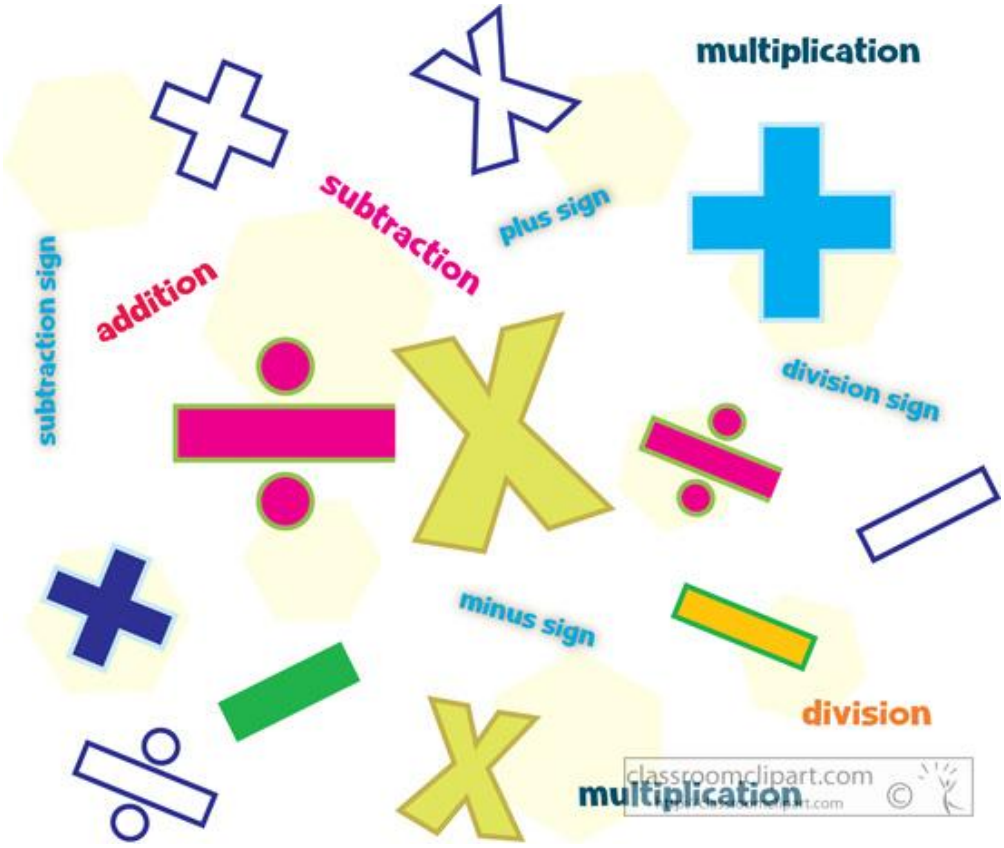
Calculation Progression



2014 Maths Curriculum

Key Milestones – 2014 maths curriculum

Maths requires skills and knowledge to be firmly in place before the next steps can be taken. For some children this will take longer than others. Listed below are some key milestones which your child will need to master before moving onto the next stage.

Foundation Stage

- **1 more than, 1 less than any number up to and including 20**
- Adding 2 single digit numbers using objects
- Subtracting 2 single digit numbers using objects
- Solve problems using **doubling**
- Solve problems using **halving**
- Solve problems using **sharing**

Key Stage 1:

Year 1

- Recognise + , - , and = signs
- Know all number bonds to 20 and facts within 20
- Add 1 and 2 digit numbers to 20 including 0
- Subtract 1 and 2 digit numbers to 20 including 0
- Understand that number sentences can be shown in several forms e.g. 7 = ? – 9
- Solve 1 step problems using objects, pictures and arrays
- **Count in 2s, 5's and 10's – link with multiplication**
- **Group objects into 2's, 5's and 10's – link with division**

Year 2

- Solve problems using objects, pictures, numbers and measures
- Show an increased knowledge of mental and written methods
- Know all number facts to 20 fluently
- Understand and use number facts up to 100
- Add 2 digit numbers to 1 digit numbers
- Add 2 digit numbers to 2 digit numbers
- Add 3 digit numbers to 1 digit numbers
- Use inverse (opposite) to check answers
- **Know 2, 5 and 10 tables fluently including division facts**
- Recognise odd and even numbers
- Use x , ÷ , and = symbols
- Solve multiplication and division problems using objects, arrays, repeated addition and known multiplication facts.
- Group and share objects and numbers
- **Double and half numbers with ease and recognise the link to the 4 times tables**

