EXAMINATION DATA SHEET FOR ADVANCED PROGRAMME PHYSICS

Physical Constants

Name	Symbol	Value with unit
Acceleration due to Gravity	g	$9{,}81\ \text{m}\cdot\text{s}^{-2}$
Speed of light in a vacuum	c	$3{,}00 \times 10^{8}\ \text{m}\cdot\text{s}^{-1}$
Universal gravitational constant	G	$6{,}67 \times 10^{-11}\ \text{N}\cdot\text{m}^{2}\cdot\text{kg}^{-2}$
Coulomb's constant	k	$8{,}99 \times 10^{9}\ \text{N}\cdot\text{m}^{2}\cdot\text{C}^{-2}$
Magnitude of charge on an electron	e	$1{,}602 \times 10^{-19}\ \text{C}$
Mass of an electron	m_e	$9{,}109 \times 10^{-31}\ \text{kg}$
Mass of a proton	m_p	$1{,}673 \times 10^{-27}\ \text{kg}$
Mass of a neutron	m_n	$1{,}675 \times 10^{-27}\ \text{kg}$
Unified atomic mass unit	u	$1{,}660 \times 10^{-27}\ \text{kg}$
Avogadro's constant	N_A	$6{,}022 \times 10^{23}\ \text{mol}^{-1}$
Absolute zero temperature	T_0	$-273{,}15\ ^{\circ}\text{C}$
1 light-year	ly	$9{,}461 \times 10^{15}\ \text{m}$
Stefan-Boltzmann constant	σ	$5{,}67 \times 10^{-8}\ \text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-4}$

Formulae

Thermal Physics		
$\Delta L = \alpha L_0 \Delta T$	$Q = mc\Delta T$	$Q = mL_f$
$\Delta V = \beta V_0 \Delta T$	$Q = mL_v$	
Modern Physics		
$\lambda = \dfrac{\ln 2}{t_{\frac{1}{2}}}$	$t = -\dfrac{\ln\left(\frac{A}{A_0}\right)}{\lambda}$	
$\lambda_{\max} T = 2{,}90 \times 10^{-3}\ \text{m}\cdot\text{K}$	$\dfrac{L_{star}}{L_{sun}} = \left(\dfrac{m_{star}}{m_{sun}}\right)^{a}$	

Mechanics		
$v = u + at$ **or** $v_f = v_i + a\Delta t$	$s = \left(\frac{v+u}{2}\right)t$ **or** $\Delta x = \left(\frac{v_f + v_i}{2}\right)t$	
$v^2 = u^2 + 2as$ **or** $v_f{}^2 = v_i{}^2 + 2a\Delta x$	$s = ut + \frac{1}{2}at^2$ **or** $\Delta x = v_i\Delta t + \frac{1}{2}a\left(\Delta t^2\right)$	
$f = \frac{1}{T}$	$\omega = \frac{\theta}{t}$	$T = \frac{2\pi}{\omega}$
$s = \theta r$	$v = \omega r$	$a = \frac{v^2}{r}$
$g = \frac{GM}{r^2}$	$a = \omega^2 r$	$F = m\omega^2 r$
$\tau = r F_\perp$	$\tau = r_\perp F$	
Charged Particles in Fields		
$E = \frac{F}{q}$	$E = \frac{V}{d}$	$F = qvB \sin\theta$
Oscillations		
$a = -\omega^2 x$	$x = x_0 \sin\omega t$	$x = x_0 \cos\omega t$
$v = v_0 \cos\omega t$	$v = v_0 \sin\omega t$	$v = \pm\omega\sqrt{x_0{}^2 - x^2}$
$E_K = \frac{1}{2}m\omega^2\left(x_0{}^2 - x^2\right)$	$E_P = \frac{1}{2}m\omega^2 x^2$	