

Calculation Policy for Addition and Subtraction at Mareham Le Fen Church of England Primary School



Mental Strategies

These are a **selection** of mental calculation strategies:

Mental recall of number bonds

$$6 + 4 = 10$$

$$10 - 4 = 6$$

$$25 + 75 = 100$$

$$100 - 35 = 65$$

$$\square + 3 = 10$$

$$10 - \square = 7$$

$$19 + \square = 20$$

$$100 - \square = 45$$

Addition using partitioning and recombining

$$34 + 45 =$$

$$(30 + 40) + (4 + 5) = 79$$

Mental recall of addition and subtraction facts

$$10 - 6 = 4$$

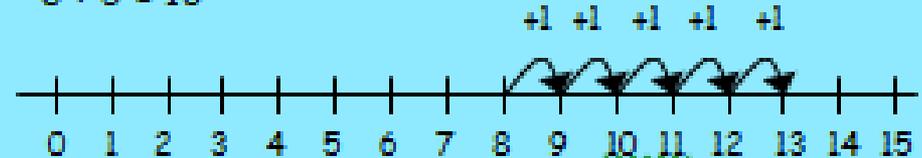
$$20 - 17 = 3$$

$$17 - \square = 11$$

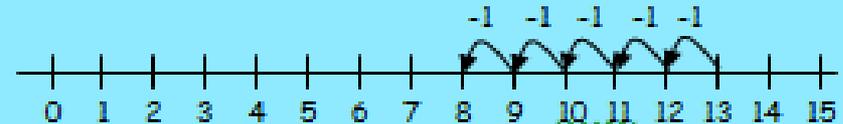
$$10 - \square = 2$$

Counting on and back in ones using a number line

$$8 + 5 = 13$$



$$13 - 5 = 8$$



Use near doubles

$$6 + 7 = \text{double } 6 + 1 = 13$$

Mental Strategies continued

Use the relationship between addition and subtraction

$$36 + 19 = 55 \quad 19 + 36 = 55$$

$$55 - 19 = 36 \quad 55 - 36 = 19$$

Add the nearest multiple of 10, 100 and 1000 and adjust

$$24 + 19 = 24 + 20 - 1 = 43$$

$$458 + 71 = 458 + 70 + 1 = 529$$

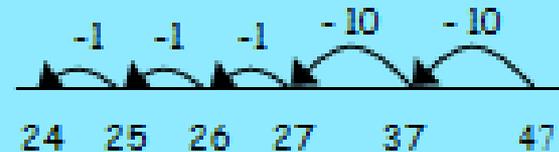
Subtract the nearest multiple of 10, 100 and 1000 and adjust

$$24 - 19 = 24 - 20 + 1 = 5$$

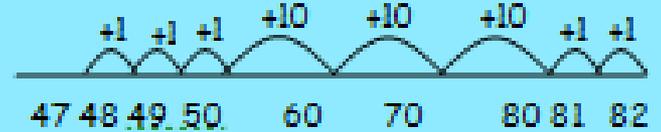
$$458 - 71 = 458 - 70 - 1 = 387$$

Counting on and back using a blank number line (BNL)

$$47 - 23 = 24$$



$$82 - 47 = 35$$



Find a small difference by counting up

$$82 - 79 = 3$$

Mental Strategies continued

Counting on or back in repeated steps
of 1, 10, 100, 1000

$$86 - 52 = 34$$

(by counting back in tens and then in ones)

$$86 + 57 = 143$$

(by counting on in tens and then in ones)

$$460 - 300 = 160$$

(by counting back in hundreds)

$$460 - 300 = 160$$

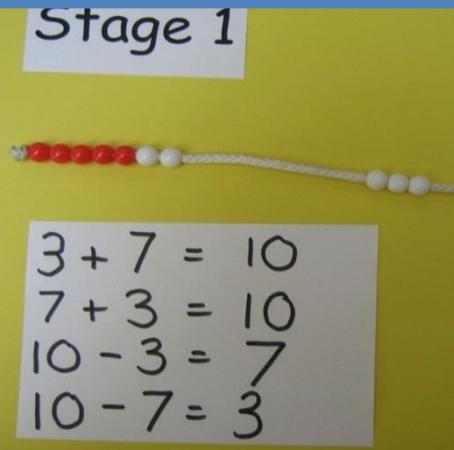
(by counting back in hundreds)

*MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED.
THEY ARE NOT REPLACED BY WRITTEN METHODS*

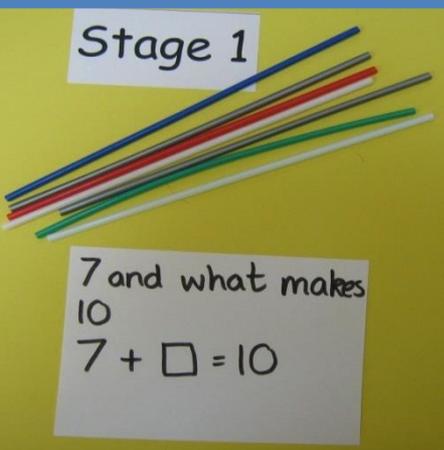
Children will begin to understand that adding can be done in any order (commutativity) and the principle of exchange.



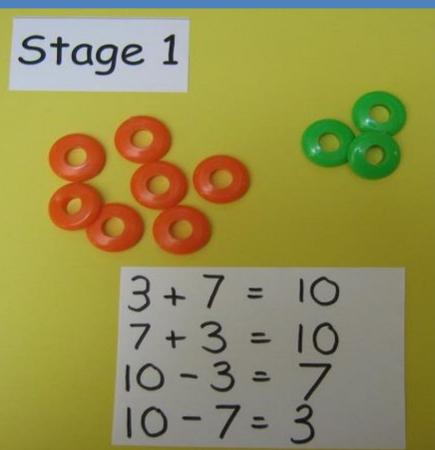
Fingers



Bead Strings



Straws



Any Object

$3 + 7 = 10$
 $7 + 3 = 10$
 $10 - 3 = 7$
 $10 - 7 = 3$

7 and what makes
 10
 $7 + \square = 10$

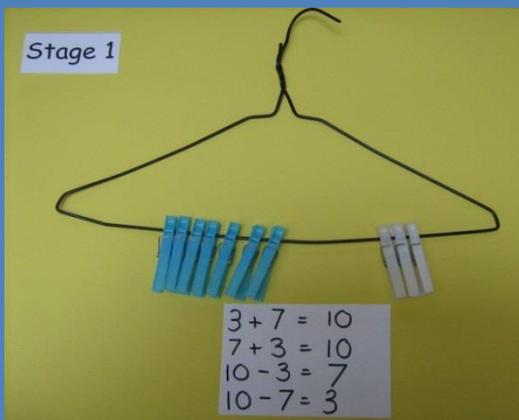
$3 + 7 = 10$
 $7 + 3 = 10$
 $10 - 3 = 7$
 $10 - 7 = 3$

