## Fluency policy

## Addition and subtraction

To teach fluency in addition and subtraction facts, we use Number Sense Maths and their Number Facts Fluency programme.
"The Number Facts Fluency Programme teaches a core set of number facts (the grid facts - see Appendix) and the calculation strategies that high attaining children and countries use to solve them. Modelled on the phonics programmes used in early reading, the programme groups the grid facts and teaches them systematically alongside the calculation strategies that can be used to solve them. All facts are taught comprehensively on the path to fluency."

The Number Facts Fluency programme is split into the following six stages:


Within each of the stages above, there are a series of books which contain the teaching points.

## Stage 1 - Visual Number Foundations

These books teach children to subitise (recognise amounts without counting). We teach this skill in the Early Years Foundation Stage (nursery and reception) through lots of repeated practice of "seeing" amounts. The Number Sense programme is not necessarily used at Elmhurst to teach this.

## Stage 2 - Make and Break Numbers to 10

In these books, children learn about the numbers to 10 in depth. For each number children "break" it into two parts e.g. 7 is 2 and 5 . The lessons use tens frames, part whole models and then link these to addition and subtraction calculations.


## Stage 3 - Facts and Strategies within 10

In this book, children learn a wide range of strategies for adding and subtracting all number facts below ten.

> 1) One more, one less


- Adding one gives one more than the starting number. Subtracting one gives one less than the starting number.
- Commutativity: when solving $1+7$, it is easier to think of "one more than seven"
- "Next door number neighbours" are the numbers next to each other on the number line

2) Two more, Two less

- Even numbers can be made in groups of two, odd numbers can't

- Adding two to an even number gives the next even number. Subtracting two from an even number gives the previous even number. The same applies to odd numbers.
- These numbers become the "even number neighbours" and "odd number neighbours" as they are next to each other.



## 3) Number 10 fact families

This builds on Stage 2 where children were taught to "make and break" the numbers to ten. Children use the same representations (tens frames and part-whole models) and link these to four calculations


## 4) Five and a bit

Children learn that numbers from six to ten can all be composed as "five and a bit". They use their fingers, tens frames and part-whole models which are then linked to the calculations.


## 5) Know about zero

- If we add or subtract zero, the number remains unchanged
- If we subtract any number away from itself, we are always left with zero

$$
\begin{aligned}
& 2+0=2 \\
& 0+2=2 \\
& 2-0=2
\end{aligned}
$$

$$
2-2=0
$$



## 6) Doubles and near doubles

- Children should know their doubles of numbers up to five off by heart. They then use this to write addition calculations and then also to half numbers as well.

- Children are taught to use doubles to calculate near doubles e.g. if we know that $4+4=8$ then $4+5$ is only one more.



## 7) Number neighbours

- Building on their knowledge from books one and two, children apply their knowledge of number neighbours to finding the difference:
- Next door number neighbours have a difference of 1 .
- Odd number neighbours have a difference of 2
- Even number neighbours have a difference of 2 .



## 8) Seven tree and nine square

- As sets of calculations that are not covered by the other strategies, a visual representation is used for these.



## Stage 4 - Ten and a Bit

This book teaches children about the "teens" numbers (between 10 and 20) and how they are composed of ten and a bit more. This lays the foundations for later place value teaching.

Tens frames and part whole models are used again, but the place value chart is also introduced at this stage.


## Stage 5 - Facts and Strategies across ten

This book introduces children to calculation strategies when the numbers are larger than ten.

