sets of numbers

- counting numbers $\mathbb{N}^* = \{1,\ 2,\ 3, \ldots\}$

- whole numbers $\mathbb{N} = \{0,\ 1,\ 2,\ 3, \ldots\}$ are non-negative integers.

- integers $\mathbb{Z} = \{\ldots -2, -1, 0, 1, 2, 3, \ldots\}$

- $\mathbb{D}$ is the set of decimal numbers

- $\mathbb{R}$ is the set of real numbers

positive number: *nombre strictement positif*
non-negative number : *nombre positif ou nul*

even and odd, factors and multiples

- even numbers $2, \ 4, \ 6, \ldots$ can be divided exactly by two.
- odd numbers $1, \ 3, \ 5, \ldots$ are numbers that will have a remainder of 1 when divided by 2.

$12 = 4 \times 3 = 2^2 \times 3$ is a composite number

- 12 is a multiple of 4 and a multiple of 3.
- $2, 3, 4$ and 6 are factors of 12.
- 2 and 3 are prime factors of 12.

prime numbers

a prime number has exactly two factors : 1 and itself.

- $12 = 2 \times 2 \times 3$ is a composite number
- $2 \times 2 \times 3$ is a prime *factorization* of 12.

prime numbers

Can you explain the color codes around each number?

is it a prime ?

1. **one digit primes**

   2, 3, 5 and 7

2. **two digits primes**

   all non multiples of 2, 3, 5 and 7

3. **bigger ?**

is it a prime ?

Is 137 a prime ?

- Step 1 : $\sqrt{137} \approx 11$

- Step 2 : list prime numbers less $\sqrt{137} : 2, 3, 5, 7, 11$

- Step 3 : Check if any of them is a factor of 137.
  None is : $137 = 2 \times 68 + 1$, $137 = 3 \times 45 + 2$, $137 = 7 \times 19 + 4$ and $137 = 11 \times 12 + 5$.

$\therefore 137$ is a prime.

is it a prime ?

Is 37 a prime ?

- 2 digits, we check if any of $2, 3, 5, 7$ is a factor.
- None is.

$\therefore 37$ is a prime.

prime factorization

The *fundamental theorem of arithmetic* states that every composite number can be written as the product of prime factors in exactly one way (ignoring order).

prime factorization	not a prime factorization
$12 = 2^2 \times 3$	$12 = 4 \times 3$
17	$17 = 1 \times 17$
$35 = 5 \times 7$	$98 = 2 \times 49$

words with -ise, -ize (-isation, -ization)

words like :

- _prioritize,
- mischaracterize,
- deinustrialize,
- conceptualize,
- hypersensitized_
  Oxford english dictionary recommends using **-ize** which has proper latin origin (while -ise is correct, but comes from the French).