Our Lady and St Patrick's Approach to Calculation

Why did we write this booklet?

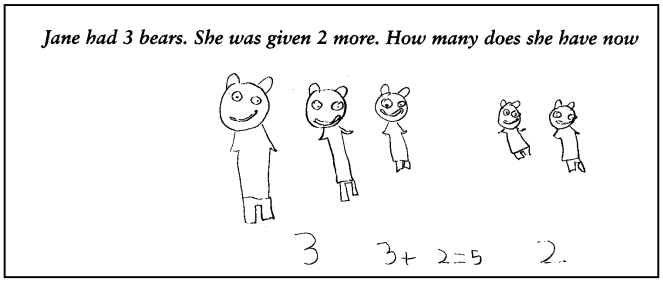
This booklet aims to show you, as simply as possible, how to help you to help your children. Methods of calculations have changed greatly in the past ten years.
When children are in years 1 and 2 they are **not** expected to record vertical sums like

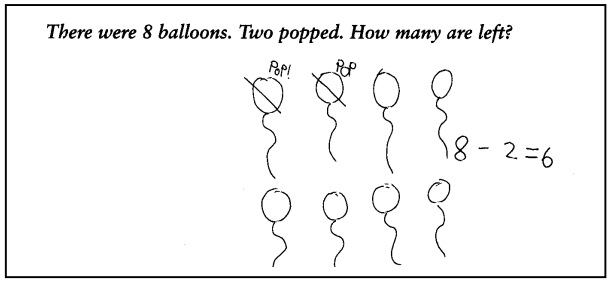
$$\begin{array}{r} 6 \\ 4\ + \\ \hline 10 \\ \hline \end{array} \qquad \textbf{OR} \qquad \begin{array}{r} \cancel{1}^{1}7 \\ -\ 9 \\ \hline 8 \\ \hline \end{array}$$

but this doesn't mean that they won't learn that 6 + 4 = 10 or 17 – 9 = 8 as number facts.

Throughout this booklet we have tried to show how skills can be developed from early mental calculations to formal written recording.

Children will be doing a daily mixture of counting, talking about numbers and using numbers to solve real life problems. They will begin to record what they've done with pictures and numbers. These recordings will help them to understand what is happening and to show how they've worked something out. Here are two examples of early recording.





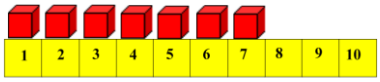
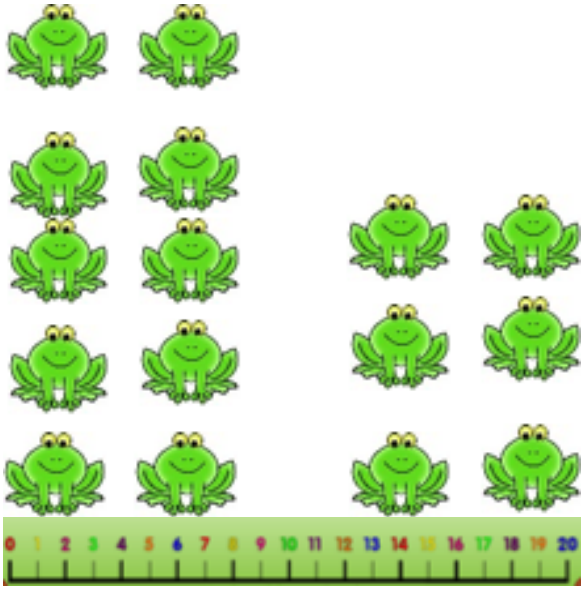
Throughout Key Stage 2 children will carry on using horizontal recording of addition and subtraction to support their mental calculations. They will also continue to use drawings, diagrams and blank number lines to support their thinking.

The maths work your child is doing at school may look very different to the kind of 'sums' you remember. This is because children are encouraged to work mentally, where possible, using personal jottings to help support their thinking. Even when children are taught more compact written methods, they are only encouraged to use these methods for calculations they cannot solve in their heads. The more compact written methods may also look different to the way in which you were taught.

This booklet shows the range of different methods that we are now teaching.

Addition

Reception/Foundation Stage

I have 7 cubes on my number track. If I add one more. how many will I have?  Three teddies are having tea in the café. One more joins them. How many will there be now? How many more teddies do I need to make 5? 	Children find one more than a number up to 20
Count out three strawberries. Count out 2 strawberries. How many strawberries altogether? 	Children combine two groups of objects and add them all to find the total
10 frogs and 6 more is 16 10 add 6 equals 16 10 + 6 = 16 	Using quantities and objects they add two single digit numbers and count on or back to find the answer. They may refer to a numberline.

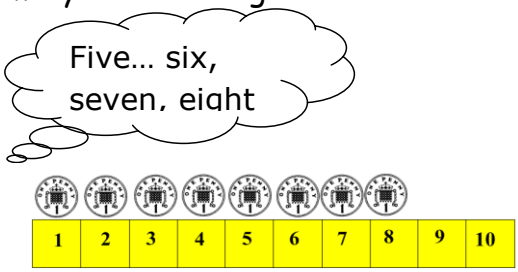
Mental Calculation:

- Counting and reading numbers to 20
- Doubling using objects and numbers
- Halving using objects

- Sharing using objects
- Adding two single digit numbers

Addition

Year 1

<table>
<tr><td>I have 5 pennies and 3 pennies. How many have I altogether?
 
</td><td colspan="2">Children understand + as finding the total of two or more sets of objects.

They add one-digit and two-digit numbers to 20, including zero

They might draw a picture to help them solve the problem.</td></tr>
<tr><td colspan="2">Using a marked number line with marked divisions to 20 to solve calculations such as:
9 + 7 = ☐
 

Appropriateness of number: choices of number here remain within 20 and build towards crossing 10.</td><td>Children use numberlines to support their calculations, starting by counting in 1s.</td></tr>
<tr><td colspan="2">Begin to introduce ☐ = 9 + 7 to show the symbolism of balanced calculations and commutative number sentences.</td><td>Children understand that the = sign doesn't always come at the end of a calculation.</td></tr>
</table>

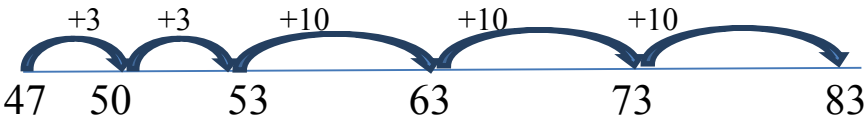
Mental Calculation:

- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- Number bonds ('story of' 5, 6, 7, 8, 9 and 10)
- Count on in ones from a given 2-digit number
- Add two single-digit numbers
- Add three single-digit numbers spotting doubles or pairs to 10
- Count on in tens from any given 2-digit number
- Add 10 to any given 2-digit number
- Use number facts to add single-digit numbers to two-digit numbers, e.g. use 4 + 3 to work out 24 + 3, 34 + 3…
- Add by putting the larger number first

Addition

Year 2

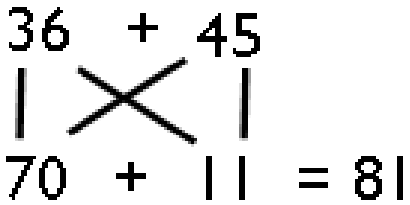
47 + 36 =



47 + 36 = 83

Children progress to adding two two-digit numbers using an empty number line, which they label themselves.
They partition the 36 into 6 units or ones and 3 tens. They add 3 to get to the next ten (using number bond knowledge that 7+3 makes 10) and 3 again (which makes the 6 in 36). Then add the three groups of 10.

36 + 45 =



36 + 45 = 30 + 6 + 40 + 5
= 30 + 40 = 70
= 6 + 5 = 11
= 70 + 11
= 81

Children learn to partition a number i.e. separate it into tens and units, and use this to make adding easier – adding the tens and then the units.

	T	U
	4	7
+	3	6
	1	3
	7	0
	8	3

Some children may go on to record this vertically in a more expanded, written column method. The headings of each column are clearly labelled. Numbers should be carefully chosen so that no regrouping is required when adding the two figures together.

Mental Calculation:

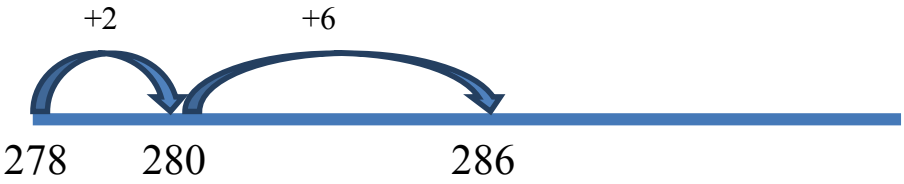
- Number bonds – knowing all the pairs of numbers which make all the numbers to 12, and pairs with a total of 20 and derive and use related facts up to 100
- Count on in ones and tens from any given 2-digit number
- Add two or three single-digit numbers
- Add a single-digit number to any 2-digit number using number facts, including bridging multiples of 10. (E.g. 45 + 4, 38 + 7)
- Add 10 and small multiples of 10 to any given 2-digit number
- Add any pair of 2-digit numbers

- show that addition of two numbers can be done in any order (commutative)
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Addition

Year 3

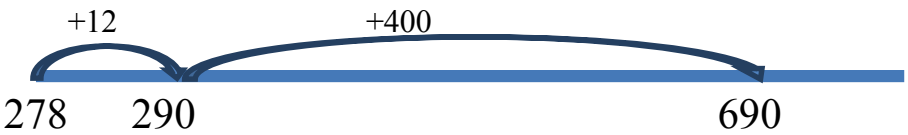
278 + 8 =



Children may still be using the number line to solve a mental calculation including three-digit numbers add ones, three-digit numbers add tens, three-digit numbers add hundreds and three-digit numbers add thousands

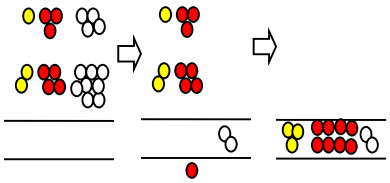
Numbers initially cross the tens boundary within a three-digit number. Children are still encouraged to recognise their number bonds so that smaller jumps reinforce mental strategies, rather than a jump of 8.
Moving to:
278 + 82 =
crossing the hundreds boundary within 3 digits up to 1000

278 + 412 =



Moving to crossing hundreds boundary within 3 digits up to 1000

134 + 248 = 382



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  1 3 4
+ 2 4 8
  3 8 2
    1
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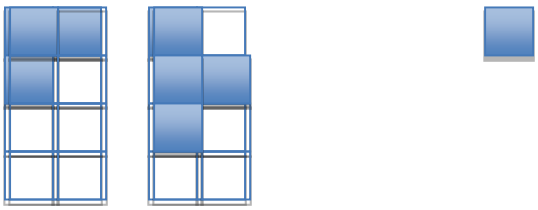
The use of apparatus alongside the written method is imperative to ensure conceptual understanding

Children move on to adding numbers with up to three digits, using formal written methods of column addition. They will use apparatus to help them see how it works. In the example yellow are hundreds, red are tens and white units.

