Scientific Notation Notes

Scientific notation is a short way to write very large or very small numbers. It is written as the product of a number between 1 and 10 and a power of 10.

TO CONVERT A NUMBER INTO SCIENTIFIC NOTATION:

• Create a number between 1 and 10 by moving the decimal to the left.

• Count the number of spaces the decimal moved to determine the exponent of 1
 EXAMPLE: 3,346,000,000. = 3.346×10^9

The decimal moved 9 places # between 1 & 10 power of ten Add zeros as needed for place holders.

TO CONVERT A NUMBER INTO STANDARD FORM:

• Move the decimal to the right the number of spaces indicated by the exponent
. EXAMPLE: : 1.312×10^6 = 1,312,000 The decimal moved 6 places to the RIGHT. Add zeros as needed for place hold

Check!

After putting the number in Scientific Notation, just check that:

•   The "digits" part is between 1 and 10 (it can be 1, but never 10)

•   The "power" part shows exactly how many places to move the decimal point

Why Use It?

Because it makes it easier when dealing with very big or very small numbers, which are common in Scientific and Engineering work.

Example: it is easier to write (and read) 1.3×10^{-9} than 0.0000000013

It can also make calculations easier, as in this example:

Example: a tiny space inside a computer chip has been measured to be 0.00000256m wide, 0.00000014m long and 0.000275m high.

What is its volume?

Let's first convert the three lengths into scientific notation:

•   width: 0.000 002 56m = 2.56×10^{-6}

•   length: 0.000 000 14m = 1.4×10^{-7}

•   height: 0.000 275m = 2.75×10^{-4}

Then multiply the digits together (ignoring the ×10s):

$2.56 \times 1.4 \times 2.75 = 9.856$

Last, multiply the ×10s:

$10^{-6} \times 10^{-7} \times 10^{-4} = 10^{-17}$ (easier than it looks, just **add −6, −4 and −7** together)

The result is **9.856×10^{-17} m³**

It is used a lot in Science:

Example: Suns, Moons and Planets

The Sun has a Mass of 1.988×10^{30} kg.

Easier than writing 1,988,000,000,000,000,000,000,000,000,000 kg

(and that number gives a false sense of many digits of accuracy.)

To complete exercise