

Calculation Policy



Hillborough Infant and Nursery School

Owned and Written by Assistant Headteacher, Mrs S Barber	Date February 2022
Approved by Senior Leadership Team	Date February 2022
Date for Review	February 2023
This policy has been updated to reflect the General Data Protection Regulation (GDPR) and Data Protection Act 2018, and it supersedes the HM Government Information Sharing Guidance for Practitioners and Managers published in March 2015.	

Aims and rationale:

Mathematics will be at the core of children's schooling throughout their time at Hillborough Infant & Nursery School and the need for a clear, progressive policy which is understood throughout the school is vital.

Early practical, oral and mental work must be undertaken in order to lay the foundations of understanding in counting, place value and number facts as well as the four operations of addition, subtraction, division and multiplication.


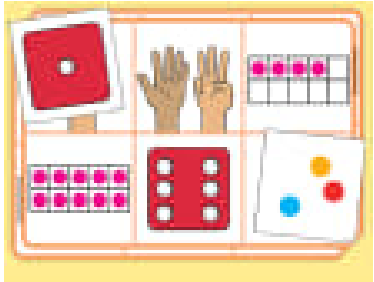

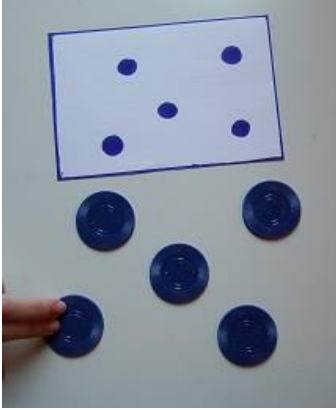
Children will initially be introduced to number, counting, calculations, shape, measure and geometry through practical, oral and mental activities. Once they begin to understand these concepts they will be encouraged to informally record before finally using mathematical signs and symbols to record in a more organised/ formal way.

This policy explains the methods used to help our pupils with calculations. The methods we are advocating are in line with the new National Curriculum (September 2014). All staff in school work from this document so that we can ensure the consistency of our approach and can make sure that the children move onto the next step when they are ready whilst ensuring appropriate progression through from EYFS to the end of KS1.

Whichever of the four operations of addition, subtraction, multiplication and division is being taught children need to experience all of the following steps to completely understand it:

1. Concrete: use of concreted manipulatives for children to understand the concept.
2. Pictorial including the use of number lines and 100 squares.
3. Abstract including recording as digits and using mathematical symbols.

Nursery	
Counting	<ul style="list-style-type: none">● Say number words in sequence – recite numbers past 5● Develop fast recognition of up to 3 objects, without having to count them individually (Subitise up to 3 objects)● Say one number for each item in order: 1, 2, 3, 4, 5● Know that the last number reached when counting a small set of objects tells you how many there in total ('cardinal principle')● Show 'finger numbers' up to 5● Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5
Comparison	<ul style="list-style-type: none">● Compare quantities using language: 'more than', 'fewer than'● Can identify groups with the same number of things
Composition	<ul style="list-style-type: none">● Solve real world mathematical problems with numbers up to 5● Can physically partition a number of things into two groups, and can recognise that those groups can be recombined to make the same total● Can talk about different arrangements they can see within the whole

Written Methods	<ul style="list-style-type: none"> Experiment with their own symbols and marks as well as numerals.
Representations	   
Reception	
Counting	<ul style="list-style-type: none"> Count objects, actions and sounds Knows that the quantity does not change if simply rearranged Subitise up to 5 objects Link the number symbol (numeral) with its cardinal number value Count beyond 20
Comparison	<ul style="list-style-type: none"> Compare numbers that are far apart, near to and next to each other and next to each other. For example, 8 is a lot bigger than 2 but 3 is only a little bit bigger than 2 Understand the 'one more than/one less than' relationship between consecutive numbers. Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed evenly.
Composition	<ul style="list-style-type: none"> Explore the composition of numbers to 10 Knows that a number can be partitioned into more than 2 numbers Automatically recall number bonds for numbers 0-10
Written Methods	<ul style="list-style-type: none"> Experiment with their own symbols and marks as well as numerals.