Lower Key Stage 2

Year 3

- Mentally add and subtract
    - 3 digit numbers and 1's
    - 3 digit numbers and 10's
    - 3 digit numbers and 100's
- Use place value knowledge to partition numbers
- Use a formal written method to add and subtract 2 and 3 digit numbers – using practical apparatus first
- Estimate answers and use inverse (opposite actions) to check
- Solve problems using number facts and place value knowledge
- **Know multiplication and division facts for 3, 4, and 8 times tables fluently**
- Multiply a 2 digit number by a 1 digit number

Year 4

- Use formal written methods for adding, subtracting and multiplying 4 digit numbers
- Estimate answers and use inverse (opposite actions) to check
- Solve 2 step problems deciding which operation to use
- **Know multiplication and division facts for all numbers up to and including 12 x 12 fluently**
- Multiply 3 numbers together
- Find factor pairs
- Use a formal written method to multiply 2 and 3 digit numbers by 1 digit numbers
- Use a number line as a way of recording 'chunking' when dividing

Upper Key Stage 2

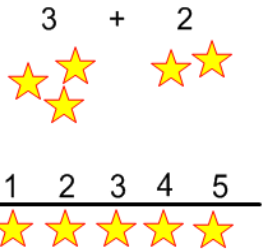
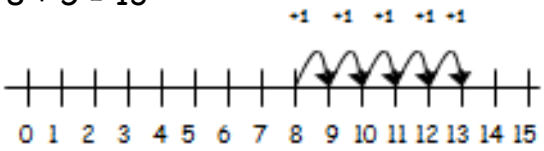
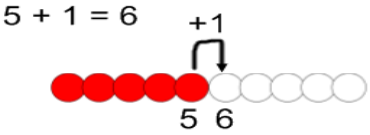
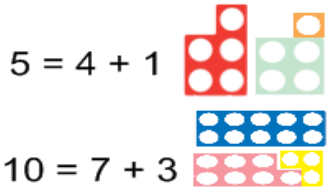
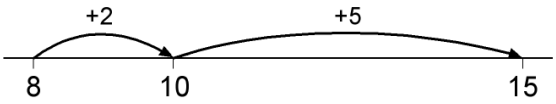
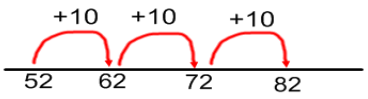
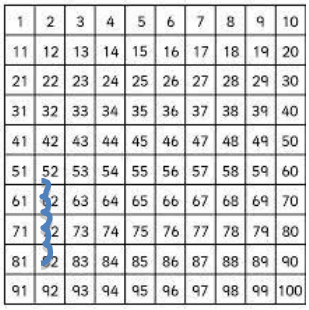
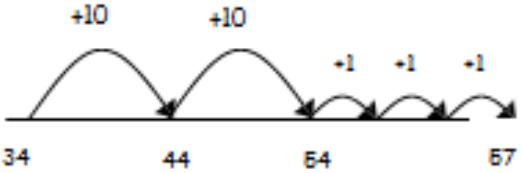
Year 5

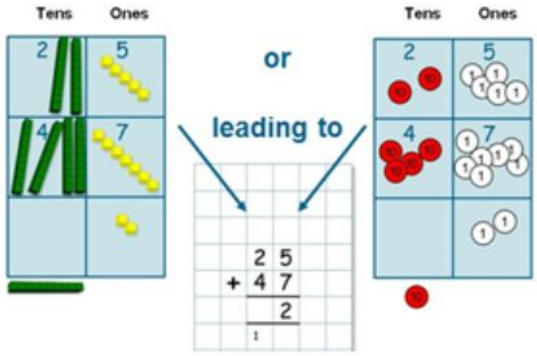
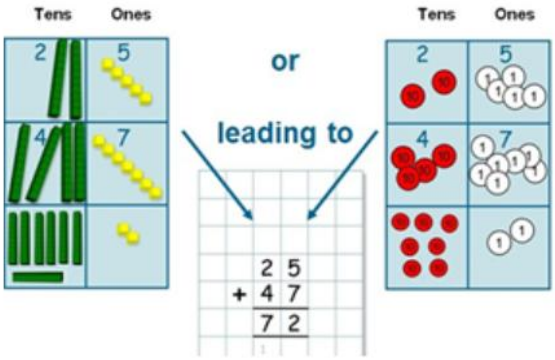
- Add, subtract and multiply 4 digit and larger numbers using a compacted formal written method
- Multiply and divide numbers including decimals by 10, 100 and 1000
- Use a short division method
- Add and subtract mentally using increasingly larger numbers
- Round answers to check accuracy
- Solve multistep problems deciding on method and operations
- Use knowledge of multiples and factor pairs
- Understand and use the terms prime, squared and cubed
- Recall prime numbers to 19
- Work out if a number is prime up to 100

