



Top 20

- Learn **every** equation and apply everything you were taught last year.
- Seventy-five percent of the **calculus** used is the power rule and natural log.
- Acceleration is **not** always constant.
- Angles are measured from any **axis**; not just +x-axis.
- Draw an FBD for **all** problems that involve forces.
- Assign a **direction** as positive. If the answer comes out positive, your choice of direction was correct. If negative, reverse directions.
- Energy is always **conserved**. If it appears to be lost, consider heat. Explanation is concise.
- Gravitational force acts at the **center** of mass.
- The lever arm is the **perpendicular** distance from the axis of rotation to the line of action of the force.
- If any force does not pass through the center of mass:
 - draw an FBD with the forces **applied** at the points of application.
 - sum** both forces and torques.
- The basic **form** of a differential equation is $\alpha \frac{d^2x}{dt^2} + \beta x = 0$; $\frac{\beta}{\alpha} = \omega^2$; $\omega = \frac{2\pi}{T}$.
 "x" is a generic variable. α and β are constants.
- Flux** is the flow of a physical property in space.
 - Electric flux equals $\int \vec{E} \cdot d\vec{A}$ or $\frac{q_{\text{enclosed}}}{\epsilon_0}$
 - Magnetic flux equals $\int \vec{B} \cdot d\vec{A}$
- Distributions**: rho, ρ , is volume; sigma, σ , is area; and lambda, λ , is length.
- Potential difference is **evaluated** in the direction of the electric field from a position of unknown value to a position of known value.
- Capacitance does not **depend** on charge or voltage.
- Kirchhoff's **Rules**:

Element	Potential Gain (positive)	Potential Drop (negative)
Battery	Chosen current flows out of the Battery	Chosen current flows into the Battery
Resistor	Transverse resistor <u>against</u> the direction of your chosen current	Transverse resistor <u>in</u> the direction of your chosen current
Capacitor	Discharging	Charging
Inductor	Decay of Current	Rise of Current
- The Right Hand Rules apply to both current-carrying wires and moving charges. A moving charge is a very small **current**.
- Capacitor and inductor **behavior**

Element	Time = 0	Time > 4 to 5 Time Constants (τ)
Capacitor	Closed Switch = Conductor	Open Switch = Insulator
Inductor	Open Switch = Insulator	Closed Switch = Conductor
- Know the difference between a line **integral** and closed path integral; between an area integral and a closed area integral.
- Learn **Maxwell's** Equations