

# Scientific Notation

Sometimes, you may come up with a very long number. It might be a big number, like 4,895,000,000 or it might be a small number, like 0.0000073.

**Scientific Notation** is used to make these numbers easier to work with. Scientific Notation for a number is expressed as  $M \times 10^n$ .

In this expression “n” is an integer, and “M” is a number greater than or equal to 1 and less than 10. M is expressed in decimal notation (only one digit in front of the decimal point).

Example 1: Convert 4,895,000,000 to Scientific Notation.

Steps to conversion

- Remember that any whole number can be written with a decimal point. For example:  $4,895,000,000 = 4,895,000,000.0$
- The decimal place is moved to the **left** until you have a number between 1 and 10.
- In this example the decimal point was moved nine places to the left to achieve 4.895.
- The fact that the decimal was moved 9 places to the left is balanced by applying a multiple of  $10^9$ .

$$4.895 \times 10^9 = 4.895 \times 10 = 4,895,000,000$$

**Scientific Notation** can also be used to turn 0.0000073 into  $7.3 \times 10^{-6}$ .

Example 2: Convert 0.0000073 to Scientific notation.

Steps to conversion

- First, move the decimal place until you have a number between 1 and 10. If you keep moving the decimal point to the **right** in 0.0000073 you will get 7.3.
- Next, count how many places you moved the decimal point. You had to move it 6 places to the right to change 0.0000073 to 7.3. You can show that you moved it 6 places to the right by noting that the number should be multiplied by  $10^{-6}$ .

$$7.3 \times 10^{-6} = 0.0000073$$

**Remember:**

In a power of ten, the exponent — the small number above and to the right of the 10 tells which way you moved the decimal point.

- A power of ten with a **positive exponent**, such as  $10^5$ , means the decimal was **moved to the left**. The original number had at least one non-zero digit in front of the decimal point.
- A power of ten with a **negative exponent**, such as  $10^{-5}$ , means the decimal was **moved to the right**. The original number had no non-zero digits in front of the decimal point.