



Oxford Cambridge and RSA

June 2023 only

**GCSE (9–1) Combined Science B
(Twenty First Century Science)**

J260 04/08

Data and Equation Sheet



INSTRUCTIONS

- Do **not** send this Data and Equation Sheet for marking. Keep it in the centre or recycle it.

INFORMATION

- This Data and Equation Sheet is for the June 2023 examination series only.
- This Data and Equation Sheet has **4** pages.

Equations in physics

Key: HT = Higher Tier only

P1 Radiation and waves	
wave speed = frequency \times wavelength	$v = f\lambda$

P2 Sustainable energy	
energy transferred = power \times time	$E = Pt$
efficiency = $\frac{\text{useful energy transferred}}{\text{total energy transferred}}$	

P3 Electric circuits	
charge = current \times time	$Q = It$
potential difference = current \times resistance	$V = IR$
potential difference = $\frac{\text{work done (energy transferred)}}{\text{charge}}$	$V = \frac{W}{Q}$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
energy transferred (work done) = charge \times potential difference	$E = QV$
power = potential difference \times current	$P = VI$
power = (current) ² \times resistance	$P = I^2R$
potential difference across primary coil \times current in primary coil = potential difference across secondary coil \times current in secondary coil	$V_p I_p = V_s I_s$
force = magnetic flux density \times current \times length of conductor	$F = BIl$
HT	

	P4 Explaining motion	
	weight = mass × gravitational field strength	$W = mg$
	average speed = $\frac{\text{distance}}{\text{time}}$	$v = \frac{s}{t}$
	acceleration = $\frac{\text{change in speed}}{\text{time taken}}$	$a = \frac{v - u}{t}$
	(final speed) ² – (initial speed) ² = 2 × acceleration × distance	$v^2 - u^2 = 2as$
HT	momentum = mass × velocity	$p = mv$
HT	change in momentum = resultant force × time for which it acts	$\Delta p = Ft$
	force = mass × acceleration	$F = ma$
	work done = force × distance (along the line of action of the force)	$W = Fs$
	kinetic energy = $\frac{1}{2} \times \text{mass} \times (\text{speed})^2$	$E = \frac{1}{2}mv^2$
	gravitational potential energy = mass × gravitational field strength × height	$E = mgh$
	power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$

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	P6 Matter – models and explanations	
	density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
	change in internal energy = mass × specific heat capacity × change in temperature	$\Delta E = mc\Delta\theta$
	energy to cause a change of state = mass × specific latent heat	$E = ml$
	force exerted by a spring = spring constant × extension	$F = kx$
	energy stored in a stretched spring = $\frac{1}{2} \times \text{spring constant} \times (\text{extension})^2$	$E = \frac{1}{2}kx^2$

The Periodic Table of the Elements

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18)

Key
 atomic number
Symbol
 name
 relative atomic mass

1 H hydrogen 1.0																	2 He helium 4.0																		
3 Li lithium 6.9	4 Be beryllium 9.0															9 F fluorine 19.0	10 Ne neon 20.2																		
11 Na sodium 23.0	12 Mg magnesium 24.3															17 Cl chlorine 35.5	18 Ar argon 39.9																		
19 K potassium 39.1	20 Ca calcium 40.1	3 Sc scandium 45.0	4 Ti titanium 47.9	5 V vanadium 50.9	6 Cr chromium 52.0	7 Mn manganese 54.9	8 Fe iron 55.8	9 Co cobalt 58.9	10 Ni nickel 58.7	11 Cu copper 63.5	12 Zn zinc 65.4	13 B boron 10.8	14 C carbon 12.0	15 N nitrogen 14.0	16 O oxygen 16.0	31 Ga gallium 69.7	32 Ge germanium 72.6	33 As arsenic 74.9	34 Se selenium 79.0	35 Br bromine 79.9	36 Kr krypton 83.8														
37 Rb rubidium 85.5	38 Sr strontium 87.6	39 Y yttrium 88.9	40 Zr zirconium 91.2	41 Nb niobium 92.9	42 Mo molybdenum 95.9	43 Tc technetium	44 Ru ruthenium 101.1	45 Rh rhodium 102.9	46 Pd palladium 106.4	47 Ag silver 107.9	48 Cd cadmium 112.4	49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.3	55 Cs caesium 132.9	56 Ba barium 137.3	57–71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1	79 Au gold 197.0	80 Hg mercury 200.6	81 Tl thallium 204.4	82 Pb lead 207.2	83 Bi bismuth 209.0	84 Po polonium	85 At astatine	86 Rn radon
87 Fr francium	88 Ra radium	89–103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium	113 Nh nihonium	114 Fl flerovium	115 Mc moscovium	116 Lv livermorium	117 Ts tennessine	118 Og oganesson																		