Representations

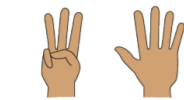
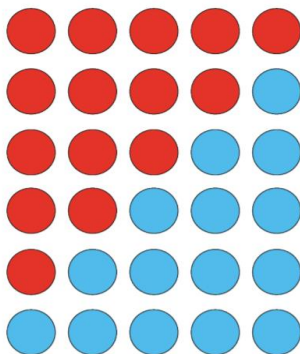


Figure 15: 8 represented as 3 fingers and 5 fingers



Figure 16: 8 represented as 6 and 2 with base 10 number boards



Figure 17: 8 represented as two 4-value dice



Figure 18: 8 represented as 2 rows of 4



Figure 19: 8 represented as tally marks: 5 and 3



Figure 20: 8 represented on a bead string: 7 and 1

Year 1

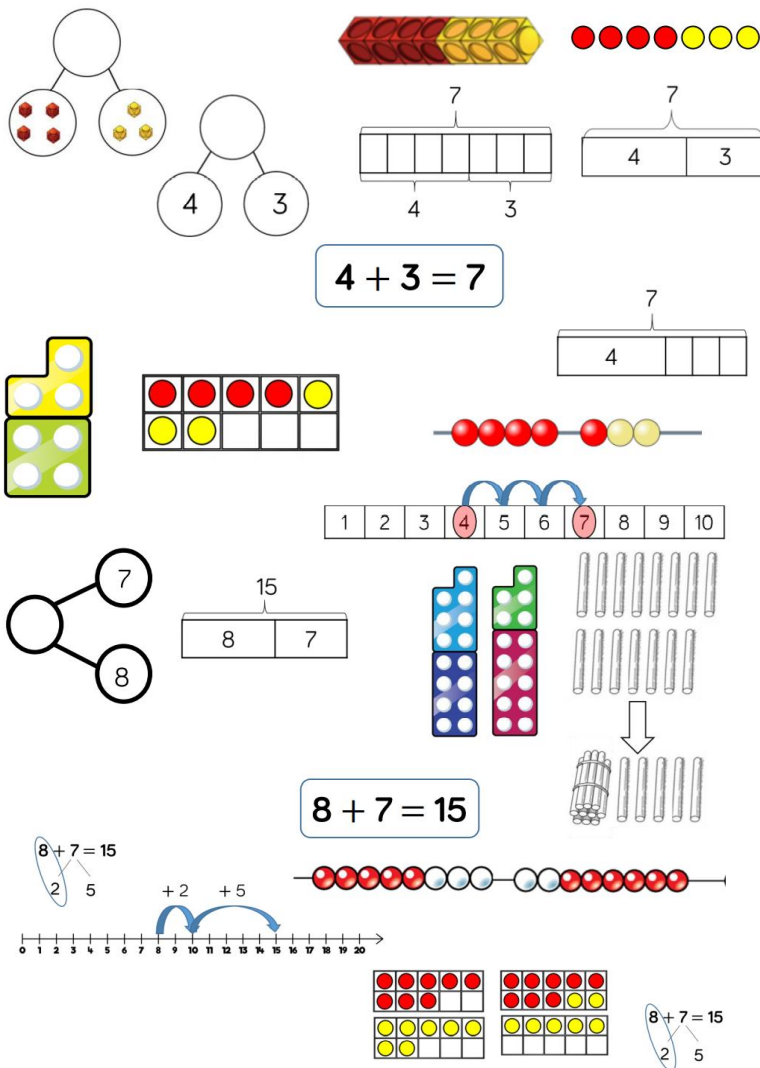
Addition

Mental Calculations

Written Calculations

- Read, write and interpret mathematical statements using symbols +, -, =
- Represent and use number bonds and related addition facts within 20
- Add one digit and two-digit numbers up to 20, including zero.
- Solve one-step problems using concrete objects and pictorial representations, and missing number problems such as $7 = - 9$
- Given a number, identify (and use the language) one more
- Begin to compare (what's the same/different?) for commutative sums e.g $3 + 7 = 7 + 3$
- Memorise and reason with number bonds to 10 & 20 in several forms
- Add using objects, Numicon, cubes etc and number lines and tracks
- Check with everyday objects
- Ensure pre-calculation steps are understood, including:
 - Counting objects (including solving simple concrete problems)
 - Conservation of number
 - Recognise place value in numbers beyond 20
 - Counting as reciting and as enumerating

