PARK HILL JUNIOR SCHOOL

MATHS PARENT BOOKLET

Park Hill Junior School Maths parent booklet

This booklet contains all the calculation methods that are to be taught throughout the school. It has been written to help parents and carers become more familiar with the methods we teach at school and become more confident in supporting their children's learning at home. When faced with a calculation, children should be able to decide which method is most appropriate and have strategies to check its accuracy.

Children may learn new methods in each year group, however children should not be discouraged from using previously taught methods with which they are secure, while the new concepts are becoming embedded. Likewise, previous methods may be consolidated in the next year group.

The long-term aim is for children to be able to select an efficient method of their choice that is appropriate for a given task. They should do this by always asking themselves:

- 'Can I do this in my head?'
- 'What is the best method to use?'
- 'Why is this the best method to use?'
- 'Do I need to use a written method?'

Addition

The mental methods that lead to column addition generally involve partitioning, e.g. adding the tens and units separately, often starting with the tens as this is the larger part of the number. They can also include the use of number squares or number lines for counting on.

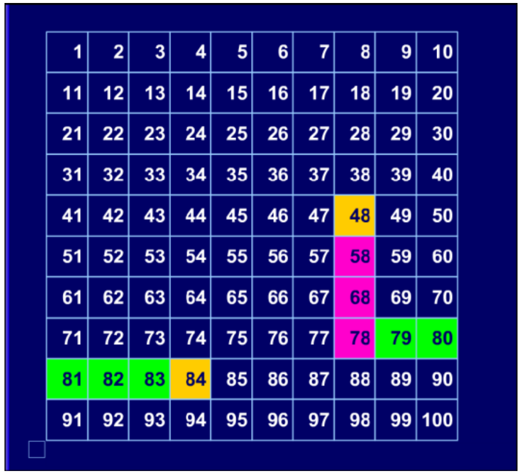
Using a number square to add:

Children are encouraged to use a number square to add by counting on, initially in units, then in tens and units.

8 + 7=15

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

48 + 36=84



Counting on:

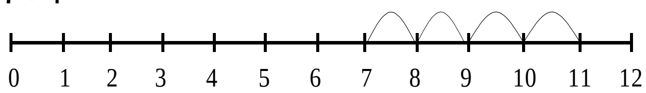
7 + 4 =11

Put the number 7 in your head then count on 4. The answer is where you land.

Using a number line to count on in ones: (Frog Method)

Draw jumps on number line to support understanding.

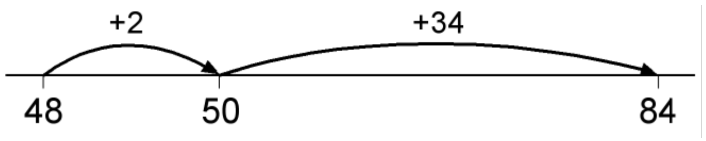
7+4 =



Start on number 7, jump four spaces to the right. The answer is the number you land on.

Using a number line to bridge through 10 and jump in bigger steps:

48 + 36 = 84



Draw a number line and get to the next 10 first then add the remaining number.

Partitioning (splitting) both numbers into tens and units and recombining:

47 + 38 =
40 + 30 = 70
7 + 8 = 15
70 + 15 = 85

Partitioned numbers can also be written under one another:

47 =40 +7
+38 30 +8
70 + 15= 85

Partitioning (splitting) ONE number into tens and units and recombining:

Partition one number e.g. the 47 into 40 and 7 then add it to the 38.
47 + 38=
40 +38=78
78 + 7 = 85

Extend to partitioning larger numbers and even adding decimals in the context of money

Expanded method set in columns:

Move on to a layout showing the addition of the tens to the tens and the units to the units separately. The addition of the tens in the calculation 47 + 76 is described in the words ‘forty plus seventy equals one hundred and ten’, stressing the link to the related fact ‘four plus seven equals eleven’.

