



Heptonstall Primary School



Calculation Policy Year 1 and 2

This booklet contains the calculation methods used in year 1 and 2 for each of the four operations – addition, subtraction, multiplication and division.

Please use this document as a tool to support your child at home. The methods we use in school may or may not be familiar to you. Children can become confused when they seek support from an adult at home because often, the adult will teach the method they themselves were taught.

Knowing how the methods in this booklet work will help you to help your child. All staff in school use this document so that we can ensure consistency in our approach.

Year 1



Year 1



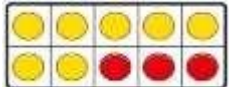
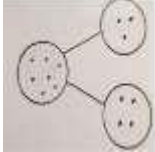
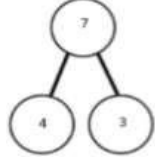
Key Stage 1

Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, children will develop an understanding of how numbers work, so that they are confident with 2-digit numbers and beginning to read and say numbers above 100. A CPA approach will be used throughout each unit, ensuring a range of manipulative and representations are used to support children's learning.

Addition and Subtraction: A focus on number bonds, first via practical hands-on experiences and subsequently using memorisation techniques, enables a good grounding in these crucial facts, and ensures that all children leave Year 2 knowing the pairs of numbers which make all the numbers up to 10 at least. Children will also have experienced and been taught pairs to 20. Children's knowledge of number facts enables them to add several 1-digit numbers, and to add/subtract a 1-digit number to/from a 2-digit number. Another important conceptual tool is the ability to add/subtract 1 or 10, and to understand which digit changes and why. This understanding is extended to enable children to add and subtract multiples of 10 to and from any 2-digit number. The most important application of this knowledge is the ability to add or subtract any pair of 2-digit numbers by counting on or back in 10s and 1s. Children will then extend this knowledge by learning the written method of column addition and subtraction (with regrouping and exchanging) with emphasis on the place value of each digit.

Multiplication and Division: Children will be taught to count in 2s, 3s, 5s and 10s, and will relate this skill to repeated addition. Children will learn the associated $\times 2$, $\times 3$, $\times 5$ and $\times 10$ tables. Engaging in a practical way with the concept of repeated addition and the use of arrays enables children to develop a preliminary understanding of multiplication and asking them to consider how many groups of a given number make a total will introduce them to the idea of division. Children will also be taught to double and halve numbers and will thus experience scaling up or down as a further aspect of multiplication and division.

Fractions: Fractions will be introduced as numbers and as operators, specifically in relation to halves, quarters and thirds. Children will learn how to find halves and quarters of shapes and amounts, linking to their learning of division, using the same skills and methods.

	National Curriculum Objectives	Mental Calculation	Written Calculation
<p>Y1 +</p>	<p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs Represent and use number bonds and related subtraction facts within 20 Add one-digit and two-digit numbers to 20, including zero Solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as $7 = 4 + \square$</p>	<p>Place the larger number in your head and count on the smaller number to find your answer. $9 + 4 = 13$ E.g. If I am at 9, how many more do I need to make 13. How many more do I add on now? Learn number bonds to 10</p>	<p>Combining two parts to make a whole. (Including number bonds) Concrete (use other resources too e.g. counters, teddy bears, cars and demonstrate on a number frame)</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>$4 + 3 = 7$</p> </div> <div style="text-align: center;">  <p>$4 + 1 = 5$</p> </div> <div style="text-align: center;">  <p>$7 + 3 = 10$</p> </div> </div> <p>Children to represent the concrete objects using dots or crosses on a part whole model</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Pictorial</p> </div> <div style="text-align: center;">  <p>Abstract</p> </div> </div> <p>$4 + 3 = 7$ Four is a part, 3 is a part and the whole is seven.</p>

Place the larger number in your head and add the smaller number by counting on to find your answer.

$$2 + 14 =$$

Put 14 in your head and count on another 2 to find the answer of 16.

Starting at the bigger number and counting on

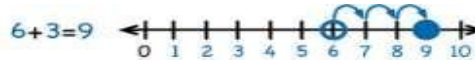
Concrete

Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.

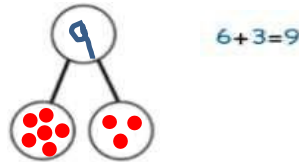


$$12 + 5 = 17$$

Pictorial



Circle the biggest number and jump forwards the smaller number in the number line.

