

Mathematics and Associated
Teaching Methods I

DECIMAL NUMBERS

Degree in Primary Education Teaching

Decimal fractions

- Definition
- To guess if a fraction is equivalent to a decimal fraction

Decimal expression of a decimal fraction

In 1585 a Belgian mathematician (Simon Stevin) proposed to represent quantities smaller than the unit by dividing the unit in tenths, hundredths, thousandths,...



Decimal expression of decimal fractions

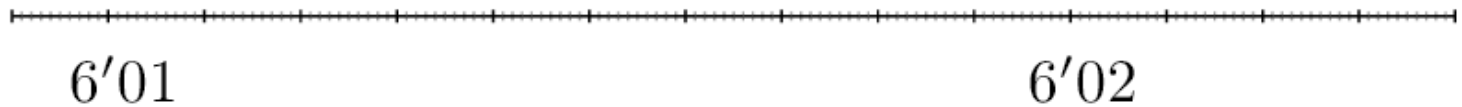
Exact or finite decimal numbers

Representation in the number line

- As a rational number.
- As a decimal expression. For example:

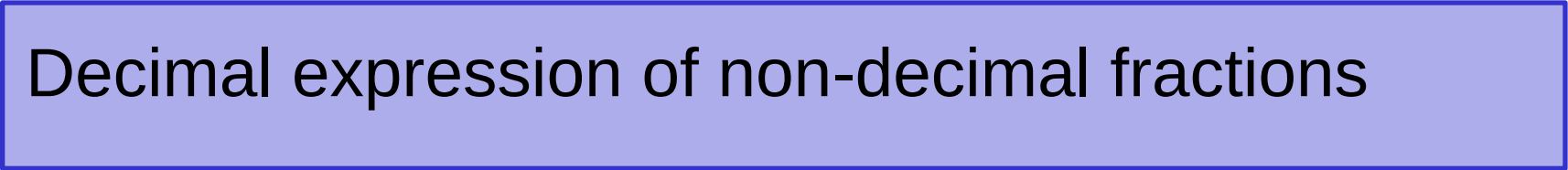


$7^{\circ}08'$ $7^{\circ}93'$



$6^{\circ}01'05''$ $6^{\circ}01'98''$

Non-decimal fractions



Decimal expression of non-decimal fractions



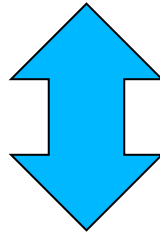
Infinite recurring decimal numbers

Types of decimal numbers

- **Exact or finite**: decimal fractions
- **Infinite recurring**: non-decimal fractions
 - Pure recurring
 - Mixed recurring
- **Infinite non recurring**: irrational numbers

Corresponding fraction

- Every fraction can be expressed by a exact or recurrent decimal number



- Every exact or recurrent decimal number can be expressed by a fraction (a rational number):
corresponding fraction

The decimal expression of a number
can be non unique

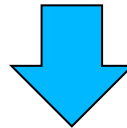
Operations with exact or recurrent decimal numbers

- Alternatives:
 1. Operations with fractions: look for the corresponding fraction for each decimal number and operate with fractions.
 2. Analogous algorithms than the ones for natural numbers: using some rules about the position of the comma in the result. This method is more appropriate for **exact** decimal numbers.

Real numbers

$$Q = \{\text{rational numbers}\} = \left\{ \begin{array}{l} \text{exact or recurrent} \\ \text{decimal numbers} \end{array} \right\}$$

$$I = \{\text{irrational numbers}\} = \left\{ \begin{array}{l} \text{in finite non recurrent} \\ \text{decimal numbers} \end{array} \right\}$$



$$R = Q \cup I$$

The graphical representation of the real numbers
fill the whole number line