Progression in methods taught at Mickleover Primary for written calculations

Dear Parents

Please find attached a progression of the methods that your child will encounter in each phase when learning written methods for addition , subtraction, multiplication and division. They have been taken from the school Calculation Policy which can be found in full, on the school website in the 'Parents' section. Please retain your copy for reference but they will also be available on the School Website.

Please find time to look through the methods used, as these will be the methods that your child will be taught in class in this and future years. It can be helpful for parents to ask their child to show them and explain the methods that they are being taught in school. The ability to explain will aid their understanding. Please refrain from supporting your child by teaching other methods which do not form part of our policy.

Please return the slip below indicating that you have received this document and should you require any clarification of the methods being taught please comment below. We are hoping to run workshops in the Autumn Term 2016.

Many thanks

Mrs M. Harrison (KS 2 Maths Coordinator)
Mrs S. Sharpe (KS 1 Maths Coordinator)

I have received a copy of the progression of written calculation methods. _____

I would be interested in attending a workshop on Ks1 ☐ ks 2 ☐

Addition ☐ Subtraction ☐ Multiplication ☐ Division ☐

Year 3 copy

Progression in written addition methods

Year 2

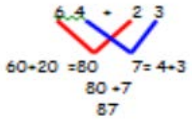
Children solve problems with addition using concrete objects and pictorial representations. Children will learn to add -:

1. A two digit number and ones
2. A two digit number and tens
3. Two two-digit numbers
4. Three one-digit numbers

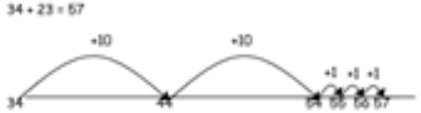
- Using place value knowledge children combine Tens and Ones to add.

T	O
1	3
2	1

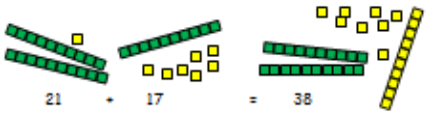
10 + 20 = 30
3 + 1 = 4
30 + 4 = 34



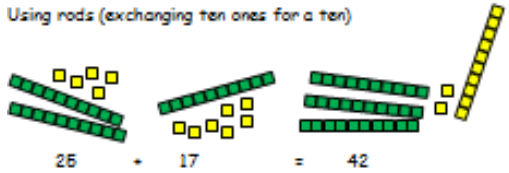
- Using an empty number line to add two-digit numbers.



- Using Tens and Ones apparatus children add by combining groups, counting from the largest.



- Using Tens and Ones apparatus children add by combining groups, where 10 ones are exchanged for a Ten .



Year 3

Add numbers with up to three digits, using formal written method of columnar addition

Stage 1 no exchange and expanded

$$\begin{array}{r} 21 \\ +17 \\ \hline 38 \end{array} \qquad \begin{array}{r} 20+1 \\ 10+7 \\ \hline 30+8 \end{array}$$

Stage 2 with exchange and expanded

$$\begin{array}{r} 25 \\ +17 \\ \hline 42 \end{array} \qquad \begin{array}{r} 20+5 \\ 10+7 \\ \hline 30+12=42 \end{array}$$

Stage 3 begin to represent as vertical alongside expanded

$$\begin{array}{r} 67 \quad (60+7) \\ +24 \quad (20+4) \\ \hline 80+11=91 \end{array} \qquad \begin{array}{r} 67 \\ +24 \\ \hline 11\,(7+4) \\ 80\ (60+20) \\ \hline 91 \end{array}$$

Stage 4 more than two numbers recorded vertically

$$\begin{array}{r} 24 \\ 67 \\ +12 \\ \hline 13\ (4+7+2) \\ 90\ (20+60+10) \\ \hline 103\ (90+13) \end{array}$$