Counting On

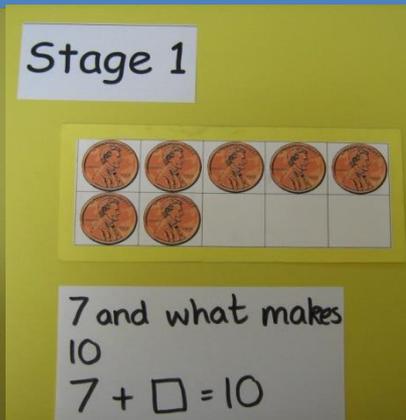
+ Addition+ Stage 1

Combining Objects

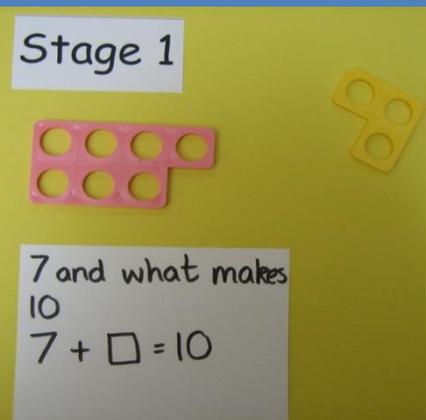
Pegs



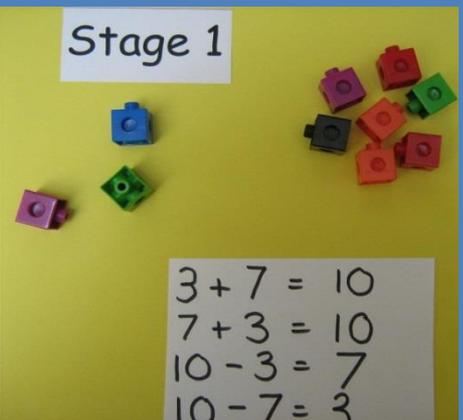
Subitise



Numicon



Cubes



$3 + 7 = 10$
 $7 + 3 = 10$
 $10 - 3 = 7$
 $10 - 7 = 3$

7 and what makes
 10
 $7 + \square = 10$

7 and what makes
 10
 $7 + \square = 10$

$3 + 7 = 10$
 $7 + 3 = 10$
 $10 - 3 = 7$
 $10 - 7 = 3$

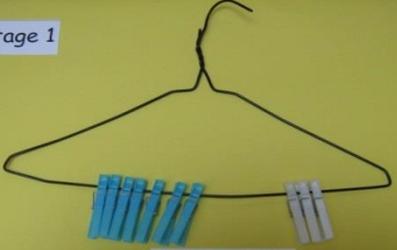
They will be confident in using the terms 'worth' and 'value' when talking about single-digit numbers e.g. 6.

Children will use practical resources to physically remove an amount from a group to find the total remaining.

<p>Stage 1</p> 	<p>Stage 1</p>  <p> $3 + 7 = 10$ $7 + 3 = 10$ $10 - 3 = 7$ $10 - 7 = 3$ </p>	<p>Stage 1</p>  <p> 7 and what makes 10 $7 + \square = 10$ </p>	<p>Stage 1</p>  <p> $3 + 7 = 10$ $7 + 3 = 10$ $10 - 3 = 7$ $10 - 7 = 3$ </p>
Fingers	Bead String	Straws	Any Object

Counting Back

-Subtraction- Stage 1

Pegs	Subitise	Numico	Cubes	Comparison
<p>Stage 1</p>  <p> $3 + 7 = 10$ $7 + 3 = 10$ $10 - 3 = 7$ $10 - 7 = 3$ </p>	<p>Stage 1</p>  <p> 7 and what makes 10 $7 + \square = 10$ </p>	<p>Stage 1ⁿ</p>  <p> 7 and what makes 10 $7 + \square = 10$ </p>	<p>Stage 1</p>  <p> $3 + 7 = 10$ $7 + 3 = 10$ $10 - 3 = 7$ $10 - 7 = 3$ </p>	<p>Stage 1^s</p>  <p>Language of more and less</p>

Children will be introduced to the language of comparisons including equal use of the vocabulary 'less' and 'more'.

Practical resources will continue to be used. As they become confident, children will choose their own way of representing their calculations using practical resources and pictures.

Stage 2

children write number sentence:
 $7 + 3 = 10$
 $3 + 7 = 10$

Bead Strings

Stage 2

children write number sentence:
 $7 + 3 = 10$
 $3 + 7 = 10$

Pegs

Stage 2

Children write number sentences:
 $10 = 6 + 4$
 $4 + 6 = 10$

Any Objects

Stage 2

5 and 1 more is? 6
 5 and 2 more is? 6, 7
 5 and 3 more is? 6, 7, 8

+ Addition + Stage 2

Any Objects

Dominoes

Cubes

Straws

Stage 2

children write number sentence:
 $7 + 3 = 10$
 $3 + 7 = 10$

Stage 2

Children write number sentences:
 $3 + 6 = 9$
 $6 + 3 = 9$
 $9 - 3 = 6$
 $9 - 6 = 3$

Stage 2

Children write number sentences:
 $14 + 11 = 25$
 $11 + 14 = 25$

Stage 2

Children write number sentences:
 $14 + 11 = 25$
 $11 + 14 = 25$

Count on
 One more,
 Two more,
 Three more...

Children use number sentences alongside their pictures and practical resources.

Children need to know the relationship between addition and subtraction (inverse).

Practical resources will continue to support children's understanding. Children will make links between subtraction and addition.

Stage 2

Children write number sentence
 $10 - 6 = 4$
 $10 - 4 = 6$

Any Objects

Stage 2

Children write number sentence
 $10 - 7 = 3$
 $10 - 3 = 7$

Pegs

Stage 2

Children write number sentence
 $10 - 7 = 3$
 $10 - 3 = 7$

Any Objects

-Subtraction- Stage 2

Counting Back

- 1 less
- 2 less
- 3 less

Stage 2

Children write number sentences:
 $3 + 6 = 9$
 $6 + 3 = 9$
 $9 - 3 = 6$
 $9 - 6 = 3$

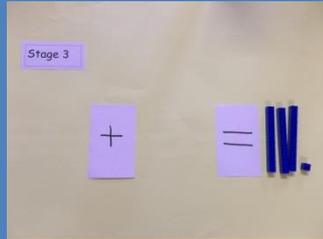
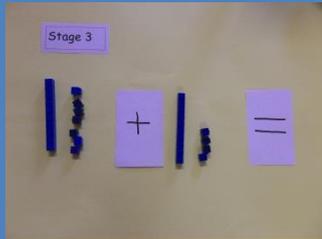
Stage 2

5 and 1 less
5 and 2 less
5 and 3 less

Children will use number sentences alongside their pictures and practical resources.

