

PHYS 1260 | Final Exam Formulae

Chapter 17: The Electric Field

Electric field, $E = k \frac{|q|}{r^2}$; $k = 8.99\text{E}9 \text{ N}\cdot\text{m}^2/\text{C}^2$

Chapter 18: Electric Potential

Electrical potential energy, $U_E = |q|\Delta V$; electronvolt-joule conversion, $1 \text{ eV} = 1.60\text{E-}19 \text{ J}$

Chapter 19: Electric Current

Electrical resistance of a cylindrical conductor, $R = \rho \frac{\ell}{A}$

Chapter 20: Direct Current Circuits

Resistors in series, $R_{\text{eq}} = \sum_i R_i$; resistors in parallel, $\frac{1}{R_{\text{eq}}} = \sum_i \frac{1}{R_i}$

Chapter 21: Magnetism

Radius of a circular trajectory, $r = \frac{mv}{|q|B}$; conservation of energy, $\frac{1}{2}mv^2 = |q|\Delta V$

Chapter 22: Electromagnetic Induction and AC Circuits

Induced emf, $\epsilon = \frac{\Delta\Phi}{\Delta t}$; magnetic flux, $\Phi = BA$

Chapter 23: Light

Index of refraction, $n = \frac{c}{v}$

Chapter 24: Geometrical Optics

Thin lens equation, $\frac{1}{f} = \frac{1}{s} + \frac{1}{s'}$; linear magnification, $m = -\frac{s'}{s}$

Chapter 25: The Eye and Optical Instruments

Angular magnification, $M = \frac{f_1}{f_2}$

Chapter 26: Wave Optics

Coherence length in terms of wavelength, $x_c = \frac{\lambda^2}{\Delta\lambda}$; watch units on $\Delta\lambda$!

Chapter 27: Relativity

Length contraction, $\ell = \ell_0 \sqrt{1 - (v/c)^2}$

Chapter 29: The Atom

Balmer series, $\frac{1}{\lambda} = R \left(\frac{1}{2^2} - \frac{1}{n^2} \right)$; $n = 3, 4, 5, \dots$; Rydberg constant, $R = 1.097\text{E}7 \text{ m}^{-1}$

The first longest wavelength in the Balmer series corresponds to $n = 9$.

Table 23-1 The Visible Spectrum

Spectral colors and the approximate frequencies and vacuum wavelengths corresponding to each color.

Color		Frequency (10^{14} Hz)		Wavelength ($\text{nm} = 10^{-9} \text{ m}$)
Violet		6.7–7.5		400–450
Blue		6.0–6.7		450–500
Green		5.5–6.0		500–550
Yellow		5.0–5.5		550–600
Orange		4.6–5.0		600–650
Red		4.3–4.6		650–700

Chapter 30: Nuclear Physics and Elementary Particles

Decay constant, $\lambda = \frac{\ln 2}{T_{1/2}}$