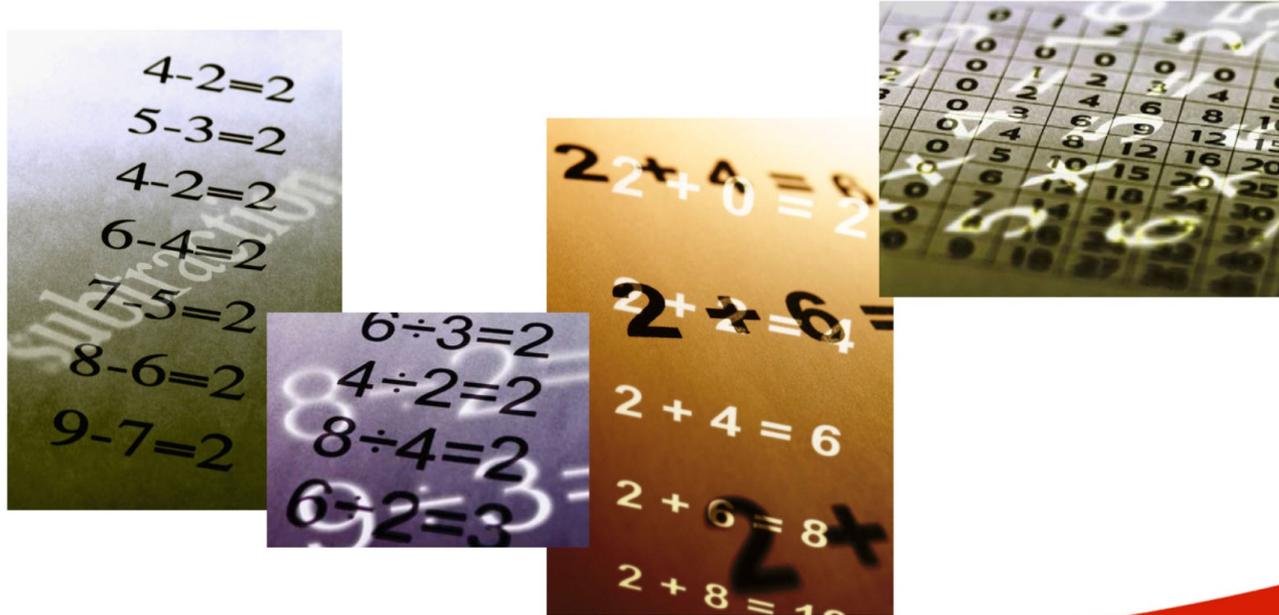# Enfield Local Authority
Written Calculation Policy 2014

ENFIELD Council

Enfield LA Calculation Policy 2014

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.
Enfield LA Maths Team will be working with Early Years Consultants to produce maths guidance for nursery and reception.

Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, **however it is vital that pupils are taught according to the stage that they are currently working at,** being moved onto the next stage once they show conceptual understanding, or working at a lower stage until they are secure enough to move on.

Providing a context for calculation:

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

Choosing a calculation method:

Children need to be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved:

Can I do it in my head using a mental strategy?

Could I use some jottings to help me?

Should I use a written method to work it out?

To work out a tricky calculation:
Approximate
Calculate
Check

Key Stage 1 – Addition

Y1	Y2
Through practical activities in meaningful contexts and informal written methods.	Through practical activities in meaningful contexts and informal written methods.

Y1

Through practical activities in meaningful contexts and informal written methods.

- Recall number bonds to 20 and within 20.
- Pictures and Marks – 1 more / 2 more.
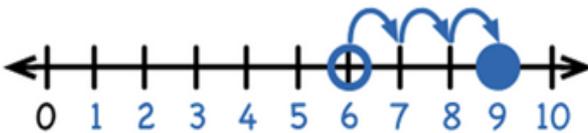 There are 3 cars in the garage. 1 more came along.

$3 \quad + \quad 1 = 4 \qquad 4 + 1 = 5$

Terry has 3 apples and Tony has 2 apples. How many altogether?

- Number lines to 20.

