جامعــة خليفــة
Khalifa University

KU Entrance Test: Physics Data Sheet		
Fundamental Constants		
Quantity	**Symbol**	**Approximate value**
Acceleration due to gravity on Earth	g	9.81m/s^2
Universal gravitational constant	G	6.67×10^{-11} m^3/(kg.s^2)
Avogadro's number	N_A	6.02×10^{23} per mol
Gas constant	R	8.31 J/(mol.K) = 0.082 (L.atm/mol.K)
Boltzmann's constant	k_B	1.38×10^{-23} J/K
Stephan-Boltzmann constant	σ	5.67×10^{-8} W/(m^2.K^4)
Coulomb constant	k	8.99×10^{9} N.m^2/C^2
Speed of light in vacuum	c	2.998×10^{8} m/s
Speed of light in air at STP	c	2.998×10^{8} m/s
Speed of sound in air at STP	v	330 m/s
Charge of Proton	e	1.60×10^{-19} C
Mass of Proton	m_p	1.67×10^{-27} kg
Mass of an electron	m_e	9.1×10^{-31} kg
Electron-Volt Conversion Constant	$1eV$	1.6×10^{-19} J
Magnetic Constant	μ_o	$4\pi\times10^{-7}$ H/m = 1.26×10^{-6} H/m
Planck's constant	h	6.63×10^{-34} J.s = 4.14×10^{-15} eV.s
Coefficients of Friction (wood-wood)	$\mu_{w\text{-}w}$	0.30
Coefficients of Friction (rubber-asphalt)	$\mu_{r\text{-}a}$	0.67
Atomic Mass Unit	u	1.66×10^{-27} kg

Refraction Indexes		Electric Resistivities		Unit Conversion	
Material	**Refraction Index**	**Material**	**Resistivity (Ω.m)**	**Value**	**Equivalent to**
Air	1.00	Aluminum	2.82×10^{-8}	1 radian (rad)	180°/π
Alcohol	1.36			Temperature (K)	Temperature (℃)+273
Corn Oil	1.47	Copper	1.72×10^{-8}	Temperature (°F)	Temperature (°C)×1.8+32
Diamond	2.42			1 kilowatt-hour (k.Wh)	3.60×106 J
Glass, Crown	1.52	Gold	2.44×10^{-8}	1 atm	1.0×10^{5} N/m^2=1.0×10^{5} Pa
Glass, Flint	1.61			1 in	0.0254 m
Glycerol	1.47	Nichrome	1.50×10^{-6}	1 ft	0.3048 m
Quartz, Fused	1.46			1 mile	1609.3 m
Water	1.33	Silver	1.59×10-8	1 lb	453.6 g
Lucite	1.50	Tungsten	5.60×10^{-8}		

Motion, Force and Momentum			Angular motion		
Quantity	**Symbol**	**Equation**	**Quantity**	**Symbol**	**Equation**
Displacement	Δx	$\Delta x = v_i t + \frac{1}{2} a t^2$ $\Delta x = \frac{(v_i + v_f)}{2} t$	Angular velocity	ω	$\omega = \frac{d\theta}{dt}$ $\omega = \frac{2\pi r}{T}$
Velocity or Speed	v_f	$v_f = v_0 + at$ $v_f^2 = v_i^2 + 2a\Delta x$	Angular acceleration	α	$\alpha = \frac{d\omega}{dt}$
Average velocity	v_{avg}	$v_{\text{avg}} = \frac{\Delta x}{\Delta t}$	Angular displacement	$\Delta\theta$	$\Delta\theta = \frac{\Delta s}{r}$
Average acceleration	a_{avg}	$a_{\text{avg}} = \frac{\Delta v}{\Delta t}$	Angular momentum	$\vec{L}$	$\vec{L} = \vec{r} \times \vec{p}$ $\vec{L} = I\omega$
Gravitational force	F	$F = G\frac{m_1 m_2}{r^2}$	Centripetal acceleration	a_c	$a_c = \frac{v^2}{r}$
Newton's 2nd Law	F_{net}	$F_{\text{net}} = m\,a$	Tangential speed	v_t	$v_t = r\omega$
Weight	F_g	$F_g = mg$			
Impulse	J	$J = F_{\text{avg}}\Delta t$	Tangential acceleration	a_t	$a_t = r\alpha$
Linear Momentum	p	$p = mv$	Wave speed	v	$v = \lambda f$
Impulse-Momentum	Δp	$\Delta p = F_{\text{avg}}\Delta t$ $\Delta p = mv_f - mv_i$	Wave frequency	f	$f = \frac{1}{T}$
Hooke's Law	–	$F = -k\Delta x$	Centripetal force	F_c	$F_c = \frac{mv^2}{r}$

