	46 is 40 and 6 46 is 40 and $\underline{\quad}$ 46 is 6 and $\underline{\quad}$ $40 + \underline{\quad} = 46$ $6 + 40 = \underline{\quad}$
Recall and use number bonds to 5 totalling 60 (to support time).	$40 + 20 = \underline{\quad}$ $25 + \underline{\quad} = 60$ $60 = \underline{\quad} + 15$ $60 - 10 = \underline{\quad}$ $60 - \underline{\quad} = 30$ $35 = 60 - \underline{\quad}$
Recall and use multiplication and division facts for 2, 5 and 10 multiplication tables, including recognising odd and even numbers.	$6 \times 2 = \underline{\quad}$ $2 \times \underline{\quad} = 16$ $\underline{\quad} \times 5 = 15$ $\underline{\quad} = 5 \times 7$ $110 \div 10 = \underline{\quad}$ $\underline{\quad} = 80 \div 10$ Which of these numbers are odd? 32, 44, 18, 40, 55, 23, 100
Mental Calculation Strategies – Addition and Subtraction	
Count on or back in ones and tens from any given number, e.g. ($36 + 40 =$) <i>Concrete – Diennes equipment, place value counters, beadstring</i> <i>Pictorial – Diennes jottings, number line</i>	$36 + 40 = \underline{\quad}$ $30 + 48 = \underline{\quad}$ $89 - 50 = \underline{\quad}$ $76 - \underline{\quad} = 46$
Partition and combine multiples of tens and ones. <i>Concrete – Diennes equipment, place value counters, beadstring</i> <i>Pictorial – Diennes jottings, number line</i>	$40 + 37$ 40 add 30 and 7 = 40 add 30 add 7 $15 + 14$ 10 and 5 add 10 and 4 = 10 add 10 add 5 add 4 or 15 add 10 add 4 $37 + 12$ 37 add 10 and 2 = 37 add 10 add 2 $78 - 42$ 78 take away 40 and 2 = 78 take away 40 take away 2 $80 - 35$ 80 take away 30 and 5 = 80 take away 30 take away 5

<p>Reorder numbers in a calculation. Concrete – Diennes equipment, place value counters, beadstring Pictorial – Diennes jottings, number line</p>	<p>$28 + 3$ doesn't need reordering as the greater number is first already $2 + 17$ reorder as $17 + 2$ $5 + 63$ reorder as $63 + 5$ $16 - 8$ will not give the same answer if reordered</p>
<p>Find a small difference by counting up from the lesser to the greater number Concrete – Diennes equipment shown horizontally, beadstring Pictorial – Number line</p>	<p>$52 - 47$ $74 - 66$ $81 - 79$ $32 - 25$</p>
<p>Begin to bridge through 10 when adding a single digit number (partitioning, e.g. $58 + 5 = 58 + 2 + 3$) Concrete – Diennes equipment, place value counters, beadstring Pictorial – number line</p>	<p>$58 + 5 = 58 + 2 = 60$ $46 + 7 = 46 + 4 = 50$ $60 + 3 = 63$ $50 + 3 = 53$ $63 + 8 = 63 + 7 = 70$ $48 + 7 = 48 + 2 = 50$ $70 + 1 = 71$ $50 + 5 = 55$</p>
<p>Add or subtract 9 or 11 and 19 or 21 by rounding and compensating. Concrete – Diennes equipment, place value counters Pictorial – number line, 100 square</p>	<p>$34 + 9$ as $34 + 10 - 1$ $34 + 11$ as $34 + 10 + 1$ $77 + 19$ as $77 + 20 - 1$, or $77 + 10 + 10 - 1$ $46 - 9$ as $46 - 10 + 1$ $46 - 11$ as $46 - 10 - 1$ $63 - 19$ as $63 - 20 + 1$, or $63 - 10 - 10 + 1$</p>
Mental Calculation Strategies – Multiplication and Division	
<p>Apply counting in twos, threes, fives and tens to solve multiplication problems with a repeated addition context. Concrete – real items to model the context of the problem, Multilink arrays, beadstring Pictorial – images of the items in the context of the problem, jottings, arrays, number line</p>	<p>5×4 count in fives until fact is known 3×10 count in tens until fact is known 7×3 using a representation then count in threes 2×9 count in twos until fact is known</p>
<p>Share an amount into equal parts. Concrete – real items to model the context of the problem Pictorial – images of the items in the context of the problem</p>	<p>$24 \div 2$ share out until fact is known $40 \div 10$ share out until fact is known $18 \div 3$ using a representation to share 18 into 3 equal parts</p>
<p>Separate an amount into equal groups using repeated subtraction. Concrete – real items to model the context of the problem, Multilink arrays, beadstring Pictorial – images of the items in the context of the problem, arrays, jottings, number line</p>	<p>$24 \div 2$ repeated subtraction until fact is known $40 \div 10$ repeated subtraction until fact is known $18 \div 3$ repeated subtraction to find how many 3s are in 18 I have 24 sweets. How many children would get 2 sweets? There are 30 bears who live on one street. Three bears live in every house. How many houses are on the street?</p>
<p>Derive and use doubles of simple two-digit numbers. (of which the ones total less than 10) Concrete – Diennes equipment, place value counters Pictorial – Diennes jottings</p>	<p>Double 43 is double 40 (80) plus double 3 (6) = 86 24 add 24 is double 20 (40) plus double 4 (8) = 48 2×33 (two lots of 33) is double 30 (60) plus double 3 (6) = 66</p>
<p>Derive and use halves of simple two-digit number even numbers. (of which the tens are even) Concrete – Diennes equipment, place value counters Pictorial – Diennes jottings</p>	<p>Half of 64 is half of 60 (30) plus half of 4 (2) = 32 Halve of 28 is half of 20 (10) plus half of 8 (4) = 14 $46 \div 2$ is half of 40 (20) plus half of 6 (3) = 23</p>

Decision Making

- When calculating, children should ask themselves:
- do I know the answer because it is a fact I have learnt?
 - can I work it out easily in my head?
 - can I use some equipment or a jotting?

Concrete→Pictorial→Abstract

All new concepts are introduced using concrete apparatus eg. cubes, counters, bead strings, Diennes (hundreds, tens and ones equipment). When children are ready, we then move on to representing the concept using pictures or jottings eg. numberlines, bar models, arrays, part/whole diagrams. The final stage is using abstract forms (numbers and symbols).