Raising Achievement in Primary Mathematics

Calculations policy

whatever it takes
## ADDITION AND SUBTRACTION

### Year group 1

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<th><strong>NC end of year statements</strong></th>
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<td>- read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs</td>
<td>- memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 − 7 = 9; 7 = 16 − 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.</td>
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<tr>
<td>- represent and use number bonds and related subtraction facts within 20</td>
<td>- combine and increase numbers, counting forwards and backwards.</td>
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<td>- add and subtract one-digit and two-digit numbers to 20, including zero</td>
<td>- discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.</td>
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<td>- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as ( 7 = \square - 9 ).</td>
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### Pre-requisite skills

- Recite numbers in order and count objects accurately to at least 30.
- Read and write numbers from 1 to 20
- Know one more and one less than a number within the number range
- Use number names as nouns as well as adjectives
- Represent numbers using concrete objects and pictorial representations including the number line and begin to recognise place value
- Recognise patterns within the number system up to 20 e.g. that the next number in the counting sequence is 1 more than the last number; that teens numbers follow the same patterns as numbers up to 10.
- Work out how many in a group of objects greater than 10 by arranging into Numicon tens patterns and ones
- Record mathematical tasks informally using numerals, diagrams, Numicon shapes/patterns or other structured images
- Compare and order numerals to 20 using appropriate language e.g. more/less, bigger/smaller

### Associated skills

- Count to 100 and above, forwards and backwards, from 0 or any number.
- Demonstrate understanding of teens numbers by building with structured apparatus.
- Build 2 digit numbers with a variety of structured apparatus, Numicon, tens frames and Base 10
- Read, write and order numbers to 100 in numerals
- Partition 2 digit numbers into tens and ones
- Count in ones, twos, fives and tens
- Recognise odd and even numbers
- Understand equivalence in coin values
- Use language greater, smaller, heavier, lighter to compare 2 quantities
- Understand and use comparative language more than less/fewer than, equal to, most, fewest, least

### Number facts

- Know by heart addition and subtraction facts for all numbers up to and including 10 and use these to derive +/- facts within 20.
- Know all doubles facts of numbers up to 5 and corresponding halves

## ADDITION

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<th>OPPORTUNITIES FOR PROBLEM SOLVING</th>
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Recognise addition in problems involving combining and increase

There are 4 blue pencils in my pencil case and 2 red pencils. Altogether I have 6 pencils.

4 children are playing on the climbing frame. 2 more joined them. Now there are 6 children.

Add 1 digit numbers with a total no greater than 10 without counting in ones

Use a variety of equipment to solve an addition problem and say the corresponding number sentence, using a range of language associated with addition

Know that there is sometimes more than one answer to a question
Find me 3 Numicon shapes that make 10. Can you do it a different way?

Use structured apparatus to systematically organise addition and subtraction facts:
How many different ways can you make 9 with 2 Numicon shapes?
How do you know you have got all the ways?
Find all the dominoes with 8 spots altogether. Can you arrange them in a pattern?

Begin to recognise the relationship between addition and subtraction by exploring parts and wholes
Use 3 Numicon shapes 2,4 and 6 and say the additions and subtractions from these e.g. 2 + 4 = 6, 4 + 2 = 6, 6 – 4 + 2, 6 – 2 = 4

Solve simple real life problems involving money
Use Numicon. What happens when you add:
2 even numbers
2 odd numbers
an even and an odd number
Can you explain what happens?

Missing numbers (using a range of practical resources to support)
What numbers go in the boxes?
9 + □ = 10
10 - □ = 9
6 + □ = 9
10 - □ = 3

Is it true that?
Is it true that 3 + 4 = 4 + 3?
Continue the pattern:
0 + 1 = 1

Recognise subtraction in problems involving partitioning and decrease (take away/fewer/less)

There are 6 crocodiles in the river. 2 climb out on to the bank. How many are left in the river?

There are 8 bananas. Four children have one each, how many bananas are left?