H	T	U
	4	7
+	7	6
	1	3
1	1	0
1	2	3

Extend to adding larger numbers even decimals

	H	T	U
	3	6	7
+	1	8	5
		1	2
	1	4	0
+	4	0	0
	5	5	2

Compact column method: (Column addition)

In this method, recording is reduced further. Carry digits are recorded below the line, using the words ‘carry ten’ or ‘carry one hundred’, not ‘carry one’.

```
  H T U
  3 6 7
+ 1 8 5
  -----
  5 5 2
  -----
  1 1
```

Extend to larger number and even decimals in the context of money

```
   T U . t h
   6 7 . 2 5
+  1 5 . 3 5
   ---------
   8 2 . 6 0        £82.60
   ---------
   1       1
```

Subtraction

Mental methods should involve counting back in single digit numbers, leading onto counting back in multiples of 10, possibly using a number square.

Children find subtraction difficult particularly when they are introduced to column methods at an early stage when they are not ready for it. With continued practice and re-inforcement, children will become very comfortable using counting on and counting back methods on a number line.

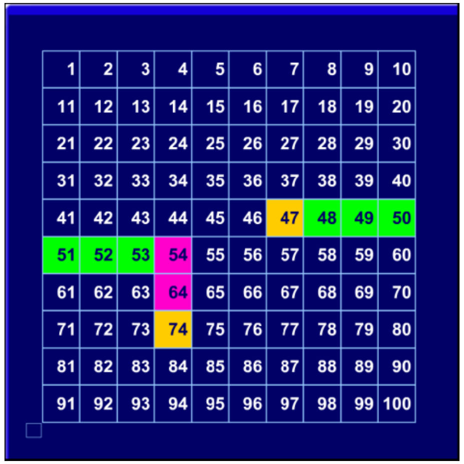
Using a number square to subtract:

Children are encouraged to use a number square to subtract by counting backwards, initially in units, then in tens and units.

15 – 7 = 8

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

74 – 27 = 47



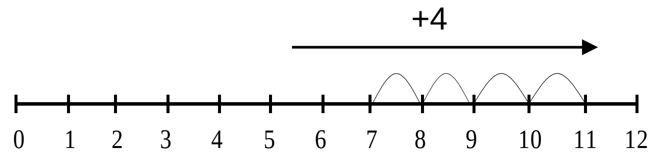
Counting back:

15 – 7 = 8

Put the number 15 in your head then count back 7. The answer is where you land.

Find a 'difference' by counting up: (Frog method)

I have collected 7 cards. For a set of cards I need 11 in total. How many more cards do I need to collect?

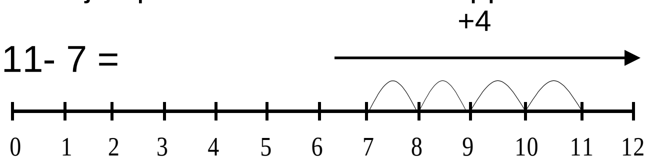


Start on the smaller number 7 and count on in ones until you reach the larger number. How many jumps are there?

Using a number line to count on in ones:

Draw jumps on number line to support understanding.

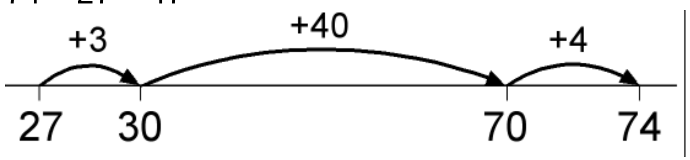
11- 7 =



Start on number 7, jump spaces to the right until you get to 11. The answer is the number of jumps you do.