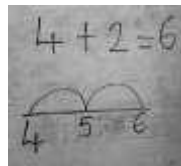


Draw counters to add each part to the part sections of the whole part model. Count the total to find the sum.

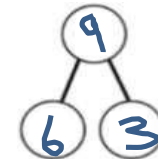
The abstract number line

What is 2 more than 4? What is the sum of 2 and 4?

What is the total of 4 and 2? $4 + 2 =$



The abstract part whole model



Understanding teen numbers as a complete 10 and some more Concrete

Complete a group of 10 objects and count more.



13 is 10 and 3 more. $10 + 3 = 13$

Pictorial

Use a ten frame to support understanding of a complete 10 for teen numbers.



13 is 10 and 3 more.

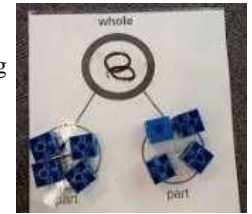
Abstract

1 ten and 3 ones equal 13.

$$10 + 3 = 13$$

Finding a missing part Concrete

Use a part, whole model to find the missing part. Add the part we already have using cubes or counters. Count on until we get to the whole using the counters or cubes.



Pictorial

As above using a whiteboard and pen. Draw counters for the parts.

Y1
–

Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs

Represent and use number bonds and related subtraction facts within 20

Subtract one-digit and two-digit numbers to 20, including zero

Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = ? - 9$.

Place the larger number in your head and count back the smaller number to find your answer.

$13 - 4 = 9$

E.g.
If I am at 13, how many do I need to count back to get to 9?

Learn number bonds to 10 and related subtraction sentences

Counting back and taking away

Concrete

Children arrange objects and remove to find how many are left.

1 less than 6 is 5.

6 subtract 1 is 5.

$6 - 1 = 5$



Move the beads along the bead string as you count backwards.

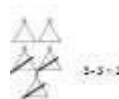


$13 - 4 = 9$

Pictorial

Cross out drawn objects to show what has been taken away. 5-

$3 = 2$



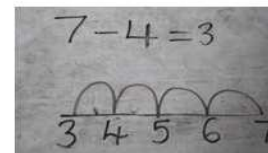
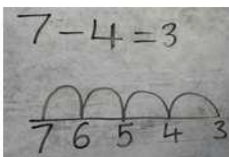
Children count back to take away and use a number line or number track to support the method.



$8 - 3 = 5$

The abstract number line

What is 4 less than 7? What is 7 subtract 4? $7 - 4 =$



Finding a missing part, given a whole and a part

Concrete

Given a missing number subtraction number sentence, we first of all find the inverse.

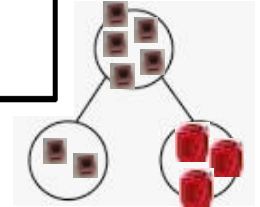
We then use a whole, part model and cubes or counters

We put the whole number in the whole section.

We put the part we know in the part section.

We count on from the part we know using cubes until we get to the whole number.

$$\begin{array}{l} 5 - ? = 2 \\ \text{inverse} \\ 2 + ? = 5 \end{array}$$



Pictorial

We find the inverse of the number sentence.

We draw a whole part model.

We write the whole number in the whole section.

We draw the part we know in the part section.

We count on from the part we know by drawing counters and stopping when we get to the whole.

Abstract

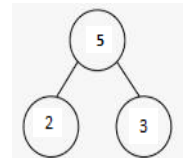
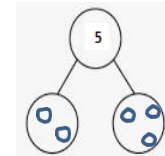
We find the inverse of the number sentence.

We draw a whole, part model.

We write the whole number in the whole section.

We write the part in the part section.

We count on from the part until we get to the whole and write the missing part.



Y1
x

Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Count in 2s, 5s and 10s
Begin to say what three 5s are by counting in 5s, or what four 2s are by counting in 2s, etc.
Double numbers to 10

Multiplication

Recognising and making equal groups

Concrete

Children arrange objects in equal and unequal groups and understand how to recognise whether they are equal.



Pictorial

Children draw and represent equal groups.



Describe equal groups using words e.g. there are 3 equal groups of 5 NB: This method also to be used when finding doubles of amounts.

