

Modified Enlarged 24pt
OXFORD CAMBRIDGE AND RSA EXAMINATIONS
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GCSE (9–1) Physics A (Gateway Science)
J249 01/02/03/04
Equation Sheet

INSTRUCTIONS

Do NOT send this Equation Sheet for marking. Keep it in the centre or recycle it.



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	$p = h \rho g$

	P2 FORCES	
	distance travelled = speed × time	$s = vt$
	acceleration = $\frac{\text{change in velocity}}{\text{time}}$	$a = \frac{v - u}{t}$
	$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$	$v^2 - u^2 = 2as$
	kinetic energy = $\frac{1}{2} \times \text{mass} \times (\text{speed})^2$	$E = \frac{1}{2}mv^2$
	force = mass × acceleration	$F = ma$
HT	momentum = mass × velocity	$p = mv$
	work done = force × distance (along the line of action of the force)	$W = Fs$
	power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$

	P2 FORCES	
	force exerted by a spring = spring constant × extension	$F = kx$
	energy transferred in stretching $= \frac{1}{2} \times \text{spring constant} \times (\text{extension})^2$	$E = \frac{1}{2} kx^2$
	gravitational force = mass × gravitational field strength	$W = mg$
	gravitational potential energy = mass × gravitational field strength × height	$E = mgh$
	pressure = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$	$p = \frac{F}{A}$
	moment of a force = force × distance (normal to direction of the force)	$M = Fd$

	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	$F = B I l$
HT	potential difference across primary coil = $\frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$ potential difference across secondary coil	$\frac{V_p}{V_s} = \frac{N_p}{N_s}$

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	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	$V_p I_p = V_s I_s$

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