The following examples are taken directly from the Hunter's Bar Junior School draft maths policy for the current curriculum. The examples contain notes to help support the understanding of each method. The methods are design to show progression throughout school with some methods relevant at all stages of the curriculum and others only being introduced in certain year groups.

Year 3

Addition

Stage 3   Add numbers with up to 3 digits

Introduce the expanded column addition method:

2	6	8	+	5	7	4			
2	0	0		6	0		8		
5	0	0	+	7	0		4		
1	0	0		1	0				
8	0	0		4	0	+	2	= 8	4 2

Move to the compact column addition method, with 'carrying':

2 3 6 + 1 7 4

Children who are very secure and confident with 3-digit expanded column addition should be moved onto the compact column addition method, being introduced to "carrying" for the first time. Compare the expanded method to the compact column method to develop an understanding of the process and the reduced number of steps involved.

```
  2 3 6
+ 1 7 4
-------
  1 1
4 1 0
```

Add units first.

Exchanged digits to be placed in the gap underneath the calculation.

This should be discussed as 3 tens plus 7 tens, NOT 3 + 7.

Year 4

Addition

Stage 4   Add numbers with up to 4 digits

Move from expanded addition to the compact column method, adding units first, and „carrying" numbers underneath the calculation. Also include money and measures contexts.

e.g. 3517 + 396 = 3913

3 5 1 7 + 3 9 6

```
  3 5 1 7
+   3 9 6
---------
    1 1
  3 9 1 3
```

Introduce the compact column addition method by asking children to add the two given numbers together using the method that they are familiar with (expanded column addition-see Stage 3). Teacher models the compact method with carrying, asking children to discuss similarities and differences and establish how it is carried out.

Add units first.

Exchanged digits to be placed in the gap underneath the calculation.

Reinforce correct place value by reminding them the actual value is 5 hundreds add 3 hundreds, not 5 add 3, for example

Use and apply this method to money and measurement values.

Expanded Column Addition is introduced in Year 3.

Compact Column Addition is introduced in Year 4 and continued throughout school with decimals being introduced in Year 5.

Year 5

Stage 5   Add numbers with more than 4 digits

Including money, measures and decimals with different numbers of decimal places.

```
    2   3 . 5   9
+           7 . 5   5
    1   1 . 1
    3   1 . 1   4
```

The decimal point should be aligned in the same way as other place value columns, and must be in the same column in the answer.

```
    2   3   4   8   1
+       1   3   6   2
            1
    2   4   8   4   3
```

Numbers should exceed 4 digits.

```
    1   9 . 0   1
+       3 . 6   5
        0 . 7   0
    1   1 .
    2   3 . 3   6
```

Pupils should be able to add more than two values, carefully aligning place value columns

> Empty decimal places can be filled with zero to show the place value in each column

> Say '6 tenths add 7 tenths' to reinforce place value

Children should:
- Understand the place value of **tenths and hundredths** and use this to align numbers with different numbers of decimal places.

Year 6

Stage 6   Add several numbers of increasing complexity

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

Adding several numbers with different numbers of decimal places (including money and measures):

- Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row.

- Zeros could be added into any empty decimal places, to show there is no value to add.

> Empty decimal places can be filled with zeros to show the place value in each column

```
        8   1   0   5   9
+           3   6   6   8
+       1   5   3   0   1
+       2   0   5   5   1
        1   1   1   1
    1   2   0   5   7   9
```

Adding several numbers with more than 4 digits

Compact Column Addition is continued in Y5

Compact Column Addition is continued in Y6

Subtraction

Stage 4 — Subtracting with up to 4-digit numbers

Partitioned column subtraction with 'exchanging' (Decomposition)

$$2\ 7\ 5\ 4 - 1\ 5\ 6\ 2 = 1\ 1\ 9\ 2$$

```
             600
   2000 +  700 + '50 + 4
-  1000 +  500 + 60 + 2
   1000 + 100 + 90 + 2
```

> As introduced in Y3, but moving towards more complex numbers and values. Use place value counters to reinforce 'exchanging'.

> Subtracting money: partition into £1 + 30 + 5 for example.

Compact column subtraction

```
   2 ⁶7̶ '5 4
 -   1 5 6 2
     1 1 9 2
```

> To introduce the compact method, ask children to perform a subtraction calculation with the familiar partitioned column subtraction then display the compact version for the calculation they have done. Ask pupils to consider how it relates to the method they know, what is similar and what is different, to develop an understanding of it

> Give plenty of opportunities to apply this to money and measures.

> Always encourage children to consider the best method for the numbers involved—mental, counting on, counting back or written method

Mental strategies

A variety of mental strategies must be taught and practised, including counting on to find the difference where numbers are closer together, or where it is easier to

> Approximate,
> Calculate,
> Check it mate!

Multiplication

Stage 4 — Multiply 2 and 3 digits by a single digit,

using multiplication tables up to 12 × 12

Developing the grid method:

Eg. 136 × 5 = 680

X	100	30	6
5	500	150	30

```
    500
    150
  +  30
    680
```

> Encourage column addition to add accurately.

