

# Mathematical symbols

From: *A Maths Dictionary for Kids* by Jenny Eather at [www.amathsdictionaryforkids.com](http://www.amathsdictionaryforkids.com)

**+** plus, add, positive

**-** minus, subtract, less, take away, negative

**x \*** times, multiplied by

**÷ /** divided by, divide 

**=** is equal to, equals

**≠** is not equal to

**≈** is approximately equal to

**<** is less than

**>** is greater than

**≤** is less than or equal to

**≥** is greater than or equal to

**.** decimal point

**°** degree, degrees

**%** percent

**π Π** pi ... 3.14 approximately

**Σ** sum

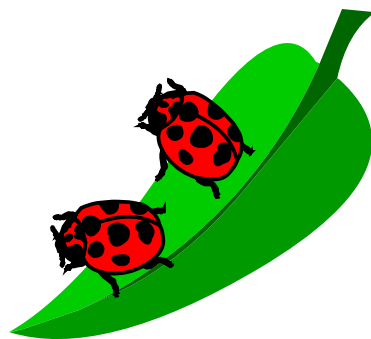
**∞** infinity

**∴** therefore

**!** factorial

**x<sup>n</sup>** nth power of x

**√** square root




**( )** brackets, parentheses

**{ }** braces, curly brackets

**[ ]** brackets, square brackets

**↔** **AB** line 

**→** **AB** ray 

**—** **AB** line segment 

**||** parallel 

**⊥** perpendicular 

**≍** lines - equal length 

**∠** angle 

**⊓** right angle 

**△** triangle 

**~** is similar to

**≅** is congruent to

**f** frequency, function

**| || ||| |||| |||||** tally marks 1, 2, 3, 4, 5

**\$** dollar, dollars

**c, ¢** cent, cents

**£** pound, pounds

**€** euro, euros

**¥** yen



# Types of Notation

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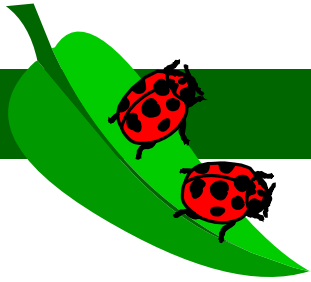
There are many types of mathematical notation. Some commonly used types are included below.

## Standard Notation

625



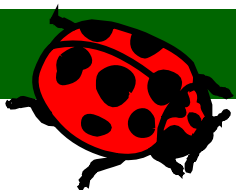
Writing a number in its normal state as a simple number without any decimal points or exponents.



## Decimal Notation

625.179

Writing numbers according to their place value in base -10. The Hindu-Arabic system uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. A decimal point is used to separate whole numbers from numbers smaller than 1 (called decimal fractions).



## Index or Exponential Notation


$$5^4 = 5 \times 5 \times 5 \times 5$$

Writing numbers using an index (exponent, power or order) - a small number placed to the upper-right of a number which shows how many copies of the base number are multiplied together.

## Scientific Notation

$625,000,000 = 6.25 \times 10^8$

Writing very large or very small numbers using a number between 1 and 10 multiplied by a power of 10.



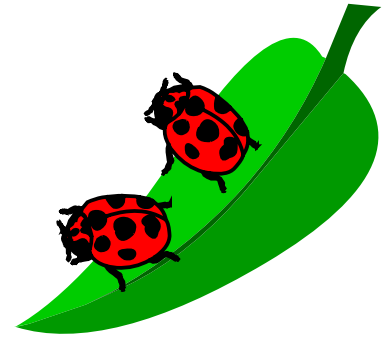
# Expanded Notation

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Expanded notation is a way of writing numbers to show place value.



Thousands	Hundreds	Tens	Ones	Decimal Point	Tenths	Hundredths	Thousandths	Ten-thousandths
$\times 1000$	$\times 100$	$\times 10$	$\times 1$	.	$\frac{1}{10}$ $\times 10$	$\frac{1}{100}$ $\times 100$	$\frac{1}{1000}$ $\times 1000$	$\frac{1}{10000}$ $\times 10000$



## Examples

Two methods of writing expanded notation are shown for each number below.

$$64 = (6 \times 10) + (4 \times 1)$$

$$64 = 60 + 4$$



$$964 = (9 \times 100) + (6 \times 10) + (4 \times 1)$$

$$964 = 900 + 60 + 4$$

$$4.32 = (4 \times 1) + (3 \times \frac{1}{10}) + (2 \times \frac{1}{100})$$

$$4.32 = 4 + 0.3 + 0.02$$

$$34.05 = (3 \times 10) + (4 \times 1) + (5 \times \frac{1}{100})$$

$$34.05 = 30 + 4 + 0.05$$

$$0.375 = (3 \times \frac{1}{10}) + (7 \times \frac{1}{100}) + (5 \times \frac{1}{1000})$$

$$0.375 = 0.3 + 0.07 + 0.005$$



$$967.123 = (9 \times 100) + (6 \times 10) + (7 \times 1) + (1 \times \frac{1}{10}) + (2 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$$

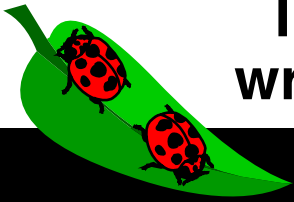
$$967.123 = 900 + 60 + 7 + 0.1 + 0.02 + 0.003$$

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# Index or Exponential Notation

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Index or exponential notation is a way of writing numbers using an index (exponent).

