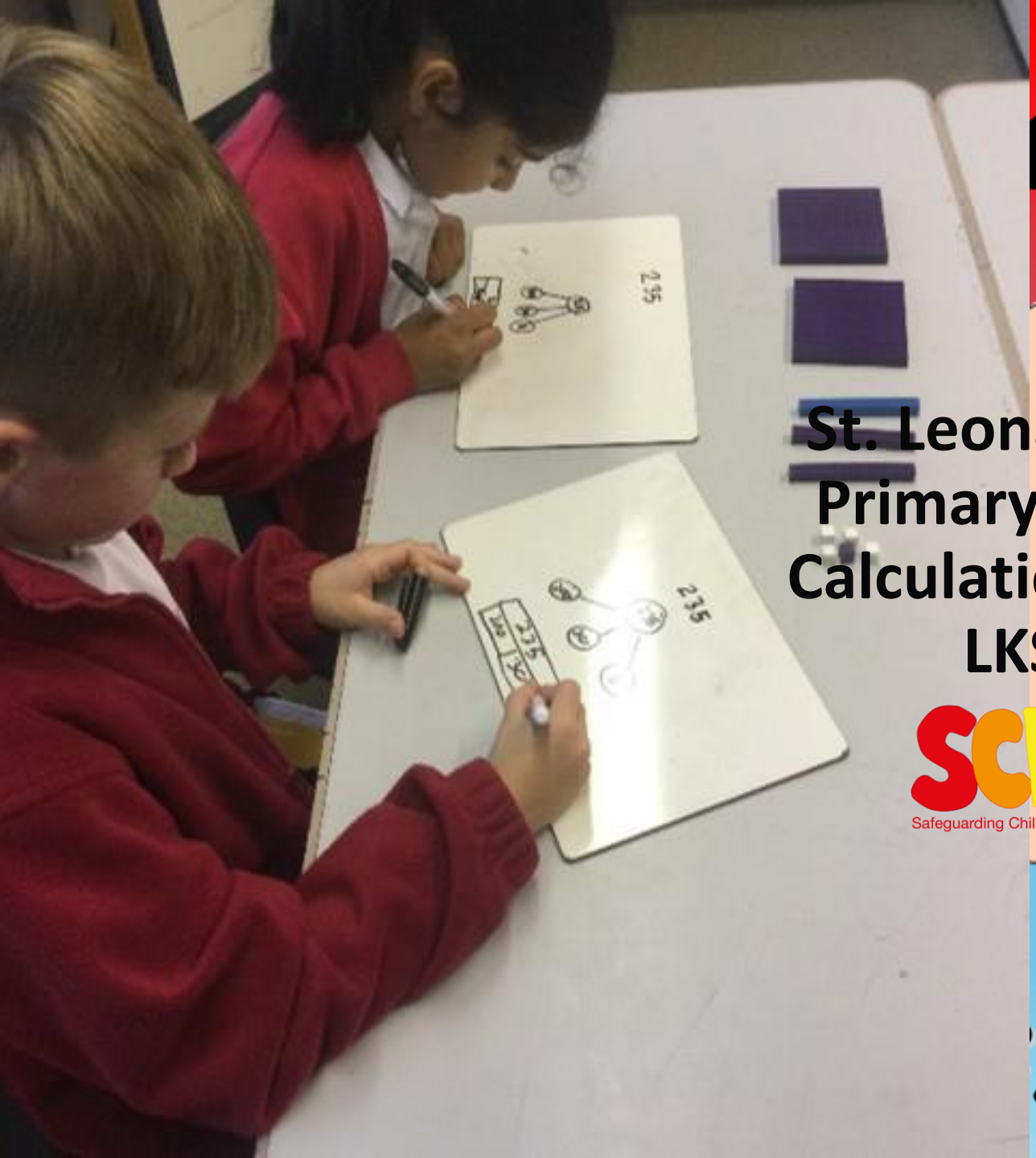



# St. Leonard's CE Primary School Calculation Policy LKS2

Safeguarding Children In Banbury

# About St. Leonard's Calculation Policy

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics; it is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.