Children will understand that subtraction is not commutative. Numbers in a calculation can be done in any order but the answers will be different e.g. $10 - 6 = 4$, $4 - 10 = -6$.

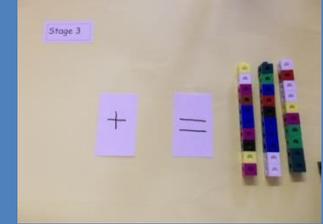
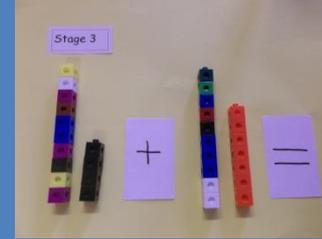
Children will now be confident in using practical resources to help them combine groups of objects with numbers up to 20.



$14 + 17$

$= 31$

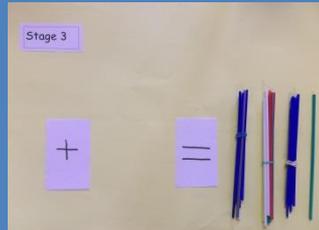
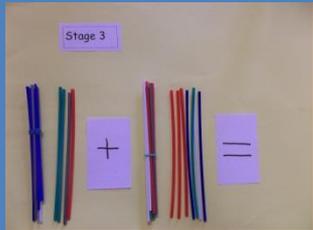
Exchange



$14 + 17$

$= 31$

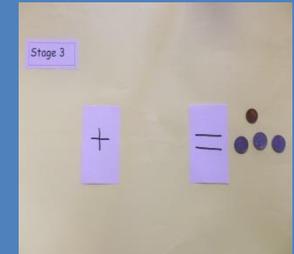
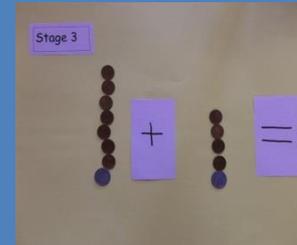
+ Addition+ Stage 3



$14 + 17$

$= 31$

Place Value



$14 + 17$

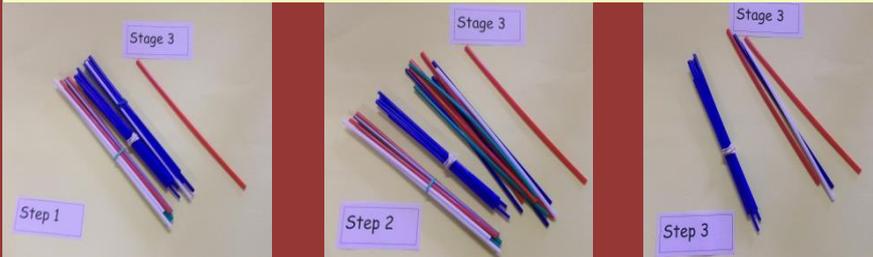
$= 31$

They will continue using practical resources as they also begin to use number lines and hundred squares to support their mental methods.

Children will start to work with totals greater than 20 where they apply their understanding of the principle of exchange.

Children will now be confident in using practical resources to 'take away' and 'find the difference'.

Exchange one ten for ten ones



$$31 - 17 = 14$$

Exchange one ten for ten ones



$$31 - 17 = 14$$

-Subtraction- Stage 3

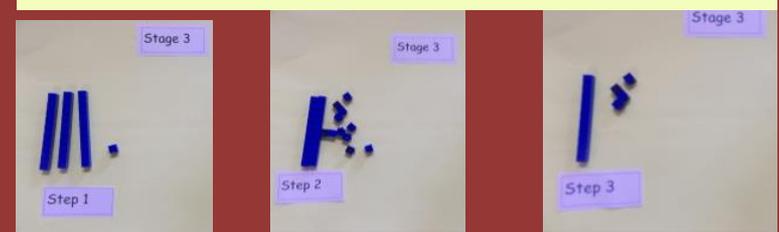
They will continue using practical resources as they also begin to use number lines and hundred squares to support their mental methods.

Exchange one ten for ten ones



$$31 - 17 = 14$$

Exchange one ten for ten ones



$$31 - 17 = 14$$

Children will start to work with numbers greater than 20 which require them to apply their knowledge of the principle of exchange.

