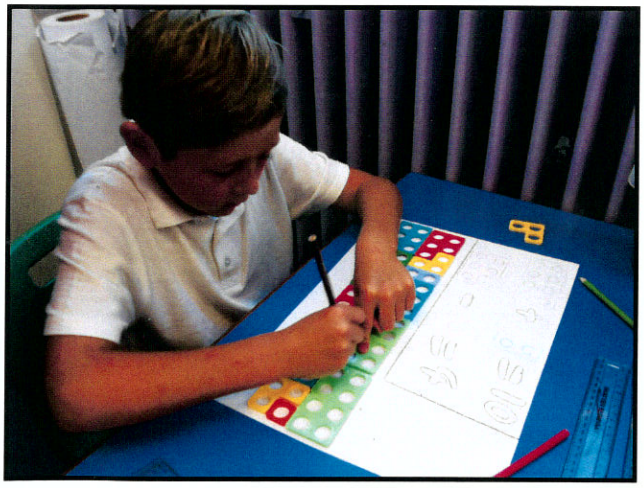
Park Junior School

Information for Parents

Progress in calculation strategies

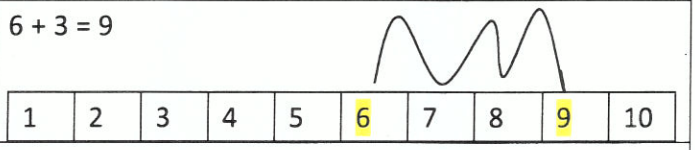
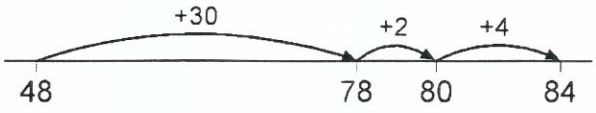


"Together we make a difference."

CALCULATION POLICY

These are the methods that we teach at school. Different year groups teach different methods and the policy shows how the methods change as the children move through the school.

Addition

The different stages	*Example of what it looks like*
Stage 1 Counting sets of objects	
Stage 2 Combining 2 sets of objects into 1 group and counting practically.	For example for 6+2= the children may get 6 cubes, then 2 more and count how many altogether.
Stage 3 Drawing pictures/dots – informal jottings. Then counting how many altogether..	4 + 2 = 6 * * * * + * *
Stage 4 Counting on, on a number line with numbers on it.	6 + 3 = 9 
Stage 5 Steps in addition can be recorded on a number line. The steps often bridge through a multiple of 10. 1) Partition the smaller number into tens and units 2) Add on the tens. 3) Add on the units.	8 + 7 = 15  48 + 36 = 84 30 6 

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Stage 6 Partitioned numbers are then written under one another:	$\begin{array}{rcl} 47 & = & 40+7 \\ +\,76 & & 70+6 \\ \hline & & 110+13 \end{array} = 123$
Stage 7 Write the numbers in columns. Add the tens first:	$\begin{array}{r} 47 \\ +\ 76 \\ \hline 110 \\ 13 \\ \hline 123 \end{array}$
Adding the units first:	$\begin{array}{r} 47 \\ +\ 76 \\ \hline 13 \\ 110 \\ \hline 123 \end{array}$
Stage 8 This then becomes the shorter method where numbers get carried into the next column.	$\begin{array}{r} 47 \\ +\ 76 \\ \hline 123 \\ 11 \end{array}$
Stage 9 Later, move to adding three two-digit numbers, two three-digit numbers and numbers with different numbers of digits.	$\begin{array}{r} 258 \\ +\ 87 \\ \hline 345 \\ 11 \end{array}$

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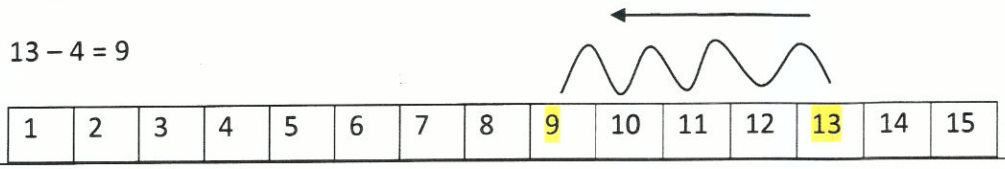
Subtraction