**Age stage expectations:**

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014 and the method(s) shown for each year group should be modelled to the vast majority of pupils. Pupils are taught according to the pathway that they are currently working at and are showing to have 'mastered' a pathway before moving on to the next one. Of course, pupils who are showing to be secure in a skill can be challenged to the next pathway as necessary.

**Maths Mastery:**

At the centre of the mastery approach to the teaching of mathematics is the belief that **all children have the potential to succeed**. They should have access to the same curriculum content and, rather than being extended with new learning, they should **deepen their conceptual understanding by tackling challenging and varied problems**. Similarly, with calculation strategies, children must not simply rote learn procedures but demonstrate their understanding of these procedures through the use of concrete materials and pictorial representations. This policy outlines the different calculation strategies that should be taught and used in Year 1 to Year 6 in line with the requirements of the 2014 Primary National Curriculum.

Safeguarding Children In Banbury

# About St. Leonard's Calculation Policy

**Mathematical Language:**

The 2014 National Curriculum is explicit in articulating the importance of children using the correct mathematical language as a central part of their learning (*reasoning*). Indeed, in certain year groups, the non-statutory guidance highlights the requirement for children to extend their language around certain concepts. It is therefore essential that teaching using the strategies outlined in this policy is accompanied by the use of appropriate and precise mathematical vocabulary. New vocabulary should be introduced in a suitable context (for example, with relevant real objects, apparatus, pictures or diagrams) and explained carefully. High expectations of the mathematical language used are essential, with teachers only accepting what is correct.

**How to use the policy:**

This calculation policy is a guide for all staff and parents of St Leonard's Primary school and has been adapted from work by PiXL. It is expected that teachers will use their professional judgement as to when consolidation of existing skills is required or if to move onto the next concept. However, the **focus must always remain on breadth and depth rather than accelerating through concepts.** Children should not be extended with new learning before they are ready, they should deepen their conceptual understanding by tackling challenging and varied problems.
Teachers can use any teaching resources that they wish to use and the policy does not recommend one set of resources over another, rather that, a variety of resources are used. The principle of the concrete-pictorial-abstract (CPA) approach [Make it, Draw it, Write it] is for children to have a true understanding of a mathematical concept.

Safeguarding Children In Banbury

# Addition: Year Three

Year 3 statutory requirements :

- Find 10 or 100 more than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Add numbers with up to three digits, using formal written methods of columnar addition.

Use expanded column method with place value resources to support the conceptual understanding of adding numbers up to three digits ***with no carrying***.

