



AS Level Physics

Chapter 2 – Foundations of Physics

1.1.2 Physical Quantities and Units

Worked Examples

Question

1

Circle the correct value for the prefix tera (T) in the list below:

$$10^6 \quad 10^9 \quad 10^{12} \quad 10^{15}$$

Answer: Using the Table 1:

$$10^6 = 1,000,000 = \text{Mega}$$

$$10^9 = 1,000,000,000 = \text{Giga}$$

$$10^{12} = 1,000,000,000,000 = \text{Tera}$$

$$10^{15} = 1,000,000,000,000,000 = \text{Peta}(P)$$

So the answer to this question is $10^{12} = \text{Tera}$

Prefix	Symbol	Value
tera-	T	10^{12}
giga-	G	10^9
mega-	M	10^6
Kilo-	k	10^3
centi-	c	10^{-2}
milli-	m	10^{-3}
micro-	μ	10^{-6}
nano-	n	10^{-9}
pico-	p	10^{-12}

Table 1

Question

2

Rearrange the following prefixes in the order of smallest to largest:

$$\mu \quad c \quad p \quad k$$

Answer: Using the table 1:

$$\mu = 10^{-6}$$

$$c = 10^{-2}$$

$$p = \text{pico} = 10^{-12}$$

$$k = 10^3$$

Now rearrange from the smallest to largest gives:

$$p \quad \mu \quad c \quad k$$

So the answer to this question is: $p \quad \mu \quad c \quad k$



Question

3

Complete the table of Fig. 1.1 by stating the value or name of each of the remaining three prefixes.

Prefix	Value
micro (μ)	10^{-6}
mega (M)	
	10^{-9}
tera (T)	

Answer: Using the table 1:

Prefix	Value
micro (μ)	10^{-6}
mega (M)	10^6
nano (n)	10^{-9}
tera (T)	10^{12}

Prefix	Symbol	Value
tera-	T	10^{12}
giga-	G	10^9
mega-	M	10^6
Kilo-	k	10^3
centi-	c	10^{-2}
milli-	m	10^{-3}
micro-	μ	10^{-6}
nano-	n	10^{-9}
pico-	p	10^{-12}

Table 1



Question

4

Draw a straight line from each quantity on the left hand side to its correct unit on the right hand side; one has been done for you.

velocity		Nm ⁻²
work done		ms ⁻¹
stress		Nm
density		kg m ⁻³

Answer:

Velocity:

$$\text{Velocity} = \frac{\text{distance}}{\text{time}} = \frac{\text{metre}}{\text{seconds}} = \frac{\text{m}}{\text{s}} = \text{ms}^{-1}$$

SI units

Work done:

$$\text{Work done} = \text{Force} \times \text{distance} = \text{Newton} \times \text{metre} = \text{N} \times \text{m} = \text{Nm}$$

Stress:

$$\text{Stress} = \frac{\text{Force}}{\text{Area}} = \frac{\text{Newton}}{\text{metre squared}} = \frac{\text{N}}{\text{m}^2} = \text{Nm}^{-2}$$

Density:

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{\text{kilogram}}{\text{metre cubed}} = \frac{\text{kg}}{\text{m}^3} = \text{kgm}^{-3}$$

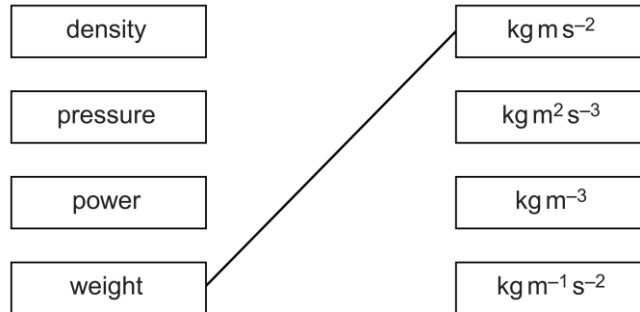
velocity		Nm ⁻²
work done		ms ⁻¹
stress		Nm
density		kg m ⁻³



Question

5

Draw a line from each quantity on the left-hand side to the correct unit on the right-hand side. One quantity (weight) has already been matched to its unit.



Answer:

Density:

$$\text{Density} = \frac{\text{mass}}{\text{Volume}} = \frac{\text{kilogram}}{\text{metre cubed}} = \frac{\text{kg}}{\text{m}^3} = \text{kg m}^{-3}$$

SI units

Pressure:

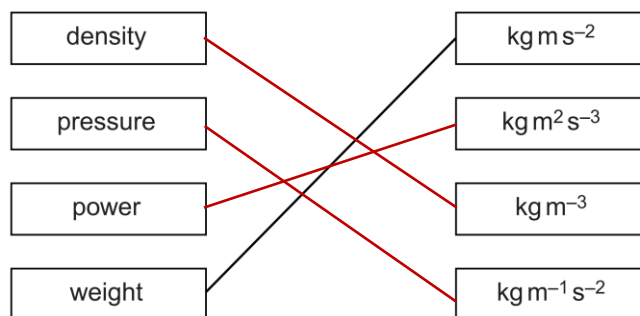
$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} = \frac{\text{mass} \times \text{acceleration}}{\text{Area}} = \frac{\text{kilogram} \times \text{metres per seconds squared}}{\text{metre squared}} = \frac{\text{kg} \times \text{ms}^{-2}}{\text{m}^2} = \text{kg m}^{-1} \text{s}^{-2} = \text{Pa (Pascals)}$$

Power:

$$\text{Power} = \frac{\text{Work}}{\text{Time}} = \frac{\text{Force} \times \text{Displacement}}{\text{Time}} = \frac{\text{kilograms metre per seconds squared} \times \text{metre}}{\text{seconds}} = \frac{\text{kgms}^{-2} \times \text{m}}{\text{s}} = \text{kg m}^2 \text{s}^{-3} = \text{W (Watts)}$$

Weight:

$$\text{Weight} = \text{mass of object} \times \text{acceleration of gravity} = \text{kilogram} \times \text{metre per seconds squared} = \text{kg m s}^{-2} = \text{N (Newtons)}$$



Please see the **'1.1.1 Physical Quantities and Units notes'** for revision notes.

For revision notes, tutorials, worked examples and more help visit www.tutorpacks.co.uk.