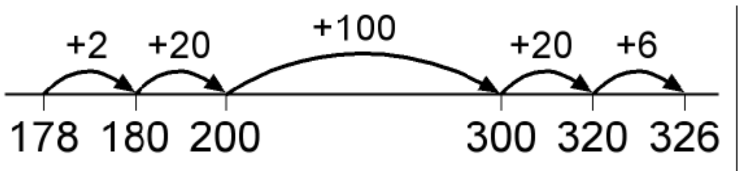
Using a number line to bridge through 10 starting with the smaller number to count on:

74 – 27 = 47

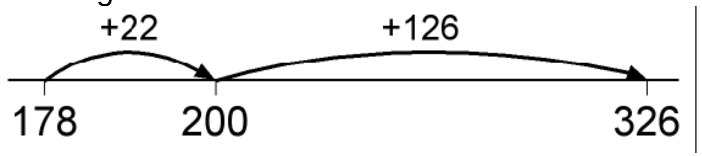


Draw a number line and begin with the smaller number and get to the next 10 then keep adding until you get to the larger number you are subtracting. Then add the jumps to get your answer.

326 – 178=148



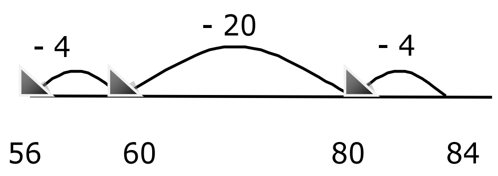
Leading to:



Extend to larger numbers and reaching the answer with fewer jumps.

Using a number line to bridge through 10 starting with the larger number to count back:

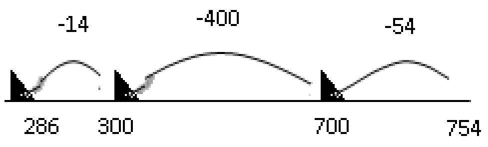
84 - 56 = 28



Add the jumps

Draw a number line and begin with the larger number by writing it on the right side of the number line then get to the previous 10 and keep subtracting until you get to the smaller number. Then add the jumps to get your answer.

754 – 286 = 468



Add the jumps

Partitioning (splitting) ONE number into tens and units and recombining:

In subtraction, we partition the smaller number only

83 – 47 =

47

40 7

83 – 40 = 43

Take the Tens (from the smaller number) away from the bigger number.

The answer to this calculation is then used as the start of the next calculation.
Take away the Units, using the jumping back method.
So it is 83 - 40 = 43
43 - 7 = 36

Extend to partitioning larger numbers and even subtracting decimals in the context of money

Compact column method:

In this method, recording is reduced further. Carry digits are recorded above the numbers, using the words ‘carry ten’ or ‘carry one hundred’, not ‘carry one’.

753 – 286 = 467

$$\begin{array}{rccc} & \mathbf{H} & \mathbf{T} & \mathbf{U} \\ & {\scriptstyle 6} & {\scriptstyle {}^{1}4} & {\scriptstyle 1} \\ & \cancel{7} & \cancel{5} & 3 \\ - & 2 & 8 & 6 \\ \hline & 4 & 6 & 7 \\ \hline \end{array}$$

Extend to larger number and even decimals in the context of money

1.34 – 1.17 =

$$\begin{array}{rcccc} & \mathbf{U} & \mathbf{.} & \mathbf{t} & \mathbf{h} \\ & & & {\scriptstyle 2} & {\scriptstyle 1} \\ & 1 & . & \cancel{3} & 4 \\ - & 1 & . & 1 & 7 \\ \hline & 0 & . & 1 & 7 \\ \hline \end{array}$$

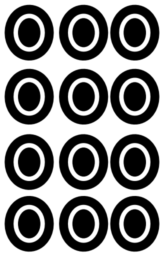
Multiplication

Early stages of multiplication will focus on groups and sets, leading onto the learning of multiplication tables and division facts up to 12 x 12 by the end of year 4 which is then revised in year 5 and year 6.