A child's commentary might go like this... 4 ones add 8 ones equals 12. I need to regroup 12 ones into 1 ten and 2 ones so I put the ten under the tens column and the 2 ones in the units column. 3 tens plus 4 tens plus 1 ten underneath is 8 tens. Record this in the tens column. 1 hundred plus 2 hundreds is 3 hundreds. Record this in the hundreds column

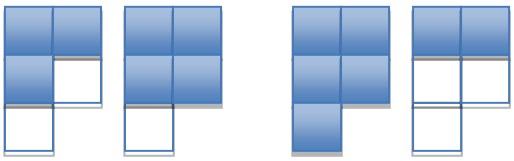
$^{3}/_{8}$ + $^{1}/_{8}$ + $^{1}/_{8}$ = $^{5}/_{8}$ 	In addition to whole numbers, children also begin to add fractions with the same denominator up to a whole. Children need experience of doing this with practical apparatus and images to reinforce conceptual understanding They also recognise fractions that add to make one whole e.g $\frac{1}{4} + \frac{3}{4}$ or $^{3}/_{5} + {}^{2}/_{5}$

Mental calculation:

- Know pairs of numbers which each total to 20
- Know pairs of multiples of 10 with a total of 100
- Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning
- Add multiples and near multiples of 10 and 100
- Perform place value additions without a struggle. (E.g. 300 + 8 + 50 = 358)
- Use place value and number facts to add a 1-digit or 2-digit number to a 3-digit number. (E.g. 104 + 56 is 160 since 104+50=154 and 6+4=10 and 676 + 8 is 684 since 8=4+4 and 76+4+4=84)
- Add pairs of simple 3-digit numbers, e.g. 320 + 450
- Begin to add amounts of money using partitioning.

Addition

Year 4

4627 + 3914 = 8541 Th H T U 4 6 2 7 + 3 9 1 4 8 5 4 1 1 1 This should move onto adding up to 3 numbers including a mix of 3 digit add 4 digit.	Children add with up to 4 digits using the formal written methods of columnar addition, where appropriate. As in Year 3 this should be taught with apparatus to ensure conceptual understanding. A child's commentary might go like this: 7 units and 4 units equals 11 units. I need to regroup 11 into one unit and record this in the units column, and 1 ten. Record this under the tens column. 2 tens add 1 ten add the 1 ten underneath equals 4 tens. Record this in the tens column. 6 hundreds plus 9 hundreds equals 15 hundreds. Regroup this into 5 hundreds (record in hundreds column) and 1 thousand (record underneath Th column). 4 thousands add 3 thousands add the 1 thousand underneath is 8 thousand, record this in the thousands column.
4627 + 3914 ≈ 8500 4600 + 3900 (rounded to nearest 100)	Children also their knowledge of rounding to estimate quickly mentally
4627 + *3914* = 8541. Check using subtraction: 8541 – **4627** = *3914* or 8541 – *3914* = **4627**	They use inverse operations to check answers to calculations
$^3/_5$ + $^4/_5$ = $^7/_5$ = 1 $^2/_5$ 	Children continue to add fractions with the same denominator beyond one whole. Again this should be done practically and pictorially
$^2/_3$ + ? = 1	They are confident with fractions that add to 1 and fraction complements to 1.

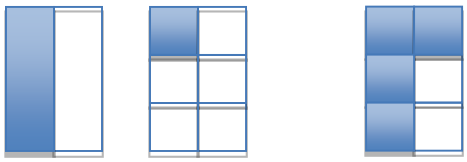
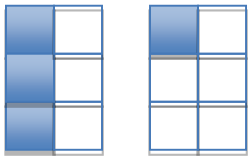
Mental Calculation:

- Add any two 2-digit numbers by partitioning or counting on
- Know by heart/quickly derive number bonds to 100 and to £1
- Add to the next hundred, pound and whole number
  (e.g. 234 + 66 = 300, 3.4 + 0.6 = 4)
- Perform place value additions without a struggle.
  (E.g. 300 + 8 + 50 + 4000 = 4358)

- Add multiples and near multiples of 10, 100 and 1000.
- Add £1, 10p, 1p to amounts of money
- Use place value and number facts to add 1-, 2-, 3-and 4-digit numbers where a mental calculation is appropriate'. (E.g. 4004 + 156 by knowing that 6+4=10 and that 4004+150= 4154 so total is 4160)

Addition

Year 5

43401 + 22524 + 31391 = 97,316 TTh Th H T U 4 3 4 0 1 2 2 5 2 4 + 3 1 3 9 1 9 7 3 1 6 ~~1~~ ~~1~~	Building on Year 4 strategies, children move to adding numbers with more than 4 digits within 1 million. Numbers should be chosen carefully so that when starting with larger numbers no regrouping is required to make sure there is clarity and understanding of application of strategy before regrouping. As in Year 4 children should be rounding to estimate answers and using the inverse operation to check, looking at the reasonableness of the answer.
£132.52 + £213.83 = H T U • t h 1 3 2 • 5 2 + 2 1 3 • 8 3 3 4 6 • 3 5 ~~1~~	This should Progress to addition of numbers to two decimal places in context (such as money) A clear step to success must be the writing of the decimal point in the answer area first to help when regrouping past this boundary. Use of practical apparatus, such as money, should be used to support this calculation and ensure conceptual understanding.
£132.52 + £213.83 Rounded to the nearest 10: £130 + £210 = £340	Children should use rounding to check the relevance of numbers in the answer.
$^1/_2$ + $^1/_6$ = $^4/_6$  = $^3/_6$ + $^1/_6$ 	Add fractions with denominators that are multiples of the same number. They see the relationship between the two fractions, realising that to convert $^1/_2$ s into $^1/_6$ s you multiply by 3 and whatever you do to the denominator you must do to the numerator so you multiply that by 3 also:

	$\frac{1}{2} = \frac{3}{6}$ (X 3 / X 3)

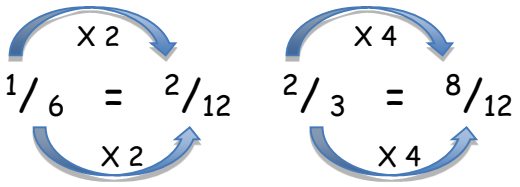
Mental Calculation

- Know numbers bonds to 1 and to the next whole number
- Add to the next 10 from a decimal number, *e.g. 13·6 + 6·4 = 20*
- Add numbers with two significant digits only, using mental strategies. (E.g. 3.4 + 4.8 or 23,000 + 47,000)
- Add one or two-digit multiples of 10, 100, 1000, 10,000 and 100,000. (E.g. 8000 + 7000 or 600,000 + 700,000)
- Add near multiples of 10, 100, 1000, 10,000 and 100,000 to other numbers. (E.g. 82,472 + 30,004)
- Add decimal numbers which are near multiples of 1 or 10, including money. *(E.g. 6·34 + 1·99 or £34·59 + £19·95)*
- Use place value and number facts to add two or more friendly numbers including money and decimals. (E.g. 3 + 8 + 6 + 4 + 7, 0.6 + 0.7 + 0.4, or 2,056 + 44)

Addition

Year 6

120,537 + 234,271 + 323,221 = 678,029 1 2 0 5 3 7 2 3 4 2 7 1 3 2 3 2 2 1 **6 7 8 0 2 9** 1 1	Building on Year 5 strategies and number choices, children move to adding numbers up to 5 digits within 10 million. Model the use of the comma when writing such large numbers and reading the numbers within the separated groups by the comma, reinforcing and reiterating the value of each digit.
0.557 + 1.211 + 0.202 = 1.970 0 • 5 5 7 1 • 2 1 1 + 0 • 2 0 2 1 • 9 7 0 1	Children calculate decimals numbers to three decimal places. Note in the example, the use of '0' as a place value holder here and as a digit within the decimal number itself: to reiterate the understanding of its importance and value.

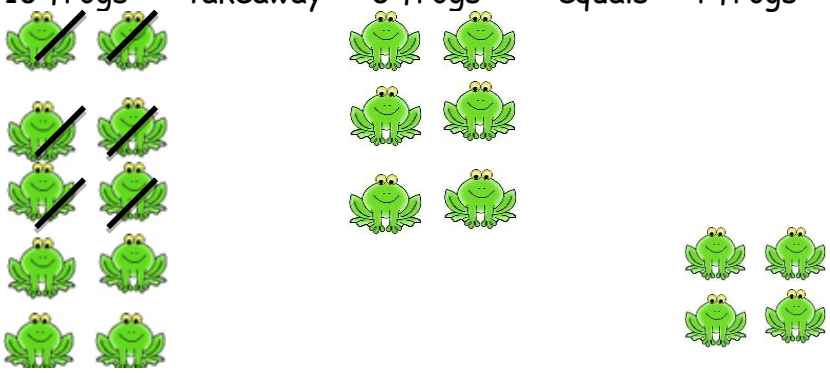
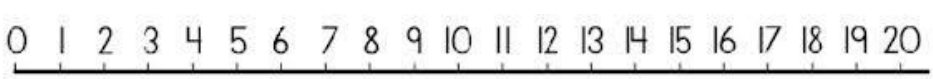
$2^1/_6 + 1^2/_3 =$  $2^2/_{12} + 1^8/_{12} = 3^{10}/_{12}$ $= \underline{3\ ^5/_6}$	Children now move on to adding mixed numbers and fractions with different denominators, using the concept of equivalent fractions. As in Year 5 they should start with fractions with denominators that are a multiple of each other and progress onto more complex problems, e.g. converting to a common denominator. Here children recognise that both 6 and 3 are factors of 12 so they convert the fractions to 12^{ths} to continue the calculation. They give their answer in the simplest form, recognising that $^{10}/_{12}$ ths can be divided by 2 and therefore simplified to $^5/_6$ ths.

Mental Calculation:

- Know by heart number bonds to 100 and use these to derive related facts. (E.g. 3.46 + 0.54 = 4)
- Derive quickly and without difficulty, number bonds to 1000
- Add small and large whole numbers where the use of place value or number facts makes the calculation do-able 'in our heads'. (E.g. 34,000 + 8000.)
- Add multiples of powers of ten and near multiples of the same. (E.g. 6345 + 199.)
- Add negative numbers in a context such as temperature where the numbers make sense.
- Add two 1-place decimal numbers or two 2-place decimal numbers less than 1 (E.g. 4.5 + 6.3 or 0.74 + 0.33)
- Add positive numbers to negative numbers, e.g. calculate a rise in temperature, or continue a sequence beginning with a negative number

Subtraction

Foundation Stage (Reception)

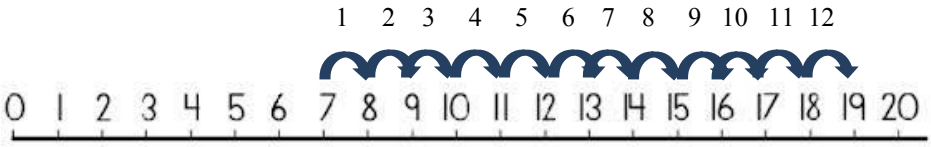
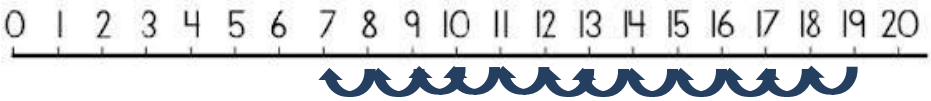
There are 4 people on the bus, 1 gets off. How many are left? **3**  We made 6 cakes and ate 2. How many are left? 	Children find one less than a number to 20. They use practical apparatus and model the calculation with objects or their fingers. They cross out objects they are subtracting.
10 - 6 = 4 10 frogs takeaway 6 frogs equals 4 frogs   	They subtract using single digit numbers and may refer to a number line, counting back in 1s

Mental Calculation:

- Counting and reading numbers to 20
- Place numbers one to 20 in order and say which number is one more or one less
- Doubling using objects and numbers
- Halving using objects
- Sharing using objects
- Subtracting two single digit numbers

Subtraction

Year 1

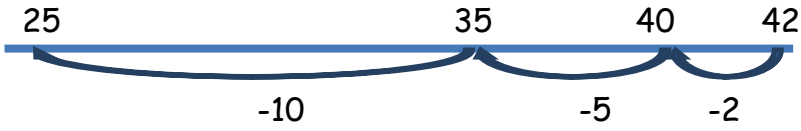
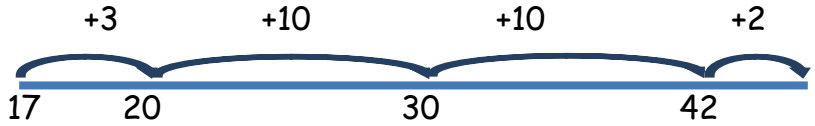
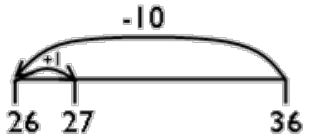
20p – 7p = 13p Sam spent 7p. What was his change from 20p?  They build on Reception and crossing off images to really understand takeaway.	Children read, write and interpret mathematical statements involving (-) and the (=) signs.
19 - 7 = 12  	They subtract one-digit and two-digit numbers to 20.They use counting on to find the difference. Start at 7 and count on to 19 in ones.
19 - 7 = 12  	They can check by taking away. 19 takeaway 7 is 12
7 - 3 = □ □ = 7 - 3 7 - □ = 4 4 = □ - 3 □ - 3 = 4 4 = 7 - □ □ - ∇ = 4 4 = □ - ∇ **Note the variety of layouts so children see balancing calculations and the equals sign near the start, as well as at the end, of calculations**	They begin to explore missing number problems involving (-) and (=) signs. They may use either of th strategies above: takeaway e.g. 7 takeaway 3 equals 4, or they may use counting on e.g. 4 count on 3 equals 7 so 7 – 3 = 4

Mental Calculation:

- Number bonds ('story of' 5, 6, 7, 8, 9 and 10)
- Reasoning with number bonds e.g. 9 + 7 = 16; 16 – 7 = 9; 7 = 16 - 9
- Count back in ones from a given 2-digit number
- Subtract one single-digit number from another
- Count back in tens from any given 2-digit number
- Subtract 10 from any given 2-digit number
- Use number facts to subtract single-digit numbers from two-digit numbers, e.g. use 7 – 2 to work out 27 – 2, 37 – 2…

Subtraction

Year 2

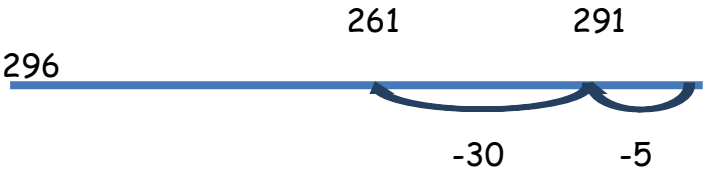
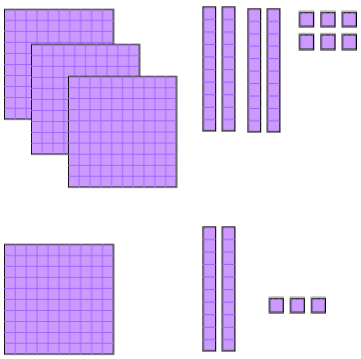
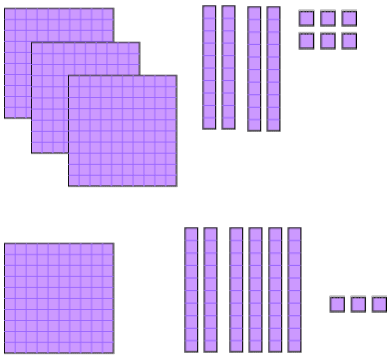
Starting with 39 – 7 to ensure clarity of strategy (does not cross tens boundary, subtracting units only) Moving to 42 – 17 Taking away:  Finding the difference:  	Children continue to use concrete objects, apparatus and pictorial representations to solve subtraction problems. start to see subtraction as 'how many more' Children use multiples of 2 and 5 to make it easier and more efficient than jumping in ones. They count back to the next 10 e.g. 42 – 2 to get to 40 or count up to next 10 e.g. 17 +3 to get to 20. They are using empty numberlines that are unmarked.
39 – 7 = 32 T U 3 9 - 7 3 2	They may start to record their subtraction calculation in columns (where the subtraction doesn't cross the tens) to support place value and prepare for formal written methods with larger numbers.
70 + 30 = 100 (known fact – use this below) 100 - Δ = 30 30 + □ = 100	They solve missing number puzzles in different forms, referring to missing numbers as shapes or letters to build on commutative facts.
36 – 9 = 27  	When working mentally children start to understand how they can use 'nearly numbers' e.g. subtract 10 and add one rather than subtracting 9.

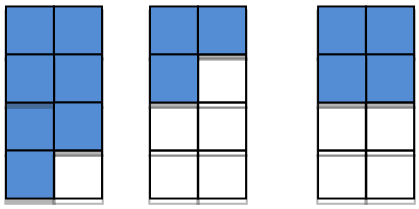
Mental Calculation:

- Number bonds – knowing all the pairs of numbers which make all the numbers to 12 and derive and use related facts up to 100 e.g. 10 - 7 = 3 so 100 - 70 = 30
- Count back in ones and tens from any given 2-digit number
- Subtract a single-digit number from any 2-digit number using number facts, including bridging multiples of 10, e.g. 56 – 3, 53 – 5.
- Subtract 10 and small multiples of 10 from any given 2-digit number
- Subtract any pair of 2-digit numbers by counting back in tens and ones or by counting up.
- subtracting three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

Subtraction

Year 3

296 – 35 = 261 (mentally but with the number line image in mind)  	Children calculate subtractions from numbers up to 1000. Model deciding appropriate calculation choices e.g. calculations such as: 296 – 5 or 296 – 35 should be tackled mentally. In this example discrete teaching of mental strategies is needed linking to written number line methods taught in Y2.
346 – 123 = 223  H T U 3 4 6 - 1 2 3 2 2 3 Note the appropriateness of the number to start with: no regrouping needed.	Children start to use the formal, column written method. They must begin by modelling the value and layout practically, using labelled columns. The strategy and method must be secure before moving onto regrouping. They do each column with diennes and record, then the next column and so on. Starting with the units: 6 subtract 3 is 3. 4 tens subtract 2 tens is 2 tens. 3 hundreds subtract 1 hundred is 2 hundreds.
346 – 163 = 183  H T U 2 1 ~~3~~ 4 6 - 1 6 3 1 8 3 It is important that children realise that the value of the number still remains the same (there is still 346, some are simply regrouped	Once confident with the formal written method they move onto larger numbers that require regrouping. It is vital that practical apparatus are used to support this and each column is done at a time. 6 ones subtract 3 ones is 3 ones. I cannot subtract 6 tens from 4 tens so I need to regroup the 3 hundreds into 2 hundreds and 10 tens. I add these to my 4 tens to make 14 tens. 14 tens minus 6 tens is 8 tens. 2 hundreds subtract 1 hundred is 1 hundred.

