

CAMBRIDGE OCR

June 2027

GCSE (9–1) Physics A (Gateway Science)

J249 01/02/03/04

Equation Sheet

INSTRUCTIONS

You can write on this Equation Sheet but it will NOT be sent for marking.

EQUATIONS IN PHYSICS

Key: HT = Higher Tier only

	P1 MATTER		
	density = $\frac{\text{mass}}{\text{volume}}$		$\rho = \frac{m}{V}$
	change in thermal energy = mass × specific heat capacity × change in temperature		$\Delta E = m c \Delta \theta$
	thermal energy for a change in state = mass × specific latent heat		$E = m l$
	for a given mass of gas at a constant temperature: pressure × volume = constant		$p V = \text{constant}$
HT	pressure due to a column of liquid = height of column × density of liquid × gravitational field strength		$p = h \rho g$

2

	P2 FORCES		
	distance travelled = speed × time		$s = v t$
	acceleration = $\frac{\text{change in velocity}}{\text{time}}$		$a = \frac{v - u}{t}$
	$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$		$v^2 - u^2 = 2 a s$

	P2 FORCES	
	kinetic energy = $\frac{1}{2} \times \text{mass} \times (\text{speed})^2$	$E = \frac{1}{2} m v^2$
	force = mass $\times$ acceleration	$F = m a$
HT	momentum = mass $\times$ velocity	$p = m v$
	work done = force $\times$ distance (along the line of action of the force)	$W = F s$
	power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
	force exerted by a spring = spring constant $\times$ extension	$F = k x$
	energy transferred in stretching = $\frac{1}{2} \times$ spring constant $\times$ (extension) ²	$E = \frac{1}{2} k x^2$
	gravitational force = mass $\times$ gravitational field strength	$W = m g$
	gravitational potential energy = mass $\times$ gravitational field strength $\times$ height	$E = m g h$
	pressure = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$	$p = \frac{F}{A}$
	moment of a force = force $\times$ distance (normal to direction of the force)	$M = F d$

	P3 ELECTRICITY	
	charge flow = current × time	$Q = It$
	potential difference = current × resistance	$V = IR$
	energy transferred = charge × potential difference	$E = QV$
	power = potential difference × current	$P = VI$
	power = (current) ² × resistance	$P = I^2 R$
	energy transferred = power × time	$E = Pt$

	P4 MAGNETISM AND MAGNETIC FIELDS	
HT	force on a conductor (at right angles to a magnetic field) carrying a current: force = magnetic flux density × current × length	$F = BIl$
HT	$\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$	$\frac{V_p}{V_s} = \frac{N_p}{N_s}$

	P5 WAVES IN MATTER	
	wave speed = frequency × wavelength	$v = f\lambda$

	P7 ENERGY		
	efficiency = $\frac{\text{useful output energy transfer}}{\text{input energy transfer}}$		

	P8 GLOBAL CHALLENGES		
	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil		$V_p I_p = V_s I_s$

BLANK PAGE

BLANK PAGE



Copyright Information

Cambridge OCR is committed to securing permission to reproduce all third-party content that it uses in its assessment materials. If Cambridge OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, Cambridge OCR will be happy to correct its mistake at the earliest possible opportunity. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the Cambridge OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

For queries or further information please contact The Cambridge OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

Cambridge OCR is part of Cambridge University Press & Assessment, which is itself a department of the University of Cambridge.

