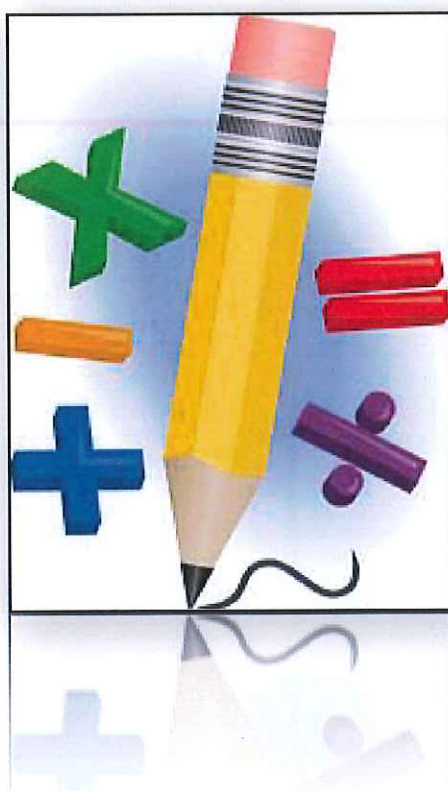




**St Hugh of Lincoln R.C. Primary School**



**Helping my Child with Maths**

**Calculation Methods  
Key Stage 2**

## Introduction

The information in this booklet is to help your child with maths.

It explains some of the different strategies used for mental and written calculations in school.

It gives a wide variety of ways of helping your child at home.

It also includes a selection of websites which your child may enjoy.

The aim of this booklet is to provide you with a greater understanding of how mathematics is taught in school and to show you progression of the four operation methods through Key Stage 2.

## The New Curriculum

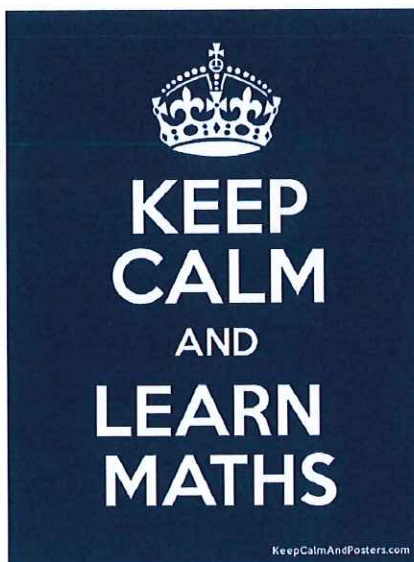
### New Expectations

By the end of Year 4 pupils should

*- memorise their multiplication tables up to and including the 12 times tables.*

By the end of Year 6 pupils should

*- be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.*



# Mental Mathematics

- Use number bonds to 10, 20, 100 and 1000. Then transferable to decimals.
- Use doubles and near doubles.
- Partition into thousands, hundreds, tens and units.
- Adding near multiples of 10. Adding the multiple then add and subtract 1.
- Subtracting near multiples of 10. Subtracting the multiple then subtracting or adding 1.





