Subtraction: **Column Method**

> **Prior Knowledge:**
>
> - Be able to correctly place numbers (integers and decimals) into a place value chart.
> - Be able to add numbers confidently.
> - Be able to change money between pence and pounds.

There are lots of subtractions that we can work out in our heads, where we can use strategies such as partitioning to split the numbers into parts to help us work them out.

When subtractions (with positive numbers) become too tricky to work out mentally, it is useful to use a standard written method for subtraction. This method is called the column method and involves writing numbers one above the other. It works when subtracting a smaller number from a bigger number. It is important that units (ones) are lined up vertically, tens are lined up vertically and so on. Using this method will allow us to subtract decimals, as well as integers.

Example 1

Calculate 857 – 253.

We begin by writing the numbers one above the other, ensuring that the columns are lined up so that units are above units, tens are above tens and so on. The number we are subtracting from must always be on top.

```
  H  T  U
  8  5  7
– 2  5  3
  _____
```

Beginning on the far right-hand side (in this case, the units column): 7 – 3 = 4

The 4 is written underneath the units column.

```
  8  5  7
– 2  5  3
  _____
        4
```

We then calculate the next column (in this case, the tens): 5 – 5 = 0

```
  8  5  7
– 2  5  3
  _____
     0  4
```

Finally, we calculate the last column (in this case, the hundreds): 8 – 2 = 6

```
  8  5  7
– 2  5  3
  _____
  6  0  4
```

857 – 253 = **604**

Example 2

Find the difference between 987 and 4534.

To find the difference between two numbers, we subtract. To use column subtraction we need to subtract the smaller number from the larger, 4534 – 987. The first number goes on top:

```
  Th  H   T   U
   4  5   3   4
-      9   8   7
  _____
```

We begin with the units column. In this case, 4 is smaller than 7. If we subtract 7 from 4, the answer is -3, but we can only use positive numbers with the column method. Similarly, we can't just subtract 4 from 7 as this is a different calculation. Instead, we 'borrow' from the tens column. The 3 becomes 2, and we put the 1 in front of our 4, which now becomes 14.

```
   4  5   ²3   ¹4
-      9   8    7
  _____
```

14 – 7 = 7

```
   4  5   ²3   ¹4
-      9   8    7
  _____
                7
```

Moving to the tens column, you will notice that 2 is smaller than 8, therefore we must borrow from the hundreds column. The 5 in the hundreds column becomes 4, and our 2 becomes 12.

```
   4  ⁴5  ¹²3   ¹4
-       9   8    7
  _____
                7
```

12 – 8 = 4

```
   4  ⁴5  ¹²3   ¹4
-       9   8    7
  _____
            4    7
```

Similarly, when we move to the hundreds column, we must borrow again.

```
  ³4  ¹⁴5  ¹²3   ¹4
-        9   8    7
  _____
             4    7
```

14 – 9 = 5

```
  ³4  ¹⁴5  ¹²3   ¹4
-        9   8    7
  _____
         5   4    7
```

Finally, 3 – 0 = 3.

```
  ³4  ¹⁴5  ¹²3   ¹4
-        9   8    7
  _____
      3  5   4    7
```

4534 – 987 = **3547**

Example 3

We can also use the column method when subtracting decimals.

Consider the calculation 45.2 – 1.9.

Like before, we begin by writing the numbers one above the other, ensuring that the decimal points are lined up correctly.

$$
\begin{array}{ccccc}
T & U & . & \frac{1}{10} \\
4 & 5 & . & 2 \\
- & 1 & . & 9 \\
\hline
& & . & \\
\hline
\end{array}
$$

We begin on the far right-hand side again; this time we start in the tenths column. Notice that the digit 2 is less than the 9, meaning that we must borrow from the units.

$$
\begin{array}{cccc}
4 & {}^{4}5 & . & {}^{1}2 \\
- & 1 & . & 9 \\
\hline
& & . & \\
\hline
\end{array}
$$

$$
\begin{array}{cccc}
4 & {}^{4}5 & . & {}^{1}2 \\
- & 1 & . & 9 \\
\hline
& & . & 3 \\
\hline
\end{array}
$$

$$
\begin{array}{cccc}
4 & {}^{4}5 & . & {}^{1}2 \\
- & 1 & . & 9 \\
\hline
3 & . & 3 \\
\hline
\end{array}
$$

$$
\begin{array}{cccc}
4 & {}^{4}5 & . & {}^{1}2 \\
- & 1 & . & 9 \\
\hline
4 & 3 & . & 3 \\
\hline
\end{array}
$$

45.2 – 1.9 = **43.3**

Example 4
Calculate 106 – 2.53.

Similarly, we are able to use the column method when subtracting integers and decimals.