$6+3=9$

- Derive related facts to 20.
  $\square = 5 + 4$
  $5 + 4 = \square$
  $\square + 4 = 9$
  $\square + \square = 9$
- Money and addition up to 20p.
- Read, write and interpret mathematical statement involving addition (+) and equals (=).

Video clips:
Using a range of equipment and strategies to reinforce addition statements

National Curriculum requirements:
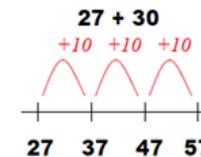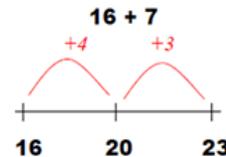Add 1 digit and 2 digit numbers to 20, including 0.

Y2

Through practical activities in meaningful contexts and informal written methods.

- Fluent recall of bonds to 20 and within 20.
- Derive and use related facts up to 100.
- Addition of money up to £1.
- Add numbers using concrete objects, pictorial representations and mentally.

$16 + 7 \qquad\qquad 27 + 30$

- Show that addition of two numbers can be done in any order (commutative).
- Recognise and use the inverse relationship between addition and subtraction.
- Progressing to partitioned columnar method (in preparation for year 3).

$63 + 16$
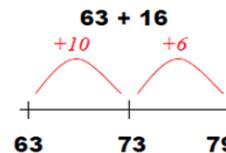

```
  2 0 + 3
+ 3 0 + 4
  5 0 + 7
      = 5 7
```

National Curriculum requirements:
(using concrete objects, pictorial representations and mentally)
Add 2 digit numbers and ones.
Add 2 digit number and tens.
Add two 2 digit numbers.
Add three 1 digit numbers.

Key Stage 2 – Addition

Y3	Y4

Y3

- Continue with partitioned columnar method.
- Introduce expanded columnar addition.

```
    H   T   O

    2   3   6
+       7   3
            9
    1   0   0
    2   0   0
    3   0   9
```

Progressing to the compact columnar method.

T O	H T O	T O	H T O	T O	H T O
2 3	3 1 5	9 4	5 6 1	4 7	2 3 7
+ 4 2	+ 6 2 4	+ 7 3	+ 7 1 8	+ 2 5	+ 5 1 6
6 5	9 3 9	1 6 7	1 2 7 9	7 2	7 5 3
			1	1	1

- Add money using both £ and pence in practical contexts.

Video clip:
Demonstration of expanded 3 digit columnar addition

National Curriculum requirements:
Add numbers with up to 3 digits, using the formal written method of columnar addition.

Y4

- Continue with columnar addition.

H T O	H T O	Th H T O
3 7 1	3 7 6	2 3 8 8
+ 4 8 5	+ 4 8 5	+ 1 1 2 4
8 5 6	8 6 1	3 5 1 2
1	1 1	1 1

- Estimate and use inverse operations to check answers to a calculation.

- Add money using both £ and pence in practical contexts.

National Curriculum requirements:
Add numbers with up to 4 digits, using the formal written method of columnar addition.

Key Stage 2 – Addition

Y5	Y6
• Continue to use columnar addition, adding numbers with more than 4 digits.	• Add several numbers of increasing complexity using columnar addition.

```
    3   2 8 7 9
+   3   5 9 8 7
    6   8 8 6 6
```

• Addition of money and decimals.

```
  £ 2 3 · 5 9
+ £  7 · 5 5
  £ 3 1 · 1 4
```

```
  1 9 · 0 1
    3 · 6 5
+   0 · 7 0
  2 3 · 3 6
```

```
  2 3 · 3 6 1
      9 · 0 8 0
    5 9 · 7 7 0
+     1 · 3 0 0
    9 3 · 5 1 1
    2 1     2
```

```
    8 1,0 5 9
      3,6 6 8
    1 5,3 0 1
+   2 0,5 5 1
  1 2 0,5 7 9
```

National Curriculum requirements:
Add whole numbers with more than 4 digits, using the formal written method of columnar addition.