Multiplication using arrays and repeated addition:

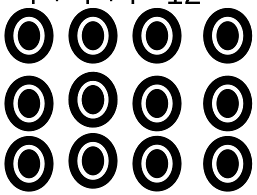
Arrays support understanding of the concept of repeated addition
An array is a systematic arrangement of objects, often in rows and columns.

4 x 3 = 12
3 + 3 +3 + 3 = 12



or

4 + 4 +4= 12



Multiplication using partitioning (splitting):

23 x 4 = 92

23 x 4 = (20 x 4) + (3 x 4)
= (80) + (12)
= 92

Grid method:

32 x 3 = 96

	T	U
X	30	2
3	90	6

T U

9 0
+ 6
9 6

e.g. 72 x 38

	T	**U**
X	**70**	**2**
30	**2100**	**60**
8	**560**	**16**

Th	H	T	U
2	1	0	0
	5	6	0
		6	0
+		1	6
2	7	3	6
	1		

Expanded short multiplication:

The next step is to represent the method of recording in a column format, but showing the working. Draw attention to the links with the grid method.

```
H T U
  3 8
X   7
-----
  5 6
2 1 0
-----
2 6 6
-----
```

Compact short multiplication:

The recording is reduced further, with carry digits recorded below the line.

```
H T U
  3 8
X   7
-----
2 6 6
-----
  5
```

Expanded long multiplication:

```
T H T U
    5 6
X   2 7
  -----
    4 2
  3 5 0
```

```
   1 2 0
 1 0 0 0
 -------
 1 5 1 2
 -------
   1
```

Compact long multiplication:

```
T  H  T  U
      5  6
X     2  7
----------
   3  9  2
1  1  2  0
----------
1  5  1  2
   1
```

Extend to larger number and even decimals in the context of money

Expanded long multiplication:

T U . t h

```
   7 . 9 6
x        8
----------
   0 . 4 8
+  7 . 2 0
 5 6 . 0 0
----------
 6 3 . 6 8
----------
 1
```

Compact long multiplication:

T U . t h

$$\begin{array}{r} 7.96 \\ \times \qquad 8 \\ \hline 63.68 \\ \hline {\scriptstyle 7\quad 4} \end{array}$$

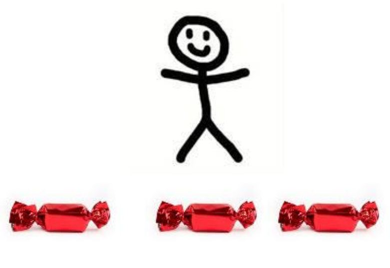
Division

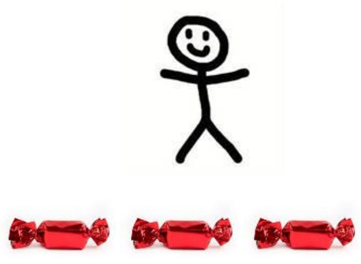
Using written methods for division can be the most difficult for children. Early mental approaches should involve grouping and sharing. Discussing the sharing out of sweets is an example. When there are some left over, the term remainder can be introduced.

Division as grouping or sharing:

Sharing:
Number of groups is known and you are finding out the **size** of the groups.
Grouping:
Size of groups is known and you are finding out the **number of groups.**

Sharing:
Begin to understand division as having groups of equal size
Sharing – 6 sweets are shared between 2 people. How many do they have each? =3





Grouping:
Sorting objects into groups of 2 / 3 / 4

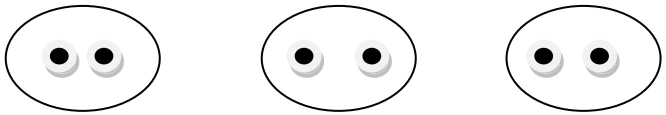
You have eight socks. How many pairs of socks are there? =4

6÷2 can be modelled as:
There are 6 strawberries.
How many people can have 2 each?

How many 2's go into 6?