2 lots of 4 is the same as double 4



Finding the total of equal groups by counting in 2s, 5s and 10s

Concrete



2 4



5 10 15



There are 5 pens in each pack 5...10...15...20...25...30...35...40...

Repeated addition

Use different objects and pictures to add equal groups. Write addition sentences to describe objects and pictures.



Number squares to support counting in 2s, 5s and 10s.

Y1

÷

Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Begin to count in 2s, 5s and 10s
Find half of even numbers to 12
Find half of even numbers by sharing

Division Grouping

Concrete

Learn to make equal groups from a whole and find how many equal groups of a certain size can be made. Sort a whole set people and objects into equal groups.



There are 10 children altogether.

There are 2 in each group.

There are 5 groups.

Pictorial

Represent a whole and work out how many equal groups.



There are 10 in total. There are

5 in each group.

There are 2 groups.

Sharing

Share a set of objects into equal parts and work out how many are in each part.



Sketch or draw to represent sharing into equal parts. This may be related to fractions.



10 shared into 2 equal groups gives 5 in each group.



NB: This method also to be used when finding fractions of amounts.

Year 2



Year 2

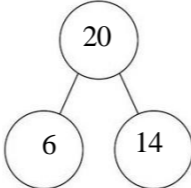
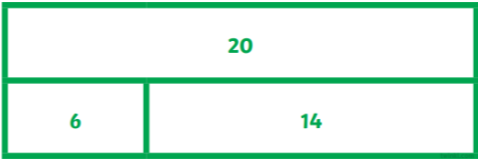
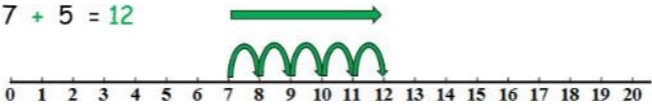
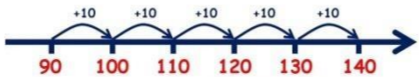
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Y2	National Curriculum Objectives	Mental Calculation	Written Calculation																											
+	Add numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; three one-digit numbers.	Use place value knowledge to find one more and ten more than any 2-digit number up to 100. Count on in multiples of 10, 5, 2 and 3 and in tens from any number. Use patterns of known facts. Eg. $7 + 2 = 9$ so $27 + 2 = 29$ Use number bonds to 10 knowledge when adding three or more single digit numbers. Eg. $8 + 4 + 2$ as $10 + 4$	<p style="text-align: center;">Part Whole Models and Bar Models to visualise number bonds and simple addition calculations</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>$6 + 14 = 20$ $14 + 6 = 20$ $20 = 14 + 6$ $20 = 14 + 6$</p> </div> <div style="text-align: center;">  </div> </div> <p style="text-align: center;">Number lines for 2-digit add 1 digit and for adding multiples of 10</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>$7 + 5 = 12$</p>  </div> <div style="border: 1px solid #008000; padding: 5px; width: 150px;"> <p>NB: When initially introducing written strategies, simpler calculations (which would normally be solved mentally) may be used to demonstrate the method before progressing onto more challenging calculations.</p> </div> </div> <div style="text-align: center; margin-top: 20px;"> <p>$90 + 50 = 140$</p>  </div> <p style="text-align: center;">Column Addition for adding two 2-digit numbers</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td>T</td><td>O</td></tr> <tr><td></td><td>2</td><td>1</td></tr> <tr><td>+</td><td>1</td><td>1</td></tr> <tr><td></td><td></td><td></td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td>T</td><td>O</td></tr> <tr><td></td><td>2</td><td>8</td></tr> <tr><td>+</td><td>1</td><td>3</td></tr> <tr><td></td><td>4</td><td>1</td></tr> <tr><td></td><td>1</td><td></td></tr> </table> <div style="border: 1px solid #008000; padding: 5px; width: 150px;"> <p>NB: Emphasis to be made on the place value of each digit so children do not think it is $2 + 1$. Ask questions such as 'What is the value of 2 in this calculation?', 'Can you show me this number partitioned?'</p> </div> </div>		T	O		2	1	+	1	1					T	O		2	8	+	1	3		4	1		1	
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Y2

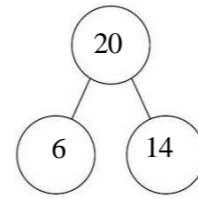
Subtract numbers using concrete objects, pictorial representations, and mentally, including:
a two digit number subtract ones;
a two digit number subtract tens;
two-digit numbers subtract two-digit.

