

MEASUREMENTS AND SI UNITS

In science we can make qualitative and quantitative statements. When we make an observation such as "the metal bar expands when heated"; we are making a qualitative statement. When we are taking measurements and we state that "the metal bar expands 2.6 mm"; we are making a quantitative statement. Whenever a quantitative statement is made, the number should always include a unit.

All measurements have units and in order to avoid confusion, we use S.I. Units (a universal and standard system of measurement)

International System of Units

Fundamental Quantity		Base SI Unit	
Name	Symbol	Name	Symbol
Mass	M	Kilogram	kg
Length	L	Metres	m
Time	T	Seconds	s
Current	I	Amperes	A
Temperature	T/θ	Kelvin degrees Celsius	K °C
Luminous Intensity	I	candela	cd

Sometimes Physicists must use units that are very small or very large. Submultiple units are smaller than the basic unit and multiple units are larger than the basic unit. The base unit is either multiplied by a multiple of 10 (multiple) or divided by a multiple of ten (submultiple)

Common Prefixes with SI Units

PREFIX	MULTIPLE	SYMBOL
giga	10^9	G
mega	10^6	M
kilo	10^3	k
PREFIX	SUBMULTIPLE	SYMBOL
milli	10^{-3}	m
micro	10^{-6}	μ
nano	10^{-9}	η
pico	10^{-12}	p

You must be able to convert units to higher or lower units. If you want to convert a smaller unit to a larger unit, you must divide the number by an appropriate multiple of ten.

Example: Convert 6000g to kg

There are 1000 g in 1 kg Therefore to convert from g to kg you must divide the number by 1000.

$$= 6000 \div 1000$$

$$= 6\text{kg}$$

(*HINT Your final number should be smaller than the original.*)

To convert a larger unit to a smaller unit, you must multiple the number by a multiple of ten.

Example: Convert 7m to mm

1 m has 1000 mm

$$= 7 \times 1000$$

$$= 7000 \text{ mm}$$

(*HINT Your final number should be larger than the original*)

QUESTIONS (*From New Coordinated Science page 16*)

1. Copy and complete the table below

MEASUREMENT	UNIT	SYMBOL
Length		
Mass		
		S
	Ampere	
Temperature		
Area		m ³
	Newton	

2. a) How many mg are there in 1 g?
 b) How many g are there in 1 kg?
 c) How many mg are there in 1 kg?
 d) How many mm are there in 4 km?
 e) How many cm are there in 5 km?

3. Write down the values of

- | | |
|----------------|-----------------|
| a) 300 cm in m | e) 0.5 s in ms |
| b) 500 g in kg | f) 0.75 km in m |
| c) 500 m in km | g) 2.5 kg in g |
| d) 250 ms in s | h) 0.8 m in mm |