Year 6

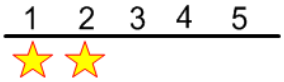
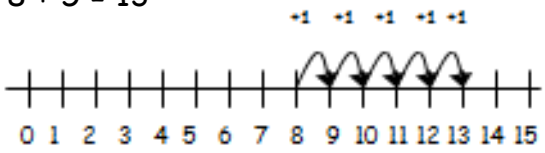
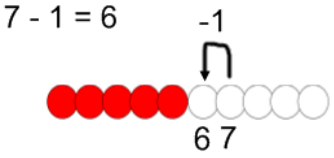
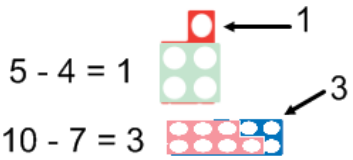
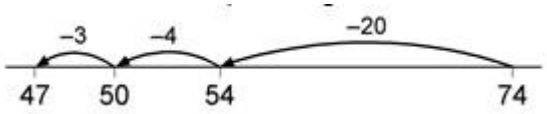
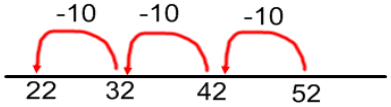
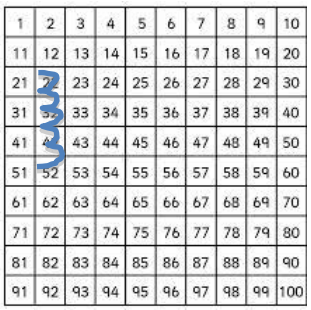
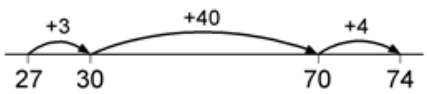
- Use knowledge of the order of operation to be able to carry out a calculation
    - B - brackets
    - O - ordinals
    - D - divide
    - M - multiply
    - A - add
    - S – subtract
- Carry out long multiplication using a formal written method
- Carry out long division using a formal written method

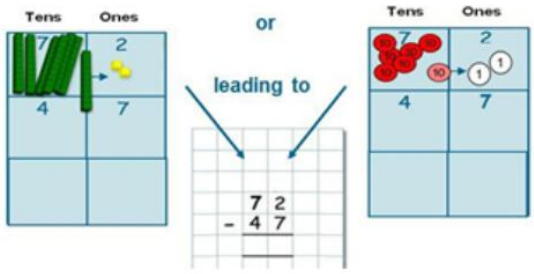
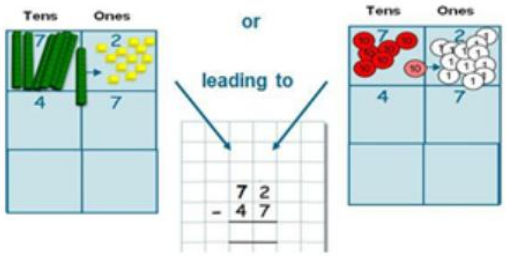
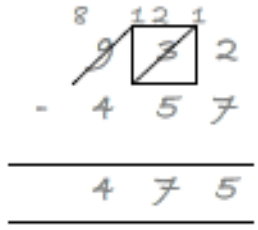
+ Addition +

STEP	Concept & images
Mental maths strategies and typical jottings your child will experience on their journey through addition using a variety of practical equipment.	  8 + 5 = 13   
	9 + 7 = 16 16 – 7 = 9 7 = ▭ - 9 Bridge 10 (e.g. 8 + 7 =15) 8 + 7 = 15 
	52 + 30 = 82   34 + 23 = 57 

Using the compact method for addition, using partitioning and practical equipment to secure understanding	HTU + HTU using partitioning 347 + 122 = 300 40 7 +100 20 2 400 60 9 = 469   
	Then, 258 + 87 = 345 (1 1) 366 + 458 = 824 (1 1) and involving larger numbers, Th H T U 3674 + 2507 6181 1 1 Then using decimal numbers, 78.5 km +54.6 km 133.1 km 11

