Prefixes

a=10^{-18}, f=10^{-15}, p=10^{-12}, n=10^{-9}, $\mu = 10^{-6}$, m=10^{-3}, c=10^{-2}, k=10^{3}, M=10^{6}, G=10^{9}, T=10^{12}, P=10^{15}

Physical Constants

$k = 1/4\pi\epsilon_0 = 8.988$ GNm^2/C^2 (Coulomb's Law)
$\epsilon_0 = 1/4\pi k = 8.854$ pF/m (permittivity of space)
$e = 1.602 \times 10^{-19}$ C (proton charge)
$\mu_0 = 4\pi \times 10^{-7}$ T·m/A (permeability of space)
$m_e = 9.11 \times 10^{-31}$ kg (electron mass)
$m_p = 1.67 \times 10^{-27}$ kg (proton mass)
$c = 3.00 \times 10^{8}$ m/s (speed of light)
$c = 2.99792458 \times 10^{8}$ m/s (exact value in vacuum)
$h = 6.62607 \times 10^{-34}$ J·s (Planck's constant)
$\hbar = 1.05457 \times 10^{-34}$ J·s (Planck's constant/2π)
$\sigma = 5.67 \times 10^{-8}$ W/(m^2·K^4) (Stefan-Boltzmann const.)
hc =1239.84 eV·nm (photon energy constant)

Units

$N_A = 6.02 \times 10^{23}$/mole (Avogadro's #)
1 u = 1 g/$N_A = 1.6605 \times 10^{-27}$ kg (mass unit)
1.0 eV = 1.602×10^{-19} J (electron-volt)
1 V = 1 J/C = 1 volt = 1 joule/coulomb
1 F = 1 C/V = 1 farad = 1 C^2/J
1 H = 1 V·s/A = 1 henry = 1 J/A^2
1 A = 1 C/s = 1 ampere = 1 coulomb/second
1 Ω = 1 V/A = 1 ohm = 1 J·s/C^2
1 T = 1 N/A·m = 1 tesla = 1 newton/ampere·meter
1 G = 10^{-4} T = 1 gauss = 10^{-4} tesla

OpenStax Chapter 27 Equations - Wave Optics

Wave properties, interference:

$v = c/n$ (wave speed in a medium)
$\lambda = \lambda_{\text{vacuum}}/n$ (wavelength in a medium)
$f\lambda = v$ (wave equation in a medium)
$\Delta x = d\sin\theta$ (path difference in double slits)
$d\sin\theta = m\lambda$ (double slits bright fringes)
$d\sin\theta = (m + 1/2)\lambda$ (double slits dark fringes)

Diffraction:

$D\sin\theta = m\lambda$ (single slit minima)
$y = L\tan\theta$ (position on a screen)
$d\sin\theta = m\lambda$ (diffraction grating maxima)
$d = 1/$(lines per meter).

Rayleigh's Diffraction Limit:

$\theta_{\min} = 1.22\lambda/D$ (resolution limit)
$\theta = s/r$ (angular separation in radians)

Polarization:

$I = I_0\cos^2\theta$ (transmission thru polarizer)
$I = \frac{1}{2}I_0$ (transmission of unpolarized light)

OpenStax Chapter 28 Equations - Special Relativity

Time dilation and length contraction:

$\Delta t = \gamma\Delta t_0 = \Delta t_0/\sqrt{1 - v^2/c^2}$
$L = L_0/\gamma = L_0\sqrt{1 - v^2/c^2}$
$\gamma = 1/\sqrt{1 - v^2/c^2}$ (relativistic factor)
$v/c = \sqrt{1 - 1/\gamma^2}$ (velocity)

Dyanmics, mass, energy:

$p = \gamma mv$ (relativistic momentum)
$m_{\text{rel}} = \gamma m$ (relativistic mass)
$E_0 = mc^2$ (rest energy)
$E = \gamma mc^2 = m_{\text{rel}}c^2$ (relativistic energy)
$\text{KE} = E - E_0 = (\gamma - 1)mc^2$ (kinetic energy)
$E = E_0 + \text{KE} = \sqrt{p^2c^2 + m^2c^4}$ (relativistic energy)
$\Delta(E_0 + \text{KE}) + \Delta\text{PE} = 0$ (conservation of energy)
$\Delta\text{PE}_{\text{elec}} = q\Delta V$ (electric potential energy)