**compensating**

**doubles**

**reordering**

**counting**

**Addition**

**'near'**

**on**

**Strategies**

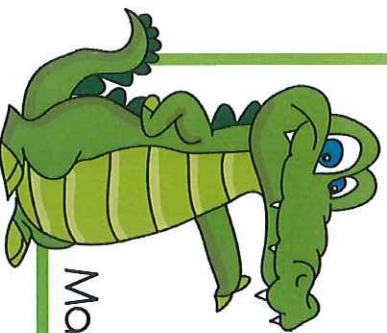
**doubles**

**bridging**

**partitioning**

**counting**

**back**





# Addition Methods

Year 3		Year 4	
Written Addition	Build on partitioning to develop expanded column addition with two 3-digit numbers e.g. $466 + 358$		Build on expanded column addition to develop compact column addition with larger numbers e.g. $1466 + 4868$
	$\begin{array}{r} 400 \ 60 \ 6 \\ + 300 \ 50 \ 8 \\ \hline 700 \ 110 \ 14 = 824 \end{array}$		$\begin{array}{r} 1000 \ 400 \ 60 \ 6 \\ 4000 \ 800 \ 60 \ 8 \\ + 1000 \ 100 \ 10 \\ \hline 6000 \ 300 \ 30 \ 4 \end{array}$
	Use expanded column addition where digits in a column add to more than the column value e.g. $466 + 358$		Compact column addition with larger numbers e.g. $5347 + 2286 + 1495$
	$\begin{array}{r} 400 \ 60 \ 6 \\ 300 \ 50 \ 8 \\ + 100 \ 10 \\ \hline 800 \ 20 \ 4 \end{array}$		$\begin{array}{r} 5347 \\ 2286 \\ + 1495 \\ \hline 121 \\ \hline 9128 \end{array}$
	Compact column addition with two or more 3-digit numbers or towers of 2-digit numbers e.g. $347 + 286 + 495$		Use expanded and compact column addition to add amounts of money Add like fractions e.g. $\frac{3}{8} + \frac{1}{8} + \frac{1}{8}$
$\begin{array}{r} 347 \\ 286 \\ + 495 \\ \hline 21 \\ \hline 1128 \end{array}$			
Compact column addition with 3- and 4-digit numbers Recognise like fractions that add to 1 e.g. $\frac{1}{4} + \frac{3}{4}$ e.g. $\frac{3}{5} + \frac{2}{5}$			

Year 5		Year 6	
Written Addition	Expanded column addition for money leading to compact column addition for adding several amounts of money e.g. $£14.64 + £28.78 + £12.26$		Compact column addition for adding several large numbers and decimal numbers with up to 2 decimal places Compact column addition with money e.g. $£14.64 + £28.78 + £12.26$
	$\begin{array}{r} £14 \ 60p \ 4p \\ £28 \ 70p \ 8p \\ + £12 \ 20p \ 6p \\ \hline £1 \ 10p \\ \hline £55 \ 60p \ 8p \end{array}$		$\begin{array}{r} £14.64 \\ + £28.78 \\ £12.26 \\ \hline 11.1 \\ \hline £55.68 \end{array}$
	Compact column addition to add pairs of 5-digit numbers Continue to use column addition to add towers of several larger numbers		Add unlike fractions, including mixed numbers e.g. $\frac{1}{4} + \frac{2}{3} = \frac{11}{12}$ e.g. $2 \frac{1}{4} + 1 \frac{1}{3} = 3 \frac{7}{12}$
	Use compact addition to add decimal numbers with up to 2 decimal places e.g. $15.68 + 27.86$		
	$\begin{array}{r} 15.68 \\ + 27.86 \\ \hline 11.1 \\ \hline 43.54 \end{array}$		
Add related fractions e.g. $\frac{3}{4} + \frac{1}{8} = \frac{7}{8}$			

