



videos

MS.1 Physical quantities, units and prefixes

Look at the following information:

*"The **current** around the circuit is 3 **amperes**."*

Current is a 'physical quantity'. It is something that can be measured or calculated. **Ampere** is a 'unit'. It is what we measure current in.

*1) What is the physical quantity and unit in the following statement?
"A force of 100 newtons is used to push a shopping trolley."*

Here is a table of some other physical quantities and units used in GCSE Physics:

physical quantity	unit
<i>force (F)</i>	<i>newton (N)</i>
<i>distance (s)</i>	<i>metre (m)</i>
<i>wavelength (λ)</i>	<i>metre (m)</i>
<i>charge (Q)</i>	<i>coulomb (C)</i>
<i>current (I)</i>	<i>ampere (A)</i>
<i>speed (v)</i>	<i>metre per second (m/s)</i>
<i>pressure (P)</i>	<i>pascal (Pa)</i>
<i>mass (m)</i>	<i>kilogram (kg)</i>

2) What is charge measured in?

3) What physical quantity is measured in newtons?

You can see from the table that there is a symbol that can represent each physical quantity and each unit. The symbol is a shorthand way of writing the physical quantity or unit. It is important that you use the correct uppercase or lowercase symbol. For example, *F* is used for force and *f* is used for frequency.

4) Research to find out the symbols used for the following physical quantities and their units:

physical quantity	unit
<i>frequency ()</i>	
<i>voltage ()</i>	
<i>work ()</i>	
<i>resistance ()</i>	
<i>acceleration ()</i>	
<i>momentum ()</i>	

Prefixes

When dealing with large or small numbers, prefixes are often used in front of the unit.

For example, *kilometres (km)*. The '*kilo*' tells us that the number must be multiplied by 1000 ($1 \text{ km} = 1 \times 1000 \text{ m} = 1000 \text{ m}$).

Here is a table of other common prefixes that are used:

prefix	multiply by	multiply by
<i>Giga (G)</i>	<i>1 000 000 000</i>	10^9
<i>Mega (M)</i>	<i>1 000 000</i>	10^6
<i>Kilo (k)</i>	<i>1 000</i>	10^3
<i>Centi (c)</i>	<i>0.01</i>	10^{-2}
<i>Milli (m)</i>	<i>0.001</i>	10^{-3}
<i>Micro (μ)</i>	<i>0.000 001</i>	10^{-6}
<i>Nano (n)</i>	<i>0.000 000 001</i>	10^{-9}

✎ 5) Work out the following in metres: i) 3.2 km, ii) 4.0 Mm, iii) 32 cm, iv) 140 mm.

✎ 6) Work out the following in kilometres (km): i) 3520 m, ii) 104 m, iii) 0.47 m, iv) 3000000 m

(Hint: Remember that 'kilo' is a substitute for multiplying by 1000, so divide the value in metres by 1000.)

✎ 7) Convert the following to kilojoules (kJ): i) 7620 J, ii) 32 000 J, iii) 345 000 J, iv) 0.034 J

✎ 8) These ones are more difficult.

i) $1000 \text{ km} = \underline{\hspace{2cm}} \text{ Mm}$

ii) $12 \text{ Gm} = \underline{\hspace{2cm}} \text{ km}$

iii) $35 \text{ mm} = \underline{\hspace{2cm}} \mu\text{m}$

iv) $346 \text{ nm} = \underline{\hspace{2cm}} \text{ mm}$