How we teach calculations at Keresforth Primary School

Updated September 2021

Contents

Addition

Early Years

Adding 2 single digits by counting on

Add 2 groups together by counting all of them. Understand that addition means adding 2 groups together.

- Physical objects will be used before written methods

3 + 2 = 5

Recording practical activities

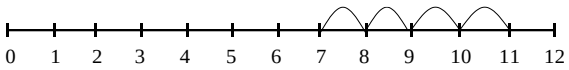
e.g. I have 3 sweets, then I get one more

() () () ()

The child draws the sweets. They may draw 3 sweets and then another. They may just draw 4 to start with.
They won't draw 3, then 1, then 4, nor should they be expected to at this stage.
This means that any recording of the format 3+1=4 is very unhelpful.

When pupils are ready to record numerals they may begin to record the above example as:
3 1
or just as
4

And when ready move on to recording symbols. 3+1, or 3+1=4.
When ready move onto the introduction of a number line for counting on for addition



Vocabulary
add
more
and
make
sum
total
altogether
one more, two more…..

Addition

Year 1

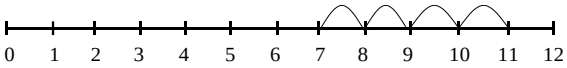
Teach only this method in Year 1

Pictures / marks

Sarah has 3 llollies. Her friend gives her 2 lollies. How many lollies does she have altogether?

Number lines (numbered)

7 + 4



How to teach and Success Criteria

Recording by - drawing jumps on prepared lines

- constructing own lines

(Teacher model number lines with missing numbers)

Vocabulary

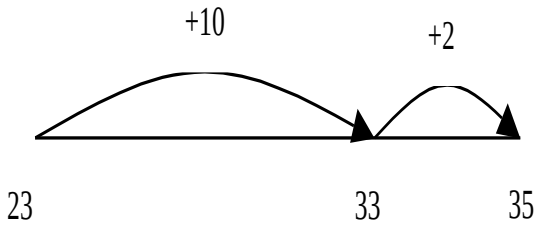
add, more, and
make, sum, total
Altogether
one more, two more…
addition
how many more to make

Year 2

Revisit method taught in Year1 and introduce Partitioning.

Partition the smaller number into tens and ones

23 + 12 = 23 + 10 + 2
= 33 + 2
= 35



How to teach and Success Criteria

- Read the number sentence.
- Draw a number line.
- Write the largest number at the start of the number line.
- Partition the smallest number.
- Jump the number of tens in the smallest number in either one jump or several smaller jumps.
- Jump the number of units in the smallest number in one jump.
- Check your work.
- The last number you landed on is the answer.

Introduce column addition with 2 digit numbers when ready

Vocabulary

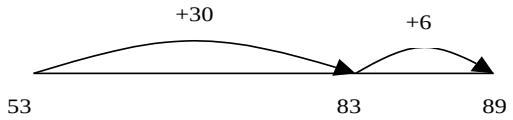
add, more, and
make, sum, total
Altogether
one more, two more…
addition

Year 3

Revisit method taught in Year2 and introduce the expanded method depending on ability.

Partition the smaller number into tens and ones

36 + 53 = 53 + 30 + 6
= 83 + 6
= 89



Pencil and paper procedures
Use column addition for numbers up three digits

$$\begin{array}{r} 83 \\ +\ 42 \\ \hline 125 \end{array}$$

How to teach and Success Criteria

- Read the number sentence.
- Write the first number.
- Write the second number underneath the first number making sure the digits are in the correct columns.
- Add the tens and write the number underneath.
- Add the units and write the number underneath.
- Add the 2 new numbers together mentally and write the number underneath.
- Check your work.
- The last number is the answer.

Vocabulary

add, more, and
make, sum, total
Altogether
one more, two more…
addition
how many more to make

	how many more to make how many more is …. Than…. how much more…..	how many more is …. Than…. how much more…..

