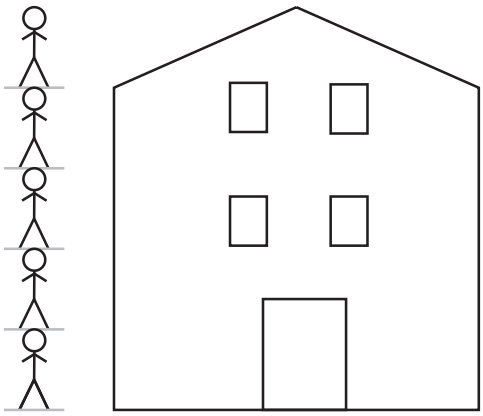
MEASUREMENT THROUGH PARAGON

1) Knowing that in Italy the average height is $170\ cm$, calculate the requested measurements approximately:

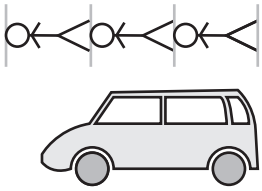


Example A

How high is approximately the house on the right?

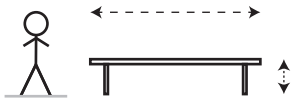
Example B

How long is approximately the car on the right?



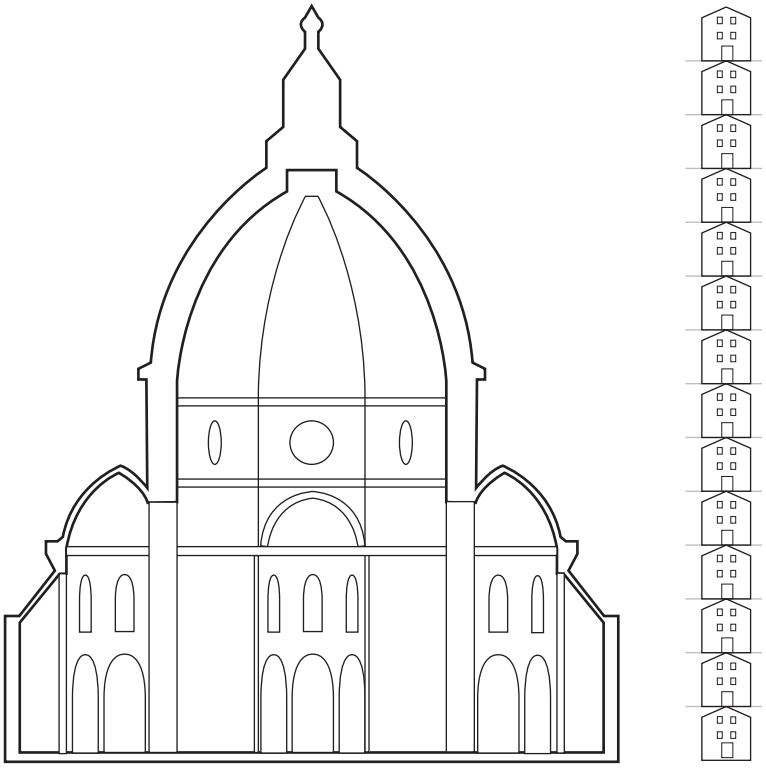
Example C

Measure length and height on the table drawn here:



Example E

Here Florence's duomo is represented in comparison to a series of houses as in the example A. Measure the height of the Church in meters.



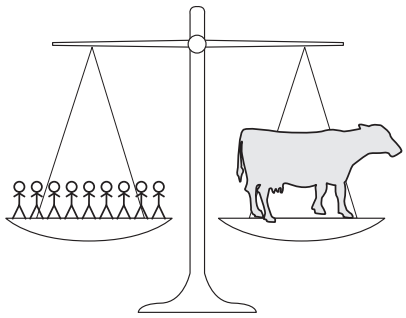
Problema F

Example F: How many cars (as those of example B) should we pile vertically in order to reach the height of Florence's Duomo?

2) Knowing that the average weight of a man is of $75\ kg$, and that the weights below are balanced, measure the requested weights approximately:

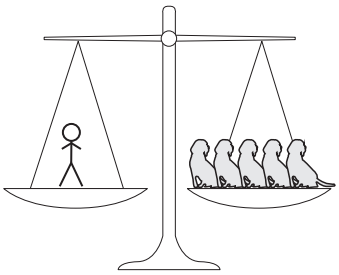
Example A

Measure the weight of a cow in kilograms:



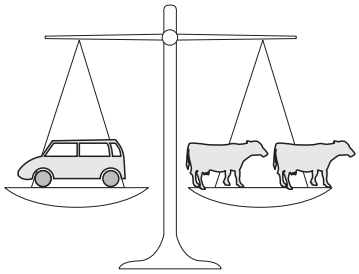
Example B

Measure the weight of a dog in kilograms:



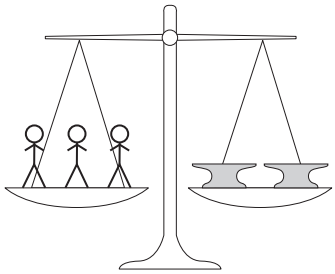
Example C

Measure the weight of a car in kilograms:



Example D

Measure the weight of an anvil in kilograms (note that two anvils are placed on the right-hand side container of the scale):



MEASUREMENT OF PHYSICAL QUANTITIES

3) Measure the following quantities, using the indicated measurement units. Do not use any graduated measuring device.

a) Length, width and height of your classroom (in meters) →

b) Volume of your classroom (in cubed meters) →

c) Treadable surface of your classroom (in square meters) →

d) Average length of one of your "walking steps" (in meters) →

e)	Average speed of an ordinary walk (in meters per second)	→	
f)	Average speed of a 100 m run (in meters per second)	→	
g)	Distance between Spinaceto and Ostia (in kilometers)	→	
h)	Distance between Milan and Rome (in kilometers)	→	

4) Determine the following lengths/distances using only one significant figure. Express the figures in meters in standard notation (first column) and scientific notation (second column). N.b.: Absolute accuracy is not requested in this exercise. However, you must generally respect the order of magnitude. The first case has been solved for you.

	Description	→	*Decimal figure*	→	*Figure in scientific notation*
	Distance from Rome to Milan	→	$500.000\ m$	→	$5 \cdot 10^5\ m$
a)	Height of the Eiffel Tower	→		→	
b)	Circumference between the earth and the Equator	→		→	
c)	Width of a fingernail	→		→	
d)	Diameter of a hair	→		→	
e)	Distance between the two doors of a football field	→		→	
g)	Length of a Marathon track	→		→	
h)	Width of a pine tree needle	→		→	

5) In the chart below you can find 3 masses (expressed in kg), labelled with the letter A, B, C…G, and belonging to order of magnitudes that are very different from one another (one of the matching has been done for you).

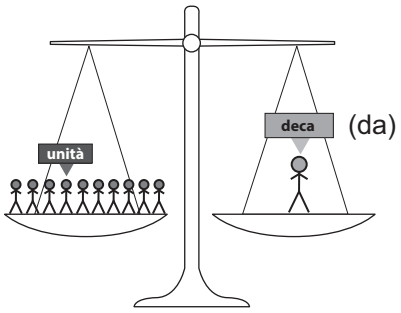
$10^{-27}\ kg$	$10^{30}\ kg$	$10^{8}\ kg$	$10^{2}\ kg$	$10^{-27}\ kg$	$10^{25}\ kg$	$10^{-6}\ kg$
A	B	C	D	E	F	G

Match each of the following measurements to the correct letter.

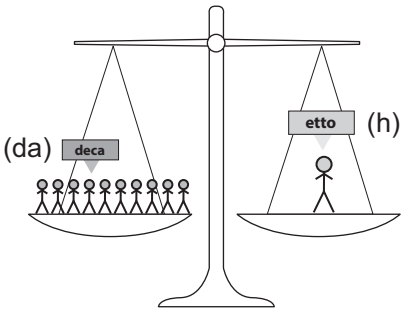
Mass of the earth	Mass of an aircraft carrier	Odd measure	Mass of an atom	Mass of a grain of sand	Mass of a boar	Mass of the sun
					D	

THE METRICAL SYSTEM

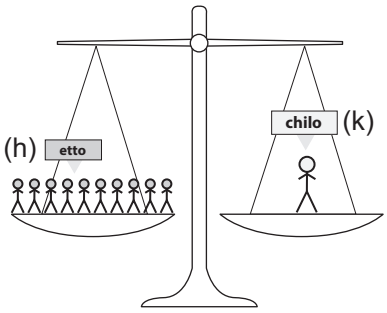
The metrical system does not use cows, cars or houses: starting from any measurement unit you want, (gram, meter, watt, etc.), new measurement are created by adding prefixes like “kilo”, “mega”, “micro”. The prefixes have all the same meanings, so 1kg equals 1000 grams, one kilometer equals 1000 meters a kilowatt is 1000 watts and so on. Below are a series of drawings related to the prefixes “deca”, “hecto” and “kilo” in the first line amd, deci, centi, mili in the second line. After that, you will find the meaning of the most important prefixes.