1

compensating

reordering

bridging

# Subtraction

counting

inverse

on **Strategies**

counting

partitioning

back



# Subtraction Methods



Year 3

Mental Subtraction

### Using number facts

Know pairs which total each number to 20

e.g.  $20 - 14 = 6$

Number bonds to 100

e.g.  $100 - 48 = 52$

e.g.  $100 - 35 = 65$



Subtract using number facts to bridge back through a 10

e.g.  $42 - 5 = 42 - 2 (40) - 3 = 37$

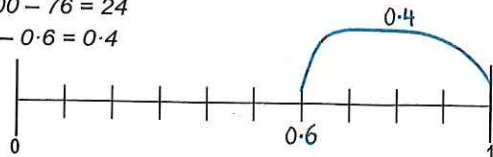
Year 4

### Using number facts

Number bonds to 10 and 100 and derived facts

e.g.  $100 - 76 = 24$

e.g.  $1 - 0.6 = 0.4$



Number bonds to £1 and £10

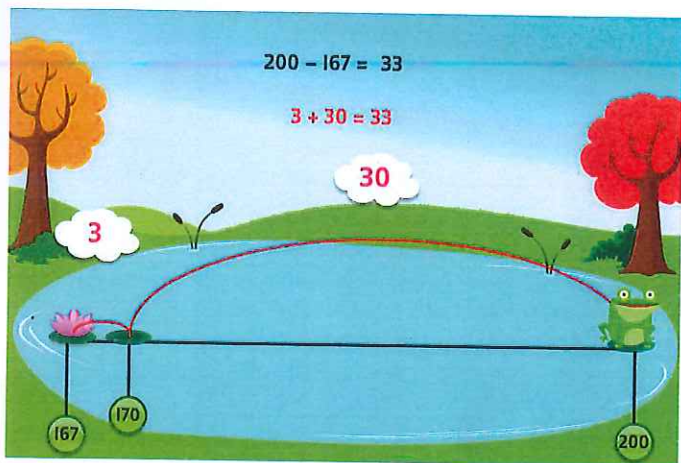
e.g.  $£1.00 - 86p = 14p$

e.g.  $£10.00 - £3.40 = £6.60$

Written Subtraction

Develop counting up subtraction

e.g.  $200 - 167$



Expanded column subtraction with 3- and 4-digit numbers

e.g.  $726 - 358$

$$\begin{array}{r} 600 \quad 110 \quad 16 \\ \cancel{700} \quad \cancel{20} \quad \cancel{8} \\ - 300 \quad 50 \quad 8 \\ \hline 300 \quad 60 \quad 8 \end{array}$$

Begin to develop compact column subtraction

e.g.  $726 - 358$

$$\begin{array}{r} 6 \quad 11 \quad 16 \\ \cancel{7} \quad \cancel{2} \quad \cancel{8} \\ - 3 \quad 5 \quad 8 \\ \hline 3 \quad 6 \quad 8 \end{array}$$

Year 5

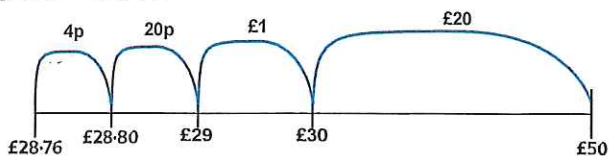
Compact column subtraction for numbers with up to 5 digits

e.g.  $16\,324 - 8516$

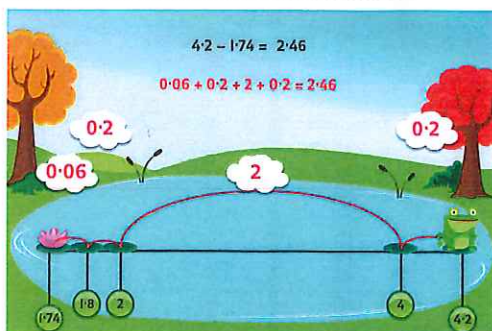
$$\begin{array}{r} 0 \quad 15 \quad 13 \quad 1 \quad 14 \\ \cancel{1} \quad \cancel{6} \quad \cancel{3} \quad \cancel{2} \quad \cancel{4} \\ - 8 \quad 5 \quad 1 \quad 6 \\ \hline 7 \quad 8 \quad 0 \quad 8 \end{array}$$

Continue to use counting up subtraction for subtractions involving money, including finding change

e.g.  $£50 - £28.76$



Use counting up subtraction to subtract decimal numbers



e.g.  $4.2 - 1.74$

Subtract related fractions

e.g.  $\frac{3}{4} - \frac{1}{8} = \frac{5}{8}$

NB Counting up subtraction provides a default method for ALL children

Year 6

Compact column subtraction for large numbers

e.g.  $34\,685 - 16\,458$

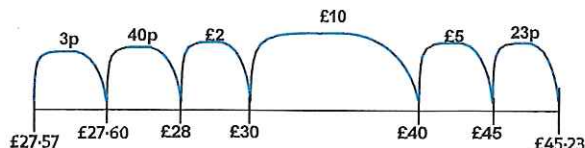
$$\begin{array}{r} 2 \quad 14 \quad 7 \quad 15 \\ \cancel{3} \quad \cancel{4} \quad \cancel{6} \quad \cancel{8} \quad \cancel{5} \\ - 1 \quad 6 \quad 4 \quad 5 \quad 8 \\ \hline 1 \quad 8 \quad 2 \quad 2 \quad 7 \end{array}$$

Use counting up for subtractions where the larger number is a multiple or near multiple of 1000 or 10000

Use counting up subtraction when dealing with money

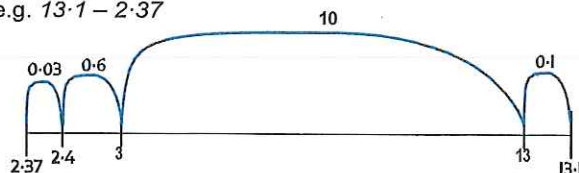
e.g.  $£100 - £78.56$

e.g.  $£45.23 - £27.57$



Use counting up subtraction to subtract decimal numbers

e.g.  $13.1 - 2.37$

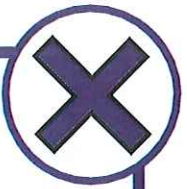


Subtract unlike fractions, including mixed numbers

$$\begin{array}{r} - \\ - \\ \hline \end{array} \quad \begin{array}{l} \text{e.g. } \frac{3}{4} - \frac{1}{3} = \frac{5}{12} \\ \text{e.g. } 2\frac{3}{4} - 1\frac{1}{3} = 1\frac{5}{12} \end{array}$$