## 1) Make ten and then: addition



- Using place value counters and tens frames, children first represent the two numbers (image 1 above)
- Next, they move over some counters to fill the first tens frame and "make ten (image 2 above)
- Finally, they add on the remaining counters to the ten (image 3 above)
- When they are ready, children move away from the counters and use their skills in partitioning numbers to calculate mentally instead (image below)


2) Make ten and then: subtraction


- Using place value counters, children represent the whole number e.g. 13 (image 1 above)
- Next, they cross out or remove any counters on the second ten frame (so they are left with ten)
- Finally, they cross out or remove any further counters needed (image 2 above)
- When they are ready, children move away from the counters and use their skills in partitioning numbers to calculate mentally instead (image below)


3) More doubles and near doubles

- Children need to learn their doubles for six to ten off by heart. The above representations are used to support this (fingers showing five-and-a-bit and part-whole models)

- Children use their knowledge of doubles to calculate near doubles. Knowing that number neighbours have a difference of one, they add one to the total.

- Hidden doubles can be found and calculated when children spot their odd or even number neighbours being added



## 4) Adjusting

- For adding and subtracting numbers that are close to ten, children can think of this as adding or subtracting too much and then adjusting


Subtracting 9 can be calculated by subtracting 10 and adding 1. For example: 17-9


17

So, $17-9=17-10+1$
$=8$

Subtracting 8 can be calculated by subtracting 10 and adding 2. For example: 15-8


So, $15-8=15-10+2$
$=7$

## Stage 6 - Extending Facts and Strategies Beyond the Grids

In this last book, children learn to apply their strategies to larger 2-digit numbers.

## 1) Calculating with multiples of ten

- Children need to be able to count in tens forwards and backwards and write these as numerals

- Children then move on to using their addition skills and learning to unitise (seeing tens as a unit that we can calculate with)

$$
\begin{aligned}
& 2+4=6 \\
& 2 \text { tens }+4 \text { tens }=6 \text { tens } \\
& 20+40=60
\end{aligned}
$$

$60-40=$ " 6 tens minus 4 tens is 2 tens because 6 minus 4 is 2 "

## 2) Two-digit numbers: calculating with ones

- We can use addition facts within ten to add ones to a 2-digit number

- We can use subtraction facts within ten to subtract ones from a 2-digit number


3) Two-digit numbers: calculating with tens

- We can use our knowledge from book 1 to add multiples of ten to other 2-digit numbers

- We can use our knowledge from book 1 to subtract multiples of ten from other 2-digit numbers



## 4) Make the next ten and then: addition

- We can use our number bonds to ten to work out number bonds to the next multiple of ten

- We can extend "make ten and then" from Stage 5 to add across multiples of ten.


5) Make the previous ten and then: subtraction

- We can extend our knowledge of subtracting from ten to subtract from a multiple of ten.

- We can extend the "make ten and then" strategy from Stage 5 to subtract from a multiple of ten



## Appendices

The grid of addition facts. They are colour coded to match the strategies on the following page.

| + | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | $0+0$ | $0+1$ | $0+2$ | $0+3$ | $0+4$ | $0+5$ | $0+6$ | $0+7$ | $0+8$ | $0+9$ | $0+10$ |
| 1 | $1+0$ | $1+1$ | $1+2$ | $1+3$ | $1+4$ | $1+5$ | $1+6$ | $1+7$ | $1+8$ | $1+9$ | $1+10$ |
| 2 | $2+0$ | $2+1$ | $2+2$ | $2+3$ | $2+4$ | $2+5$ | $2+6$ | $2+7$ | $2+8$ | $2+9$ | $2+10$ |
| 3 | $3+0$ | $3+1$ | $3+2$ | $3+3$ | $3+4$ | $3+5$ | $3+6$ | $3+7$ | $3+8$ | $3+9$ | $3+10$ |
| 4 | $4+0$ | $4+1$ | $4+2$ | $4+3$ | $4+4$ | $4+5$ | $4+6$ | $4+7$ | $4+8$ | $4+9$ | $4+10$ |
| 5 | $5+0$ | $5+1$ | $5+2$ | $5+3$ | $5+4$ | $5+5$ | $5+6$ | $5+7$ | $5+8$ | $5+9$ | $5+10$ |
| 6 | $6+0$ | $6+1$ | $6+2$ | $6+3$ | $6+4$ | $6+5$ | $6+6$ | $6+7$ | $6+8$ | $6+9$ | $6+10$ |
| 7 | $7+0$ | $7+1$ | $7+2$ | $7+3$ | $7+4$ | $7+5$ | $7+6$ | $7+7$ | $7+8$ | $7+9$ | $7+10$ |
| 8 | $8+0$ | $8+1$ | $8+2$ | $8+3$ | $8+4$ | $8+5$ | $8+6$ | $8+7$ | $8+8$ | $8+9$ | $8+10$ |
| 9 | $9+0$ | $9+1$ | $9+2$ | $9+3$ | $9+4$ | $9+5$ | $9+6$ | $9+7$ | $9+8$ | $9+9$ | $9+10$ |
| 10 | $10+0$ | $10+1$ | $10+2$ | $10+3$ | $10+4$ | $10+5$ | $10+6$ | $10+7$ | $10+8$ | $10+9$ | $10+10$ |

