Lesson - Addition and subtraction with 3-digit numbers

Year: Year 3

Hello, I am Otto! Adding and taking away are the maths you use every day: working out a bill, finding how many pages are left in a book, or comparing scores. In Year 3 you learn to add and subtract numbers with up to three digits, first in your head and then with the column method.

Starter activity

A farm shop sells 245 eggs on Saturday and 130 eggs on Sunday. How many eggs is that in total? Try it without writing anything down: 245 + 100 = 345, then 345 + 30 = 375. Now the farmer has 375 eggs to restock, but 120 are already in the fridge. How many more does he need to find? Think about whether you add or subtract before you calculate.

Adding and subtracting in your head

Definition: mental calculation

A **mental method** is a way of working out an answer by thinking carefully, perhaps jotting down a number line, but without a full written method. Good mental methods use what you know about place value.

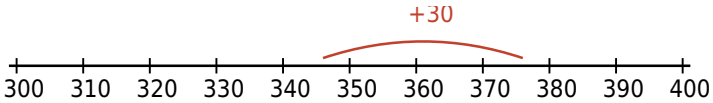
Rule: adding and subtracting ones, tens and hundreds

- Adding or subtracting ones changes only the ones digit, unless you cross a ten (for example 197 + 5 = 202).
- Adding or subtracting tens changes only the tens digit, unless you cross a hundred (for example 380 + 40 = 420).
- Adding or subtracting hundreds changes only the hundreds digit (for example 468 + 200 = 668).

Example 1

Work out 346 + 30 and 346 − 200.

346 + 30: add 3 to the tens digit: 4 tens + 3 tens = 7 tens. The answer is **376**. 346 − 200: take 2 from the hundreds digit: 3 hundreds − 2 hundreds = 1 hundred. The answer is **146**.



Hopping on 30 on a number line in steps of 10: 346, 356, 366, 376.

Method: partitioning the second number

1. Split the number you add into hundreds, tens and ones.
2. Add the hundreds first, then the tens, then the ones.
3. Keep a running total in your head or write each step.

Example 2

Work out 237 + 154 by partitioning.

Split 154 into 100 + 50 + 4. 237 + 100 = 337. 337 + 50 = 387. 387 + 4 = 391. So 237 + 154 = **391**.

Adding with the column method

Definition: column addition

In **column addition** we write the numbers one under the other so that hundreds, tens and ones line up. We add the ones first, then the tens, then the hundreds. If a column adds to 10 or more, we **exchange** (carry): ten ones become one ten, or ten tens become one hundred.

Method: column addition

1. Write the numbers in columns, with ones under ones.
2. Add the ones. If the total is 10 or more, write the ones digit and carry 1 to the tens column.
3. Add the tens, including any carried ten. Carry to the hundreds if needed.
4. Add the hundreds, including any carried hundred.
5. Check with an estimate: round both numbers and see if your answer is close.

	2	6	4
+	1	2	7
=	**3**	**9**	**1**

264 + 127: ones 4 + 7 = 11 (write 1, carry 1). Tens 6 + 2 + 1 = 9. Hundreds 2 + 1 = 3. The answer is 391.

Example 3

Work out 458 + 267.

Ones: 8 + 7 = 15, write 5 and carry 1 ten. Tens: 5 + 6 + 1 = 12, write 2 and carry 1 hundred. Hundreds: 4 + 2 + 1 = 7. The answer is **725**.

Subtracting with the column method

Method: column subtraction

1. Write the bigger number on top and the smaller number underneath, in columns.
2. Start with the ones. If the top digit is smaller, exchange: take 1 ten from the tens column and add 10 to the ones.
3. Subtract the tens. Exchange 1 hundred for 10 tens if you need to.
4. Subtract the hundreds.
5. Check by adding your answer to the smaller number: you should get the bigger number.

Example 4

Work out 532 − 168.

Ones: 2 is less than 8, so exchange 1 ten: 12 − 8 = 4. The tens digit becomes 2. Tens: 2 is less than 6, so exchange 1 hundred: 12 − 6 = 6. The hundreds digit becomes 4. Hundreds: 4 − 1 = 3. The answer is **364**. Check: 364 + 168 = 532.

Watch out

Never subtract the smaller digit from the bigger one just because it is easier. In 532 − 168, the ones are 2 − 8, and you cannot do 8 − 2 instead. Also remember the exchanged ten: the tens digit of the top number goes down by 1 after an exchange.

Estimating and checking

Rule: estimate by rounding

To estimate, round each number to the nearest 10 or 100 and then calculate. If your exact answer is far from the estimate, check your working. For example 398 + 205 is about 400 + 200 = 600, and the exact answer 603 is close.

Key fact: inverse operations

- Addition and subtraction undo each other.
- If 175 + 248 = 423, then 423 − 248 = 175 and 423 − 175 = 248.
- Use the inverse to check any answer, and to find missing numbers.

Example 5

Find the missing number: __ + 184 = 503.

Use the inverse: 503 − 184 = **319**. Check: 319 + 184 = 503.

Word problems

Method: solving word problems

1. Read the problem twice and underline the numbers.
2. Decide which operation is needed: put together (add), take away or find the difference (subtract).
3. Write the calculation and solve it.
4. Write the answer with its unit, for example £ or cm, and check it makes sense.

Example 6

A bus has 128 seats. On a trip, 94 seats are taken. How many seats are empty?

We take away: 128 − 94. Ones: 8 − 4 = 4. Tens: 2 − 9, so exchange: 12 − 9 = 3 (the hundreds become 0). The answer is **34 empty seats**. Check: 34 + 94 = 128.

Example 7

Maya has £250 in her bank. She spends £86 on trainers and £45 on a book. How much is left?

First add the spending: 86 + 45 = 131. Then subtract: 250 − 131 = **£119**. Check: 119 + 131 = 250.

Did you know?

The column method was used by merchants in India and Arabia over 1000 years ago and arrived in Europe through trade. Before it, many people used a counting board called an abacus. Today a computer chip does millions of additions every second, but it uses the same place value idea as you do.

Otto's tip

Always estimate first and check last. Estimate with rounded numbers before you start, and use the inverse operation when you finish. Two quick checks catch nearly every slip.