



Mathematics Calculations Booklet

Information for parents
about approaches in
numeracy.

Useful Websites for maths:

[www. Riverside.n-yorks.sch.uk](http://www.Riverside.n-yorks.sch.uk)

www.mad4maths.co.uk

www.bitesize.co.uk

www.coxhoe.durham.sch.uk

www.mathszone.co.uk

Obviously in a short booklet it is difficult to show teaching and learning methodology.

Please do call in and see a member of staff if you are at any time unsure of the techniques your child is being taught at school.

Rhymes

Sing number rhymes or songs with your child, particularly ones that involve holding up a number of fingers, like *Five little speckled frogs*. Children particularly enjoy these, especially with actions.

There are lots of fun audio CD's and books available too!

Dice Counting

Take turns to roll a dice and count back to zero from the number thrown. For example:



Four, three, two, one, zero!

Build a Tower

For this game you need a dice and some building blocks or Lego bricks.

- ◆ Take turns.
- ◆ Roll the dice.
- ◆ Collect the number of bricks to build your own tower.
- ◆ The first to 10 wins!

For a change, start with 10 blocks or bricks each. Take away the number on the dice. First to exactly zero wins.

One More, One Less

For this game you need a dice, a coin and some building blocks or Lego bricks.

- ◆ Take turns to roll the dice.
- ◆ Build a tower with that number of blocks or bricks.
- ◆ Then toss the coin. Heads means take one brick off. Tails means add one on.
- ◆ If you can guess how many bricks there will be after this, you keep them!
- ◆ The first to collect 20 bricks or more wins!

This booklet has been compiled to outline some of the approaches in teaching and recording calculations throughout school. By the end of Key Stage 2 we aim for children to have developed an efficient written method to solve calculations.

It is important that children use written recording to help clarify their thinking and support their development. The aim is to encourage understanding and not teach tricks! Each method is taught in the year group specified. However, while the new concepts are becoming embedded, the children are encouraged to use previously taught methods with which they feel secure.

We want children to be able to apply their mental maths skills and for this reason, in every written method there is an element of mental processing.

Children are taught logical strategies and to make informal jottings to tackle problems before a formal method is used. Although the main focus of this information is on pencil and paper procedures it is important to recognise that the ability to calculate mentally lies at the heart of primary numeracy. Therefore please encourage your child to practise their KIRFs (Key Instant Recall Facts) each day as this will help when working with larger numbers.

Useful Vocabulary

Complements: Children are encouraged to learn number bonds (groups) to ten and one hundred, or ways of making 10 and 100

E.g. Complements to make ten could be $2 + 8$ or $4 + 6$

Complements to make 100 could be $20 + 80$ or $36 + 64$

Inverse: In general addition and subtraction are inverse (opposite) operations. Doubling and halving are inverse operations.

Multiplication and division are also inverse operations.

E.g. If you know:

$3 + 7 = 10$ then you also know $10 - 3 = 7$ or $10 - 7 = 3$

$3 \times 7 = 21$ then you also know $21 \div 7 = 3$ or $21 \div 3 = 7$

If you know double 6 is 12, you also know half of 12 is 6.

Partitioning: Is splitting a number in to tens and units and so on.

E.g.

$$53 = 50 + 3$$

$$253 = 200 + 50 + 3$$

$$4765 = 4000 + 700 + 60 + 5$$

You can also split single digit numbers into parts

Eg 7 is $5 + 2$

8 is $5 + 3$

Recognising Numbers

Choose a number for the week, e.g. 2.

Encourage your child to look out for this number all the time.

♦ Can your child see the number 2 anywhere?

at home

- in the kitchen

- on pages in a book

in the street

- on doors

- on car number plates

- on buses

while out shopping

- on the shop till

- on shelves

- in shop windows

♦ Find two apples, toys, spoons, straws, sweets, etc.

♦ Make patterns, such as two knives, two forks, two spoons, two knives, two forks, two spoons...