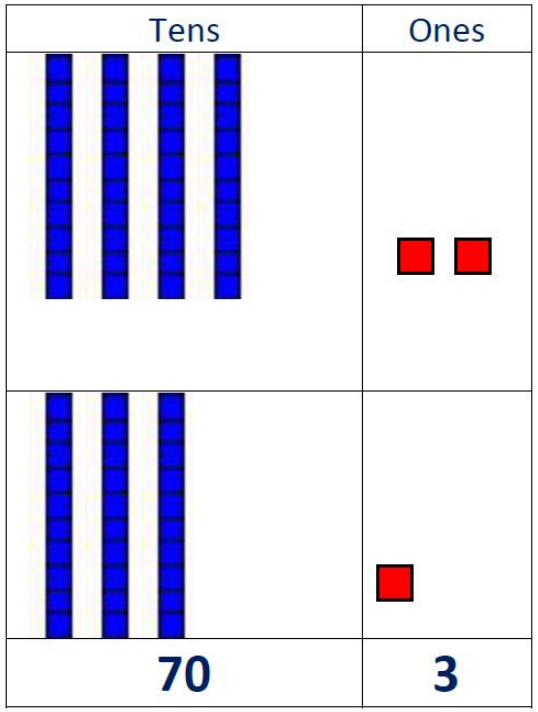
**42 + 31 = 73**

**40 + 2**

**+ 30 + 1**

**70 + 3**

**OR**

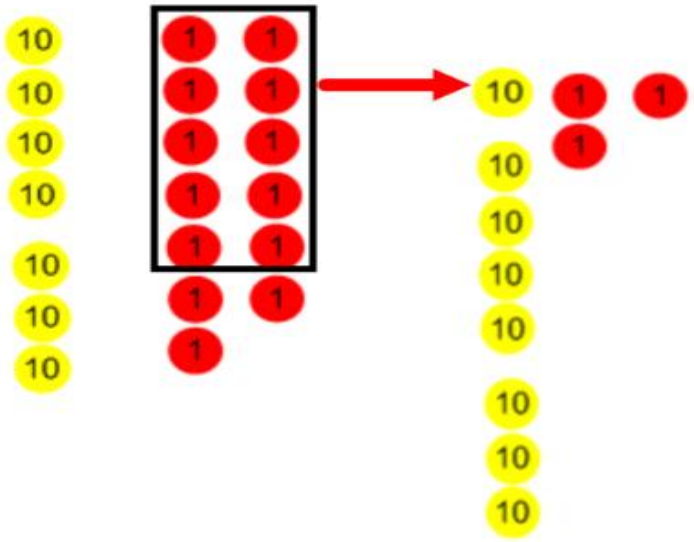


# Addition: Year Three

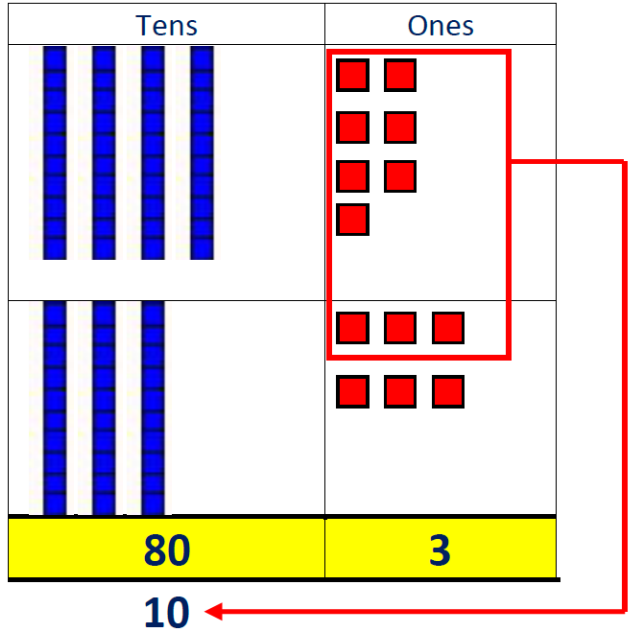
Progress to using the expanded column method with place value resources to support the conceptual understanding of adding numbers up to three digits ***with carrying***.

**47 + 36 = 83**

**40 + 7**
**+ 30 + 6**
**80 + 3**
**10**




OR




Extend to using the expanded column method to add three digit numbers + three digit numbers ***with carrying***.

