

# MATHEMATICS VOCABULARY

RK

## 1. NUMBERS

- Integers (whole numbers, positive and negative).  
Integral: *Constituting a whole together with other parts or factors.*
- Rational numbers (fractions).  
Ratio (plural ratios)  
*A number representing a comparison between two things. or The relative magnitudes of two quantities (usually expressed as a quotient).*  
Magnitude: *The absolute or relative size, extent or importance of something.*
- Quarter (a popular fraction).  
(1) A quarter (1/4) Any one of four equal parts into which something has been divided.  
(2) A coin worth 25 cents. Notice  $\frac{1}{4} = 0.25$ .  
(3) A period of three consecutive months (quarter of a year).
- Decimal numbers, decimal system.  
From medieval Latin. *Decimus: tenth.*  
To decimate  
*From Latin decimare to take the tenth (decimus) part of anything, in particular referring to the levying and payment of tithe and also the practice of capital punishment applied to one man at random (by lot) out of every ten in a legion.*  
Decimal system is the number system which uses 10 as a base. For example, what is 123? It  $1 \times 10^2 + 2 \times 10 + 3 \times 1$ .
- Percent  
*A part or other object per hundred.*  
From Latin: per centum (“for every hundred”).  
In Spanish: por ciento.  
Notice: One hundredth =  $\frac{1}{100} = 0.01 = 1\%$ .

## 2. MATHEMATICAL OPERATIONS

- Addition. To add.  
*To make an addition (to); join or combine or unite with others; increase the quality, quantity, size or scope of; “We added two students to that dorm ...”*
- Subtraction. To subtract.  
*To remove or reduce; especially to reduce a quantity or number.*

Important. When we subtract 1 from 6 the result is 5. Notice that in the mathematical expression the order of numbers is reversed:  $6 - 1 = 5$ . We are subtracting **from** 6, so 6 is listed first.

- Multiplication. To multiply.

*To grow in number; To breed or propagate.*

Multiplication is repeated addition.  $5 \times 3 = 3 + 3 + 3 + 3 + 3$ . Notice how 3 **multiplies**.

- Division. To divide.

*To split or separate (something) into two or more parts.*

Notice: a half of 10 is 5. In arithmetic this can be written in two ways:

$$\frac{1}{2} \times 10 = 5 \text{ or } \frac{10}{2} = 5.$$

- Inverse.

*The reverse version of a procedure.*

*Removing one's shoes is the inverse of putting one's shoes on.*

Subtraction is inverse of addition:  $1 + 2 = 3$ , so  $3 - 2 = 1$ .

Division is inverse of multiplication:  $2 = 6$ .  $6 \div 3 = 2$ .

- Opposite.

(1) Located directly across from something else, or from each other

*She saw him walking on the opposite side of the road.*

(2) Facing in the other direction

*They were moving in opposite directions.*

Numbers 2 and  $-2$  are **opposite** on the number line. They are on opposite sides of 0 and at equal distance from 0.

In algebra:  $-a$  is the opposite of  $a$ .

A simple rule: For all numbers  $a$ ,  $a + (-a) = 0$ . The sum of opposites is 0.

- Reciprocal. This has two meanings.

(1) Of an action, feeling, etc, done, felt, etc, by each of two people to, on or towards the other.

(2) In the contrary or opposite way, order, or direction

In mathematics we use the second meaning for multiplicative inverses:  $\frac{2}{3}$  is reciprocal of  $\frac{3}{2}$ , 2 is reciprocal of  $\frac{1}{2}$ ,  $\frac{1}{10}$  is reciprocal of 10. In general:  $\frac{1}{a}$  is reciprocal of  $a$ , for all numbers  $a$ , except  $a = 0$ . Zero has no reciprocal.  $\frac{1}{0}$  has no meaning. It is undefined. To define means: *To state the meaning of a word or word group or a sign or symbol.*

Simple rule: For all numbers  $a$  other than 0,  $a \times \frac{1}{a} = 1$ . The product of reciprocals is 1.

### 3. ALGEBRA

- To commute.

*To travel from one's home (usually in the suburbs of a city) to one's workplace (usually in the city itself, or in another city) to go to work, or vice versa.*

Addition and multiplication are commutative: For all numbers  $a + b = b + a$ , and  $ab = ba$ . Subtraction and division are not commutative, but notice that

$$-(a - b) = b - a$$

In other words:  $b - a$  is the **opposite** of  $a - b$ . Also

$$\frac{1}{\frac{a}{b}} = \frac{b}{a}$$

In other words:  $b \div a$  is the **reciprocal** of  $a \div b$ .

- To associate.

*To connect or join together; combine.*

Addition and multiplication are associative: For all numbers,  $(a + b) + c = a + (b + c)$ , and  $(ab)c = a(bc)$ . When adding more than two numbers, we can group additions in any way we like. The same for multiplications. Subtraction and division are not associative.

- To distribute.

*To give shares of something. To deal out.*

The distributive property of addition and multiplication says that for all numbers  $a$ ,  $b$ , and  $c$

$$a \times (b + c) = a \times b + a \times c$$

What is being distributed here? It is multiplication. Notice that the single multiplication by  $a$  on the left side of the identity above is distributed on the right hand side. There are two multiplications by  $a$  there.

- Identity.

*Identical* often means *the same*, like when we say that two different actions can give identical results. An example of a mathematical identity is the equation  $x = x$ . This is a very simple equation with identical expressions on each side of the = sign. But:

$$(x + y)^2 = x^2 + 2xy + y^2$$

is also an identity. Why is it? The equation has an algebraic expression on the left hand side of the = sign, and an algebraic expression on the right hand side. These expressions are not identical, they are clearly different. However, the equation is an identity, because, as can be shown using algebra, the values of both expressions are the same for any choice of the values of the variables  $x$  and  $y$ . In other words, the solution set for this equation is the set of all numbers.

- A variable.

An element can be a variable, if its value is not constant. If you plan your weekend activities the weather can be a variable. The plan can change depending on the weather. In mathematics variables like  $x$ ,  $y$ ,  $z$ ,... on represent arbitrary numbers that can assume different numerical values. Usually each variable stands for any number, but in some applications the choice can be restricted. For example

in the expression  $1/x$ , the variable  $x$  can be any number except 0, since the the expression  $1/0$  does not a number.