♦ Practise writing the number 2 (always start from the top).

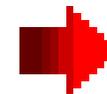
Choose a different number each week

Dice Game

Use a 'dotted' dice and write the numbers 1 to 6 on a sheet of paper (or use the numbered animals).

♦ Throw the dice. Can your child guess how many dots there are? Check by counting.

♦ Ask your child which number on the paper matches the dots on the dice.



4

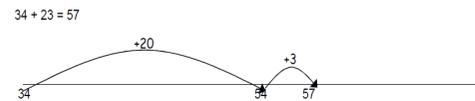
Addition

Y1/2

Children are encouraged to count on using practical resources e.g. using fingers, counters, beads, 100 squares and familiar objects. They will also be introduced to a numbered lines to support their calculations:



By Y2 children 'empty number lines' will begin to use themselves starting with the larger number and counting on. First counting on in tens and ones. Followed by adding the tens in one jump and the units in one jump. Alternatively they may find it easier to partition:



OR $34 + 23 = 30 + 20 = 50$
 $4 + 3 = 7$
 $50 + 7 = 57$

Y3

Children will begin to use column addition. Firstly adding the most significant digits

$$\begin{array}{r} 67 \\ + 24 \\ \hline 80 \text{ (60 + 20)} \\ \underline{11} \text{ (7 + 4)} \\ 91 \end{array}$$

The language is important.
 When adding the tens, we would say $60+20=80$ not $6+2=8$

first:

Then moving on to adding the least significant digits first in preparation for 'carrying'.

$$\begin{array}{r} 67 \\ + 24 \\ \hline 11 \text{ (7 + 4)} \\ \underline{80} \text{ (60 + 20)} \\ 91 \end{array}$$

$$\begin{array}{r} 267 \\ + 85 \\ \hline 12 \text{ (7 + 5)} \\ 140 \text{ (60 + 80)} \\ \underline{200} \\ 352 \end{array}$$

Y4,5 and 6

From this, children will begin to use a more 'traditional' method remembering to carry below the line.

Using similar methods, children will numbers with different numbers of add two or more decimal fractions decimal places.

$$\begin{array}{r} 587 \\ + 475 \\ \hline 1062 \\ \hline \end{array}$$

$$\begin{array}{r} 3587 \\ + 675 \\ \hline 4262 \\ \hline \end{array}$$

add several digits; begin to with up to three

The calculation methods used for adding and subtracting are introduced initially by using words such as *more*, *less*, *count back*, *count on* and later the children will learn language such as *add*, *take away*, *difference between*, *double*, *make*, *sum*, *total*, *altogether*. They will learn to recognise number sentences and number stories. For example:

$4 + 3 = 7$
 $7 - 3 = 4$

If you had 4 sweets and James had 3 sweets there would be 7 sweets altogether.

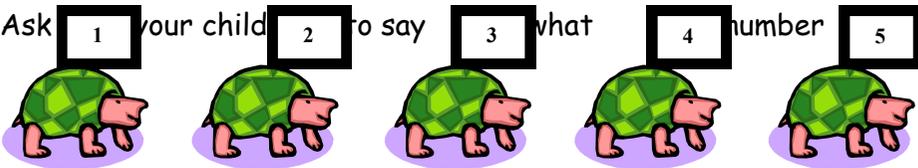
If there were 7 sweets and you gave James 3 sweets there would be 4 left.

Fun activities to do at home

Counting and putting numbers in order

Use old magazines, comics or greetings cards. Cut out pictures of animals, or anything else your child is interested in. Label the animals 1 to 5.

- ◆ Shuffle the animals. Put them in order from 1 to 5.
- ◆ Remove one animal. Ask your child which number is missing. Repeat with other numbers and more than one missing number.
- ◆ Ask 1 your child 2 to say 3 what 4 number 5



comes before or after a number you choose.

When your child can do this, repeat with numbers 1 to 10.