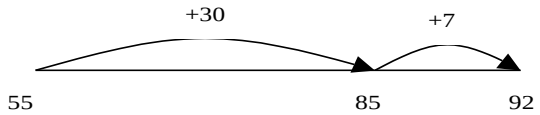
Addition

Year 4

Revisit partitioning as a mental strategy and for differing ability only

Partition the smaller number into tens and ones

55 + 37 = 55 + 30 + 7
= 85 + 7
= 92



Pencil and paper procedures

358 + 73 = 431

```
  358
+  73
  431
```

Extend to decimals in the context of money (vertically)

£ 2.50 + £ 1.75 = £ 4.25

```
  £ 2.50
+ £ 1.75
  £ 4.25
```

How to teach and Success Criteria

- Read the number sentence.
- Write the first number.
- Write the second number underneath the first number making sure the digits are in the correct columns and the decimal points are underneath each other.
- Add the units and write the number underneath.
- Add the tens and write the number underneath.
- Add the hundreds and write the number underneath.
- Add the 3 new numbers together mentally and write the number underneath.
- Check your work.

The last number is the answer.

Vocabulary

Year 5

Revisit partitioning as a mental strategy and for differing ability only

Pencil and paper procedures

Extend to numbers with at least four digits and beyond
3547 + 4769 = 4262

```
  3547
+ 4769
  8316
```

```
  36.8
+ 49.3
  86.1
```

Extend to decimals (either one or two decimal places)

How to teach and Success Criteria

- Read the number sentence.
- Write the first number.
- Write the second number underneath the first number making sure the digits are in the correct columns.
- Add the units and write the number underneath.
- Add the tens and write the number underneath.
- Add the hundreds and write the number underneath.
- Add the thousands and write the number underneath.
- Add the 4 new numbers together mentally and write the number underneath.
- Check your work.
- The last number is the answer.
- Add compact methods where appropriate.

Children should use the carrying method to numbers with at least four digits.

Year 6

Revisit partitioning as a mental strategy and for differing ability only

Pencil and paper procedures

Extend to numbers with any number of digits and decimals with 1 and 2 decimal places.
124.9 + 117.25 = 242.15

```
  124.9
+ 117.25
  242.15
```

How to teach and Success Criteria

- Read the number sentence.
- Write the first number.
- Write the second number underneath the first number making sure the digits are in the correct columns and the decimal points are underneath each other.
- Add the hundredths and write the number underneath.
- Add the tenths and write the number underneath.
- Add the units and write the number underneath.
- Add the tens and write the number underneath.
- Add the hundreds and write the number underneath.
- Add the 5 new numbers together mentally and write the number underneath.
- Check your work.
- The last number is the answer.
- Add compact methods where appropriate.
-

Children should use the carrying method to number with any number of digits.

add, more, and make, sum, total • Altogether one more, two more… addition how many more to make how many more is …. Than…. how much more…..		

Subtraction

Early Years

Counting how are many left

Count how many are left when a group is removed. Understand that subtraction is take away.

- Physical objects will be used before written methods.

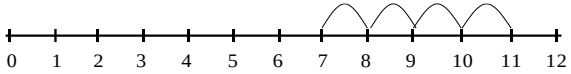
4 _ 1 = 3

Subtracting 2 single digits by counting on and back

Use pictorial representations

When ready introduce numbers for representations

When ready introduce a number line for counting on and back for subtraction



Vocabulary

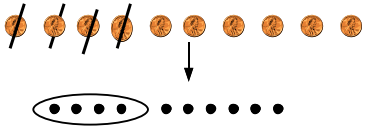
take away
how many are left
one less, two less…
how many fewer
difference between

Subtraction

Year 1

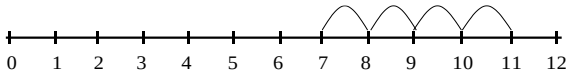
Pictures / marks

Sam spent 4p. What was his change from 10p?



Number lines (numbered)

The difference between 7 and 11
(Counting up)



Recording by - drawing jumps on prepared lines
- constructing own lines

(Teachers model jottings appropriate for larger numbers)

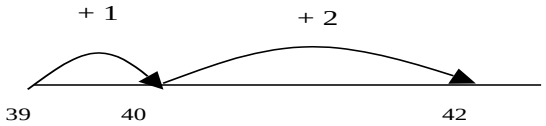
Vocabulary

take away
how many are left…
one less, two less….
how many fewer
difference between
how much less

Year 2

Find a small difference by counting up

42 – 39 = 3



How to teach and Success Criteria

- Read the number sentence.
- Draw a number line.
- Write the smallest number at the start of the number line.
- Write the largest number at the end of the number line.
- Jump to the next multiple of 10. (number/size of jumps will depend on child's ability)
- Jump in steps of 10 to the ten in the largest number.
- Jump to the number at the end of the number line.
- Check your work.
- Add the **numbers** on the jumps. This is the answer.

