

Modified Enlarged 24pt

CAMBRIDGE OCR

June 2027

**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.

EQUATIONS IN PHYSICS

Key: HT = Higher Tier only

	P1 RADIATION AND WAVES	
	wave speed = frequency × wavelength	$v = f\lambda$

	P2 SUSTAINABLE ENERGY	
	energy transferred = power × time	$E = Pt$
	efficiency = $\frac{\text{useful energy transferred}}{\text{total energy transferred}}$	

2

	P3 ELECTRIC CIRCUITS	
	charge = current × time	$Q = It$
	potential difference = current × 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 × potential difference	$E = QV$
	power = potential difference × current	$P = VI$
	power = (current) ² × resistance	$P = I^2R$

	P3 ELECTRIC CIRCUITS	
	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$
HT	force = magnetic flux density × current × length of conductor	$F = BIl$

	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 = $\frac{1}{2}$ × mass × (speed) ²	$E = \frac{1}{2}mv^2$
	gravitational potential energy = mass × gravitational field strength × height	$E = mgh$
	power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$

	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		$\Delta E = m c \Delta \theta$
	energy to cause a change of state = mass × specific latent heat		$E = m l$
	force exerted by a spring = spring constant × extension		$F = k x$
	energy stored in a stretched spring = $\frac{1}{2}$ × spring constant × (extension)²		$E = \frac{1}{2} k x^2$

The Periodic Table of the Elements

(1)	(2)	Key										(3)	(4)	(5)	(6)	(7)	(0)																																																						
1		atomic number										18																																																											
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	21	Sc	scandium	45.0	22	Ti	titanium	47.9	23	V	vanadium	50.9	24	Cr	chromium	52.0	25	Mn	manganese	54.9	26	Fe	iron	55.8	27	Co	cobalt	58.9	28	Ni	nickel	58.7	29	Cu	copper	63.5	30	Zn	zinc	65.4	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						114	Fl	flerovium						116	Lv	livermorium									

ELEMENTS LISTED IN ATOMIC NUMBER ORDER:

ATOMIC NUMBER	NAME	SYMBOL	RELATIVE ATOMIC MASS
1	Hydrogen	H	1.0
2	Helium	He	4.0
3	Lithium	Li	6.9
4	Beryllium	Be	9.0
5	Boron	B	10.8
6	Carbon	C	12.0
7	Nitrogen	N	14.0
8	Oxygen	O	16.0
9	Fluorine	F	19.0
10	Neon	Ne	20.2
11	Sodium	Na	23.0
12	Magnesium	Mg	24.3
13	Aluminium	Al	27.0
14	Silicon	Si	28.1
15	Phosphorus	P	31.0
16	Sulfur	S	32.1
17	Chlorine	Cl	35.5
18	Argon	Ar	39.9
19	Potassium	K	39.1
20	Calcium	Ca	40.1
21	Scandium	Sc	45.0
22	Titanium	Ti	47.9
23	Vanadium	V	50.9
24	Chromium	Cr	52.0
25	Manganese	Mn	54.9
26	Iron	Fe	55.8
27	Cobalt	Co	58.9
28	Nickel	Ni	58.7
29	Copper	Cu	63.5
30	Zinc	Zn	65.4
31	Gallium	Ga	69.7
32	Germanium	Ge	72.6
33	Arsenic	As	74.9
34	Selenium	Se	79.0
35	Bromine	Br	79.9
36	Krypton	Kr	83.8
37	Rubidium	Rb	85.5
38	Strontium	Sr	87.6
39	Yttrium	Y	88.9
40	Zirconium	Zr	91.2
41	Niobium	Nb	92.9

ATOMIC NUMBER	NAME	SYMBOL	RELATIVE ATOMIC MASS
42	Molybdenum	Mo	95.9
43	Technetium	Tc	
44	Ruthenium	Ru	101.1
45	Rhodium	Rh	102.9
46	Palladium	Pd	106.4
47	Silver	Ag	107.9
48	Cadmium	Cd	112.4
49	Indium	In	114.8
50	Tin	Sn	118.7
51	Antimony	Sb	121.8
52	Tellurium	Te	127.6
53	Iodine	I	126.9
54	Xenon	Xe	131.3
55	Caesium	Cs	132.9
56	Barium	Ba	137.3
72	Hafnium	Hf	178.5
73	Tantalum	Ta	180.9
74	Tungsten	W	183.8
75	Rhenium	Re	186.2
76	Osmium	Os	190.2
77	Iridium	Ir	192.2
78	Platinum	Pt	195.1
79	Gold	Au	197.0
80	Mercury	Hg	200.6
81	Thallium	Tl	204.4
82	Lead	Pb	207.2
83	Bismuth	Bi	209.0
84	Polonium	Po	
85	Astatine	At	
86	Radon	Rn	
87	Francium	Fr	
88	Radium	Ra	
104	Rutherfordium	Rf	
105	Dubnium	Db	
106	Seaborgium	Sg	
107	Bohrium	Bh	
108	Hassium	Hs	
109	Meitnerium	Mt	
110	Darmstadtium	Ds	
111	Roentgenium	Rg	
112	Copernicium	Cn	
114	Flerovium	Fl	
116	Livermorium	Lv	

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