NB Counting up subtraction provides a default method for ALL children

Written Subtraction



**Knowing**      multiplying by  
**multiplication facts**      multiples of 10

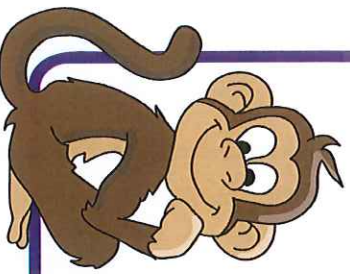
# **Multiplication**

**arrays**      doubling

# **Strategies**

**partitioning**      understanding

**repeated**      fractions, decimals  
**addition**      and percentages







# Multiplication Methods

## Year 3

Build on partitioning to develop grid multiplication  
e.g.  $23 \times 4$

x	20	3	
4	80	12	= 92

Written Multiplication

## Year 4

Use grid multiplication to multiply 3-digit numbers by 1-digit numbers  
e.g.  $253 \times 6$

x	200	50	3	
6	1200	300	18	= 1518

Use a vertical written algorithm (ladder) to multiply 3-digit numbers by 1-digit numbers  
e.g.  $253 \times 6$

$$\begin{array}{r}
 253 \\
 \times 6 \\
 \hline
 1200 \leftarrow 6 \times 200 \\
 300 \leftarrow 6 \times 50 \\
 + 18 \leftarrow 6 \times 3 \\
 \hline
 1518
 \end{array}$$

Use grid multiplication to multiply 2-digit numbers by 2-digit numbers  
e.g.  $16 \times 48$

x	10	6	
40	400	240	= 640
8	80	48	= 128
			<u>768</u>

## Year 5

### Using number facts

Use times-tables facts up to  $12 \times 12$  to multiply multiples of 10/100 of the multiplier

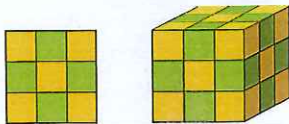
e.g.  $4 \times 6 = 24$  so  $40 \times 6 = 240$  and  $400 \times 6 = 2400$

Use knowledge of factors and multiples in multiplication

e.g.  $43 \times 6$  is double  $43 \times 3$

e.g.  $28 \times 50$  is half of  $28 \times 100$  ( $2800$ ) = 1400

Know square numbers and cube numbers



Mental Multiplication

## Year 6

### Using number facts

Use times-tables facts up to  $12 \times 12$  in mental multiplication of large numbers or numbers with up to 2 decimal places

e.g.  $6 \times 4 = 24$  and  $0.06 \times 4 = 0.24$

Short multiplication of 2-, 3- and 4-digit numbers by 1-digit numbers  
e.g.  $435 \times 8$

$$\begin{array}{r}
 435 \\
 \times 8 \\
 \hline
 24 \\
 \hline
 3480
 \end{array}$$

Long multiplication of 2-, 3- and 4-digit numbers by 'teen' numbers  
e.g.  $48 \times 16$

$$\begin{array}{r}
 48 \\
 \times 16 \\
 \hline
 480 \\
 288 \\
 \hline
 768
 \end{array}$$

Written Multiplication

Short multiplication of 2-, 3- and 4-digit numbers by 1-digit numbers  
e.g.  $3743 \times 6$

$$\begin{array}{r}
 3743 \\
 \times 6 \\
 \hline
 421 \\
 \hline
 22458
 \end{array}$$

Long multiplication of 2-, 3- and 4-digit numbers by 2-digit numbers

$$\begin{array}{r}
 456 \\
 \times 38 \\
 \hline
 1368 \\
 3648 \\
 \hline
 17328
 \end{array}$$