National Curriculum requirements:
Add whole numbers with more than 4 digits, using the formal written method of columnar addition.
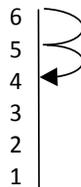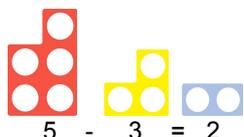
Key Stage 1 – Subtraction

Y1	Y2
Through practical and meaningful contexts and informal written methods.	Through practical and meaningful contexts.

Y1

Through practical and meaningful contexts and informal written methods.

• We made 6 cakes. We ate 2 of them.
How many cakes are left?

6
5
4
3
2
1

• Link to vertical number line $6 - 2 =$

$5 - 3 = 2$

• Find the difference within 20.

• Represent and use number bonds within 20.

• Record using subtraction (–) and equals signs (=)

• Derive related facts up to 20.

$5 - 2 = \square$	$\square = 5 - 2$
$5 - \square = 3$	$3 = \square - 2$
$\square - 2 = 3$	$3 = 5 - \square$
$\square - \square = 3$	$3 = \square - \square$

• Counting back on a 100 square and a vertical number line.

National Curriculum requirements:
Subtract 1 digit and 2 digit numbers up to 20, including 0.
Represent and use number bonds and related subtraction facts.

Y2

Through practical and meaningful contexts.

• Fluent recall of bonds to 20 and within 20.

• Derive and use related facts up to 100
e.g. $10 - 7 = 3$ so $100 - 70 = 30$.

• Counting back by partitioning second number. Subtract the ones first to be in line with columnar subtraction

46
E.g. 46 - 18
46 - 10 - 8
- 8
36
- 10
28
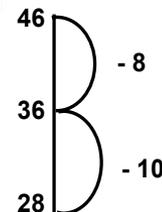
• Find the difference by counting up (only when the difference is small).
$23 - 18 = 5$

+1 +1 +1 +1 +1
16 17 18 19 20 21 22 23
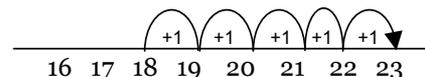
• Recognise and use the inverse relationship between addition and subtraction

• Show that subtraction is not commutative (done in any order)

• Progressing to the partitioned columnar method in preparation for year 3

• Subtraction of money, including change.

National Curriculum requirements:
(using concrete objects, pictorial representations and mentally)
Subtract 2 digit numbers and ones.
Subtract 2 digit number and tens.
Subtract two 2 digit numbers.
Subtract three 1 digit numbers.

Key Stage 2 – Subtraction

Y3	Y4

Y3

- Continue with vertical number line subtraction progressing to the expanded columnar subtraction method.

$$89-35 = 54$$

$$
\begin{array}{r}
80 + 9 \\
- \ 30 + 5 \\
\hline
50 + 4 = 54
\end{array}
$$

- Introduce exchanging through the expanded columnar subtraction method.

72 - 47

$$
\begin{array}{r}
^{60}7\!\!\!/0 + {}^{1}2 \\
- \ 40 + 7 \\
\hline
20 + 5 = 25
\end{array}
$$

- Progressing on to compact columnar subtraction.

T O	H T O	T O
4 7	8 6 4	$^4 5\!\!\!/^1 1$
- 2 3	- 6 2 1	- 3 6
2 4	2 4 3	1 5

- Emphasise value of digit, e.g. 4 tens subtract 2 tens = 2 tens. Use the correct language for subtraction i.e. exchange rather than borrow.
- Subtract amounts of money to give change.

Video clips:
Subtraction - teaching children to consider the most appropriate methods before calculating
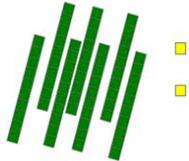
Introducing partitioned column subtraction method, from practical to written

National Curriculum requirements:
Subtract numbers with up to 3 digits using the formal written method of columnar subtraction.

Y4

- Continue with partitioned columnar subtraction progressing to compact columnar subtraction.

H T O	H T O	H T O	Th H T O
$^3 4\!\!\!/^1 3\ 7$	$^3 4\!\!\!/ {}^{12}3\!\!\!/ {}^1 2$	$^5 6\!\!\!/\ ^9 7\!\!\!/0\ ^1 4$	$8\ ^3 4\!\!\!/\ ^{11}2\!\!\!/\ ^1 6$
- 1 8 2	- 1 8 7	- 3 4 7	- 2 1 7 7
2 5 5	2 4 5	2 5 7	6 2 4 9

- Estimate and use inverse operations to check answers to a calculation.