Add fractions with the same denominator within one whole

$$\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$$

Year 4

Add numbers with up to 4 digits using the formal written methods of columnar addition. Carry below the line and cross off when added into the calculation

$$\begin{array}{r} 625 \\ +\ 48 \\ \hline 673 \\ \hline \end{array} \qquad \begin{array}{r} 783 \\ +\ 42 \\ \hline 825 \\ \hline \end{array}$$

	2	5	6
+	1	2	7
	3	8	3
		1	

	5	2	0	9
+	3	1	9	2
	8	4	0	1
		1	1	

Add fractions of the same denominators

$$1\frac{1}{6} + \frac{4}{6} = 1\frac{5}{6}$$

Progression in written subtraction

Year 2

Childen subtract numbers using concrete objects and pictorial representations. . Children will learn to subtract -:

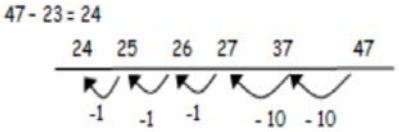
- A two digit number and ones
- A two digit number and tens
- Two two-digit numbers

- Using knowledge of addition and subtrasction families and the inverse relationship od addition and subtraction.

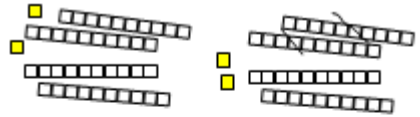
3 + 2 = 5 2 + 3 = 5 Number
5 - 2 = 3 5 – 3 = 2 families

48 + 36 = 84 so 84 – 36 = 48 Inverse

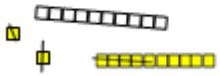
- Using place value knowledge children subtract Tens and Ones.



- Using Tens and Ones apparatus children subtract by removing rods where 10 ones are exchanged for a Ten .



subtract 7 by exchanging a ten rod for 10 units



Year 3

Subtract numbers with up to three digits, using formal written method of columnar subtraction

Stage 1 – expanded with no exchange

```
  89  =   80 + 9
- 57      50 + 7
           30 + 2  = 32
```

Stage 2 – expanded with exchange

Step 1

```
  71     70 + 1
- 46   - 40 + 6
```

The calculation should be read as e.g. 1 minus/take/subtract 6

Step 2

```
      60 + 11
    - 40 + 6
      20 + 5  =  25
```

when confident

Step 3

```
      60
      70 + 11
    - 40 + 6
      20 + 5  = 25
```

```
  754
-  86
```

Step 1
```
  700 + 50 + 4
-       80 + 6
```

Step 2 *(adjust from T to U)*
```
  700 + 40 + 14
-       80 + 6
```

Step 3 *(adjust from H to T)*
```
  600 + 140 + 14
-       80 + 6
  600 + 60 + 8  = 668
```

Step 4
```
  600   140
  700 + 60 + 14
-       80 + 6
  600 + 60 + 8  = 668
```

Subtract fractions with the same denominator within one whole

$\frac{6}{7} - \frac{1}{7} = \frac{5}{7}$

Year 4

Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate

```
  6 14 1
   7 5 4
-    8 6
-------
    6 6 8
```

	5	6^{5}	$^{1}2$
-	3	1	9
	2	4	3

NOTE: In both examples, we have '**exchanged**' one of the six tens for ten ones. •

Children will also begin to find the difference between two three-digit sums of money, with or without 'adjustment' from the pence to the pounds; know that decimal points should line up under each other

£3.50- £1.67

1.67- 0.3

```
  1.67
- 0.30
```

Subtract fractions with the same denominator

$1\frac{1}{6} - \frac{4}{6} = \frac{3}{6}$

Progression in written multiplication methods

Year 2

Children recall & use multiplication facts for 2, 5 & 10 tables, including recognising odd and even numbers.

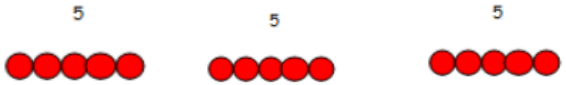
- Using a 100 square to find and discuss patterns when counting.