Introduce simple column subtraction without decomposition when pupils are ready

Vocabulary

takeaway
how many are left
one less, two less…
how many fewer
difference between
how much less
subtract
how many have gone

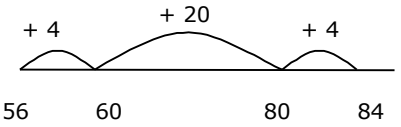
Year 3

Find a small difference by counting up

Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5

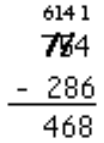
Pencil and paper procedures

Complementary addition
84 – 56 = 28



Introduce compact subtraction gradually progressing to use decomposition-

Decomposition



Vocabulary

exchanging
takeaway
how many are left
one less, two less…
how many fewer
difference between
how much less
subtract

		how many have gone

Subtraction

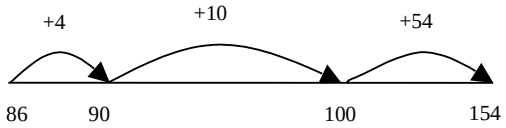
Year 4

Find a difference by counting up for mental methods and differing abilities only

e.g. 5003 – 4996 = 7
This can be modelled on an empty number line (see complementary addition below).

Recap- Pencil and paper procedures

Complementary addition
154 – 86 = 68



How to teach and Success Criteria

- Read the number sentence.
- Draw a number line.
- Write the smallest number at the start of the number line.
- Write the largest number at the end of the number line.
- Jump to the next multiple of 100.
- Jump in steps of 100 to the hundred in the largest number.
- Jump to the number at the end of the number line.
- Check your work.
- Add the jumps. This is the answer.
- Formal subtraction

Use compact subtraction including decomposition
Introducing concepts of decimal numbers in the form of money

```
614 1
7Ø4
- 286
 468
```

```
£ 2.85
-£ 1.75
 £ 1.10
```

Vocabulary
exchanging

Year 5

Find a difference by counting up for mental methods and differing abilities only

Compact decomposition-
Decomposition
Include decimal numbers with up to 2dp

```
614 1
7Ø4
- 286
 468
```

How to teach and Success Criteria

- Read the calculation
- Set out the calculation in columns considering the place value of each digit
- Check the largest number is on the top and the smaller number is on the bottom
- Begin to subtract from the ones column-always check the larger digit is on the top
- Use decomposition if the smaller number is on the top

```
5 13 1
Ø467
- 2684
 3783
```

```
12.85
- 1.75
 11.10
```

Vocabulary
exchanging
takeaway
how many are left
one less, two less…
how many fewer
difference between
how much less

Year 6

Find a difference by counting up for mental methods and differing abilities only

Compact decomposition
Include decimal numbers up to 3dp

```
614 1
7Ø4
- 286
 468
```

How to teach and Success Criteria

- Read the calculation
- Set out the calculation in columns considering the place value of each digit
- Check the largest number is on the top and the smaller number is on the bottom
- Begin to subtract from the ones column-always check the larger digit is on the top
- Use decomposition if the smaller number is on the top

```
5 13 1
Ø467
- 2684
 3783
```

```
12.853
- 1.750
 11.103
```

Vocabulary
exchanging
takeaway
how many are left
one less, two less…
how many fewer
difference between
how much less

takeaway **how many are left** **one less, two less…** **how many fewer** **difference between** **how much less** **subtract** **how many have gone**	**subtract** **how many have gone**	**subtract** **how many have gone**

Multiplication
Early Years
Count repeated groups of the same size.  3 groups of 2 = 6

Multiplication

Year 1

Pictures and symbols

There are 3 sweets in one bag.

How many sweets are there in 5 bags?

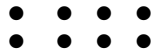
(Recording on a number line modelled by the teacher when solving problems)

Vocabulary

Lots of
Groups of
Doubling
Multiples

Year 2

Arrays and repeated addition

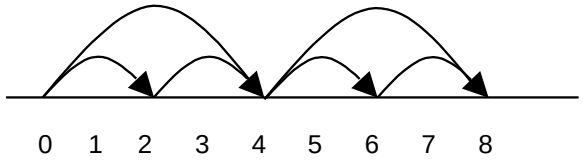


4 x 2 or 4 + 4

2 x 4

or repeated addition

2 + 2 + 2 + 2



How to teach and Success Criteria

- Read the number sentence.
- Draw a number line.
- Write a zero at the beginning of the number line.
- Look at the first number in the number sentence and draw that number of jumps on top of the number line.
- Count each jump in multiples of the second number to the end of the number line.
- Check your work.
- The last number you landed on is the answer.