Index or exponent or power or order.

Index, exponent, power or order  
all mean the same thing.

An index (exponent, power or order) is a small number placed to the upper-right of a number which shows how many copies of the base number are multiplied together.

$5^4 = 5 \times 5 \times 5 \times 5 = 625$

base                      expanded                      value

index, exponent, power or order

## Examples

Exponent, Index or Power	Base	Expanded	Value	Read as
2	3	3 x 3	9	three <b>squared</b> OR three <b>to the power of two</b>
3	5	5 x 5 x 5	125	five <b>cubed</b> OR five <b>to the power of three</b>
4	10	10 x 10 x 10 x 10	10 000	ten <b>to the power of four</b>
5	4	4 x 4 x 4 x 4 x 4	1024	four <b>to the power of five</b>

# Scientific Notation

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Scientific notation is a way of writing very large or very small numbers using a number between 1 and 10 multiplied by a power of ten.

## Writing numbers in scientific notation.

1. Put a decimal point after the first digit.
2. To find what power of 10 to use, count the number of places from the decimal point to the end of the number.
3. Drop the zeros and write the number  $\times 10$  to the power.

3.4560000000000<sup>12</sup>

$$= 3.456 \times 10^{12}$$

For very small numbers, count back to the original decimal point and write the power of 10 as a negative.

0.00000007.25<sup>8</sup>

$$= 7.25 \times 10^{-8}$$

## Examples

### decimal notation

84 500

678 345.96

50 000 000 000

0.0246

0.000 024 6

0.000 000 000 1

### scientific notation

$8.45 \times 10^4$

$6.7834596 \times 10^5$

$5 \times 10^{10}$

$2.46 \times 10^{-2}$

$2.46 \times 10^{-5}$

$1 \times 10^{-10}$

# What E means on a calculator

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If a number is too big or too small to fit in a calculator display, often, scientific notation using the letter E (or e) for exponent (power or index) will be used.



## Example



If you multiply  $10\,000\,000\,000 \times 10\,000\,000\,000$  and the answer is too big so you may see  $1E20$  or  $1e+20$  which means **one times ten to the power of 20** or **1.0** with the **decimal point moved 20 places to the right.**

Use a calculator to multiply large numbers.

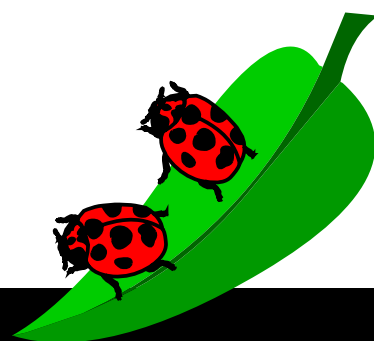


Check the answer to see if it shows E or e.



## Notation

- decimal notation** ▶ 100 000 000 000 000 000 000 000
- scientific notation** ▶  $1 \times 10^{20}$
- calculator versions** ▶  $1E20$   
▶  $1e + 20$



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# Set Notation - some symbols

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<b>A, B, C, ...</b>	sets are usually named using capital letters.
<b>{ , , , }</b>	the set of ...
<b>{ }</b>	empty or null set
<b>∅</b>	empty or null set
<b>:</b>	such that
<b> </b>	such that
<b>...</b>	and so forth
<b>element</b>	any member of a set
<b>∈</b>	is an element of
<b>∉</b>	is not an element of
<b>∪</b>	union, the union of
<b>∩</b>	intersect, the intersection of
<b>⊂</b>	is a subset of
<b>⊆</b>	is a subset of
<b>⊄</b>	is not a subset of
<b>⊃</b>	is a superset of
<b>⊇</b>	is a superset of
<b>ℝ</b>	the set of real numbers
<b>ℕ</b>	the set of natural numbers
<b>ℤ</b>	the set of integers
<b>ℚ</b>	the set of fractions
<b>&lt;</b>	is less than
<b>&gt;</b>	is greater than
<b>≤</b>	is less than or equal to
<b>≥</b>	is greater than or equal to
<b>=</b>	is equal to, equals
<b>≠</b>	is not equal to

