

# **BioMedical Admissions Test (BMAT)**

## **Section 2: Mathematics**

### **Topic M1: Units**

## Topic M1: Units

At this stage you should be very confident and familiar with the following units:

### Units of mass

Metric Names	Value
Miligram (mg)	1000mg = 1g
Gram (g)	1g (Base value)
Kilogram (kg)	1000g = 1kg
Tonne (t)	1000kg = 1t

### Units of force

Force Name	Value on Earth	Formula
Newtons (N)	1kg = 9.81N	Force(N)= mass (kg) x velocity (m/s <sup>2</sup> )

### Units of length

Metric Names	Value
Milimetre (mm)	1mm = 0.1cm
Centimetre (cm)	10mm = 1cm
Metre (m)	100cm = 1m
Kilometre (kn)	1000m = 1km

### Units of area

Metric Names	Values
Square millimetre (mm <sup>2</sup> )	1mm <sup>2</sup> = 1mmx1mm
Square centimetre (cm <sup>2</sup> )	1cm <sup>2</sup> = 10mmx10mm= 100mm <sup>2</sup>
Square metres (m <sup>2</sup> )	1m <sup>2</sup> = 100cmx100cm = 10000cm <sup>2</sup>
Square kilometres (km <sup>2</sup> )	1km <sup>2</sup> = 1000mx1000m = 1000000m <sup>2</sup>

## Units of **capacity** and **volume**

Metric Names	Values
Millilitre (ml)	1ml (base value)
Litre (l)	1l = 1000ml
Cubic millimetres (mm <sup>3</sup> )	1mm <sup>3</sup> = 0.001ml
Cubic centimetres (cm <sup>3</sup> )	1cm <sup>3</sup> = 1ml or 1000cm <sup>3</sup> = 1l
Cubic metres (m <sup>3</sup> )	1m <sup>3</sup> = 1000l

## Units of **time**

Time	Value
Seconds	1 second (base value)
Minutes	1 minute = 60 seconds
Hours	1 hour = 60 minutes
Days	1 day = 24 hours
Weeks	1 week = 7 days
Months	1 month = 28,29,30,31 days based on which month it is
Years	1 year = 12 months = 365 days (leap year = 366 days)

## Compound units

These are when **two different units are combined**. An example of this is when measuring speed, where the units are km/h (also written as  $\text{km h}^{-1}$ ).

Changing between compound units is more complex than simply changing between standard units. You must convert both units separately.

**Example:** What is  $14\text{g/cm}^3$  converted into  $\text{kg/m}^3$ ?

First we convert the grams portion of the compound unit to kilograms.

We know that  $1\text{kg} = 1000\text{g}$  so therefore  $1\text{g} = \frac{1}{1000}\text{kg}$ .

$$14\text{g/cm}^3 = \frac{14}{1000}\text{kg/cm}^3 = 0.014\text{kg/cm}^3$$

Now we move onto converting the  $\text{cm}^3$  to  $\text{m}^3$ .

We know that  $1\text{m}^3 = 100 \times 100 \times 100\text{cm}^3 = 1000000\text{cm}^3$ . Therefore  $1\text{cm}^3 = \frac{1}{1000000}\text{m}^3$

$$0.014\text{kg/cm}^3 = \frac{0.014}{1000000}\text{kg/cm}^3 = 0.014 \div \frac{1}{1000000} = 0.014 \times 1000000 = 14000\text{kg/m}^3$$