Representations



part-whole model; bar model; number shapes; tens frames; bread strings; number tracks; numicon; straws; number lines (labelled)

Year 1

Subtraction

Mental Calculations

- Subtract one digit and two-digit numbers to 20, including zero.
- Read, write and interpret mathematical statements using symbols (+, -, =) signs.
- Represent and use number bonds and related addition facts within 20
- Solve one-step problems using concrete objects and pictorial representations, and missing number problems such as $7 = - 9$
- Memorise and reason with number bonds
- Subtract using objects, Numicon, cubes etc and number lines and tracks Check with everyday objects
- Ensure pre-calculation steps are understood, including:

Written Calculations

- Counting objects (including solving simple concrete problems)
- Conservation of number
- Recognise place value in numbers beyond 20
- Counting as reciting and as enumerating

Representations

$14 - 6 = 8$

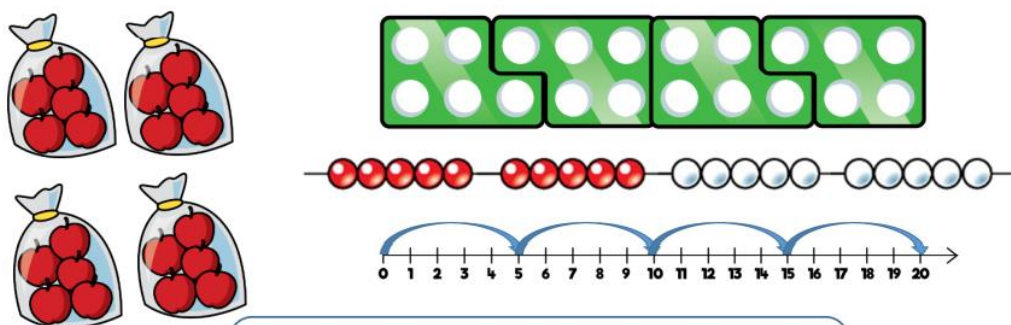
Part-whole model; bar model; number shapes; numicon; tens frames; bead strings; number trackers; number lines (labelled); straws

Year 1

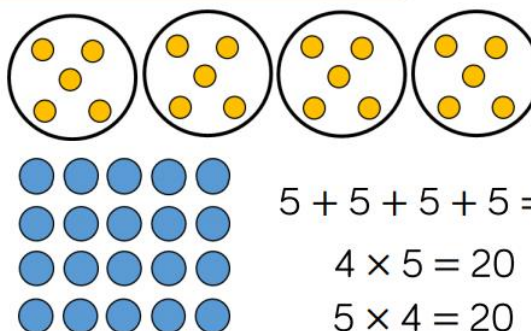
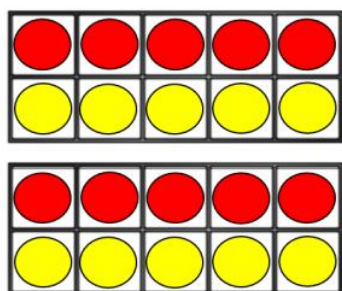
Multiplication

Mental Calculations	<ul style="list-style-type: none"> • 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 multiples of twos, fives and tens with equipment, songs & rhythms, and including by rote • Counting 2s e.g. counting socks, shoes, animal legs • Counting in 5s e.g. counting fingers, fingers in gloves, toes • Counting in 10s e.g. counting fingers, toes • Doubles up to 10
Written Calculations	<ul style="list-style-type: none"> • Recognising odd and even numbers • Write as a number pattern (e.g. 5, 10, 15...; 2, 4, 6...; 10, 20, 30...) <p>➤ It is important to use a range of models to develop understanding of multiplication and that children made connections between arrays, number patterns and counting in twos, fives and tens</p> <p>➤ Although there is no statutory requirement for written multiplication in Year 1, it may be helpful to encourage children to being to write it as repeated addition sentences in preparation for Year 2. E.g. $2+2+2+2=8$ or $4 \times 2=8$</p>

Representations



One bag holds 5 apples.
How many apples do 4 bags hold?