**367 + 185 = 552**

**300 + 60 + 7**
**+ 100 + 80 + 5**
**500 + 50 + 2**
**100 10**

**Note:** The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added.

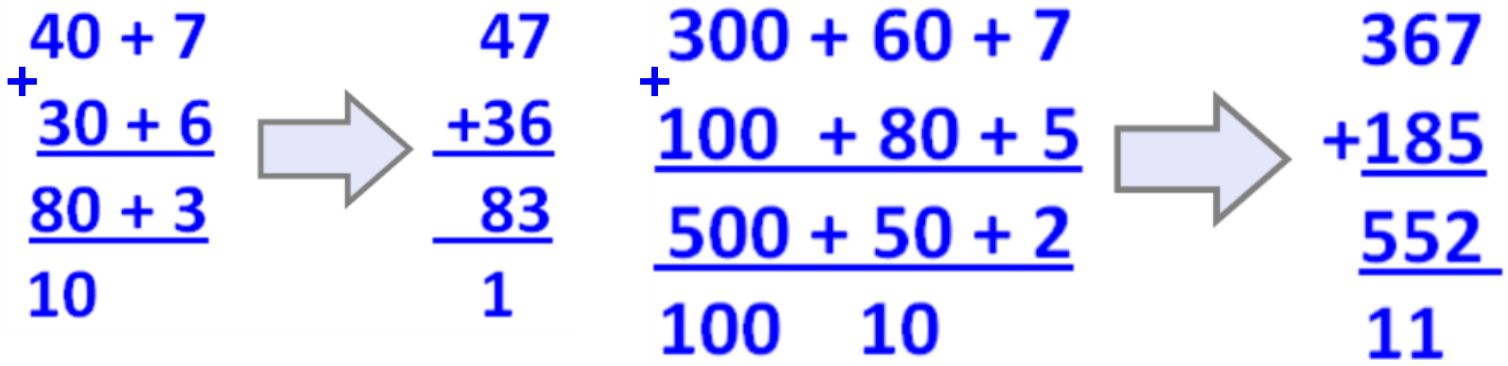
Safeguarding Children In Banbury

# Addition: Year Four

Year 4 statutory requirements :

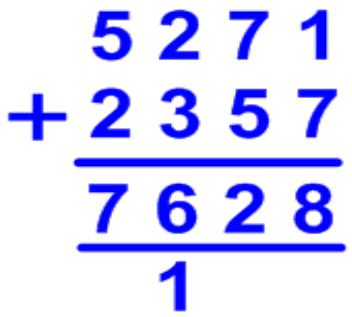
- Find 1000 more than a given number.
- Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate.
- Solve addition two-step problems in contexts, deciding which operations and methods to use and why,

Build on learning from Year 3 and model how expanded method links to compact column addition method.




**Note:** The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added.

By the end of year 4, pupils should be adding numbers up to 4 digits using compact column addition method.



# Subtraction: Year Three

Year 3 statutory requirement:

- Find 10 or 100 less than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Subtract numbers with up to three digits, using formal written methods of column subtraction.
- Subtract numbers mentally, including:
  - A three-digit number and ones
  - A three-digit number and tens
  - A three-digit number and hundreds.

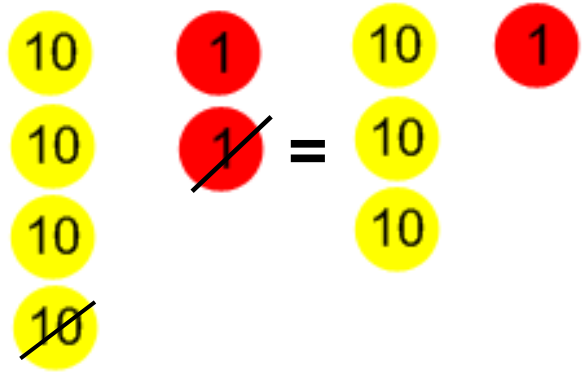
Use expanded column method with place value resources to support the conceptual understanding of subtracting numbers with up to three digits ***with no exchanging.***