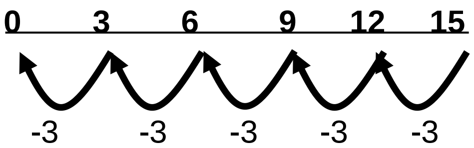
Division using dots:

6÷2= grouping 6 dots into groups of 2. There are 3 groups.



Division as sharing and repeated subtraction on a number line:

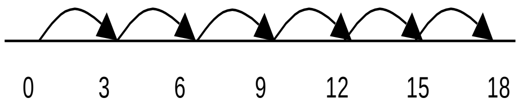
15 ÷ 3 can be modelled as:
Sharing – 15 shared between 3 equals 5



count the jumps

Division as grouping and repeated addition on a number line:

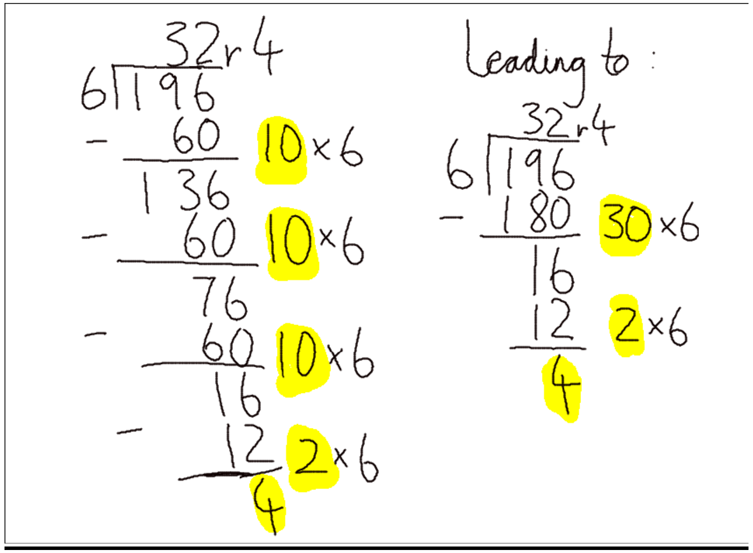
18 ÷ 3 can be modelled as:
Grouping - How many 3’s make 18?



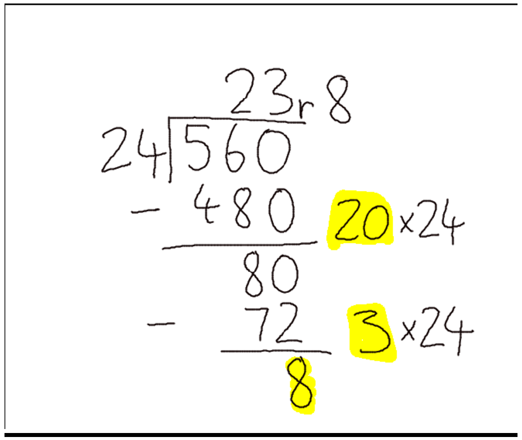
Count the jumps

Division by chunking:

This method, often referred to as ‘chunking’, is based on subtracting multiples of the divisor, or ‘chunks’. Initially children subtract several chunks, but with practice they should look for the biggest multiples of the divisor that they can find to subtract.



Long division:



Short division:

Th H T U

$$\begin{array}{r|l} & \;\;\;\color{red}{3\;\;6\;\;8} \\ \hline 7 & 2\;\;5\;\;{}^{\color{blue}{4}}7\;\;{}^{\color{blue}{5}}6 \end{array}$$

7 will not go into 2.

7 goes into 25 3 times with 4 left over. Write your 3 above the line and write your 4 remainder small to the right of the 5.
7 will not go into 4.
7 goes into 47 6 times with 5 left over. Write your 6 above the line and write your 5 remainder small to the right of the 7.
7 will not go into 5.
7 goes into 56 8 times. Write your 8 above the line.
So 7 goes into 2576 368 times.
2576 ÷ 7 = 368