The grid of subtraction facts.

| - | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0 | $0-0$ |  |  |  |  |  |  |  |  |  |  |
| 1 | $1-0$ | $1-1$ |  |  |  |  |  |  |  |  |  |
| 2 | $2-0$ | $2-1$ | $2-2$ |  |  |  |  |  |  |  |  |
| 3 | $3-0$ | $3-1$ | $3-2$ | $3-3$ |  |  |  |  |  |  |  |
| 4 | $4-0$ | $4-1$ | $4-2$ | $4-3$ | $4-4$ |  |  |  |  |  |  |
| 5 | $5-0$ | $5-1$ | $5-2$ | $5-3$ | $5-4$ | $5-5$ |  |  |  |  |  |
| 6 | $6-0$ | $6-1$ | $6-2$ | $6-3$ | $6-4$ | $6-5$ | $6-6$ |  |  |  |  |
| 7 | $7-0$ | $7-1$ | $7-2$ | $7-3$ | $7-4$ | $7-5$ | $7-6$ | $7-7$ |  |  |  |
| 8 | $8-0$ | $8-1$ | $8-2$ | $8-3$ | $8-4$ | $8-5$ | $8-6$ | $8-7$ | $8-8$ |  |  |
| 9 | $9-0$ | $9-1$ | $9-2$ | $9-3$ | $9-4$ | $9-5$ | $9-6$ | $9-7$ | $9-8$ | $9-9$ |  |
| 10 | $10-0$ | $10-1$ | $10-2$ | $10-3$ | $10-4$ | $10-5$ | $10-6$ | $10-7$ | $10-8$ | $10-9$ | $10-10$ |


| 11 |  | $11-1$ | $11-2$ | $11-3$ | $11-4$ | $11-5$ | $11-6$ | $11-7$ | $11-8$ | $11-9$ | $11-10$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 12 |  |  | $12-2$ | $13-3$ | $12-4$ | $12-5$ | $12-6$ | $12-7$ | $12-8$ | $11-9$ | $12-10$ |
| 13 |  |  |  | $13-3$ | $13-4$ | $13-5$ | $13-6$ | $13-7$ | $13-8$ | $13-9$ | $13-10$ |
| 14 |  |  |  |  | $14-4$ | $14-5$ | $14-6$ | $14-7$ | $14-8$ | $14-9$ | $14-10$ |
| 15 |  |  |  |  |  | $15-5$ | $15-6$ | $15-7$ | $15-8$ | $15-9$ | $15-10$ |
| 16 |  |  |  |  |  |  | $16-6$ | $16-7$ | $16-8$ | $16-9$ | $16-10$ |
| 17 |  |  |  |  |  |  |  | $17-7$ | $17-8$ | $17-9$ | $17-10$ |
| 18 |  |  |  |  |  |  |  |  | $18-8$ | $18-9$ | $18-10$ |
| 19 |  |  |  |  |  |  |  |  |  | $19-9$ | $19-10$ |
| 20 |  |  |  |  |  |  |  |  |  |  | $20-10$ |

Strategies taught in the programme:


