Scientific Notation

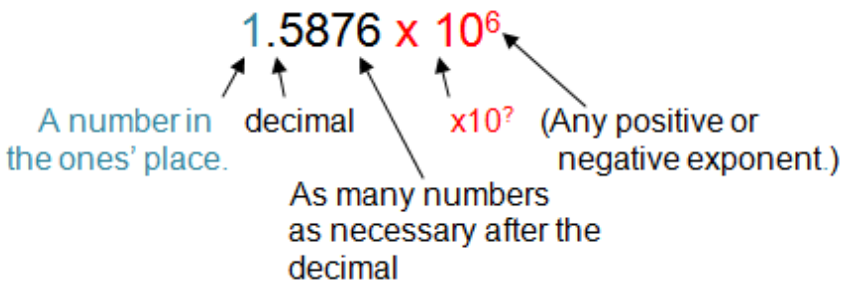
Numbers as multiples or fractions of ten	Number	Number as a power of ten
10 x 10 x 10 x 10	10,000	10^4
10 x 10 x 10	1000	10^3
10 x 10	100	10^2
10	10	10^1
10 x 1/10	1	10^0
1/10	0.1	10^{-1}
1/100	0.01	10^{-2}
1/1000	0.001	10^{-3}
1/10,000	0.0001	10^{-4}

Consider the number: $10^3 = \overset{1}{10} \times \overset{2}{10} \times \overset{3}{10} = 1000$

10 is called the **Base**

3 is called the **Exponent** *(also called the power, index, or logarithm)*

Scientific notation must always be written with the same components as the following model:



Why use scientific notation?

It can be used for any numbers bit is especially convenient for extremely small numbers: $0.000000001 = 10^{-9}$ or extremely large numbers $1000000000000 = 10^{12}$

Converting ***from*** scientific notation

If the exponent is *positive*, shift the decimal point that many places to the *right*.
If the exponent is *negative*, shift the decimal point that many places to the *left*.

For more information: www.facweb.bhc.edu

Scientific Notation

Example A: Find the value of 5×10^8

Step 1: Add a decimal after the 5. (Since 5 is in the 'first' place, we originally didn't need the decimal point.)

5.

Step 2: Since the power of 10 is 8, move the decimal point 8 spaces to the right. Then add 8 zero's (since you have 8 extra spaces).

5 . 0 0 0 0 0 0 0 0

1 2 3 4 5 6 7 8

So the answer is **500,000,000**

Example B: Find the scientific notation of .000458

Step 1: You are going to be moving the decimal point to the right, but think about where you want to place it. Behind the first non-zero number, which is 4.

.0 0 0 4 5 8

You want the decimal to be here.

Step 2: Your exponent is going to be negative 4 since you counted 4 spaces to the right. Write the number in scientific notation.

So you answer is: **4.58×10^{-4}**

Example C: Find the scientific notation of 32,500

Step 1: Take out any commas and put in a decimal after the 3.

3.2500

Step 2: Count how many spaces there are from the decimal to the end of the number. In this example there are four spaces, so your exponent will be 4.

Step 3: Remove all non-zero numbers as zero's are never included in scientific notations.

3.2500

So the answer is: **3.25×10^4**

Your exponent is 4 because you counted four spaces to the right.

Example D: Find the value of 8.2×10^{-7}

Step 1: Since the power of 10 is negative 7, move the decimal point seven spaces to the left. As you have six extra spaces, you will need to add six zero's.

0 0 0 0 0 0 0 8 . 2

7 6 5 4 3 2 1

So your answer is: **.00000082**

Exercise 1: The speed of light in a vacuum is 299 792 458 m/s. What is this written in Scientific notation?

Exercise 2: The rest mass of an electron is 0.000 000 000 000 000 000 000 000 000 000 910 938 kg. What is this written in Scientific notation?

Adapted from : http://www.algebra-class.com/scientific-notation.html and http://www.mathopolis.com/

1) To be in Scientific Notation the decimal point needs to be here: 2.997 924 58 So the decimal point has to be moved 8 places = $2.997\,924\,58 \times 10^8$ m/s

2) The number has 30 zeros after the decimal point. But to write the number in Scientific Notation the decimal point needs to go one space further, like this: 9.10938. So the decimal point has to be moved 31 places altogether. The answer is 9.10938×10^{-31} kg

STUDENT LEARNING CENTRE
REGISTRY BUILDING ANNEXE

TEL: 61-8-8201 2518
E-MAIL: slc@flinders.edu.au

INTERNET: http://www.flinders.edu.au/SLC
POSTAL: PO BOX 2100, ADELAIDE, SA 5001