



GENERAL CONCEPTS NOTEBOOK — DAY 4

(Physics + Chemistry + Maths cross-subject quick concepts)

● 1. Difference Between Scalar & Vector Quantities

Scalars: Only magnitude

Examples → mass, time, work, energy, temperature

Vectors: Magnitude + direction

Examples → electric field, force, displacement, momentum

Shortcut:

→ *If direction changes the value, it's a vector.*

● 2. Superposition Principle (Common to Physics & Chemistry)

Physics (Electric field):

Net electric field = vector sum of fields due to individual charges

Chemistry (Wave functions):

Orbitals combine by adding or subtracting wave functions

Shortcut:

→ *Effects simply add up = superposition.*

● 3. Periodicity Logic (Useful for remembering structures)

Left → Right:

- Atomic size decreases
- Electronegativity increases
- Effective nuclear charge increases

Top → Bottom:

- Size increases
- Shielding increases

Used to understand crystal properties and bond strength.

● 4. How to Identify Function Quickly in Maths

A relation is a function if:

- ✓ Each element of domain has **exactly one** image
- ✗ No element has two different images

Memory:

→ *No two arrows leaving one number.*

● 5. Basic Unit Cell Logic (All Exams)

- SC → least efficient packing
- BCC → medium
- FCC → highest stability + density

Use "S B F" → Simple < Body < Face.

● 6. Inverse Square Law (Common Pattern)

Many physical laws follow:

$$\frac{1}{r^2}$$

Examples:

- Electric field
- Gravitational field
- Light intensity
- Radiation intensity

Reason: spreading over surface area of a sphere ($4\pi r^2$).

● 7. Domain–Range Logical Tricks

- Domain → think “input”
- Range → think “actual output”
- Codomain → all possible outputs allowed

Used heavily in functions & mapping.

● 8. Diagram Memory Hack (Electrostatics + Solid State)

If you see **spreading lines** → field

If you see **repeating pattern** → lattice

● 9. Smallest Repeating Unit

Physics: wave unit → wavelength

Chemistry: crystal → unit cell

Maths: periodic function → period

Common idea: pattern repeats itself.

● 10. Board Exam Writing Strategy

- Define → diagram → formula → conclusion
- Good flow gets full marks even if answer is simple.