Oxford Cambridge and RSA

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

J250 05/06/11/12 Physics

Equation Sheet

INSTRUCTIONS

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

INFORMATION

• This Equation Sheet has **4** pages.

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	$\Delta E = mc\Delta\theta$
	thermal energy for a change in state = mass × specific latent heat	$E = ml$

	P2 Forces	
	distance travelled = speed × time	$s = vt$
	acceleration = $\frac{\text{change in velocity}}{\text{time}}$	$a = \frac{v-u}{t}$
	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2as$
	kinetic energy = $\frac{1}{2}$ × mass × (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 = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
	force exerted by a spring = spring constant × extension	$F = kx$
	energy transferred in stretching = $\frac{1}{2}$ × spring constant × (extension)^2	$E = \frac{1}{2}kx^2$

	P2 Forces	
	gravitational force = mass × gravitational field strength	$W = mg$
	gravitational potential energy = mass × gravitational field strength × height	$E = mgh$

	P3 Electricity and magnetism	
	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	$P = I^2R$
	energy transferred = power × time	$E = Pt$
HT	force on a conductor (at right angles to a magnetic field) carrying a current: force = magnetic flux density × current × length	$F = BIl$

	P4 Waves and radioactivity	
	wave speed = frequency × wavelength	$v = f\lambda$

	P5 Energy	
	efficiency = $\frac{\text{useful output energy transfer}}{\text{input energy transfer}}$	

	P6 Global challenges	
	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_pI_p = V_sI_s$

Turn over