$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

Year 1

Division

Mental Calculations

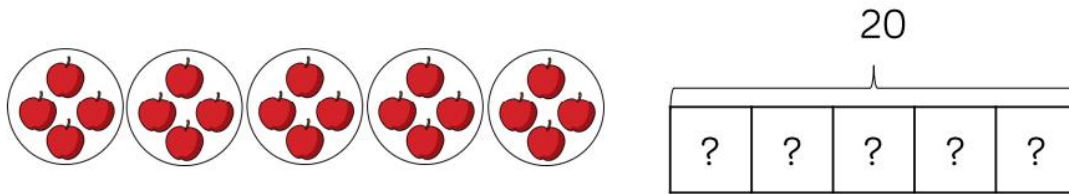
Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. (Pupils) make connections between arrays, number patterns, and counting in twos, fives and tens.

Count on or back in 2s, 5s and 10s and Songs are useful look for patterns.

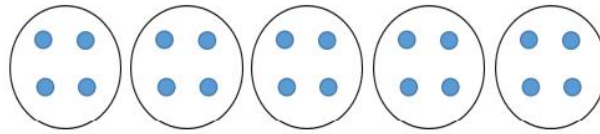
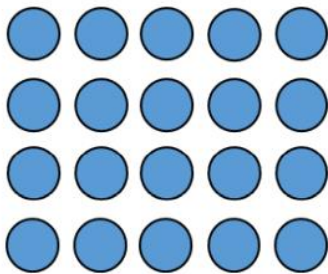
Written Calculations

- Children should experiment with the concepts of sharing and grouping in a number of contexts. Initially they use their own recording – moving towards fluent, symbolic notation in Year 2.
- Conceptual understanding and recording should be continuously supported by the use of arrays as a default model, as well as other representations.

Representations



There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?



$$20 \div 5 = 4$$

Year 2

Addition

Mental
Calculations

- **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
- **Adding three one-digit numbers**
- **Recall and use addition and subtraction facts to 20 facts fluently, and derive and use related facts up to 100**

Written
Calculations

- **Demonstrate the commutative law of addition**
- Re-partition numbers
- Use a hundred square
- Check calculations using inverse and by adding numbers in different order
- Using partitioning to separate tens and units, eg, $54 = 50 + 4$

Representations

$7 + 6 + 3 = 16$

$38 + 23 = 61$

$7 + 6 + 3 = 16$

$38 + 5 = 43$

$38 + 23 = 61$

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	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Part-whole model, bar model, tens frames, number shapes, numicon, number lines (labelled and blank), straws, hundred squares, base 10/dienes, column addition, place value counters

Year 2

Subtraction

Mental Calculations

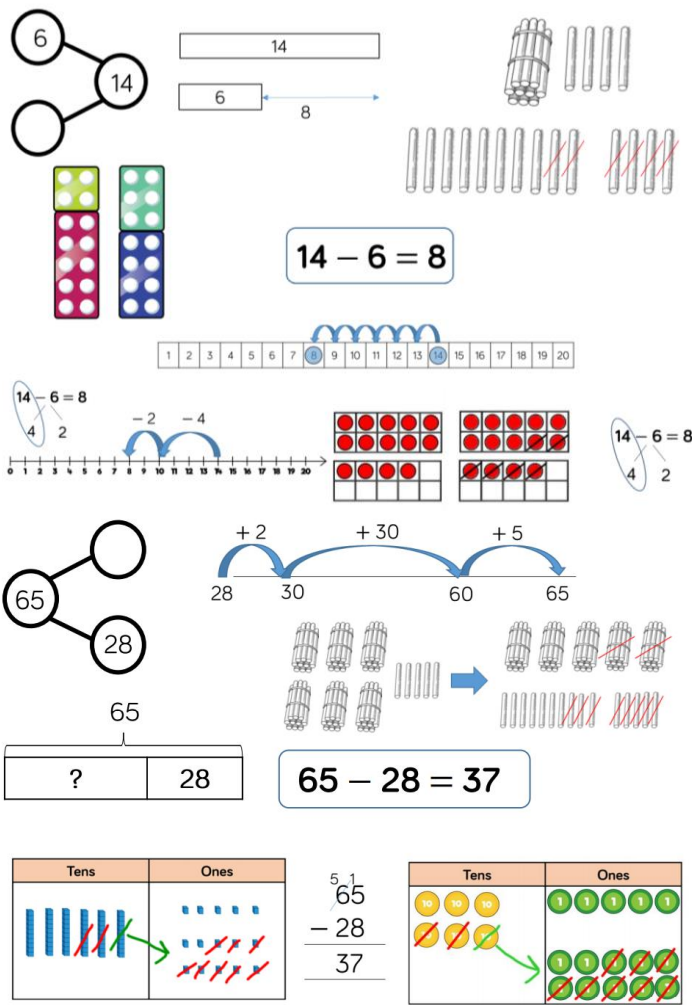
Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers

