



## MATH NOTES

### METHODS AND MEANINGS

#### Scientific Notation

Scientific notation is a way of writing very large and very small numbers compactly. A number is said to be in scientific notation when it is written as a product of two factors and:

- The first factor is greater than or equal to 1 but less than 10.
- The second factor is an integer power of 10.

Scientific notation usually uses the symbol "x" for multiplication instead of using a "." or parentheses.

For example,  $2.56 \times 10^5$  is correctly written in scientific notation, but  $25.6 \times 10^4$  is not.

Scientific Notation	Standard Form
$5.32 \times 10^6$	5,320,000
$3.07 \times 10^{-4}$	0.000307

To change  $25.6 \times 10^4$  into scientific notation, first write 25.6 in scientific notation and then simplify:

$$\begin{aligned} & 25.6 \times 10^4 \\ &= 2.56 \times 10^1 \times 10^4 \\ &= 2.56 \times 10^5 \end{aligned}$$



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#### Laws of Exponents

In the expression  $x^3$ ,  $x$  is the base and 3 is the exponent.

$$x^3 = x \cdot x \cdot x$$

The patterns that you have been using are called the laws of exponents. Here are the basic rules with examples:

Law	Examples
$x^m x^n = x^{m+n}$ for all $x$	$x^3 x^4 = x^{3+4} = x^7$ $2^5 \cdot 2^{-1} = 2^4$
$\frac{x^m}{x^n} = x^{m-n}$ for $x \neq 0$	$x^{10} \div x^4 = x^{10-4} = x^6$ $\frac{5^7}{5^3} = 5^{-3}$
$(x^m)^n = x^{mn}$ for all $x$	$(x^4)^3 = x^{4 \cdot 3} = x^{12}$ $(10^5)^6 = 10^{30}$
$x^0 = 1$ for $x \neq 0$	$\frac{x^2}{x^2} = x^0 = 1$ $9^0 = 1$
$x^{-1} = \frac{1}{x}$ for $x \neq 0$	$\frac{1}{x^2} = \left(\frac{1}{x}\right)^2 = (x^{-1})^2 = x^{-2}$ $3^{-1} = \frac{1}{3}$