Stage 1 Practical	Practically get a group of objects and take some away.
Stage 2 Jottings Draw a set of objects and then cross some out.	11 – 4 = 7 ✗ ✗ ✗ ✗ * * * * * * *
Stage 3 Count back on a number line with numbers on.	13 – 4 = 9 
Stage 4 Using a number line 74 – 27 = 47 worked by counting back: Also working out the difference by counting on	 Work out the difference between 48 and 84 = 36 

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Stage 5 Partitioned numbers are then written under one another: This is how we start introducing the column subtraction method	74 – 23 = 7 0 + 4 - 2 0 + 3 5 0 + 1 = 5 1
Stage 6 **(Exchange for 2 digit numbers)** These show the 2 steps which lead to the shortened version of the column subtraction method. We always start with the units number.	74 – 27= 70 + 4 – 20 + 7 60 14 ~~70~~ + ~~4~~ – 20 + 7 40 + 7 ⇨ 6 14 ~~7~~ ~~4~~ – 2 7 4 7
Stage 7 **(Exchange for 3 digit numbers)** The same method but for bigger numbers still starting with the units number.	700 + 40 + 1 – 300 + 60 + 7 600 130 11 ~~700~~ + ~~40~~ + ~~1~~ – 300 + 60 + 7 300 + 70 + 4 ⇨ 6 13 11 ~~7~~ ~~4~~ ~~1~~ – 3 6 7 3 7 4
Stage 8 **(Exchange for 4 digits including 0)**	4000 900 100 ~~5000~~ + ~~000~~ + 00 + ~~8~~ - 1000 + 200 + 50 + 7 3000 + 700 + 50 + 1 ⇨ 9 4 ~~10~~ 10 5 0 0 8 - 1 2 5 7 3 7 5 1

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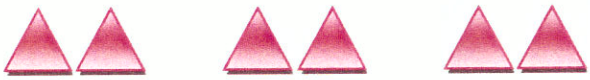
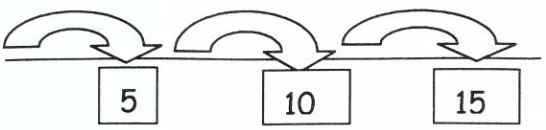
Multiplication

Year 2	2 times table 5 times table 10 times table	Within this teach how to know facts i.e. 6 x 4 is 5 x 4 and then 1 x 4 9 x 4 is 10 x 4 and then take away 4
Year 3	2 times table 3 times table 4 times table 5 times table 6 times table 10 times table	
Year 4 Derive and recall division facts for all tables up to 10 x 10		

Stage 1 Counting practically in repeated groups/patterns	
Stage 2 Grouping	3 x 2 = 6 
Stage 3 Arrays	3 x 2 = 6 or 2 x 3 = 6 
Stage 4 **Repeated addition** 5 times 3 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3 Repeated addition can be shown easily on a number line.	5 x 3 = 5 + 5 + 5 5 5 5 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 

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Stage 5

Partitioning

13 x 5 =
10 x 5 = 50 3 x 5 = 15
50 + 15 = 65

Stage 6 The grid method
It is better to place the number with the most digits in the left-hand column of the grid so that it is easier to add the answers of each part of the multiplication together.
7 x 38 =

×	7
30	210
8	56
	266

Stage 7: Long multiplication

The next step is to show the method of recording in a column format, but showing the working. This links to the grid method above.