Vocabulary

Lots of
Groups of
Doubling
Multiples
Inverses

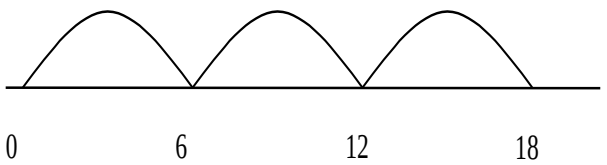
Year 3

Recap arrays and repeated addition and use for differentiation
Introduce Short multiplication written method using two digits by one digit

Continue to understand multiplication as repeated addition and continue to use arrays (as in Year 2).

Number lines

6 x 3



Mental method using partitioning multiplying tens first:

32 x 3 =

32 X 3 = (30 x3) + (2x3)

90 + 6 = 96

When ready introduce short multiplication method:

27
x **6**

Vocabulary

Lots of
Groups of
Doubling
Multiples
Inverses

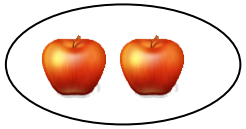
Multiplication		
Year 4	Year 5	Year 6
Recap arrays and repeated addition and use for differentiation only **Use short multiplication method:** **27** x **6** **How to teach and Success Criteria** • Read the number sentence • Set out the digits in a column and ensure they are set out according to the place value of the digits • Write your x symbol • Begin to multiply from the digit that is in the ones column and multiply by the above digit in the ones column • If the answer is above 10, write the ones in under the line and carry the tens into the next column • Then, multiply the ones from the bottom by the tens in the above number • Add any digits you have carried over from the previous multiplication • Write the final answer **When ready introduce long multiplication method two digits multiplied by two digits/ three digits multiplied by two digits:** **Vocabulary** **Multiples** **Multiply** **Product**	**Recap arrays and repeated addition and use for differentiation only** **Pencil and paper procedures** Short multiplication written method Long multiplication written method **Recap short multiplication written methods** Use the grid method of multiplication (as below) **27** x **6** **Introduce long multiplication method two digits multiplied by two digits/ three digits multiplied by two digits:** **45** **x 23** + **Vocabulary** **Multiples** **Multiply** **Product**	**Recap arrays and repeated addition and use for differentiation only** **Recap short multiplication written methods** Use the grid method of multiplication (as below) **27** x **6** **Use long multiplication method two digits multiplied by two digits/ three digits multiplied by two digits:** 45 x 23 + **Introduce calculations with decimal numbers to 1dp and 2dp** **Vocabulary** **Multiples** **Multiply** **Product**

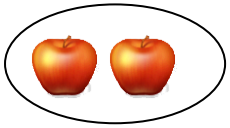
Division

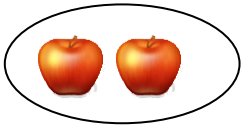
Early Years

Sharing into equal groups

Share objects into equal groups and count how many in each group.







Division

Year 1

Pictures / marks

12 children get into teams of 4 to play a game. How many teams are there?

Year 2

Understand division as sharing and grouping

Sharing – 6 sweets are shared between 2 people. How many do they have each?

6 ÷ 2 can be modelled as:

Grouping – There are 6 sweets. How many people can have 2 each? (How many 2's make 6?)

(1 digit by 1 digit)

Include remainders for Greater Depth children

How to teach and Success Criteria

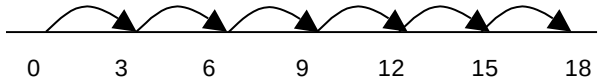
- Read the number sentence.
- Draw a number line.
- Write a zero at the beginning of the number line.
- Draw small jumps and count on in the number you are dividing by until you reach the first number in the number sentence.
- Check your work.
- **Count** the number of jumps. This is the answer.

Year 3

Understand division as sharing and grouping – Re-cap and use for differentiation only

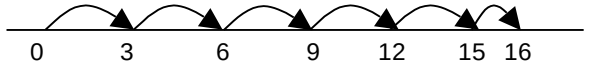
18 ÷ 3 can be modelled as:
Sharing – 18 shared between 3 (see Year 2 diagram)

Grouping - How many 3's make 18?