**42 - 11 = 31**

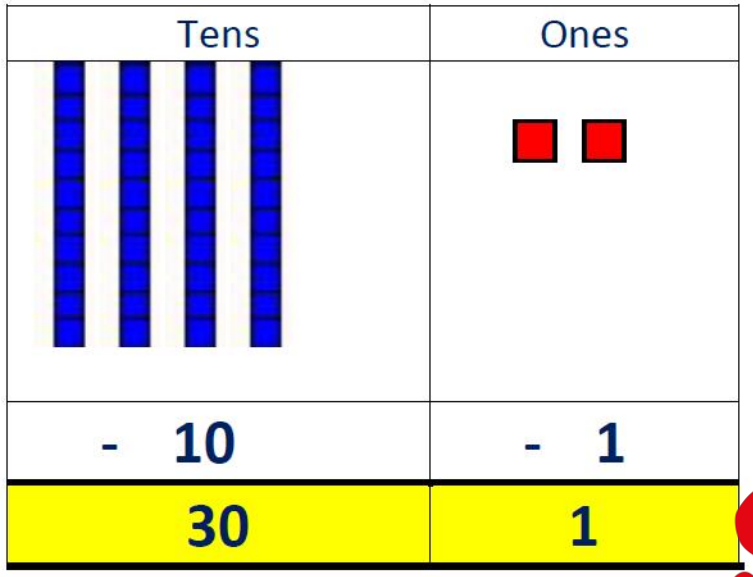
**40 + 2**

**- 10 + 1**

**30 + 1**




**OR**



# Subtraction: Year Three

Progress to using the expanded column method with place value resources to support the conceptual understanding of subtracting numbers with up to three digits ***with exchanging tens and/or hundreds***.

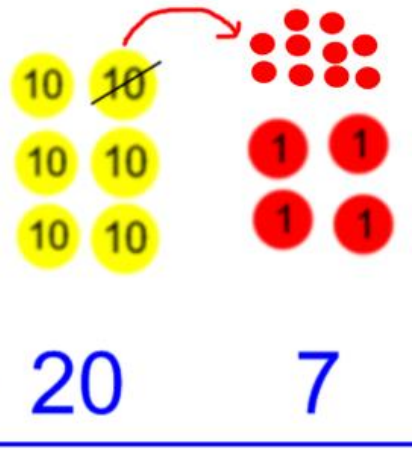
**74 - 27 = 47**

60 + 14

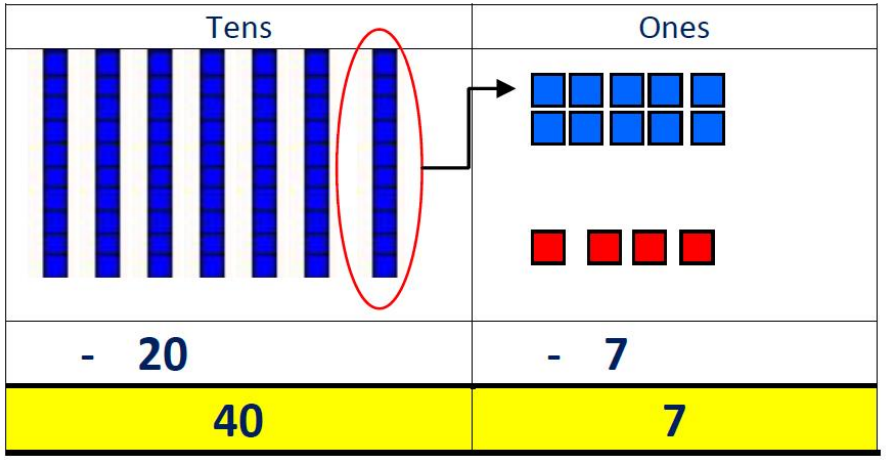
~~70~~ + ~~4~~

- 20 + 7

40 + 7




**OR**




In this example to subtract 7 ones from 4 ones we need to **exchange** a ten for ten ones. We now can subtract 7 ones from 14 ones.

Extend to using the expanded column method to subtract three digit numbers from three digit numbers.

**537 – 254 = 283**

400 + 130

~~500~~ + ~~30~~ + 7

- 200 + 50 + 4

200 + 80 + 3

**Note:** The exchanged ten or hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **top** of the column which has been adjusted.