Children should describe what they do by saying the actual values of the digits in the columns. For example, the first step in 38 × 7 is 'thirty multiplied by seven', not 'three times seven'.

$$\begin{array}{r} 30+8 \\ \times\ \ 7 \\ \hline 210 \\ 56 \\ \hline 266 \end{array}$$

$30 \times 7 = 210$
$8 \times 7 = 56$

$$\begin{array}{r} 38 \\ \times\ \ 7 \\ \hline 210 \\ 56 \\ \hline 266 \end{array}$$

This is the slightly shorter version.

Stage 8: Short multiplication
The step here involves adding 210 and 50 mentally with only the 5 in the 50 recorded.

$$\begin{array}{r} 38 \\ \times\ \ 7 \\ \hline 266 \\ \hline 5 \end{array}$$

CALCULATION POLICY

<table>
<tr>
<td>Stage 9: Multiplying two, two digit numbers
This follows the same steps as the first grid method but for 2 digit numbers.</td>
<td>
<table>
<tr><td>×</td><td>20</td><td>7</td><td></td></tr>
<tr><td>50</td><td>1000</td><td>350</td><td>1350</td></tr>
<tr><td>6</td><td>120</td><td>42</td><td>162</td></tr>
<tr><td></td><td></td><td></td><td>1512</td></tr>
</table>
1
</td>
</tr>
<tr>
<td>Stage 10 :
The amount of recording is reduced but children need to follow each step of the grid method still.</td>
<td>56 × 27 is approximately 60 × 30 = 1800.
56
× 27
1000 50 × 20 = 1000
120 6 × 20 = 120
350 50 × 7 = 350
42 6 × 7 = 42
1512
1
</td>
</tr>
<tr>
<td>The amount of recording is reduced more.</td>
<td>56 × 27 is approximately 60 × 30 = 1800.
56
× 27
1120 56 × 20
392 56 × 7
1512
1
</td>
</tr>
</table>

CALCULATION POLICY

Division

Deriving and recalling division facts

Year 2
2 times table
5 times table
10 times table

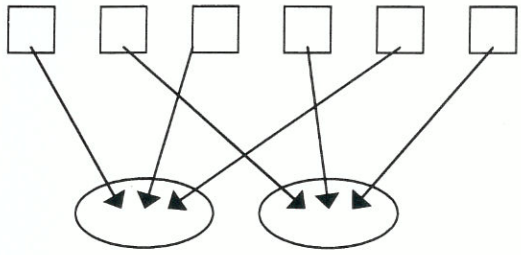
Year 3
2 times table
3 times table
4 times table
5 times table
6 times table
10 times table

Year 4
Derive and recall division facts for all tables up to 10 x 10

Stage 1
Children will develop their understanding of division and use jottings to support calculation

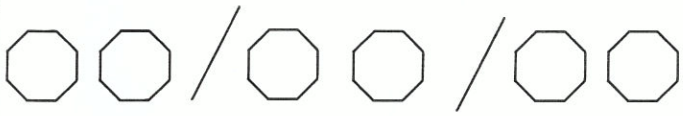
Sharing equally

6 sweets shared between 2 people, how many do they each get?



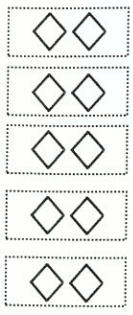
Grouping or repeated addition

There are 6 sweets, how many people can have 2 sweets each?



So 10 ÷ 2 = 5

Or alternatively arrays can be used.