Subtract numbers within 10 without counting back in ones

Use a variety of equipment to solve a subtraction problem and say the corresponding number sentence, using a range of language associated with subtraction

Know when to use addition to solve a problem

Record addition calculations in a written number sentence:

• Record number sentence as spoken e.g ‘6 plus 3 equals 9’ using words and numerals
• Use a variety of words to denote adding e.g. add, plus, and , more.

Know when to use subtraction to solve a problem

Record subtraction calculations in a written number sentence*:

• Record number sentence as spoken e.g ‘9 take away 4 equals 5’ using words and numerals
• Use a variety of words to denote subtraction e.g. subtract, take away, minus
Replace ‘subtraction’ words with – symbol
Replace 'addition' words with + symbol

Introduce symbols for equals (=) signs alongside appropriate language. Use Numicon balance scale to demonstrate that equivalence means 'has the same value as'

Solve missing number problems in addition:

\[ 4 + \square = 6 \]
\[ \square + 2 = 6 \]
\[ 8 = 2 + \square \]
\[ \square = 8 + 2 \]

Know that adding can be done in any order.

Understand that by adding 1, the answer is the next number in the counting sequence

Understand that by adding 0, the number remains unchanged

Use different strategies to add 3 single digit numbers e.g. finding pairs to 10 and identifying near doubles

Recognise that a teens number is \( 10 + U \)

Use structured apparatus or known facts to 10 to add a single digit to a teens number where the total is not

0 + 2 = 2
0 + 3......
10 + 1 = 11
10 + 2 = 12
10 + 3......

Missing symbols
Which symbols go in the box to make this number sentence correct?

6 \( \square \) 3 \( \square \) 9
7 \( \square \) 2 \( \square \) 9
10 \( \square \) 4 \( \square \) 6

I am thinking of 2 numbers with a difference of 3. What could they be?

Fact families
Can you write some number sentences using these numbers?
3 2 5

Estimating
Which number sentences will give an answer greater than 5?
3 + 4 10 - 8 2 + 1 10 - 3

What else do you know?
If you know 5 + 3 = 8, what other facts do you know?

Understand that by subtracting 1, the answer is the previous number in the counting sequence

Solve missing number problems in subtraction such as

6 - \( \square \) = 4
\( \square \) - 2 = 4
7 = 9 - \( \square \)
7 = \( \square \) - 2

Understand that by subtracting 0, the number remains unchanged

Use structured apparatus to show differences between numbers up to 10 and to solve difference problems in context e.g. measuring, data handling

Understand 'How many more' as a way of solving a subtraction problem and use structured apparatus to find the answer

Relate “how much more?” to giving change

Subtract 10 from a teens number without counting

Use structured apparatus or known facts to 10 to subtract a single digit from any number up to 20.
greater than 20
14 + 3 = 17

Partition teens numbers into 10s and write the corresponding addition sentences
13 = 10 + 3

Add 10 to a teens number

15 + 10 = 25

Use knowledge of place value to add a U to a multiple of 10.
20 + 4 = 24

Add 2 units together where the total is greater than 10 but less than 21 by bridging through 10.
8 + 5 = 13

Begin to use knowledge of facts to 10 to calculate total above 10
Use facts to 10 to say the addition facts to 11 or 12

Partition teens numbers into 10s and and write the corresponding subtraction sentences
19 – 9 = 10
19 – 10 = 9

Use structured apparatus to subtract 10 from a teens number

Use knowledge of place value to say what remains when the unit is subtracted from a 2 digit number

27 – 7 = 20

Subtract a unit from a number up to 20 by bridging through 10 if necessary.

15 – 7 = 8

Begin to use knowledge of facts to 10 to calculate with numbers above 10
Use addition facts for 11 or 12 to say the corresponding subtraction facts for 11 or 12
Notes: Include resources from NRICH website
*Teach + (addition) and = (equals) symbols before - (subtraction)
Calculations to be done initially with structured apparatus. Pupils are ready to record when they can demonstrate understanding using apparatus and explain what they are doing. Recording then follows, initially alongside the use of apparatus and then without apparatus. Although teacher may model different methods of recording, recording should be child led.
### Year group 1

#### NC end of year statements
- 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.
- recognise, find and name a half as one of two equal parts of an object, shape or quantity
- recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

#### Non statutory guidance
Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.

They make connections between arrays, number patterns, and counting in twos, fives and tens.

