

Year 11 Physics Equation Sheet Semester 2

Physical Constants

$$g = 9.8 \text{ ms}^{-2}$$

$$G = 6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-1}$$

$$h = 6.63 \times 10^{-34} \text{ Js} \quad h = \text{Planck's constant}$$

$$c = 3.00 \times 10^8 \text{ ms}^{-1} \quad c = \text{speed of light}$$

$$e = 1.60 \times 10^{-19} \text{ C} \quad e = \text{charge of an electron}$$

Common Formulae

$\vec{F} = m\vec{a}$	\vec{F} = force
	m = mass
$\vec{F}_1 = -\vec{F}_2$	\vec{a} = acceleration
	\vec{v} = velocity
$\Delta \vec{v} = \vec{v}_f - \vec{v}_i$	$\Delta \vec{v}$ = change in velocity

Projectile Motion

$$v_H = v \cos \theta \quad v = \sqrt{v_H^2 + v_V^2} \quad \theta = \tan^{-1} \left(\frac{v_V}{v_H} \right)$$

$$v_V = v \sin \theta$$

$$\vec{v} = \vec{v}_0 + \vec{a}t$$

$$\vec{s} = \vec{v}_0t + \frac{1}{2}\vec{a}t^2$$

$$v^2 = v_0^2 + 2as$$

θ = angle to the horizontal

v_H = horizontal component of velocity

v_V = vertical component of velocity

v_0 = initial velocity

v = velocity at time t

a = acceleration

s = displacement after time t

Circular Motion

$$a = \frac{v^2}{r} \quad v = \frac{2\pi r}{T} \quad \theta = \tan^{-1} \left(\frac{v^2}{rg} \right)$$

θ = angle to the horizontal

v = orbital speed

r = radius of circle

a = magnitude of centripetal acceleration

T = period of motion

Gravitation and Satellites

$$F = G \frac{m_1 m_2}{r^2} \quad v = \sqrt{\frac{GM}{r}} \quad T = \sqrt{\frac{4\pi^2 r^3}{GM}}$$

M = mass of object being orbited

v = orbital speed

r = distance between m_1 and m_2

T = period of motion

Energy and Momentum

$$K = \frac{1}{2}mv^2 \quad W = Fs \cos \theta$$

θ = angle between directions of force F and displacement s

W = work done

$$\vec{p} = m\vec{v} \quad \Delta\vec{p} = \vec{p}_f - \vec{p}_i$$

p = momentum

Δp = change in momentum

$$\vec{F} = \frac{\Delta\vec{p}}{\Delta t}$$

The Atom and Quantum

$$f = \frac{c}{\lambda} \quad f = \text{frequency} \\ \lambda = \text{wavelength}$$

$$E = hf$$

$$K_{max} = hf - W \quad W = \text{work function of the metal}$$

$$p = \frac{h}{\lambda}$$

$$E_n - E_m = hf \quad E_n - E_m = \text{energy difference}$$

The Nucleus and Radioactivity

$$E_b = \Delta mc^2$$

$$A = Z + N \quad A = \text{mass number}$$

Z = atomic number

N = number of neutrons