Addition ✚

Year 5 Add numbers with more than 4 digits

Including money and measures with different numbers of decimal places.

	U	.	$\frac{1}{10}$	$\frac{1}{100}$
£	5	.	1	7
+	3	.	9	6
£	9	.	1	3
			1	1

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

> Children should be taught to read, write and order numbers to at least **1,000,000** determining the value of each digit.

Numbers should exceed 4 digits.

Pupils should be able to add more than two values carefully aligning the place value columns. They should understand the place value of **tenths and hundredths** and use this to align numbers with different numbers of decimal places

T	U	.	10	100
1	9	.	0	1
	3	.	6	5
+	0	.	7	0
2	3	.	3	6
1	1			

> 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.

Key vocabulary: add, plus, more, and, make, altogether, total, equals, equal to, double, count on, number line, sum, tens, units, partition, recombine, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse & decimal places, decimal point, tenths, hundredths, thousandths

Key Skills for addition at Year 5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies i.e. add the nearest multiple of 10, 100 and 1000 and adjust; use near doubles, inverse, partitioning and re-combining; using number bonds.
- Use rounding to check answers and accuracy
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.
- Read, write order and compare numbers to at least 1 million and determine the value of each digit.
- Round any numbers up to 1,000,000 to the nearest 10, 100 , 1000, 10,000, and 100,000
- Add numbers with more than 4 digits using formal written methods of columnar addition

Subtraction

Year 5 Subtract with at least 4-digit numbers
including money, measures, decimals

Compact column subtraction
(with 'exchanging').

$$\begin{array}{r} {}^2\cancel{3}{}^{10}\cancel{1}{}^{}0\,{}^{1}\cancel{5}\,{}^{1}6 \\ -\quad 2\,1\,2\,8 \\ \hline 2\,8{,}9\,2\,8 \end{array}$$

Subtracting with larger integers.

> Children who are still not secure with number facts and place value will need to remain on the partitioned column method until ready for the compact method.

$$\begin{array}{r} {}^6\cancel{7}{}^{10}\cancel{1}{}^{}6\,{}^8\cancel{9}\,.\,{}^1 0 \\ -\quad 3\,7\,2\,.\,5 \\ \hline 6\,7\,9\,6\,.\,5 \end{array}$$

Subtract with decimal values, including mixtures of integers and decimals, aligning the decimal point.

> Add a 'zero' in any empty decimal places to aid understanding of what to subtract in that column.

> Create lots of opportunities for subtracting and finding differences with money and measures.

> Approximate
>
> Calculate
>
> Check it mate!

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, difference between how many more, how many fewer / less than, most, least, count back, how many left, how much less is _? , difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

Key Skills for subtraction at Year 5:

- Subtract numbers mentally with increasingly large numbers.
- Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy.
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
- Interpret negative numbers in context, counting forwards and backwards with positive and negative integers through 0.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.

Multiplication ✖

Year 5 Multiply up to 4-digits by 1 or 2 digits.

Introducing column multiplication
- Introduce by comparing a grid method calculation to a short multiplication method, to see how the steps are related, but notice how there are less steps involved in the column method (see video).
- Children need to be taught to approximate first, e.g. for **72 x 38, they will use rounding: 72 x 38** is approximately 70 x 40 = **2800**, and use the approximation to check the reasonableness of their answer against.

Short multiplication for multiplying by a single digit:

x	300	20	7
4	1200	80	28

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```
  H T U
  3 2 7
  × 4
─────────
    2 8   (4 x 7)
    8 0   (4 x 20)
1 2 0 0   (4 x 300)
─────────
1 3 0 8
    ₁
```

➡

```
  H T U
  3 2 7
    × 4
─────────
1 3 0 8
  ₁ ₂
```

Step 1: Recap the grid method used in Year 4
Step 2: Pupils could be asked to work out a given calculation using the grid, and then compare it to 'your' column method. What are the similarities and differences?

Step 3: Once children are happy with carrying underneath they can unpick the steps and show how short multiplication methods reduce the steps. Children confident in place value and 'carrying'

Introduce **long multiplication for multiplying by 2 digits:**

13 x 14 =

X	10	3
10	100	30
4	40	12

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```
    1 3
  × 1 4
─────────
    5 2
  1 3 0
─────────
  1 8 2
```
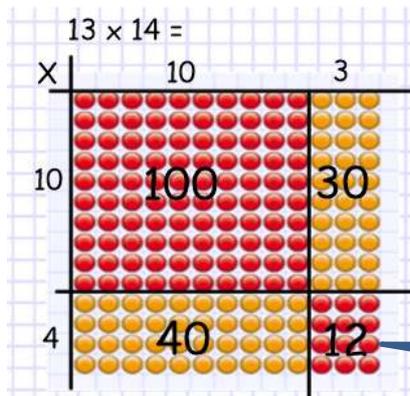
13 x 4 on the 1st row
(4 x 3 = 12, carrying the 1, for ten, then 1 x 4)
13 x 10 on the 2nd row. Put a zero in the units first, then say 3 x 1, then 1 x 1

The grid could be used to introduce long-multiplication, as the relationship can be seen in the answers in each row.

Moving towards more complex numbers:
E.g. extending to 4-digit x single digit calculations using a short division method.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... partition, grid method, total, multiple, product, sets of, inverse, square, factor, integer, decimal, short/long multiplication, 'carry'

Key Skills for multiplication at Year 5:
- Identify multiples and factors, using knowledge of multiplication tables to 12x12.
- Solve problems where larger numbers are decomposed into their factors
- Multiply and divide integers and decimals by 10, 100 and 1000
- Recognise and use square and cube numbers and their notation
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately

Division ÷

Year 5 **Divide up to 4 digits by a single digit,** including those with remainders.

Short division, including remainder answers:

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,** i.e. 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 Y6 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!

If children are confident and accurate:
- Introduce **long division** for pupils who are ready to divide any number by a 2-digit number (e.g. 2678 ÷ 19). This is a Year 6 expectation.

Key vocabulary: share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple,
divisible by, factor, quotient, prime number, prime factors, composite number (non-prime)

Key skills needed for division at Year 5:
- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Use multiplication and division as inverses.
- 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 (e.g. 98 ÷ 4 = 24 r 2 = 24.$\frac{1}{2}$ = 24.5 ≈ 25).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.