4	5	6	7	8	9	10
14	15	16	17	18	19	20

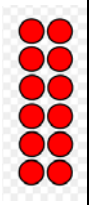
Children solve multiplication problems practically, using concrete objects, arrays, repeated addition and multiplication and division facts.

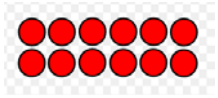
- Children solve multiplication calculations through repeatedaddition.

5 + 5 + 5  3 × 5 = 3 groups of 5 = 15

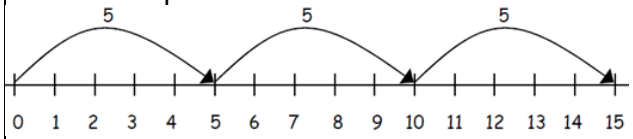


- Children draw dots to show multiplication. (arrays)



2 x 6 =  6 x 2 =

- Number lines are used to show multiplication as repeat addcition.



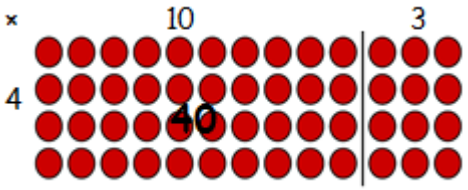
5 x 3 = 5 + 5 + 5

- Children record calculations using x and =.

Year 3

Write and calculate statements for x and ÷ using tables they know, including for TU x U using mental and progressing to formal written methods.

13 × 4 = (10 × 4) + (3 × 4)



×	10		3		
4	40	1	2	=	52

13x4= (10x4)+(3x4)
40 + 12 = 52

Year 4

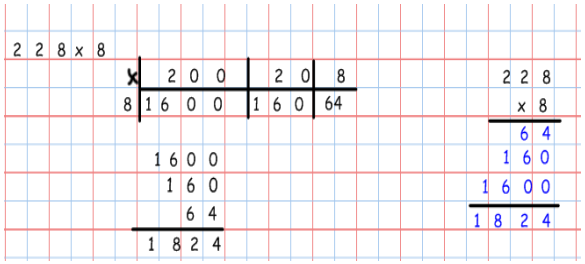
Multiply two-digit and three-digit numbers by a one-digit number using formal written

Multiply HTU x U or HT x U using grid method and vertical method alongside.

Ie 13 x 4

×	10		3		
4	40	1	2	=	52

13
X 4
12 4 x3
40 4 x 10
52



Leading to in Y5
HTU x U

carrying above to avoid confusion with carrying below

$^{1}2^{1}23$
X 6
1338

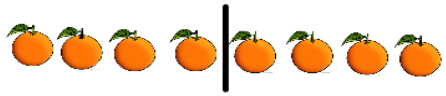
Progression in written methods for division

Year 2

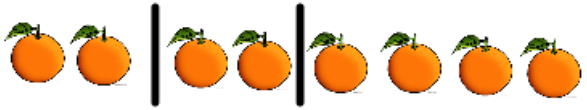
Children recognise odd and even numbers and recall division facts for the 2, 5 and 10 multiplication tables.
E.g. Sort these numbers into odd and even
15, 27,34, 75, 82

Children find a half, a quarter, a third and three quarters of shapes, objects and numbers.

- Using and sharing objects



1/2 1/2



$\frac{1}{4}$ $\frac{1}{4}$ 2 Quarter 2/4 = $\frac{1}{2}$

Children partition tens and ones with larger numbers to find half, a quarter and three quarters

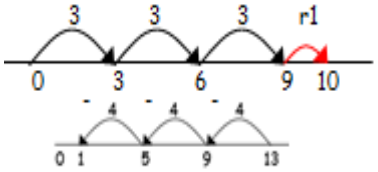
Find half of 48 48 = 40 + 8
Half of 40 = 20
Half of 8 = 4
Half of 48 = 20 + 4 = 24

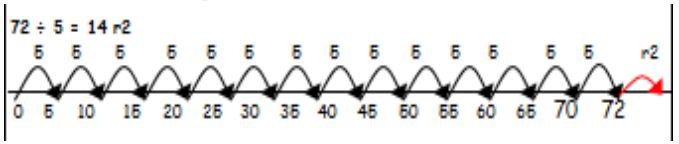
Children continue to use grouping and sharing for division using practical apparatus as taught in year 1.