- Subtract amounts of money using columnar method.

Video clips:
Subtraction - teaching children to consider the most appropriate methods before calculating

Introducing partitioned column subtraction method, from practical to written

Moving to the compact column method of subtraction

National Curriculum requirements:
Subtract numbers up to 4 digits using the formal written method of columnar subtraction.

Key Stage 2 – Subtraction

Y5	Y6
• Continue with compact columnar subtraction, including subtraction of decimals.	• Continue with compact columnar subtraction, including subtraction of decimals.

| Y5	Y6
• Use rounding to check answers to calculations and to determine, in the context of a problem, levels of accuracy.	• Use estimation to check answers to calculations and to determine, in the context of a problem, levels of accuracy.

National Curriculum requirements:
Subtract numbers with more than 4 digits.

National Curriculum requirements:
Subtract numbers with more than 4 digits.

Key Stage 1 – Multiplication

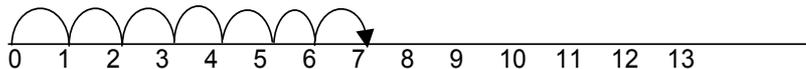| Y1	Y2
Through practical activities and meaningful contexts using concrete objects, pictorial representations and arrays with the support of the teacher.	Through practical activities and meaningful contexts using concrete objects, pictorial representations and arrays.

Y1

Through practical activities and meaningful contexts using concrete objects, pictorial representations and arrays with the support of the teacher.

• Doubles.

    7   +   7   = 14
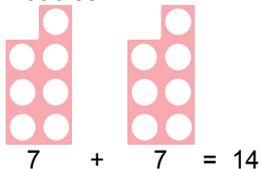
• Make connections between arrays, number patterns and counting in 2's, 5's to 50 and 10's to 100.
• Use of number lines.

```
  ⌢ ⌢ ⌢ ⌢ ⌢ ⌢ ⌢→
0 1 2 3 4 5 6 7 8 9 10 11 12 13
```

• "100 Square" to count in 2's, 5's and 10's.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

• There are 2 sweets in one bag. How many sweets are there in 5 bags?

• Counting multiples of coins: 2p, 5p, 10p.

   2p   +   2p   +   2p
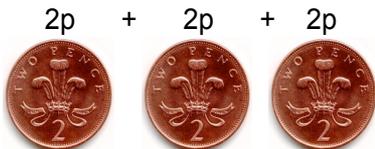
National Curriculum requirements:
Solve one step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Y2

Through practical activities and meaningful contexts using concrete objects, pictorial representations and arrays.

• Double numbers (by partitioning and recombining) 17 + 17.

   10 + 10   7 + 7
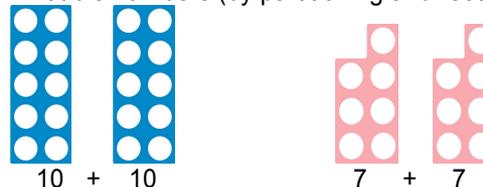
• Understand multiplication as repeated addition/groups/lots.
• Read arrays.

         2x4 (2, 4 times)
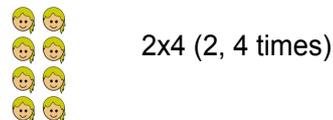
• Repeated addition on a number line.
   2 + 2 + 2 + 2   (4 groups of 2, 2 four times, 2 x 4)

```
  ⌢ ⌢ ⌢ ⌢→
0 1 2 3 4 5 6 7 8 9 10
```
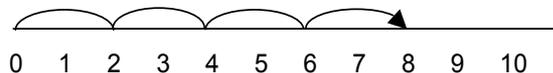
    4   +   4   (2 groups of 4, 4 two times, 4 x 2)

```
  ⌢     ⌢→
0 1 2 3 4 5 6 7 8 9 10
```

• Know the multiplication tables for 2, 5 and 10.
• Calculate mathematical statements within the multiplication tables using the multiplication (x) and equals (=) signs.
• Show that the multiplication of two numbers can be done in any order (commutative).

