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# Class 12 Science

Physics, Chemistry & Biology One-Liners

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## Physics

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### Electrostatics & Current

- Coulomb's law:  $F = kq_1q_2/r^2$ ,  $k = 9 \times 10^9 \text{ N m}^2/\text{C}^2$ .
- Electric field inside a conductor is zero.
- Drift velocity  $v_d = I / (nAe)$ .
- Kirchhoff: junction rule (charge) and loop rule (energy).

### Magnetism & EMI

- Force on a moving charge:  $F = qvB \sin\theta$ .
- Faraday: induced EMF  $= -d\phi/dt$ .
- Lenz's law gives the direction (opposes change).
- Transformer:  $V_s/V_p = N_s/N_p$ .

### Optics & Modern Physics

- Lens maker:  $1/f = (n-1)(1/R_1 - 1/R_2)$ .
- Young's double slit: fringe width  $= \lambda D/d$ .
- Photoelectric:  $E = h\nu = \text{work function} + \text{max KE}$ .
- de Broglie wavelength  $\lambda = h/p$ .

## Chemistry

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### Physical & Inorganic

- Raoult's law and colligative properties depend on particle number.
- First-order rate:  $k = (2.303/t) \log([A_0]/[A])$ .
- Electrochemistry:  $E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$ .
- d-block: variable oxidation states and coloured ions.

### Organic Chemistry

- Markovnikov and anti-Markovnikov (peroxide) additions.
- SN1 favours tertiary; SN2 favours primary substrates.
- Aldehydes give positive Tollens' and Fehling's tests.
- Amines are basic; aniline is less basic than aliphatic amines.

## Biology

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### Genetics & Reproduction

- Mendel's laws: dominance, segregation, independent assortment.
- DNA replication is semi-conservative.
- Central dogma:  $\text{DNA} \rightarrow \text{RNA} \rightarrow \text{protein}$ .
- Double fertilisation is unique to angiosperms.

### Ecology & Biotech

- 10% law of energy transfer across trophic levels.

- PCR amplifies DNA using primers and Taq polymerase.
- Restriction enzymes are molecular scissors.
- Ecological pyramids: number, biomass, energy.

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