

BASIC FORMULAS - LIGHT

Wave speed:	$v = f\lambda$	... (1.3)
Refractive index:	$n = \frac{c}{v}$	... (1.4, 2.3)
Inverse square law:	$I = \frac{P}{4\pi r^2}$	... (1.6)
Refraction:	$\frac{\sin \phi_A}{\sin \phi_B} = \frac{v_A}{v_B}$	... (2.1)
Snell's law:	$n_A \sin \phi_A = n_B \sin \phi_B$	... (2.2)
Critical angle:	$\sin \phi_c = \frac{n_B}{n_A}$	... (2.4)
Power:	$P = \frac{1}{f}$	... (3.1)
Lens equation:	$\frac{1}{o} + \frac{1}{i} = \frac{1}{f}$	... (3.2, 7.1)
Magnification:	$m = -\frac{i}{o}$	... (3.4, 7.2)
Power for lenses in contact:	$P = P_1 + P_2$	... (3.5)
Lensmaker's equation:	$P = \frac{1}{f} = (n - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$	... (3.6)
Phase difference:	$\frac{\phi}{2\pi} = \frac{D}{\lambda}$	... (4.2).
Young's slits:	$max: m\lambda \approx d \sin \theta$	$min: (m + \frac{1}{2})\lambda \approx d \sin \theta$... (4.3, 5.3)
	$max: y \approx \frac{m\lambda x}{d}$	$min: y \approx \frac{(m + \frac{1}{2})\lambda x}{d}$... (4.4)
Thin film with no phase changes:		
	$bright: 2nb = m\lambda$	$dark: 2nb = (m + \frac{1}{2})\lambda$.. (4.5)
Diffraction minima, single slit:	$\sin \theta = \frac{m\lambda}{a}$	... (5.1)
Diffraction, first minimum, circular:	$\sin \theta = 1.22 \frac{\lambda}{a}$	... (5.2)
Malus's law:	$polarised\ in: I_{out} = I_{in} \cos^2 \theta;$	$unpolarised\ in: I_{out} = \frac{1}{2} I_{in}$... (6.1)
Brewster's law:	$\tan \phi_p = \frac{n_2}{n_1}$	... (6.2)
Resolution of a lens:	$r = 1.22 \frac{\lambda}{af}$	... (7.3)
Angular size:	$\alpha \approx \frac{h}{d}$	... (8.1)
Angular magnification:	$M = \frac{\beta}{\alpha}$	... (8.2)
Magnifier (relaxed vision):	$\beta \approx \frac{h}{f_e}; \alpha_{max} \approx \frac{h}{d_v}; M_e \approx \frac{d_v}{f_e}$	... (8.4, 8.5, 8.6)
Microscope:	$|m_o| \approx \frac{g}{f_o};$	$M = |m_o| M_e$.. (8.7, 8.9)