



Indian Institute of Information Technology Vadodra

CS/IT 429

## Number System

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## Introduction

Number System

What is

Numeral/Number System....?

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## Introduction

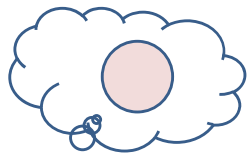
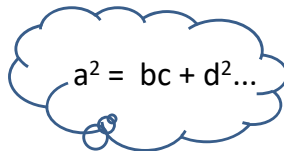
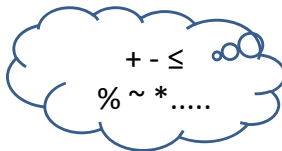
Number System

Mathematics is all about....

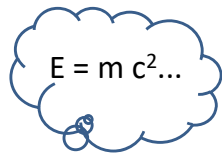
Symbols



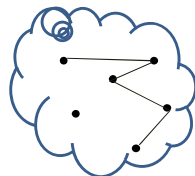
Operators



Shapes



Formulae



Algorithm



And many more...

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## Introduction

Number System

Any idea how Early human used numbers for counting....



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## Some Common Numeral/Number Systems

Number System

- Unary Numeral Systems
- Egyptian, Roman, Chinese Numeral system
- Number system according to English, French Language
- Hindu-Arabic System
- Positional System or Position Value notation

And many more....

## Evolution of Different Number Systems Across the World

Number System



## Classification of Number System

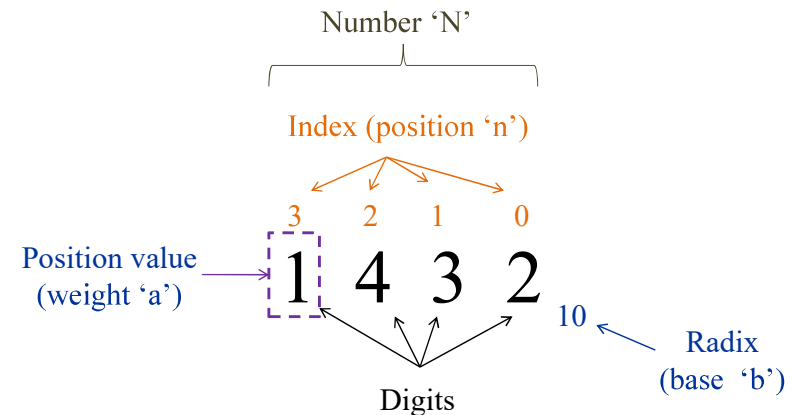
- Natural Numbers
- Whole Numbers
- Integer
- Rational and Irrational
- Real Numbers

And so on....

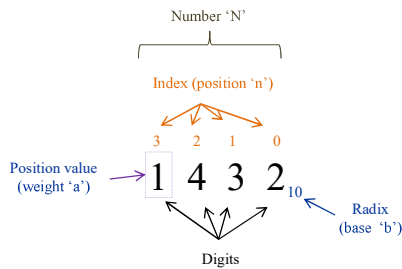
## Positional Number System

Number System

Any number 'N' (say 1432) using positional notation can be defined as:



The number 'N' (integers) can be mathematically represented as:



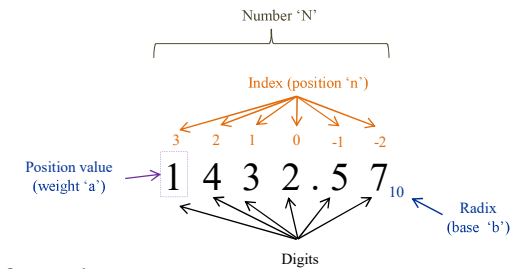
Generalized formulae

$$N(b) = \{ a_{n-1} b^{n-1} + a_{n-2} b^{n-2} + \dots + a_1 b^1 + a_0 b^0 \}$$



$$N(b) = a_{n-1} a_{n-2} \dots a_1 a_0 \dots a_{-n}$$

The number 'N' (fractional) can be mathematically represented as:



Generalized formulae

$$N(b) = \{ a_{n-1} b^{n-1} + a_{n-2} b^{n-2} + \dots + a_1 b^1 + a_0 b^0 + a_{-1} b^{-1} + a_{-2} b^{-2} \}$$



$$N(b) = a_{n-1} a_{n-2} \dots a_1 a_0 a_{-1} a_{-2}$$

Depending on the Radix (base),

different Number systems

corresponding to Positional Notation

are defined

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