Lesson - Place value to 10 000 000 and rounding

Year: Year 6

Numbers can be very large. In Year 6 you work with numbers up to 10 000 000, round them to any degree of accuracy and use negative numbers.

Starter activity

Lena reads in a newspaper: "About 9 000 000 people live in London." The exact number in the census was 8 866 540. why does the newspaper use a different number? In this chapter you will learn how to read, write, compare and round numbers as big as 10 000 000 so you can decide which degree of accuracy is sensible.

Reading and writing big numbers

Definition: place value

Place value tells us what each digit is worth. The columns, from the right, are ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions and ten millions.

Example 1

Write 6 305 207 in words.

Six million, three hundred and five thousand, two hundred and seven.

The value of a digit

Example 2

What is the value of the 3 in 6 305 207?

The 3 is in the hundred thousands column, so its value is 300 000.

Note

A zero holds a place. In 6 305 207 there are 0 ten thousands and 0 tens.

Comparing and ordering numbers

Rule: ordering numbers

A number with more digits is larger. If the number of digits is the same, compare the

digits from the left. Use < and > to show which is smaller.

Example 3

Order 4 560 000, 4 506 000 and 4 650 000, smallest first.

All have seven digits and start with 4. Compare the next digits: 5, 5, 6. Then compare 4 560 000 with 4 506 000: the next digits are 6 and 0. The order is 4 506 000, 4 560 000, 4 650 000.

Counting on and back in powers of ten

Key fact: powers of ten

10, 100, 1 000, 10 000 and so on are powers of ten. Counting on 10 000 changes only the ten thousands digit.

Example 4

What is 100 000 less than 2 350 000?

The hundred thousands digit goes from 3 to 2. The answer is 2 250 000.

Rounding

Method: rounding to a given place

1. Find the digit in the place you are rounding to.
2. Look at the digit to its right.
3. If it is 5 or more, round up. If it is 4 or less, round down.
4. Replace the digits to the right with zeros.

Example 5

Round 3 748 962 to the nearest 10 000 and the nearest million.

The thousands digit is 8, so round up to 3 750 000. The hundred thousands digit is 7, so round up to 4 000 000.

Example 6

Round 849 999 to the nearest 1 000.

The hundreds digit is 9, so round up. 849 999 rounds to 850 000.

Watch out

A 9 rounded up carries over to the next column, so 899 500 rounds to 900 000 to the nearest 1 000.

Negative numbers

Definition: negative number

A **negative number** is less than 0. On a number line the bigger a negative number looks, the smaller its value is.

Rule: negative numbers in context

To find the difference between two temperatures, count the steps on a number line. Going up from −7 to 5 is 7 + 5 = 12.

Example 7

The temperature falls from 3°C to −6°C. By how much does it fall?

3 down to 0 is 3, then 0 down to −6 is 6. The fall is 3 + 6 = 9 degrees.

More about place value and rounding

Method: comparing two big numbers

1. Count the digits. The number with more digits is bigger.
2. If both have the same number of digits, write them in a place value table.
3. Compare the digits from the left, one column at a time.
4. Stop at the first column where the digits are different. The bigger digit gives the bigger number.

Example 8

Write 5 060 308 in expanded form and say which digit is in the ten thousands column.

5 060 308 = 5 000 000 + 60 000 + 300 + 8. There is a zero in the hundred thousands column, a 6 in the ten thousands column, a zero in the thousands column and a zero in the tens column. The digit in the ten thousands column is **6**.

Example 9

A stadium holds 62 480 fans. Round this to the nearest 1 000 and to the nearest 10 000.

For the nearest 1 000, look at the hundreds digit, which is 4. Round down: 62 000. For

the nearest 10 000, look at the thousands digit, which is 2. Round down: 60 000. The same number gives different answers because the degree of accuracy is different.

Example 10

The temperature at the top of a mountain is −8°C. At the bottom it is 5°C. What is the difference?

Draw a number line. From −8 up to 0 is 8 degrees. From 0 up to 5 is 5 degrees. The difference is 8 + 5 = **13 degrees**.

Watch out: common mistakes

Do not stop rounding at the digit you are rounding to. You must look at the digit *after* it. Also remember that a number such as 7 000 040 needs zeros in the empty columns, otherwise it looks like 740. When you order negative numbers, −10 is smaller than −2 even though 10 is bigger than 2.

Why do we round?

We round when an exact number is not needed or when it is quicker to estimate. A newspaper may round the population of a town to the nearest 100 000. A builder may round the cost of materials to the nearest £10 to check an answer. In a test you can use rounding to check that your answer is sensible. If you add 3 482 719 and 517 281, your estimate of 3 500 000 + 500 000 = 4 000 000 tells you the exact answer must be close to four million.

Did you know?

The word "million" comes from an Italian word meaning "a big thousand". People first used the word about 700 years ago. Before that, nobody needed a single word for such a huge number. Today the population of the whole world is around eight thousand million, which is eight billion.

Otto's tip

Draw a place value table and write each digit in its column. It never lets you down!