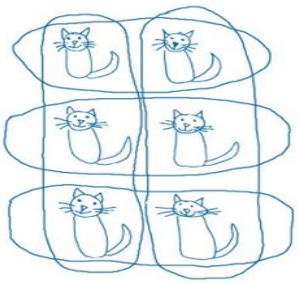
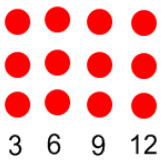
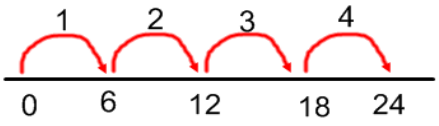
-Subtraction -

STEP	Concept & images
Mental maths strategies and typical jottings your child will experience on their journey through subtraction using a variety of practical equipment.	   8 + 5 = 13   
	Compare to find the difference  Which line has most money? How much more?  The difference is?
	Jumping back (Bridging 10) 15 – 7 = 8  74 – 27 = 47 worked by counting back: 
	52 - 30 = 22   74 - 27 = 

Using the compact method for subtraction, using partitioning and practical equipment to secure understanding	HTU – HTU Using decomposition 500 30 6 - 200 10 5 300 20 1 = 321  Then 'exchange' This will be introduced using practical equipment first. 72 - 47   Leading to… 563 – 246 = 317 5 1 5 6 3 2 4 6 3 1 7 932 - 457 becomes  Answer: 475 With decimals 3 8.00 - 4.56 3 3.44

X Multiplication X

<table>
<tr><th>STEP</th><th>Concept & images</th></tr>
<tr><td>Mental maths strategies and typical jottings your child will experience on their journey through multiplication using a variety of practical equipment.</td><td>5 x 3 = 15 is the same as 5 + 5 + 5 = 15
 
2 + 2 + 2 + 2 + 2 = 10</td></tr>
<tr><td></td><td>Array

3 groups of 2 and 2 groups of 3
 
3 x 4 = 12
 
3 6 9 12
4 x 3 = 12
 
4 8 12
Number line
Doubling 8 x 2 = 16 (double the units)
24 x 2 = 48 (double the tens, double the units, combine)
6 x 4 = 24
 
1 2 3 4
0 6 12 18 24</td></tr>
<tr><td></td><td>Multiply by 10 / 100
7.9 x 100 = 790

H T U . tenths
7 . 9
7 9 x 10 (digits move one column to left)
7 9 0 x 100 (digits move two columns to left)</td></tr>
<tr><td></td><td>Informally using partitioning
‘13 x 6 is the same as 10 x 6 and 3 x 6
(60 + 18) = 78’</td></tr>
</table>

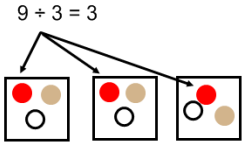
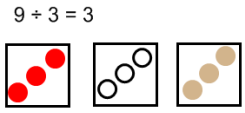
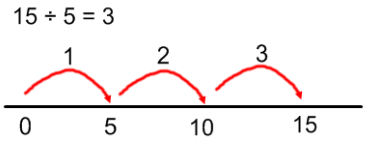
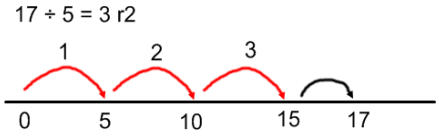
<table>
<tr><td></td><td colspan="2">… Then Grid Method

<table><tr><td>x</td><td>10</td><td>3</td></tr><tr><td>6</td><td>60</td><td>18</td></tr></table>
13 x 6 = 78</td></tr>
<tr><td rowspan="2">Using the compact method for multiplication, using partitioning and practical equipment to secure understanding</td><td>Standard method
24
x 3
12 (3x4)
60 (3x20)
72</td><td>Compact method
24
x 3
72
1</td></tr>
<tr><td>Which leads into…

126
x 14
1260
504
1764</td><td>And with decimals.