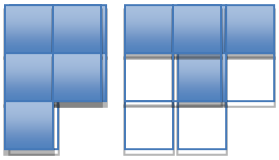
$^{7}/_{8}$ - $^{3}/_{8}$ = $^{4}/_{8}$ 	Children begin to subtract fractions with the same denominator, within one whole. They use practical apparatus and pictorial representations to explore this. They see the relationship between the two fractions, realising that to convert $^{1}/_{2}$ s into $^{1}/_{6}$ s you multiply by 3 and whatever you do to the denominator you must do to the numerator so you multiply that by 3 also:

Mental Calculation:

- Know pairs which each total to 20
- Subtract any two 2-digit numbers
- Perform place value subtractions without a struggle. (E.g. 536 – 30 = 506, etc.)
- Subtract 2-digit numbers from numbers >100 by counting up. (E.g. 143 – 76 is done by starting at 76, add 4 (80) then add 20 (100) then add 43 making the difference a total of 67)
- Subtract multiples and near multiples of 10 and 100
- Subtract, when appropriate, by counting back or taking away, using place value and number facts.
- Find change from £1, £5 and £10.
- Subtract a three-digit number and ones, tens, hundreds and thousands

Subtraction

Year 4

7432 – 2518 = 4914 Th H T U $^{6}\cancel{7}$ $^{1}4$ $^{2}\cancel{3}$ $^{1}2$ - 2 5 1 8 4 9 1 4	Children continue to use column written methods and regrouping with numbers up to 4 digits. They may have to regroup more than once. It is important that this is remodelled using practical apparatus to ensure children are secure with the method.
£213.83 - £183.51 = £30.32 H T U • t h $^{1}\cancel{2}$ $^{1}1$ 3 • 8 3 1 8 3 • 5 1 0 3 0 • 3 2	They progress onto subtraction of numbers to two decimal places in context (such as money). A clear step to success must be the writing of the decimal point in the answer area first to help when regrouping past this boundary. Use of practical apparatus, such as money, should be used to support this calculation and ensure conceptual understanding
£213.83 - £183.51 ≈ £30 £210 - £180 rounded to the nearest 10	They use rounding to estimate
7432 – 2518 = 4914 check with addition: 4914 + 2518 = 7432	They use the inverse operation to check their answers to a calculation, probably using a formal written method for addition.
$1\,^{2}/_{5} - {}^{4}/_{5} = {}^{3}/_{5}$  or $^{7}/_{5} - {}^{4}/_{5} = {}^{3}/_{5}$	Children continue to add fractions with the same denominator beyond one whole. Again this should be done practically and pictorially. Children realise that one whole in this example is $^{5}/_{5}$ and therefore $1\,^{2}/_{5}$ gives you $^{7}/_{5}$ altogether.
$1 - {}^{2}/_{3} = {}^{1}/_{3}$	Use fractions that add to 1 to find fraction complements to 1,

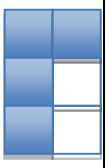
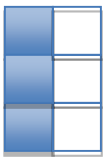
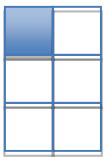
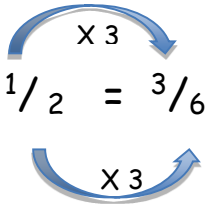
Mental Calculation:

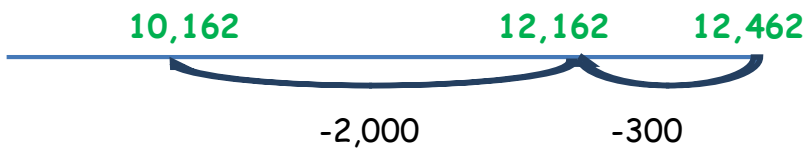
- Subtract any two 2-digit numbers
- Know by heart/quickly derive number bonds to 100
- Perform place value subtractions without a struggle. (E.g. 4736 – 706 = 4030, etc.)
- Subtract multiples and near multiples of 10, 100 and 100

- Subtract by counting up. (E.g. 503 – 368 is done by adding: 368 +2 +30 +100 +3 so we added 135)
- Subtract, when appropriate, by counting back or taking away, using place value and number facts.
- Subtract £1, 10p, 1p from amounts of money
- Find change from £10, £20 and £50.

Subtraction

Year 5

7902 – 2598 = 5308 Th H T U 7 ~~9~~ (8) ~~0~~ (9) (1) 6 - 2 5 9 8 5 3 0 8	Strategies build on those of Year 4 and involve starting numbers of up to 100,000 and progressing to 1,000,000 Children understand what happens when there is a 0 as a place value holder: I can't subtract 8 ones from 6 ones and there are 0 tens in the tens column so I regroup the 9 hundreds into 8 hundreds and 10 tens. I then regroup the 10 tens into 9 tens and one ten, which I add to my 6 to make 16 ones. 16 subtract 8 is 8. 9 tens subtract 9 tens is 0 tens. 8 hundreds subtract 5 hundreds is 3 hundreds and 7 thousands subtract 2 thousands is 5 thousands.
14,067 – 11,850 = 2211 1 (3) ~~4~~ (1) 0 6 7 - 1 1 8 5 0 0 2 2 1 1	This should progressively move to calculations with numbers more than 4 digits and decimals up to 2 decimal places.
7902 – 2598 ≈ 5300 7900 – 2600 (rounded to nearest 10)	They continue to use rounding to estimate answers and to check calculations, determining, in the context of the problem, levels of accuracy. Estimation has to be quick and efficient and done mentally.
$^1/_2$ - $^1/_6$ = $^4/_6$   = $^3/_6$ - $^1/_6$  	Building on Y4 they continue to subtract fractions with the same denominator and extend this to fractions with denominators that are multiples of the same number. They see the relationship between the two fractions, realising that to convert $^1/_2$ s into $^1/_6$ s you multiply by 3 and whatever you do to the denominator you must do to the numerator so you multiply that by 3 also: 

Mental methods: Δ = 12,462 – 2,300  Note use of symbols such as Δ and more common algebraic symbols such as *X* or *y* to find missing values		When modelling and teaching mental strategies, refer to picturing the use of a number line and either counting back or on: Δ = 12,462 – 2,300

Mental Calculation:

- Subtract numbers with two significant digits only, using mental strategies. (E.g. 6.2 – 4.5 or 72,000 – 47,000)
- Subtract one or two-digit multiples of 100, 1000, 10,000 and 100,000. (E.g. 8000 – 3000 or 600,000 – 200,000)
- Subtract one or two digit near multiples of 100, 1000, 10,000 and 100,000 from other numbers. (E.g. 82,472 – 30,004)
- Subtract decimal numbers which are near multiples of 1 or 10, including money. (E.g. 6·34 – 1·99 or £34·59 – £19·95)
- Use counting up subtraction, with knowledge of number bonds to 10/100 or £1, as a strategy to perform mental subtraction. (E.g. £10 - £3.45 or 1000 – 782]
- Recognise fraction complements to 1 and to the next whole number. (E.g. $1\ ^{2}/_{5} + ^{3}/_{5} = 2$) 4 – 5

Subtraction

Year 6

632,465 + **(745,676 – 325,534)** = **progressing to** 8,675,509 – **(9,645,253 – 2,867,675)** = **Note the use of brackets in multi-step problems identifying the brackets as the initial step needed and combining this with an additional written strategy**	Children solve multi-step subtraction problems in context, deciding which operations and methods to use a why. They work with numbers up to 10,000,000. They apply their learning of subtraction strategies and combine these with other areas of learning so solve problems.
35.712 – 8.653 = 27.059 $^{2}\cancel{3}\,^{1}5\bullet\overset{6}{\cancel{7}}\,\overset{10}{\cancel{1}}\,^{1}2$ $-\quad 0\;8\bullet 6\;5\;3$ $2\;7\bullet 0\;5\;9$	Children apply written subtraction skills to numbers up to and including three decimal places (3dp). These are presented in contextual situations such as units of measure. They recognise that calculations such as: 12 – 2.736 could be done counting on mentally or with jottings, referring back to knowledge of number lines would be more efficient than a written calculation. Discrete and modelled teaching of 'selecting the appropriate strategy' is needed.
$5^{2}/_{3} - 3^{2}/_{5} =$ $^{2}/_{3} \xrightarrow{\times 5} {}^{10}/_{15}$; $^{2}/_{5} \xrightarrow{\times 3} {}^{6}/_{15}$ $5\,^{10}/_{15} - 3\,^{6}/_{15} = 2\,^{4}/_{15}$	As in Year 5 children continue to subtract fractions with denominators that are multiples of the same number. They extend this to subtract mixed numbers and fractions with different denominators. Here children recognise that both 3 and 5 are factors of 15 so they convert the fractions to 15^{ths} to continue the calculation.

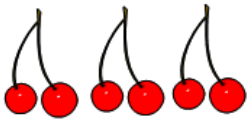
Mental Calculation:

- Use number bonds to 100 to perform mental subtraction of any pair of integers by complementary addition. (E.g. 1000 – 654 as 46 + 300 in our heads
- Use number bonds to 1 and 10 to perform mental subtraction of any pair of one-place or two-place decimal numbers using complementary addition and including money. (E.g. 10 – 3.65 as 0.35 + 6, £50 – £34.29 as 71p + £15)
- Use number facts and place value to perform mental subtraction of large numbers or decimal numbers with up to two places. (E.g. 467,900 – 3,005 or 4.63 – 1.02)

- Subtract multiples of powers of ten and near multiples of the same.
- Subtract negative numbers in a context such as temperature where the numbers make sense.