Use place value knowledge to find one more and ten more than any 2-digit number up to 100.

Count back in multiples of ten from 100. Using concrete initially, moving on to 100 square and then mentally.

Use patterns of known facts.
Eg. $5 - 2 = 3$ so $25 - 2 = 23$

Continue to use part whole models and bar models to represent related addition and subtraction facts.



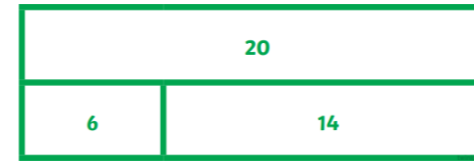
$6 + 14 = 20$

$14 + 6 = 20$

So...

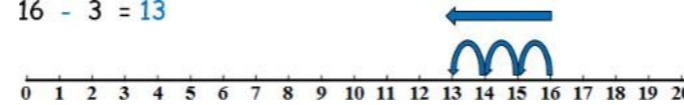
$20 - 14 = 6$

$20 - 6 = 14$

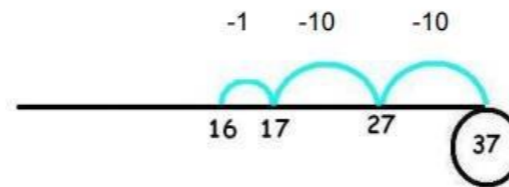


Number lines for 2-digit minus 1 digit and for subtracting multiples of 10

$16 - 3 = 13$



$37 - 21 = 16$



Column subtraction for two 2-digit number, with regrouping

NB: Emphasis to be made on the place value of each digit and when introduced to the method children should be shown it using Numicon or Base 10 to model the exchanging of tens and ones.

$$\begin{array}{r} 2 \\ 3 \\ - 15 \\ \hline 18 \end{array}$$

Y2
x

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals ($=$) signs.

Show that the multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.

Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in context.

Children to use a range of vocabulary to describe multiplication and use a variety of practical resources to explain multiplication.

Use songs to aid children's initial ability to recite counting in 10s, 2s, 5s and 3s (in that order).

Rote learn times tables to increase children's rapid recall.

Count in 2s, 5s, 10s and 3s using variety of concrete and pictorial representations



	two pence	four pence	six pence	eight pence	ten pence
	2p	4p	6p	8p	10p



Arrays for multiplication

$3 \times 4 = 12$



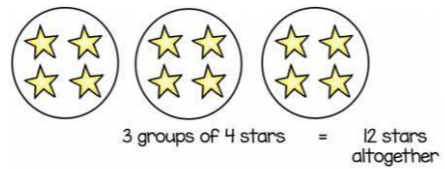
$4 \times 3 = 12$



Rotate arrays to show that multiplication of two numbers can be done in any order (commutative law)

Show multiplication as repeated addition.
 $3 + 3 + 3 + 3 = 12$

Use other pictorial representations to help children visualise the concept of multiplication.



30		
10	10	10

Y2
÷

Recall and use division facts for the 2, 5 and 10 multiplication tables.

Solve problems involving division, using materials, arrays, repeated subtraction, mental methods, and multiplication and division facts, including problems in contexts.

Calculate mathematical statements for division within the multiplication tables and write them using the division (\div) and equals (=) signs.

Show that division of one number by another is not commutative [i.e. can be done in any order].

Children to use a range of vocabulary to describe division and use a variety of practical resources to explain multiplication.

Use their multiplication knowledge to derive known division facts.
Eg. $5 \times 10 = 50$ so $50 \div 10 = 5$

Make links to multiplication by continuing to use arrays to support division.



How many groups of 3? How many groups of 5?

15 shared between 3 people is....?

15 shared between 5 people is....?

15 divided by 3 = 5

15 divided by 5 = 3

$15 \div 3 = 5$

$15 \div 5 = 3$

NB: Continue to reinforce sharing and grouping in a practical context.

Use pictorial representations to share into equal groups

$12 \div 3 = 4$



NB: This method also to be used when finding fractions of amounts.

$\frac{1}{2}$ of 8 is 4