Remainders

16 ÷ 3 = 5 r1
Sharing - 16 shared between 3, how many left over?
Grouping – How many 3's make 16, how many left over?
e.g.



(2 digit by 1 digit)

How to teach and Success Criteria

- Read the number sentence.
- Draw a number line.
- Write a zero at the beginning of the number line
- Draw small jumps and count up in the number you are dividing by until you reach the first number in the number sentence.
- Check your work
- **Count** the number of jumps the divisor has made. This is the answer.

When ready introduce short division method including remainders (using bus stop)

	<u>Vocabulary</u> **Sharing/sharing equally** **Groups of** **Dividing**	**<u>Vocabulary</u>** **Sharing/sharing equally** **Groups of** **Dividing**

Division

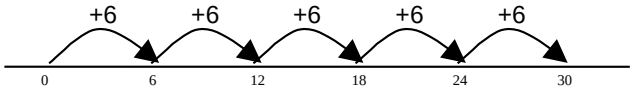
Year 4

Understand division as sharing and grouping – Re-cap and use for differentiation only

Sharing and grouping

30 ÷ 6 can be modelled as:

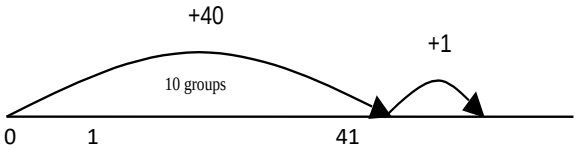
grouping – groups of 6 taken away and the number of groups counted e.g.



sharing – sharing among 6, the number given to each person

Remainders

41 ÷ 4 = 10 r1



Pencil and paper procedures

Use short division method including remainders (using bus stop)

How to teach and Success Criteria

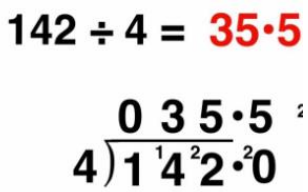
- Read the division question
- Set out the question in a bus stop method
- Place the divisor on the outside of the bus stop and the number you are sharing/dividing on the inside of the bus stop
- Begin to divide from the left had side of the number
- Write how many times it can be divided into a number on the

Year 5

Understand division as sharing and grouping using number line method – Re-cap and use for differentiation only

Use short division method including remainders (using bus stop)

Introduce converting remainders into decimals



How to teach and Success Criteria

- Read the division question
- Set out the question in a bus stop method
- Place the divisor on the outside of the bus stop and the number you are sharing/dividing on the inside of the bus stop
- Begin to divide from the left had side of the number
- Write how many times it can be divided into a number on the top of the bus stop
- Any remainders to be carried into the next number in the bus stop
- When you reach your final number and you still have remainders use 'r'
- **Next Step:-**

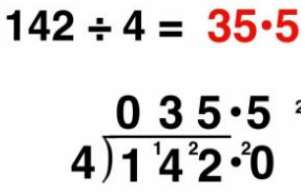
Year 6

Understand division as sharing and grouping using number line method – Re-cap and use for differentiation only

Use short division method including remainders (using bus stop)

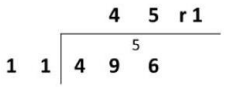
Recap converting remainders into decimals

Introduce converting remainders to quotients (fractions)

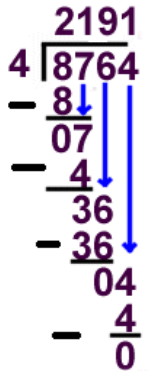


Introduce converting remainders to quotients (fractions)

496 ÷ 11 becomes



Answer: $45\frac{1}{11}$

top of the bus stop • Any remainders to be carried into the next number in the bus stop • When you reach your final number and you still have remainders use 'r' **<u>Vocabulary</u>** **Sharing/sharing equally** **Groups of** **Dividing**	• When you have a remainder, use a decimal point on both the top of the bus stop and next to the number you have been dividing. • Place you remainder next to the 0 you have placed next to the number you have been dividing **– this will now become a 2 digit number** • Continue dividing in this way until you have reached two decimal places **<u>When ready, introduce pupils to long division</u>** **<u>Vocabulary</u>** **Sharing/sharing equally** **Groups of** **Dividing**	**<u>Use long division as written method for when the divisor is a 1 or 2 digit number.</u>**  **<u>Vocabulary</u>** **Sharing/sharing equally** **Groups of** **Dividing**