Energy, Work and Power

Quantity	Symbol	Equation
Mass–energy equivalence	E	$E = mc^2$
Photon energy	E	$E = h\nu$
Work	W	$W = Fd$ $W = F\Delta x \cos\theta$
Power	P	$P = \frac{W}{t}$ $P = Fv$
Kinetic Energy	E_k	$E_k = \frac{1}{2}mv^2$
Gravitational Potential	E_p	$E_p = mgh$
Elastic Energy	U	$U = \frac{1}{2}k\Delta x^2$
Torque	τ	$\tau = Fd\sin\theta$

Electromagnetism

Quantity	Symbol	Equation
Ohm's Law	V	$V = IR$
Resistance	R	$R = \frac{\rho L}{A}$
Electrostatic forces	F_e	$F_e = k\frac{q_1 q_2}{r^2}$
Electrostatic field	E	$E = \frac{F}{q}$ $E = \frac{kQ}{r^2}$
Magnetic Force	$\vec{F}_m$	$\vec{F}_m = q\vec{v} \times \vec{B}$
Force on a wire in constant magnetic field	$\vec{F}$	$\vec{F} = I\vec{l} \times \vec{B}$
Magnetic field by a wire carrying a current	B	$B = \frac{\mu_0 I}{2\pi R}$
Electric potential	V	$V = k\frac{Q}{r}$
Electric Potential Difference	ΔV	$\Delta V = V_f - V_i$

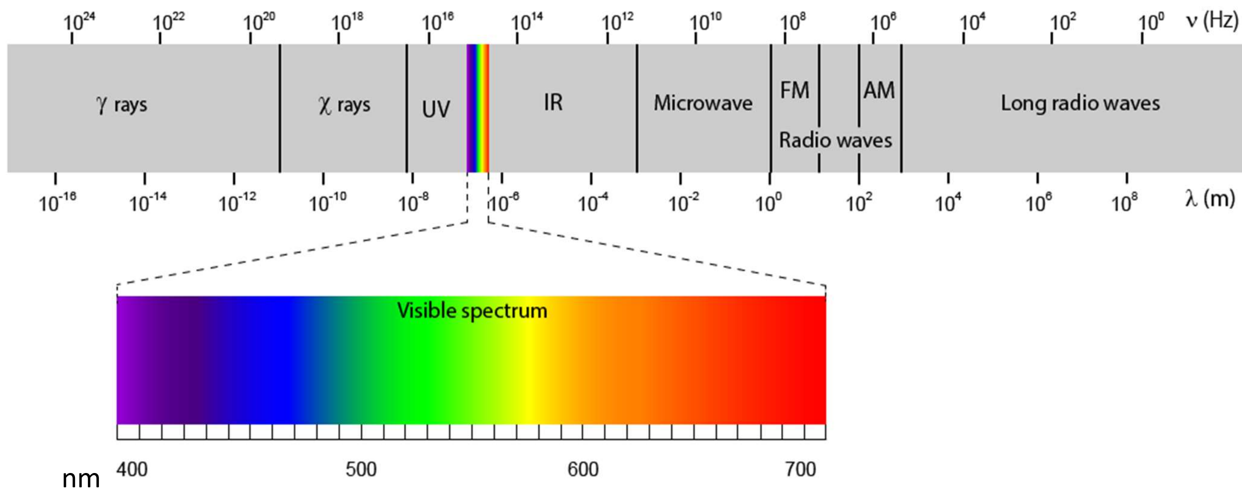
Simple Circuits

Quantity	Symbol	Equation
Charge	Q	$Q = CV$
Capacitance	C	$C = kC_0$ $C = k\frac{\varepsilon_0 A}{d}$
Equivalent capacitance	C_{eq}	$\frac{1}{C_{\text{eq,series}}} = \frac{1}{C_1} + \frac{1}{C_2}$ $C_{\text{eq,parallel}} = C_1 + C_2$
Equivalent resistance	R_{eq}	$R_{\text{eq,series}} = R_1 + R_2$ $\frac{1}{R_{\text{eq,parallel}}} = \frac{1}{R_1} + \frac{1}{R_2}$
Average current	I_{avg}	$I_{\text{avg}} = \frac{\Delta Q}{\Delta t}$
Instantaneous current	i	$i = \frac{dq}{dt}$
Electric power	P	$P = IV$

Light and Optics

Quantity	Symbol	Equation
Index of refraction	n	$n = \frac{c}{v}$
Snell's Law		$n_1 \sin\theta_1 = n_2 \sin\theta_2$

Electromagnetic Spectrum



Thermal Physics

Law/Equation	Equation
Ideal-gas law	$PV = nRT$
Boyle's Law (constant T)	$P_1V_1 = P_2V_2$
Charles's Law (constant P)	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$
Pressure Law (constant V)	$\frac{P_1}{T_1} = \frac{P_2}{T_2}$
Specific heat capacity equation	$Q = mc\Delta T$

Modern Physics

Quantity/law	Equation
Decay law	$N = N_0e^{-\lambda t}$
Half life	$T_{\frac{1}{2}} = \frac{ln2}{\lambda}$