14.53
x 4
58.12
12 1</td></tr>
</table>

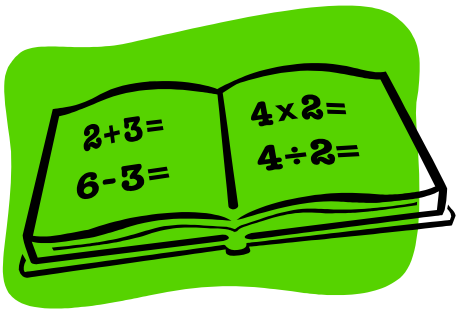
÷ Division ÷

STEP	Concept & images
Mental maths strategies and typical jottings your child will experience on their journey through division using a variety of practical equipment.	SHARING 'Is it fair?' 
	As GROUPING – link to times tables facts 12 ÷ 4 = 3 (groups) 
	Grouping using number line 15 ÷ 5 = 3 
	Finding a remainder 17 ÷ 5 = 3 r 2 
	Dividing by 10 / 100 79 ÷ 10 = 7.9 H T U . tenths 7 9 7 . 9 ÷ 10 (digits move one column to right) 0 . 7 9 ÷ 100 (digits move two columns to right)

Using the compact method for division, using partitioning and practical equipment to secure understanding	Standard 'Goes Into' Method This will be introduced using practical equipment first.  14 r 2 5 ⟌ 72 2 Then 164 r 3 6 ⟌ 987 3 2
	With decimals: Use standard method 87.5 ÷ 7 = 12.5 7 ⟌ 87.5 1 3
	425 ÷ 25 = 17 017 25 ⟌ 425 -0 (0 x 25 = 0) 42 -25 (1 x 25 = 25) 175 -175 (7 x 25 = 175) 000

Helping your child at home

DO:



- Let them have a go on their own if they ask you, BUT ..... let your child know that you are around to give help if they would like it.
- Listen to your child; let them teach you their method.
- Make practice fun, for example card games.
- Put aside a regular 10 minutes several times a week for them to tell you what they are working on.
- Try to find opportunities to show them maths being used at home or shopping, e.g. measuring quantities of food, using money etc.

- **Practise times tables regularly – the sooner children know them the easier maths becomes…**

- **Remember to use 'www.mymaths.co.uk' to encourage your child to revise areas, practise skills and enjoy playing the mathematically based games for fun.**

Useful Vocabulary

Bridging- You can make it easier to use numbers if you work out what should be added or taken away to bring you to a 10 or multiple of 10. Then add or subtract the other number separately.

Calculate- To work out

Complements- Number bonds to 10 and 100 e.g. complements of 10 are 2+8 or 4+6, complements of 100 are 46+54, 22+78…

Decomposition- To partition numbers in different ways to allow subtraction to take place when the subtracting number is larger than the starting number e.g. 700+80+4 is the same as 700+70+14 (know as exchanging)

Difference- To find the difference between 2 numbers, you need to take the smaller number away from the larger one. E.g. the difference between 10 and 4 is 6.

Factors- A factor is a whole number which will divide exactly into another whole number. E.g. 3 is a factor of 12

Inverse operation- If you have a sum with a missing gap, you can use the inverse operation to solve it, e.g. + and – are the inverse of each other and x and ÷ are the inverse of each other.
To solve 124 + _____ = 200 you could turn it to 200 – 124 = 76

Mean- To find the mean you must have a set of results. You then need to find the total of the results and divide it by the number of results you have, e.g. Here are a set of test marks
Paul 22, Sally 26,Tim 31,David 33
To find the mean of these scores add them all together (112) and then divide by 4 (28) so the mean score is 28

Median- When the data is arranged in order of size the median is the one in the middle.

Mode- Is the number which appears most frequently in a collection of data.

Multiple- Multiples are whole numbers that a larger number can be made of by adding lots of the smaller number together. E.g. 12 is a multiple of 3

Number Bond- Pairs of numbers which make a number e.g. the number bonds for 10 are 10 and 0, 9 and 1, 8 and 2, 7 and 3, 6 and 4, and 5 and 5

Ordinals- Whole numbers

Partitioning- Splitting a number into tens and units e.g. 56 = 50 + 6

Percentages- Means out of 100 so 20% is the same as 20/100. To find 20% of 50 you divide by 100 and times by 20

Prime numbers - Are numbers which will divide by themselves and 1. They only have two factors. These are the prime numbers to 30 - 2 3 5 7 11 13 17 19 23 29

Product- The answer when something has been multiplied, e.g. the product of 3 and 4 is 12

Square number- When a number is multiplied by itself, e.g. 1x1=1, 2x2 = 4, 3x3 = 9. Square numbers to 100 are 1 4 9 16 25 36 49 64 81 100

Sum- To find the sum of a group of numbers, you add the numbers together.

Name _____

Hundred Square

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

Multiplication square

12 X 12 Multiplication Table													
X	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144