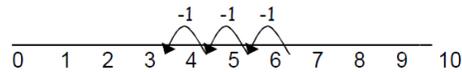
Subtraction

Early Years Maths

Y1

Children are encouraged to subtract using practical resources e.g. fingers, counters, beads, 100 squares and familiar objects. They will also be introduced to a numbered lines to support their calculations:

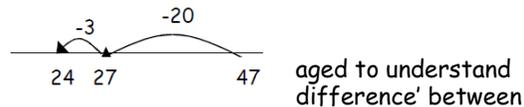
$$6 - 3 = 3$$



Y2/3

By Y2 Children will begin to use empty number lines to support calculations. First counting back in tens and ones. To help children to become more efficient they work towards subtracting the tens in one jump and the units in one jump.

$$47 - 23 = 24$$

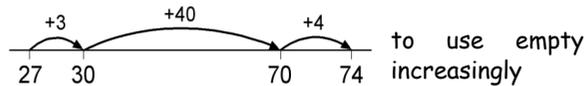


Counting On

Children are also encouraged to understand subtraction as 'finding the difference' between the smallest and largest number. They use an empty number line and the process of counting on.

Y4/5

Children will continue to use empty number lines but with increasingly large numbers. The number of jumps will vary. If appropriate, children will be introduced to expanded column subtraction



This process should be demonstrated using arrow cards to show the partitioning and base 10 materials to show the decomposition of the number.

$$\begin{array}{r} 89 \\ - 57 \\ \hline \end{array} = \begin{array}{r} 80 + 9 \\ 50 + 7 \\ \hline 30 + 2 = 32 \end{array}$$

Initially, the children will be taught using examples that do not need the children to exchange.

The teaching and learning in early years forms the foundation for calculating methods and these early experiences form the basis for later numeracy skills.

Here, we have provided some ideas as to how to help your child gain understanding and prepare for the calculation methods you will see as you read further.

Within Early Years, your child will be working in the age band which best meets their needs. Outlined below are some of the expectations there are for each stage of their learning.

22-36 months:

- Create and experiment with symbols and marks representing ideas of number
- Begin to make comparisons between quantities.
- Know that a group of things changes in quantity when something is added or taken away.

30-50 months:

- Beginning to represent numbers using fingers, marks on paper or pictures.
- Compares two groups of objects, saying when they have the same number.
- Separates a group of three or four objects in different ways, beginning to recognise that the total is still the same.
- Shows an interest in representing numbers.

40-60 months:

- Uses the language of 'more' and 'fewer' to compare two sets of objects.
- Find the total number of items in two groups by counting all of them.
- Says the number that is one more than a given number.
- Find one more or one less from a group of up to five objects, then ten objects.
- In practical activities and discussion, beginning to use the vocabulary involved in adding and subtracting.
- Record, using marks that they can interpret and explain.

The next step is to represent the method of recording onto the vertical method. Drawing attention to the links with the previous method:

$$96 \div 6$$

$$\begin{array}{r} 16 \\ 6 \overline{) 96} \\ \underline{- 60} \\ 36 \\ \underline{- 36} \\ 0 \end{array}$$

10x
6x

Answer : 16

From this children will begin to exchange.

This would be recorded by the children as

$$\begin{array}{r} \overset{60}{\cancel{70}} + \overset{1}{1} \\ - \underline{40 + 6} \\ 20 + 5 = 25 \end{array}$$

Children should know that units line up under units, tens under tens, and so on.

Y6

Children will then progress towards a quicker efficient method of recording. They may use formal column subtraction, beginning with 2/3 digit numbers and exchanging, extending to larger numbers including zeros.

$$\begin{array}{r} 5131 \\ \cancel{6467} \\ - \underline{2684} \\ 3783 \end{array}$$

However they are also encouraged to use a number line if they find this more logical. The key is to find an efficient way to record the calculation which the child understands.