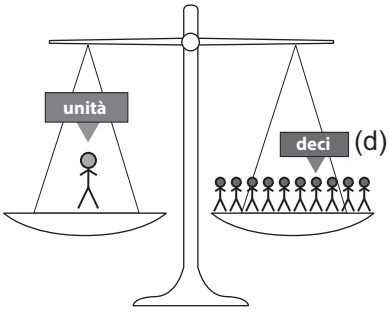
10 unit ~ 1 da



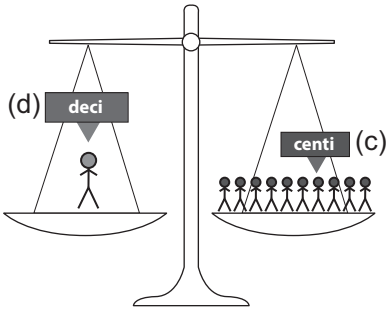
10 da ~ 1 h



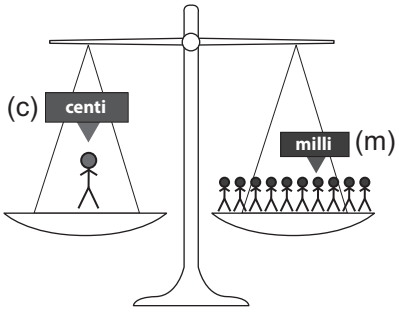
10 h ~ 1 k



1 unit ~ 10 d



1 d ~ 10 c



1 c ~ 10 m

symbol	name	effect
m	(milli)	$\times 10^{-3}$
μ	(micro)	$\times 10^{-6}$
n	(nano)	$\times 10^{-9}$
p	(pico)	$\times 10^{-12}$

symbol	name	effect
k	(kilo)	$\times 10^{3}$
M	(mega)	$\times 10^{6}$
G	(giga)	$\times 10^{9}$
T	(tera)	$\times 10^{12}$

7) This exercise is based on measurement units $A, B, C, \ldots$ (they do not need to exist in reality) and on the most important prefixes. In the first box of every line you will find a certain measurement which only equals ONE of the four measurements reported to the side. Tick the correspondent box.

a)	$1\ kA$	☐ $10\ A$	☐ $0{,}001\ A$	☐ $1000\ A$	☐ $1.000.000\ A$
b)	$22\ mB$	☐ $2200\ B$	☐ $0{,}022\ B$	☐ $2{,}2\ B$	☐ $22\ B$
c)	$3\ MC$	☐ $3 \cdot 10^6\ C$	☐ $3000\ C$	☐ $0{,}003\ C$	☐ $300\ C$
d)	$0{,}01\ kD$	☐ $10\ D$	☐ $100\ D$	☐ $1\ D$	☐ $0{,}1\ D$
e)	$7{,}7\ \mu E$	☐ $77.000\ E$	☐ $770\ E$	☐ $0{,}77\ E$	☐ $7{,}7 \cdot 10^{-6}\ E$
f)	$18\ mF$	☐ $0{,}018\ F$	☐ $18\ F$	☐ $180\ F$	☐ $0{,}0018\ F$
g)	$900\ mG$	☐ $0{,}9\ G$	☐ $9 \cdot 10^{-6}\ G$	☐ $90\ G$	☐ $0{,}009\ G$
h)	$0{,}5\ MH$	☐ $500\ H$	☐ $5 \cdot 10^5\ H$	☐ $0{,}005\ H$	☐ $5 \cdot 10^{-2}\ H$

8) This exercise is based on measurement units $A, B, C, \ldots$ (they do not need to exist in reality) and on the most important prefixes. In the first box of every line you will find a certain measurement which only equals ONE of the four measurements reported to the side. Tick the correspondent box.

a)	$20.000\ A$	☐ $20\ kA$	☐ $2\ MA$	☐ $20\ mA$	☐ $2\ A$
b)	$0{,}03\ B$	☐ $30\ mB$	☐ $3\ kB$	☐ $3\ B$	☐ $0{,}03\ MB$
c)	$70\ C$	☐ $0{,}7\ GC$	☐ $7\ \mu C$	☐ $7\ kC$	☐ $7\ nC$
d)	$0{,}1\ D$	☐ $100\ kD$	☐ $100\ \mu D$	☐ $0{,}01\ D$	☐ $100\ mD$
e)	$0{,}002\ E$	☐ $0{,}02\ mE$	☐ $0{,}2\ GE$	☐ $2\ kE$	☐ $2\ mE$
f)	$100.000\ F$	☐ $10\ mF$	☐ $100\ \mu F$	☐ $1\ kF$	☐ $0{,}1\ MF$
g)	$2400\ G$	☐ $2{,}4\ \mu G$	☐ $240\ MG$	☐ $2{,}4\ kG$	☐ $240\ mG$
h)	$120\ H$	☐ $12\ \mu H$	☐ $1{,}2\ mH$	☐ $120.000\ H$	☐ $0{,}12\ kH$