#### Pre-requisite skills
- Recognise when groups are equal or not
- Adjust objects in 2 sets to make both sets equal
- Count in 1’s, 2’s 5’s and 10’s within number range.

#### Associated skills
- Count to 100 and above, forwards and backwards, from 0 or any number.
- Build 2 digit numbers with a variety of structured apparatus, Numicon, tens frames and Base 10
- Read, write and order numbers to 100 in numerals
- Partition 2 digit numbers into tens and ones
- Recognise odd and even numbers
- Understand equivalence in coin values
- Recognise repeating patterns e.g. ababab …. abcabcabc……

#### Number facts
- Count in multiples of 2s, 5s and 10s
- Know all doubles facts of numbers up to 5 and corresponding halves

### MULTIPLICATION AND DIVISION

#### OPPORTUNITIES FOR PROBLEM SOLVING

**MULTIPLICATION**

- Recognise doubles
  *Can you find all the double dominoes? Can you put them in order?*

**DIVISION**

- Recognise halves as 2 equal parts of a shape or group of objects.

**Spot the mistake**
- Use a puppet to count but make some deliberate mistakes. e.g. 2 4 5 6 10 9 8 6
- See if the pupils can spot the deliberate mistake and correct the puppet

**Use Cuisenaire Rods to make different ‘trains’.**

*Find the dark green rod. Now make a train with the red rods which is exactly the same as the green rod train. Can you*
Demonstrate understanding of equal groups of objects, such as 3 groups of 2 or 2 groups of 10 and link this with counting in multiples of 2, 5 or 10.

| Count in 2’s 5’s and 10s and describe the pattern. Link counting in multiples with finding out how many in equal groups e.g. pairs of socks, fingers on hands, pencils in boxes, counting 2ps, 5ps and 10p |
| Find the total number of objects in repeated sets representing the groups using Numicon and where appropriate counting up in multiples e.g. 2’s, 5’s and 10’s. |
| Counting along in multiples on a counting stick and number line |
| Use Numicon to recognises equivalence in coins e.g. that two 1ps make a 2p, two 5ps make a 10p and five 2ps make a 10p |
| Respond to real life one step problems involving multiplication by representing equal groups of objects |
| Work out how many wheels are needed for 3 toy cars by putting them in 3 groups of 4. |

**Make any other trains that are just one colour?**
*Can you describe your trains? How many red rods did you need? So how many reds make a green?*

**Making links**
*If we give each teddy two apples, how many apples will three teddies have?*

**Here are 10 Lego people. If 5 people fit into a train carriage, how many carriages do we need?**

**If we put two pencils in each pencil pot how many pencils will we need?**

**Make Numicon ‘sandwiches’. The sandwich must be filled with the same filling. E.g. 3 yellow pieces of cheese inside the 9 sandwich. What other sandwiches can you make that contain lots of the same filling?**

**Solve real life division problems involving sharing and grouping using concrete equipment**

*There were 10 cakes in this box. Half of them have been eaten. How many are left?*

**Record informally using own pictures/diagrams and notation.**

**Recognises halves as the inverse of doubles**

**Recognise quarters as 4 equal parts of a shape or group of objects.**

**Begin to recognise that when an odd number is shared between 2, there will be one left over.**
**Chews cost 5p each. How much will 3 chews cost?**

Recording to be child initiated/led using concrete objects and leading to pictorial representations

Relate repeated groups to repeated addition number sentence

![Diagram of repeated groups](image1.png)

\[3 + 3 + 3 + 3 = 12\]

Respond to instructions to arrange objects in groups

![Diagram of groups of objects](image2.png)

3 groups of 2  2 groups of 3

Recognise even numbers/quantities as those which can be put into pairs equally and odd numbers/quantities as those which when put into pairs will have an ‘extra’ one.

![Diagram of even and odd](image3.png)

**Notes:** Include resources from NRICH website