Video clips: Teaching for understanding of multiplication facts
Practical multiplication and the commutative law

National Curriculum requirements:
Solve problems involving multiplication using materials, arrays, mental methods and multiplication facts.

Key Stage 2 – Multiplication

Y3	Y4
• Recall and use multiplication tables for 3, 4 and 8.	• Recall and use multiplication tables up to 12x12 (Including multiplying by 0 and 1).

Y3

• Recall and use multiplication tables for 3, 4 and 8.

• Continue to use arrays and number lines/Cuisenaire rods for 3, 4 and 8 multiplication tables.

• Write and calculate mathematical statements for multiplication. Statements to include the multiplication tables that they know and 2 digit numbers x 1 digit numbers. Pupils use mental methods and progress to formal written methods.

(grid method removed)

• Progressing to expanded method of multiplication.

```
  T O
  1 4
x   5
  2 0  (5x4)
+ 5 0  (5x10)
  7 0
```

Video clips: Teaching the grid method as an interim step
(Partitioning and counters to introduce grid).

National Curriculum requirements: Multiply 2 digits by 1 digit, using mental and progressing to formal written methods.

Y4

• Recall and use multiplication tables up to 12x12 (Including multiplying by 0 and 1).

• Short Multiplication.

No carrying	Extra digit	Carrying	Zeros	Ext.
T O	**H T O**	**H T O**	**H T O**	**H T O**
3 2	5 1	3 8	2 0 2	□ 5 □
x 3	x 2	x 7	x 4	x 4
9 6	1 0 2	2 6 6	8 0 8	6 1 2
		5		2 1

National Curriculum requirements:
Multiply 2 digits by 1 digit using formal written layout.
Multiply 3 digits by 1 digit using formal written layout.

Key Stage 2 – Multiplication

Y5	Y6
• Recall and use multiplication tables up to 12x12 (Including multiplying by 0 and 1).	• Recall and use multiplication tables up to 12x12 (Including multiplying by 0 and 1).

Y5

- Recall and use multiplication tables up to 12x12 (Including multiplying by 0 and 1).

- Continue to practise short multiplication.

- Use Grid Method to introduce long multiplication.

Video clips:
Moving from grid method to a compact method
Reinforcing rapid times table recall
Demonstration of long multiplication

National Curriculum requirements:
Multiply numbers up to 4 digits by a 1 digit number using the formal written method of short multiplication.

Multiply numbers up to 4 digits by a 2 digit number using the formal written method of long multiplication.

Multiple whole numbers and those involving decimals by 10, 100, 1000.

Y6

- Recall and use multiplication tables up to 12x12 (Including multiplying by 0 and 1).

- Continue to practise short multiplication.

- Continue to practise long multiplication.

- Multiply decimals using the grid method and progressing on to short multiplication.

- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Video clips:
Moving from grid method to a compact method
Reinforcing rapid times table recall
Demonstration of long multiplication

National Curriculum requirements:
Multiply up to 4 digits by 2 digits using the formal written method of long multiplication.
Multiply numbers by 10,100, 1000 giving answers up to 3 decimal places.

Key Stage 1 – Division

Y1	Y2
Through practical activities in meaningful contexts.	Through practical activities in meaningful contexts.

Y1

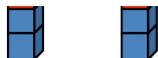Through practical activities in meaningful contexts.

- Division as sharing.
  Emphasise the importance of sharing equally.
  Share a bag of 15 sweets between 5 children – one for you, one for you, one for you, one for you, one for me.

12 shared between 3 is 4
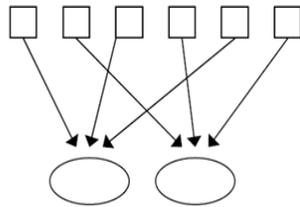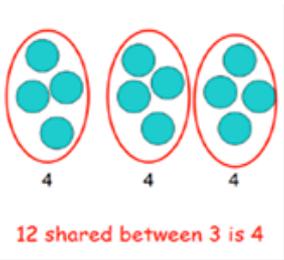
This is an important stage in teaching the difference between grouping and sharing.