Multiplication

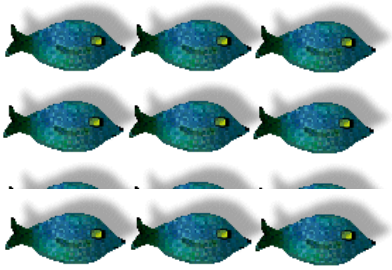
Foundation Stage (Reception)

I have two cherries on each bunch. How many cherries are on 3 bunches? 	Count repeated groups of the same size Respond to/make up number stories. Note: this is 3 groups of 2 so 2 three times.

Mental Calculations:

- Counting and reading numbers to 20
- Doubling using objects and numbers
- Halving using objects
- Sharing using objects

Year 1

There are three sweets in one bag. How many sweets are in five bags?  **Arrays:** There are three fish in one tank. How many fish are in four tanks?  Note: This is 3 fish 4 times	Children build on learning in the Foundation Stage and ensure a clear understanding of the concept of doubling. Children solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
Chidren are given 2 sweets each. How many sweets do 4 children get altogether? **2 x 4 = 8**  **2+ 2 + 2 + 2 = 8**	Practise counting in 2s, 5s and 10s, including using visual images for support Note: This reads as 2, four times or 4 groups of 2.

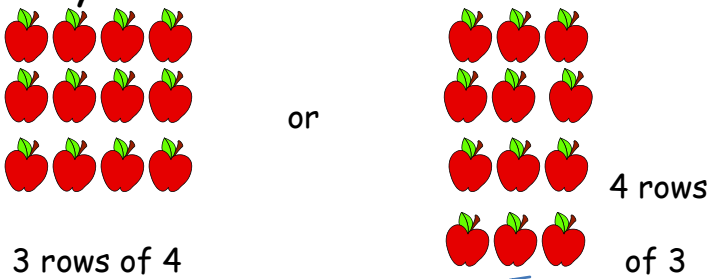
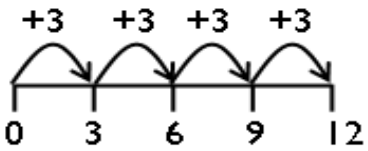
Counting in 5s: **Using one hand or 5p coins.**  **5 10 15 20 25** **Counting in 10s:** 	
 2 + 3 3 x 2	Children are shown the difference between an addition sentence and a multiplication sentence

Mental Calculation:

- Begin to count in 2s, 5s and 10s
- Begin to say what three 5s are by counting in 5s or what four 2s are by counting in 2s, etc.
- Double numbers to 10, using fingers.

Multiplication

Year 2

4x3 =□ Apples are put in a box in 3 rows of 4 (or 4 rows of 3).How many apples in the box? **Arrays:**  3 rows of 4 3 x 4 = 12 **Repeated addition:**  	Children calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (x) and the equals (=) signs. They begin to understand that multiplication is repeated addition and solve multiplication problems using arrays and on a number line. They show that multiplication of two numbers can be done in any order (commutative)
2 x 14 = 28 2 x 14 20 8 = 28 (2x10) (2x4)	Progressively, they start to apply their partitioning skills to understand the concept of multiplication of digits – strengthens place value links. They see that it is inefficient to do 14 jumps of 2 along the number line. The use of place value arrow cards could show these steps clearly. Numbers remain in teens to strengthen the ability to multiply a digit by 10

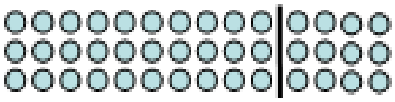
Mental Calculation:

- Count in 2s, 5s and 10s and recall and use number facts from these times tables
- Recognise odd and even numbers
- Begin to count in 3s.
- Begin to understand that multiplication is repeated addition and to use arrays (E.g. 3 x 4 is three rows of 4 dots)
- Begin to learn the 2x, 3x, 5x and 10x tables, seeing these as 'lots of', e.g. 5 lots of 2, 6 lots of 2, 7 lots of 2, etc.
- Double numbers up to 20

- Begin to double multiples of 5 to 100
- Begin to double two-digit numbers less than 50 with 1s digits of 1, 2, 3 4 or 5

Multiplication

Year 3

14 x 3 = X | 10 | 4 | 3 | 30 | 12 | = 42 3 x 1 4 30 + 12 = 42 (3x10) (3x4)  10 x 3 = 30 4 x 3 = 12	Children start to use the grid method as a way of formalising their partitioning. They should see it as the same as their partitioning strategy and it should be taught alongside so they see the link. They should also see the link to arrays. It is vital that children have a secure understanding of how to multiply by 10 before they use this method.
34 x 3 = 102 X | 30 | 4 | 3 | 90 | 12 | = 102	This should progress to two digit numbers times one digit numbers. Note how digits in numbers are, initially, those that are being reinforced and taught through expected multiplication tables knowledge.
34 x 2 = 68 30 x 2 = 60 4 x 2 = 8 60 + 8 = 68 **34 x 4 =** 34 x 2 = 68 68 x 2 = 136 60 x 2 = 120 8 x 2 = 16	Children are encouraged to see how this is best done through doubling. This should progress to doubling and doubling again when finding 4 x
Scaling problems: What height is a chair that is 4 times as high as this one measuring 12cm? 12 x 4 = 48 *Find a ribbon that is 4 times as long as the blue ribbon r = b x 4*  5 cm 20 cm	Children solve missing number problems including positive number scaling problems and correspondence problems in which m objects are connected to n objects Children could systematically work through all the possibilities or realise

Correspondence problems: There are 3 hats and 4 coats, how many different outfits can I make?	that 3 x 4 = 12: Hat 1 and coat 1, Hat 1 and coat 2, Hat 1 and coat 3, Hat 1 and coat 4 Hat 2 and coat 1, Hat 2 and coat 2 Hat 2 and coat 3, Hat 2 and coat 4 Hat 3 and coat 1, Hat 3 and coat 2 Hat 3 and coat 3, Hat 3 and coat 4.

Mental Calculation:

- Tables knowledge builds on using doubling skills of 2x to find 4x and then doubling 4x to find 8x emphasising efficiency and using known facts.
- Recall and use facts for the 2, 5, 10 (Y2) 3, 4, and 8 times tables
- Multiply whole numbers by 10 and 100
- Recognise that multiplication is commutative
- Use place value and number facts in mental multiplication. (E.g. 30 x 5 is 15 x 10)
- Partition teen numbers to multiply by a single-digit number. (E.g. 3 x 14 as 3 x 10 and 3 x 4)
- Double numbers up to 50

Multiplication

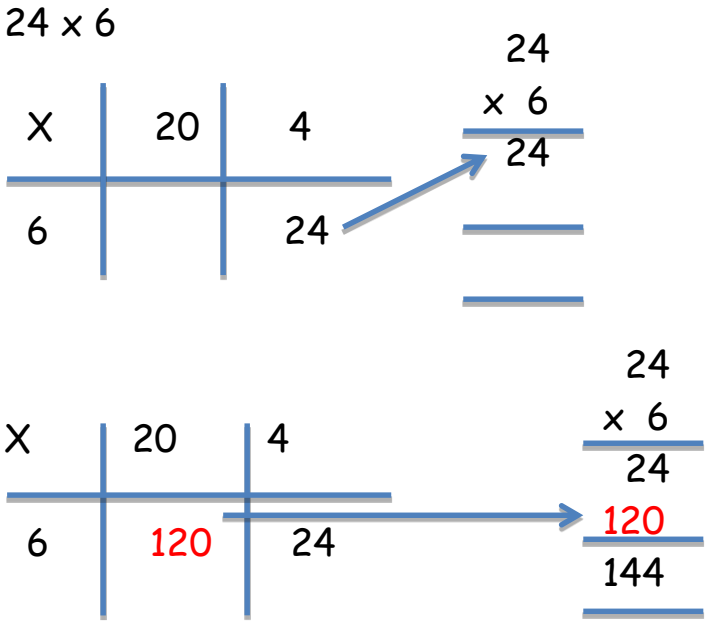
Year 4

<table>
<tr><td>143 x 6

<table>
<tr><td>X</td><td>100</td><td>40</td><td>3</td><td></td></tr>
<tr><td>6</td><td>600</td><td>240</td><td>18</td><td>= 858</td></tr>
</table>

When adding the cells within the grid, model adding the numbers in rows, starting with the largest to support mental strategies</td><td>Building on the strategies from Year 4, children move towards multiples of ten based on the known table facts up to 12 x 12 such as 30x and 40x.

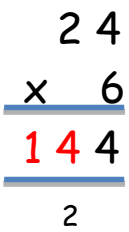
Children first use the grid, progressing from 2-digit x 1-digit to 3-digit x 1-digit</td></tr>
<tr><td>24 x 6



Note the number choices ensure column addition is support without any regrouping</td><td>Children should move quickly onto the expanded formal written method but very much see this as a different way of recording the grid method

They start with the ones so by multiplying 4 by 6 (24). They record this on the grid and the column method.
They then multiply 20 by 6 (120) using their knowledge that this is 10 times bigger than 2 x 6. They record this on the grid and on the column method.

Finally, they add up 24 and 120 (either mentally or using column addition)</td></tr>
<tr><td>24 x 6


</td><td>If they are secure in the formal written method of addition they can move to the compact formal method for multiplication.
4 x 6 is 24. Record 4 in units and 2 tens under tens. 2 tens times 6 is 12 tens, plus the 2 underneath is 14 tens. Record the 4 in the tens and the 10 tens in the hundreds column.</td></tr>
<tr><td>Correspondance problems
Numbers of choices of a meal on a menu, or</td><td>Children solve problems involving multiplying and adding, including integer scaling problems and harder</td></tr>
</table>

three cakes shared equally between 10 children.	correspondence problems such as n objects are connected to m objects.