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & 6 & . & & \\
- & & 2 & . & 5 & 3 \\
\hline
& & & . & &
\end{array}
$$

Notice how there are gaps in the tenths and hundredths column, above the 5 and 3. It's really important that you fill in these gaps with 0.

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & 6 & . & 0 & 0 \\
- & & 2 & . & 5 & 3 \\
\hline
& & & . & &
\end{array}
$$

You need to borrow for the first calculation (0 – 3); however, the column before it (the tenths) also contains a zero. Therefore, we must borrow from the units column.

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & {}^5\!6 & . & {}^1 0 & 0 \\
- & & 2 & . & 5 & 3 \\
\hline
& & & . & &
\end{array}
$$

The zero in the hundredths column now has a left-hand neighbour that it can borrow from. The 10 becomes 9 and we put the 1 in front of our 0, which becomes 10.

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & {}^5\!6 & . & {}^{9\!1}\!0 & {}^1 0 \\
- & & 2 & . & 5 & 3 \\
\hline
& & & . & &
\end{array}
$$

Now, subtract as before.

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & {}^5\!6 & . & {}^{9\!1}\!0 & {}^1 0 \\
- & & 2 & . & 5 & 3 \\
\hline
& & & . & & 7
\end{array}
$$

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & {}^5\!6 & . & {}^{9\!1}\!0 & {}^1 0 \\
- & & 2 & . & 5 & 3 \\
\hline
& & & . & 4 & 7
\end{array}
$$

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & {}^5\!6 & . & {}^{9\!1}\!0 & {}^1 0 \\
- & & 2 & . & 5 & 3 \\
\hline
& & 3 & . & 4 & 7
\end{array}
$$

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & {}^5\!6 & . & {}^{9\!1}\!0 & {}^1 0 \\
- & & 2 & . & 5 & 3 \\
\hline
& & 3 & . & 4 & 7
\end{array}
$$

$$
\begin{array}{ccccccc}
H & T & U & . & \frac{1}{10} & \frac{1}{100} \\
1 & 0 & {}^5\!6 & . & {}^{9\!1}\!0 & {}^1 0 \\
- & & 2 & . & 5 & 3 \\
\hline
1 & 0 & 3 & . & 4 & 7
\end{array}
$$

106 – 2.53 = **103.47**

Your Turn

1. Calculate the following:

   a. 392 – 171

     – _____

        _____

   b. 568 – 243

     – _____

        _____

   c. 797 – 357

     – _____

        _____

   d. 876 – 164

     – _____

        _____

   e. 1495 – 363

     – _____

        _____

   f. 5764 – 651

     – _____

        _____

   g. 8959 – 2746

     – _____

        _____

   h. 7641 – 5530

     – _____

        _____

2. Calculate the following:

   a. 478 – 391

     – _____

        _____

   b. 525 – 76

     – _____

        _____

c. 324 – 279

– _____
    _____

f. 5632 – 1045

– _____
    _____

d. 982 – 434

– _____
    _____

g. 7416 – 985

– _____
    _____

e. 6746 – 2192

– _____
    _____

h. 1007 – 989

– _____
    _____

3. Calculate the following:
    a. 145.6 – 103.2

    – _____
        _____

    d. 76.8 – 13.9

    – _____
        _____

    b. 246.3 – 92.1

    – _____
        _____

    e. 476.84 – 217.56

    – _____
        _____

    c. 565.23 – 241.14

    – _____
        _____

    f. 946.04 – 516.77

    – _____
        _____

g. 88.7 – 79.9

– _____
_____

h. 1047.2 – 956.8

– _____
_____

4. Calculate the following:

a. 246.2 – 196.07

– _____
_____

e. 26 – 1.459

– _____
_____

b. 105 – 46.7

– _____
_____

f. 1246 – 418.578

– _____
_____

c. 718 – 416.01

– _____
_____

g. 417.4 – 64.04

– _____
_____

d. 1569.4 – 79.003

– _____
_____

h. 946.11 – 756.99

– _____
_____

5. Calculate the following:

a. Subtract 987 from 1506.

_____

b. Find the difference between 1456 and 2985.

_____

c. Subtract 4503 from 5619.

_____

d. Find the difference between 89.6 and 105.9.

_____

e. Find the difference between 465.2 and 14.005.

_____

f. Janice would like to buy a laptop that costs £399. Janice has saved £195.50 so far. How much more money does she need to save?

_____

g. Write down the number that is thirty thousand less than two million.

_____

h. Anya buys a banana for 25p, an apple for 12p, and a watermelon for £1.79. How much change should Anya receive if she pays with a £10 note?

_____

_____

Challenge

Asha paid £3.55 for one notebook and one pen.

Liam paid £4.21 for one notebook and two pens.

Calculate the cost of one notebook.

_____

_____