e.g.  $456 \times 38$



**Knowing**

**division facts**

**dividing by**

**multiples of 10**

# **Division**

**arrays**

**halving**

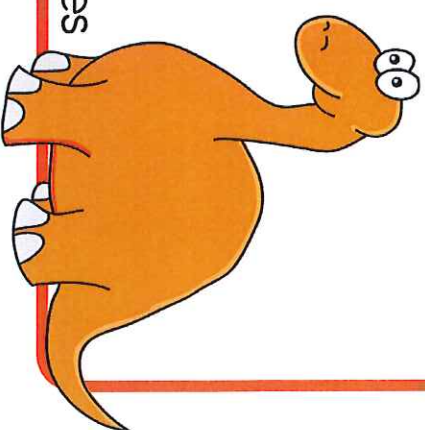
# **Strategies**

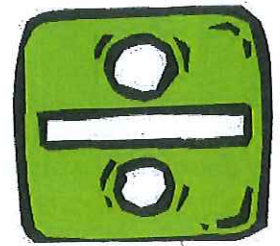
**understanding**

**partitioning**

**fractions, decimals**


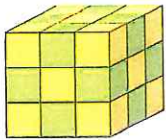
**and percentages**





# Division Methods

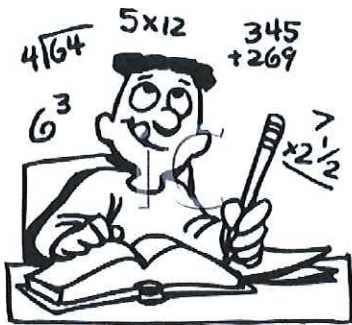
	Year 3	Year 4																																																																																																																																																																									
Mental division	<p><b>Using number facts</b>            Know half of even numbers to 40            Know half of multiples of 10 to 200            e.g. <i>half of 170 is 85</i>            Know <math>\times 2</math>, <math>\times 3</math>, <math>\times 4</math>, <math>\times 5</math>, <math>\times 8</math>, <math>\times 10</math> division facts</p>	<p><b>Using number facts</b>            Know times-tables up to <math>12 \times 12</math> and all related division facts</p> <table border="1" style="font-size: small;"> <thead> <tr> <th><math>\times</math></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> <th>11</th> <th>12</th> </tr> </thead> <tbody> <tr><th>1</th><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr> <tr><th>2</th><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td><td>22</td><td>24</td></tr> <tr><th>3</th><td>3</td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td><td>21</td><td>24</td><td>27</td><td>30</td><td>33</td><td>36</td></tr> <tr><th>4</th><td>4</td><td>8</td><td>12</td><td>16</td><td>20</td><td>24</td><td>28</td><td>32</td><td>36</td><td>40</td><td>44</td><td>48</td></tr> <tr><th>5</th><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td><td>45</td><td>50</td><td>55</td><td>60</td></tr> <tr><th>6</th><td>6</td><td>12</td><td>18</td><td>24</td><td>30</td><td>36</td><td>42</td><td>48</td><td>54</td><td>60</td><td>66</td><td>72</td></tr> <tr><th>7</th><td>7</td><td>14</td><td>21</td><td>28</td><td>35</td><td>42</td><td>49</td><td>56</td><td>63</td><td>70</td><td>77</td><td>84</td></tr> <tr><th>8</th><td>8</td><td>16</td><td>24</td><td>32</td><td>40</td><td>48</td><td>56</td><td>64</td><td>72</td><td>80</td><td>88</td><td>96</td></tr> <tr><th>9</th><td>9</td><td>18</td><td>27</td><td>36</td><td>45</td><td>54</td><td>63</td><td>72</td><td>81</td><td>90</td><td>99</td><td>108</td></tr> <tr><th>10</th><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td><td>110</td><td>120</td></tr> <tr><th>11</th><td>11</td><td>22</td><td>33</td><td>44</td><td>55</td><td>66</td><td>77</td><td>88</td><td>99</td><td>110</td><td>121</td><td>132</td></tr> <tr><th>12</th><td>12</td><td>24</td><td>36</td><td>48</td><td>60</td><td>72</td><td>84</td><td>96</td><td>108</td><td>120</td><td>132</td><td>144</td></tr> </tbody> </table>	$\times$	1	2	3	4	5	6	7	8	9	10	11	12	1	1	2	3	4	5	6	7	8	9	10	11	12	2	2	4	6	8	10	12	14	16	18	20	22	24	3	3	6	9	12	15	18	21	24	27	30	33	36	4	4	8	12	16	20	24	28	32	36	40	44	48	5	5	10	15	20	25	30	35	40	45	50	55	60	6	6	12	18	24	30	36	42	48	54	60	66	72	7	7	14	21	28	35	42	49	56	63	70	77	84	8	8	16	24	32	40	48	56	64	72	80	88	96	9	9	18	27	36	45	54	63	72	81	90	99	108	10	10	20	30	40	50	60	70	80	90	100	110	120	11	11	22	33	44	55	66	77	88	99	110	121	132	12	12	24	36	48	60	72	84	96	108	120	132	144
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Written division	<p>Perform divisions just above the 10th multiple using written jottings, understanding how to give a remainder as a whole number            Use division facts to find unit and simple non-unit fractions of amounts within the times-tables            e.g. <math>\frac{3}{4}</math> of 48 is <math>3 \times (48 \div 8) = 36</math></p>	<p>Use a written version of a mental method to divide 2- and 3-digit numbers by 1-digit numbers            e.g. <math>86 \div 3</math> as <math>20 \times 3</math> (60) and <math>8 \times 3</math> (24), remainder 2</p> $86 \div 3 = \square$ $\square \times 3 = 86 \quad 86 \div 3 = 28 \text{ r}2$ <table style="font-size: small;"> <tr><td style="border-bottom: 1px solid black;">20</td><td><math>\times 3 = 60</math></td></tr> <tr><td style="border-bottom: 1px solid black;">   8</td><td><math>\times 3 = 24</math></td></tr> <tr><td>   </td><td>   2</td></tr> </table> <p>Use division facts to find unit and non-unit fractions of amounts within the times-tables            e.g. <math>\frac{7}{8}</math> of 56 is <math>7 \times (56 \div 8) = 48</math></p>	20	$\times 3 = 60$	8	$\times 3 = 24$		2																																																																																																																																																																			
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	Year 5	Year 6																																								
Mental division	<p><b>Using number facts</b>            Use division facts from the times-tables up to <math>12 \times 12</math> to divide multiples of powers of 10 of the divisor            e.g. <math>3600 \div 9</math> using <math>36 \div 9</math>            Know square numbers and cube numbers</p> <div style="display: flex; justify-content: space-around;">   </div>	<p><b>Using number facts</b>            Use division facts from the times-tables up to <math>12 \times 12</math> to divide decimal numbers by 1-digit numbers            e.g. <math>117 \div 3</math> is <math>\frac{1}{100}</math> of <math>117 \div 3</math> (39)            Know tests of divisibility for numbers divisible by 2, 3, 4, 5, 9, 10 and 25</p>																																								
Written division	<p>Use a written version of a mental strategy to divide 3-digit numbers by 1-digit numbers            e.g. <math>326 \div 6</math> as <math>50 \times 6</math> (300) and <math>4 \times 6</math> (24), remainder 2</p> $326 \div 6 = \square$ $\square \times 6 = 326 \quad 326 \div 6 = 54 \text{ r}2$ <table style="font-size: small;"> <tr><td style="border-bottom: 1px solid black;">50</td><td><math>\times 6 = 300</math></td></tr> <tr><td style="border-bottom: 1px solid black;">   4</td><td><math>\times 6 = 24</math></td></tr> <tr><td>   </td><td>   2</td></tr> </table>	50	$\times 6 = 300$	4	$\times 6 = 24$		2	<p>Short division of 3- and 4-digit numbers by 1-digit numbers            e.g. <math>139 \div 3</math></p> $3 \overline{) 139} \begin{matrix} 46 \\ \text{r}1 \end{matrix}$ <p>Long division of 3- and 4-digit numbers by 2-digit numbers            e.g. <math>4176 \div 13</math></p> <table style="font-size: small;"> <tr><td style="border-right: 1px solid black; border-bottom: 1px solid black;">300</td><td><math>+ 20 + 1, \text{ r}3</math></td></tr> <tr><td style="border-right: 1px solid black; border-bottom: 1px solid black;">13</td><td><math>\overline{) 4176}</math></td></tr> <tr><td style="border-right: 1px solid black;">   </td><td><math>-3900</math></td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   276</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td><math>-260</math></td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   16</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td><math>-13</math></td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   3</td></tr> </table> <table style="font-size: small; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; border-bottom: 1px solid black;">13</td><td><math>\overline{) 4176}</math></td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   21</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   452</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   565</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   678</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   791</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   8104</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>   9117</td></tr> <tr><td style="border-right: 1px solid black;">   </td><td>  10130</td></tr> </table>	300	$+ 20 + 1, \text{ r}3$	13	$\overline{) 4176}$		$-3900$		276		$-260$		16		$-13$		3	13	$\overline{) 4176}$		21		452		565		678		791		8104		9117		10130
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## How can I help?

