The following equations will be useful for Exam 2...

Equation	Name	What it does	Serway
$\sum \mathbf{F} = m\mathbf{a}$	Newton's Second Law	Relates the acceleration of a body to the forces acting on it.	p. 104
$K \equiv \frac{1}{2}mv^2$	Definition of Kinetic Energy	Relates the energy of a body to its velocity.	p. 174
$\mathbf{F}_{12} = k_e \frac{\lvert q_1 \rvert \lvert q_2 \rvert}{r^2}\hat{\mathbf{r}}$	Coulomb's Law	Identifies the force between two charged particles.	p. 647
$\Delta V \equiv \frac{\Delta U}{q_0} = \int_{\mathrm{a}}^{\mathrm{b}} \mathbf{E} \cdot d\mathbf{s}$	Potential Difference	Relates the potential difference between two points to (1) the potential energy gained (or lost) by a particle accelerated through that potential difference, and (2) the electric field in that area.	p. 693
$C \equiv \frac{Q}{\Delta V}$	Definition of Capactiance	Relates the charge on a capacitor to the voltage applied.	p. 723
$C_{\mathrm{eq}} = C_1 + C_2 + C_3 + \cdots$	Capacitors in Parallel	Calculates equivalent capacitance for capacitors connected in parallel.	p. 728
$\frac{1}{C_{\mathrm{eq}}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots$	Capacitors in Series	Calculates equivalent capacitance for capacitors connected in series.	p. 730
$R = \rho \frac{l}{A}$	Resistance (uniform material)	Relates the resistance of a uniform material of resistivity ρ to its length l and cross-sectional area A.	p. 757
$R \equiv \frac{\Delta V}{I}$	Definition of Resistance	Relates voltage and current.	p. 757

Equation	Name	What it does	Serway
$\rho = \rho_0[1 + \alpha(T - T_0)]$	Temperature Dependence of Resistivity	Relates resistivity to temperature by means of a temperature coefficient of resistivity α.	p. 762
$\mathscr{P} = I\Delta V = I^2R = \frac{(\Delta V)^2}{R}$	Definition of Electrical Power	Relates electrical power to voltage, resistance, and current.	p. 764
$\mathcal{E} = IR + Ir$	Definition of emf	Establishes the sum of resistance R and internal (battery) resistance r as the constant of proportionality between an applied emf $\mathcal{E}$ and the resulting current I in a circuit.	p. 776
$R_{\text{eq}} = R_1 + R_2 + R_3 + \cdots$	Resistors in Series	Calculates equivalent resistance for resistors connected in series.	p. 779
$\frac{1}{R_{\text{eq}}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots$	Resistors in Parallel	Calculates equivalent resistance for resistors connected in parallel.	p. 781
$\sum_{\text{junc}} I = 0$	Kirchhoff's Junction Rule	Relates the currents entering a circuit junction to the currents leaving that junction.	p. 785
$\sum_{\text{loop}} \Delta V = 0$	Kirchhoff's Loop Rule	Relates the potential drops and climbs around a closed circuit loop.	p. 785
$q(t) = C\mathcal{E}(1 - e^{-t/RC})$	Charge on a Charging Capacitor	Gives the charge on a charging capacitor in an RC-circuit as a function of time.	p. 790
$I(t) = \frac{\mathcal{E}}{R}e^{-t/RC}$	Current in RC-Circuit (Charging)	Gives the current through the resistor during the charging of an RC-circuit as a function of time.	p. 790

Equation	Name	What it does	Serway
$r = \frac{mv}{qB}$	Radius of Circular Path (charged particle in magnetic field)	Calculates the radius of the circular path traversed by a particle of charge q and mass m with perpendicular speed component v in a magnetic field of strength B.	p. 813
$\mathbf{F} = q\mathbf{E} + q\mathbf{v} \times \mathbf{B}$	Lorentz Force Law	Relates the force on a charged particle to its exposure to an electric field and its motion through a magnetic field.	p. 816
$\mathbf{F}_B = I\hat{\mathbf{L}} \times \mathbf{B}$	Magnetic Force (on a segment of current-carrying wire)	Relates the force felt by a current-carrying wire of length $\lvert\hat{\mathbf{L}}\rvert$ to the magnetic field to which the wire is exposed.	p. 820
$\boldsymbol{\mu} = I\mathbf{A}$	Magnetic Dipole Moment of a Current Loop	Defines the magnetic dipole moment of a current-carrying conductor loop.	p. 823
$\boldsymbol{\tau} = \boldsymbol{\mu} \times \mathbf{B}$	Torque on a Magnetic Moment	Identifies the torque on a magnetic moment in a magnetic field.	p. 823
$d\mathbf{B} = \frac{\mu_0}{4\pi}\frac{I\,d\mathbf{s} \times \hat{\mathbf{r}}}{r^2}$	Biot-Savart Law	Allows the calculation of the magnetic field due to an arbitrary source.	p. 838
$B = \frac{\mu_0 I}{2\pi a}$	Magnetic Field (infinite current-carrying wire)	Relates the magnetic field of an infinitely long current-carrying wire to its current I and the distance a from the wire.	p. 840
$\oint \mathbf{B} \cdot d\mathbf{s} = \mu_0 I$	Ampère's Law	Relates a magnetic field to its source.	p. 845

Equation	Name	What it does	Serway
$B = \mu_0 \frac{N}{l} I = \mu_0 n I$	Magnetic Field Inside a Solenoid	Relates the strength of the magnetic field inside a solenoid to its current I and number of turns N.	p. 849
$\Phi_B \equiv \int \mathbf{B} \cdot d\mathbf{A}$	Definition of Magnetic Flux	Defines magnetic flux.	p. 850
$\mathcal{E} = -Blv$	Motional emf (laterally translating conductor)	Relates the emf induced in a laterally translating conductor segment of length l to the magnetic field through which it is moving at speed v.	p. 872
$\oint \mathbf{E} \cdot d\mathbf{s} = -\frac{d\Phi_B}{dt}$	Faraday's Law	Relates an induced electric field to its magnetic flux source.	p. 879
$\mathcal{E}_{\text{max}} = NAB\omega$	Peak emf (coil rotating in magnetic field)	Relates the maximum emf in a coil of N turns rotating with angular speed ω about its diameter in a magnetic field.	p. 881