



# **INTEGRATED SCIENCE**

## **STAGE 3**

# **FORMULAE AND DATA SHEET 2012**

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This document is valid for teaching and examining until 31 December 2012.

Work	$W = Fs ; W = \Delta E$
Potential energy	$E_p = mgh$
Kinetic energy	$E_k = \frac{1}{2} mv^2$
Power	$P = \frac{W}{t}$
Electrical power	$P = VI = I^2R$
Efficiency	efficiency = $\frac{\text{energy out}}{\text{energy in}} \times 100\%$

Percentage composition by mass for ore  $A_yB_z$

$$\% \text{ A in ore} = \frac{y \times \text{atomic weight of A}}{(y \times \text{atomic weight of A}) + (z \times \text{atomic weight of B})} \times 100$$

$$\% \text{ B in ore} = \frac{z \times \text{atomic weight of B}}{(y \times \text{atomic weight of A}) + (z \times \text{atomic weight of B})} \times 100$$

### Relevant units and definitions

<b>Volume:</b>	Volumes are given in the units of litres (L), or millilitres (mL).
<b>Energy change:</b>	Energy changes are given in the SI unit joule (J).
<b>Population density:</b>	Number of an individual species living in a particular place at a particular time per unit area.
<b>Electricity cost:</b>	Cost = rated power of appliance $\times$ duration of use $\times$ cost per unit of electricity. Cost = units of electricity used $\times$ cost per unit of electricity.

### Prefixes of the metric system

Factor	Prefix	Symbol
$10^{18}$	exa	E
$10^{15}$	peta	P
$10^{12}$	tera	T
$10^9$	giga	G
$10^6$	mega	M
$10^3$	kilo	k
$10^{-3}$	milli	m
$10^{-6}$	micro	$\mu$

### Standard atomic weights of selected elements

Name	Symbol	Atomic Weight
aluminium	Al	26.98
antimony	Sb	121.76
carbon	C	12.01
copper	Cu	63.55
gold	Au	196.97
hydrogen	H	1.008
iron	Fe	55.85
lead	Pb	207.2
nickel	Ni	58.69
oxygen	O	16.00
silicon	Si	28.09
sulfur	S	32.07
titanium	Ti	47.87
zinc	Zn	65.41
zirconium	Zr	91.22