Safeguarding Children In Banbury

# Subtraction: Year Four

Year 4 statutory requirements:

- Find 1000 less than a given number.
- Subtract numbers with up to four digits, using formal written methods of columnar subtraction where appropriate.
- Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Build on learning from Year 3 and model how expanded method links to compact column subtraction method.

$$\begin{array}{rrrr} 60 & + & 14 \\ \cancel{70} & + & \cancel{4} \\ -\ 20 & + & 7 \\ \hline 40 & + & 7 \end{array}$$

$$\begin{array}{r} 6\,{}^{1}\!\cancel{7}\,4 \\ -\ 2\,7 \\ \hline 4\,7 \end{array}$$

$$\begin{array}{rrrr} 400 & + & 130 & \\ \cancel{500} & + & \cancel{30} & + 7 \\ -\ 200 & + & 50 & + 4 \\ \hline 200 & + & 80 & + 3 \end{array}$$

$$\begin{array}{r} 4\,\cancel{5}\,{}^{1}\!\cancel{3}\,7 \\ -\ 2\,5\,4 \\ \hline 2\,8\,3 \end{array}$$

By the end of year 4, pupils should be subtracting numbers up to 4 digits using compact column subtraction method.

$$\begin{array}{r} 7\,8\,\overset{3}{\cancel{4}}\,{}^{1}\!2 \\ -\ 1\,8\,2\,9 \\ \hline 6\,0\,1\,3 \end{array}$$

**Note:** The exchanged ten or hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **top** of the column which has been adjusted.

Safeguarding Children In Banbury

# Multiplication: Year Three

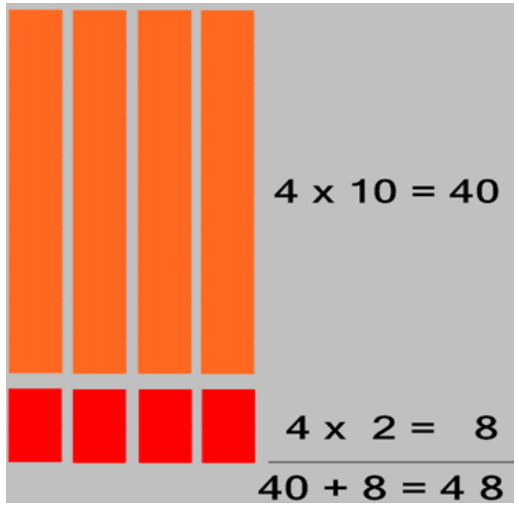
Year 3 statutory requirements:
✓Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
✓Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
✓Solve problems, including missing number problems, involving multiplication including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Develop recall of multiplication facts (alongside inverse of the corresponding division facts).

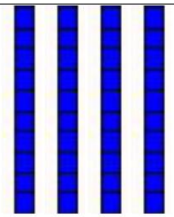
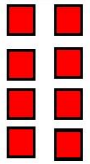
| x | 3 | 4 | 8 |
|---|---|---|---|
| 5 | | | |
| 6 | | | |
| 4 | | | |

| x | 4 | ? | ? |
|---|---|---|---|
| ? | 8 | 6 | 10 |
| 6 | 24 | 18 | 30 |
| ? | 32 | 24 | 40 |

**12 x 4 = 48**




Use concrete resources to develop conceptual understanding of the compact method introduced in Year 4.

| x | 10 | 2 |
|---|---|---|
| 4 |  |  |

**OR**

| x | 10 | 2 |
|---|---|---|
| 4 | 40 | 8 |

5cm

?cm

*The yellow ribbon is 4 times as long as the red ribbon. What is it's length?*

Safeguarding Children In Banbury

# Multiplication: Year Four

Year 4 statutory requirement:
✓ Recall multiplication and division facts for multiplication tables up to 12 × 12
✓Use place value, known and derived facts to multiply and divide mentally, including: multiply two-digit and three-digit numbers by a one-digit number using formal written layout.
✓Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 2 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 3 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| 4 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 |
| 5 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 6 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| 7 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 |
| 8 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 9 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 |
| 10 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| 11 | 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 | 99 | 110 | 121 | 132 |
| 12 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | 120 | 132 | 144 |

Develop recall of multiplication facts (alongside the inverse of the corresponding division facts).

