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Introduction

The Liverpool Maths Team has developed a calculation policy to support effective implementation of the 2013 Primary National Curriculum.

The policy focuses on the four operations of addition, subtraction, multiplication and division and includes a list of the key mental maths skills that support written methods.

For each operation, there are four stages, starting with the practical methods that support conceptual understanding moving through to methods that allow children to demonstrate efficiency in procedural approaches.

It is important to emphasise that alternative methods may be more appropriate for certain calculations and that informal methods currently used successfully in schools may continue to be used as they support the raised expectations in calculation outlined in this policy.

Subtraction

Written methods for Subtraction

It is important that children's mental methods of calculation are practised on a regular basis and secured alongside their learning and use of written methods of subtraction.

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use a written method accurately and with confidence.

Children are taught and acquire secure mental methods of calculation and one written method of calculation for subtraction which they know they can rely on when mental methods are not appropriate.

This policy shows the possible stages of each written method for subtraction, each stage building towards a more refined method.

There are some key basic skills that children need to help with subtraction, which include:

- counting
- estimating
- recalling all addition pairs to 10, 20 and 100 along with their inverses ($7 + 3 = 10$, $10 - 3 = 7$, $17 + 3 = 20$, $20 - 3 = 17$, $70 + 30 = 100$, $100 - 30 = 70$)
- knowing number facts to 10 and their inverses ($6 + 2 = 8$, $8 - 2 = 6$)
- subtracting multiples of 10 ($160 - 70$) using the related subtraction fact, $16 - 7$, and their knowledge of place value
- partitioning two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways (432 into $400 + 30 + 2$ and also into $300 + 120 + 12$)
- understanding and using subtraction and addition as inverse operations

Using and applying is a key theme and one of the aims of National Curriculum and before children move onto the next stage in written calculation it is important that their skills are broadened through their use and application in a range of contexts, these include:

- using inverse
- missing box questions
- using units of measure including money and time
- word problems
- open ended investigations

Stage 3: Partitioning (grid method)

$$24 \times 3 = 72$$

x	20	4	
3	60	12	72

$$24 \times 32 = 768$$

x	20	4	
30	600	120	720
2	40	8	48
			768

Stage 4: Short (column)

$$24 \times 3 = 72$$

$$\begin{array}{r} 24 \\ \times 3 \\ \hline 72 \\ 1 \end{array}$$

$$1241 \times 3 = 3723$$

$$\begin{array}{r} 1241 \\ \times 3 \\ \hline 3723 \\ 1 \end{array}$$

Stage 5: Long (column)

$$24 \times 32 = 768$$

$$\begin{array}{r} 24 \\ \times 32 \\ \hline 48 \\ 720 \\ \hline 768 \end{array}$$

$$1245 \times 13$$

$$\begin{array}{r} 1245 \\ \times 13 \\ \hline 3735 \\ 12450 \\ \hline 16185 \end{array}$$

In the examples given, it is also correct to multiply starting with the tens digit (ie multiplying by the most significant digit first)

Stage 1: Practical (sharing)

Children will work practically with equipment sharing objects one to one.



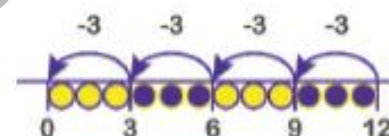
12 cakes are shared equally between 3 people.

Stage 2: Number lines (grouping)

Children will move from sharing objects practically to grouping them, this will be mirrored on a number line, working from right to left so that they see division as repeated subtraction. This will prepare them for the abstract concept of dividing numbers rather than objects.

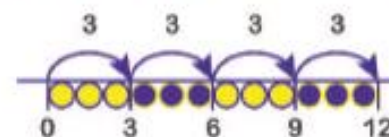


Each cake box holds 3 cakes, if I have 12 cakes, how many cake boxes will I need?



How many times can I subtract 3 from 12?

Using their knowledge of the inverse relationship between multiplication and division, children can use their multiplication tables when grouping on a number line, working from left to right.



How many groups of 3 are there in 12?

First without and then with remainders and ensuring that divisors offer an appropriate level of challenge.

