VCE PHYSICS Unit 2 – Formulae Sheet

Motion

Change in position (Displacement) Change in velocity	$\Delta x = x_{final} - x_{initial} = x_{final} + (-x_{initial})$ $\Delta v = v_{final} - v_{initial} = v_{final} + (-v_{initial})$
Velocity	$\vec{v} = \frac{\Delta x}{t} = \frac{x_2 - x_1}{t}$ $speed = \frac{distance}{time}$
Acceleration	$\vec{a} = \frac{\Delta v}{t} = \frac{v_2 - v_1}{t}$
Constant Acceleration	$v = u + at$ $x = ut + \frac{1}{2}at^2$ $x = \frac{1}{2}(u + v)t$ $v^2 = u^2 + 2ax$ $x = vt - \frac{1}{2}at^2$
Newton's second law	$\Sigma\vec{F} = m\vec{a}$
Weight	$\vec{w} = m\vec{g}$
Momentum	$\vec{p} = m\vec{v}$
Impulse	$\vec{I} = \Delta\vec{p}$ $\vec{I} = \vec{F}_{ave}\Delta t$
Torque	$\tau = r F \sin\theta$
Work	$Work = F \times x$ $Work = F x \cos\theta$ $Work = \Delta E$
Kinetic Energy	$E_K = \frac{1}{2} m v^2$
Hooke's law	$F = kx$

Spring Potential energy	$U_s = \frac{1}{2} k x^2$
Gravitational potential energy	$U_g = m g h$
Power	$P = \frac{w}{t} = \frac{\Delta E}{t}$ $P = F v_{ave}$
Efficiency	$Efficiency\ (\eta) = \frac{useful\ energy\ out}{total\ energy\ in} \times 100\ \%$

Medical Physics

Wave equation	$v = \lambda f$
Energy of Photon Wave energy X-ray energy	$E = h f$
Radiation Dose	$absorbed\ dose = \frac{energy\ absorbed}{mass}$ $dose\ equivalent = absorbed\ dose \times quality\ factor$

Physical Constants

Gravitational Field strength (g) = 9.8 N/kg
Acceleration due to Gravity = 9.8 m/s
Mass of proton = 1.672×10^{-27} kg
Mass of neutron = 1.674×10^{-27} kg
Mass of electron = 9.109×10^{-31} kg
Charge of electron e = -1.6×10^{-19} C
$1eV = 1.6 \times 10^{-19} J$
c = speed of light (3×10^8 ms^{-1})
Planck's Constant $h = 6.626 \times 10^{-34}$ J s
$h = 4.14 \times 10^{-15}$ eV s