

# Representing data as numbers

Cryptographic algorithms are mathematical operations

- ➡ messages and keys must be represented as numbers  
for instance : ASCII encoding

# Back to Caesar Cipher

**Algorithm :** shift the alphabet of a certain number of positions

**Key :** the number of positions to shift

**Key space :** 25 possible rotations (  $\sim$  5 bits security )

**Encoding :**

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Encrypting and decrypting one character is obtained as follows:

$$c = E(k, p) = (p + k) \bmod 26$$

$$p = D(k, c) = (c - k) \bmod 26$$