Lesson - Place value to 1000

Year: Year 3

Hello, I am Otto! Big numbers are everywhere: the number of pages in a book, the number of steps to the top of a tower, the number of fans in a stadium. In this chapter you will learn how our number system works for numbers up to 1000, and why a digit can be worth a lot or a little depending on where it sits.

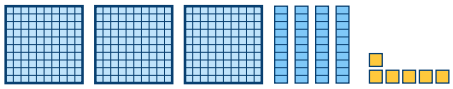
Starter activity

Imagine you are helping at the school tuck shop. Sweets are packed in bags of 100, in tubs of 10 and loose ones. You have 3 bags, 4 tubs and 6 loose sweets. How many sweets is that altogether? Count it out loud: "100, 200, 300, then 310, 320, 330, 340, then 341, 342, 343, 344, 345, 346." You have found that 3 hundreds, 4 tens and 6 ones make the number 346. The whole chapter is a more careful version of this idea.

Hundreds, tens and ones

Definition: place value

Every digit in a number has a **place** and the place decides the **value** of the digit. In a 3-digit number the places are **hundreds (H)**, **tens (T)** and **ones (O)**. Moving one place to the left makes a digit worth ten times as much.



The picture shows 3 hundreds, 4 tens and 6 ones. The number is 346.

Hundreds	Tens	Ones
3	4	6

Key fact: ten of each makes the next

- 10 ones make 1 ten.
- 10 tens make 1 hundred.
- 10 hundreds make 1 thousand, which is written 1000.
- The biggest 3-digit number is 999. Add 1 and you reach 1000.

Example 1

What is the value of the 8 in 582?

Write the number in a place value table: 5 hundreds, 8 tens, 2 ones. The 8 is in the tens column, so its value is 8 × 10 = **80**. The 5 is worth 500 and the 2 is worth 2.

Partitioning numbers

Definition: partitioning

Partitioning means splitting a number into the value of each of its digits. For example 582 = 500 + 80 + 2. We can also partition in a different way, such as 582 = 400 + 180 + 2 or 582 = 5 hundreds + 7 tens + 12 ones. The total stays the same.

Method: partitioning a 3-digit number

1. Write the number in a place value table.
2. Say the value of each digit: hundreds first, then tens, then ones.
3. Write the sum of the three values, for example 407 = 400 + 0 + 7.
4. Check by adding the parts back together.

Example 2

Partition 749 in two different ways.

Standard way: 749 = 700 + 40 + 9. Another way: take one hundred and exchange it for ten tens. That gives 600 hundreds-value and 14 tens: 749 = 600 + 140 + 9. Both add up to 749, so both are correct.

Zero as a place holder

Rule: zero holds a place

In 305 there are 3 hundreds, **0 tens** and 5 ones. We must write the zero. Without it the number would look like 35, which is much smaller. The zero is called a **place holder** because it keeps the other digits in the right columns.

Example 3

Write the number: 6 hundreds and 9 ones.

There are no tens, so the tens digit is 0. The number is **609**. In words it is six hundred and nine.

Reading and writing numbers in words

We say "and" after the hundreds. 428 is four hundred **and** twenty-eight. Numbers from 21 to 99 that are not multiples of ten need a hyphen: twenty-eight, sixty-three. Numbers such as 350 are three hundred and fifty. The number 1000 is one thousand.

Example 4

Write 717 in words, and write "nine hundred and forty" in digits.

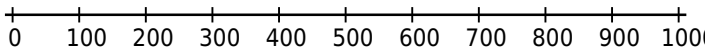
717 is seven hundred and seventeen. Nine hundred and forty is 9 hundreds, 4 tens and 0 ones, so it is **940**.

Watch out

Do not write "four hundred forty" as 40040. We write each part in its own column: 4 hundreds, 4 tens and 0 ones make 440. Also be careful with teens: "thirteen" is 13 but "thirty" is 30.

Number lines and estimating

A number line shows numbers in order. When the line goes from 0 to 1000 in jumps of 100, a number such as 640 sits between 600 and 700. It is a little past the half way point, which is 650, so it is a bit closer to 600. We can use the number line to **estimate** the position of a number: we find the nearest ten or hundred and place the number near it.



The red dot shows 640: it lies between 600 and 700, just before the middle.

Example 5

Between which two hundreds does 372 lie? Which one is it closer to?

372 is between 300 and 400. The middle is 350. 372 is more than 350, so it is closer to **400**.

10 more, 10 less, 100 more, 100 less

Rule: finding 10 or 100 more or less

- 10 more: add 1 to the tens digit. 10 less: take 1 from the tens digit.
- 100 more: add 1 to the hundreds digit. 100 less: take 1 from the hundreds digit.
- The other digits do not change, but be careful when you cross a boundary. 10 more than 295 is 305 and 10 less than 305 is 295.

Example 6

Write 10 more and 100 less than 463.

10 more than 463 is **473**. 100 less than 463 is **363**.

Comparing and ordering

Method: comparing 3-digit numbers

1. Compare the hundreds digits. The bigger hundreds digit means the bigger number.
2. If the hundreds are the same, compare the tens.
3. If the tens are the same too, compare the ones.
4. Use the signs: < means less than and > means greater than. The open mouth of the sign faces the bigger number.

Example 7

Put 538, 583 and 358 in order, smallest first.

358 has the smallest hundreds digit, so it is smallest. 538 and 583 both have 5 hundreds, so compare the tens: 3 tens is less than 8 tens. The order is **358, 538, 583**.

Counting in steps

In Year 3 you count in 4s, 8s, 50s and 100s. Counting in 100s from 0 goes 100, 200, 300 and so on. Counting in 50s goes 50, 100, 150, 200. For 4s and 8s, remember that every number you say is even, and that counting in 8s is the same as counting in 4s but missing every other number: 4, 8, 12, 16, 20 and 8, 16, 24, 32, 40.

Example 8

Continue the pattern 250, 300, 350, ...

The step is 50. The next numbers are **400, 450, 500**.

Did you know?

The digits we use today came to Europe from India and the Arab world about 800 years ago. Before that, Romans wrote numbers with letters such as C for 100 and M for 1000 and had no zero. Place value with a zero is one of the cleverest ideas in the history of maths.

Otto's tip

Always ask three questions about a digit: which column is it in, how many of that column are there, and what is the value? A drawing of hundreds, tens and ones helps if you are stuck.