Mental Calculation:

- Know by heart all the multiplication facts up to 12 x 12.
- Recognise factors up to 12 of two-digit numbers.
- Multiply whole numbers and one-place decimals by 10, 100, 1000
- Multiply multiples of 10, 100, 1000 by single digit numbers. (E.g. 300 x 6 or 4000 x 8)
- Use understanding of place value and number facts in mental multiplication. (E.g. 36 x 5 is half of 36 x 10 and 50 x 60 = 3000)
- Partition 2-digit numbers to multiply by a single-digit number mentally. (E.g. 4 x 24 as 4 x 20 and 4 x 4)
- Multiply near multiples using rounding. (E.g. 33 x 19 as 33 x 20 – 33)
- Find doubles to double 100 and beyond using partitioning
- Begin to double amounts of money. (E.g. £35.60 doubled = £71.20.)
- Use place value and known facts to multiply 3 numbers e.g. 2 x 6 x 5 = 10 x 6 = 60.
- Recognise and use factor pairs and commutativity in mental calculations

Multiplication

Year 5

2741 x 6 = 16446

	Th	H	T	U
	2	7	4	1
x				6
1	6	4	4	6
	4	2		

It is vital that children are able to explain each step and what is happening (why you record each digit in each place)

Children extend their written methods to numbers up to four-digits by a one-digit number using short multiplication.

1 unit times 6 is 6. 4 tens times 6 is 24 tens. Regroup this so you record the 4 in the tens column and the 20 tens are 2 hundreds so record under hundreds column. 7 hundreds times 6 plus the 2 hundreds underneath is 44 hundreds. Regroup this so the 4 is in the hundreds column and the 40 hundreds are 4 thousands so record underneath the thousands. 2 thousands times 6 plus the 4 underneath is 16 thousands. Regroup to record the 6 thousands in the thousands column and the 10 thousands in the Tens of thousands column.

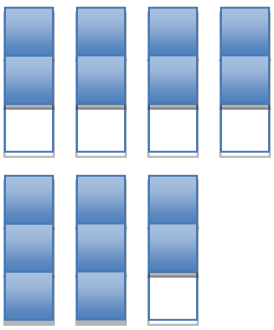
72 x 34

X	70	2	
30	2100	60	= 2160
4	280	8	= 268
			= 2448

7 2
x 3 4
8 (4 x 2)
2 8 0 (4 x 70)
6 0 (30 x 2)
2 1 0 0 (30 x 70)
2 4 4 8

They extend their skills to multiplying by a two-digit number using long multiplication. They should be encouraged to think back to the grid method and see the link between this, partitioning and the formal written method. They start with the expanded method.

Model the noting of steps to help children with self-checking and ensuring knowledge of place value.

72 x 34 = Th H T U 7 2 x 3 4 2 8 8 (72 x 4) 2 1 6 0 (72 x 30) 2 4 4 8 1 Extend as appropriate to three-digit x a two-digit and four-digit x a two-digit	Moving to the compact method when ready. Start by multiplying 72 by 4. 2 times 4 is 8. 7 tens times 4 is 28 tens. We can't record 28 tens in the tens column so regroup in to 8 tens (in tens column) and 2 hundreds in the hundreds column. Next, multiply 72 by 30. I could do this mentally using place value knowledge of 72 x 3 and x by 10 or 2 times 3 tens is 6 tens. Record the 6 tens in the tens column and record a 0 in the units column to hold the place value as there are no units. 7 tens times 3 tens is 210 tens. This can't be recorded in the tens column so regroup into 0 tens, 1 hundred and 2 thousands and record in the appropriate columns.
36.2 x 7 = 3 6 • 2 x 7 1 • 4 (0.2 x 7) 4 2 • 0 (6 x 7) 2 1 0 • 0 (30 x 7) 2 5 3 • 4	They also progress to TU.t x U using the grid or expanded formal method to begin with to ensure place value knowledge is secure and progressing to compact. Note the layout in columns to support calculating and using 0 as a place value holder.
4 × $^{2}/_{3}$ =  = $^{8}/_{3}$ = $2^{2}/_{3}$	Children begin to multiply fractions and mixed numbers by whole numbers ≤ 10. The use of apparatus and images to support this is vital. They see the image of $^{2}/_{3}$ and they draw this 4 times. They still are counting in thirds but there are 4 groups of them. Therefore $^{8}/_{3}$. They use their knowledge of how many thirds make a whole to convert this to $2^{2}/_{3}$
36 x $^{1}/_{4}$ = 36 ÷ 4 = 9	Children connect multiplication by a fraction to using fractions as operators (fractions of). In this example this means $\frac{1}{4}$ of 36.
Examples: multiplying and dividing by powers of 10 in	Children solve problems involving multiplication and division, including scaling by simple fractions and

scale drawings	problems involving simple rates, using inverses to support the introduction of ratio

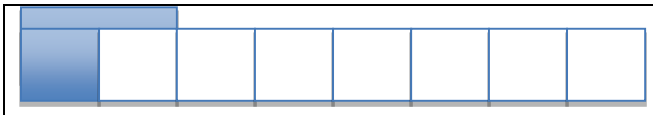
Mental Calculation:

- Know by heart all the multiplication facts up to 12 x 12.
- Multiply whole numbers and one-and two-place decimals by 10, 100, 1000, 10,000
- Use knowledge of factors and multiples in multiplication. (E.g. 43 x 6 is double 43 x 3, and 28 x 50 is $\frac{1}{2}$ of 28 x 100 = 1400)
- Use knowledge of place value and rounding in mental multiplication. (E.g. 67 x 199 as 67 x 200 – 67)
- Use doubling and halving as a strategy in mental multiplication. (E.g. 58 x 5 = half of 58 x 10, and 34 x 4 is 34 doubled twice)
- Partition 2-digit numbers, including decimals, to multiply by a single-digit number mentally. (E.g. 6 x 27 as 6 x 20 (120) plus 6 x 7 (42) making 162 or 6.3 x 7 as 6 x 7 plus 0.3 x 7)
- Double amounts of money by partitioning. (E.g. £37.45 doubled = £37 doubled (£74) plus 45p doubled (90p) £74.90)
- Identify multiples and factors: all factor pairs of a number and common factors of two numbers
- Establish whether a number up to 100 is prime and recall prime numbers up to 19.
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- Recognise and use squared numbers and cubed numbers
- use and explain the equals sign to indicate equivalence, including in missing number problems (e.g. 13 + 24 = 12 + 25; 33 = 5 x □).
-

Multiplication

Year 6

2314 x 23 = 2 3 1 4 X 2 3 6 9 4 2 4 6 2 8 0 5 3 2 2 2	Children multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. Reinforce efficiency, where this tens number could apply x 10 and doubling knowledge. See year 5 for commentary.
£36.21 x 17 = 3 6 • 2 1 x 1 7 2 5 3 • 4 7 3 6 2 • 1 0 6 1 5 • 5 7	Progress to multiplication of decimals, in the context of money is recommended to ensure a concrete understanding of the concept and value of digits. 1 hundredth x 7 = 7 hundredths. 2 tenths x 7 is 14 tenths: regroup to 1 unit (underneath units) and 4 tenths. 6 units x 7 plus the 1 underneath is 43 units: regroup to 4 tens (underneath tens) and 3 units. 3 tens x 7 plus the 4 underneath is 25 tens: regroup into 2 hundreds and 5 tens. 36.21 x 10 can be done mentally and recorded as 362.10. Note the use of the place value holder in the hundredths to help calculation.
$^1/_4 \times {}^1/_2 = {}^1/_8$ $^1/_4$ of a whole:  $^1/_2$ of a quarter: 	Children continue their work in Year 5 of multiplying fractions and mixed numbers by whole numbers. They extend this to multiply simple pairs of proper fractions. Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of). e.g. In this example they draw a quarter and then realize they have to find $^1/_2$ of that quarter. They can see from the diagram that if they $^1/_2$ a $^1/_4$

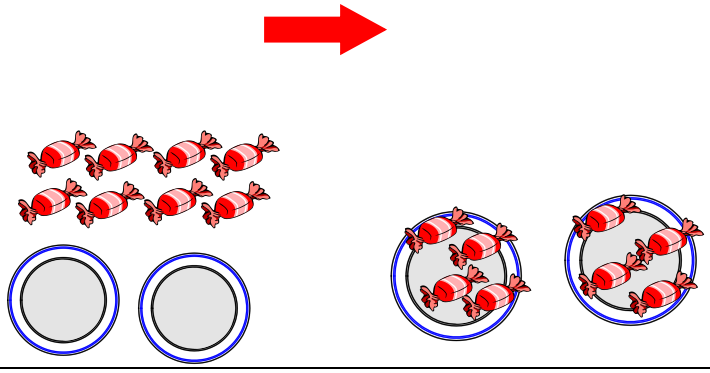
 Without practical apparatus they see that $\frac{1}{4} \times \frac{1}{2}$ Multipliy the top numbers $\frac{1 \times 1}{4 \times 2} = \frac{1}{8}$ Then multiply the bottom numbers Finally, if appropriate, simplify the fraction.	this would fit into the whole 8 times and therefore $^1/_2$ of a $^1/_4$ must be $^1/_8$.
Ratio and proportion For every egg you need three spoonfuls of flour, 1 egg : 3 spoonfuls of flour 1 : 3 $\frac{3}{5}$ of the class are boys. What fraction are girls?	Children consolidate their understanding of ratio and solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. They might use the notation *a:b* to record their work.

Mental Calculation:

- Know by heart all the multiplication facts up to 12 x 12.
- Multiply whole numbers and decimals with up to three places by 10, 100 or 1000, e.g. 234 x 1000 = 234,000 and 0.23 x 1000 = 230)
- Identify common factors, common multiples and prime numbers and use factors in mental multiplication. (E.g. 326 x 6 is 652 x 3 which is 1956)
- Use place value and number facts in mental multiplication. (E.g. 40,000 x 6 = 24,000 and 0.03 x 6 = 0.18)
- Use doubling and halving as mental multiplication strategies, including to multiply by 2, 4, 8, 5, 20, 50 and 25 (E.g. 28 x 25 is $\frac{1}{4}$ of 28 x 100 = 700)
- Use rounding in mental multiplication. (34 x 19 as (20 x 34) – 34)
- Multiply one and two-place decimals by numbers up to and including 10 using place value and partitioning. (E.g. 3.6 x 4 is 12 + 2.4 or 2.53 x 3 is 6 + 1.5 + 0.09)
- Double decimal numbers with up to 2 places using partitioning
- *e.g. 36·73 doubled is double 36 (72) plus double 0·73 (1·46)*

Division

Foundation Stage/Reception

Can you share these teddies out between four friends? How many will each friend have? Is it fair?  Can we share these eight sweets between two friends? 	Although division is not formally introduced in the foundation stage the ground work is done here. They share objects into equal groups and count how many in each group, e.g. share eight teddies equally among four children and know that each child has two teddies.