When faced with a word problem, encourage your child to do this.

- Can I do this in my head?
- Could I do this in my head using drawings or jottings to help me?
- What written method do I need to use?



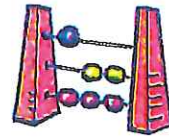
Always help your child to estimate.  
Encourage them to ask, Is my answer sensible?

***It is important that you talk and listen to your child about their work. It will help your child if they have to explain to you.***

***Be positive about the maths, even if you don't feel confident about it yourself.***

***If your child cannot do the maths homework do let the teacher know by writing a note in your child's book or telling the teacher.***

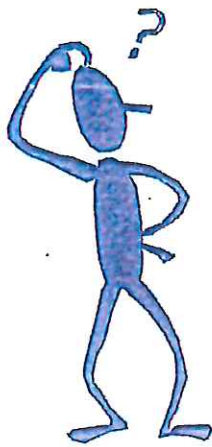
## PRACTISING NUMBER FACTS



- ✧ Find out which number facts your child is learning at school (addition facts to 10, times tables, doubles etc). Try to practise for a few minutes each day using a range of vocabulary.
- ✧ Have a 'fact of the day'. Pin this fact up around the house. Practise reading it in a quiet, loud, squeaky ... voice. Ask your child over the day if they can recall the fact.
- ✧ Play 'ping pong' to practise complements with your child. You say a number. They reply with how much more is needed to make 10. You can also play this game with numbers totalling 20, 100 or 1000. Encourage your child to answer quickly, without counting or using fingers.
- ✧ Throw 2 dice. Ask your child to find the total of the numbers (+), the difference between them (-) or the product (x). Can they do this without counting?
- ✧ Use a set of playing cards (no pictures). Turn over two cards and ask your child to add or multiply the numbers. If they answer correctly, they keep the cards. How many cards can they collect in 2 minutes?
- ✧ Play Bingo. Each player chooses five answers (e.g. numbers to 10 to practise simple addition, multiples of 5 to practise the five times tables). Ask a question and if a player has the answer, they can cross it off. The winner is the first player to cross off all their answers.
- ✧ Give your child an answer. Ask them to write as many addition sentences as they can with this answer (e.g.  $10 = \square + \square$ ). Try with multiplication or subtraction.
- ✧ Give your child a number fact (e.g.  $5+3=8$ ). Ask them what else they can find out from this fact (e.g.  $3+5=8$ ,  $8-5=3$ ,  $8-3=5$ ,  $50+30=80$ ,  $500+300=800$ ,  $5+4=9$ ,  $15+3=18$ ). Add to the list over the next few days. Try starting with a x fact as well.

## REAL LIFE PROBLEMS

- \* Go shopping with your child to buy two or three items. Ask them to work out the total amount spent and how much change you will get.
- \* Buy some items with a percentage extra free. Help your child to calculate how much of the product is free.
- \* Plan an outing during the holidays. Ask your child to think about what time you will need to set off and how much money you will need to take.
- \* Use a TV guide. Ask your child to work out the length of their favourite programmes. Can they calculate how long they spend watching TV each day / each week?
- \* Use a bus or train timetable. Ask your child to work out how long a journey between two places should take? Go on the journey. Do you arrive earlier or later than expected? How much earlier/later?
- \* Help your child to scale a recipe up or down to feed the right amount of people.
- \* Work together to plan a party or meal on a budget.



These are just a few ideas to give you a starting point. Try to involve your child in as many problem-solving activities as possible. The more 'real' a problem is, the more motivated they will be when trying to solve it.

## Maths Websites

[www.primaryinteractive.co.uk](http://www.primaryinteractive.co.uk)

[www.primarygames.com](http://www.primarygames.com)

[www.nrich.maths](http://www.nrich.maths)

[www.nnparentstoolkit.org.uk](http://www.nnparentstoolkit.org.uk)

[www.mathsplayground.com](http://www.mathsplayground.com)

[www.multiplication.com/interactive\\_games.htm](http://www.multiplication.com/interactive_games.htm)

[www.times-tables.com](http://www.times-tables.com)

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## Abacus

The school has purchased the Abacus scheme to support the New Curriculum. Your child has received a password and a username to enable them to log on to the online platform. Once on the platform your child can access a range of games to help support mathematical understanding.

