GCSE Separate Science Equations

Physics Equations

weight = mass × gravitational field strength (g)	$W = mg$
work done = force × distance (along the line of action of the force)	$W = Fs$
force applied to a spring = spring constant × extension	$F = ke$
moment of a force = force × distance (normal to direction of force)	$M = Fd$
distance travelled = speed × time	$s = vt$
pressure = force normal to a surface ÷ area of that surface	$p = F \div A$
acceleration = change in velocity ÷ time taken	$a = \Delta v \div t$
resultant force = mass × acceleration	$F = ma$
(HT) momentum = mass × velocity	$p = mv$
kinetic energy = 0.5 × mass × speed^2	$E_k = \frac{1}{2}mv^2$
gravitational potential energy = mass × gravitational field strength (g) × height	$E_p = mgh$
power = energy transferred ÷ time	$P = E \div t$
power = work done ÷ time	$P = W \div t$
efficiency = useful output energy transfer ÷ total input energy transfer	
efficiency = useful power output ÷ total power input	
wave speed = frequency × wavelength	$v = f\lambda$
charge flow = current × time	$Q = It$
potential difference = current × resistance	$V = IR$
power = potential difference × current	$P = VI$
power = (current)^2 × resistance	$P = I^2R$
energy transferred = power × time	$E = Pt$
energy transferred = charge flow × potential difference	$E = QV$
density = mass ÷ volume	$p = m \div V$

Physics Equations Provided in the Exam

(HT) pressure due to a column of liquid = height of column × density of liquid × gravitational field strength (g) — $p = h\rho g$

final velocity^2 – initial velocity^2 = 2 × acceleration × distance — $v^2 - u^2 = 2as$

(HT) force = change in momentum / time taken — $F = m\Delta v \div \Delta t$

elastic potential energy = 0.5 × spring constant × extension^2 — $E_e = \frac{1}{2}ke^2$

change in thermal energy = mass × specific heat capacity × temperature change — $\Delta E = mc\Delta\theta$

period = 1 ÷ frequency

magnification = image height ÷ object height

(HT) force on a conductor at right angles to a magnetic field carrying a current = magnetic flux density × current × length — $F = BIl$

thermal energy for a change of state = mass × specific latent heat — $E = mL$

(HT) potential difference across primary coil ÷ potential difference across secondary coil = number of turns in primary coil ÷ number of turns in secondary coil — $V_p / V_s = n_p / n_s$

(HT) potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil — $V_p I_p = V_s I_s$

for gases: pressure × volume = constant — pV = constant

Chemistry Equations

relative formula mass = sum of relative atomic masses of atoms in the molecule — $Mr = \sum A_r$

relative atomic mass (A_r) = $\frac{\text{sum of (isotope abundance × isotope mass number)}}{\text{sum of abundances of all the isotopes}}$

percentage mass of an element in a compound = (A_r × number of atoms of that element ÷ M_r of the compound) × 100

percentage yield = (mass of product actually made ÷ maximum expected mass of product)

percentage atom economy = (relative formula mass of desired product ÷ sum of relative formula masses of all reactants) × 100

concentration = mass of dissolved substance ÷ volume of solvent

(HT) number of moles = mass ÷ relative formula mass

(HT) concentration = number of moles ÷ volume

(HT) volume of gas (at room temperature) = number of moles × 24

(HT) overall energy change = sum of energy needed to break bonds in reactants – sum of energy released when bonds form in products

mean rate of reaction = quantity of reactant used ÷ time taken

mean rate of reaction = quantity of product formed ÷ time taken

R_f value = distance moved by substance ÷ distance moved by solvent

Biology Equations

magnification = image size ÷ actual size

surface area = length × width

volume = length × width × height

percentage = (proportion of total ÷ total) × 100

(HT) light intensity α 1 ÷ distance^2

$$\text{efficiency} = \left(\frac{\text{biomass transferred to the next level}}{\text{biomass available at the previous level}}\right) \times 100$$