Mental Calculation:

- Children should experience halving in context and then apply this to halving numbers in practical activities, e.g. Halving apples, sandwiches etc

Division

Year One

12 ÷ 4 = □ 12 girls play a game in groups of 4. How many are in each group?  Model forming arrays to be organised and systematic to aid counting when this develops into counting in multiples.	Children solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Children physically group items and count in groups.

6 ÷ 2 = □ 6 ÷ □ = 3 □ ÷ 2 = 3 □ ÷ ∇ = 3 □ = 6 ÷ 2 3 = 6 ÷ □ 3 = □ ÷ 2 3 = □ ÷ ∇	Children begin to explore related division facts and linking these directly to inverse, commutative facts:
6÷2=□ 6 candy canes are shared between 2 children. How many candy canes does each child get?  There are 6 candy canes. How many children can have two each? 	Pupils reinforce prior learning where division is understood by grouping and sharing Sharing between 2 Grouping in 2s.
Teacher to model the recording of finding halve and quarter of an array, for example 8 divided by 2 is 4.  Quarters: 4 equal parts with 3 in each group 	Children experience half and quarter as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. For example, they could recognise and find half a length, quantity, set of objects or shape. They connect halves and quarters to the equal sharing and grouping of sets of objects and to measures, as well as recognising and combining halves and quarters as parts of a whole.

Mental Calculation:

- Begin to count in 2s, 5s and 10s
- Find half of even numbers to 12 and know it is hard to halve odd numbers
- Find half of even numbers by sharing

- Begin to use visual and concrete arrays or 'sets of' to find how many sets of a small number make a larger number.

Division

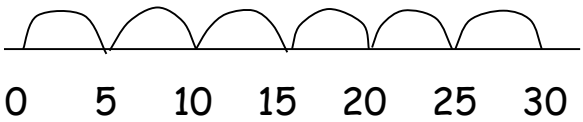
Year 2

Calculations build on expected known multiplication facts where division is by a divisor of 2, 5 and 10 initially, progressing to Y3 multiplication facts of 3, 4 and 8 also. Build upon multiplication facts that are expected to be fluent

Repeated addition

30 ÷ 5 = 6

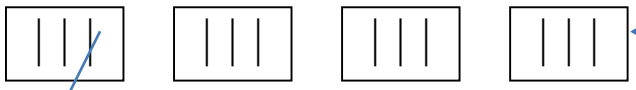
A chew bar costs 5p. How many can I buy with 30p?



They begin to use repeated addition to solve division problems e.g. To work out how many 5s there are in 30, draw jumps of 5 along a number line. You can then count the number of jumps that you have made. This shows you need 6 jumps of 5 to reach 30.

12 ÷ 4 =□

12 apples are shared equally between 4 baskets. How many apples are in each basket?

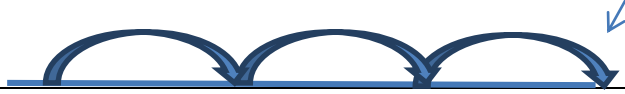


They continue to see the link with multiplication through exploring division as sharing and grouping.

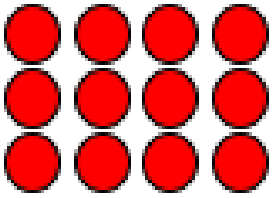
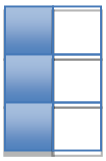
Sharing between 4

4 apples are packed in a basket. How many baskets can you fill with 12 apples?

How many 4s make 12?



Grouping in 4s.

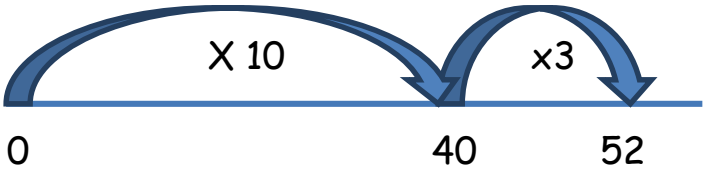
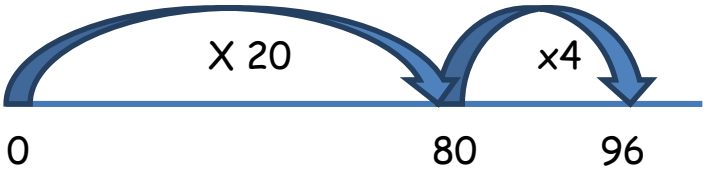
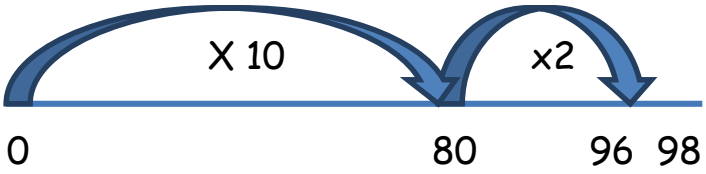
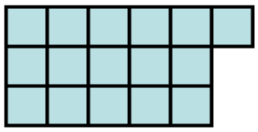
0 4 8 12 	Arrays help to make this link between grouping and sharing
□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4	They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).
1/2 of 6 = 3  2/4 = 1/2 	Children use fractions as 'fractions of'. They recognise, find, name and write fractions: 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity. They write simple fractions for example, 1/2 of 6 = 3 and recognise the equivalence of 2/4 and 1/2 . They understand that you need to divide the shape into 3 equal parts for 3rds or 4 equal parts for quarters.

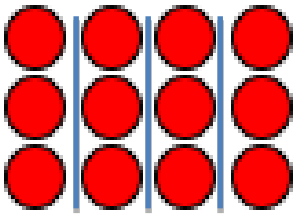
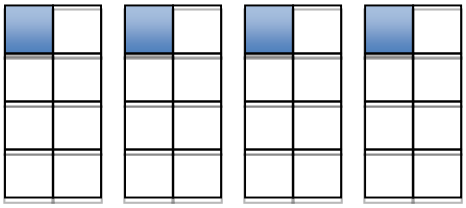
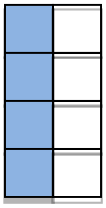
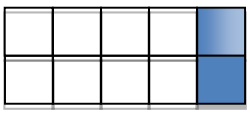
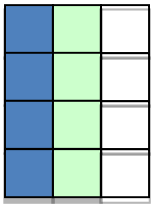
Mental Calculation:

- Count in 2s, 5s and 10s
- Begin to count in 3s
- Using fingers, say where a given number is in the 2s, 5s or 10s count. (E.g. 8 is the fourth number when I count in twos.)
- Relate division to grouping. (E.g. how many groups of five in fifteen?)
- Halve numbers to 20
- Begin to halve numbers to 40 and multiples of 10 to 100
- Find $\frac{1}{2}$, $^1/_3$, $\frac{1}{4}$ and $\frac{3}{4}$ of a quantity of objects and of amounts (whole number answers)
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

Division

Year 3

52 ÷ 4 = I need 6 drawing pins to put up a picture. How many pictures can I put up with 84 pins?  A jump of 10 groups of 4 takes you to 40. Then you need another 3 groups of 4 to reach 52. Altogether, that is 13 jumps of 4. Moving to 96 ÷ 4 =  	Children use chunking on a number line to divide two-digit numbers by multiplication facts (one-digit) that are expected to be fluent at this stage (2, 5 and 10 from Y2 and 3, 4 and 8 from Y3) progressing to any single digit divisor. Moving on from repeated addition, children are helped to understand that it would take a long time to jump in 4s to 52 so children can jump in bigger 'chunks', making the link to grid method for multiplication and partitioning.
A farmer sells cakes in boxes of 8. How many boxes can he make from 98 cakes?  **= 12 boxes** 28 ÷ 5 = 5 r 3 	They understand and work with remainders and start to apply these in context. They recognise if they do not have enough cakes to x by 3 so there are 2 cakes left over: 12r2 and therefore he can make 12 boxes. Arrays help to make the remainder clear
Missing number problems: 26 ÷ 2 = □ 24 ÷ △ = 12 □ ÷ 10 = 8 **Scaling problems:** A cake recipe for 8 people uses 500g of flour. How much flour would I need to make a cake for 4 people? (they use the relationship between 8 and 4 recognising that this is a half and therefore half of 500g is 250g) **Correspondence problems:**	Children solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

12 sweets shared equally between 4 children;  4 chocolate bars shared equally between 8 children  Each child gets 1/8 of each of the 4 chocolate bars and therefore gets half each as 4/8 = 1/2 	
Unit fractions: 1/5 of 10 = 2  **Non-unit fractions: 2/3 of 12 = 8**  **1/3 shown in blue** **2/3 is blue and green together**	Children find unit fractions of quantities and begin to find non-unit fractions of quantities. They start to see the relationship between the denominator being the number of equal parts (and therefore the divisor e.g. 3) and the numerator being how many of those equal parts (the multiplier e.g. 2).

