



# Top 20

1. Learn **every** equation and **apply** everything you were taught last year.
2. **Angles** are measured from any axis; not just +x-axis.
3. Draw an **FBD** for all problems that involve forces.
4. Assign a **direction** as positive. If the answer comes out positive, your choice of direction was correct. If negative, reverse directions.
5. Energy is always **conserved**. If it appears to be lost, consider heat or sound.
6. An **expanding** volume of a gas does negative work on its surroundings.
7. Internal energy and kinetic energy of a gas depend only on **temperature**.
8. Pressure is measured in **pascal**, Pa ( $\text{N/m}^2$ ).
9. Gravitational force acts at the **center** of mass.
10. The lever arm is the **perpendicular** distance from the axis of rotation to the line of action of the force.
11. When calculating the buoyancy force use the volume of the liquid/gas **displaced**.
12. Wave speed is controlled by the **medium** while frequency is controlled by the source.
13. The maximum **speed** is the speed of light,  $3 \times 10^8$  m/s.
14. A capacitor that has been charging for a **short time** behaves like a closed switch (conductor); however, for a long time, the capacitor behaves like an open switch (insulator).
15. Capacitance does not **depend** on charge or voltage.
16. Kirchhoff's **Rules**

Element	Potential Gains (positive)	Potential Drop (negative)
Battery	Battery Chosen current flows <u>out</u> of the Battery	Chosen current flows <u>into</u> 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

17. The Right Hand Rules apply to both current-carrying wires and moving charges. A moving charge is a very small **current**.
18. Increasing magnetic **flux** induces a magnetic field in the opposite direction of an existing magnetic field. Decreasing magnetic flux induces a magnetic field in the same direction as an existing magnetic field. To determine direction of induced current, use Lenz's Law with the right hand rule and the induced magnetic field.
19. Energy does not equal mass times  $c^2$ . Rather, the energy contained in matter is **equivalent** to mass times  $c^2$ .
20. Light and matter have **both** wave and particle characteristics.