- Introduce halving even numbers up to 10.

  Half of 4

National Curriculum requirements:
Solve one step problems involving division, by calculating the answer by using concrete objects, pictorial representations and arrays with the support of the teacher.

Y2

Through practical activities in meaningful contexts.
- Recall and use division facts for 2, 5 and 10 times tables.
- Continue to use division as sharing.
- Division as grouping.

- 15 children get into teams of 5 to play a game. How many teams are there?
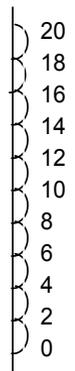
  How many groups of 5 in 15?

  How many 5's have been counted?

- How many 2's in 10?

- Understand '÷ 2' as 'half of'.
- Understand that division is not commutative.
- Recognise relationship between x and ÷
- Record using division (÷) and equals (=) signs.
- Use number lines to answer questions such as $20 ÷ 2 =$

  20
  18
  16
  14
  12
  10
  8
  6
  4
  2
  0

  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

National Curriculum requirements:
Solve problems involving division using materials, mental methods and division facts.

Key Stage 2 – Division

Y3	Y4
• Recall and use division facts for 3, 4, and 8 times tables.	• Recall and use all division facts for all tables up to 12 (Including dividing by 1).
• Write and calculate mathematical statements for division using the tables they know.	• Continue with short division method.
• Introduce short division, with exact answers.	
	• Progressing to short division with remainders.
• Progressing to short division involving carrying, with exact answers.	

National Curriculum requirements:
Division questions based on multiplication tables they know.

Divide 2 digits by 1 digit, progressing to formal written methods.

The National Curriculum statutory requirements for Year 3 and the use of written methods are not clear therefore our guidance for Year 3 has been based on the skills required to access Year 4 statutory requirements.

National Curriculum requirements:
Divide 2 digits by 1 digit and 3 digits by 1 digit becoming fluent with formal written method of short division with exact answers and progressing to remainders.

The National Curriculum statutory requirements for Year 4 and the use of written methods are not clear therefore our guidance for Year 4 has been based on the skills required to access Year 5 statutory requirements.

Key Stage 2 – Division

Y5	Y6

Y5

- Consolidate the use of the formal written method of short division.
-

$$0\ 6\ 6\ 3\ r\ 5$$
$$8\overline{)5\ ^53\ ^50\ ^29}$$

- Introduce long division

432 ÷ 15 becomes

```
        2  8  r 12
1  5 | 4  3  2
        3  0  0
        1  3  2
        1  2  0
           1  2
```

Answer: 28 remainder 12

432 ÷ 15 becomes

```
           2  8
1  5 | 4  3  2
        3  0  0     15×20
        1  3  2
        1  2  0     15×8
           1  2
```

$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

432 ÷ 15 becomes

```
           2  8 · 8
1  5 | 4  3  2 · 0
        3  0 ↓
        1  3  2
        1  2  0
        1  2  0
        1  2  0
              0
```

Answer: 28·8

National Curriculum requirements:
Divide 2 digits by 1 digit.
Divide 3 digits by 1 digit.
Divide 4 digits by 1 digit.

Children interpret the remainders appropriately for the context.
e.g. as fractions, decimals or by rounding
98÷4 = 98/4 = 24r2 = 24 ½ = 24.5 rounded to 25

Divide whole numbers and those involving decimals by 10, 100, 1000.

Y6

- Consolidate short division.

- Children should be able to interpret remainders as whole number remainders, fractions or by rounding, as appropriate for the context.

98 ÷ 7 becomes

```
     1  4
     2
7 | 9  8
```

Answer: 14

432 ÷ 5 becomes

```
     8  6  r 2
        3
5 | 4  3  2
```

Answer: 86 remainder 2

496 ÷ 11 becomes

```
     4  5  r 1
        5
1 1 | 4  9  6
```

Answer: $45\frac{1}{11}$

N.B: The above examples are taken from the National Curriculum for Mathematics appendix.

National Curriculum requirements:
Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division where appropriate.

Divide up to 4 digits by a 2 digits whole number using the formal written method of long division.

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