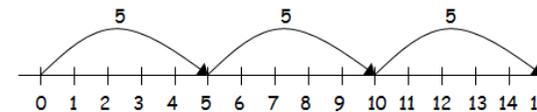
Multiplication

Please encourage your child to learn their times tables. They are **VERY** important in many aspects of life. We start by learning the 2, 5 and 10 times tables. After this, children learn all times table facts up to 5x5 and, by the time they leave primary school, we aim for children to know all multiplication and division facts up to 10X10.

Y1/2

Multiplication is explained as repeated addition. This can be shown easily on a number line:

$$5 \times 3 = 5 + 5 + 5$$



Y6

Children will continue to use written methods to solve short division. When they are ready they may also use this technique to solve 2 digit division. For example:

$$972 \div 36$$

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{- 720} \\ 252 \\ \underline{- 252} \\ 0 \end{array}$$

20x
7x

Answer : 27

Short division of HTU \div U can be introduced as an alternative, more compact recording method than chunking, but only when children are secure in the other methods.

$$72 \div 5 = \begin{array}{r} 14 \text{ r } 2 \\ 5 \overline{) 720} \end{array}$$

$$256 \div 7 = \begin{array}{r} 036 \text{ r } 4 \\ 7 \overline{) 256} \end{array}$$

Division

Y3

We reinforce the message that multiplication is repeated addition. However, when children are working with larger numbers, they begin to use partitioning. For example:

$$\begin{aligned} 38 \times 5 &= (30 \times 5) + (8 \times 5) \\ &= 150 + 40 \\ &= 190 \end{aligned}$$

Y4

Children are introduced to the grid method TU x U (Short multiplication - multiplication by a single digit)

For example: $23 \times 8 = 184$

x	20	3	
	160	24	

160	
+ 24	
184	

Y5

Children continue with the grid method but this may be extended towards multiplying two digit numbers by two digit numbers:

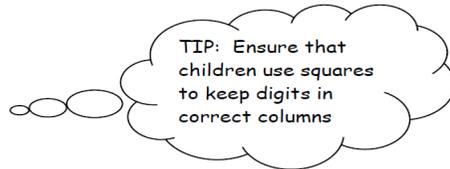
x	70	2	
	2100	60	
	560	16	

2100	
+ 560	
+ 16	
2756	

Children are also shown how to record in a column format, but showing the working. At this stage it is important to draw attention to the links with the grid method.

e.g.

223	
x 6	
18	(6 x 3)
120	(6 x 20)
1200	(6 x 200)



Y6 The recording is reduced further, with carry digits recorded below the line. If appropriate, they are also shown how to use a column format to help calculate long multiplication. Again, initially, they are encouraged to show their working:

HTU
38
x 7
266
5

56
x 27
42
350
120
1000
1512
1

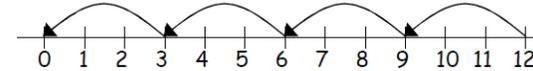
Moving onto:

56
x 27
392
1120
1512
1

Y1/2

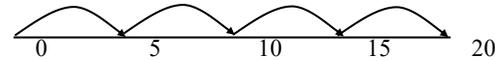
Children are encouraged share into groups using counters, beads, multiplication grid and familiar objects (for example sweets!). They will also be introduced to a numbered lines to support their calculations:

$12 \div 3 = 4$



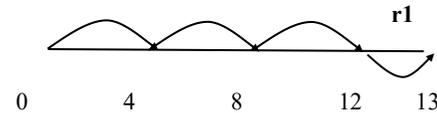
Once children have an understanding that, when dividing they start with a large number and share into smaller groups, they may then be introduced to **counting on** in groups. Children may find this method more efficient.

$20 \div 5 = 4$



Y3

Children will continue to use a number line. Children may also move onto calculations involving remainders. For example: $13 \div 4 = 3r1$



Y4/5

Children will continue to use a number line to support calculations but will begin to work with larger numbers - using their knowledge of tables to help 'chunk' the number they are dividing into groups:

$72 \div 5 = 14 r2$