> Move onto short multiplication (see Y5) if and when children are confident and accurate multiplying 2 and 3-digit numbers by a single digit this way, and are already confident in "carrying" for written addition.

Children should be able to:

- Approximate before they calculate, and make this a regular part of their calculating, going back to the approximation to check the reasonableness of their answer. e.g:

  "346 × 9 is approximately 350 × 10 = 3500"
  Record an approximation to check the final answer against.

- Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.

- Recall all times tables up to 12 × 12

> Approximate,
> Calculate,
> Check it mate!

Expanded Column Subtraction is introduced in Year 3. This progresses into compact column subtraction in Year 4 and continues into Year 5 and Year 6 with the introduction of decimals.

Grid Multiplication is introduced in Year 3 and continued into Year 4.

Calc: 25 x 36 =

Step 1

$$\begin{array}{r} 25 \\ \times\ 36 \\ \hline \end{array}$$

5 x 6 = 30
5 x 30 = 150
20 x 6 = 120
20 x 30 = 600

$$\begin{array}{r} 1 \\ \hline 900 \end{array}$$

Step 2

$$\begin{array}{r} 25 \\ 36 \\ \hline 30 \\ 150 \\ 120 \\ 600 \\ 1 \\ \hline 900 \end{array}$$

Step 3

$$\begin{array}{r} 25 \\ 36 \\ \hline 180 \\ 720 \\ 1 \\ \hline 900 \end{array}$$

Long Multiplication is introduced in Year 5 and uses elements learnt in Grid Multiplication. The school follows the process above to give the children a really clear link between Step 3 and Step 1.
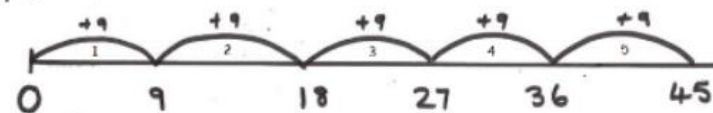
Stage 3   Divide 2-digit numbers by a single digit
(where there is no remainder in the final answer)

7 ÷ 2 = 3 R 1

Introduce number line for numbers with no remainders jumping in single steps to make the link between times tables:
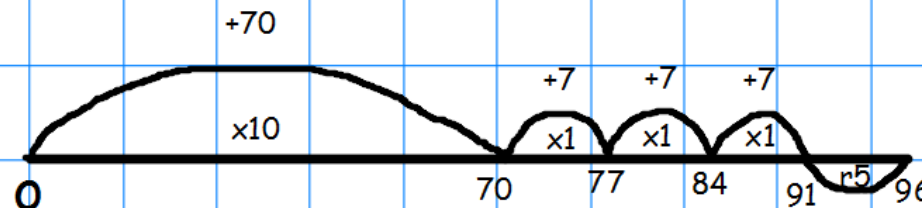
$45 \div 9 = 5$

How many lots of 9 make 45?

Introduce larger jumps, 'chunking' of numbers, to enable larger calculations to be solved easily.

$91 \div 7 = 13$

$96 \div 7 = 13\ r\ 5$

Number line division is introduced in Year 3 and continued into Year 4.

Real life contexts need to be used routinely to help pupils gain a full understanding, and the ability to recognise the place of division and how to apply it to problems.

Division

Stage 5 Divide up to 4 digits numbers by a single digit
(including those with remainders)

Short division, including remainder answers:

C: 5309 ÷ 8

A: 663 r5

```
      0 6 6 3 r 5
  8) 5 ⁵3 ⁵0 ²9
```

Short division with remainders: Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real life problem solving context, where pupils consider the meaning of the remainder and **how** to express it, ie. as a fraction, a decimal, or as a rounded number or value, depending upon the context of the problem.

The answer to 5309 ÷ 8 could be expressed as 663 and five eighths, 663 r 5, as a decimal, or rounded as appropriate to the problem involved.

See Stage 6 for how to continue the short division to give a decimal answer for children who are confident.

Include money and measure contexts.

Approximate,
Calculate,
Check it mate!

Introduce long division by chunking for dividing by 2 digits.

```
          27
  36 ) 972
     - 720      20x
       252
     - 252      7x
         0
                 ↓
  Answer :      27
```
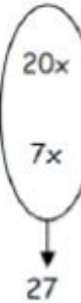
- Find out 'How many 36s are in 972?' by subtracting 'chunks' of 36, until zero is reached (or until there is a remainder).
- Teach pupils to write a 'useful list' first at the side that will help them decide what chunks to use, e.g.:

Useful list: 1x = 36
10x = 360
100x = 3600

- Introduce the method in a simple way by limiting the choice of chunks to 'Can we use 10 lots? Can we use 100 lots?' As children become confident with the process, encourage more efficient chunks to get to the answer more quickly (e.g. 20x, 5x), and expand on their 'useful' lists.

Where remainders occur, pupils should express them as fractions, decimals or use rounding, depending upon the problem.

Approximate,
Calculate,
Check it mate!

Short Division is introduced in Year 5 as a more efficient written method for division.

Long division is introduced in Year 6 for larger division calculations.