

Lesson 7:

Scientific Notation

SNC1P

Scientific notation (also called Standard Form in Britain) is the way that scientists easily handle very large numbers or very small numbers.

Like this:

$$\begin{array}{ccc} 700 & \rightarrow & 7 \times 10^2 \\ \text{A Number} & & \text{In Scientific Notation} \end{array}$$

Or this:

$$\begin{array}{ccc} 4,900,000,000 & \rightarrow & 4.9 \times 10^9 \\ \text{A Number} & & \text{In Scientific Notation} \end{array}$$

For example,

700 \rightarrow is written as 7×10^2 in scientific notation.

Why? How?

$700 = 7 \times 100$ and $100 = 10^2$ (see powers of 10)
so $700 = 7 \times 10^2$

Both 700 and 7×10^2 have the same value but just shown in different ways.

What about this: 4,900,000,000?

$4,900,000,000 = 4.9 \times 1,000,000,000$
but $1,000,000,000 = 10^9$,

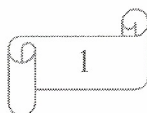
so 4,900,000,000 is 4.9×10^9 in scientific notation.

The number is written in **two parts**:

- Just the **digits** (with the decimal point placed after the first digit), followed by
- $\times 10$ to a **power** that puts the decimal point where it should be (i.e. it shows how many places to move the decimal point).

$$\begin{array}{ccc} \text{Digits} & & \text{Power of 10} \\ \swarrow & & \swarrow \\ 5326.6 & = & 5.3266 \times 10^3 \\ \text{A Number} & & \text{In Scientific Notation} \end{array}$$

In this example, 5326.6 is written as 5.3266×10^3 , because $5326.6 = 5.3266 \times 1000 = 5.3266 \times 10^3$



Sample Problems/Homework

A. Convert the following numbers into scientific notation			B. Convert the following numbers into standard notation:		
1)	3,400		1)	2.30×10^4	
2)	0.000023		2)	1.76×10^{-3}	
3)	101,000		3)	1.901×10^{-7}	
4)	0.010		4)	8.65×10^{-1}	
5)	45.01		5)	9.11×10^3	
6)	1,000,000		6)	5.40×10^1	
7)	0.00671		7)	1.76×10^0	
8)	4.50		8)	7.4×10^{-5}	
9)	7000000		9)	2.34×10^5	
10)	6050000000		10)	3.10×10^4	
11)	940000000		11)	7.23×10^{-4}	
12)	5000000000		12)	2.4785×10^2	
13)	12300000000000000		13)	1.92×10^7	
14)	48900000000		14)	2.68×10^3	
15)	8700000000		15)	5.16×10^{-5}	
16)	0.452		16)	5.92×10^{-5}	
17)	0.0012		17)	7.12×10^6	
18)	0.00004		18)	9.11×10^5	
19)	0.009205		19)	3.8×10^{-4}	
20)	0.5781		20)	8.291×10^{-5}	