Jottings to support informal methods

Written Calculations

Representations



Part-whole model, bar model, number lines (labelled), number lines (blank), straws, hundred square, straws, base 10, place value counters, column method

Year 2

Multiplication

Mental Calculations

- **Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables**, connecting the 2, 5 and 10 multiplication tables to each other
- Connect the 10 multiplication table to place value
- **Recognise odd and even numbers**
- **show that multiplication of two numbers can be done in any order (commutative)**
- Use a variety of language to describe multiplication and division
- Apply doubling of numbers up to ten to doubling larger numbers
- Counting in 3s – odd / even pattern

Written Calculations

- **calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs**
- Begin to use other multiplication tables and recall facts to perform written calculations
- Use a range of materials and contexts ... including arrays and repeated addition

Skill: 2 times table

Skill: 5 times table

Skill: 10 times table

Skill: Solve 1-step problems using multiplication

One bag holds 5 apples.
How many apples do 4 bags hold?

$5 + 5 + 5 + 5 = 20$

$4 \times 5 = 20$

$5 \times 4 = 20$

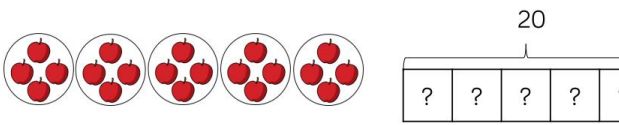
Year 2

Multiplication

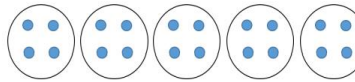
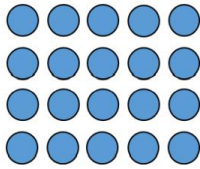
Mental Calculations	<ul style="list-style-type: none"> Recall and use multiplication and division facts for the 2, 5, 10, 3s multiplication tables, including recognising odd and even numbers Calculate mathematical statements for multiplication and division the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs.
Written Calculations	<ul style="list-style-type: none"> Show that 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 contexts. Pupils decode a problem first, represent it using manipulatives and jottings; and finally record it symbolically.

Skill: Solve 1-step problems using multiplication (sharing)

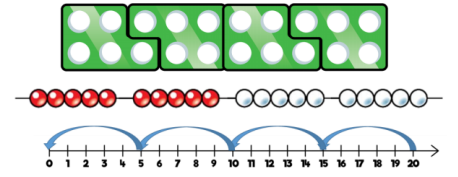
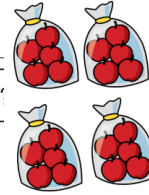
Skill: Solve 1-step problems using division (grouping)



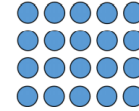
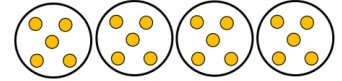
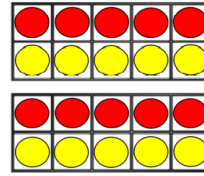
There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?



$$20 \div 5 = 4$$



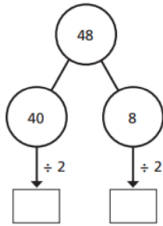
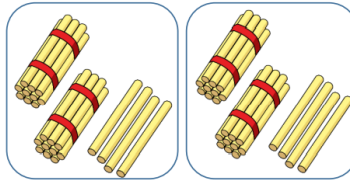
There are 20 apples altogether.
They are put in bags of 5.
How many bags are there?



$$20 \div 5 = 4$$

Skill: Divide 2-digits by 1-digit (sharing with no exchange)

Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1



$$48 \div 2 = 24$$

