

III. REWRITING NUMBERS FROM SCIENTIFIC INTO NORMAL NOTATION

If a number is already written in scientific notation, it can be rewritten as a normal number by simply moving the decimal place as many times as the exponent. Move the decimal to the right for positive powers of ten (big numbers) and to the left for negative powers of ten (small numbers).

2. PRACTICE – Convert each number from scientific notation into normal notation.

$$7 \times 10^3 = \underline{\hspace{2cm}} \quad 5.7 \times 10^4 = \underline{\hspace{2cm}} \quad 9.81 \times 10^5 = \underline{\hspace{2cm}}$$

$$4 \times 10^{-2} = \underline{\hspace{2cm}} \quad 9.2 \times 10^{-3} = \underline{\hspace{2cm}} \quad 8.37 \times 10^{-4} = \underline{\hspace{2cm}}$$

IV. SCIENTIFIC NOTATION AND POWERS OF TEN

When solving a physics problem you will often arrive at an answer that is written in terms of a power of ten, but is not in scientific notation. For example: 54×10^3 . To change this into scientific notation, adjust the leading number (the 54) until it is greater than or equal to 1 and less than 10, which is 5.4. Now adjust the exponent of the 10 so that the overall value stays the same as it was originally. In this case since the decimal was moved one place to the left, add 1 to the exponent. This gives: 5.4×10^4 , which has the same value as 54×10^3 (since they both equal 54,000).

3. PRACTICE – Convert each value into scientific notation.

$$20 \times 10^3 = \underline{\hspace{2cm}} \quad 63 \times 10^7 = \underline{\hspace{2cm}} \quad 30 \times 10^{-4} = \underline{\hspace{2cm}}$$

$$0.4 \times 10^5 = \underline{\hspace{2cm}} \quad 0.72 \times 10^3 = \underline{\hspace{2cm}} \quad 0.5 \times 10^{-2} = \underline{\hspace{2cm}}$$

$$42 \times 10^{-3} = \underline{\hspace{2cm}} \quad 0.25 \times 10^4 = \underline{\hspace{2cm}} \quad 360 \times 10^{-4} = \underline{\hspace{2cm}}$$

$$0.05 \times 10^5 = \underline{\hspace{2cm}} \quad 640 \times 10^6 = \underline{\hspace{2cm}} \quad 0.03 \times 10^{-5} = \underline{\hspace{2cm}}$$

V. METRIC PREFIXES AND SCIENTIFIC NOTATION

One last thing scientists do to make writing numbers in scientific notation even easier is to use prefixes to represent a power of ten (see below). If you want to write a number that uses a metric prefix in scientific notation, simply replace the prefix with the power of ten. For example, 5 **nanometers** (5 nm) can be written as 5×10^{-9} m. Notice that the $\times 10^{-9}$ takes the place of the **nano**. The prefix is part of the number, you must include it! For example, 5 nm is not equal to 5 m, it is 0.000000005 m. If you forget the prefix, you are writing a completely different number.

10^{18}	10^{15}	10^{12}	10^9	10^6	10^3	10^{-3}	10^{-6}	10^{-9}	10^{-12}	10^{-15}	10^{-18}
exa	peta	tera	giga	mega	kilo	milli	micro	nano	pico	femto	atto
E	P	T	G	M	k	m	μ	n	p	f	a

7. PRACTICE – Change each measurement from prefix notation into scientific notation.

$$2 \text{ nm} = \underline{\hspace{2cm}} \quad 3 \text{ TJ} = \underline{\hspace{2cm}} \quad 5 \text{ mm/s} = \underline{\hspace{2cm}}$$

$$20 \text{ kN} = \underline{\hspace{2cm}} \quad 54 \text{ mA} = \underline{\hspace{2cm}} \quad 98 \text{ MHz} = \underline{\hspace{2cm}}$$

$$612 \text{ } \mu\text{s} = \underline{\hspace{2cm}} \quad 1.21 \text{ GW} = \underline{\hspace{2cm}} \quad 308 \text{ pF} = \underline{\hspace{2cm}}$$