Build on learning from Year 3 and model how grid method and/or expanded method links to compact short multiplication.

| x | 30 | 6 |
|---|---|---|
| 4 | 10 10 10<br>10 10 10<br>10 10 10<br>10 10 10 | 1 1 1 1 1 1<br>1 1 1 1 1 1<br>1 1 1 1 1 1<br>1 1 1 1 1 1 |

30 + 6
x 4
24
+ 120
144

$\overset{2}{3}6 \times 4 = 144$

2 eggs
150g flour
180g sugar

Use knowledge of times tables to solve scaling problems.

Susie wants to bake 12 cupcakes people.
The ingredients given are for four cupcakes.
How much flour will she need?

| Cupcakes | Flour |
|---|---|
| 4 | 150g |
| 12 | 900g |

x3

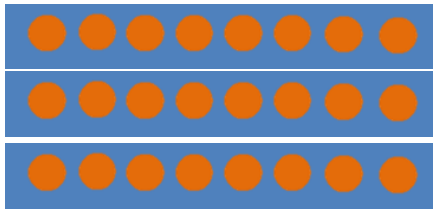
x3

Safeguarding Children In Banbury

# Division: Year Three

Year 3 statutory requirement:
✓Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
✓Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
✓ Solve problems, including missing number problems, involving division including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

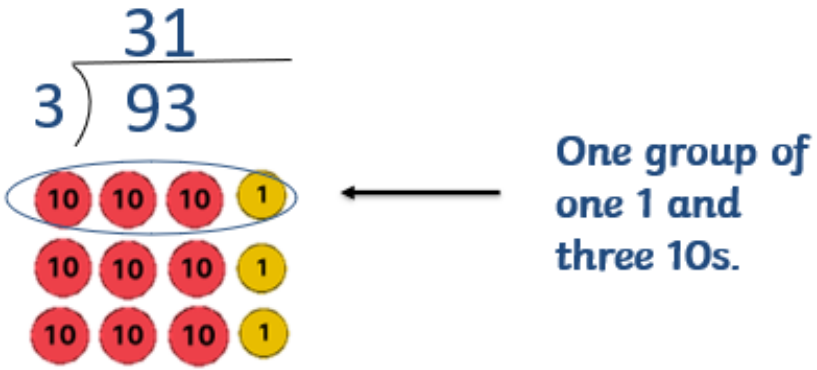
24 ÷ 8 = 3



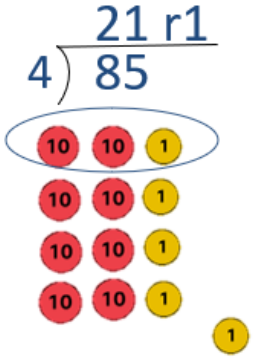
| 24 | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor).

93 ÷ 3 =




85 ÷ 4




Limit to 1 remainder initially and then extend to multiple remainders.

**Remember** to develop connections between fractions and division and rephrase these calculations as 1/3 of 96; ¼ of 72, ¼ of 872 and 1/5 of 185. Note: Year 3 fraction objective - *Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators;*

Safeguarding Children In Banbury

# Division: Year Four

Year 4 statutory requirement: Note - there isn't a statutory objective for division. However, Y4 statutory multiplication objectives are to (1) recall multiplication and division facts for multiplication tables up to 12 × 12 and (2) multiply two-digit and three-digit numbers by a one-digit number using formal written layout so we will build on the connections between multiplication and division.

$$3\overline{)96} = 32 \qquad 4\overline{)7^{3}2} = 18 \qquad 4\overline{)8\,7^{3}2} = 218 \qquad 5\overline{)1\,8^{3}5} = 037$$

Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor).

Limit numbers to NO remainders in the final answer, but with remainders occurring within the calculation.

Extend to 3-digit number first where the divisor can go into the first number and then progress to when the divisor cannot go into the first number.

**Remember** to develop connections between fractions and division and rephrase these calculations as 1/3 of 96; ¼ of 72, ¼ of 872 and 1/5 of 185. Work should be built on from Year Three and processes continued where children are not ready to move on to these more formal methods. Note: Year 4 fraction objective: *solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number.*

Safeguarding Children In Banbury