, repeated subtraction and arrays are introduced in year 2.

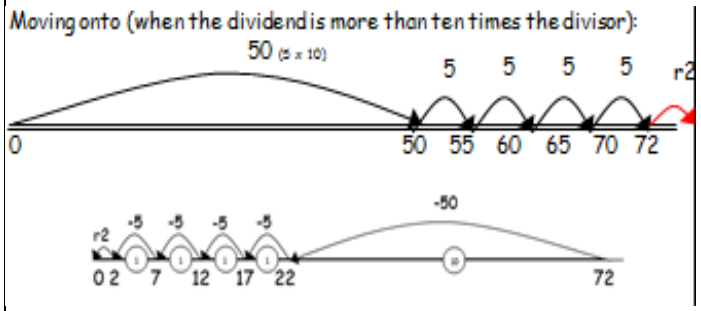
Year 3

1) Solve division through repeated addition or subtraction that involves remainders, e.g. 10 ÷ 3 = 3 r1

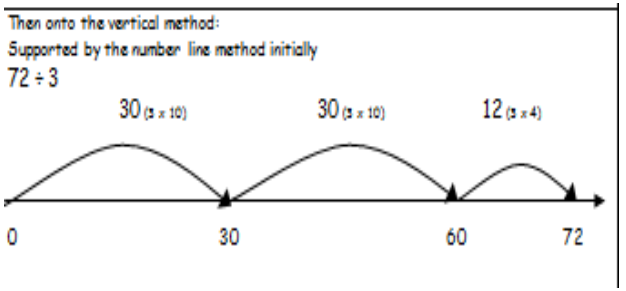


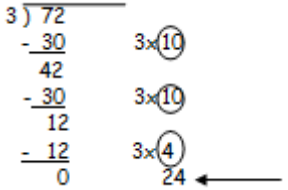


Moving onto (when the dividend is more than ten times the divisor):

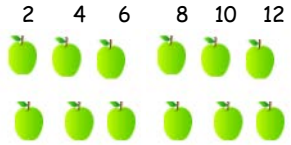


Year 4

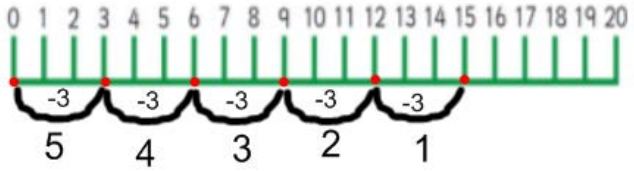




- Mental methods, and division facts - Children count regularly, on and back, in steps of2, 5 and 10 using concrete objects or pictoral representations.



- Repeat subtraction - Children recognise division as repeat subtraction.Using a numberline children start with the total amount to be divided (the first number). They then jump back in steps of the divisor (the second number) until they reach 0. By counting the number of steps taken we find the answer.

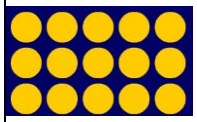


15 ÷ 3 = 5

NB. We always count backwards below the line for subtraction.

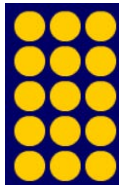
- Arrays - Children will be introduced to arrays as a pictorial representation to show division.

15 ÷ 3 = 5



.

There are 5 groups of 3.



15 ÷ 5

There are 3 groups of 5

E.g. 15 pencils shared between 3 pots, how many in each pot?

Children calculate mathematical statements for division within the multiplication tables and write them using division (÷) and equals (=) signs.