

seven units, honest digits, and how wrong you're allowed to be

## The seven base units \*

**Length**  
metre (m)

**Mass**  
kilogram (kg)

**Time**  
second (s)

**Electric current**  
ampere (A)

**Temperature**  
kelvin (K)

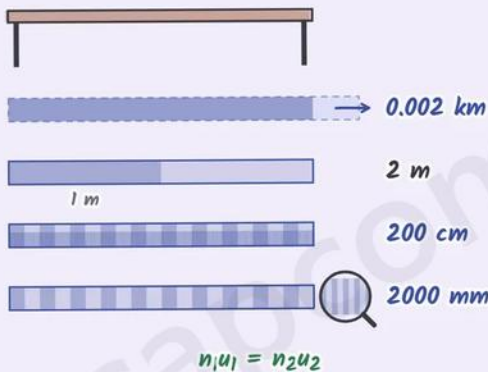
**Amount of substance**  
mole (mol)

**Luminous intensity**  
candela (cd)

a unit is an agreed standard of the same kind; the SI (1971) is decimal, so a change of unit only shifts the point

## A physical quantity

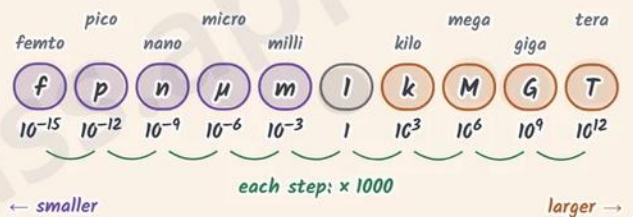
- a physical quantity = a number  $\times$  a unit: without its unit the number means nothing
- change the unit and the number changes the other way:  
 $n_1 u_1 = n_2 u_2$
- base quantities have units of their own; every other unit is built from them (derived)



the same length in four units: the smaller the unit, the bigger the number;  $n_1 u_1 = n_2 u_2$

## Prefixes

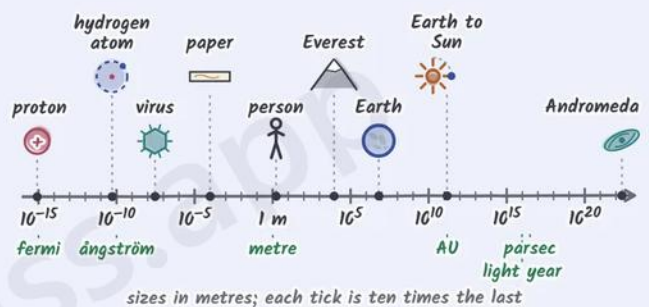
- a prefix is a power of ten stuck to the unit: km, ms,  $\mu$ s, nm
- shift the decimal by counting the power of ten, don't hunt for a conversion factor



the prefixes from femto to tera: each step is  $\times 1000$

## A sense of scale, order of magnitude \*

- order of magnitude: the power  $n$  when written  $A \times 10^n$ ,  $0.5 \leq A < 5$



from a proton to Andromeda on one ladder of powers of ten, with the named units at their own powers