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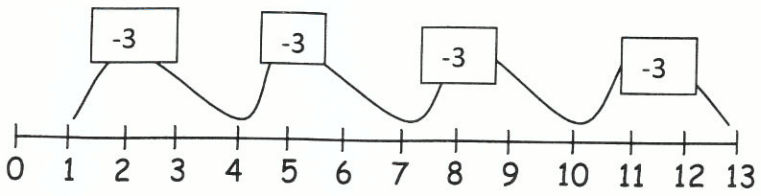
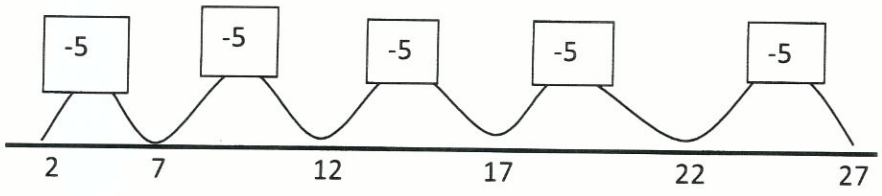
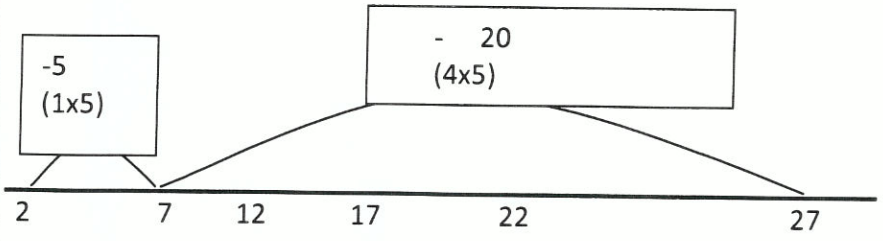
Stage 2 Children should also move onto calculations involving remainders through repeated subtraction.	**Repeated subtraction using a number line or bead bar** 13 ÷ 3 = 4r1 
Stage 3	Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s – numbers with which the children are more familiar. 27 ÷ 5 = 5r2 
Stage 4 Moving onto:	27 ÷ 5 = 5r2 

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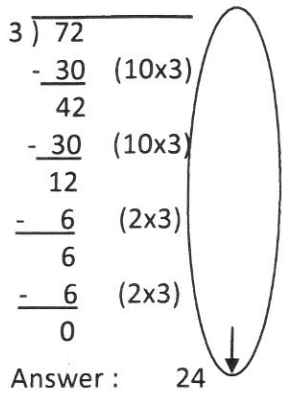
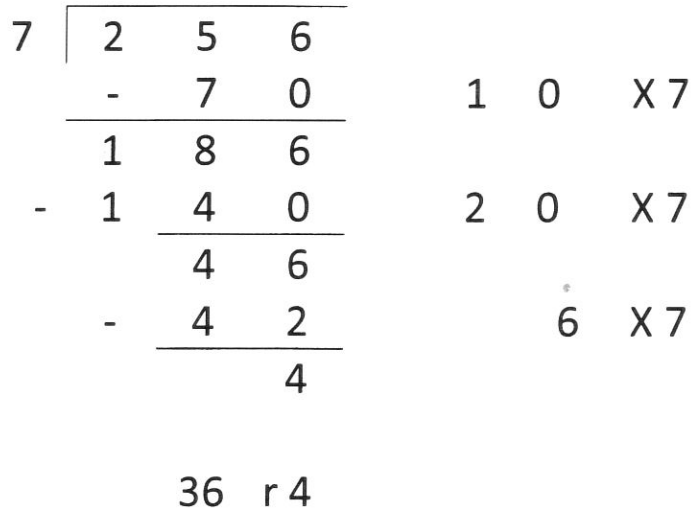
Stage 5 TU÷U Then onto the vertical method:	72 ÷ 3 
Stage 6 HTU÷U Introduce subtracting larger multiples of ten. This is called chunking.	256 ÷ 7 

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Stage 7: Long division HTU÷U	How many packs of 24 can we make from 560 biscuits? Start by multiplying 24 by multiples of 10 to get an estimate. As 24 × 20 = 480 and 24 × 30 = 720, we know the answer lies between 20 and 30 packs. We start by subtracting 480 from 560. $24\overline{)560}$ $20 - 480 \quad 24 \times 20$ 80 $3 \quad 72 \quad 24 \times 3$ 8 Answer: 23 R 8 In effect, the recording above is the long division method, though conventionally the digits of the answer are recorded above the line as shown below. $\begin{array}{r} 23 \\ 24\overline{)560} \\ -480 \\ \hline 80 \\ -72 \\ \hline 8 \end{array}$ Answer: 23 R 8