

VCE PHYSICS Unit 1 – Formulae Sheet

Thermal Effects

Temperature	$^{\circ}\text{F} = \left(\frac{9}{5}\right)^{\circ}\text{C} + 32$ $\text{K} = ^{\circ}\text{C} + 273.15$
First Law of Thermodynamics	$\Delta U = Q - W$
Specific Heat Capacity	$Q = m c \Delta T$
Latent Heat	$Q = m l$
Wein's Displacement Law	$\lambda_p = \frac{2.898 \times 10^{-3}}{T}$
Stephan-Boltzmann Law	$P = e \sigma A (T^4 - T_s^4)$

Electric Circuits

Electric Current	$I = \frac{q}{t}$
Voltage	$V = \frac{E}{q}$
Electrical Energy	$V = \frac{E}{q} \rightarrow E = q V$ $E = V I t$
Electric Power	<p>General power expression $P \frac{E}{t}$</p> <p>Electricity specific expressions</p> $P = V I$ $P = I^2 R$ $P = \frac{V^2}{R}$

Ohm's Law	$V = I R$
Series Resistances	$R_T = R_1 + R_2 + R_3 + \dots$
Parallel Resistances	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$
Voltage Divider	$\frac{V_{out}}{V_{in}} = \frac{R_2}{R_1 + R_2}$

Matter

Parallax	$d = \frac{1}{p}$
Hubble's Law	$v = H_o d$
Half-life	$N = N_0 \left(\frac{1}{2}\right)^n$
Mass-Energy equation	$E = m c^2$
Photon Energy	$E_{\text{photon}} = h f$

Prefix	tera	giga	mega	kilo	deci	centi	milli	micro	nano	pico
Symbol	T	G	M	k	d	c	m	μ	n	p
Notation	10^{12}	10^9	10^6	10^3	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}

Physical Constants

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 $e = -1.6 \times 10^{-19}$ C

Stefan-Boltzmann constant $\sigma = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$

Astronomical unit (AU) – the distance from Earth to the Sun. 1.496×10^{11} m

Light Year (ly) – the distance light travels in one year. 9.461×10^{15} m

Parsec (pc) – 3.086×10^{16} m

To convert parsec to Astronomical units (AU) multiply by 206 265

To convert parsec to light-years multiply by 3.2616

Hubble constant $H_o = 70 \text{ km s}^{-1} \text{ Mpc}^{-1}$

$1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$

$c = \text{speed of light} (3 \times 10^8 \text{ ms}^{-1})$

Planck's Constant $h = 6.626 \times 10^{-34} \text{ J s}$

$h = 4.14 \times 10^{-15} \text{ eV s}$