AS Level Physics

Chapter 2 – Foundations of Physics

2.1.2 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:

$$10^6 = 1{,}000{,}000 = Mega$$
$$10^9 = 1{,}000{,}000{,}000 = Giga$$
$$\mathbf{10^{12} = 1{,}000{,}000{,}000{,}000 = Tera}$$
$$10^{15} = 1{,}000{,}000{,}000{,}000{,}000 = Peta(P)$$

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

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:

$$\mu \quad c \quad \rho \quad k$$

Answer: Using the table 1:

$$\mu = 10^{-6}$$
$$c = 10^{-2}$$
$$p = pico = 10^{-12}$$
$$k = 10^3$$
$$Now\ rearrange\ from\ the\ smallest\ to\ larget\ gives:$$
$$p \quad \mu \quad c \quad k$$

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

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:

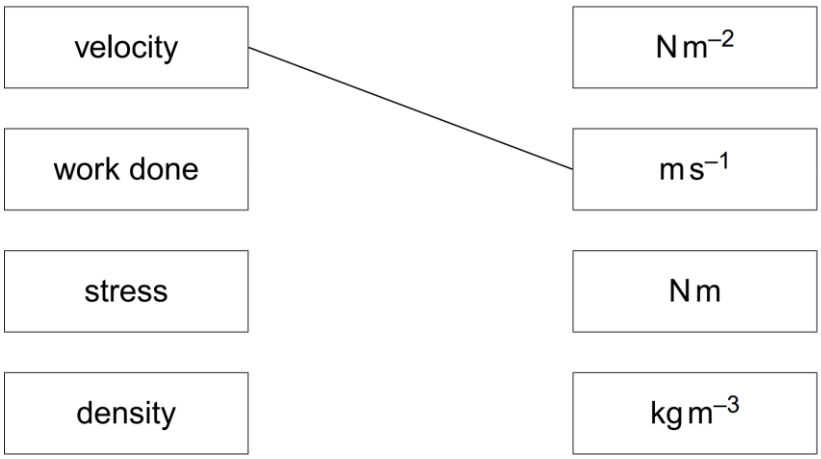
Prefix	Value
micro (μ)	10^{-6}
mega (M)	$\mathbf{10^{6}}$
nano (n)	10^{-9}
tera (T)	$\mathbf{10^{12}}$

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.



Answer:

Velocity:

SI units

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

Work done:

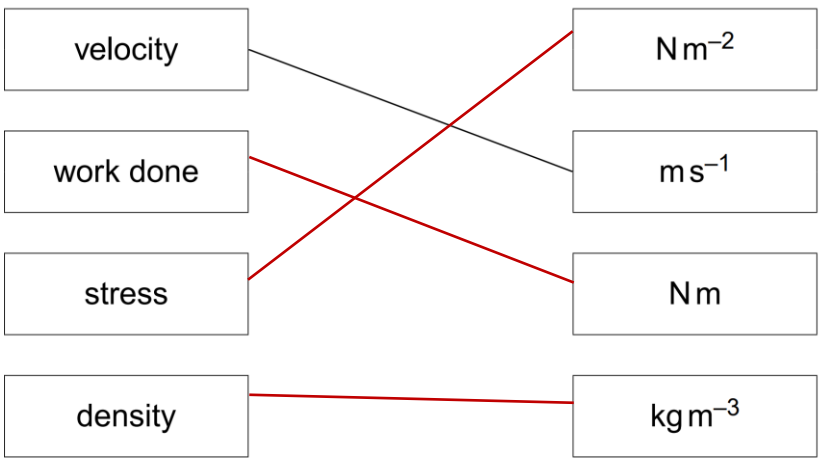
$$Work\ done = Force\ x\ distance = Newton \times metre = N \times m = \boldsymbol{Nm}$$

Stress:

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

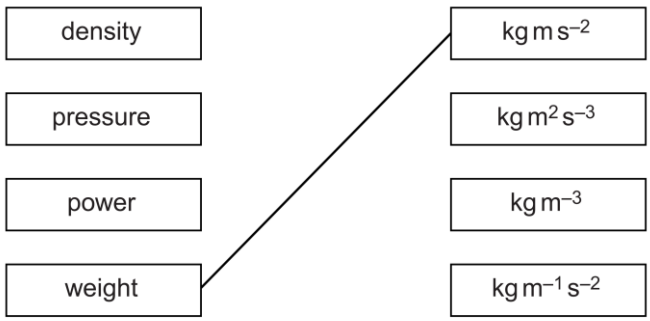
Density:

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



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:

SI units

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

Pressure:

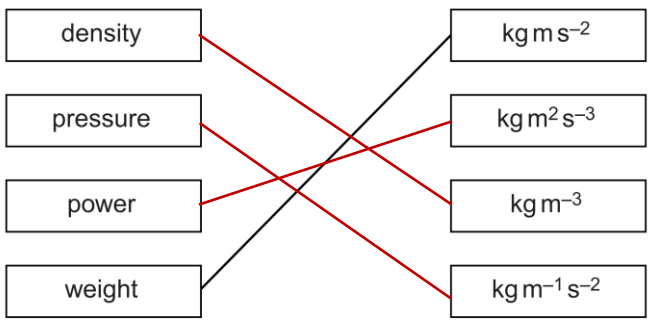
$$Pressure = \frac{Force}{Area} = \frac{mass\ \times acceleration}{Area} = \frac{kilogram\ \times metres\ per\ seconds\ squared}{metre\ squared} = \frac{kg \times ms^{-2}}{m^2} = \boldsymbol{kg\ m^{-1}\ s^{-2}} = Pa\ (Pascals)$$

Power:

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

Weight:

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



Please see the ‘2.1.1 Physical Quantities and Units notes’ for revision notes.

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