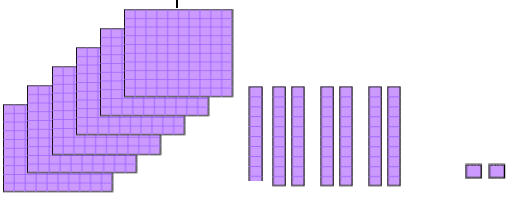
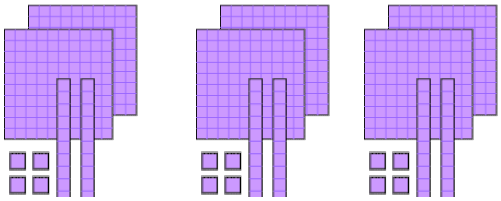
Mental Calculation:

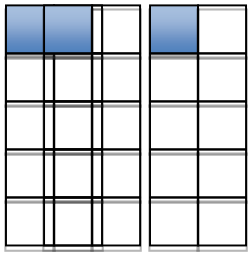
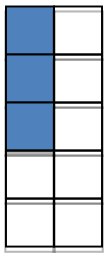
- Know by heart all the division facts derived from the 2x, 3x, 4x, 5x, 8x and 10x tables.
- Divide whole numbers by 10 or 100 to give whole number answers
- Recognise that division is not commutative.
- Use place value and number facts in mental division. (E.g. 84 ÷ 4 is half of 42)

- Divide larger numbers mentally by subtracting the tenth multiple, including those with remainders. (E.g. 57 ÷ 3 is 10 + 9 as 10x3=30 and 9x3=27)
- Halve even numbers to 100, halve odd numbers to 20

Division

Year 4

632 ÷ 3 = 2 2 4 3 | 6 7 $^{1}2$  6 hundred 7 tens 2 ones  Regroup 1 ten into 10 ones 	Children now practice to become fluent in the formal written method of short division for a three-digit number by a one-digit number with exact answers. As with all written calculations, this should be introduced using diennes, to aid their understanding. They use diennes to aid their understanding. They make 672 using diennes or PV counters. "Start with 6 hundreds. How many hundreds in each group if I shared them into 3 groups? 2 hundreds. Record above hundreds. 7 tens divided into 3 would be 2 tens in each group with 1 left over. Record the 2 above the tens then regroup the remaining ten into 10 ones. Add these to the 2 ones to make 12 ones altogether. Record this in the ones column. 12 ones divided into 3 groups is 4 ones in each group. Record this above the ones column. So 672 ÷ 3 = 224

Correspondence problem: 3 cakes shared equally among 10 children.   = 3/10 of cake per child. = 0.3 of a cake	Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions. Chrn work practically and visually so they see they need to split each cake into 10 equal parts. Each child then gets 1/10th of each cake and therefore 3/10ths altogether
See year 3 for visual/concrete examples **1/5 of 405 =** **405 ÷ 5 = 81** 0 8 1 5 | 4 ^{4}0 5 **3/4 of 492=** **492 ÷ 4 = 23** 0 2 3 4 | 4 9 ^{1}2	Children continue their work in Year 3 using fractions to divide larger quantities, including non-unit fractions where the answer is a whole number. They could use the formal method to calculate the answer.
Simplifying fractions **6/9 = 2/3** ÷3 $^{6}/_{9}$ = $^{2}/_{3}$ ÷3	They use factors and multiples to recognise equivalent fractions and simplify where appropriate. They understand that whatever you do to the numerator your do to the denominator and vice versa.

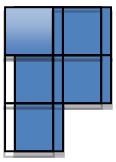
Mental Calculation:

- Know by heart all the division facts up to 144 ÷ 12. (12 times table)
- Divide whole numbers by 1, 10, 100 to give whole number answers or answers with two decimal places
- Divide multiples of 100 by 1-digit numbers using division facts. (E.g. 3200 ÷ 8 = 400)
- Use place value and number facts in mental division. (E.g. 245 ÷ 20 is double 245 ÷ 10)
- Divide larger numbers mentally by subtracting the 10th or 20th multiple as appropriate. (E.g. 156 ÷ 6 is 20 + 6 as 20x6=120 and 6x6=36)
- Find halves of even numbers to 200 and beyond using partitioning

- Begin to halve amounts of money. (E.g. Half of £52.40 = £26.20)

Division

Year 5

4323 ÷ 6 = 0 7 2 0 r 3 6 | 4 $^{4}3$ $^{1}2$ 3 Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding: **4323 ÷ 6 = 4323/6** **= 720 r3 (remainder)** **= 720 ½ (fraction)** **= 720.5 (decimal)** **≈ 721 (rounding)** **4323 people attend a concert. There are 6 chairs in each row. How many rows are needed to seat everyone? 721**	Children extend their understanding of the formal written method of short division to divide numbers up to 4 digits by a one-digit number and they interpret remainders appropriately for the context. How many thousands in each group if I shared them into 6 groups? 0 thousands. Record above thousands. 4 thousands left. Regroup these into 40 hundreds and add to the hundreds column to make 43 hundreds. 43 hundreds divided into 6 is 7 hundreds in each group with one hundred left over. Regroup this into 10 tens and add to the tens column to make 12 tens. 12 tens divided by 6 is 2 tens in each group. You can't share 3 ones into 6 groups so this is the remainder.
$^{6}/_{5}$ = 1 $^{1}/_{5}$ 6 ÷ 5 = 1 r 1 so the remainder is $^{1}/_{5}$ because you are dividing by 5 or they see that $^{5}/_{5}$ makes one whole with $^{1}/_{5}$ left over. 	They continue to find non-unit fractions of large amounts and turn improper fractions into mixed numbers and vice versa.

Mental Calculation:

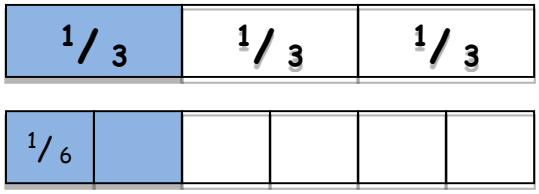
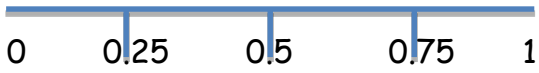
- Know by heart all the division facts up to 144 ÷ 12. (12 x 12)
- Divide whole numbers and decimals by 10, 100, 1000, 10,000 to give whole number answers or answers with 1, 2 or 3 decimal places
- Use doubling and halving as mental division strategies. (E.g. 34 ÷ 5 is (34 ÷ 10) x 2)

- Use knowledge of multiples and factors, also tests for divisibility in mental division. (E.g. 246 ÷ 6 is 123 ÷ 3 and we know that 525 divides by 25 and by 3)
- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers and establish whether a number up to 100 is prime and recall prime numbers up to 19.
- Halve amounts of money by partitioning. (E.g. Half of £75.40 = half of £75 (37.50) plus half of 40p (20p) which is £37.70)
- Divide larger numbers mentally by subtracting the 10th or 100th multiple as appropriate. (E.g. 96 ÷ 6 is 10 + 6, as 10 × 6 = 60 and 6 × 6 = 36; 312 ÷ 3 is 100 + 4 as 100 x 3 = 300 and 4 x 3 = 12)
- Reduce fractions to their simplest form.

Division

Year 6

4963 ÷ 11 = 0 4 5 1 r 2 11 | 4 ^{4}9 ^{5}6 ^{1}3 **4963 ÷ 11 = 451 r 2 or 451^{2}/$_{11}$ or 451.18 or ≈ 451**	Children continue their work in Year 5 using short division to divide a number with up to 4 digits by a 1-digit or a 2-digit number. They continue to give remainders as whole numbers, fractions, decimals or by rounding as appropriate for the context. They choose the most efficient strategy for the numbers involved.
4963 ÷ 11 = 1 3 . 9 3 7 | 9 ^{2}7 . ^{6}5 ^{2}1	They use written division methods where the answer has up to two decimal places and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. Start by putting the decimal point in place to avoid confusion. 9 tens divided by 7 is 1 ten in each group with 2 tens left over. Regroup these to make 20 ones and add to 7 ones (27 ones). 27 ones divided by 7 is 3 ones in each group with 6 left over. Regroup these into 60 tenths and add to the 5 tenths (65 tenths). 65 tenths divided by 7 is 9 tenths in each group with 2 tenths left over. Regroup these into 20 hundredths and add to the one hundredth (21 hundredths). 21 hundredths divided between 7 is 3 hundredths in each group.

$^1/_3 \div 2 = {}^1/_6$  $\frac{1}{3 \times 2} = \frac{1}{6}$	Children divide proper fractions by whole numbers. They understand that you need to divide 1/3 into 2 equal parts. They might use a fraction wall to help. If I split a third into 2 equal parts how many parts will there be in the whole? 6. So $^1/_3 \div 2 = {}^1/_6$ The way to do this without pictures is displayed below.
$^3/_8$ **as a decimal is 0.375.** They calculate 3 ÷ 8 = 0.375 $^3/_4$ **as a decimal is 0.75.**  	Children also associate a fraction with division and calculate decimal fraction equivalents. They understand that this is 3 out of 8 whole parts and therefore the numerator divided by the denominator gives the decimal equivalent. They should initially see this using a number line from 0 to 1 e.g. $\frac{3}{4}$ is number line split into 4 equal parts so each part is $\frac{1}{4}$ or 1 divided by 4 so 0.25. 3 parts is $\frac{3}{4}$ or 3 divided by 4 or 0.25 x 3. So 0.75

Mental Calculation:

- Know by heart all the division facts up to 144 ÷ 12.
- Divide whole numbers by powers of 10 to give whole number answers or answers with up to three decimal places.
- Identify common factors, common multiples and prime numbers and use factors in mental division. (E.g. 438 ÷ 6 is 219 ÷ 3 which is 73)
- Use tests for divisibility to aid mental calculation.
- Use doubling and halving as mental division strategies, e.g. to divide by 2, 4, 8, 5, 20 and 25. (E.g. 628 ÷ 8 is halved three times: 314, 157, 78.5)
- Divide one and two place decimals by numbers up to and including 10 using place value. (E.g. 2.4 ÷ 6 = 0.4 or 0.65 ÷ 5 = 0.13, £6.33 ÷ 3 = £2.11)
- Halve decimal numbers with up to 2 places using partitioning
- *e.g. Half of 36·86 is half of 36 (18) plus half of 0·86 (0·43)*
- Know and use equivalence between simple fractions, decimals and percentages, including in different contexts.
- Recognise a given ratio and reduce a given ratio to its lowest terms.
- Use knowledge of BODMAS to carry out calculations involving all 4 operations