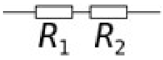
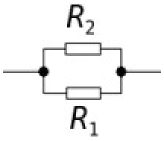
iGCSE CIE Physics 0625 (2020 Syllabus) Formula List

General	
Average speed *(ms^{-1})* = distance *(m)* / time *(s)*	
Average velocity *(ms^{-1})* = displacement *(m)* / time *(s)*	$v = \frac{s}{t}$
Period of a pendulum *(s)* = total time *(s)* / number of swings	$T = \frac{t}{\text{number}}$
Acceleration *(ms^{-2})* = (final velocity *(ms^{-1})* – initial velocity *(ms^{-1})*) / time *(s)*	$a = \frac{v-u}{t}$
Weight *(N)* = mass *(kg)* × gravitational field strength *(ms^{-2})* *Note: Earth's gravitational field strength = 10 ms^{-2}*	$F = mg$
Force *(N)* = mass *(kg)* × acceleration *(ms^{-2})*	$F = ma$
Density *(kgm^{-3})* = mass *(kg)* / volume *(m^3)*	$\rho = \frac{M}{V}$
Hooke's law: Force *(N)* = constant *(Nm^{-1})* × extension *(m)*	$F = kx$
Pressure *(Pa)* = force *(N)* / area *(m^2)*	$P = \frac{F}{A}$
Fluid Pressure *(Pa)* = density *(kgm^{-3})* × gravitational field strength *(ms^{-2} or Nkg^{-1})* × height *(m)*	$P = \rho gh$
Work *(J)* = force *(N)* × distance moved *(m)*	$\Delta E = Fd$
Power *(W)* = work *(J)* / time *(s)*	$P = \frac{\Delta E}{t}$
Kinetic Energy *(J)* = ½ × mass *(kg)* × velocity^2 *(ms^{-1})*	$KE = \frac{1}{2}mv^2$
Gravitational potential energy *(J)* = mass *(kg)* × gravitational field strength *(ms^{-2} or Nkg^{-1})* × height *(m)*	$GPE = mgh$
Efficiency *(%)* = useful power output *(W)* / total power input *(W)* × 100	Efficiency = $\frac{P_{out}}{P_{in}}$
Efficiency *(%)* = useful energy output *(J)* / total energy input *(J)* × 100	Efficiency = $\frac{E_{out}}{E_{in}}$
Moment *(Nm)* = force *(N)* × perpendicular distance from pivot *(m)*	$M = Fd$
Sum of clockwise moments *(Nm)* = sum of anticlockwise moments *(Nm)*	$F_1d_1 = F_2d_2$
Momentum *($kgms^{-1}$)* = mass *(kg)* × velocity *(ms^{-1})*	$p = mv$
Force *(N)* = change in momentum *($kgms^{-1}$)* / time *(s)*	$F = \frac{\Delta p}{t}$
Impulse *($kgms^{-1}$ or Ns)* = change in momentum *($kgms^{-1}$)*	$Ft = mv - mu$
Centripetal Force *(N)* = mass *(kg)* × velocity^2 *(ms^{-1})* / radius *(m)*	$F = \frac{mv^2}{r}$
Orbital Period *(s)* = 2 × π × radius *(m)* / velocity *(ms^{-1})*	$T = \frac{2\pi r}{v}$
Thermal	
Boyle's Law for changes in gas pressure at constant temperature : pressure$_1$ *(Pa)* × volume$_1$ *(m^3)* = pressure$_2$ *(Pa)* × volume$_2$ *(m^3)* *or* pressure *(Pa)* × *volume (m^3) = constant*	$P_1V_1 = P_2V_2$ *or* PV = constant
Energy *(J)* = mass *(kg)* × specific heat capacity *(Jkg^{-1}°C^{-1})* × temperature change *(°C)*	$E = mc\Delta T$
Thermal capacity *(J°C^{-1})* = mass *(kg)* × specific heat capacity *(Jkg^{-1}°C^{-1})*	$C = mc$
Energy transferred *(J)* = mass *(kg)* × specific latent heat *(Jkg^{-1})*	$E = ml$
Expansion *(m)* = linear expansivity *(°C^{-1})* × original length *(m)* × temperature rise *(°C)*	Expansion = $\alpha l\Delta T$

Electricity	
Current *(A)* = charge *(C)* / time *(s)*	$I = \frac{Q}{t}$
Voltage *(V)* = energy transferred *(J)* / charge *(C)*	$V = \frac{E}{Q}$
Voltage *(V)* = current *(A)* × resistance *(Ω)*	$V = IR$
Power *(W)* = current *(A)* × voltage *(V)*	$P = IV$
Power *(W)* = current^2 *(A)* × resistance *(Ω)*	$P = I^2R$
Energy transferred *(J)* = current *(A)* × voltage *(V)* × time *(s)*	$\Delta E = IVt$
Energy transferred *(J)* = power *(W)* × time *(s)*	$\Delta E = Pt$
Resistors in series: Total Resistance *(Ω)* = sum of individual resistors *(Ω)* 	$R_{TOTAL} = R_1+R_2+R_3+...R_n$
Resistors in parallel: 1 / total resistance *(Ω)* = 1 / sum of individual resistors *(Ω)* 	$\frac{1}{R_{TOTAL}} = \frac{1}{R_1}+\frac{1}{R_2} \dots \frac{1}{R_n}$
Resistance *(Ω)* = resistivity *(Ωm)* × length *(m)* / area *(m^2)* *Note: since wires have a circular cross section, area = π × radius^2*	$R = \frac{\rho l}{A}$
Transformers: voltage in secondary coil *(V)* / voltage in primary coil *(V)* = turns on secondary coil / turns on primary coil	$\frac{V_s}{V_p} = \frac{N_s}{N_p}$
Transformers: voltage in primary coil *(V)* / voltage in secondary coil *(V)* = current in secondary coil *(A)* / current in primary coil *(A)*	$\frac{V_p}{V_s} = \frac{I_s}{I_p}$
Waves	
Wave speed *(ms^{-1})* = frequency *(Hz)* × wavelength *(m)*	$c = f\lambda$
Frequency *(Hz)* = 1 / Period *(s)*	$F = \frac{1}{T}$
Refractive index = sine of the angle of incidence, i / sine of the angle of refraction, r	$n = \frac{\sin_i}{\sin_r}$
Refractive index = speed of light in vacuum / speed of light in material	$n = \frac{c_v}{c_m}$
Refractive index = 1 / sine of critical angle	$n = \frac{1}{\sin c}$
Nuclear	
Radioactive alpha decay: $^{238}_{92}Th \rightarrow ^{234}_{90}U + ^{4}_{2}He + energy$	$^{A}_{Z}X \rightarrow ^{A-4}_{Z-2}Y + ^{4}_{2}He$
Radioactive beta decay: $^{209}_{82}Pb \rightarrow ^{209}_{83}Bi + ^{0}_{-1}e + energy$	$^{A}_{Z}X \rightarrow ^{A}_{Z+1}Y + ^{0}_{-1}e$
Radioactive gamma decay: $^{60}_{27}Co \rightarrow ^{60}_{27}Co + \gamma + energy$	$^{A}_{Z}X \rightarrow ^{A}_{Z}Y + \gamma$
Energy *(J)* = mass defect *(kg)* × speed of light^2 *(ms^{-1})*	$E = mc^2$

Compiled by J.Wilson January 2020