Fractions.

Of ferman: Fernando Mancebo Rodriguez

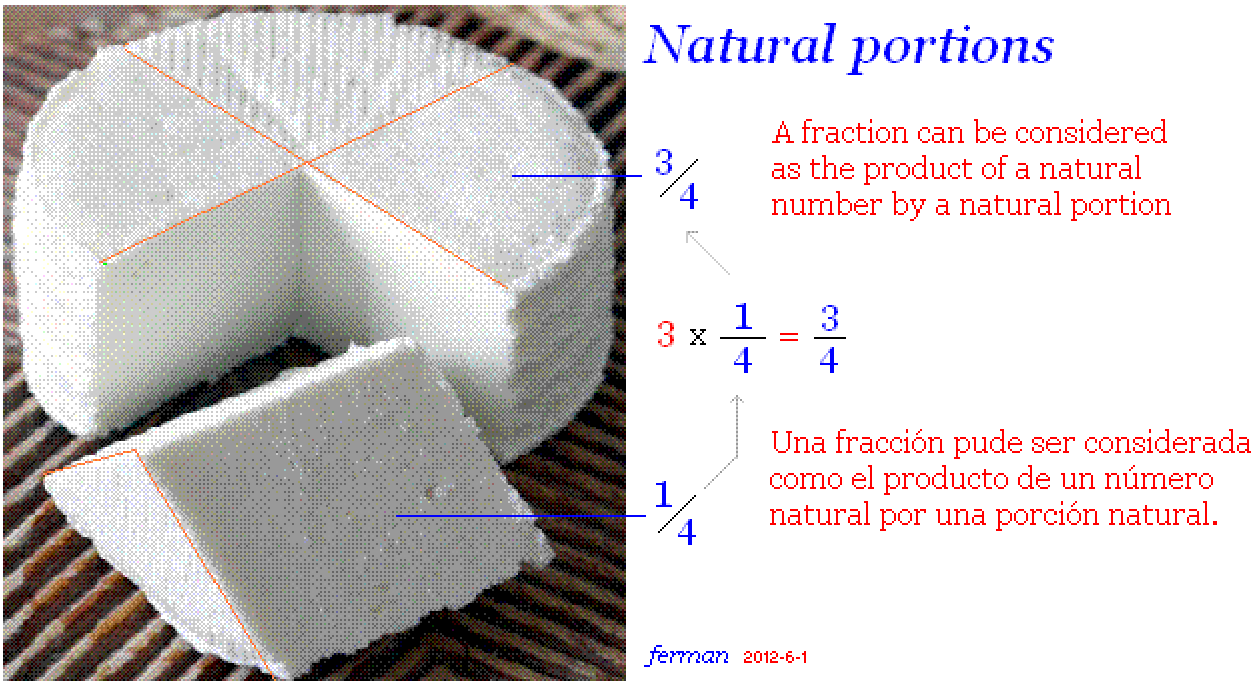
Natural nunbers and natural portions.

Definition

"Fractions could be considered as the product of natural numbers by portions of unit."
This way, the fraction consists in a set of portions belonging to units previously divided.

Portion

We can consider portion to each part in what we have divided any unit.
To be able act mathematically with fractions, the unit has to be divided in equal parts, being each one of them equivalent to the other ones, that is, in partitions any portion will be always equal to any other one, and it will be written expressing the unit as numerator and expressing the portions in which the unit is divided as denominator, in the following way: 1/5
Where 1/5 say us that the unit has been divided in five equal portions.



Natural number and natural portion

We already know that the natural number (1, 2, 3, 4, etc.) could be the first mathematical concepts that the man understood: 1 rock, 2 eggs, 3 apples, etc.
But not much later, the man possibly took conscience that any object in turn could be divided in parts, as for example a melon in 2 portions; a deer in 4 portions, etc.
So very early, the primitive man begin to conceive of a "natural" manner that many of the around elements could be parted in portions.
Well, to the portion that can be contemplated when we part a physical element is the one that we name as natural portion, of course, by similitude y approximation to the natural numbers.
Also for differentiating from the mathematical portion, which is merely abstract or of pure mathematics, as for example 0,25; 0,74; 0,20 etc.

This way, for the existence of a natural portion is necessary to have the previous conscience of having taking an element that has been parted in portions.
A natural portion doesn't exist if previously we don't have considered a comparative and precedence unit.
For example, a fourth 1/4 where exists the comparative unit and where exists de portion.

Multiplication of natural numbers and multiplication of natural portions

We already know the simple a easy product of the natural numbers.
For example, if we have 1 apple and we want to multiply it by 5, then we put 1*5 = 5

But besides the product of natural numbers by portions of unit also exist.
For example, if we divide a cheese in 8 portions we can express it saying that each portion is a eighth of cheese 1/8.

But later on, to these portions already divided, we can multiply them by a natural number. This way, to 1/8 we can multiply by 3, obtaining a result of 3*1/8 = 3/8.
Well, to this is to what we name fractions, to the result of multiplying a natural number (3) by a natural portion (1/8).
In this case, el numerator represents the numbers of portions that we have joined (3), and the denominator say us the numbers of portions on what the units have been divided. (8)

Sequences and their limits

Limit of sequences of numbers

Many sequences of number can have well-defined limits.
For example:
0,9; 0,99; 0,999; 0,9999; 0,99999 .,.,.,.,.,.,.,.,.,.,.,. where its limit is 1.

Limit of sequences of digits

Many sequences of digits (that compose numbers) can also have well-defined or well-established limits.
For example:

0,9999999 ...... where its limit is 1.
0,3333333 ...... where its limit is 1/3
2,71828 .... where its limit is e.
3,141592 .... where its limit is Pi.

In the cases of Pi and number e, they have irrational and transcendental limits.

In any case, limits are values to which the sequences go, say, tendencies, unreachable goals, never a real consecution.

For example,

0,3333333 .... never gets the goal of 1/3. This way 3 * 0.33333 ...... = 0,999999...... but it never gets to be 1.

Why? Because in the decimal division of 1/3 = 0.333333 ..... always last apart a infinitesimal remainder.
Then if we multiply 3 * 0.33333 ..... = 0,999999.... because we never include the remainder.
Why occur this?
Because of the decimal division is imperfect and have the problem of can't make exact divisions, and many times in partitions we lost the remainders, and so, when we proceed to the multiplication of divider by quotient, in the result lacks the remainder.
Now well, by convention and to facilitate operations, sometimes we can use the limits, but mathematically is not equal a sequence of infinite digits than its limit.

Fractions with sequence of digits

Many fractions produce sequences of digits when we proceed to the division of numerator by denominator, say, when we traduce the fraction into a decimal division.
For example, 2/3 = 0,666666 ....
In these cases, the produced sequence of digits tends to get a limit.
In the anterior example, 0,6666........... has its limit in 2/3.
So, from this circumstance we can produce a theorem.

Theorem of limits in fractions:

"Any fraction that gives us as decimal result a sequence of infinite digits, is in turn the limit of this sequence of digits."