



## **Worlebury St. Paul's Church of England VA Primary School** **Written Calculation Mathematics Policy 2014**

This policy should be taken as part of the overall strategy of the school and operated within the context of our vision, aims and values as a Church of England School.

### **Aims and Objectives**

Our aim is that all children become fluent in the fundamentals of mathematics, develop a conceptual understanding and have the ability to recall and apply knowledge rapidly and accurately. The development of formal written methods of performing and recording calculations plays a big part in this. Each teacher has the responsibility to ensure that learning is reinforced and that children move progressively from informal to more formal methods of recording when they are capable of understanding the underlying mathematical processes.

The reasons for using written methods include:

- To assist in a mental calculation by writing down some of the numbers involved;
- To clarify a mental procedure for the writer;
- To help to communicate solutions and methods with other readers;
- To provide a record of work done for themselves, teachers and others;
- To work out calculations which are too difficult to be done mentally;
- To develop, refine and use a set of rules for correct and efficient calculations.

### **Teaching and Learning**

Written recording and calculation strategies: expectations for each year.

#### **Foundation Stage**

- Begin to record in the context of play or practical activities and problems e.g. recording using objects, marks, stamps, etc; writing shopping bills in the class shop; recording how many children in the class come to school on the bus

#### **Year One**

- Add and subtract one-digit and two-digit numbers to 20, including zero. Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations.
- Solve one-step problems involving multiplication and division, calculate the answer using concrete objects, pictorial representation and arrays with the support of the teacher. Make connections between arrays, number patterns and counting in twos, fives and tens.

#### **Year Two**

- Solve problems with addition - using concrete objects and pictorial representations, including those involving numbers, quantities and measures; apply increasing knowledge of mental and written methods.

- Add or subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; adding three one-digit numbers
- Solve problems involving multiplication or division, using materials, arrays, repeated addition, mental methods, and multiplication or division facts, including problems in contexts
- Know and use multiplication facts 2, 5 and 10.

### **Year Three**

- Add or subtract numbers with up to three digits, using formal written methods of columnar addition.
- I Solve problems, including missing number problems, using number facts, place value, and more complex addition.
- Write and calculate mathematical statements for multiplication or division using the multiplication tables known, including for two-digit numbers, using mental and progressing to formal written methods.
- Know and use multiplication facts 2, 3, 4, 5, 8 and 10.

### **Year Four**

- Add or subtract numbers with up to four digits using the formal written methods of columnar addition or columnar subtraction where appropriate.
- Add or subtract numbers linked to money and measures to two decimal places.
- Multiply two-digit and three-digit numbers by a one-digit number using the formal written layout
- Practise to become fluent in the formal written method of short division with exact answers.
- Know and use multiplication facts up to 12x12.

### **Year Five**

- Add or subtract whole numbers with more than four digits, including using formal written methods (columnar addition or columnar subtraction).
- Add numbers linked to money and measures to two decimal places.
- Use all four operations to solve problems involving measure (length, mass, volume, money) using decimal notation, including scaling.
- Multiply numbers up to four digits by a one or two-digit number using the formal written method, including long multiplication for two digit numbers.
- Divide numbers up to four digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.
- Divide whole numbers and those involving decimals by 10, 100 and 1000
- Interpret non integer answers to division by expressing results in different ways.

### **Year Six**

- Solve addition multi-step problems in contexts, deciding which operations and methods to use and why.
- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.
- Multiply multi-digit numbers up to four digits by a two-digit whole number using the formal written method of long multiplication.
- Multiply one-digit numbers with up to two decimal places by whole numbers.
- Divide numbers up to four digits by a two-digit whole number using the formal written method of long division, and interpret remainder as whole number remainders, fractions, or by rounding, as appropriate for the context.

- Divide numbers up to four digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.

## **Methods**

We need a uniform approach to teaching written calculations in order to progress effectively and increase understanding of the concept. Please refer to the strategies below to clarify the teaching expected for each year group. For a model of each Strategy see the 'Strategies for the Written Method of Calculation' sheets or Strategy Cards in each classroom. Each strategy is labelled with a progressive letter. All strategies indicate end of year expectations.

## **Addition**

### **Reception and Year 1**

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc. (Strategy A).