Children are now confident in using practical resource to combine objects using the principle of exchange appropriately.

Stage 4

$25 + 47 =$

$31 + 16 =$

Step 1	
Tens	Ones
2	5
4	7

Step 1

Stage 4

$25 + 47 =$

$31 + 16 =$

Step 2	
Tens	Ones
2	5
4	7

Step 2

+ Addition+ Stage 4

Step 3

Stage 4

$25 + 47 =$

$31 + 16 =$

Step 3	
Tens	Ones
2	5
4	7

Step 3

Step 4

Stage 4

$25 + 47 =$

$31 + 16 =$

Step 4	
Tens	Ones
2	5
4	7

Step 4

They will now begin to organise their practical resources (e.g. straws, base 10, place value counters) in a vertical manner where their combined totals are situated at the bottom.

Children are now confident in using practical resource to 'take away' and 'find the difference' using the principle of exchange appropriately.

Stage 4

$$31 - 14$$

$$32 + 13 =$$

Step 1	
Tens	Ones
3	1
1	4

Step 1

Stage 4

$$31 - 14$$

$$32 + 13 =$$

Step 2	
Tens	Ones
2	1
1	4

Step 2

-Subtraction- Stage 4

Stage 4

$$31 - 14$$

$$32 + 13 =$$

Step 3	
Tens	Ones
2	1
1	4
	7

Step 3

Stage 4

$$31 - 14$$

$$32 + 13 =$$

Step 4	
Tens	Ones
2	1
1	4
1	7

Step 4

They will now begin to organise their practical resource (e.g. straws, base 10, place value counters) in a vertical manner where the amount that remains at the end of the calculation is situated at the bottom.

Children will now be secure in organising their practical resources in a vertical manner where their combined totals are situated at the bottom.

Stage 5

25 + 47

Step 1	
Tens	Ones
2	5
4	7

25
+ 47

Step 1

Stage 5

25 + 47

Step 2	
Tens	Ones
2	5
4	7
	2

25
+ 47
—
2
—
1

Step 2

+ Addition + Stage 5

Stage 5

25 + 47

Step 3	
Tens	Ones
2	5
4	7
7	2

25
+ 47
—
72
—
1

Step 3

They will be now able to make the links between this representation and the formal column addition when seen alongside one another.

Children will now be secure in organising their practical resources in a vertical manner for subtraction using the principle of exchange appropriately.

Stage 5

Step 1

Tens	Ones
3	1

31
-14

31
-14

Step 1

Stage 5

Step 2

Tens	Ones
2	11

28
-14

28
-14

Step 2

- Subtraction - Stage 5

Stage 5

Step 3

Tens	Ones
2	11

28
-14

28
-14

Step 3

Stage 5

Step 4

Tens	Ones
2	1

28
-14

28
-14
17

Step 4

They will be now able to make links between this representation and the formal column subtraction when seen alongside each other.

Children will have a full understanding of the links between the practical resource representation for column addition and the formal written method.

Stage 6

$$\begin{array}{r} 327 \\ + 496 \\ \hline 823 \\ \hline 1 \quad 1 \end{array}$$

+ Addition + Stage 6

They will now be able to explore calculating with larger numbers using their understanding of the formal written method.

Children will have a full understanding of the links between the practical resource representation for column subtraction and the formal written method.

Stage 6

$$\begin{array}{r} 784 \\ - 259 \\ \hline 525 \end{array}$$

-Subtraction- Stage 6

They will be able to explore calculating with larger numbers using their understanding of the formal written method.

Glossary



- **Blank number line (BNL):** a line where you can count on and back in different sized jumps (to aid mental arithmetic)
- **Commutativity:** the calculation can be done in any order
- **Equal sign:** this means is equal to and not 'the answer!'
- **Equivalence:** means equal to
- **Exchange:** swap ten ones for one ten or ten tens for one hundred and visa versa
- **Inverse:** the opposite calculation
- **Less and more:** adding on more or taking away for less
- **Number lines:** used for counting on or back in small jumps of ones and twos(to aid mental arithmetic)
- **Number sentences:** the calculation e.g. $7 + 4 = 11$
- **Place value:** What each digit in a number represents; hundreds, tens or ones
- **Principle of exchange:** when you get ten in a place value it becomes something else e.g. ten ones become one ten, ten tens become one hundred
- **Single-digit numbers:** numbers 0 to 9
- **Two-digit number:** numbers which have tens and ones in e.g. 34