They count on a numbered line and then move on to using a blank number line. After this they count on to the nearest 10. (Strategy B, C, D)

### **Year 2**

Children count on in 10s from any 2-digit number. After this they use partitioning and a blank number line. By the end of Year 2 they should be using an expanded columnar method. (Strategy E, F, F2)

### **Year 3**

Children use the expanded column method for 2-digit and then 3-digit numbers. (Strategy G, H, H2)

### **Year 4**

Pupils use the expanded column method with decimals. They then move on to the compact column method with 3 then 4 digits. By the end of Year 4 they can use the compact column method linked to money and measures to 2 decimal places. (Strategy I, J, K, L)

### **Year 5**

Pupils can use the compact column method with more than four digits. (Strategy L, M)

### **Year 6**

Pupils can use the compact column method with more than four digits including using decimal notation of up to three decimal places. (Strategy L, M)

## **Subtraction**

### **Reception and Year 1**

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc. (Strategy A, B).

They count back using a numbered line and then move on to using a blank number line – jumping back to the previous 10 and therefore using more efficient jumps. (Strategy C, D)

## **Year 2**

Children jump back in 10s then units using partitioning, they then progress to jumping back in larger jumps using partitioning. Finally they use expanded decomposition with no exchanges. (Strategy E, F, G)

## **Year 3**

Children use the expanded decomposition column method for 2-digit numbers, with one exchange and then progress to using 3-digit numbers and more than one exchange. (Strategy H, I)

## **Year 4**

Pupils use the compact column method first with 3-digits and then with 4-digits. By the end of Year 4 they should be able to use the compact column method to 2 decimal places. (Strategy J, K, L)

## **Year 5**

Pupils can use the compact column method with more than four digits. (Strategy M)

## **Year 6**

Pupils can use the compact column method with more than four digits including using decimal notation of up to three decimal places. (Strategy N)

## **Multiplication**

### **Reception and Year 1**

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc. They can make equal sets or groups practically and can count in 2s, 5s and 10s. (Strategy A).

They use repeated addition on a numbered line to work out multiplications. (Strategy B)

Children make connections between arrays, number patterns and counting in 2s, 5s and 10s. (Strategy B2)

### **Year 2**

Children use repeated addition on a blank number line. They also use arrays for multiplication facts 2, 5 and 10. (Strategy C, D)

By the end of Year 2, children use partitioning and a blank number line. (Strategy E)

### **Year 3**

Children use the grid method TUxU progressing to TUxTU. (Strategy F, G)

### **Year 4**

Pupils use the grid method HTUxTU and then with decimals. They then progress to the column method and the formal written layout for multiplication. (Strategy H, I, J, K)

### **Year 5**

Pupils use the formal written layout for multiplication. They then use the expanded written method for long multiplication progressing to the formal written method for long multiplication. (Strategy L, M, N, O)

## **Year 6**

Pupils can multiply one-digit numbers (2 decimal places) by whole numbers. They are confident in the written method of long multiplication. (Strategy P, Q)

## **Division**

### **Reception and Year 1**

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, etc. They share groups of objects during practical problem solving activities.

(Strategy A).

They group objects, recording using symbols or pictures and make connections between arrays, number patterns and counting in 2s, 5s and 10s. (Strategy B, C,)

Children group, using a number line and counting on. (Strategy D)

### **Year 2**

Children use arrays for division facts 2, 5 and 10. They count up on a number line progressing to counting up on a number line with a remainder. They use division facts 2, 5 and 10. (Strategy E, F, G)

### **Year 3**

Pupils count up on a number line. They use division facts 2, 3, 4, 5, 8 and 10. They progress to counting up on a number line with a remainder using the above division facts. (Strategy H, I)

### **Year 4**

Pupils count up on a number line using 'chunks of'. They progress to the 'bus stop' method of short division (with exact answers). (Strategy J, K, L)

### **Year 5**

Pupils can use the 'bus stop' method of short division, with remainders – first of all up the 3-digits and then up to 4-digits. They progress to interpreting non integer answers to division by expressing results in different ways. (Strategy M, N, O)

### **Year 6**

Pupils can use the short division method (bus stop) interpreting remainders according to the context. They also know the formal written method for long division. (Strategy P, Q)

This policy will be reviewed according to the policy cycle.

Signed: *Gillian Quick*

Date: 4<sup>th</sup> September 2014

Equality Impact Assessment Review:

